Stamford Reservoir

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

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Survey and Management Summary

Fish populations in Stamford Reservoir were surveyed in fall 2015 by daytime electrofishing, tandem hoop netting in 2017 and 2018, as well as nighttime electrofishing, trap netting, and low-frequency electrofishing in 2018. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

Reservoir Description: Stamford Reservoir is a 5,124-acre impoundment of Paint Creek, a tributary of the Clear Fork of the Brazos River Basin approximately 10 miles southeast of Haskell, TX. The reservoir is used for municipal and industrial water supply for the City of Stamford, flood control, and recreation. Long-term drought from 2012-2015 caused the water level to decline to approximately 17.0 ft. below conservation pool level. Water level fluctuated between 1.0 ft. above and about 4.0 ft. below from spring 2015 to summer 2017. Water level declined to about 5.5 ft. below conservation pool by early fall 2018, but heavy rainfall in the fall of 2018 flooded the reservoir to about 5 ft. above conservation pool. By spring 2019, water level was about 2.0 ft. over conservation pool.

Management History: Sport fish include Largemouth Bass, White Crappie, Blue Catfish, Channel Catfish, Flathead Catfish, and White Bass. All species have been managed with the statewide fishing regulations. Golden alga is found in the reservoir and caused the first documented toxic bloom in March 2015 which resulted in a moderate lake-wide fish kill. In 2016, Blue Catfish were stocked to restore the fishery. In 2015-2017, and in 2019, stockings of Florida Largemouth Bass fingerlings were attempted to restore the fishery.

Fish Community

- **Prey species:** Gizzard Shad, Bluegill, Longear Sunfish, and Inland Silversides were the predominant prey species. Sizes and relative abundance of prey species observed were optimal for sport fishes.

- **Catfishes:** The 2018 low-frequency electrofishing survey yielded an adequate sample of Blue Catfish to evaluate size structure; fish ranged from 5 to 20 inches. Presence of 20-inch fish provided promise that some individuals may have survived the golden alga kill. Channel Catfish catch in the 2018 tandem hoop net survey was low and comprised of mostly sub-stock length fish. Channel Catfish were not re-stocked following the drought and golden alga kill, and their existing population was likely remnant and/or comprised of fish that may have washed into the reservoir from the watershed.

- **Largemouth Bass:** Exploratory sampling in 2015 yielded a catch of mostly sub-stock fish. Sampling for Largemouth Bass during fall 2018 was halted because of equipment issues, and the entire survey could not be completed. Fish collected were mostly sub-legal length and were likely from the recovery stockings. Florida Largemouth Bass allele frequencies were high in the samples taken in 2015 and 2018.

- **White Crappie:** The White Crappie sample was mostly fish of sub-stock length, indicative of adequate reproduction. Body conditions of White Crappie were optimal. Target sample size for age and growth to legal length estimation was not achieved, but those fish sampled had a mean age of 1.9 years.

Management Strategies: Blue Catfish will be monitored by low-frequency electrofishing in spring 2022. Prey species and Largemouth Bass will be sampled by standard electrofishing in fall 2020 and 2022. Additional daytime sampling may be conducted in fall 2020 to evaluate feasibility for future monitoring. White Crappie will be monitored by trap netting during fall 2022. Biennial stockings of Florida Largemouth Bass and Blue Catfish fingerlings will be requested for supplemental stockings to boost recruitment. Boater access and fisheries habitat enhancements will be pursued. Golden alga samples and toxicity analyses will be conducted during the cold seasons.

Introduction

This document is a summary of fisheries data collected from Stamford Reservoir during 2015-2019. 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 species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Management strategies are included to address existing problems and/or opportunities. Historical data is presented with the 2015-2019 data for comparison.

Reservoir Description

Stamford Reservoir is a 5,124-acre impoundment of Paint Creek, a tributary of the Clear Fork of the Brazos River Basin approximately 10 miles southeast of Haskell, TX. The reservoir is used for municipal and industrial water supply for the City of Stamford; it is also used for flood control and recreation. Long-term drought from 2010-2015 dropped the water level 17.0 ft. below conservation pool level by spring 2015. Golden alga is present and caused the first documented fish kill in March 2015. The bloom presented a moderate, lake-wide fish kill, and most fisheries experienced substantial losses. During 2015-2018, water level fluctuated from 1.0 ft. above conservation pool to 5.5 ft. below conservation pool, but heavy rainfall flooded the reservoir to about 5.0 ft. above conservation pool in fall of 2018. By spring 2019, water level was about 2.0 ft. over conservation pool (Figure 1). Other descriptive characteristics for Stamford Reservoir are in

Table 1.

Angler Access

Boater access consisted of two public boat ramp locations. Anchor Marina Ramp is located on the north side of the reservoir off Farm-to-Market Rd 3495 and Anchor Lane. The second boat ramp is located at Stamford Marina on the southern side of the reservoir off FM 2976 and Stamford Marina Drive. Bank and handicapped access were restricted to the areas around the boat ramps. Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Homer and Goldstrohm 2015) included:

1. Sample sport fish and forage species populations for ascertaining management needs. Stock Florida Largemouth Bass fingerlings at 2,000 fish/km to take advantage of greatly increased habitat from spring 2015 rains and to supplement the population remaining after the fish kill caused by golden alga in March 2015.

   Action: Fishes were surveyed by electrofishing in 2015 and 2018, tandem hoop netting in 2017 and 2018, and low-frequency electrofishing in summer 2018, and trap netting in fall 2018. Florida Largemouth Bass fingerlings were stocked annually from 2015-2017 and in 2019. Channel Catfish fingerlings were also stocked following poor relative abundance in monitoring surveys.

2. Speak with the City of Stamford about potential boat ramp improvements at Stamford Marina and explore availability of funding to support the ramp improvement efforts.

   Action: City of Stamford was contacted in 2018 about the deteriorating conditions of the boat ramp and dock, and improvement needs were discussed. However, there are no immediate plans by the City of Stamford to address the improvement needs. Communication efforts by the TPWD Inland Fisheries will be continued.

3. Conduct monitoring of golden alga presence, cell densities, and toxicity by conducting quarterly water samples as well as monitor water quality conditions.

Action: Golden alga samples were collected, and toxicity and cell counts were monitored monthly during the cold season (November-March) of 2015-2019 instead of quarterly given toxicity has not been observed previously in the warmer months.

4. Communicate and educate the public of the risks of invasive species by posting signage at access points, providing visual aids and literature to marinas and business owners, and provide educational information by use of media.

   Action: Signs displaying Clean, Drain, and Dry rules were posted at each of the public boat ramps, and informational pamphlets were provided to the Anchor and Stamford marinas. Multiple interviews to local news stations were given to discuss invasive species threats, and multiple popular press articles were written as well.

Harvest regulation history: Sport fish in Stamford Reservoir have been managed with statewide harvest regulations (Table 3).

Stocking history: While Stamford Reservoir has been stocked with a variety of species since its impoundment, Florida Largemouth Bass have been the most frequently stocked. However, in late-winter 2015, a moderately toxic golden alga bloom caused a lake-wide kill that devastated Stamford Reservoir's fisheries. Once the reservoir caught substantial water from late spring rains, a series of recovery stockings of Florida Largemouth Bass (2015-2017 and in 2019) and Blue Catfish (2016) were conducted. A supplemental stocking of Channel Catfish fingerlings was conducted in June 2019 following poor catches in recent monitoring surveys. A complete stocking history is presented in

Table *4*.

Vegetation/habitat management history: Golden alga has been found, and it first became moderately toxic in late winter of 2015. Since the reservoir has substantially increased in water level, golden alga has still been present, but has not become toxic. In 2017, TPWD Inland Fisheries collaborated with Still Waters Bass Club to conduct a Christmas tree brush pile project to enhance structural habitat in the reservoir.

Water transfer: No interbasin transfers are known to exist.

Methods

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Stamford Reservoir (TPWD, unpublished). 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).

Low-frequency Electrofishing - Blue Catfish were targeted by low-frequency electrofishing (1 hour at 20, 3-min stations) during summer 2018.

Electrofishing – A bass-only exploratory electrofishing survey (1.0 hour at 12, 5-min stations) was conducted during the daytime in fall 2015. Largemouth Bass, sunfishes, and Gizzard Shad were collected by nighttime electrofishing (0.6 hour at 7, 5-min stations) during fall 2018. Equipment issues prohibited the completion of the fall 2018 electrofishing survey, and additional sampling could not be conducted. Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of electrofishing.

Trap netting – Crappie were collected by using trap nets (10 net nights at 10 stations) during fall 2018. Catch rate (i.e., CPUE) for trap netting was recorded as the number of fish caught per net night (fish/nn). Additional fish were collected by experimental gill nets and were used for age estimation. Ages for White Crappie were determined using otoliths from seven randomly-selected fish (range 9.0 to 10.9 inches).

Tandem hoop netting – Channel Catfish were collected by using tandem hoop nets baited with soap bait during summer 2018 (8 series set at 8 stations) and summer 2019 (9 series set at 9 stations). Catch rate (i.e. CPUE) for hoop netting was recorded as the number of fish caught per series set (fish/tandem series).

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

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.

