

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2015 Fisheries Management Survey Report

Toledo Bend Reservoir

Prepared by:

Todd Driscoll, District Management Supervisor
and
Dan Ashe, Assistant District Management Supervisor

Inland Fisheries Division
Jasper District
Brookeland, Texas



Carter Smith
Executive Director

Craig Bonds
Director, Inland Fisheries

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Toledo Bend Reservoir were surveyed in 2015-2016 using electrofishing and gill netting. Anglers were surveyed from June 2015 through May 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 Texas side of the reservoir.

- **Reservoir Description:** Toledo Bend Reservoir is a 181,600-acre (70,469 acres in Texas) impoundment of the Sabine River in Newton, Sabine, and Shelby counties in southeast Texas. Water level fluctuations average 3 feet annually. Aquatic habitat consisted of aquatic vegetation (primarily hydrilla and American lotus) and standing timber.
- **Management History:** Historically, the black bass fishery has been the most popular at Toledo Bend Reservoir, accounting for 65 to 85% of annual angling effort. Approximately 10 to 20% of anglers target crappie. Texas Parks and Wildlife Department has stocked Florida Largemouth Bass (FLMB) annually since 1990 (except 2006 and 2014) to increase abundance of bass > 8 pounds. The Louisiana Department of Wildlife and Fisheries (LDWF) also stocks FLMB annually. Joint efforts with LDWF have resulted in standardization of all recreational harvest regulations. In 1998, giant salvinia was discovered in Toledo Bend Reservoir. Cold temperatures during the winter of 2010 and low water levels in 2011 reduced overall coverage to trace amounts. In 2013, plant coverage reached the historic high (9,314 acres) and impeded angler access. In 2015, high inflows that flushed plants from backwater areas, coupled with increased efforts of commercial applicators, resulted in a reduction to 2,068 acres.
- **Fish Community**
 - **Prey species:** Gizzard Shad, Threadfin Shad, and Bluegill were the most abundant prey species and provided ample forage for sport fish.
 - **Catfishes:** Blue Catfish abundance was relatively stable over the last three survey years, and high numbers of fish 12 to 30 inches were available to anglers. Channel Catfish numbers were similar, and the majority of fish were < 12 inches. Catfish angling catch rate averaged 1.3/h. Blue Catfish and Flathead Catfish provided trophy opportunities for anglers.
 - **Temperate basses:** Historically, Striped Bass were periodically stocked by LDWF, but no fish have been collected since 2008. White Bass were present in low numbers. Few anglers target White Bass in the reservoir (< 1% of fishing effort), but during the spawning season (January – March) the fishery is popular in the Sabine River above the reservoir.
 - **Black basses:** Spotted Bass were present in low numbers. Largemouth Bass abundance was relatively high; size structure and fish condition were good. The black bass fishery was most popular (84% of fishing effort). Angling catch rate was high (1.2 /h).
 - **Crappies:** White Crappie and Black Crappie were present in the reservoir. Angling catch (2.2/h) and total harvest (51,898 fish) reflected an abundant crappie population.
- **Management Strategies:** Stock FLMB annually to improve large fish potential. Monitor Largemouth Bass population biennially with electrofishing and creel surveys every four years. Continue reporting tournament results to monitor large fish abundance. Survey giant salvinia coverage annually to monitor effects of control measures. Publish monthly articles in the *Lakecaster* highlighting TPWD activities.

INTRODUCTION

This document is a summary of fisheries data collected from the Texas side of Toledo Bend 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 species of 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

Toledo Bend Reservoir is an impoundment of the Sabine River in Newton, Sabine, and Shelby counties in southeast Texas. The Sabine River Authority (SRA) constructed the reservoir in 1966 for municipal, industrial, and agricultural water supply, generation of hydroelectric power, and recreational use. At conservation pool (172 feet above mean sea level), Toledo Bend Reservoir is 181,600 surface acres (70,469 acres in Texas), has a shoreline length of 1,200 miles, and a mean depth of 20 feet. Water level fluctuation averages 3 feet annually, but the historic low water level was observed in 2011 (159.6 feet MSL; Figure 1). The reservoir was eutrophic with a mean Carlson's Trophic State Index chl-*a* of 47.6 (Texas Commission on Environmental Quality 2011). Habitat at time of sampling consisted of aquatic vegetation (primarily American lotus) (Table 6) and standing timber. Most of the land around the reservoir is used for timber production, agriculture, and residential development. Other descriptive characteristics for Toledo Bend Reservoir are in Table 1.

Angler Access

Toledo Bend Reservoir has 33 public boat ramps on the Texas side. Several of the boat ramps in the upper reservoir were periodically unavailable during summer and fall of 2013-2015 due to giant salvinia coverage. Additional boat ramp characteristics are in Table 2. Shoreline access is limited to public boat ramp areas.

Management History

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

1. Stock Florida Largemouth Bass (FLMB) annually ($\geq 500,000$ fingerlings) to maintain and improve large fish potential.
Action: FLMB were stocked in 2015 and 2016.
2. Conduct biennial electrofishing (fall and spring) and creel surveys to monitor status of Largemouth Bass population.
Action: Fall electrofishing surveys were conducted in 2013 and 2015, spring electrofishing surveys were conducted in 2014 and 2016, and a creel survey was conducted from June 2015 through May 2016.
3. Continue black bass tournament-monitoring program to increase information on relative abundance of large fish (> 20 inches).
Action: Since 2011, data from 67 tournaments have been compiled.
4. Conduct annual vegetation surveys to monitor giant salvinia and hydrilla abundance and recommend management strategies.
Action: Annual vegetation surveys have been conducted since 1998. Aerial flights have been conducted since 2006. Primary control methods have included herbicide treatments via private contractors and salvinia weevil releases.
6. Conduct gillnetting surveys every two years to monitor the status of catfish populations.
Action: Surveys were conducted in 2014 and 2016.
7. Publish monthly popular articles in the *Lakecaster*, a newsletter distributed to 30 counties in

Texas and Louisiana.

Action: Articles highlighting TPWD activities at Toledo Bend Reservoir have been published monthly since 2000.

Harvest regulation history: Due to standardization of all harvest regulations with LDWF, no sport fish in Toledo Bend Reservoir are managed with TPWD statewide regulations (Table 3). Standardization of Striped Bass and White Bass harvest regulations occurred in 1980 and 1997, respectively, and black bass regulations were standardized in 1991. In 2011, regulations were standardized for crappies and catfishes. In 2014, the harvestable-length portion of the Blue and Channel Catfish regulation was changed from 20 to 30 inches.

Stocking history: Since 1990, Toledo Bend Reservoir has received annual stockings of FLMB every year except 2006 and 2014 (Table 4). From 1992 to 2009, Striped Bass were stocked annually by LDWF. Surplus Striped Bass fingerlings were stocked by TPWD in 2002.

Vegetation/habitat management history: Historically, nuisance exotic species include water hyacinth and giant salvinia. Water hyacinth has remained problematic, requiring periodic herbicide treatments. However, giant salvinia is by far the most problematic aquatic vegetation species. From 1998 to 2004, herbicide treatments conducted by the Aquatic Habitat Enhancement (AHE) staff, coupled with annual water level drawdowns each fall, limited giant salvinia coverage to < 500 acres. The cessation of fall drawdowns in the mid-2000s was accompanied by significant increases in giant salvinia acreage. Subsequent herbicide treatments have been conducted by certified commercial applicators with focus on access points to maintain recreational access and minimize plant transport to other waters.

Salvinia weevils were first introduced in 2004 as a biological control for giant salvinia. Additional weevil stockings have occurred every year since, but the numbers of insects and the locations have varied. Salvinia weevils are not cold tolerant, and mortality during the colder months has been the biggest obstacle to establishing populations large enough to impact salvinia abundance.

Hydrilla coverage at Toledo Bend Reservoir has exceeded 20,000 surface acres. From 2010-2014, hydrilla ranged from 3,890 acres (2010) to 14,698 acres (2013) (Table 6). Although hydrilla is listed on the TPWD list of prohibitive plants, it is considered beneficial at Toledo Bend Reservoir, as coverage has never been problematic or caused access problems.

