PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-221-M-6

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2015 Fisheries Management Survey Report

Brandy Branch Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Brandy Branch Reservoir were surveyed in 2015 using electrofishing. Anglers were surveyed from December 2015 through February 2016 with a creel survey. Historical data are presented with the 2015/2016 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:** Brandy Branch Reservoir is a 1,257-acre impoundment of Brandy Branch Creek in the Sabine River Basin in Harrison County. It is used for power plant cooling and recreation. Structural habitat is mainly inundated timber. Hydrilla was the most dominant aquatic plant species during the 2015 survey. Eurasian watermilfoil was discovered in 2007 and has expanded in recent years. Giant salvinia was introduced from a boat trailer in 2008 and immediate efforts to eradicate this invasive species were successful. There have been several other giant salvinia introductions; all have been eradicated to date. Tilapia were discovered in the reservoir in 2015. Their presence is likely due to an unauthorized introduction; they were not intentionally stocked by Texas Parks and Wildlife.

- **Management History:** Largemouth Bass are the primary sport fish in this reservoir. All sport fish have historically been managed with statewide harvest regulations.

- **Fish Community**
  - **Prey species:** Threadfin Shad were present in the reservoir. Low numbers of Gizzard Shad have been collected during past surveys, but none were observed during the 2015 survey. Electrofishing catch of Bluegills was much lower than past surveys, but Largemouth Bass relative weights (body condition) indicate adequate prey availability in the reservoir.

  - **Catfishes:** Due to historically low density and lack of directed angling effort, no sampling was conducted to survey the Channel Catfish population.

  - **Largemouth Bass:** Largemouth Bass population had moderate abundance, good size structure, and adequate recruitment. The number of fish >14 inches was slightly higher in 2015 compared to 2013. Largemouth Bass had fast growth rates; the average age of 14-inch fish was 2 years. Of 30 fish submitted for genetic testing in 2015, 93% were pure Florida Largemouth Bass. Most (98.6%) anglers during the winter 2015/2016 creel survey fished specifically for Largemouth Bass. Angling catch rate of Largemouth Bass during this period was 0.6 fish/h.

  - **Black Crappie:** Due to historically low abundance and limited directed angling effort, no sampling was conducted to survey the Black Crappie population.

Management Strategies: Continue to monitor the reservoir for invasive aquatic plant coverage and new giant salvinia introductions during annual invasive plant surveys and periodic boat ramp inspections. Provide technical guidance to the controlling authority related to invasive species management. Conduct an additional electrofishing survey in fall 2017, and general monitoring surveys with electrofishing in 2019. Access and vegetation surveys will be conducted in 2019.

INTRODUCTION

This document is a summary of fisheries data collected from Brandy Branch Reservoir in 2015/2016. 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 2015/2016 data for comparison.

Reservoir Description

Brandy Branch Reservoir is a 1,257-acre impoundment constructed in 1983 on Brandy Branch Creek in the Sabine River Basin. It is located in Harrison County near the City of Hallsville. The controlling authority is American Electric Power Company (AEP). Primary water uses are power plant cooling and public recreation. It has a watershed of approximately 4.1 square miles, a shoreline length of 17 miles, and a Shoreline Development Index of 4.1. Annual water level fluctuation was 1 to 4 feet (Figure 1). Supplemental water is pumped in from Big Cypress River (Lake O' the Pines) by the controlling authority to maintain sufficient water level for power plant cooling. Structural habitat consisted primarily of inundated timber, and hydrilla was the most abundant aquatic plant. Tilapia were discovered in the reservoir in 2015. Their presence is likely due to an unauthorized introduction. Other descriptive characteristics for Brandy Branch Reservoir are in Table 1.

Angler Access

Brandy Branch Reservoir has one public boat ramp and one boat ramp located in AEP's Pirkey Environmental Park, which is available to groups by arrangement through AEP. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to the public boat ramp area, however bank fishing access is available to groups that utilize Pirkey Environmental Park.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Bister and Wright 2012) included:

1. Conduct annual surveys to monitor invasive aquatic plants. Provide technical guidance to the controlling authority regarding invasive aquatic plant management.
   Action: Surveys have been conducted each year. Hydrilla and Eurasian watermilfoil were still present. Isolated treatment has been conducted to open up areas to fishing along the bank in Pirkey Environmental Park. Giant salvinia has not established in the reservoir, but several introductions at the public boat ramp have been discovered during the review period. These infestations were isolated with floating oil-spill booms, and plants were either physically removed or treated with herbicide. No giant salvinia plants have been found since the last treatment during January 2016.
2. Participate in the controlling authority's Christmas tree fish attractor projects.
   Action: No fish attractor placement has been conducted during this report period. Instead, we have provided input on projects to improve the area at the public boat ramp and the development of Pirkey Environmental Park.
3. Provide information to the public about fisheries-related issues at Brandy Branch Reservoir.
   Action: Fishing opportunities and issues at Brandy Branch Reservoir have been discussed during public outreach events.
4. Invasive species continue to threaten Texas waters.
   Action: Efforts have been made to provide information about invasive species to the controlling authority and the public. American Electric Power transfers water from Big Cypress Bayou below Lake O' the Pines to Brandy Branch Reservoir to maintain water levels. This inter-basin water transfer is documented to facilitate any future invasive

species responses.

Harvest regulation history: Sport fishes in Brandy Branch Reservoir are currently managed with statewide regulations (Table 3).

Stocking history: Brandy Branch Reservoir was stocked initially with Florida Largemouth Bass, Channel Catfish, Coppernose Bluegill, Redear Sunfish, and Green Sunfish in 1983. Gizzard Shad and Threadfin Shad were stocked to supplement the prey base. In an effort to improve angling for Pirkey Environmental Park, Channel Catfish were stocked in 2015. The complete stocking history is presented in Table 4.

Vegetation/habitat management history: Giant salvinia and waterhyacinth were introduced to the reservoir in February 2008 by an angler who had not cleaned his boat trailer prior to launching. Immediate response by TPWD Inland Fisheries District staff resulted in the physical removal of all plants that could be found. There have been several similar introductions since then; all of which have been eradicated by TPWD. There has been limited treatment of hydrilla and Eurasian watermilfoil to clear areas to pump water by the controlling authority, or to clear areas to allow easy access for angling adjacent to Pirkey Environmental Park.