Habitat – In July 2015, an aerial survey was conducted to determine salt cedar coverage at the reservoir. The water body perimeter was circumnavigated, and salt cedar coverage at the reservoir was documented. and developed into shapefiles then overlaid on satellite imagery for Haskell County by using Global Information Systems (GIS) software. Salt cedar coverage was calculated in GIS software. Structural habitat and vegetation surveys were conducted in summer 2018 by using the random point method (TPWD, Inland Fisheries Division, unpublished manual revised 2015). The survey was conducted by selecting 197 random points throughout the reservoir. One hundred seventy-four (n=174) additional random stations were selected along the shoreline to include vegetation and structural shoreline habitat for a total of 371 random stations; shoreline stations were analyzed separately. Plants and structural habitat types were identified at

or below the waterline and marked as “1” for present or “0” for absent. Percent occurrence (% = [# stations present / total stations sampled] X 100) and associated 95% confidence intervals were calculated (Allto Consulting 2019) for native and exotic plant species and structural habitat types.

Water level – Source for water level data was the United States Geological Survey (USGS 2019).

Results and Discussion

Habitat: In the 2015 aerial survey, salt cedar was found throughout much of the shoreline, and an estimated 2,800 acres had the invasive species present at varying densities. Since 2016, most of the salt cedar in the lakebed and on the shoreline has been inundated with water. In the summer 2018 structural habitat survey, most of the shoreline was comprised of natural shoreline, rocky areas, and gravel (Table 6). The 2018 vegetation surveys indicated that most areas throughout the reservoir were featureless or had coverage of inundated terrestrial vegetation, bulrush, and American lotus (Table 7). Salt cedar was not documented at any of the random sampling stations likely because much of the prior coverage was submersed, withered, and indistinguishable from other inundated terrestrial vegetation, but it was observed in other locations not sampled in the 2018 survey.

Prey Species: Prey species observed in the fall 2018 electrofishing survey included Gizzard Shad, Bluegill, and Longear Sunfish. Inland Silversides were also numerous, but they could not be effectively sampled with the standardized gear. Gizzard Shad were caught at a rate of 452.6/h, which individuals ranged from 3-15 inches (Figure 2). The catch rate of Gizzard Shad was substantially less than what had been observed in the 2012 (720.0/h) and 2010 (1,203.0/h) surveys. The IOV for Gizzard Shad in 2018 (96) remained high similar to the 2012 (88) and 2010 (90) surveys and indicated that the samples size distribution was favorable for providing adequate prey for sport fish. Bluegill were caught at rate of 27.4/h, a rate substantially less than 2012 (89.0/h) and 2010 (63.0/h) samples. In the 2018 survey, most Bluegill were 3-5 inches (PSD=0; Figure 3). In 2018, Longear Sunfish were caught at a rate of 12.0/h. Despite the low sample sizes and the inability to complete the electrofishing survey in fall 2018, prey sizes in the sample were optimal, and their availability appeared sufficient for the recovering sport fish populations.

Catfishes: Prior to the most recent low-frequency electrofishing sample in summer 2018, Blue Catfish were sampled during spring 2011 at a rate of 209.0/h, and legal-length fish were caught at a rate of 157.0/h (Figure 4). Blue Catfish were sampled during summer 2018 and were caught at a rate of 50.0/h (Figure 5); one Channel Catfish was observed as well. Catch rate of legal-length Blue Catfish was 5.0/h. Blue Catfish ranged from 5-20 inches, which most were 10 inches. The variable sizes and presence of quality-length Blue Catfish was promising for the fishery in that stockings in 2016 may have been effective as well as there may have been possible reproduction from fish that may have survived the golden alga kill. Channel Catfish catch in the summer 2017 (3.3/tandem series) and 2018 (1.1/tandem series) tandem hoop netting surveys were low (Figure 6). Catch rate of legal fish decreased from 1.1/tandem series to 0.3/tandem series from 2017 to 2018. In both surveys, length of the Channel Catfish ranged from 7-16 inches, and most were sub-legal length. Channel Catfish were not stocked into Stamford Reservoir until summer 2019, and existing fish were likely survivors of the golden alga kill and/or had come from surrounding areas within the watershed during high-flow events. Nonetheless, Channel Catfish appear to have some evidence of recruitment.

Largemouth Bass: During the exploratory bass-only electrofishing sample in 2015, Largemouth Bass were caught at a rate of 32.0/h, and only one legal, 17-inch fish was caught (Figure 7). Fish in the sample were mostly sub-stock length ranging from 3-7 inches. In fall 2018, Largemouth Bass were caught at a rate of 17.1/h, and stock-length fish were caught at a rate of 8.6/h (Figure 8). Only one legal, 15-inch fish was caught during the survey. In 2018, the target sample of 13 legal length fish (13.0-14.9 inches) for age estimation was not achieved, nor was the desired sample of 30 fish for assessing Florida Largemouth Bass allele frequency. Despite the low sample size in 2018, Florida Largemouth Bass genetic influence appeared to be high (70.0%; Table 8).

White Crappie: White Crappie were caught at a rate of 18.2/nn during the 2018 trap netting survey, and stock-length fish were sampled at a rate of 9.8/nn (Figure 9). Catch rate of legal White Crappie was 1.9/nn.

The size distribution of fish ranged from 2-13 inches (PSD=30), and most fish were sub-stock length. Mean relative weights of stock-length fish were good (W_r≥100) to excellent for most inch groups. The target sample size of 13 fish for age estimation at legal length was not achieved, though the mean age at legal length of the fish sampled was 1.9 years (N=7; Figure 10). The total catch rate and the size distribution in the 2018 sample were indicative of a recovering White Crappie fishery.

Fisheries Management Plan for Stamford Reservoir, Texas

Prepared – July 2019

ISSUE 1: The reservoir's fishery for Blue Catfish is recovering from the previous drought as well as the March 2015 golden alga kill. A supplemental stocking may be necessary to increase population growth and recruitment.

MANAGEMENT STRATEGIES

1. Should water quality conditions and water level permit, stock Blue Catfish in 2020 at a rate of 15/acre.
2. Stock Florida Largemouth Bass at a rate of 1,000/shoreline km in 2021.

ISSUE 2: Stamford Reservoir has areas with ample vegetation when water level is high. However, the reservoir has limited structural fish habitat, and much of it is unavailable once water level drops about 4-5 ft. from conservation pool elevation. A habitat enhancement project to increase structural habitat may allow for better fish survival and fishing quality.

MANAGEMENT STRATEGY

1. Speak with City of Stamford about potential fisheries habitat improvement opportunities at Stamford Reservoir.

ISSUE 3: The boat ramp and dock at Stamford Marina are in poor condition and need to be repaired.

MANAGEMENT STRATEGY

1. Continue discussions with City of Stamford about the poor condition of the Stamford Marina boat ramp and its dock as well as possible strategies to address the issues such as a Motor Boat Access Grant.

ISSUE 4: Golden alga is established in the reservoir, and it poses a threat to existing fisheries.

MANAGEMENT STRATEGY

1. Golden alga cell counts and toxicity will be monitored periodically during the cold season (November-March) annually.

ISSUE 5: Salt cedar (*Tamarix* spp.) is established throughout various sections of the reservoir. While much shoreline coverage was inundated with the 2016 and fall 2018 flood events, multiple areas still have existing coverage. To date, no control measures have been taken.

MANAGEMENT STRATEGY

1. Inform City of Stamford about the salt cedar establishment and discuss possible measures of control.

ISSUE 6: 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 owners at Anchor and Stamford marinas 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 by 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 Stamford Reservoir include Channel Catfish, Blue Catfish, Largemouth Bass, and White Crappie. Known important forage species include Gizzard Shad and sunfishes, particularly Bluegill and Longear Sunfish, as well as Inland Silversides. The reservoir was devastated by prolonged drought from 2012-2015 and a moderate lake-wide golden alga kill in March 2015, and many popular sport fish populations in the reservoir endured substantial losses in abundance. Since the reservoir refilled from heavy rainfall during 2015-2016, fish populations have been recovering. More information is presented in Table 9.

Low-Density Fisheries: Flathead Catfish are present in the reservoir, and they have been managed with the statewide harvest regulations. but are thought to support a small component of the catfish fishery. White Bass are present in the reservoir, and they are managed with the statewide harvest regulations. Traditional monitoring efforts for White Bass have been by gill netting with effort of five net nights. While the reservoir has previously produced adequate catches of White Bass in monitoring surveys, the population anecdotally supports a minor fishery. Therefore, gill netting will not be conducted during this monitoring cycle to monitor White Bass. Presence/absence of low-density sportfish species will be documented concurrently while sampling for other species.

Survey objectives, fisheries metrics, and sampling objectives

Prey species: Gizzard Shad and Bluegill comprise most of the prey community in Stamford Reservoir. Prey species will be monitored by nighttime electrofishing conducted during fall 2022. Sampling will occur at 12 randomly selected 5-minute stations for a duration of 1.0 h. Total catch-per-unit-effort (CPUE) will be determined for prey with no target precision. A sample of 50 Gizzard Shad will be attempted to be collected for generating a length frequency distribution and evaluating Index of Vulnerability. Fifty Bluegill ≥stock-length will be attempted to evaluate size structure as Proportional Size Distribution (PSD). If sampling objectives are not achieved, no additional sampling will be conducted unless additional sampling is necessary to achieve unfulfilled objectives for Largemouth Bass monitoring.

