Lake Tawakoni

2018 Fisheries Management Survey Report

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-3

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

Prepared by:

Evan Cartabiano, Assistant District Management Supervisor
and
Jacob Norman, District Management Supervisor

Inland Fisheries Division
Tyler North District, Tyler, Texas

Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

July 31, 2019

Contents

Survey and Management Summary

Fish populations in Lake Tawakoni were surveyed in 2017 and 2019 using gill nets. Anglers were surveyed from June 2017 through May 2018 with a creel survey. Historical data are presented with the 2017-2019 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: Lake Tawakoni is a 37,325-acre reservoir located in Van Zandt, Rains, and Hunt Counties, Texas, on the South Fork and Cowleech Fork of the Sabine River and Caddo Creek. The reservoir was constructed by the Sabine River Authority to provide water for municipal and industrial uses and for recreational purposes.

Management History: Important sport fishes in Lake Tawakoni include Striped Bass, Hybrid Striped Bass (Palmetto Bass and Sunshine Bass), White Bass, Blue Catfish, Channel Catfish, Black Crappie, White Crappie, and Largemouth Bass. Annual requests are submitted to stock Striped Bass and Hybrid Striped Bass to maintain these fisheries. The Blue and Channel Catfish regulation was changed from the statewide regulation to a 25 fish bag with no minimum length limit, with no more than 7 over 20 inches, and no more than 2 of those over 30 inches to enhance trophy Blue Catfish potential.

Fish Community

- **Prey species:** No electrofishing survey was conducted during 2018. Catch of Gizzard Shad from the three previous surveys (2006, 2010, and 2014) was high, and most Gizzard Shad were available as prey to most sport fish. Electrofishing catch of sunfish species was very low.
- **Catfishes:** Lake Tawakoni continues to support quality fisheries for Blue Catfish and Channel Catfish which were responsible for the highest directed angling effort. Blue Catfish remain more abundant in population surveys than Channel Catfish and were harvested at higher numbers in 2017/2018.
- **Temperate basses:** Lake Tawakoni contains a diverse mix of temperate bass including White Bass, Striped Bass, and Hybrid Striped Bass supported by an ample prey base and abundant open water habitat. Temperate bass are the second most targeted fish at Lake Tawakoni. Annual requests are submitted to stock Striped Bass and Hybrid Striped Bass.
- **Largemouth Bass:** Largemouth Bass were not assessed during the 2018 period. The creel survey in 2017-2018 indicated that 13% of fishing effort was directed at Largemouth Bass, which was up from 6% in 2013-2014. This change was likely due to increased water level and improved shoreline habitat in 2017-2018.
- **Crappie:** Directed angling effort for crappie was 10% in 2013-2014 and 2017-2018. Except for creel surveys, no crappie sampling has been conducted since 2006 due to low catch rates in nets.

Management Strategies: Continue stocking Hybrid Striped Bass and Striped Bass at 10 fish/acre. Conduct an electrofishing survey in 2022, and gill net surveys in 2021 and 2023. Access and vegetation surveys will be conducted in 2022.

Introduction

This document is a summary of fisheries data collected from Lake Tawakoni in 2018-2019. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. This report deals with major sport fishes and important prey species. Historical data are presented with the 2018-2019 data for comparison.

Reservoir Description

Lake Tawakoni is a 37,325-acre impoundment of the Sabine River in Van Zandt, Rains, and Hunt Counties, Texas. The reservoir was constructed by the Sabine River Authority in 1960 as water supply for municipal, industrial, and recreational uses. At conservation pool elevation (CPE), Lake Tawakoni has a surface area of 37,325 acres, a shoreline length of 200 miles, and a mean depth of 12 feet. Water levels have varied considerably over the last four years. The elevation has been above CPE for the first six months of 2019 (Figure 1). The reservoir is eutrophic with a mean trophic state index chl-a of 65.74 µg/L (Texas Commission on Environmental Quality 2018). Other descriptive characteristics for Lake Tawakoni are shown in Table 1.

Angler Access

Boat access is available at numerous public and private boat ramps located around the lake. Bank fishing access is present near all public boat ramps, and in privately-owned (fee) facilities. Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Storey and Bennett 2014) included:

1. Monitor catfish fishery and submit a regulation change proposal to promote trophy Blue Catfish.

   Action: Gill netting was conducted in spring 2017 and 2019 to monitor abundance and size distribution of Blue Catfish and Channel Catfish. An access point creel survey was conducted from June 2017 to May 2018 to monitor angler effort, catch and harvest of catfish species. With overwhelming angler support, the catfish regulation on Channel and Blue Catfish was changed to a 25 fish bag with no minimum length limit, with no more than 7 over 20 inches, and no more than 2 of those over 30 inches.

2. Monitor and maintain temperate bass fishery.

   Action: Gill netting was conducted in spring 2017 and 2019 to monitor abundance and size distribution of temperate bass. An access point creel survey was conducted from June 2017 to May 2018 to monitor angler effort, catch and harvest of temperate basses. Fingerling Striped Bass and Hybrid Striped Bass (Palmetto Bass and/or Sunshine Bass) were requested at a rate of 10 fish/acre each year. The Lake Tawakoni Sportsman’s Association purchased Sunshine Bass to supplement TPWD stockings (in the event of reduced production from TPWD hatcheries) and assisted with boat stockings of purchased fish.

3. Monitor and enhance Lake Tawakoni’s Largemouth Bass fishery.

   Action: Due to low angler utilization and low historical catch rates, fall electrofishing survey in 2018 was not conducted and no genetic analysis was performed.

Harvest regulation history: Until 2016, Blue and Channel Catfish were managed under the statewide catfish regulation (25 fish per day with a minimum length of 12 inches). With overwhelming angler support, a regulation change to reduce harvest of trophy Blue Catfish was implemented in 2016. Current regulations are found in Table 3.

Stocking history: Lake Tawakoni has been stocked regularly with Hybrid Striped Bass and Striped Bass fingerlings and/or fry since the late 1970s. The complete stocking history is in Table 4.

Water transfer: Lake Tawakoni is used for municipal water supply, recreation, and flood control. No inter-basin transfers are known to exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the TPWD protocol (TPWD unpublished). 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).

Gill netting – Catfish and temperate bass were collected by gill netting (15 net nights at 15 stations in 2015 and 2017, and 10 net nights at 10 stations in 2019). 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_r)] were calculated for target fishes according to Anderson and Neumann (1996). Palmetto Bass PSD was calculated according to Dumont and Neely (2011). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – An annual access-point creel survey was conducted from June 2017 through May 2018. 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 2017).

Habitat – A vegetation survey was conducted in 2018. 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 2019).

Results and Discussion

Habitat:. Native vegetation in 2018 covered less than 1% of the reservoir's surface area which was similar to 2010. Non-native vegetation covered less than 0.1% of the reservoir's surface area (Table 6). A structural habitat survey was last conducted in 2010 (Storey 2011).

Creel: Directed fishing effort by anglers was highest for catfish species (40%), followed by anglers fishing for temperate bass (28%; Table 7). Total fishing effort for all species and direct expenditures at Lake Tawakoni were lower in 2017-2018 ($2,029,774) when compared to the 2013-2014 creel period ($2,821,033) (Table 8). The majority of anglers interviewed on Lake Tawakoni were from the surrounding area, Including Dallas-Fort Worth (Appendix C).

Prey species: Electrofishing catch rates of Bluegill and Gizzard Shad were 14.5/h and 367.5/h, respectively in 2014. Index of Vulnerability (IOV) for Gizzard Shad was good, indicating that 96% of Gizzard Shad were available to existing predators; this was like IOV estimates in previous years (Figure 2). Total CPUE of Bluegill in 2014 was lower than 2010 but similar to 2006, and size structure continued to be dominated by small individuals (Figure 3).

Channel Catfish: Gill net catch rates of Channel Catfish (≤3.3/nn from the last three surveys) consistently reflect a low-density population primarily consisting of small fish (PSD = 0; Figure 4). Channel Catfish harvest was high, with 91% of fish caught were retained. The size distribution of harvested fish was similar to previous years (Figure 6).

Blue Catfish: The gill net catch rate of Blue Catfish was 35.9/nn in 2019 and increased over each of the last three surveys (Figure 5). Size structure consisted primarily of fish < 20 inches (PSD = 9). Body condition was good (Wr range = 85-100) suggesting an adequate prey base for Blue Catfish.

Like Channel Catfish, harvest rates of Blue Catfish were high, as only 14% of legal fish were released. Harvested fish ranged from 12 to 42 inches, with the bulk of the harvest occurring from 14 to 21 inches (Figure 7).

Temperate Bass: The gill net catch rate of White Bass was 2.6/nn in 2019, which is slightly lower than in 2015 and 2017 (Figure 8). Anglers targeting White Bass exclusively accounted for 3.2% of total angling effort. The gill net catch rate of Hybrid Striped Bass was 0.7/nn in 2019, down from 3.2/nn in 2017 and 4.2/nn in 2015 (Figure 9). Harvested fish ranged in size from 15 to 23 inches in length (Figure 12). Striped Bass gill net catch rate was 2.1/nn in 2019 and like the previous two surveys (Figure 10). Striped Bass relative weight (Wr) showed some individuals with poorer condition than in the previous samples. Anglers targeting Striped Bass exclusively accounted for only 0.6% of total angling effort and no anglers specifically targeting Hybrid Striped Bass were interviewed. Total directed effort for Temperate Bass was 28.2%, and only 13% of legal fish caught were released.

Largemouth Bass: In 2018 no electrofishing survey was conducted. The total electrofishing catch rate of Largemouth Bass was 5.5/h in 2014, down from 37.0/h in 2010 but like 4.0/h in 2006 (Figure 14). Low catch rates precluded collection of fish for age and growth assessment and genetic evaluation. Directed effort towards Largemouth Bass was 12.7% in the 2017-2018 creel survey, up from 6.1% in 2013-2014. Increased effort is likely due to increased littoral habitat from higher water level. Harvest of Largemouth Bass was 33% of non-tournament fish caught.

Crappie: Crappie accounted for 10% of total fishing effort from both the 2013-2014 and 2017-2018 creel surveys. Harvest of legal fish was extremely high, with less than 1% being released (Table 14). Most fish harvested were 10 and 11-inch fish for both White Crappie (Figure 16) and Black Crappie (Figure 17). Some non-compliance was noticed with Black Crappie as approximately 4% of the harvest was sub-legal fish.

Fisheries Management Plan for Lake Tawakoni, Texas

Prepared – June 2019

ISSUE 1: Hybrid Striped Bass and Striped Bass have been a part of the fishery at Lake Tawakoni since the early 1980s, and account for the second highest fishing effort. Annual stocking of Striped and Hybrid Bass is required to sustain the population and maintain a fishery.

MANAGEMENT STRATEGIES

1. Stock Hybrid Striped Bass (Palmetto, Sunshine, or combination) and Striped Bass annually, each at 10 fish/acre. Fry can be substituted at the appropriate rate for either Hybrids or Striped Bass if fingerlings are unavailable.
2. Encourage efforts by the Lake Tawakoni Sportsman's Association to purchase Sunshine Bass in the event of reduced production from TPWD hatcheries and aid with boat stockings of any purchased fish.