Water transfer: The annual water yield from Toledo Bend Reservoir is 2,086,600 acre-feet, of which half is allocated to SRA-Texas and half to SRA-Louisiana (collectively the SRAs). Of the 1,043,300 acre-feet/year allocated to SRA-Texas, a water right exists for 750,000 acre-feet/year. In 2003, SRA-Texas applied for the unpermitted 293,300 acre feet. The SRAs operate the Toledo Bend Project primarily for purposes of water supply and conservation, and secondarily for renewable hydropower production and recreation. Hydroelectric power production is for Entergy Gulf States, Inc, CLECO Power, LLC, and Entergy Louisiana, LLC, and major direct water sales are to the cities of Hemphill and Huxley and two industrial companies (Tenaska and XTO). In 2003, SRA-Texas agreed to examine the feasibility of inter-basin transfer of water to north Texas (i.e., Dallas Water Utilities, Tarrant Regional Water District and North Texas Municipal Water District). The development of this pipeline project is projected for 2060 (Texas Water Development Board 2012).

METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Toledo Bend 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, Spotted Bass, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1 hour at 12, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing. Ages for Largemouth Bass were determined using otoliths from 13 randomly-selected fish (range 13.0 to 14.9 inches).

Gill netting – Blue Catfish, Channel Catfish, and White Bass were collected by gill netting (15 net nights at 15 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

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.

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

Creel survey – A roving creel survey was conducted from June 2015 through May 2016. 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 2015). Total angler catch of Largemouth Bass \geq 4, 7, and 10 pounds was also estimated. Anglers were asked if released fish were within weight categories. Harvested fish lengths were converted to weights for classification (19 inches = 4 pounds; 23 inches = 7 pounds; 25 inches = 10 pounds). Harvested and released fish were combined to represent total catch for weight categories.

Habitat – Vegetation surveys of the entire reservoir were conducted by airplane. Prevalent habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the United States Geological Survey (USGS 2016).

RESULTS AND DISCUSSION

Habitat: A structural habitat survey conducted in 2003 indicated that the littoral zone included primarily dead timber and boat docks (Driscoll 2004). Over 60,000 acres of standing timber were present in Texas waters. Historically, aquatic vegetation coverage at Toledo Bend Reservoir (primarily hydrilla) has exceeded 20,000 surface acres. Since 2010, hydrilla has ranged from trace amounts (2015) to 14,698 acres (2013) (Table 6). High inflows and water levels throughout 2015 reduced hydrilla coverage. Although hydrilla is listed on the TPWD and federal list of prohibitive plants, it is considered beneficial habitat at Toledo Bend Reservoir, as coverage has never been problematic or caused access problems. Nuisance exotic species include giant salvinia and water hyacinth. Although both species are distributed reservoir-wide, a majority of plant biomass is located in shallow, backwater areas (headwaters of both the reservoir and major embayments). In 2013, giant salvinia coverage reached the historic high of 9,314 acres, and was 8,693 acres in 2014. In 2015, high inflows that flushed plants from backwater areas, coupled with increased efforts of commercial applicators, resulted in increased plant mortality and a coverage of 2,068 acres.

Creel: Similar to that of previous survey years, fishing effort on the Texas side of Toledo Bend Reservoir was primarily directed at black basses (84.4%) and crappies (10.4%) (Table 7). In 2015/2016, total fishing

effort was 411,413 h, a decline from 2013/2014 (535,642 h) (Table 8). Direct expenditures in 2015/2016 (\$3,945,419) also declined from 2013/2014 (\$6,082,890).

Prey species: Primary prey species included Gizzard Shad, Threadfin Shad, and Bluegill. All three species provided abundant prey. Gizzard Shad catch rates were relatively stable during the last three sampling years (range = 64.0 to 99.0/h), and IOVs ranged from 19 to 20 (Figure 2). Historically, Threadfin Shad catch rates have been highly variable; catch rate in 2015 was 9,117/h (Appendix A). Bluegill catch rates by electrofishing during the previous three survey years were similar (range = 310.0 to 453.0/h) (Figure 3). Few anglers sought sunfish (0.8% of total fishing effort) (Table 7), and total estimated harvest was 6,315 fish (Table 9).

Catfishes: Blue Catfish gill net catch rates were relatively similar (range = 6.1 to 10.7/nn) during the last three sampling years (Figure 5). Fish > 30 inches were caught in each of the last three survey years, and PSDs ranged from 28 to 43. Fish condition was moderate as W_r ranged from 80 to 125, indicating adequate prey availability.

Gill net catch rates of Channel Catfish were also relatively similar during the last three survey years (2012 = 5.8/nn; 2014 = 4.2/nn; 2016 = 7.5/nn) (Figure 6). Population size structure was dominated by smaller fish (PSD range = 0 to 6).

Catfish anglers (rod and reel only) accounted for 2.3% of the total fishing effort (Table 7) and catch rate was 1.3/h (Table 10). Total estimated harvest was 5,554 fish; 86% of harvested fish were Channel Catfish (Figure 8). Anecdotal information indicated that Blue and Flathead Catfish provided a substantial passive gear fishery.

Temperate basses: Historically, gill net catch rates of White Bass have averaged 1.8/nn, reflecting a low-density population in the reservoir. During the last three survey years, catch rates ranged from 0.9 to 3.6/nn (Figure 9).

Since the 1970s, Striped Bass were frequently stocked by the LDWF to support broodfish procurement for Palmetto Bass production. However, no fish have been stocked since 2009, and they were last caught with gill nets in 2008.

During the last three creel surveys, little directed fishing effort for temperate basses was observed (Table 7). However, during the spawning season (January through March) a popular White Bass fishery exists in the Sabine River upstream of the reservoir. Estimated temperate bass harvest was 12,130 fish in 2015/2016 (Table 11); 56% of harvested fish were Yellow Bass (Figure 11).

Black basses: Spotted Bass were present in the reservoir, but only one was collected by electrofishing in 2015 (Appendix A). Total estimated harvest was 2,652 fish in 2015/2016 (Figure 14).

Fall electrofishing catch rates during 2012 to 2015 reflected relatively high and stable Largemouth Bass abundance (range = 126.0 to 175.0/h) (Figure 12). Population size structure was similar across years (PSD range = 40 to 64; PSD-14 range = 22 to 41). Relative weights ranged from 85 to 125, indicating Largemouth Bass were in moderate condition. Growth rate was adequate, as average age at 14 inches was 2.5 years.

Similarly, spring electrofishing catch rates were also relatively high (range = 134.0 to 209.5/h) (Figure 13). However, spring surveys reflected higher proportions of larger fish (PSD range = 68 to 75; PSD-14 range = 40 to 43).

Although the reservoir has been stocked with FLMB annually since 1990 (only exception in 2006 and 2014) (Table 4), reservoir-wide FLMB influence has remained low and relatively stable. Since 2007,

FLMB alleles ranged from 25 to 29% and no pure FLMB were collected (Table 13).

The majority of total fishing effort (84.4%) was directed at black basses (27.4% was tournament-related) (Table 7). From 2011 to 2016, angler catch rates were relatively high and consistent, exceeding 1.0/h during all three survey periods (Table 12). During 2015/2016, total directed effort and harvest was 346,331 h and 43,572 fish, respectively. A total of 25,983 fish were retained by tournament anglers for weigh-in and release. Although the proportion of legal-size fish immediately released increased during the last three survey years, it was still relatively low (range = 32 to 58%) when compared to most Texas reservoirs. The proportion of total catch during the last three survey periods was nearly identical for the four size categories, with fish ≥ 4 pounds comprising approximately 3% of total catch (Table 12).

A tournament-monitoring program was implemented in June 2004 to increase information on legal-sized fish (≥ 14 inches) and provide greater insight regarding large (> 20 inches) fish abundance (Appendix C). Since 2011, results reflect relatively high abundance of legal-sized fish and desirable numbers of larger fish. Proportion of teams catching limits (5 legal-sized fish) ranged from 28.1 to 56.2%, while the proportion of individual anglers ranged from 13.2 to 81.8%. Average winning weights ranged from 24.9 to 27.6 pounds for team events and 18.6 to 23.4 pounds for individual events. The proportion of teams with weights > 15 pounds was similar (15.7 to 22.0%), while individual events were more variable (7.2 to 32.4%). Across years for all tournaments, average big bass weight ranged from 8.0 to 10.7 pounds.

Crappies: Historically, trap net catch rates of crappies have been low (2.3/nn). Trap net surveys were discontinued in 2004.