Blue Catfish: Anecdotally, catfishes historically supported a popular fishery at Stamford Reservoir. Blue Catfish were thought to support a bulk of the directed fishing effort for the catfish fishery. The species has been managed with the statewide 12-inch minimum length limit and 25-fish daily bag limit (in combination with Channel Catfish). During 2016, Blue Catfish fingerlings were stocked into the reservoir to restore the fishery following the golden alga kill. Historical monitoring for Blue Catfish has been achieved by both gill netting and low-frequency electrofishing. Future sampling is necessary to monitor the status of the fishery and recovery of the Blue Catfish population. Data will also be used to inform anglers about the fishery and to reassess and refine existing management strategies. Given that traditional gill netting surveys have yielded low catch rates and have not produced adequate sample sizes of ≥50 stock-length fish, gill netting will not be conducted during spring 2023 to monitor Blue Catfish. Low frequency electrofishing will be conducted instead during late spring or early summer 2022 for 1.0 h at 20 randomly selected 5-minute stations if the schedule and spring weather conditions allow. A target of ≥50 fish ≥stock length will be attempted to evaluate size structure, and about five fish per represented inch group will be weighed to assess relative weight. Otoliths from 13 fish, 11.0-12.9 inches will be collected to assess growth to legal length.

Channel Catfish: Channel Catfish have been managed by the statewide 12-inch minimum length limit (MLL) and 25 fish daily bag limit. Historical monitoring for Channel Catfish has been achieved with spring gill netting surveys. However, tandem hoop netting survey were conducted in summer 2017 and 2018. Low

catch in these monitoring surveys was expected to be low given the severity of the golden alga kill. Stockings of Channel Catfish were not conducted during the monitoring period. Channel Catfish will be requested for upcoming stocking plans to boost their recruitment potential, and no additional sampling will be conducted to specifically monitor Channel Catfish during this monitoring cycle. Presence/absence of Channel Catfish will be noted during other surveys.

Largemouth Bass: Largemouth Bass support an anecdotally popular fishery at Stamford Reservoir. Long-term drought and the golden alga kill resulted in substantial losses in abundance and poor recruitment during the last reporting cycle. Largemouth Bass were stocked during spring 2015-2017 and in summer 2019 to restore the fishery. A nighttime survey was attempted in fall 2018 but had to be stopped because of equipment issues. Continuation of sampling is necessary to determine the status of the fishery, to inform constituents about the Largemouth Bass fishery, and reassess and refine management strategies. To continue monitoring efforts, nighttime electrofishing will be conducted in fall 2020 and fall 2022 for a duration of 1.0 hour at 12, 5-minute stations. Relative abundance (i.e., CPUE Total, Stock CPUE, and CPUE-14) will be calculated; desired precision of RSE≤25 will be attempted for CPUE-Total and Stock CPUE only. A sample of ≥50 stock-length fish will be attempted to be collected to evaluate size structure as PSD, and five fish per represented inch group ≥stock length will be weighed and measured to assess body conditions (i.e., relative weight). Fin clips will be collected from a random sample of 30 fish to determine allele frequencies of the Florida and Northern Largemouth Bass strains. Otoliths will be collected from 13 fish, 13.0-14.9 inches (category II sample) to assess growth to legal length. If sampling objectives are not achieved, up to one hour of additional sampling may be conducted if deemed feasible. Non-random sampling may be conducted to improve the category II age sample. Stamford Reservoir is a turbid reservoir, and visibility of fish during sampling can be poor during the nighttime. Thus, turbidity conditions may result in suboptimal capture of fish. Should time and weather permit, evaluation of the feasibility of daytime electrofishing for monitoring Largemouth Bass and prey species may be also conducted during fall 2020 with equal effort and compared to the nighttime sample.

White Crappie: White Crappie support a popular fishery at the reservoir, and they have been managed by the 10-inch minimum length limit and 25-fish daily bag limit. Traditionally, White Crappie have been monitored by trap netting with at least 10 net nights during late fall. Sampling for White Crappie was last conducted during fall 2018. The recent sample was suggestive of a recovering White Crappie population. Future monitoring is necessary to assess the recovery of this population as well as the information will be used to inform constituents on the status of the fishery. Trap netting will be conducted during late fall 2020 and 2022 by deploying trap nets among 10 randomly selected stations. Total catch rate, Stock CPUE, and CPUE-10 will be calculated to monitor relative abundance. Target precision for CPUE-Total and Stock CPUE will be RSE≤25, and CPUE-10 will be determined without a target precision. A sample of ≥50 stock-length fish will be collected to evaluate size structure as PSD, and five fish per represented inch group ≥stock-length will be measured and weighed to assess body conditions (i.e., relative weights). A sample of 13 fish, 9.0-10.9 inches will be retained to assess age at legal length. If sampling objectives are not achieved, an additional five trap nets may be set if deemed feasible.

Creel: A creel survey will not be conducted during the 2019-2023 monitoring cycle.

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Tables and Figures

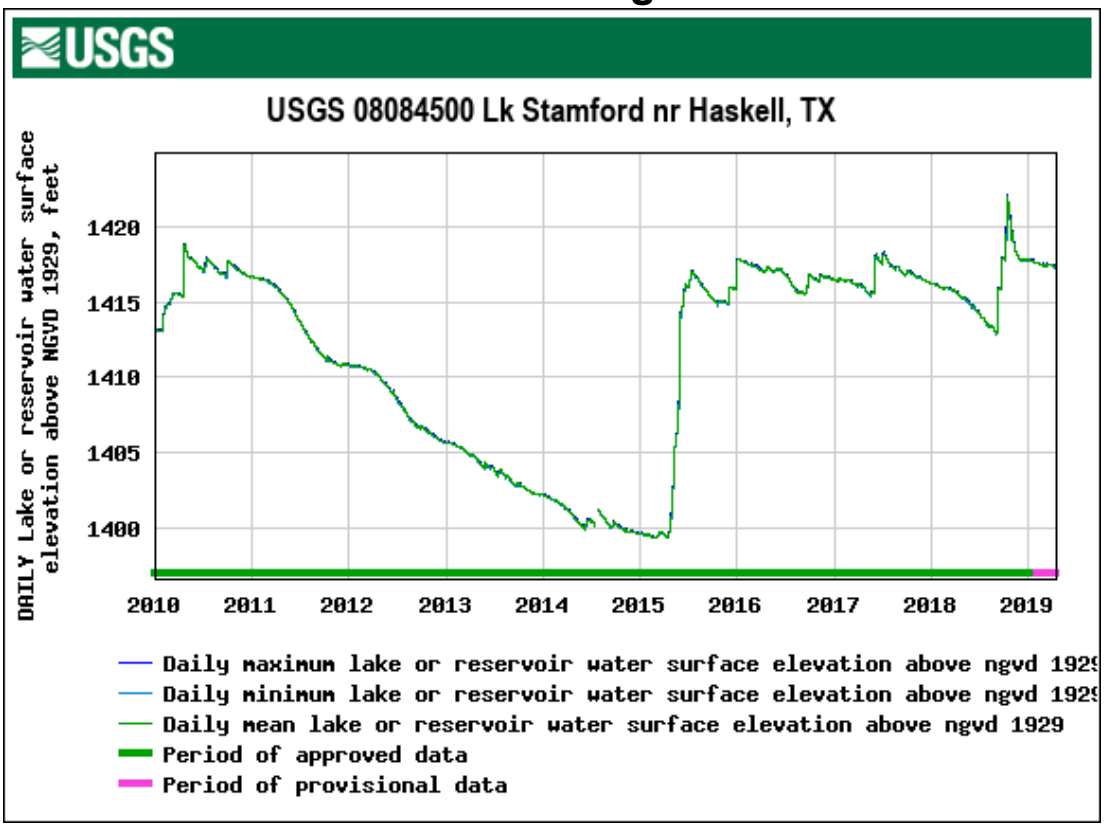


Figure 1. Daily water level elevations in feet above mean sea level (MSL) recorded for Stamford, Reservoir, Texas, 2010-2019 (USGS 2019).

Table 1. Characteristics of Stamford Reservoir, Texas.

Characteristic	Description
Year Constructed	1953
Controlling Authority	City of Stamford
County	Haskell
Reservoir Type	Tributary; Paint Creek
River Basin	Brazos
Shoreline Development Index	6.23
USGS 8-Digit Hydrologic Unit Watershed	12060103 (Paint Creek)
Conservation Pool Level (ft. above mean sea level)	1,417
Maximum Depth (ft. above mean sea level)	1,381
Conductivity (µS/cm)	695-3,200

Table 2. Boat ramp characteristics for Stamford Reservoir, Texas, March 2019. Reservoir elevation at time of survey was at conservation pool level (1,417 ft. above mean sea level).

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft.)	Condition
Stamford Marina	33.046454º -99.609365º	Y	20	1,405	Accessible; needs repair
Anchor Marina	33.068464º -99.599612º	Y	10	1,413	Multiple Lanes; Accessible

Table 3. Harvest regulations for Stamford 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 Stamford Reservoir, Texas. FRY = fry <1 in.; FGL = fingerling 1-3 in.