ISSUE 2: Catfish are Lake Tawakoni's most targeted species, accounting for 40% of total fishing effort. Due to the regulation change in 2016, which was aimed at providing improved trophy catfish opportunities, monitoring of this vital fisheries resource to determine impacts of the regulation change will continue.

MANAGEMENT STRATEGIES

1. Conduct supplemental gill netting in spring 2021 and routine gill netting in spring 2023 to monitor abundance and size distribution of Blue Catfish and Channel Catfish.
2. Conduct an access point creel survey from June 2021 through May 2022 to monitor angler effort, catch and harvest of catfish species.

ISSUE 3: The lake elevation of Lake Tawakoni is subject to significant fluctuations in response to periodic drought and demand for water. Periods of low water levels result in limited aquatic habitat which reduces electrofishing catch rates of littoral species such as Largemouth Bass. Directed effort for Largemouth Bass accounted for 12.7% of total effort from June 2017 to May 2018, up from 6.1% in the June 2013 through May 2014 creel.

MANAGEMENT STRATEGIES

1. Conduct fall electrofishing survey in 2022 with biologist-selected sites to monitor abundance and size distribution of Largemouth Bass and prey species.
2. Collect a 30-fish sample of Largemouth Bass for genetic analysis and 13 fish for age and growth analysis

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. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing, and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their customers.
3. Educate the public about invasive species using media and the internet.
4. Make a speaking point about invasive species when presenting to constituent and user groups.
5. Keep track of (i.e., map) existing and future inter-basin water transfers to facilitate potential invasive species responses.

Objective-Based Sampling Plan and Schedule (2019–2023)

Sport fish, forage fish, and other important fishes

Sport fishes in Lake Tawakoni include Hybrid Striped Bass, Striped Bass, White Bass, Blue Catfish, Channel Catfish, crappies, and sunfishes. Gizzard shad and Threadfin Shad are the primary prey species.

Low-density fisheries

Flathead Catfish: Fishing effort directed at Flathead Catfish was very low, with no anglers reporting targeting Flathead Catfish in the 2017-2018 creel. However, anglers have reported catching some very large Flatheads while fishing for crappie and other species, and hand fishermen have been seen to harvest them. No OBS plan objectives have been set for Flathead Catfish.

Survey objectives, fisheries metrics, and sampling objectives

Catfish: Fishing effort directed at catfish species during the last creel survey was 40.2%, making them the most popular species on Lake Tawakoni. Blue and Channel Catfish are managed with a no minimum length, 25 fish daily bag limit, with no more than 7 fish over 20 inches, and no more than two of those over 30 inches. Flathead Catfish are under the statewide regulation. Gill netting surveys will be used to monitor Channel and Blue Catfish population relative abundance, size structure, and condition and access-point creel surveys will be conducted to monitor angler catch, harvest, and fishing effort in 2021-2022. Analysis of previous gillnet surveys predicts between 6 and 9 stations would be required to yield an RSE< 25 at the 80th percentile. A sampling effort of 10 gill nets set at randomly-selected sites will be conducted in spring 2021 and 2023. Five additional sites will be selected in the event more sites are needed to meet desired RSE. Any large-scale changes identified in the population or fishery requiring further study will be investigated.

Temperate Bass: Hybrid Striped Bass, Striped Bass, White Bass and Yellow Bass account for 28.2% of fishing effort in the 2017-2018 creel, which is down from 33.9% in 2013-2014. Gill netting surveys will be used to monitor temperate bass population relative abundance, size structure, and condition and access-point creel surveys will be conducted to monitor angler catch, harvest, and fishing effort in 2021-2022.

Temperate bass will be collected in gill net sets for catfish, and no additional effort will be expended beyond that directed at catfish.

Largemouth Bass: Nearly 13% of fishing effort was targeted at Largemouth Bass in 2017-2018. Historically, sampling of LMB was poor due to low water levels and minimal shore line habitat. However, in recent years water levels have returned to full pool and habitat is available in localized areas. To evaluate LMB population indices, 12 biologist-selected sites will be sampled with electrofishing during fall of 2022 to determine size structure, and condition on an exploratory basis. The results of the 2022 habitat survey will be used to identify electrofishing sites. An access-point creel survey will be conducted in 2021-2022 to monitor angler catch, harvest, and fishing effort.

Crappie: Directed angling effort for crappie in 2017-2018 was 10.2%. Data from access creel surveys conducted 2021-2022 will be used to monitor trends in directed effort, and angler catch and harvest.

Prey Species: Prey species on Lake Tawakoni will be collected during the Largemouth bass sampling in 2022 to monitor relative abundance. Forage base adequacy will be assessed via relative weights of predatory species. No additional effort will be expended past that for Largemouth Bass.

Habitat: A comprehensive assessment of aquatic vegetation species will be conducted every four years using the digital shapefile method to quantify total vegetative coverage. The next assessment is scheduled for summer 2022 and will include a structural habitat survey.

Literature Cited

Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.

DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and Gizzard Shad population characteristics in Alabama reservoirs. North American Journal of Fisheries Management 16:888-895.

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

Guy, C. S., R. M. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.

Storey, K. W. 2011. Statewide freshwater fisheries monitoring and management program, Lake Tawakoni, Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Project F-221-M-1, Job A, 36 pages

Storey, K. W. and D. Bennett. 2014. Statewide freshwater fisheries monitoring and management program, Lake Tawakoni, Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Performance Report, Federal Aid Project F-221-M-5, 44 pages

Texas Commission on Environmental Quality. 2016. Trophic classification of Texas reservoirs. 2016 Texas Water Quality Inventory and 303 (d) List, Austin. 18 pp.

United States Geological Survey (USGS). 2019. National water information system: Web interface. Available: http://waterdata.usgs.gov/tx/nwis (May 2019).

Tables and Figures

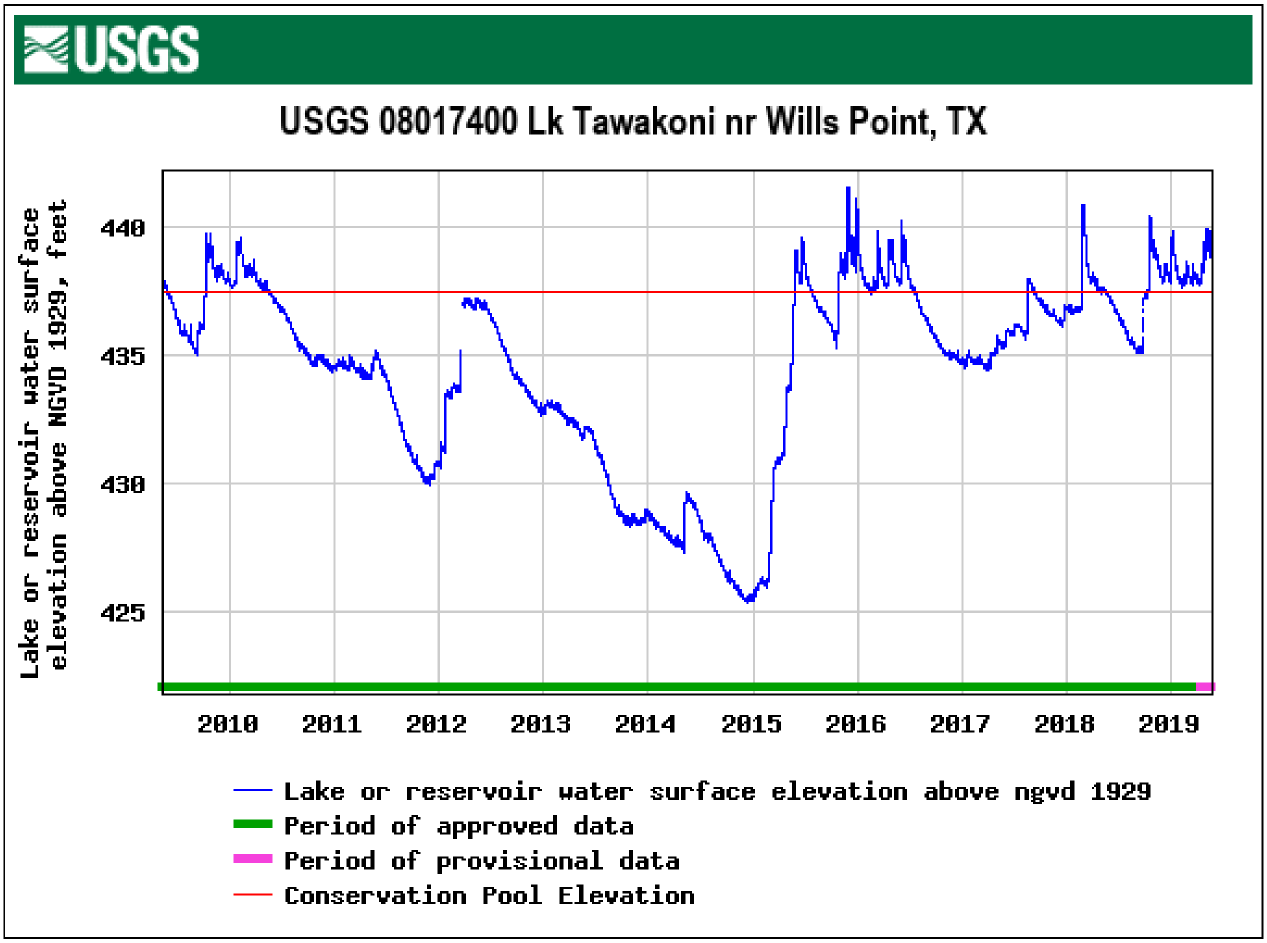


Figure 1. Quarterly water level elevations in feet above National Geodetic Vertical Datum (NGVD) for Lake Tawakoni, Texas.

Table 1. Characteristics of Lake Tawakoni, Texas.

Characteristic	Description
Year constructed	1960
Controlling authority	Sabine River Authority
Counties	Van Zandt & Rains (location of dam), Hunt
Reservoir type	Mainstem
Shoreline Development Index	7.45
Conductivity	175 µS/cm

Table 2. Boat ramp characteristics for Lake Tawakoni, Texas, September, 2014. Reservoir elevation at time of the survey was 427.2 feet above mean sea level.