Water transfer: Brandy Branch Reservoir receives water from Lake O' the Pines to maintain sufficient water level in the reservoir for power plant operation. This constitutes water transfer from the Cypress Creek basin to the Sabine River basin.

METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Brandy Branch 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 2015).

Electrofishing – Largemouth Bass, Sunfishes, 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 13 randomly-selected fish in 2013 (range 13.0 to 14.6 inches) and 2015 (N = 13; range 13.0 to 14.8 inches).

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 through 2015.

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). Standard error (SE) was calculated for structural indices. Relative standard error (RSE = 100 X SE of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – An access-point creel survey was conducted during winter 2015/2016. The creel period was December through February. Angler interviews were conducted on 5 weekend days and 4 weekdays during the quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Habitat – The most recent structural habitat survey was conducted in 2011. Vegetation surveys were conducted in 2012 to 2015 to monitor expansion of hydrilla and Eurasian watermilfoil. Native aquatic vegetation was surveyed during in 2015. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was American Electric Power at Pirkey Power Plant.

RESULTS AND DISCUSSION

Habitat: Structural habitat in 2011 consisted primarily of standing timber (240 acres) and natural shoreline (Bister and Wright 2012, Table 6). Hydrilla was the dominant aquatic vegetation and has been relatively stable for the past several years (Table 7). Eurasian watermilfoil coverage has expanded from 14 acres in 2011 (Bister and Wright 2012) to 48 acres in 2015 (Table 7). Native aquatic vegetation covered only 5% of the reservoir's surface area compared to over 30% coverage by non-native vegetation types (Table 7). Native aquatic vegetation species observed in 2015 were cattails, reeds, white water lily, pondweed, and *Chara*.

Creel: Directed fishing effort by anglers during the winter creel survey period was almost entirely for Largemouth Bass (98.6%; Table 8). Total fishing effort during the winter survey period increased from 14,887 hours in 2007/2008 to 19,911 hours in 2015/2016 (Table 9). Direct expenditures were actually lower than the previous creel survey, which is likely because fuel prices were much higher in 2007/2008 compared to 2015/2016. The majority of anglers (69%) that were interviewed during winter 2015/2016 were from ZIP codes within 50 miles of Brandy Branch Reservoir (Appendix C).

Prey species: No Gizzard Shad were collected during the 2015 electrofishing survey. However, Bister and Wright (2012) reported their presence in previous surveys. Threadfin Shad were present during the 2015 electrofishing survey (Appendix A). Shad abundance is usually lower in reservoirs that contain aquatic vegetation. The electrofishing catch rate of Bluegill declined from 1,196/h in 2011 to 279/h in 2015 (Figure 2). Redear Sunfish were also present, but their abundance was lower than in previous surveys (Figure 3).

Channel Catfish: Channel catfish are present in Brandy Branch Reservoir, but population abundance is extremely low because water clarity is high, submersed aquatic vegetation is abundant, and predation from Largemouth Bass on juvenile catfish is likely high. Gill netting surveys in 2008 and 2012 only caught three Channel Catfish in each year. During a creel survey from December 2007 through February 2008 no directed effort or catch of Channel Catfish was documented. Therefore, sampling this low density fishery was determined to be unnecessary. One harvested 20-inch channel catfish was observed during the 2015/2016 winter creel survey.

Largemouth Bass: The electrofishing catch rate of stock-length Largemouth Bass (fish ≥ 8 inches) was 94/h in 2015, which was higher than in the previous two surveys (Figure 4). Growth of Largemouth Bass in Brandy Branch Reservoir was fast. The average age at 14 inches was 2.0 years in 2015 (N = 13; 13.0 to 14.8 inches; range 1 – 2 years) and 1.8 years in 2013 (N = 13; 13.0 to 14.9 inches; range = 1 – 4 years). Body condition was moderate (relative weight above 90) for nearly all size classes of fish in 2013 and 2015, which indicated adequate prey availability (Figure 4). Directed fishing effort for Largemouth Bass was 6,080 hours by live-release tournament anglers and 13,553 hours for non-tournament anglers (Table 10) from December 2015 to February 2016. Tournament angling effort in 2015/2016 was slightly lower than the previous survey in 2007/2008, but non-tournament effort increased by almost 100% (Table 10). Almost 9% of Largemouth Bass released were ≥ 4 pounds (Table 10). Largemouth Bass harvested by non-tournament anglers ranged from 14 to 21 inches in length (Figure 5). Largemouth Bass brought in for tournament weigh-ins exhibited a similar length range; 14 to 20 inches (Figure 6). Most (97%) legal Largemouth Bass caught by non-tournament anglers were released (Table 10). Florida Largemouth Bass

influence was high; 93% of fish in the 2015 genetic sample were pure Florida Largemouth Bass (Table 11).

Black Crappie: Trap netting surveys were discontinued in this reservoir due to historically low catch rates of Black Crappie. The last survey to collect a Black Crappie in a trap net was in 1993, in which one fish was caught. Also, no directed angling effort was identified during the 2007/2008 winter creel survey. Sampling this low density population was determined to be unnecessary.

Fisheries management plan for Brandy Branch Reservoir, Texas

Prepared – July 2016

ISSUE 1: Hydrilla was first documented in this reservoir in 1990, but has not caused access problems for anglers. The controlling authority occasionally reports issues with keeping intake screens clean of hydrilla fragments. Eurasian watermilfoil was detected in 2007, but has remained at relatively low coverage. Giant salvinia was introduced during February 2008 by a boater, and immediate response to contain, remove, and spray with herbicide resulted in the elimination of the infestation. There have been several similar introductions since then; all of which have been eradicated by TPWD. Game wardens have written several citations over the past few years to boaters that have had giant salvinia on their boat trailers.