Species	Year	Number	Size
Catfish, Blue	1974	25,300	FGL
	1977	41,250	FGL
	1991	52,000	FGL
	2016	257,183	FGL
	Total	375,733	
Catfish, Channel	1971	2,250	FGL
	1973	13,000	FGL
	1974	1,500	FGL
	2003	149,712	FGL
	2019	108,386	FGL
	Total	166,462	
Bass, Florida Largemouth	1977	60,720	FGL
	1978	116,200	FGL
	1985	83,435	FGL
	1986	71,500	FRY
	1996	260,933	FGL
	1998	262,295	FGL
	2001	100,735	FGL
	2002	263,514	FGL
	2015	268,999	FGL
	2016	95,024	FGL
	2017	95,497	FGL
	2019	95,910	FGL
	Total	1,774,762	
Bass, Palmetto	1977	23,500	FGL
	1979	46,900	FGL
	1982	46,016	FGL
	Total	116,416	
Walleye	1976	1,000,000	FRY
	1977	1,227,000	FRY
	1978	1,150,000	FRY
	Total	3,377,000	

Table 5. Objective-based sampling plan components for Stamford Reservoir, Texas 2018–2019.

Gear/target species	Survey objective	Metrics	Sampling objective
Electrofishing			
Gizzard Shad	Relative Abundance	CPUE–Total	RSE≤25
	Size Structure	Length frequency	N≥50
	Prey Availability	IOV	N≥50
Bluegill	Relative Abundance	CPUE-Total	RSE≤25
	Size Structure	Length Frequency, PSD	N≥50 stock-length
Largemouth Bass	Relative Abundance	CPUE-Total, Stock CPUE, CPUE-14	RSE≤25 (CPUE-Total and Stock CPUE); Practical Effort for CPUE-14
	Size Structure	Length Frequency, PSD	N≥50 stock-length
	Body Conditions	W_r	N≥5 fish/inch group
	Genetics	Allele Frequencies for FLMB and NLMB	N=30 (random)
	Age and Growth	Age at Legal Length	N=13, 13.0-14.9 inches
Low-Frequency Electrofishing			
Blue Catfish	Relative Abundance	CPUE-Total and Stock CPUE	RSE≤25
	Size Structure	Length Frequency, PSD	N≥ 50 stock-length
	Body Conditions	W_r	N≥5 fish/inch group
Trap netting			
White Crappie	Relative Abundance	CPUE–Total, CPUE–Stock, CPUE-10	RSE≤25 (CPUE-Total and Stock CPUE); Practical Effort (CPUE-10)
	Size Structure	Length Frequency, PSD	N≥50 stock-length
	Body Conditions	W_r	N≥5 fish/inch group
	Age and Growth	Age at Legal Length	N=13, 9.0-10.9 inches

Table 6. Percent occurrence and associated 95% confidence intervals (parentheses) for structural habitat types along the shoreline (174 points) encountered during the summer 2018 habitat survey, Stamford Reservoir, Texas. Water level at time of survey was approximately 6 ft. below conservation pool level (1,411 ft. above mean sea level).

Habitat Type	% Shoreline
Boat Ramp	<1.0
Bulkhead	1.7 (±1.9)
Rock Bluff	3.4 (±2.7)
Boat Dock/Pier	1.7 (±1.9)
Gravel	7.5 (±3.9)
Rocky Shoreline	17.2 (±5.6)
Natural Shoreline	70.1 (±6.8)

Table 7. Percent occurrence and associated 95% confidence intervals (parentheses) for vegetation types throughout the reservoir (197 points) and along the shoreline (174 points) encountered during the summer 2018 vegetation survey, Stamford Reservoir, Texas. Water level at time of survey was approximately 6 ft. below conservation pool level (1,411 ft. above mean sea level).

Habitat type	% Reservoir	% Shoreline
Logs/Fallen Timber	<1.0	<1.0
Spikerush	<1.0	<1.0
Black Willow	<1.0	1.7 (±1.9)
Common Buttonbush	<1.0	1.7 (±1.9)
Waterstargrass	<1.0	3.4 (±2.7)
Cattail	<1.0	5.2 (±3.3)
American Pondweed	<1.0	5.7 (±3.4)
Coontail	1.3 (±1.6)	2.3 (±2.2)
Smartweed	1.5 (±1.7)	1.7 (±1.9)
Standing Timber	3.5 (±2.6)	5.2 (±3.3)
American Lotus	9.4 (±4.1)	13.8 (±5.1)
Bulrush	13.2 (±4.7)	54.0 (±7.4)
Flooded Terrestrial Vegetation	36.1 (±6.7)	37.9 (±7.2)
Open Water/Featureless	58.4 (±6.9)	19.0 (±5.8)

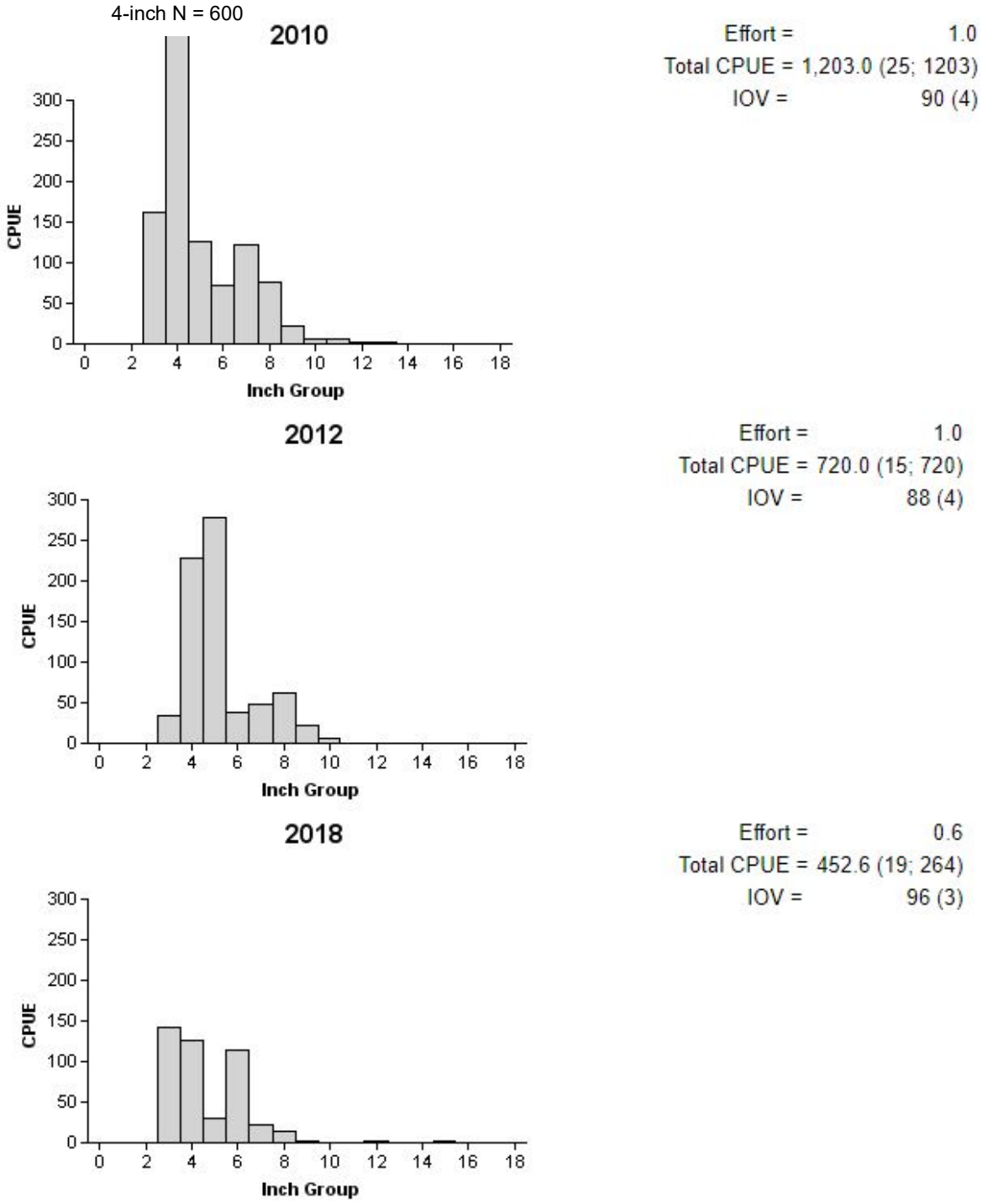


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for the fall 2010, 2012, and 2018 electrofishing surveys at Stamford Reservoir, Texas.