Boat ramp	Public	Latitude	Longitude	Elevation at end of boat ramp (ft msl)	Parking capacity (N)	Condition
429 Marina and Resort	N	32.852700	-96.071015	436.15	20	Adequate
Anchor Inn North	N	32.896975	-96.001746	436.7	20	Adequate
Anchor Inn South	N	32.887567	-96.004002	424.2	30	Adequate
Caddo Creek Road	Y	32.925170	-96.056740	436.14	15	Adequate
Cedar Cove Landing	N	32.891868	-95.902660	437.27	15	Adequate
Duck Cove Marina	N	32.854053	-96.059529	435.1	20	Adequate
Duck Cove Public	Y	32.849946	-96.056414	436.98	40	Adequate
Lake Tawakoni S.P.	Y	32.847828	-95.996166	422.7	47	Excellent
Sky Point RV Park	N	32.895367	-95.946697	422.2	50	Excellent
Walnut Cove	N	32.887629	-96.045843	436.22	20	Adequate
West Tawakoni Park	Y	32.909164	-96.017403	430.0	30	Excellent
White Point Causeway	Y	32.860698	-96.066449	425.2	34	Adequate

Table 3. Harvest regulations for Lake Tawakoni, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	No MLL, 7 over 20-inches, two of which may be over 30-inches
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Striped and Hybrid Striped Bass	5 (in any combination)	18-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 Lake Tawakoni, Texas. FRY = fry; FGL = fingerling.

Year	Number	Size	Year	Number	Size	Year	Number	Size
Blue Catfish			Striped Bass Cont.			Sunshine Bass		
1989	366,675		2017	1,974,269	FRY	2004	139,000	FGL
Species Total	366,675		2018	195,695	FGL	2007	60,900	FGL
			2018	611,612	FRY	2011	50,440	FGL
Striped Bass			Species Total	14,239,195		2015	500,000	FRY
1979	755,800					2015	155,853	FGL
1982	195,694		Palmetto Bass			2016	90,970	FGL
1991	352,558	FGL	1975	100,466	FGL	Species Total	997,163	
1992	203,462	FGL	1979	181,500	FGL			
1993	184,300	FGL	1980	110,400	FGL	Florida Largemouth Bass		
1994	722,640	FGL	1983	179,302	FGL	1984	507,714	FGL
1995	382,333	FGL	1995	218,946	FGL	1992	469,904	FGL
1996	183,700	FGL	1996	166,295	FGL	1993	917,785	FGL
1997	257,080	FGL	1997	119,000	FGL	1998	367,500	FGL
1998	135,256	FGL	1998	267,842	FGL	1999	364,995	FGL
1999	262,678	FGL	1999	128,619	FGL	2010	508,133	FGL
2000	189,410	FGL	2002	92,910	FGL	2011	501,454	FGL
2002	288,856	FGL	2004	189,319	FGL	Species Total	3,637,485	
2003	369,005	FGL	2005	189,557	FGL			
2004	78,739	FGL	2006	188,206	FGL	Green x Redear Sunfish		
2005	100,211	FGL	2007	172,704	FGL	1973	5,300	FGL
2006	156,865	FGL	2008	190,027	FGL	Species Total	5,300	
2007	916,724	FRY	2009	97,968	FGL			
2007	320,619	FGL	2010	182,650	FGL	Walleye		
2008	283,198	FGL	2011	152,443	FGL	1979	450,000	FGL
2009	1,719,115	FRY	2013	297,543	FGL	Species Total	450,000	
2009	348,921	FGL	2014	143,020	FGL			
2010	8,000	FRY	2015	1,024,683	FRY			
2010	150,970	FGL	2016	144,662	FGL			
2013	1,000,978	FRY	2017	2,507,185	FRY			
2013	244,494	FGL	2018	147,662	FGL			
2014	499,784	FGL	Species Total	7,192,909				
2015	349,634	FGL						
2016	796,595	FRY						

Table 5. Objective-based sampling plan components for Lake Tawakoni, Texas 2018-2019.

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
	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
	Prey availability	IOV	N ≥ 50
Gill netting			
Temperate Bass	Size structure	PSD, length frequency	N = 30
	Condition	W_r	10 fish/inch group (max)
Channel/Blue Catfish	Abundance	CPUE–stock	RSE-Stock ≤ 25
	Size structure		N ≥ 50 stock
	Condition	W_r	10 fish/inch group (max)

[a] No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

Table 6. Survey of aquatic vegetation, Lake Tawakoni, Texas, 2010 and 2018. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2010	2018
Native submersed	0.6 (<0.1)	2.41 (<0.1)
Native emergent	417.4 (1.1)	261.34 (0.7)
Non-native		
Hydrilla (Tier III)*	<0.1 (<0.1)	
Alligatorweed (Tier III)*		0.17 (<0.1)
Phragmites sp (Tier III)*	0.4 (<0.1)	0.56 (<0.1)

*Tier III is Watch Status

Table 7. Percent directed angler effort by species for Lake Tawakoni, Texas, 2008–2018. Survey periods were from 1 June through 31 May.

Species group	2008/2009	2013/2014	2017/2018
Catfish spp.	44.6	42.9	40.2
Temperate basses	35.0	33.9	28.2
Crappie spp.	2.6	10.3	10.2
Anything	5.7	6.9	8.6
Black bass	12.1	6.1	12.7

Table 8. Total fishing effort (h) for all species and total directed expenditures at Lake Tawakoni, Texas, 2008-2018. Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Creel Statistic	2008/2009	2013/2014	2017/2018
Total fishing effort (hours)	162,641 (17)	279,527 (29)	208,696 (18)
Total directed expenditures	$1,433,605 (33)	$2,821,033 (46)	$2,029,774 (27)

Gizzard Shad

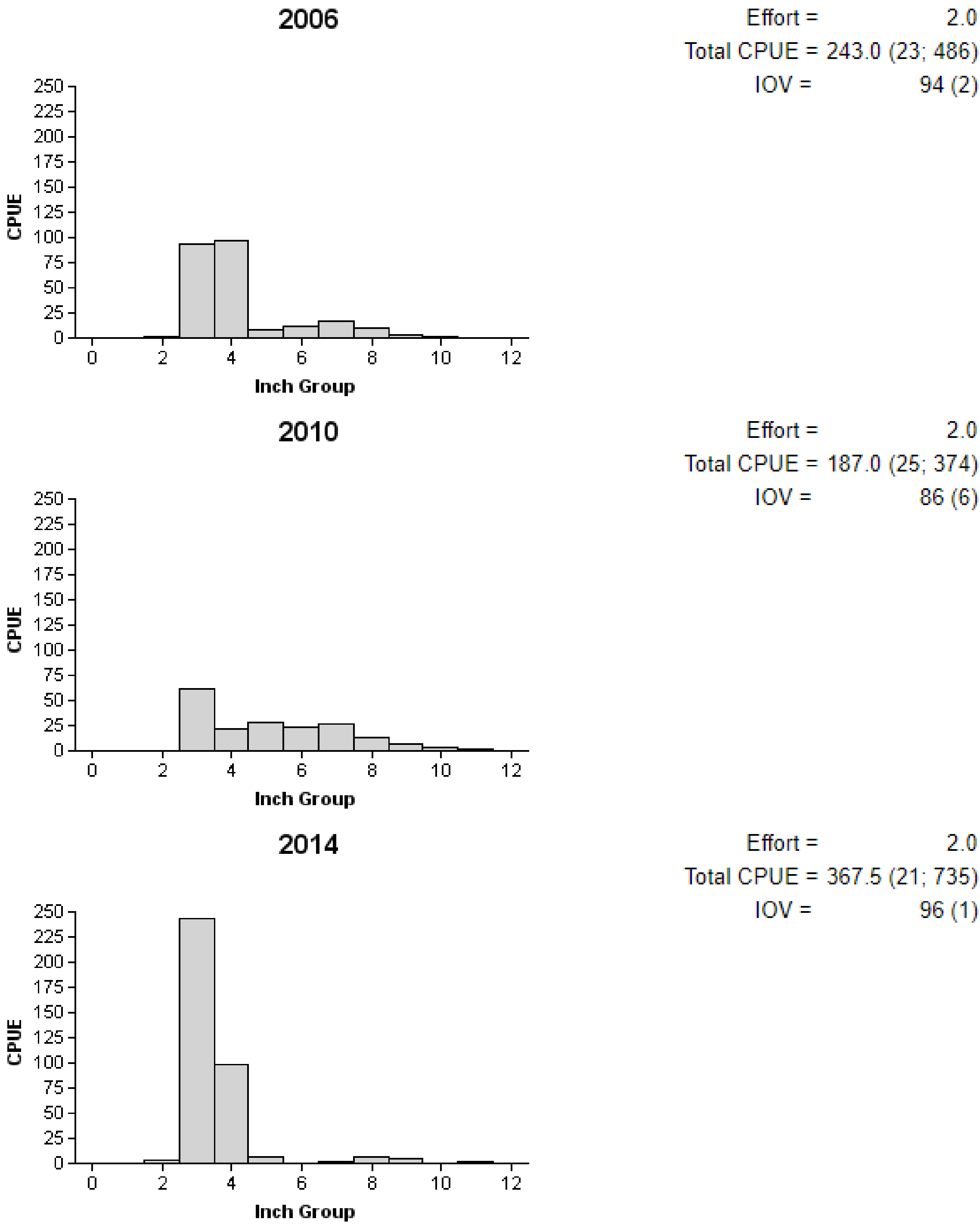
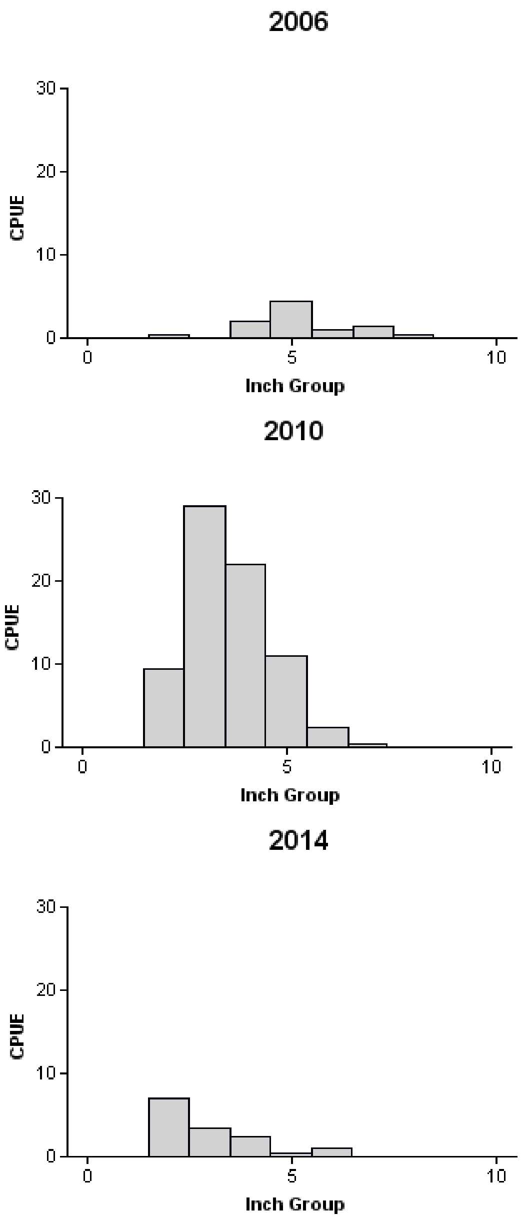


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Tawakoni, Texas, 2006, 2010, and 2014.