MANAGEMENT STRATEGIES

1. Provide technical guidance to American Electric Power Company (AEP) regarding invasive aquatic plant management.
2. Work with AEP to install floating containment booms at the boat ramp in order to capture any floating invasive plants that are introduced by boaters in the future. The design of the booms should allow boats to navigate between them, so that any plants coming from a boat trailer would be held in the immediate area. During periodic inspections of the containment area, any plants present can be removed by hand and/or treated with herbicide. This strategy would provide optimal protection for the rest of the reservoir by confining any introductions to the boat ramp.
3. Continue to work with TPWD Game Wardens to patrol the boat ramp and check boat trailers for invasive species.
4. Conduct annual surveys to monitor trends and estimate coverage of invasive aquatic plants.

ISSUE 2: American Electric Power Company at Pirkey Power Plant has developed the Pirkey Environmental Park on their property at Brandy Branch Reservoir. This location is host to public user groups (e.g., Boy Scouts, Girl Scouts, fishing clubs, etc.) and includes good shoreline access and a fishing pier for angling. Hydrilla, Eurasian watermilfoil, and other plants inhibit good fishing access along some shorelines and the pier in the park. Therefore, it is important to manage aquatic vegetation to promote good fishing access.

MANAGEMENT STRATEGIES

1. Provide technical guidance to American Electric Power Company (AEP) regarding aquatic plant management in Pirkey Environmental Park.

ISSUE 3: 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 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 through the use of 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

FY 2017 – FY 2020

Sport fish, forage fish, and other important fishes

Largemouth Bass is the primary sport fish in Brandy Branch Reservoir. Extremely low density Black Crappie and Channel Catfish populations are present, but they receive little to no directed angling effort. The most important forage species is Bluegill. The electrofishing catch rate of Bluegill has been > 1,000 fish/hour in past surveys. Threadfin Shad and Redear Sunfish were present in the most recent survey, but in low numbers. Gizzard Shad have been present in the past, but abundance has historically been very low.

Low-density fisheries

Channel Catfish: Channel catfish are present in Brandy Branch Reservoir, but population abundance is extremely low because water clarity is high, submersed aquatic vegetation is abundant, and predation from largemouth bass on juvenile catfish is likely high. Gill netting surveys in 2008 and 2012 only caught three Channel Catfish in each year. A creel survey from December 2007 through February 2008 indicated that no directed effort or catch of Channel Catfish occurred. Sampling this population is unnecessary in FYs 2017 – 2020.

Black Crappie: Trap netting surveys were discontinued in this reservoir due to historically low catch rates of Black Crappie. The last survey to collect a Black Crappie was in 1993, in which one fish was caught. No directed angling effort was identified during the 2007/2008 winter creel survey. During the most recent angler creel survey during winter 2015/2016, only 1% of directed effort was toward crappie. Sampling this population is unnecessary in FYs 2017 – 2020.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Brandy Branch Reservoir. An angler creel survey conducted December 2015 through February 2016 indicated 98.6% of directed angling effort was for Largemouth Bass during the 3-month survey period. Results from this creel survey showed directed angling effort for largemouth bass to be 15.6 hours/acre. Largemouth Bass have always been managed with the statewide 14-in MLL regulation. Trend data on CPUE, size structure, growth, and body condition have been collected biennially since 1996 with fall nighttime electrofishing. Population genetics have been determined every 4 years since 2007. Continuation of biennial trend data in this clear reservoir with night electrofishing in the fall will allow for determination of 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 2017 and 2019 (Table 12), but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is $\leq$ 25. Past sampling has consistently achieved RSE of CPUE-S < 25, so we are confident we will achieve this level of precision with the minimum sampling effort. However, if failure to achieve either objective has occurred after one night of sampling, we will sample an additional 6 randomly selected stations another night. Otoliths from 13 fish between 13.0 and 14.9 inches will be collected in 2017 and 2019 to determine mean age at 14 inches to monitor large-scale changes in growth that may indicate the need for further investigation.

Relative weight of largemouth bass ≥ 8 inches (total length) will be determined from their length/weight data (maximum of 10 fish weighed and measured per inch class). Due to consistent Florida Largemouth Bass genetic influence in the population, and no anticipated stocking plans, genetic analysis will only be conducted once every 8 years beginning in 2023.

Bluegill: Bluegill is the primary prey species at Brandy Branch Reservoir. Like Largemouth Bass, trend data on CPUE and size structure of Bluegill has been collected biennially since 1996. Continuation of sampling, as per Largemouth Bass, will allow for monitoring of large-scale changes in Bluegill relative abundance and size structure. Sampling effort based on achieving sampling objectives for Largemouth Bass will result in sufficient numbers of Bluegill structure estimation (PSD; 50 fish at a minimum of 12 stations with 80% confidence). RSE for relative abundance estimates has been ≤ 25 of CPUE-Total using the traditional 12 randomly-selected stations during the past three electrofishing surveys. No additional effort will be expended to achieve an RSE ≤ 25 for CPUE-Total of Bluegill 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. 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).

Gizzard Shad and Threadfin Shad: A low density Threadfin Shad population exists in the reservoir, and Gizzard Shad have been present in previous surveys, but they are not the primary prey species. We will document their presence/absence during fall electrofishing surveys in fall 2017 and 2019 (Table 12).

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.

Bister, T. J., and L. D. Wright. 2012. Inland Fisheries Division monitoring and management program survey report for Brandy Branch Reservoir, 2011. Texas Parks and Wildlife Department, Federal Aid in Sport Fish Restoration, Grant F-221-M-2, Performance Report, Austin.

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.