Creel data reflected a productive crappie fishery that was second to the black bass fishery in terms of total fishing effort (10.4%; Table 7). Angler catch rate was high (2.2/h; Table 14) and total harvest was 51,898 fish (Table 14; Figure 17).

Fisheries management plan for Toledo Bend Reservoir, Texas

Prepared – July 2016.

ISSUE 1: Creel surveys indicate most sportfishing effort at Toledo Bend Reservoir is for Largemouth Bass. The reservoir also hosts a considerable number of annual bass tournaments (30-50% of black bass effort). Tournament-monitoring and creel data reflect high angler catch of large fish (> 8 pounds) and the reservoir has produced seven ShareLunkers (three since 2012).

MANAGEMENT STRATEGIES

1. Continue annual stocking of FLMB (\geq 500,000 fingerlings) to maintain and improve large fish potential.
2. Continue the tournament-monitoring program to increase information on legal-sized fish.
3. Conduct biennial electrofishing and creel surveys every four years to monitor status of the Largemouth Bass population.
4. Examine Largemouth Bass growth every four years.
5. Promote fish handling procedures that minimize tournament-related mortality to minimize impacts on largemouth bass population and reduce conflicts with non-tournament anglers.

ISSUE 2: Giant salvinia exceeded 9,000 acres in 2013 (historical high) and impeded angler access. Although coverage declined to 2,068 acres in 2015, transport to other waters is likely.

MANAGEMENT STRATEGIES

1. The TPWD AHE office has taken the lead role with management of giant salvinia. Assist AHE staff with implementation of management strategies.
2. Monitor giant salvinia coverage annually via airplane to document plant distribution and effects of control measures (i.e., herbicides and weevils).
3. Continue to oversee herbicide treatments by private contractors.
4. At access points, maintain all educational signs and continue herbicide treatments to prevent transport to other waters.
5. Continue to investigate effects of salvinia weevil releases.
6. Continue to communicate with LDWF regarding plant distribution and control measures.

ISSUE 3: The crappie fishery at Toledo Bend Reservoir is significant (10-20% of the total annual fishing effort; annual harvest 50,000 - 200,000 fish).

MANAGEMENT STRATEGY

1. Conduct creel surveys every four years to monitor the crappie fishery, as trap netting at Toledo Bend Reservoir is not effective.

ISSUE 4: A considerable catfish fishery also exists. Although the rod and reel catfish fishery is minor, the majority of the actual directed catfish effort is likely due to passive gear anglers.

MANAGEMENT STRATEGY

1. Conduct biennial gillnetting surveys to monitor catfish populations.

ISSUE 5: Area constituents are interested in TPWD activities and management actions related to Toledo Bend Reservoir and need to be informed.

MANAGEMENT STRATEGY

1. Continue to publish monthly articles on TPWD activities in the *Lakecaster*, a newsletter distributed to approximately 30 counties in Texas and Louisiana.

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 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

Sport fish, forage fish, and other important fishes

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

Low density fisheries

Historically, White Bass and Striped Bass catch rates from gill net surveys were ≤ 3.0 and $1.0/n$, respectively, indicating low population densities in the reservoir. Since the 1970s, Striped Bass were frequently stocked by the LDWF to support broodfish procurement for Palmetto Bass production. However, no fish have been stocked since 2009, and no fish have been caught with gill nets since 2008. During the last three survey years, less than 3% of angling effort was directed at temperate basses. Although no future directed sampling is planned, White Bass and Striped Bass catch will be recorded from gill net surveys directed at catfishes (see below).

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Toledo Bend Reservoir, accounting for approximately 80% of the annual angling effort (30-50% of effort tournament-related). The reservoir supports a high-quality, nationally-recognized fishery with substantial economic contributions. Largemouth Bass have always been managed with the statewide 14-in MLL regulation. For nearly 20 years, trend data on CPUE, size structure, and body condition (with fall and spring electrofishing), and angler catch, effort, and harvest (with roving creel surveys) were collected annually. Recently, biennial surveys have been conducted since 2014 for fall and spring electrofishing, and since 2010 for creel surveys. The population is abundant, recruitment rates have been high and steady, and size structure has been desirable and stable. Continuation of biennial trend data with night electrofishing (both fall and spring) in 2017/2018 and 2019/2020 will allow for determination of any large-scale changes in the

Largemouth Bass population that may spur further investigation. A minimum of 16 randomly selected 5-min electrofishing sites will be sampled, but sampling will continue at random sites until 50 stock-sized fish are collected and the RSE of CPUE-S is ≤ 25 (the anticipated effort to meet both sampling objectives is 12-20 stations with 80% confidence). If failure to achieve either objective has occurred after one night of sampling and objectives can be attained with 6-12 additional random stations, another night of effort will be expended. Since angler catch and effort have been consistent and desirable over the last 15 years, annual creel surveys will be conducted every four years, with the next survey scheduled for 2019/2020.

In addition, average age of Largemouth Bass between 13.0 and 14.9 inches (Category 2; N = 13) will be estimated in 2019 and every four years thereafter. If growth problems are detected from this cursory estimate, mean length-at-age will be estimated from a random population sample of 400 fish > 150 mm, subsampled at 10 fish per 10 mm strata (Category 4). Largemouth Bass genetics will also be monitored every four years with a mixed age-class sample (N = 30).

Crappies: The crappie fishery is the second most popular at Toledo Bend Reservoir, accounting for 10 – 20% of the annual angling effort. Historically, trap netting has resulted in low and variable catch rates. For over 10 years, creel surveys have been used to monitor the crappie fishery and make inferences about the population. Although directed effort and harvest have varied over the years, angler catch rates have remained relatively high since 2005 (range = 1.3 – 2.8 fish/h), reflecting an abundant crappie population. A creel survey will be conducted in 2019/2020 and every four years thereafter (4 quarters, 5 weekend and 4 week days/quarter) to detect any large-scale changes in the crappie population that may warrant additional sampling.

Catfishes: The rod and reel catfish fishery accounts for <5% of the annual angling effort. Anecdotal information indicates that the passive gear fishery is more popular and accounts for frequent catches of Blue and Flathead Catfish > 30 pounds, especially in the upper third of the reservoir. Flathead Catfish are managed with a no MLL, 10-fish daily bag limit. Channel and Blue Catfish are managed with a no MLL, 50-fish daily bag limit (no more than 5 \geq 30 inches per day).

Biennial gill netting data has indicated relatively stable Channel and Blue Catfish recruitment and abundance, and should provide adequate population-level insight relative to large-scale changes that would dictate further investigation. A minimum of 15 randomly selected gill netting sites will be sampled in 2018 and 2020, but sampling will continue at random sites until 50 stock-sized fish are collected and the RSE of CPUE-S is ≤ 25 (the anticipated effort to meet both sampling objectives is 12-18 stations with 80% confidence). Additional sampling will occur (5-10 gill netting sites) if objectives are not attained.

Currently, little is known about the Flathead Catfish population at Toledo Bend Reservoir. However, the majority of passive-gear angling occurs in the upper third of the reservoir. Although a low-frequency electrofishing survey was attempted in June 2015 (upper reservoir only) to establish a baseline relative abundance estimate for trend comparisons over time, only two fish were collected from 10 random stations. No additional sampling is planned.

Prey species: Bluegill, Gizzard Shad, and Threadfin Shad are the primary forage at Toledo Bend Reservoir. Like Largemouth Bass, trend data on CPUE and size structure were collected annually for 20 years with fall electrofishing. Since 2014, fall electrofishing has been conducted biennially. Continuation of biennial sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill and Gizzard Shad relative abundance and size structure. Effort based on achieving sampling objectives for Largemouth Bass will result in sufficient numbers of Bluegill for size structure (PSD; 50 fish minimum) and relative abundance (RSE ≤ 25 of CPUE-Total) and Gizzard Shad size structure (IOV; 50 fish minimum). At the effort needed to achieve sampling objectives for Largemouth Bass, the expected RSE for CPUE-T is 39 for Gizzard Shad and 66 for Threadfin Shad. No additional effort will be expended to achieve an RSE25 for Gizzard or Threadfin Shad, but Largemouth Bass body condition (fish ≥ 8 " TL) will be used to provide additional information on forage abundance and vulnerability.