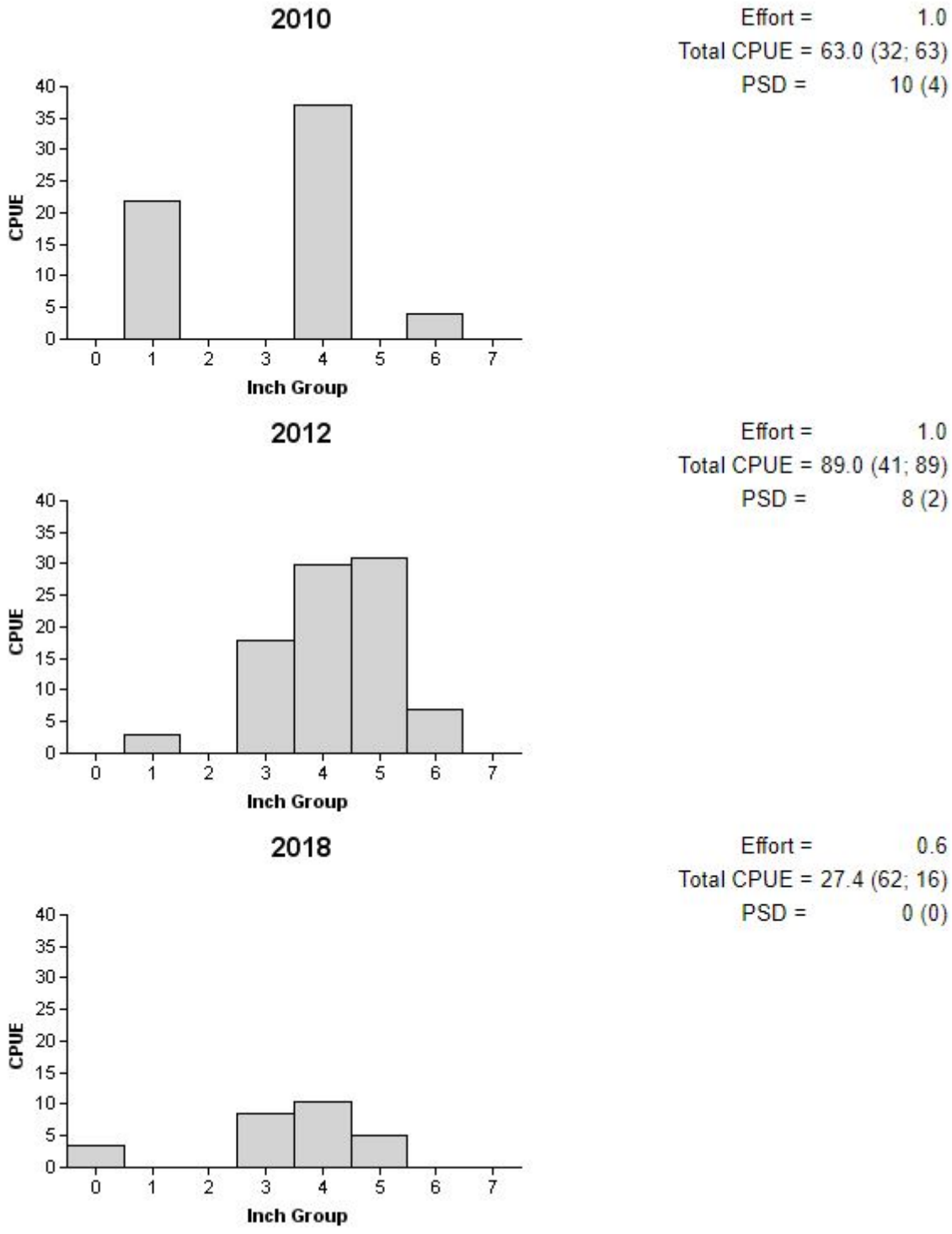


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD are in parentheses) for the fall 2010, 2012, and 2018 electrofishing survey, Stamford Reservoir, Texas.

Blue Catfish

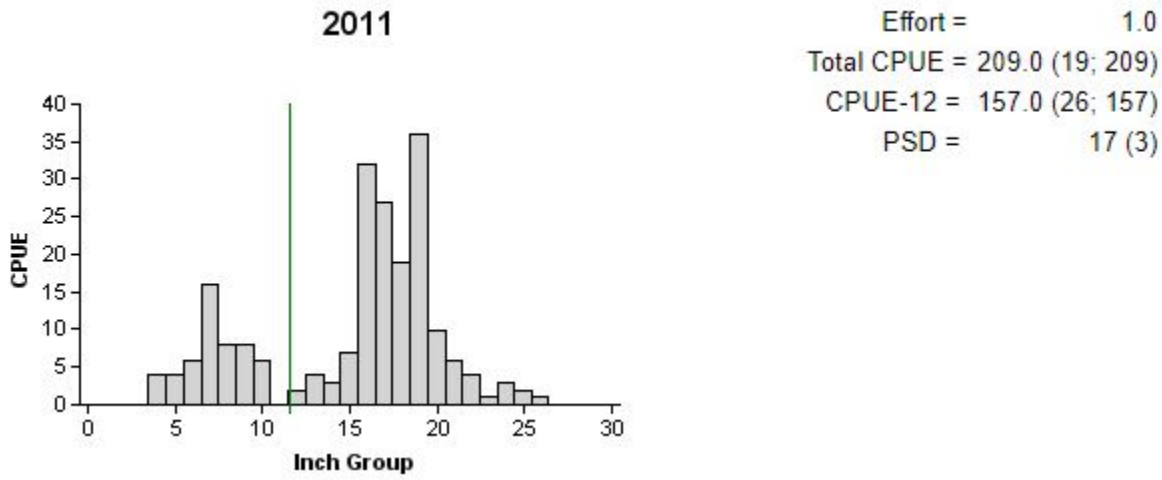


Figure 4. Number of Blue Catfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD are in parentheses) for the spring 2011 low-frequency electrofishing survey, Stamford Reservoir, Texas. Vertical line denotes the minimum length limit.

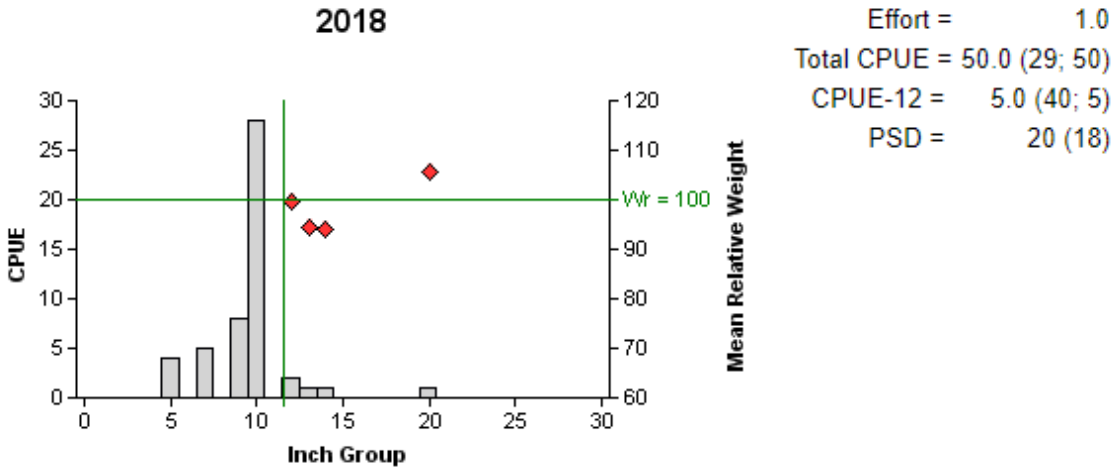


Figure 5. Number of Blue Catfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for PSD are in parentheses) for the summer 2018 low-frequency electrofishing survey, Stamford Reservoir, Texas. Vertical line denotes the minimum length limit.