Water Level

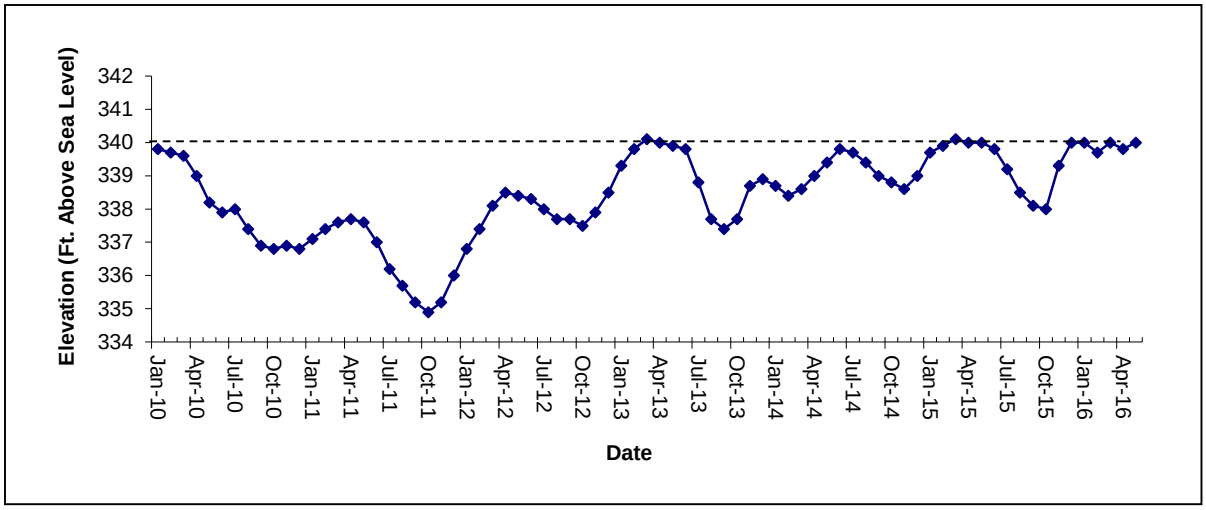


Figure 1. Monthly water level elevations in feet above mean sea level (MSL) recorded for Brandy Branch Reservoir, Texas. Conservation pool elevation = 340.0 feet MSL.

Table 1. Characteristics of Brandy Branch Reservoir, Texas.

Characteristic	Description
Year constructed	1983
Controlling authority	American Electric Power Company (AEP)
County	Harrison
Reservoir type	Tributary/Cooling
Shoreline development index (SDI)	4.1
Conductivity	364 umhos/cm

Table 2. Boat ramp characteristics for Brandy Branch Reservoir, Texas, August, 2015. Reservoir elevation at time of survey was 338.5 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Public ramp	32.437993 -94.46505	Y	30	*	Good

* End of ramp is unknown due to sand.

Table 3. Harvest regulations for Brandy Branch Reservoir, Texas.

Species	Bag limit	Length limit
Catfish, Channel	25	12-inch minimum
Catfish, Flathead	5	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 Brandy Branch Reservoir, Texas. Size categories are: FRY=<1 inch, FGL = 1-3 inches, AFGL = advanced fingerlings, ADL = adult, and UNK = unknown.

Species	Year	Number	Size
Black Crappie	1990	78,648	UNK
	Total	78,648	
Bluegill	1993	416,780	FGL
	1993	9,984	FRY
	Total	426,764	
Channel Catfish	1983	81,831	AFGL
	1984	60,252	FGL
	1986	51,573	AFGL
	1986	10,435	FGL
	2004	10,624	AFGL
	2004	64,412	FGL
	2015	6,565	ADL
	Total	285,692	
Coppernose Bluegill	1983	123,000	UNK
	1985	88,014	FRY
	Total	211,014	
Flathead Catfish	1983	16	UNK
	Total	16	
Florida Largemouth Bass	1983	120,952	FRY
	1984	242,000	FGL
	Total	362,952	
Gizzard Shad	1991	1,260	UNK
	1992	1,000	UNK
	Total	2,260	
Green Sunfish	1983	67,200	UNK
	Total	67,200	
Redear Sunfish	1983	129,450	UNK
	Total	129,450	
Threadfin Shad	1986	1,500	AFGL
	1991	1,490	ADL
	1992	1,000	ADL
	Total	3,990	
White Crappie	1986	170	ADL
	1987	15,072	FRY
	Total	15,242	

Table 5. Objective-based sampling plan components for Brandy Branch Reservoir, Texas 2015 – 2016.

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]			Presence/Absence
Threadfin Shad [a]			Presence/Absence

[a] No additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Bluegill. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

Table 6. Survey of structural habitat types, Brandy Branch Reservoir, Texas, 2011 (Bister and Wright 2012). Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Natural	17.2 miles	97.0
Concrete	0.5 miles	3.0
Standing timber	240.0 acres	19.0

Table 7. Survey of aquatic vegetation, Brandy Branch Reservoir, Texas, 2012 – 2015. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2012	2013	2014	2015
Native submersed				32.0 (2.5)
Native floating-leaved				3.0 (0.2)
Native emergent				30.0 (2.4)
Non-native				
Giant salvinia (Tier I)[a]	[b]	[b]	[b]	[b]
Hydrilla (Tier II)[a]	240.0 (19.1)	308.0 (24.5)	354.0 (28.2)	338.0 (26.9)
Eurasian watermilfoil (Tier II)[a]	23.0 (1.8)	23.0 (1.8)	42.0 (3.3)	48.0 (3.8)

[a] Tier I is immediate response status, Tier II is maintenance status.
[b] Giant salvinia not found during surveys, but has been repeatedly found and eliminated at the boat ramp.

Table 8. Percent directed angler effort by species for Brandy Branch Reservoir, Texas, winter 2007/2008 and winter 2015/2016. Survey periods were from December through February.

Species	2007/2008	2015/2016
Largemouth Bass	100	98.6
Crappie		1.0
Tilapia		0.4

Table 9. Total fishing effort (h) for all species and total directed expenditures at Brandy Branch Reservoir, Texas, winter 2007/2008 and winter 2015/2016. Survey periods were from December through February. Relative standard error is in parentheses.