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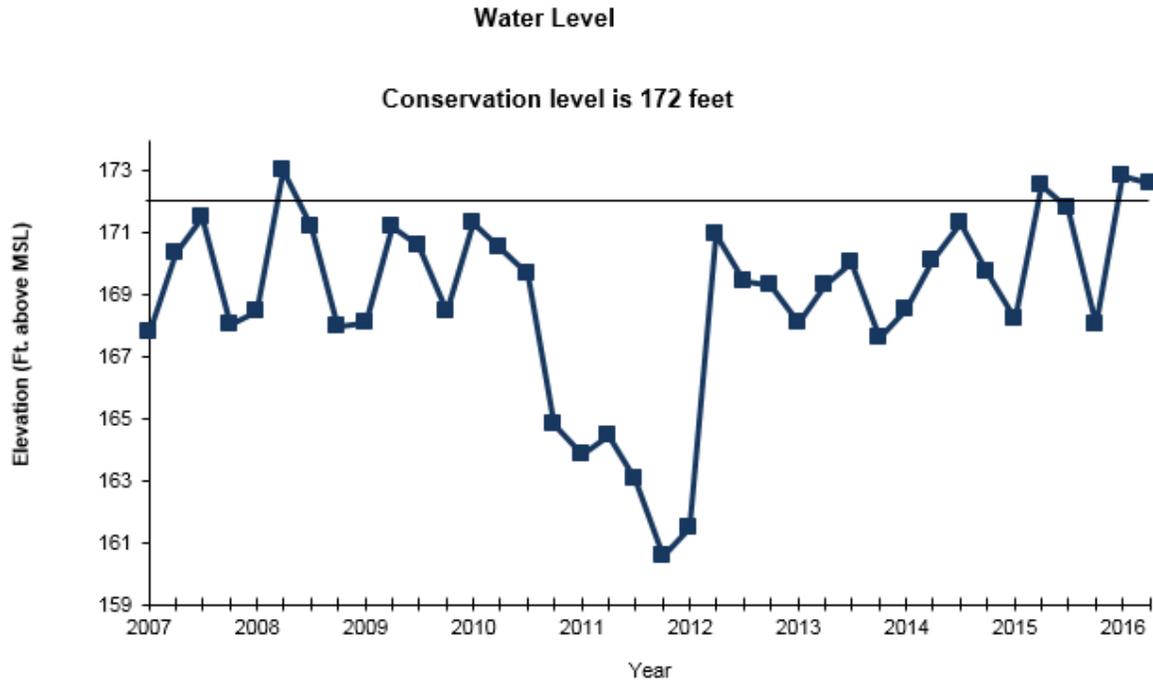


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Toledo Bend Reservoir, Texas.

Table 1. Characteristics of Toledo Bend Reservoir, Texas.

Characteristic	Description
Year constructed	1966
Controlling authority	Sabine River Authority
Counties	Newton, Sabine, and Shelby
Reservoir type	Mainstream
Shoreline Development Index (SDI)	21.2
Conductivity	120 uS/cm

Table 2. Boat ramp characteristics for Toledo Bend Reservoir, Texas, April 2016. Reservoir elevation at time of survey was 172 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of ramp (ft)	Condition
Andersons	31.162648; -93.583517	Y	40	162	Excellent
Newton County	31.153861; -93.594517	Y	12	164	Adequate
Paradise Point	31.205157; -93.659961	Y	20	163	Excellent
Willow Oak	31.211520; -93.733369	Y	14	164	Excellent
Six Mile	31.238681; -93.755865	Y	30	162	Excellent
Twin Oaks	31.246955; -93.758859	Y	15	162	Adequate
Fin and Feather	31.279031; -93.720730	Y	62	162	Excellent
Jack's 944	31.298236; -93.753221	Y	10	164	Adequate
White Oak	31.310339; -93.698019	Y	10	161	Adequate
Indian Mounds	31.328243; -93.694740	Y	30	162	Excellent
Lowes Creek	31.372340; -93.716929	Y	25	163	Adequate
Harborlight	31.409432; -93.781470	Y	12	165	Adequate
Mid Lake Campground	31.416172; -93.778926	Y	4	163	Poor, limited parking, rough ramp
Alpine Marina	31.426599; -93.749389	Y	10	158	Adequate
Chateau Shores	31.458580; -93.759177	Y	10	164	Adequate

Frontier Park	31.454580; -93.769585	Y	6	165	Adequate
Pendleton Harbor	31.463457; -93.751533	Y	10	168	Adequate
Playcation Marina	31.520378; -93.800937	Y	3	166	Poor, limited parking
Holly Park #1	31.522311; -93.801259	Y	10	157	Adequate
Holly Park #2	31.522290; -93.801305	Y	20	166	Adequate
Bean's VIP	31.514980; -93.779075	Y	6	166	Poor, rough road and ramp
Newell's Fishing World	31.516551; -93.771824	Y	30	162	Poor, rough road and parking lot
Shamrock Marina	31.522458; -93.786841	Y	20	165	Adequate
East Hamilton	31.597306; -93.839628	Y	20	160	Excellent
Nath Road	31.598265; -93.846441	Y	4	164	Poor, dirt road, not accessible when wet
Ragtown	31.681047; -93.828269	Y	20	165	Excellent
Bayou Siepe	31.732396; -93.829848	Y	8	161	Adequate
Huxley Bay Marina	31.751496; -93.844425	Y	30	161	Adequate
Bill's Landing	31.821105; -93.906238	Y	15	164	Adequate
Tenaha Creek	31.843365; -93.941008	Y	8	165	Adequate
Williams Camp	31.882399; -93.940378	Y	8	165	Poor, rough road and parking, giant salvinia coverage limits access
Swede Johnson	31.919395; -93.968925	Y	30	160	Excellent
Joaquin	31.972200; -94.008469	Y	12	165	Adequate

Table 3. Harvest regulations for Toledo Bend Reservoir, Texas.

Species	Bag limit	Length limit
Catfishes: Channel and Blue Catfish, their hybrids and subspecies	50 (in any combination)	None ^a
Catfish, Flathead	10	18-inch minimum
Bass, White	25	None
Bass, Striped	5	None ^b
Bass, Largemouth	8 ^c	14-inch minimum
Bass, Spotted	8 ^c	None
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	None

^aOnly 5 Blue or Channel Catfish \geq 30 inches may be retained each day.

^bOnly 2 Striped Bass \geq 30 inches may be retained each day.

^cBag limit for Spotted and Largemouth Bass is 8 in the aggregate.

Table 4. Stocking history of Toledo Bend Reservoir, Texas. FGL = fingerling; AFGL = advanced fingerling; UNK = unknown.

Species	Year	Number	Size
Channel Catfish	1967	544,745	AFGL
	Total	544,745	
Flathead Catfish	1973	400	UNK
	Total	400	
Florida Largemouth Bass	1985	225,300	FGL
	1985	107,323	FRY
	1988	150,000	FRY
	1990	446,797	FRY
	1991	194,714	FGL
	1991	207,291	FRY
	1992	406,497	FGL
	1993	204,653	FGL
	1993	1,616,523	FRY
	1994	370,104	FGL
	1994	733,997	FRY
	1995	400,007	FGL
	1996	450,015	FGL
	1997	234,875	FGL
	1998	162,837	FGL
	1998	237,898	FRY
	1999	1,206,777	FGL
	2000	321,974	FGL
	2001	508,505	FGL
	2002	740,373	FGL
	2003	961,015	FGL
	2004	492,536	FGL
	2005	849,436	FGL
	2007	502,918	FGL
	2008	512,768	FGL
	2009	860,614	FGL
	2010	509,034	FGL
2011	499,321	FGL	
2012	500,666	FGL	
2013	604,447	FGL	
2015	508,034	FGL	
2016	503,971	FGL	
Total		17,321,510	
Largemouth Bass	1967	1,689,700	FRY
	1967	284,300	UNK
	1987	305	AFGL

Species	Year	Number	Size
	1987	22,900	FGL
	Total	1,997,205	
Paddlefish	1992	106,234	UNK
	1995	15,334	UNK
	Total	121,568	
ShareLunker Largemouth Bass	2006	4,592	FGL
	2008	2,604	FGL
	2012	9,051	FGL
	2013	4,677	FGL
	2014	14,078	FGL
	Total	35,002	
Striped Bass	1974	16,290	FGL
	1976	60,178	UNK
	1977	100,200	UNK
	1979	95,000	UNK
	1981	96,249	UNK
	1983	104,133	UNK
	1984	406,920	FGL
	1985	484,500	FGL
	1986	203,000	FRY
	1988	719,115	FGL
	1988	29,200	FRY
	1991	240,364	FGL
	2002	272,179	FGL
	Total	2,827,328	