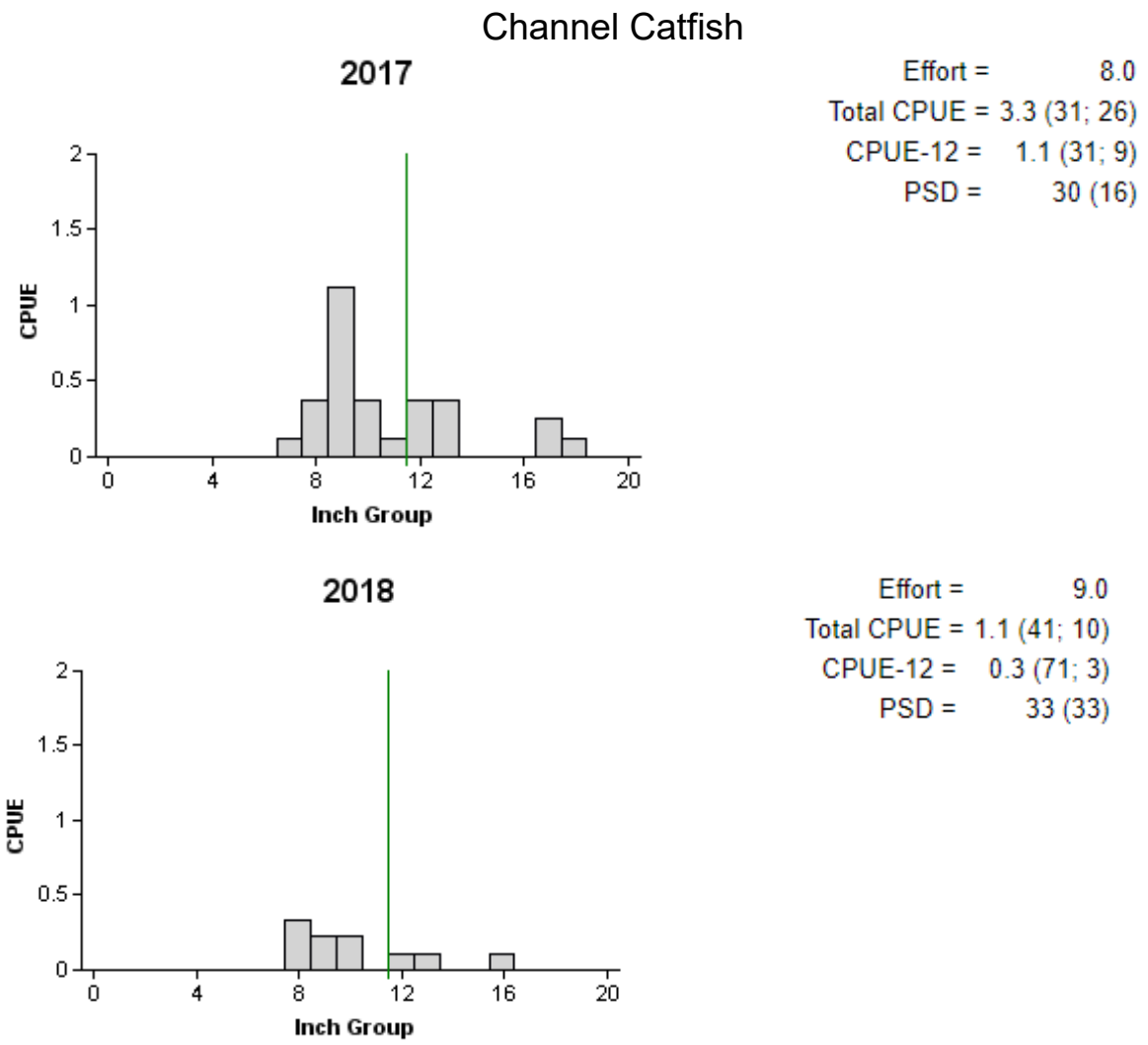


Figure 6. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for PSD are in parentheses) for the summer 2017 and 2018 tandem hoop netting surveys, Stamford Reservoir, Texas. Vertical line denotes the minimum length limit.

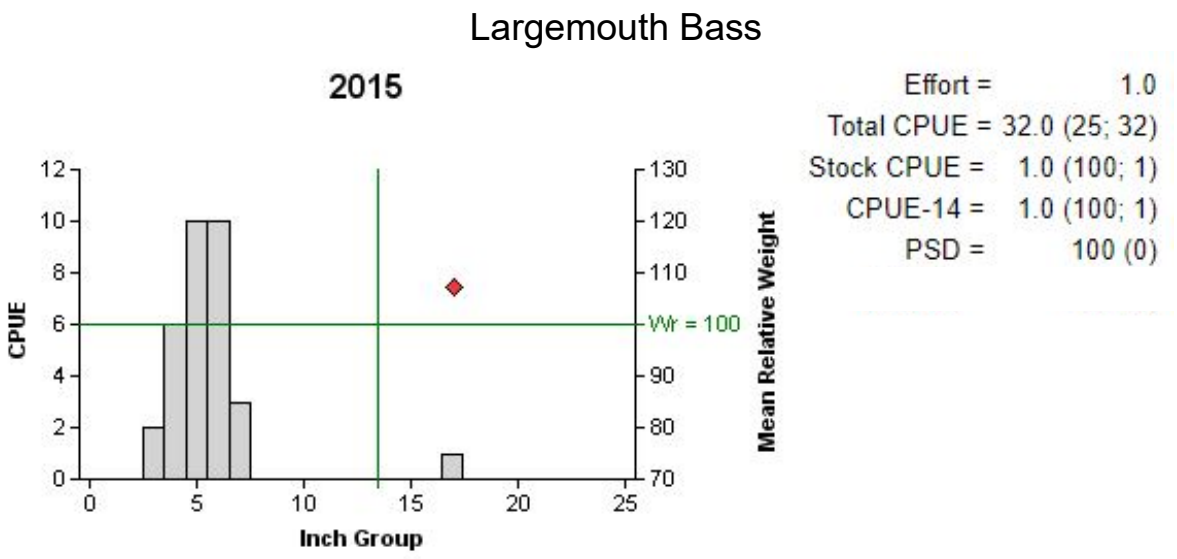


Figure 7. Number of Largemouth Bass caught per hour (CPUE, bars), population indices (RSE and N for CPUE and SE for PSD are in parentheses), and mean relative weights (diamonds) for the spring 2015 daytime electrofishing survey, Stamford Reservoir, Texas. The vertical line denotes the minimum length limit, and the horizontal line represents relative weight at 100.

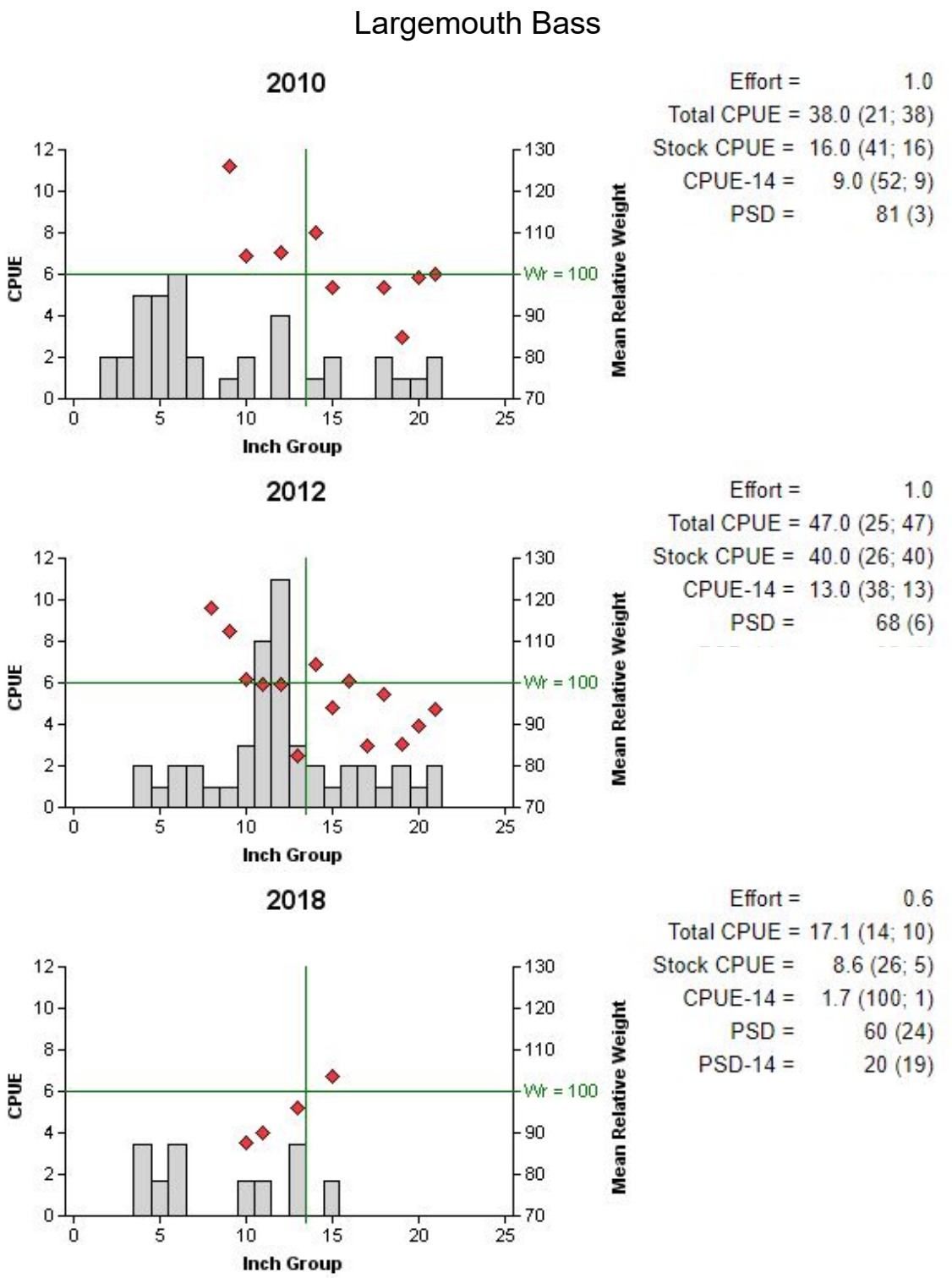


Figure 8. Number of Largemouth Bass caught per hour (CPUE, bars), population indices (RSE and N for CPUE and SE for PSD are in parentheses) and mean relative weights (diamonds) for the fall 2010, 2012 and 2018 nighttime electrofishing surveys, Stamford Reservoir, Texas. The vertical line denotes the minimum length limit, and the horizontal line represents relative weight at 100.

Largemouth Bass

Table 8. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Stamford Reservoir, Texas, 2015 and 2018. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by micro-satellite DNA analysis.