Creel statistic	2007/2008	2015/2016
Total fishing effort	14,887 (39)	19,911 (40)
Total directed expenditures	$143,380 (48)	$117,804 (50)

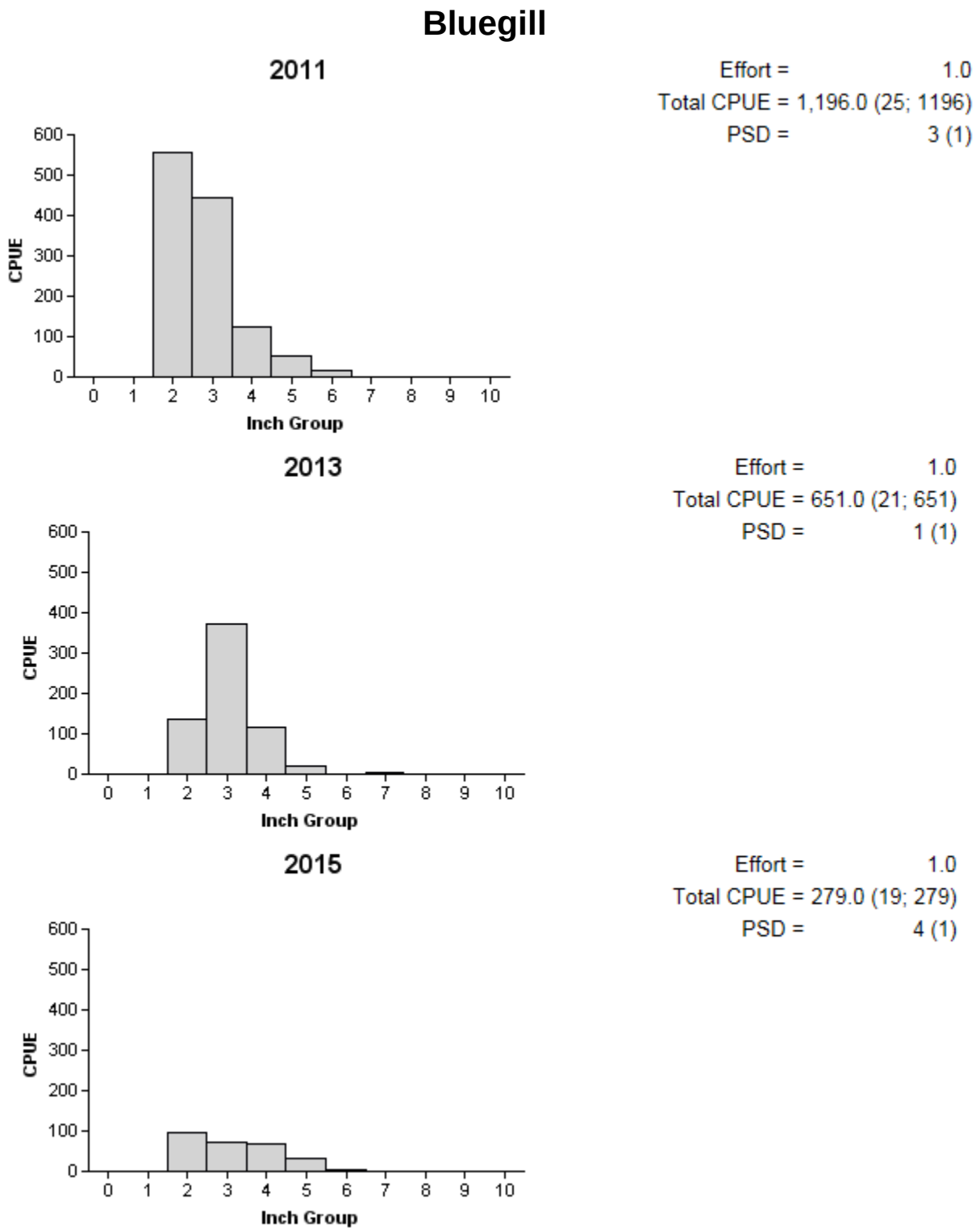


Figure 2. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Brandy Branch Reservoir, Texas, 2011, 2013, and 2015.