Bluegill



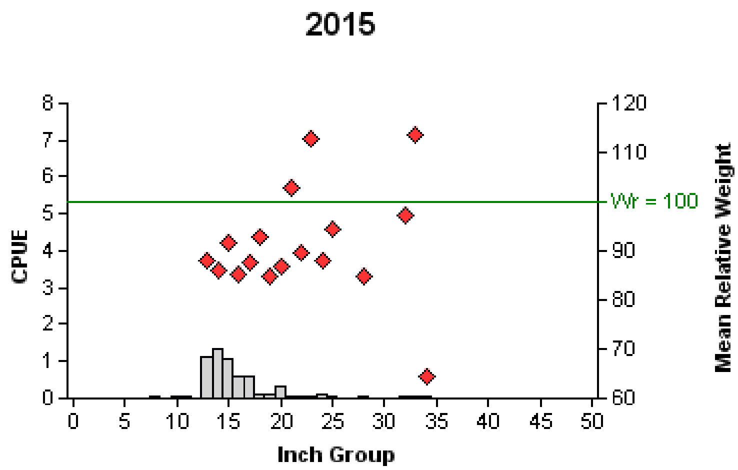
2006
Effort = 2.0
Total CPUE = 10.0 (33; 20)
IOV = 94 (0)

2010
Effort = 2.0
Total CPUE = 74.5 (26; 149)
IOV = 86 (2)

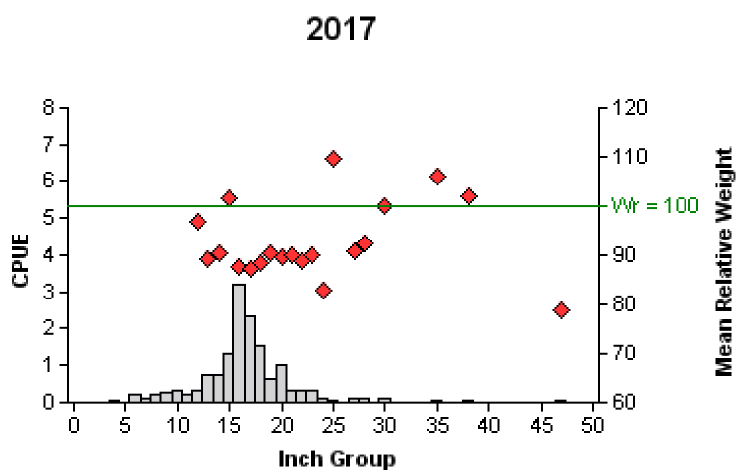
2014
Effort = 2.0
Total CPUE = 14.5 (89; 29)
IOV = 96 (0)

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, Lake Tawakoni, Texas, 2006, 2010, and 2014.

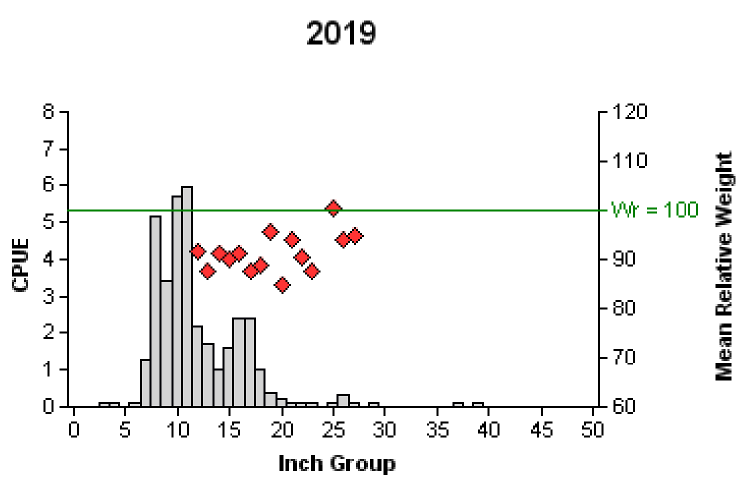
Blue Catfish



Effort = 15.0
Total CPUE = 6.2 (16; 93)
PSD = 17 (4)



Effort = 15.0
Total CPUE = 15.1 (16; 226)
PSD = 20 (4)



Effort = 10.0
Total CPUE = 35.9 (27; 359)
PSD = 9 (3)

Figure 4 Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tawakoni, Texas, 2015, 2017, and 2019.

Channel Catfish

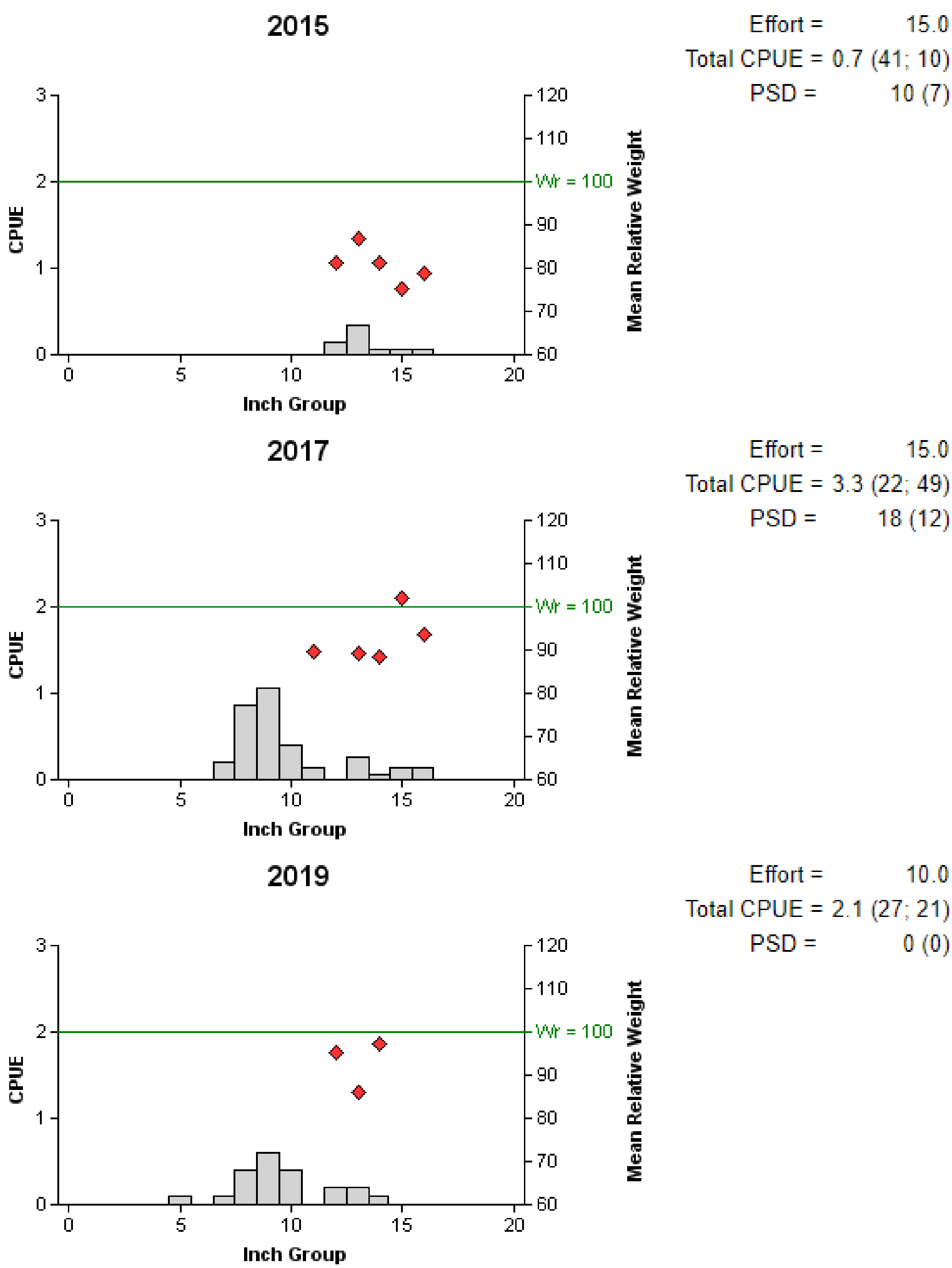


Figure 5. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tawakoni, Texas, 2015, 2017, and 2019.

Table 9 Creel survey statistics for Blue and Channel Catfish at Lake Tawakoni, Texas, from June 2008 through May 2009, June 2013 through May 2014, and June 2017 through May 2018. Total catch per hour is for anglers targeting catfishes and total harvest is the estimated number of Blue and Channel Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2008/2009	2013/2014	2017/2018
Surface area (ac)	34,476	29,504	36,825
Directed effort (h)	72,532 (19)	119,790 (28)	83,938 (19)
Directed effort/ac	2.10 (19)	4.06 (28)	2.28 (19)
Total catch/h	1.20 (40)	1.34 (23)	0.74 (40)
Total harvest	114,939 (40)	119,289 (43)	53,760 (41)
Blue Catfish	20,495 (43)	49,997 (42)	34,607 (29)
Channel Catfish	45,436 (32)	66,647 (41)	19,152 (41)
Harvest/ac	3.33 (40)	4.04 (43)	1.46 (41)
Blue Catfish	0.60 (43)	1.7 (42)	0.94 (29)
Channel Catfish	1.32 (32)	2.26 (41)	0.52 (41)
Percent legal released	68%	64%	23%

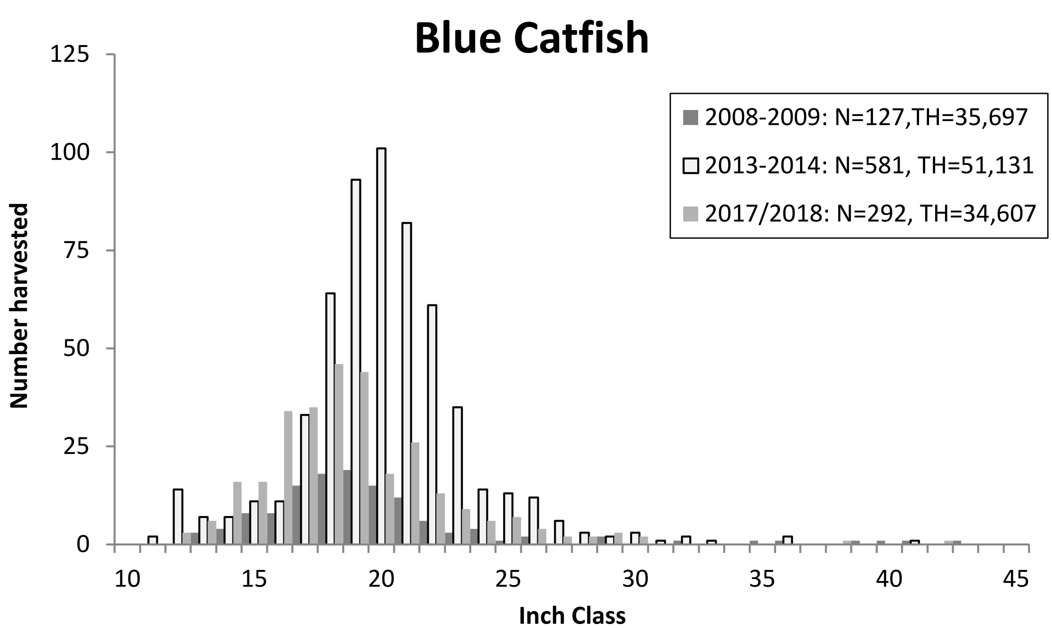


Figure 6 Length frequency of harvested Blue Catfish observed during creel surveys at Lake Tawakoni, Texas, June 2008 through May 2018, all anglers combined. N is the number of harvested Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