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

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-stock \leq 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Age-and-growth	Age at 14 inches	$N = 13, 13.0 - 14.9$ inches
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	$N = 30$, any age
Bluegill ^a	Abundance	CPUE – total	
	Size structure	PSD, length frequency	$N \geq 50$
Gizzard Shad ^a	Abundance	CPUE – total	
	Size structure	PSD, length frequency	$N \geq 50$
	Prey availability	IOV	$N \geq 50$
Threadfin Shad ^a	Abundance	CPUE – total	
<i>Gill netting</i>			
Blue Catfish	Abundance	CPUE– stock	RSE-stock \leq 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
Channel Catfish ^a	Abundance	CPUE– stock	
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
<i>Creel survey^b</i>			
Black basses	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	
Crappies	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	
Catfishes	Trend information on angler utilization	Angler effort, CPUE, total harvest and size composition	

^a No additional effort will be expended to achieve an RSE \leq 25 for CPUE of Bluegill, Gizzard Shad, Threadfin Shad, or Channel Catfish, if not reached from designated Largemouth Bass or Blue Catfish sampling effort.

^b Angler utilization data and associated statistics will be calculated for all sport fish.

Table 6. Survey of prevalent aquatic vegetation, Toledo Bend Reservoir, September 2010 - 2015. Surface area (acres) is listed (both Texas and Louisiana) with percent of total reservoir surface area in parentheses.

Species	2010	2011	2012	2013	2014	2015
American lotus	200 (<1)	19 (<1)	3,074 (2)	1,386 (1)	3,032 (2)	736 (<1)
Giant salvinia (Tier II)*	31 (<1)	Trace	1,960 (1)	9,314 (6)	8,693 (5)	2,068 (1)
Hydrilla (Tier III)*	3,890 (2)	10,081 (6)	5,421 (3)	14,698 (9)	13,848 (8)	Trace
Water hyacinth (Tier II)*	Trace	Trace	Trace	Trace	Trace	Trace

*Tier II is Maintenance, Tier III is Watch Status

Table 7. Percent directed angler effort by species for Toledo Bend Reservoir, Texas, 2011 - 2016. For black basses, proportions of tournament-angler effort are in parentheses. Survey periods were from 1 June through 31 May.

Species	Year		
	2011/2012*	2013/2014	2015/2016
Catfishes	2.5	1.4	2.3
Temperate basses	2.6	0.7	0.6
Sunfishes	2.7	0.7	0.8
Black basses	67.3 (50.0)	78.0 (35.6)	84.4 (27.4)
Crappies	21.7	15.9	10.4
Anything	3.2	3.1	1.5

*2011/2012 survey only included summer and spring quarters

Table 8. Total fishing effort (h) for all species and total directed expenditures at Toledo Bend Reservoir, Texas, 2011 - 2016. Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Statistic	2011/2012*	2013/2014	2015/2016
Total fishing effort	141,767 (13)	535,642 (17)	411,413 (16)
Total directed expenditures	\$1,665,630 (30)	\$6,082,890 (25)	\$3,945,419 (23)

*2011/2012 survey only included summer and spring quarters

Gizzard Shad

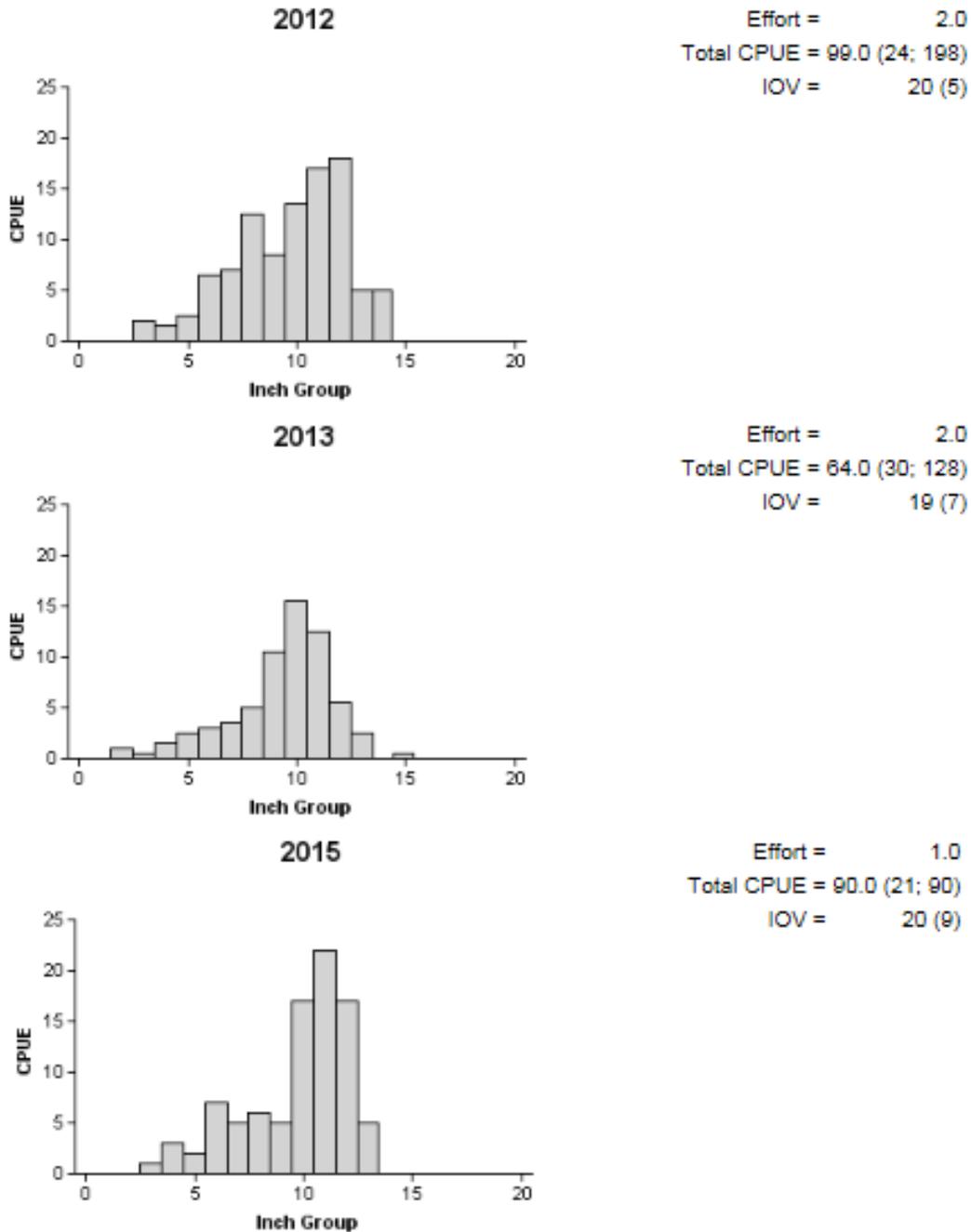


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Toledo Bend Reservoir, Texas, 2012, 2013, and 2015.