Redear Sunfish

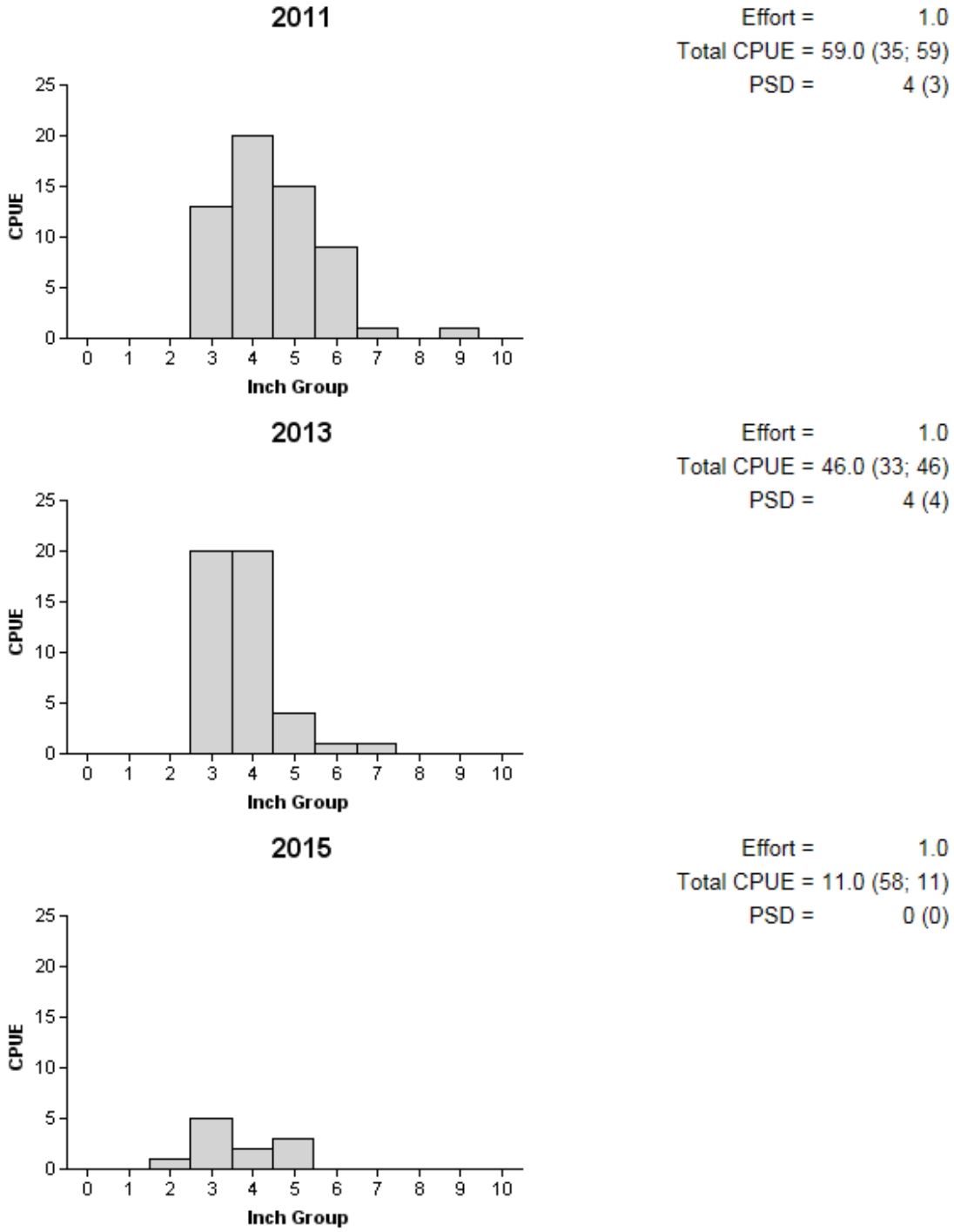


Figure 3. Number of Redear Sunfish caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Brandy Branch Reservoir, Texas, 2011, 2013, and 2015.

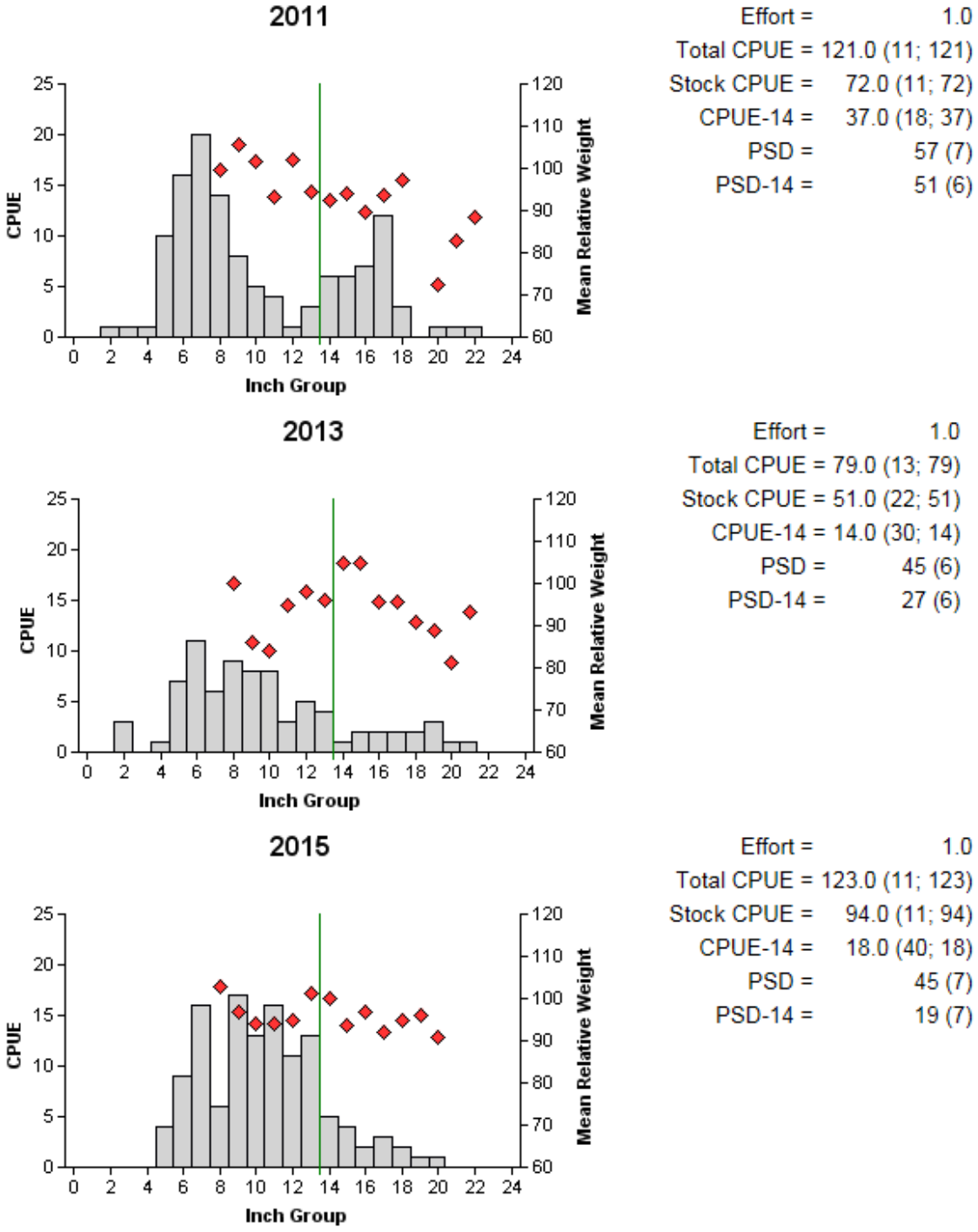


Figure 4. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Brandy Branch Reservoir, Texas, 2011, 2013, and 2015. Vertical lines indicate the minimum length limit.

Largemouth Bass

Table 10. Creel survey statistics for Largemouth Bass at Brandy Branch Reservoir, Texas, winter 2007/2008 and winter 2015/2016. Survey periods were from December through February. 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.

Statistic	2007/2008	2015/2016
Surface area (acres)	1,257	1,257
Directed angling effort (h)		
Tournament	7,790 (40)	6,080 (43)
Non-tournament	7,097 (40)	13,553 (41)
All black bass anglers combined	14,887 (39)	19,633 (40)
Angling effort/acre	11.8 (39)	15.6 (40)
Catch rate (number/h)	0.4 (12)	0.6 (10)
Harvest		
Non-tournament harvest	587 (88)	85 (79)
Harvest/acre	0.5 (88)	0.1 (79)
Tournament weigh-in and release	1,129 (88)	702 (74)
Release by weight		
<4.0 lbs	NA	8,649 (42)
4.0-6.9 lbs	NA	786 (53)
7.0-9.9 lbs	NA	39 (155)
≥10.0 lbs	NA	0
Percent legal released (non-tournament)	87	97