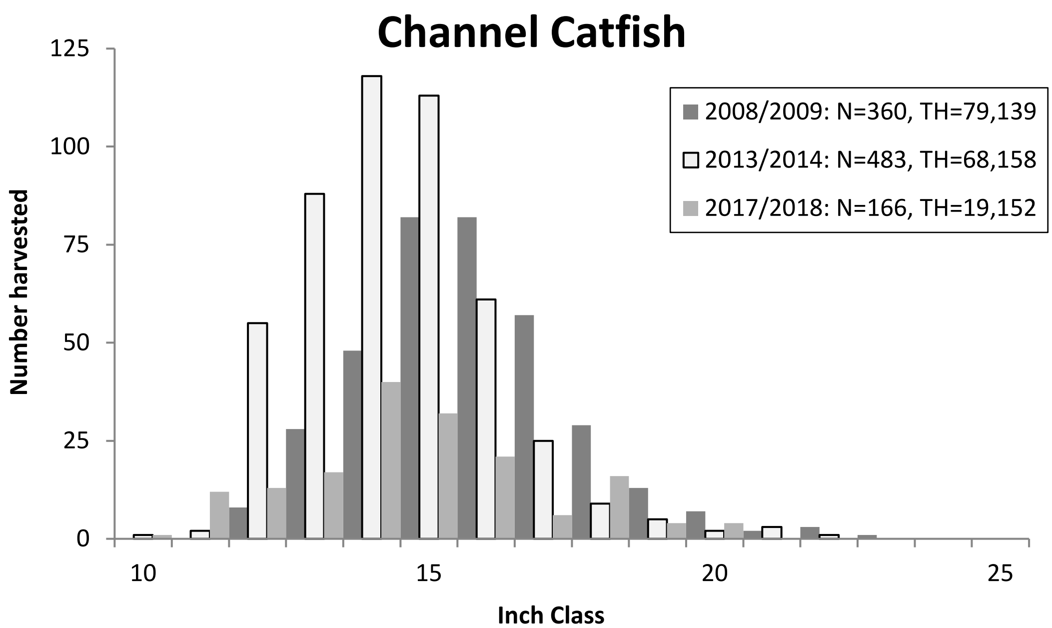


Figure 7. Length frequency of harvested Channel Catfish observed during creel surveys at Lake Tawakoni, Texas, June 2008 through May 2018, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

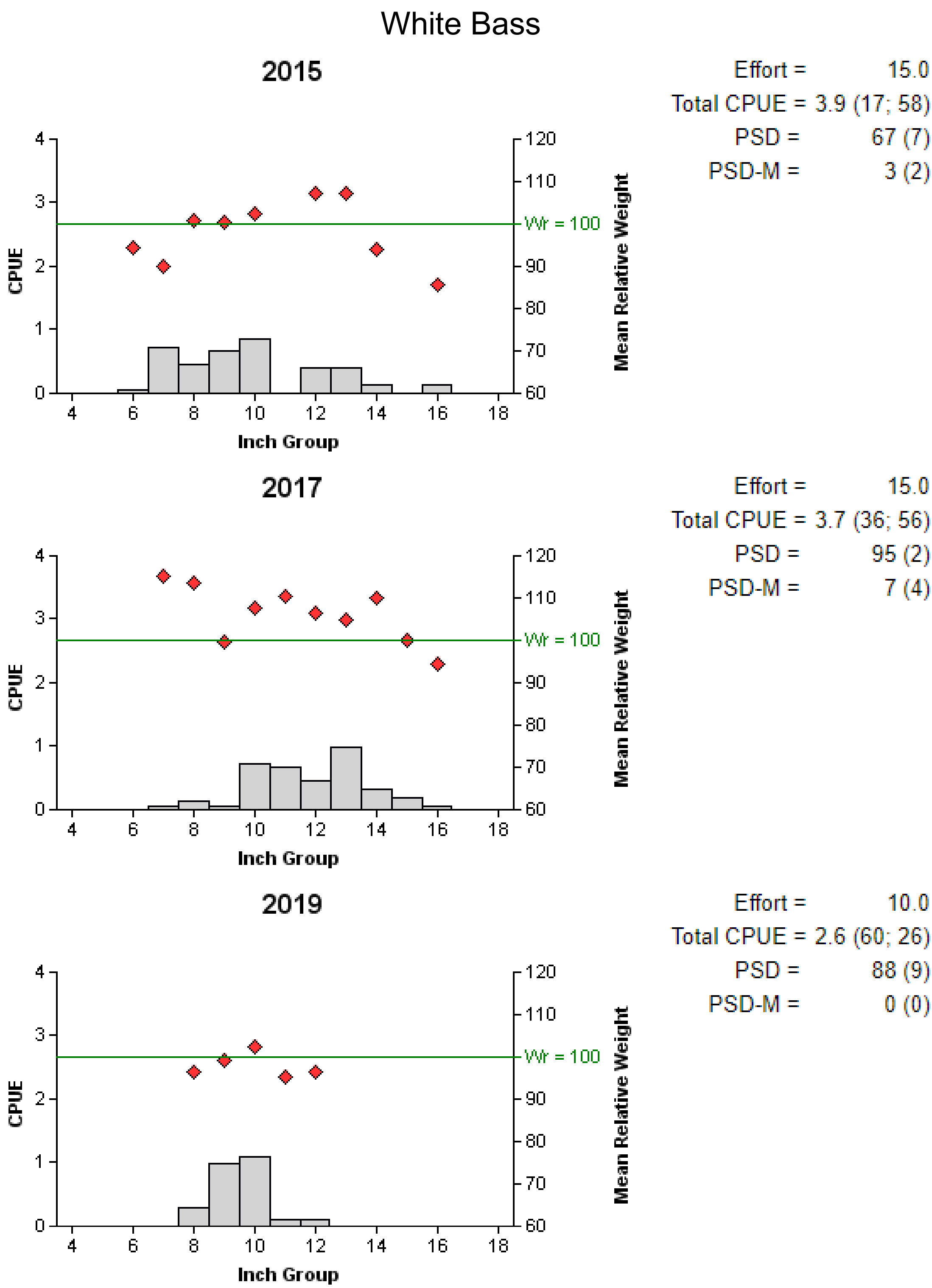


Figure 8. Number of White Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tawakoni, Texas, 2015, 2017, and 2019.

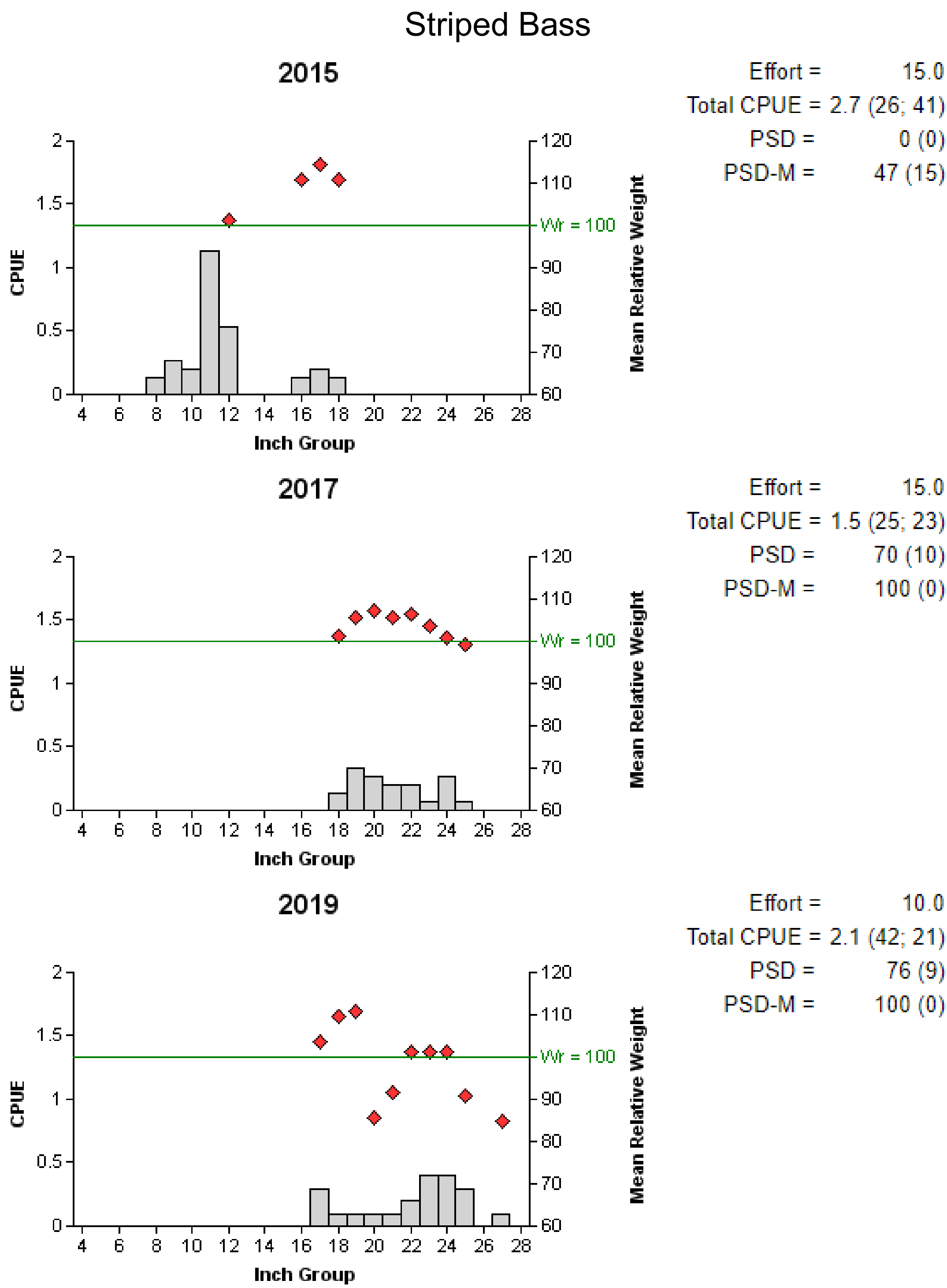
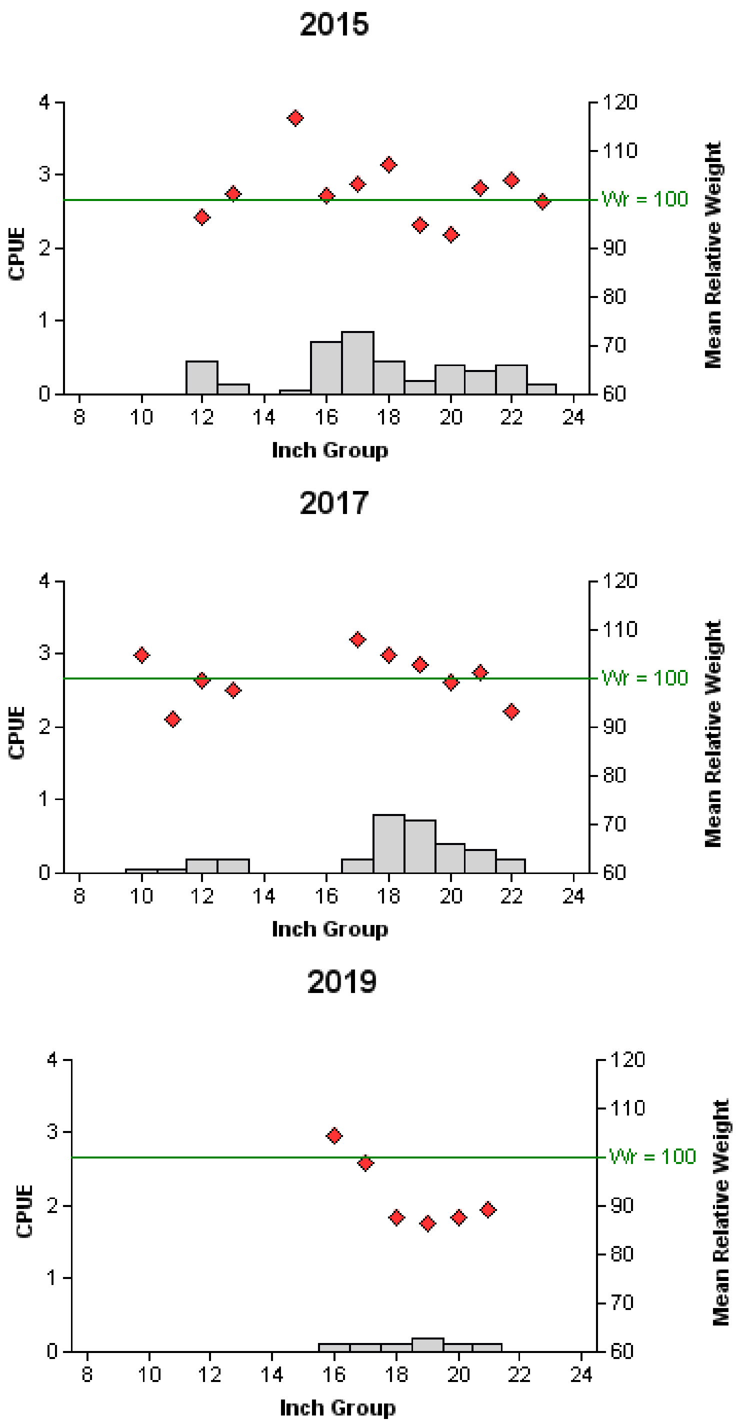