Bluegill

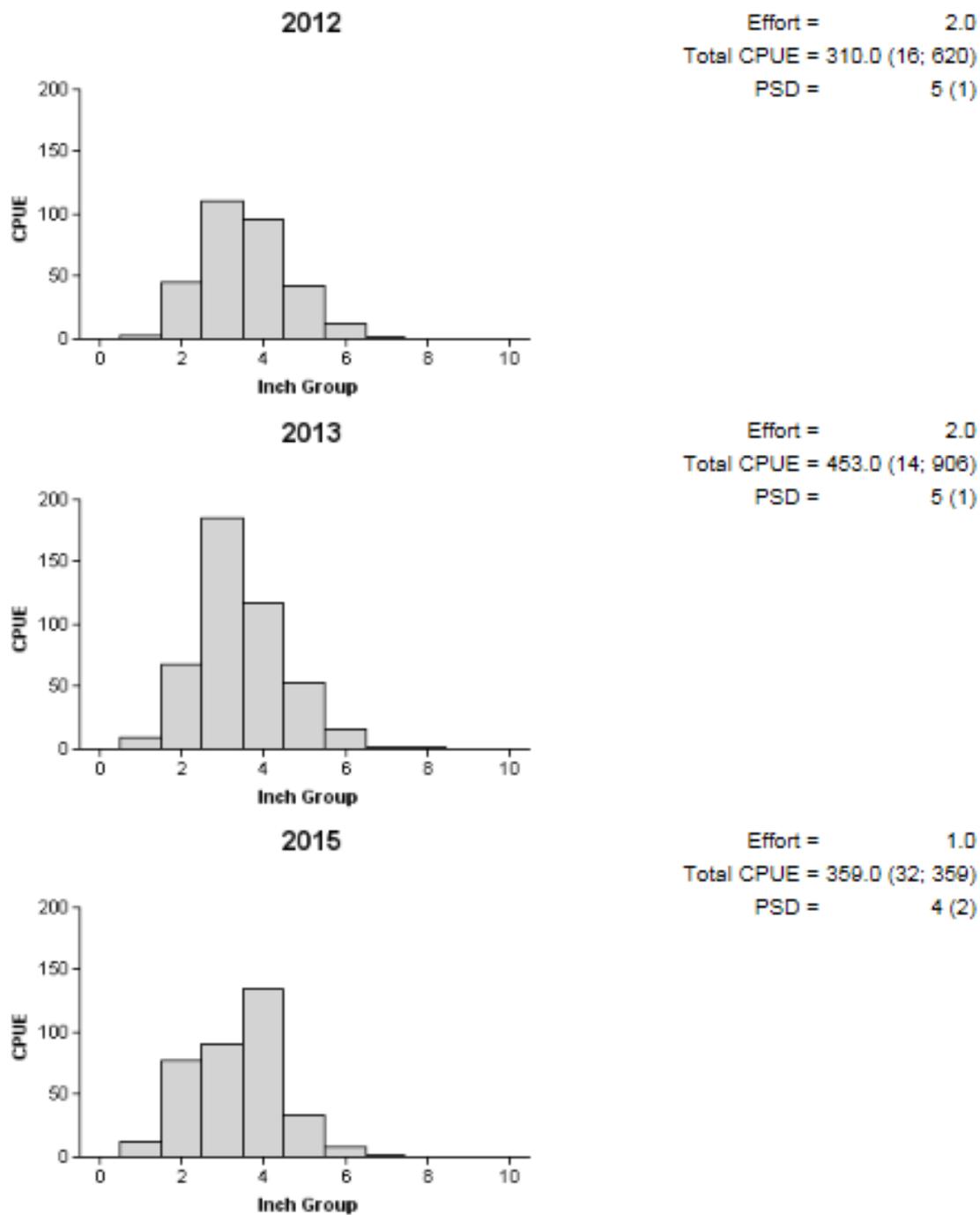


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Toledo Bend Reservoir, Texas, 2012, 2013, and 2015.

Sunfishes

Table 9. Creel survey statistics for sunfishes at Toledo Bend Reservoir, Texas from June through August 2011/March through May 2012, June 2013 through May 2014, and June 2015 through May 2016. Total catch per hour is for anglers targeting sunfishes, and total harvest is the estimated number of sunfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Statistic	2011/2012*	2013/2014	2015/2016
Surface area (acres)	49,112	70,469	70,469
Directed effort (h)	3,886 (38)	3,926 (52)	3,165 (61)
Directed effort/acre	0.08 (38)	0.06 (52)	0.04 (61)
Total catch per hour	5.68 (48)	12.78 (46)	4.60 (52)
Total harvest	19,126 (14)	18,570 (142)	6,315 (85)
Harvest/acre	0.39 (14)	0.26 (142)	0.09 (85)
Percent legal released	65	69	85

*2011/2012 survey only included summer and spring quarters

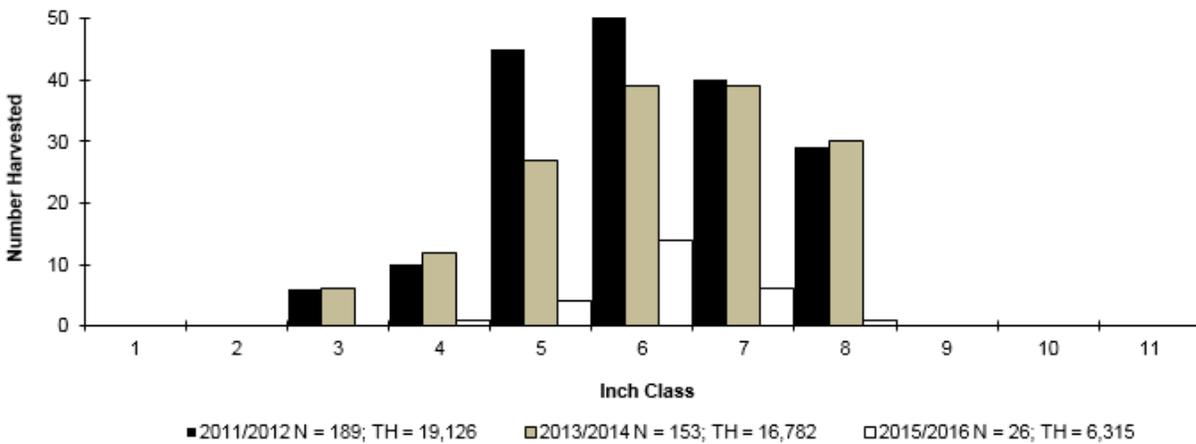


Figure 4. Length frequency of harvested Bluegill observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested Bluegill observed during creel surveys, and TH is the total estimated harvest for the creel period.