Year	Sample Size	Number of Fish			% FLMB Alleles	%FLMB
		FLMB	Intergrade	NLMB		
2015	30	22	8	0	90.6	73.3
2018	10	2	8	0	70.0	20.0

White Crappie

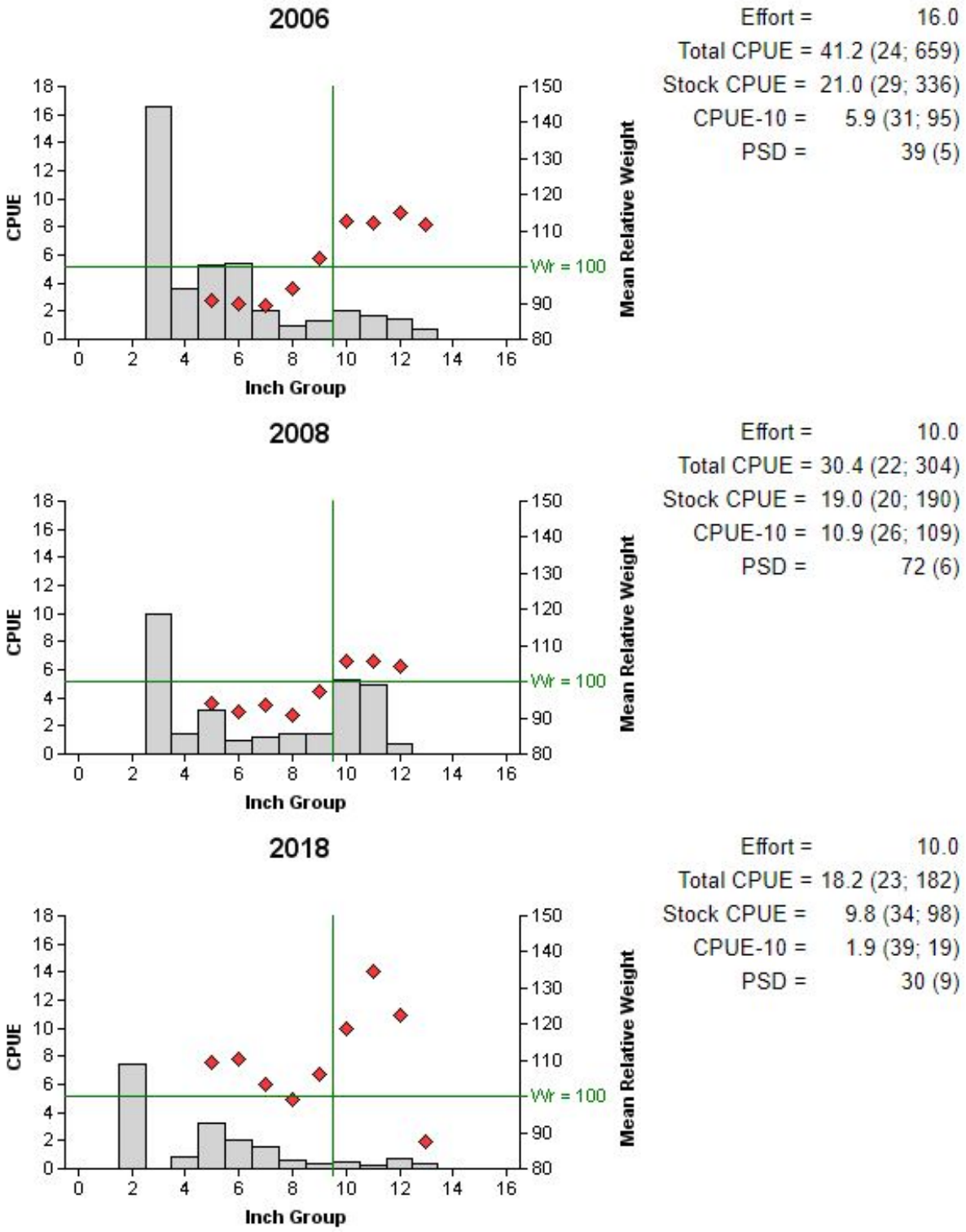


Figure 9. White Crappie caught per net night (CPUE, bars), population indices (RSE and N for CPUE and SE for PSD are in parentheses) and mean relative weights (diamonds) for the fall 2018 trap netting survey, Stamford Reservoir, Texas. The vertical line denotes the minimum length limit, and the horizontal line represents relative weight at 100.

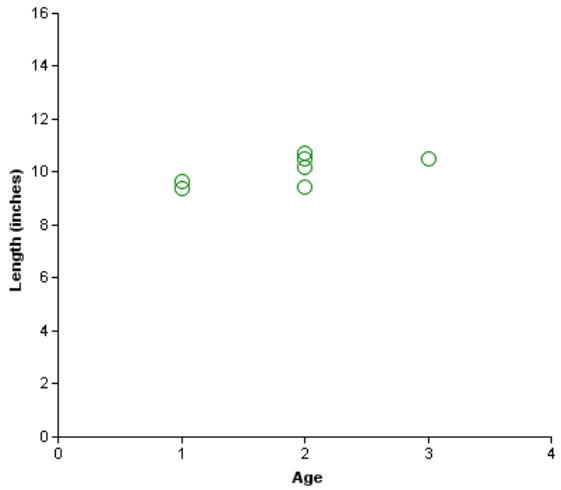


Figure 10. Age distribution for sample of White Crappie (N=7) taken from fall 2018 trap netting survey, Stamford Reservoir, Texas.

Proposed Sampling Schedule

Table 9. Proposed sampling schedule for Stamford Reservoir, Texas. Survey period is June 2019-May 2023. Gill netting surveys are conducted in the spring, low-frequency electrofishing is conducted in late spring to early summer, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

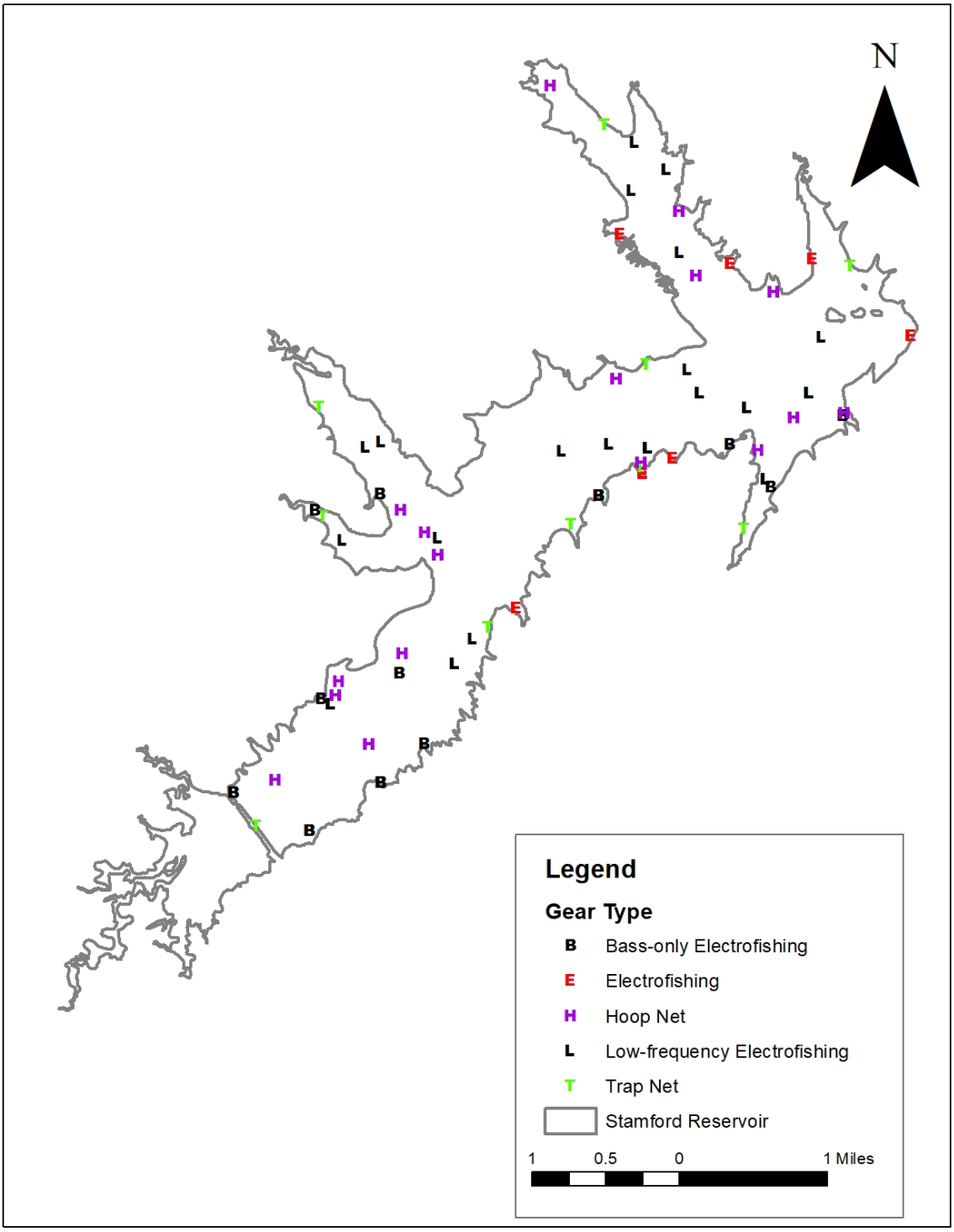
	Survey year			
	2019-2020	2020-2021	2021-2022	2022-2023
Angler Access				S
Vegetation				S
Electrofishing – Fall		A		S
Electrofishing – Low frequency				A
Trap netting		A		S
Report				S

Appendix A

Number (N) and catch per unit effort (CPUE; RSE in parentheses) of all target species collected from all gear types from Stamford Reservoir, Texas, 2018. Sampling effort was 1.0 hour for low-frequency electrofishing, 35 minutes for nighttime electrofishing, 10 net nights for fall trap netting, and 1 hour for daytime electrofishing. Inland Silversides were visually abundant as a prey species, but they could not be sampled with the standardized gear.