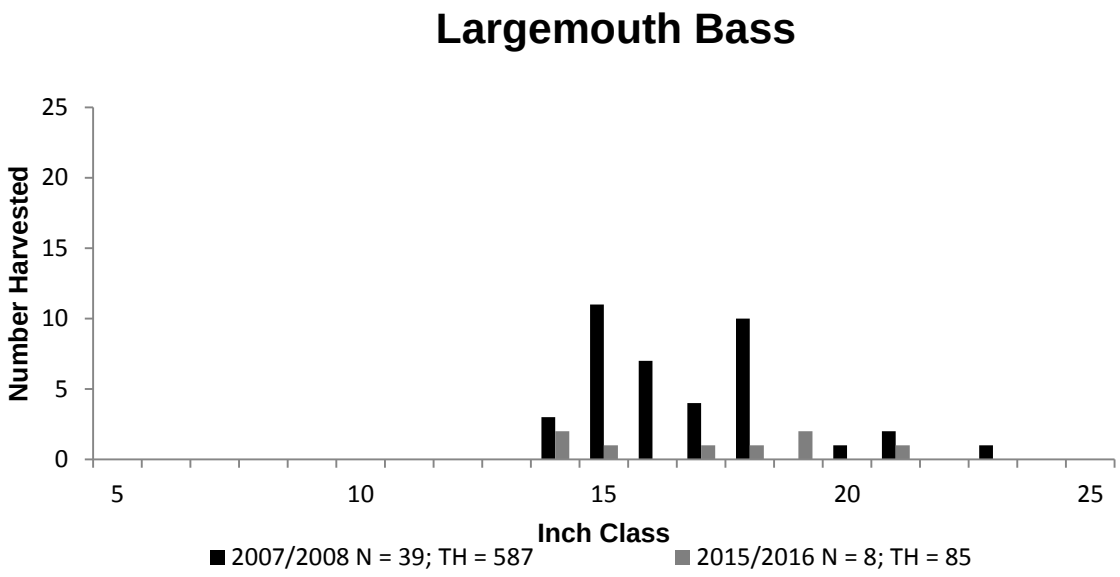


Figure 5. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Brandy Branch Reservoir, Texas, winter 2007/2008 and winter 2015/2016, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated non-tournament harvest for the creel period.

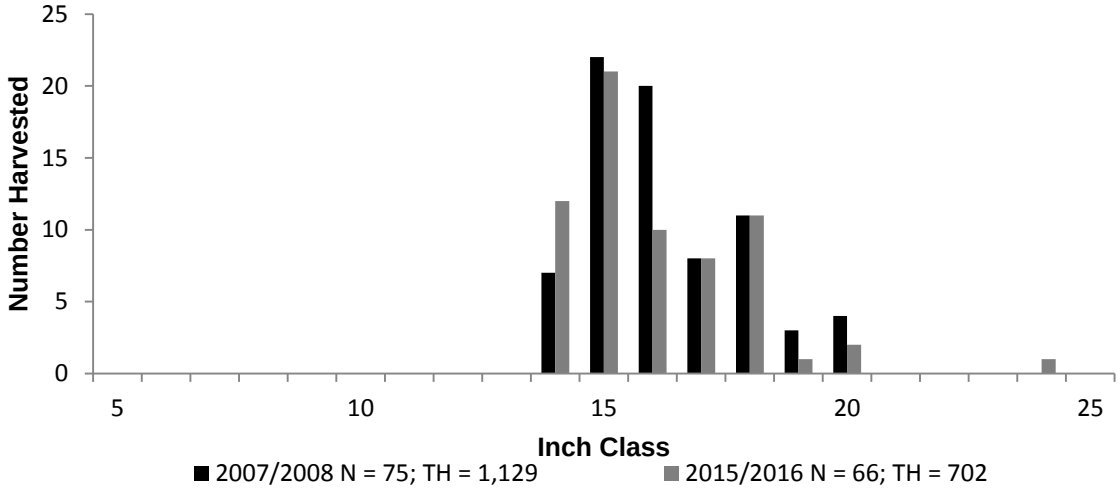


Figure 6. Length frequency of tournament-held Largemouth Bass brought to weigh-in observed during creel surveys at Brandy Branch Reservoir, Texas, winter 2007/2008 and winter 2015/2016, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the estimated tournament-held fish that we brought to weigh-in for the creel period.

Largemouth Bass

Table 11. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Brandy Branch Reservoir, Texas, 2005, 2007, 2011, and 2015. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined with micro-satellite DNA analysis.

		Number of fish				
Year	Sample size	FLMB	Intergrade	NLMB	% FLMB alleles	% FLMB
2005	30	30	0	0	99.5	100.0
2007	30	30	0	0	99.6	100.0
2011	30	26	4	0	99.0	87.0
2015	30	28	2	0	99.0	93.0

Table 12. Proposed sampling schedule for Brandy Branch Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