Figure 9. Number of Striped Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tawakoni, Texas, 2015, 2017, and 2019.

Hybrid Striped Bass



2015: Effort = 15.0
Total CPUE = 4.2 (40; 63)
PSD = 84 (5)
PSD-M = 86 (5)

2017: Effort = 15.0
Total CPUE = 3.2 (31; 48)
PSD = 83 (9)
PSD-M = 83 (9)

2019: Effort = 10.0
Total CPUE = 0.7 (48; 7)
PSD = 100 (0)
PSD-M = 100 (0)

Figure 10. Number of Hybrid Striped Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Tawakoni, Texas, 2015, 2017, and 2019.

Table 10. Creel survey statistics for White, Striped and Hybrid Bass at Lake Tawakoni, Texas, from June 2008 through May 2009, June 2010 through May 2011, and June 2017 through May 2018. Total catch per hour is for anglers targeting temperate basses and total harvest is the estimated number of temperate basses harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	Year		
	2008-2009	2013-2014	2017/2018
Surface area (ac)	34,476	29,504	36,825
Directed effort (h)	56,863 (22)	94,724 (33)	50,247 (21)
Directed effort/ac	1.65 (22)	3.21 (33)	1.36 (21)
Total catch/h	1.14 (39)	2.34 (17)	2.14 (20)
Total harvest	31,735 (80)	102,533 (54)	114,292 (38)
Striped Bass	4,860 (144)	863 (577)	9,053 (62)
Hybrid Striped Bass	7,847 (99)	22,633 (55)	15,480 (50)
White Bass	17,001 (49)	75615 (42)	77,013 (27)
Harvest/ac	0.92 (80)	3.48 (54)	3.10 (38)
Striped Bass	0.14 (144)	0.03 (577)	0.24 (62)
Hybrid Striped Bass	0.23 (99)	0.77 (55)	0.42 (50)
White Bass	0.49 (49)	2.56 (42)	2.09 (27)
Percent legal released	64%	35%	13%

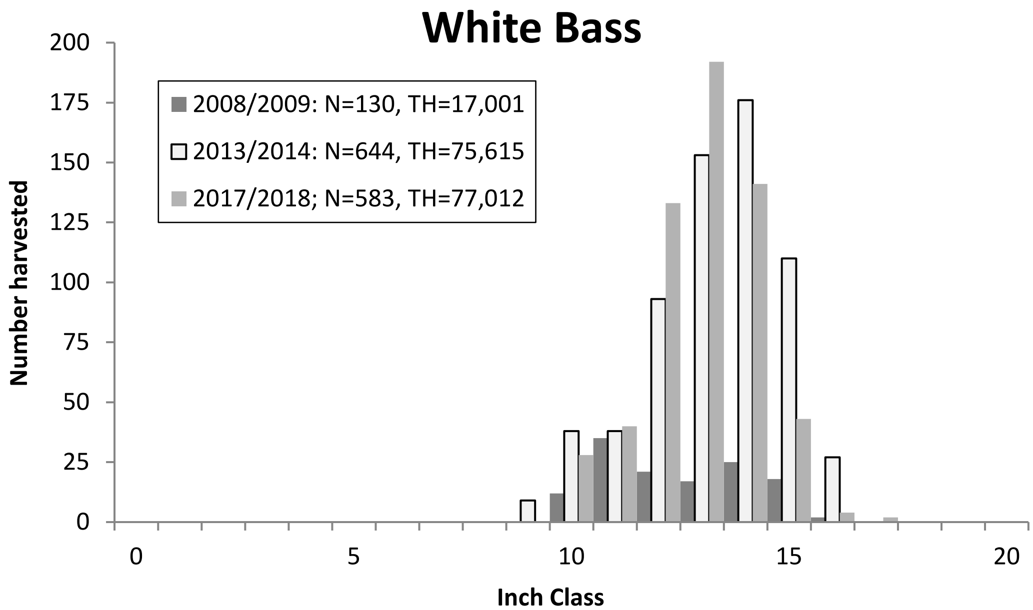


Figure 11. Length frequency of harvested White Bass observed during creel surveys at Lake Tawakoni, Texas, June 2008 through May 2018, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

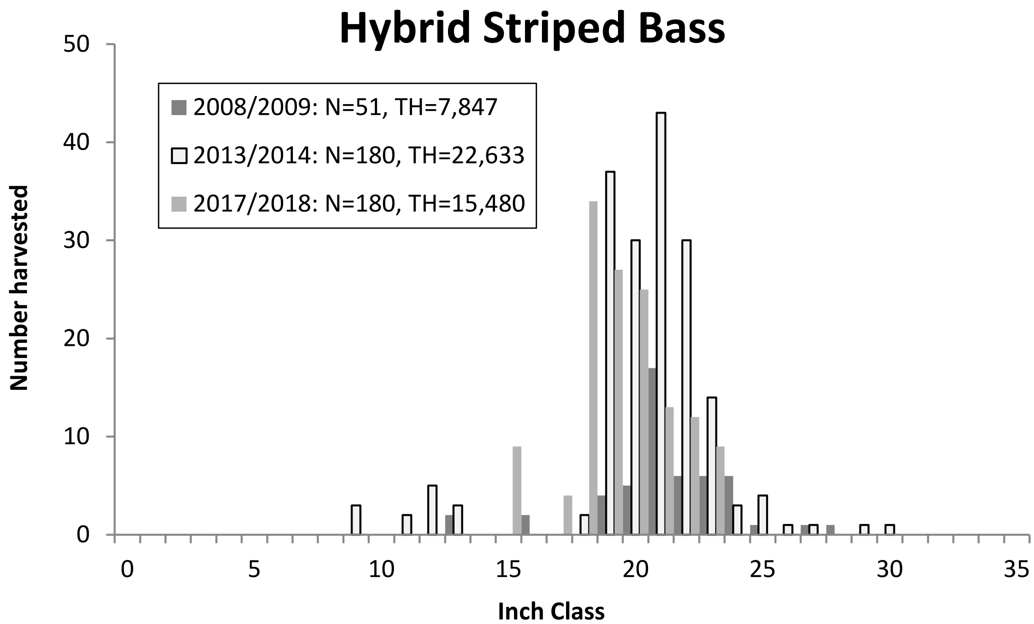


Figure 12. Length frequency of harvested Hybrid Striped Bass observed during creel surveys at Lake Tawakoni, Texas, June 2008 through May 2018, all anglers combined. N is the number of harvested Palmetto/Sunshine Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