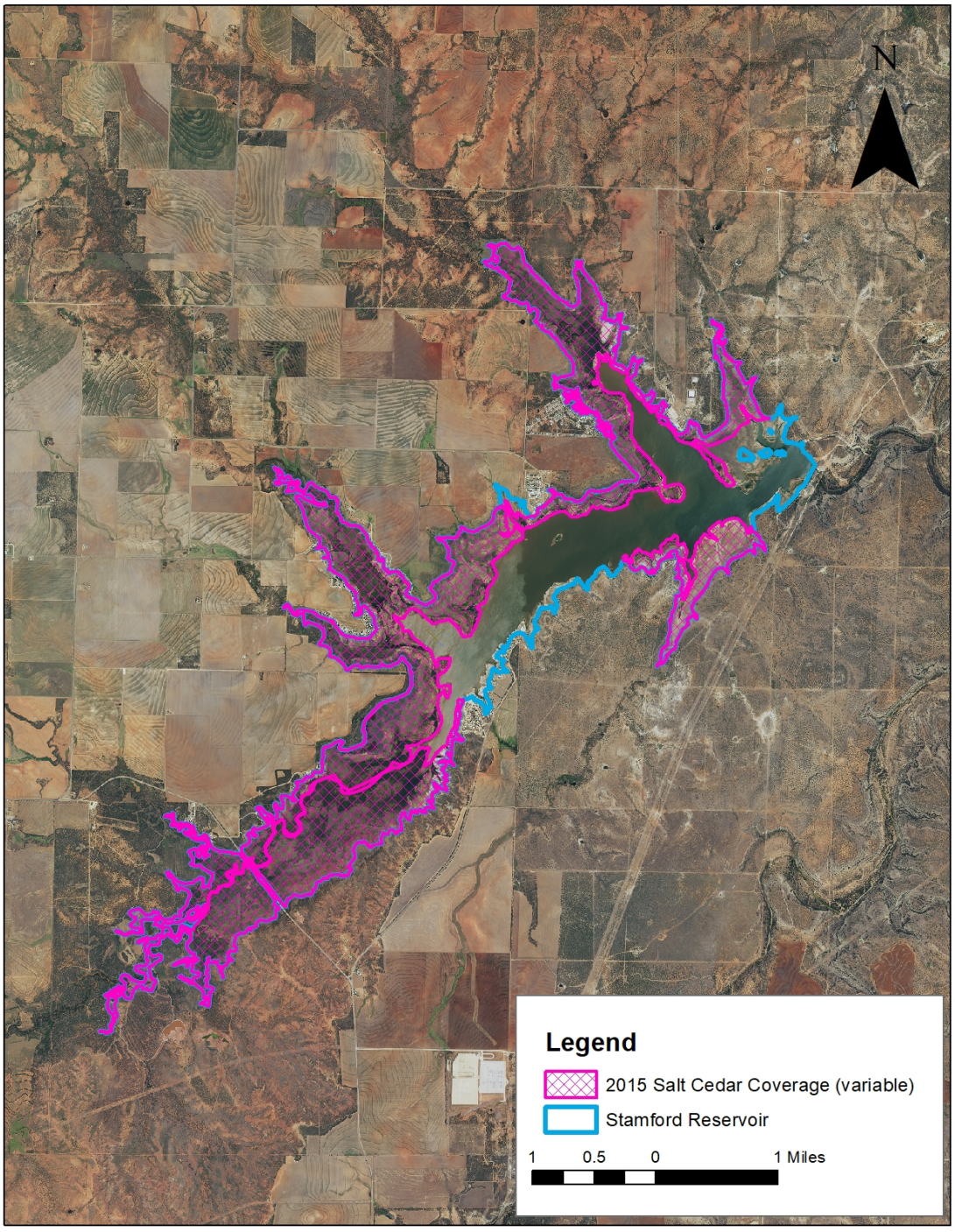
Species	Low-frequency Electrofishing		Electrofishing		Trap Netting		Hoop Netting	
	N	CPUE	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad			264	452.6 (19)				
Common Carp							2	0.2 (66)
Smallmouth Buffalo							2	0.2 (66)
Blue Catfish	50	50.0 (29)					3	0.3 (50)
Channel Catfish	1	1.0 (100)					10	1.1 (41)
Green Sunfish			1	1.7 (100)				
Warmouth			1	1.7 (100)			1	0.1 (100)
Orangespotted Sunfish			1	1.7 (100)				
Bluegill			16	27.4 (62)			6	0.7 (56)
Longear Sunfish			7	12.0 (58)				
Largemouth Bass			10	17.1 (14)				
White Crappie					182	18.2 (22)	41	4.6 (28)
Freshwater Drum							3	0.3 (71)

Appendix B



Locations of bass-only electrofishing (B), electrofishing (E), low-frequency electrofishing (L), and trap netting (T) stations at Stamford Reservoir, Texas, 2016-2019.

Appendix C



Map of the aerial survey of Salt Cedar (*Tamarix* spp.) coverage, Stamford Reservoir, Texas, July 2015. Water level at the time of the survey was within 1.0 ft from conservation pool (1,416 ft. above mean sea level).

Appendix D

Golden alga (*Prymnesium parvum*) cell count, toxicity, and associated specific conductivity measurements for samples collected at Stamford Reservoir, Texas, 2014-2019. For samples without cells detected, toxicity analyses were not conducted (NC). BDL = Below Detectable Limit; ITUs = Ichthyotoxic Units; N/A = Not Available.

Date	Site	Cell Count	Toxicity	ITUs	Specific Conductivity (uS/cm)
1/13/2014	Unidentified Site	0 / *P. parvum* suspect	Non-toxic	0	N/A
12/9/2014	Stamford Marina	6,000	Non-toxic	0.0	N/A
12/9/2014	Anchor Marina	9,000	Non-toxic	0.0	N/A
1/26/2015	Stamford Marina	36,000	Non-toxic	0.0	2,340
1/26/2015	Anchor Marina	31,000	Non-toxic	0.0	2,388
3/3/2015	Anchor Marina	66,000	Non-toxic	0.0	2,115
3/3/2015	Stamford Marina	71,000	Non-toxic	0.0	2,037
3/18/2015	Stamford Marina	98,000	Non-toxic	0.0	N/A
3/18/2015	Anchor Marina	284,000	Moderate	5.0	N/A
5/11/2015	Anchor Marina	1,000	Non-toxic	0.0	N/A
5/11/2015	Stamford Marina	0 / *P. parvum* suspect	NC	NC	N/A
12/7/2015	Stamford Marina	0/BDL	NC	NC	N/A
12/7/2015	Anchor Marina	0 / *P. parvum* ID	NC	NC	N/A
1/11/2016	Anchor Marina	0 / *P. parvum* suspect	NC	NC	N/A
2/15/2016	Anchor Marina	0/BDL	NC	NC	N/A
1/9/2017	Stamford Marina	0/BDL	NC	NC	N/A
1/9/2017	Anchor Marina	0 / *P. parvum* suspect	NC	NC	695
2/8/2017	Stamford Marina	0/BDL	NC	NC	1031
2/8/2017	Anchor Marina	0/BDL	NC	NC	1031
12/13/2017	Stamford Marina	0 / *P. parvum* suspect	NC	NC	930
12/13/2017	Anchor Marina	0 / *P. parvum* ID	NC	NC	940
1/9/2018	Stamford Marina	0 / BDL	NC	NC	960
1/9/2018	Anchor Marina	0 / BDL	NC	NC	960
2/26/2018	Stamford Marina	0 / BDL	NC	NC	N/A
2/26/2018	Anchor Marina	0 / BDL	NC	NC	N/A
12/10/2018	Anchor Marina	0 / BDL	NC	NC	695
12/10/2018	Stamford Marina	0 / BDL	NC	NC	703
1/14/2019	Anchor Marina	0 / BDL	NC	NC	787
1/14/2019	Stamford Marina	0 / *P. parvum* ID	NC	NC	909
2/20/2019	Anchor Marina	0 / *P. parvum* suspect	NC	NC	895
2/20/2019	Stamford Marina	0 / BDL	NC	NC	920

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