Blue Catfish

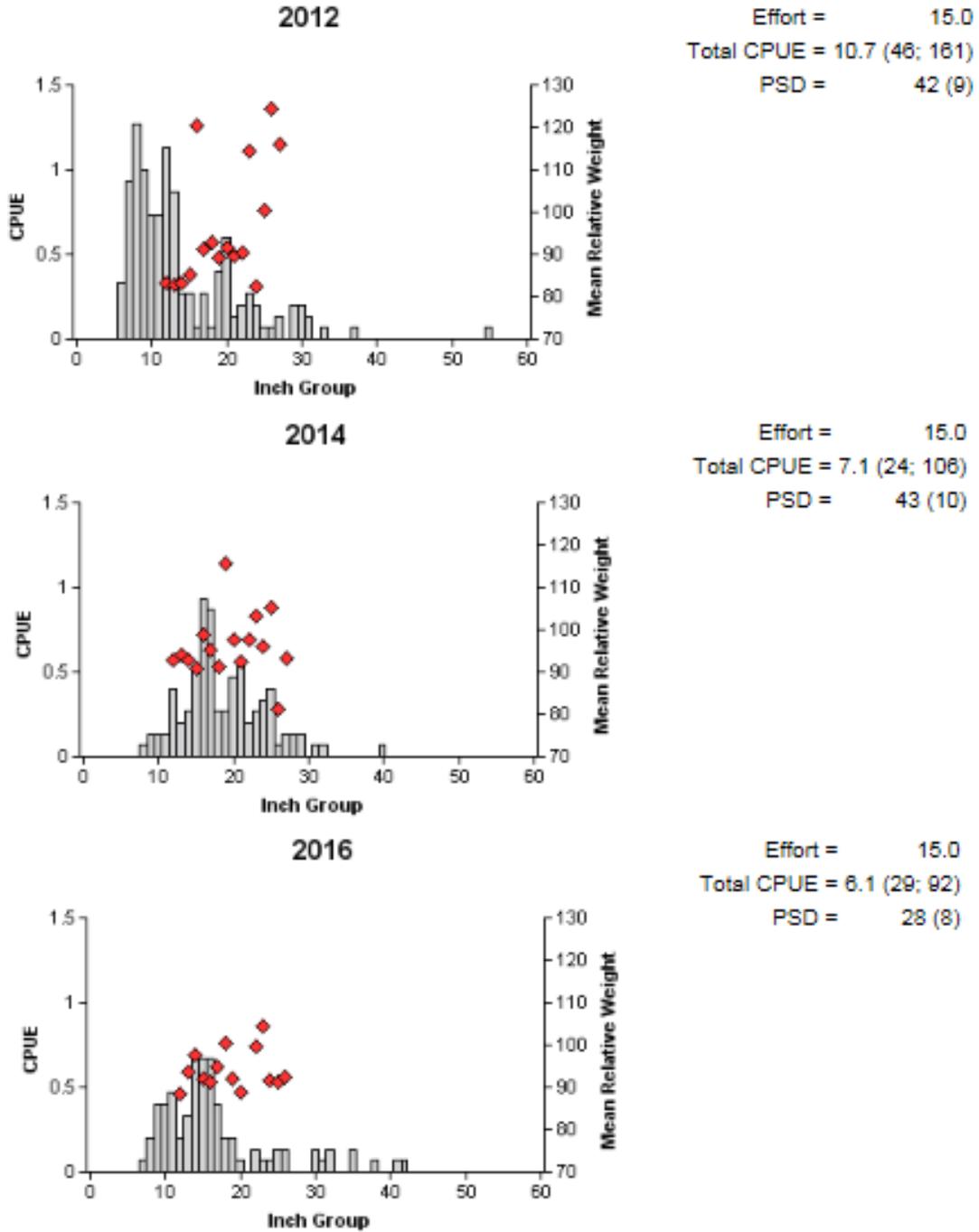


Figure 5. Number of Blue Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Toledo Bend Reservoir, Texas, 2012, 2014, and 2016.

Channel Catfish

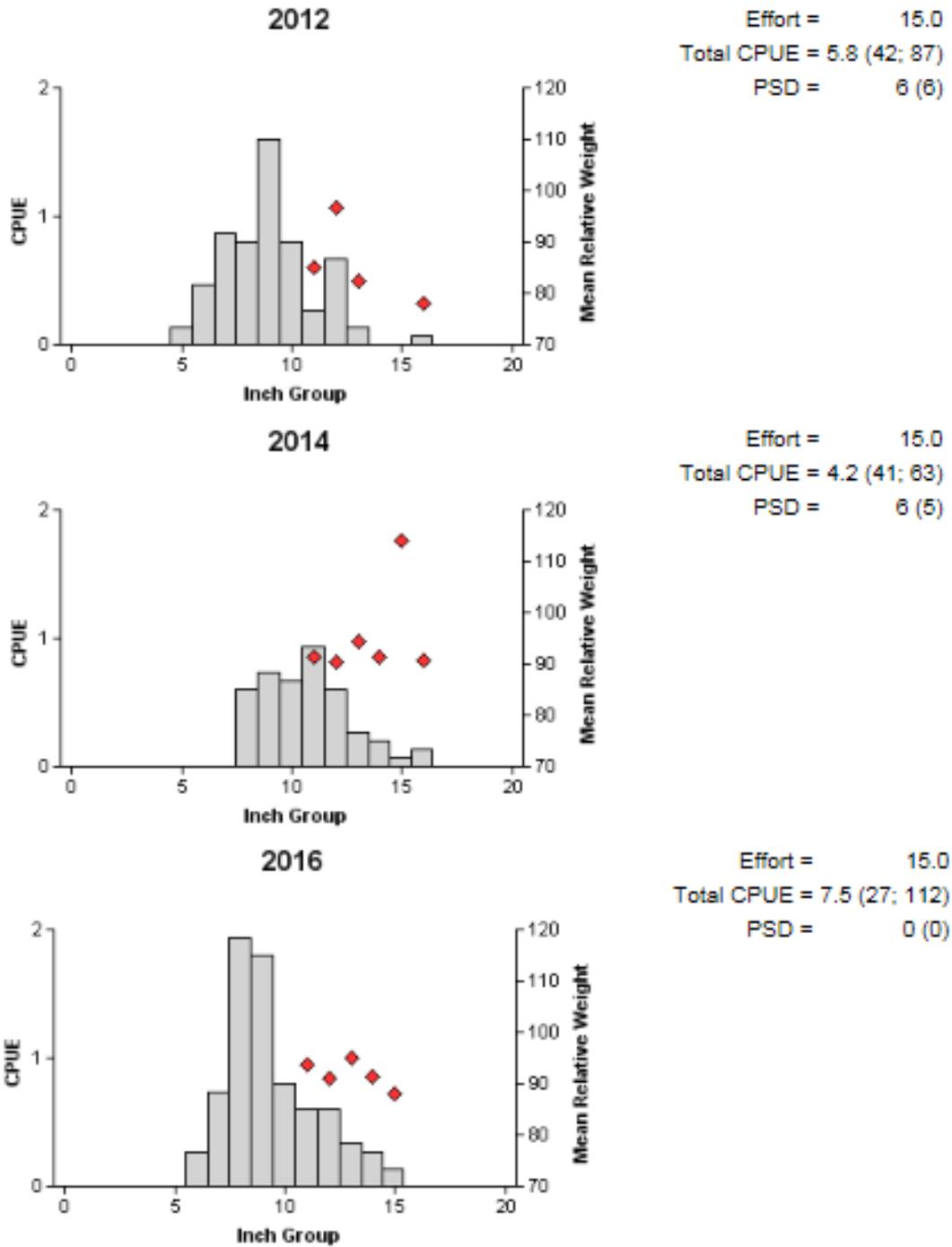


Figure 6. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Toledo Bend Reservoir, Texas, 2012, 2014, and 2016.

Catfishes

Table 10. Creel survey statistics for catfishes at Toledo Bend Reservoir, Texas from June through August 2011/March through May 2012, June 2013 through May 2014, and June 2015 through May 2016. Total catch per hour is for anglers targeting catfishes, and total harvest is the estimated number of catfishes harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Statistic	2011/2012*	2013/2014	2015/2016
Surface area (acres)	49,112	70,469	70,469
Directed effort (h)	3,536 (50)	7,747 (39)	9,475 (33)
Directed effort/acre	0.07 (51)	0.11 (39)	0.13 (33)
Total catch per hour	4.02 (47)	2.21 (52)	1.30 (20)
Total harvest	5,280 (180)	9,854 (170)	5,554 (120)
Harvest/acre	0.11 (180)	0.14 (170)	0.08 (120)
Percent legal released	28	64	74

*2011/2012 survey only included summer and spring quarters

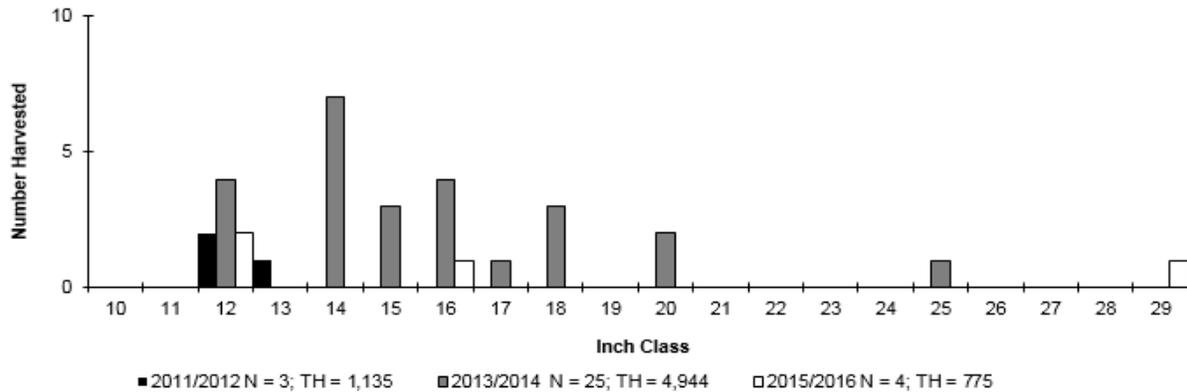


Figure 7. Length frequency of harvested Blue Catfish observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