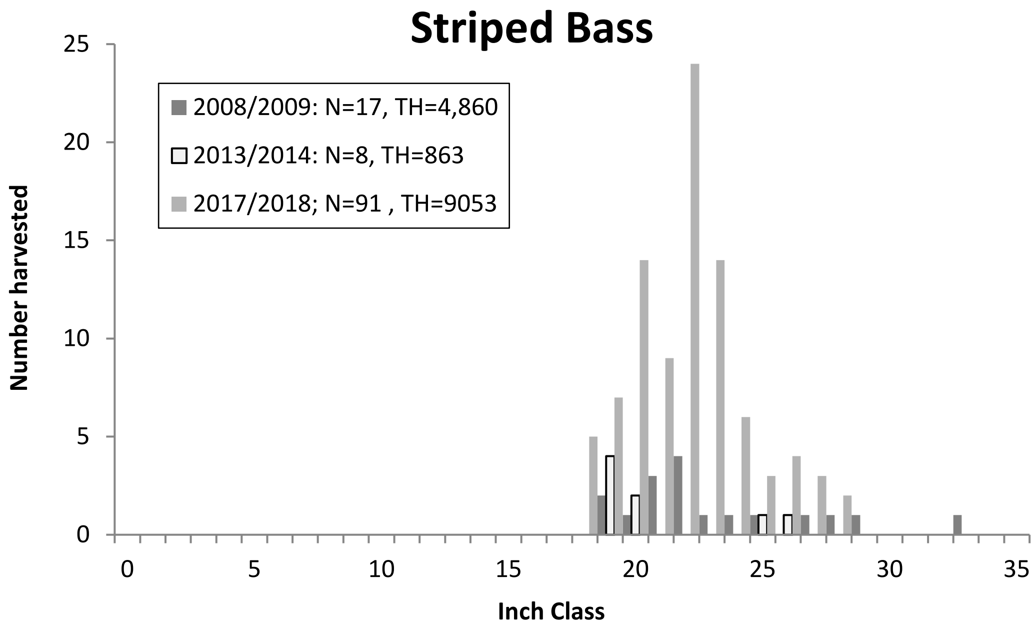
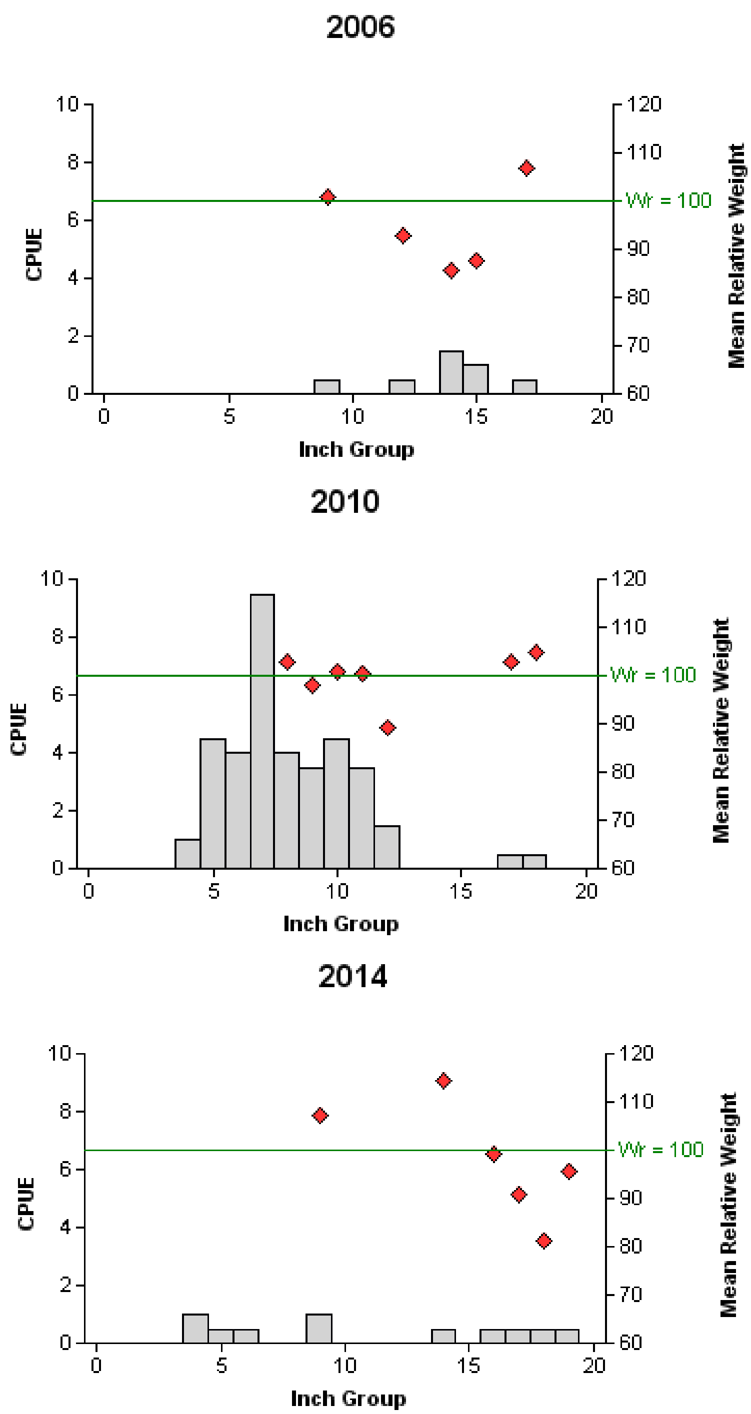


Figure 13. Length frequency of harvested Striped Bass observed during creel surveys at Lake Tawakoni, Texas, June 2008 through May 2018, all anglers combined. N is the number of harvested Palmetto/Sunshine Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass



Effort = 2.0
Total CPUE = 4.0 (35; 8)
PSD = 88 (12)

Effort = 2.0
Total CPUE = 37.0 (21; 74)
PSD = 14 (4)

Effort = 2.0
Total CPUE = 5.5 (51; 11)
PSD = 71 (16)

Figure 14. 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, Lake Tawakoni, Texas, 2006, 2010, and 2014.

Table 11. Creel survey statistics for Largemouth Bass at Lake Tawakoni, Texas, from June 2008 through May 2009, June 2010 through May 2011, and June 2017 through May 2018. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

Creel survey statistic	2008/2009	2013/2014	2017/2018
Surface area (ac)	34,476	29,504	36,825
Directed angling effort (h)			
Tournament	1,082 (106)	775 (114)	17,976 (33)
Tournament % of total bass effort	5%	4%	68%
Non-tournament	18,649 (31)	16,248 (36)	8,533 (37)
All black bass anglers combined	19,731 (31)	17,023 (38)	26,509 (30)
Angling effort/acre	0.57 (31)	0.58 (38)	0.72 (30)
Catch rate (number/h)	0.32 (35)	0.36 (22)	0.19 (24)
Harvest			
Non-tournament harvest	16 (0)	1,970 (218)	2,819 (139)
Harvest/ac	>0.01 (0)	0.07 (128)	0.07 (139)
Tournament weigh-in and release	167 (1016)	551 (320)	6,656 (91.25)
Release by weight			
<4.0 lbs		1,955 (122)	5,433 (101)
4.0-6.9 lbs		406 (243)	387 (84)
7.0-9.9 lbs		130 (552)	-
≥10.0 lbs		-	-
Percent legal released (non-tournament)	47%	81%	67%

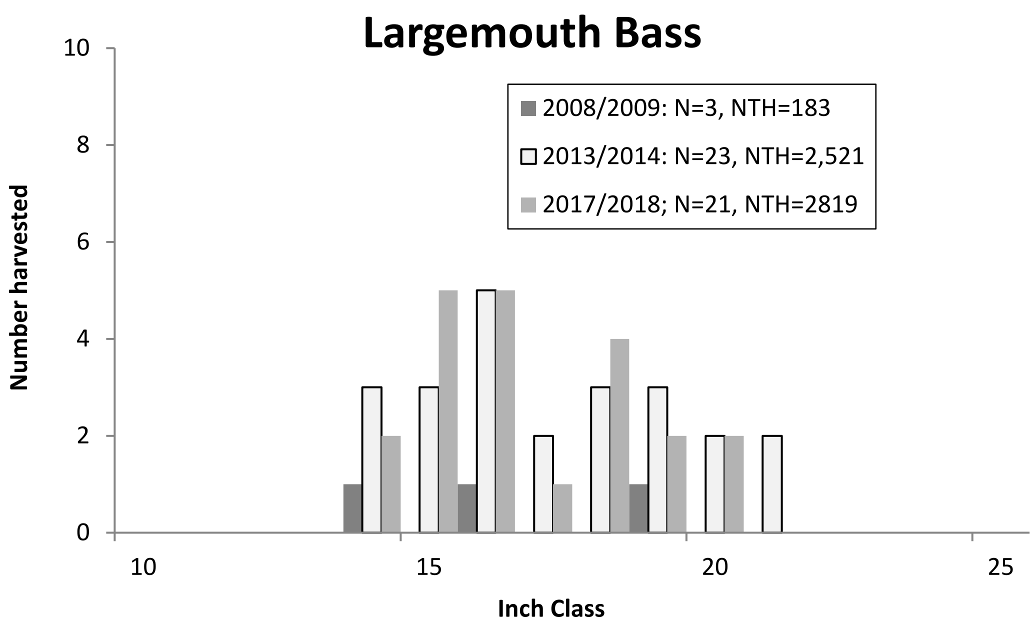


Figure 15. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Lake Tawakoni, Texas, June 2008 through May 2018, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and NTH is the estimated non-tournament harvest for the creel period.

Crappie

Table 12. Creel survey statistics for White and Black Crappie combined at Lake Tawakoni, Texas, from June 2008 through May 2009, June 2010 through May 2011, and June 2017 through May 2018. 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		
	2008/2009	2010/2011	2017/2018
Surface area (acres)	34,476	29,504	36,825
Directed effort (h)	4,246 (58)	28,703 (37)	21,341 (28)
Directed effort/acre	0.12 (58)	0.97 (37)	0.58 (28)
Total catch per hour	1.93 (28)	1.20 (40)	3.2 (30)
Total harvest	7,503 (88)	25,236 (82)	54,887 (53)
Harvest/acre	0.22 (88)	0.86 (82)	1.49 (53)
Percent legal released	0%	8%	0%

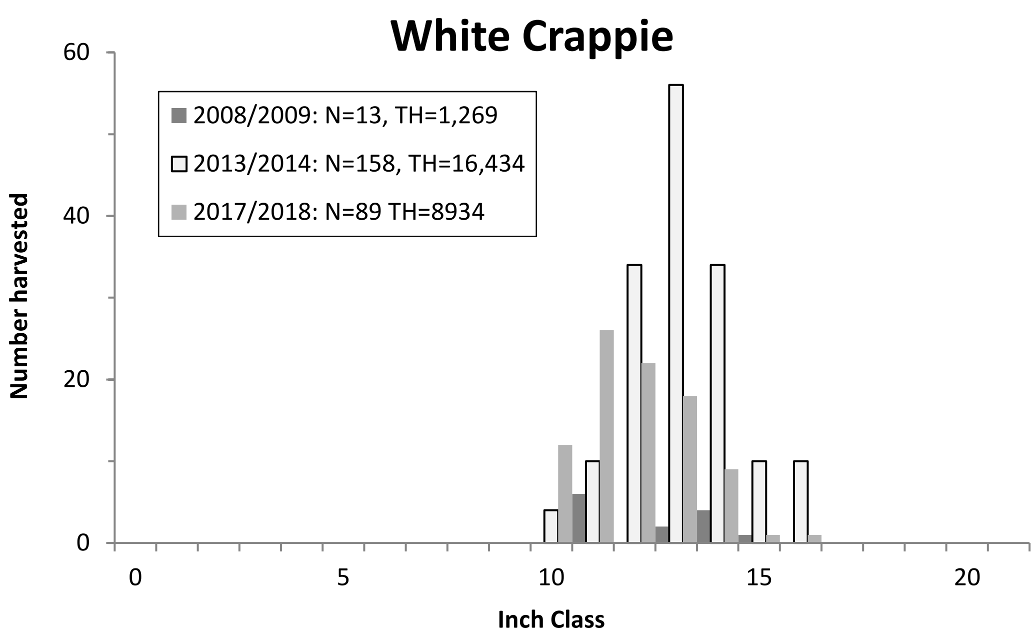


Figure 16. Length frequency of harvested White Crappie observed during creel surveys at Lake Tawakoni, Texas, June 2008 through May 2018, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