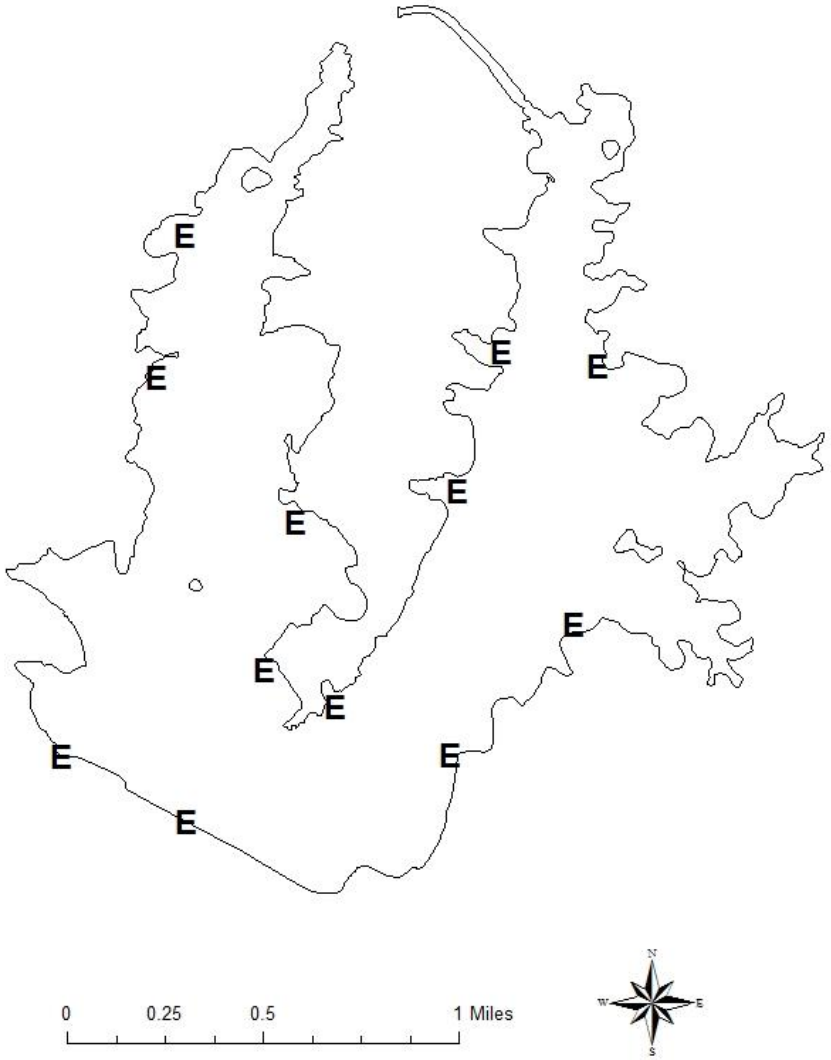
Survey year	Electrofish Fall	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation			
2016-2017					A			
2017-2018	A				A			
2018-2019					A			
2019-2020	S				S	S		S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Brandy Branch Reservoir, Texas, 2015. Sampling effort was 1 hour for electrofishing.

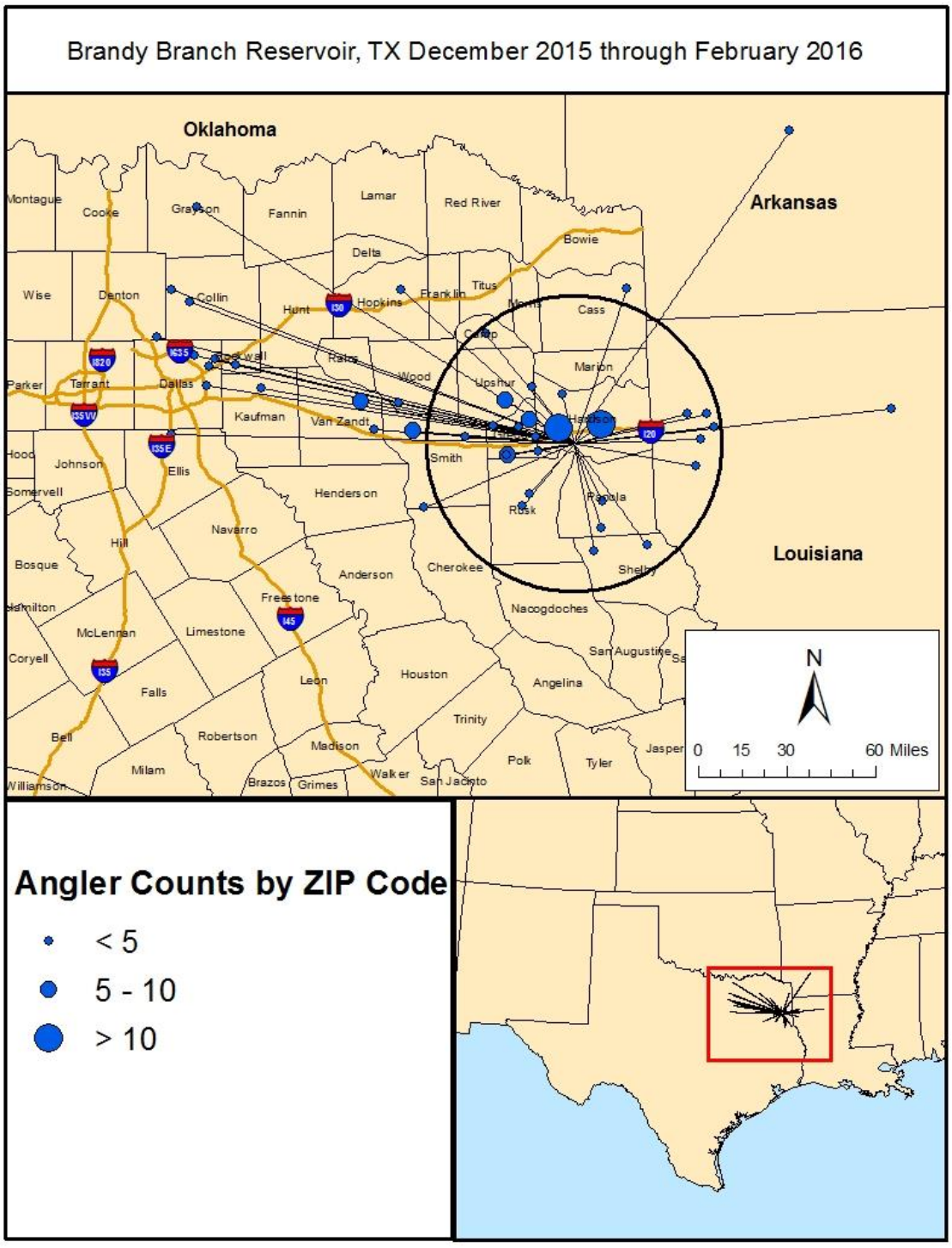
	Electrofishing	
Species	N	CPUE
Threadfin Shad	13	13.0
Green Sunfish	1	1.0
Bluegill	279	279.0
Redear Sunfish	11	11.0
Largemouth Bass	123	123.0

APPENDIX B



Location of sampling sites, Brandy Branch Reservoir, Texas, 2015. Electrofishing stations are indicated by E. Water level was near conservation pool elevation at time of sampling.

Appendix C



Location, by ZIP code, and frequency of anglers that were interviewed at Brandy Branch Reservoir, Texas, during the December 2015 through February 2016 creel survey. Circle indicates 50-mile radius from Brandy Branch Reservoir.