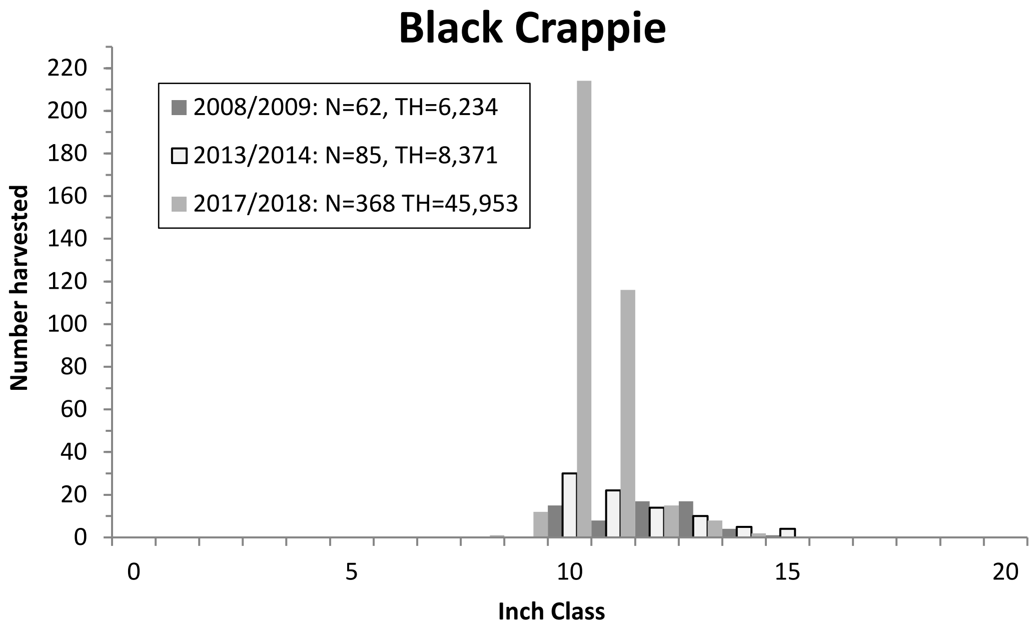


Figure 17. Length frequency of harvested Black Crappie observed during creel surveys at Lake Tawakoni, Texas, June 2008 through May 2018, all anglers combined. N is the number of harvested Black Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Proposed Sampling Schedule

Table 13. Proposed sampling schedule for Lake Tawakoni, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

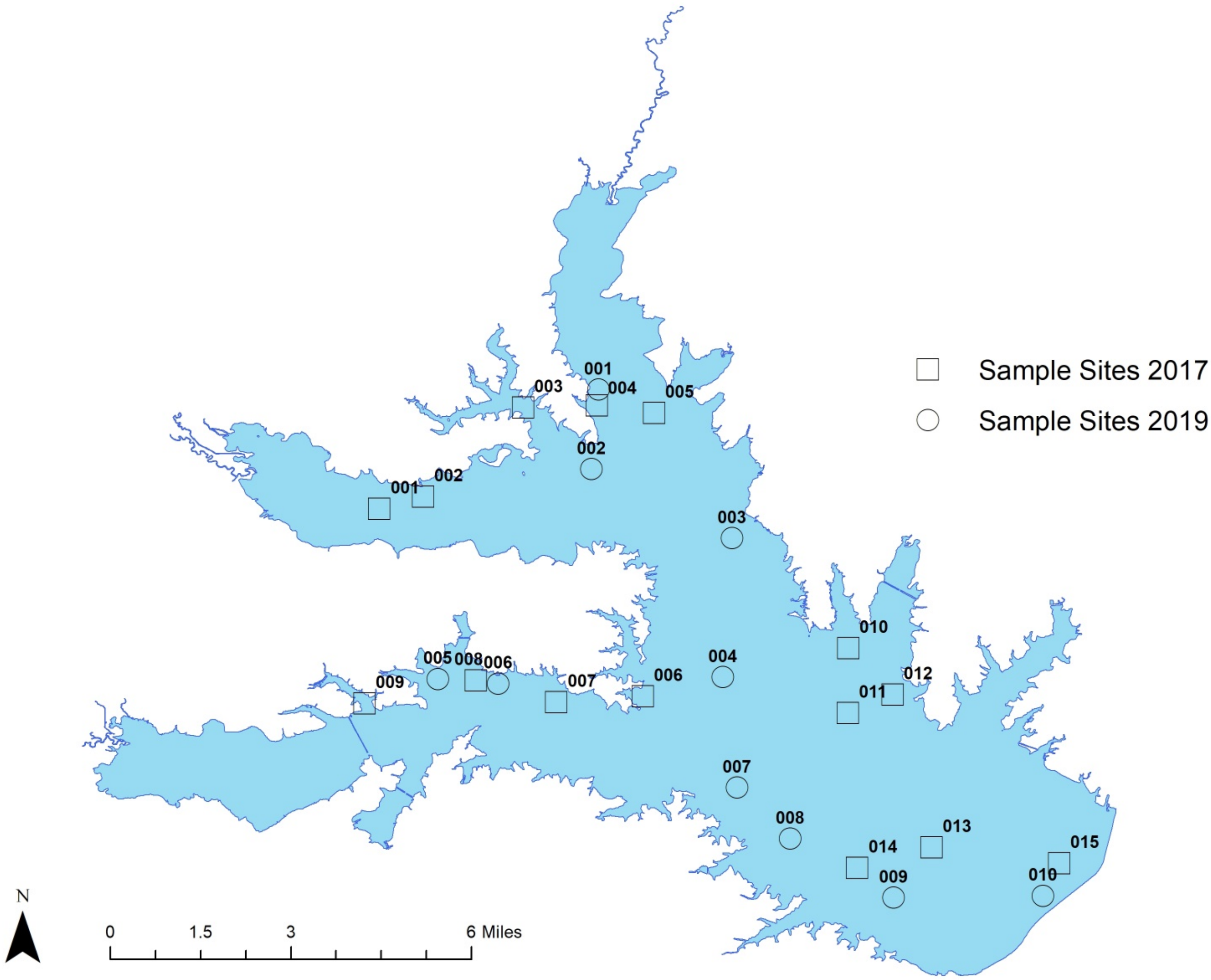
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Vegetation				S
Electrofishing				S
Gill netting		A		S
Creel survey			S	
Report				S

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 Lake Tawakoni, Texas, 2017-2019. Sampling effort was 25 net nights for gill netting.

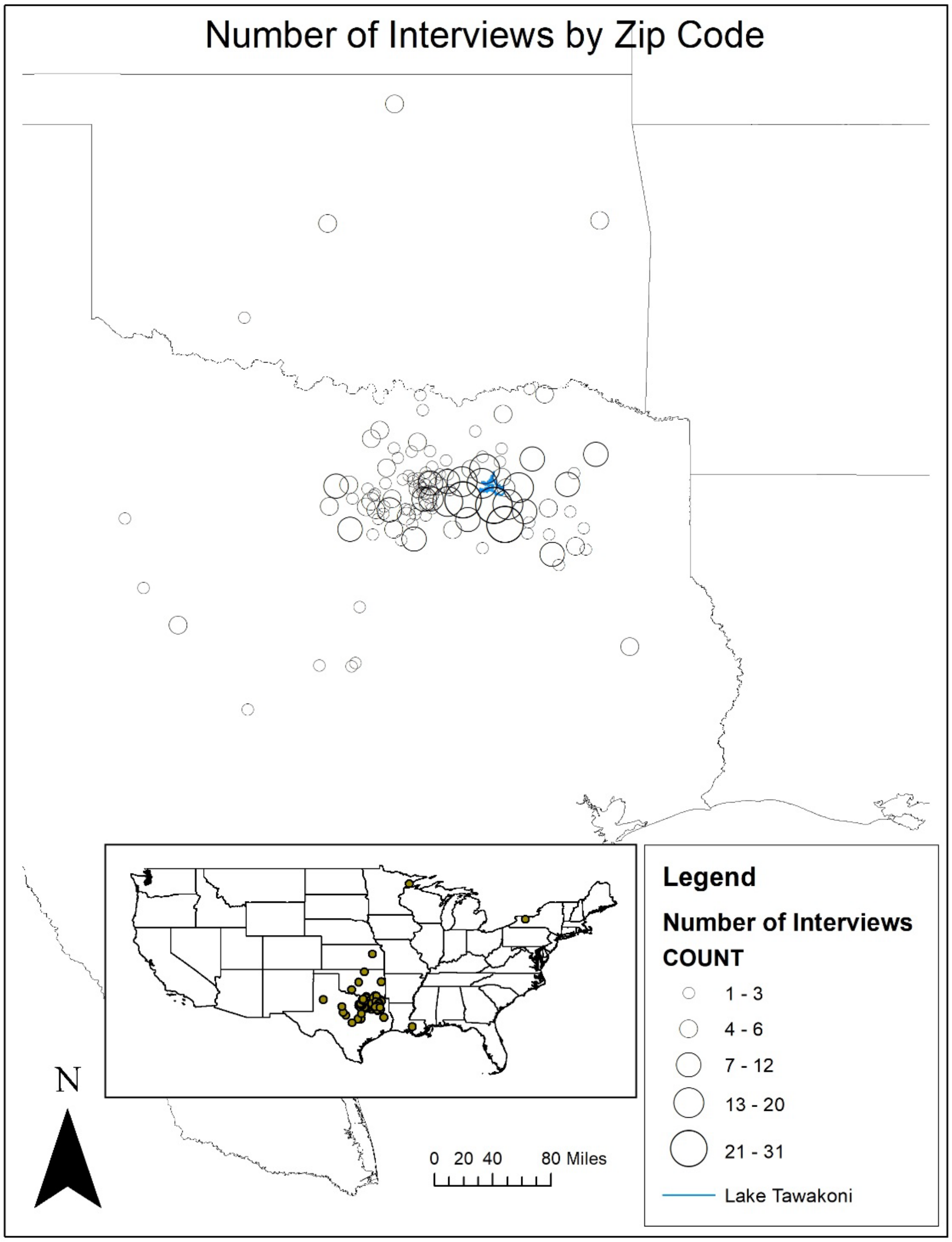
Species	Gill Netting	
	N	CPUE
Blue Catfish	585	23.4 (19)
Channel Catfish	70	2.8 (18)
White Bass	82	3.28 (31)
Striped Bass	44	1.76 (23)
Hybrid Striped Bass	55	2.20 (30)

APPENDIX B – Map of sampling locations



Location of gill net sampling sites, Lake Tawakoni, Texas, 2017-2019. Water level was near full pool at time of sampling.

APPENDIX C – reporting of creel ZIP code data



Location, by ZIP code, and frequency of anglers that were interviewed at Lake Tawakoni, Texas, during the June 2017 through May 2018 creel survey.

Life's better outside.®

In accordance with Texas State Depository Law, this publication is available at the
Texas State Publications Clearinghouse and/or Texas Depository Libraries.