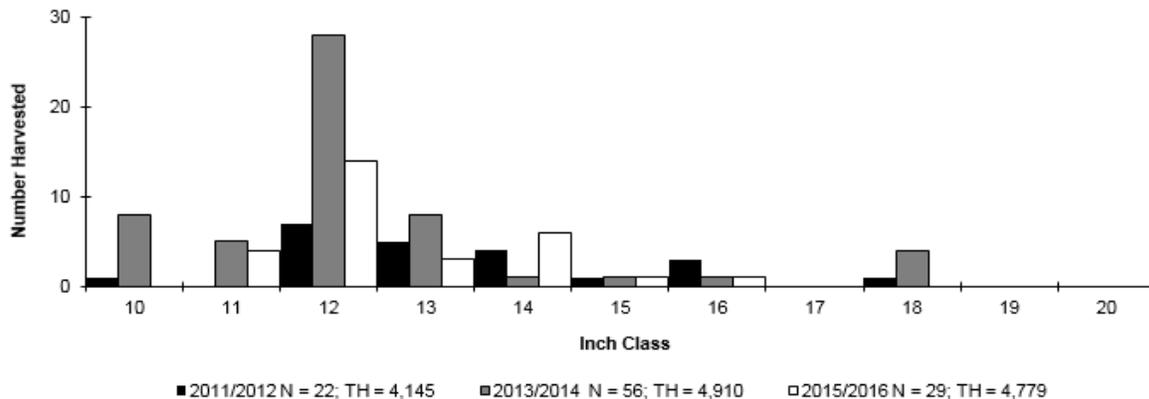


Figure 8. Length frequency of harvested Channel Catfish observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass

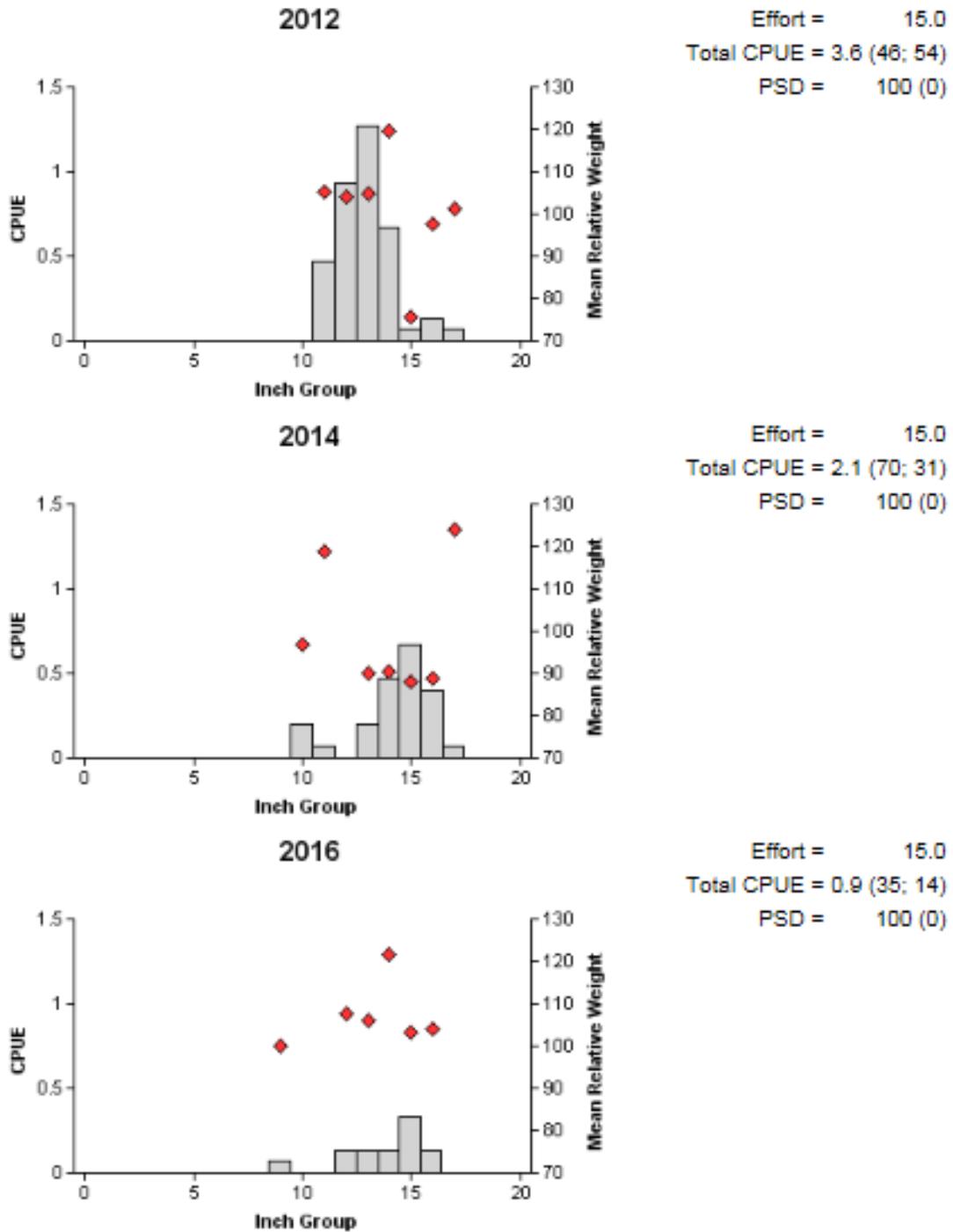


Figure 9. Number of White Bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Toledo Bend Reservoir, Texas, 2012, 2014, and 2016.

Temperate basses

Table 11. Creel survey statistics for temperate basses at Toledo Bend Reservoir, Texas from June through August 2011/March through May 2012, June 2013 through May 2014, and June 2015 through June 2016. 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.

Statistic	2011/2012*	2013/2014	2015/2016
Surface area (acres)	49,112	70,469	70,469
Directed effort (h)	3,610 (53)	3,805 (49)	2,425 (87)
Directed effort/acre	0.07 (53)	0.05 (49)	0.03 (87)
Total catch per hour	3.67 (72)	3.79 (52)	3.20 (23)
Total harvest	4,544 (290)	18,360 (348)	12,130 (91)
Harvest/acre	0.09 (290)	0.26 (348)	0.17 (91)
Percent legal released	72	42	69

*2011/2012 survey only included summer and spring quarters

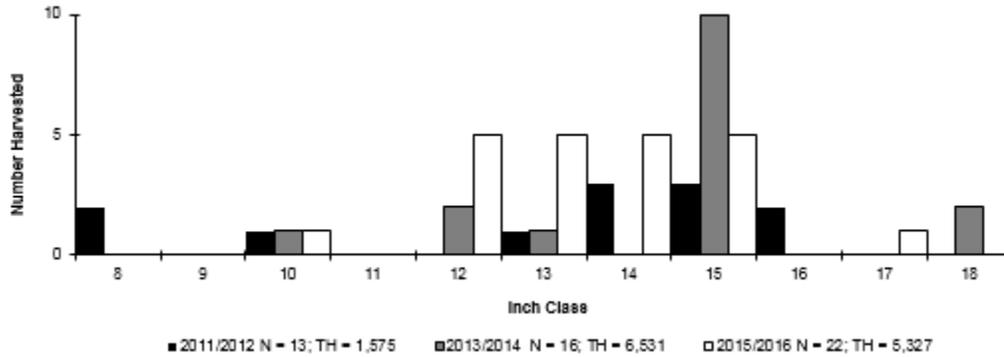


Figure 10. Length frequency of harvested White Bass observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

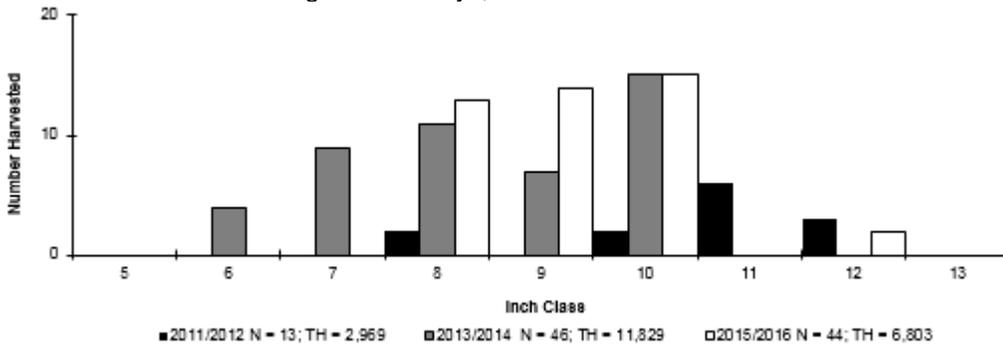


Figure 11. Length frequency of harvested Yellow Bass observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested Yellow Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

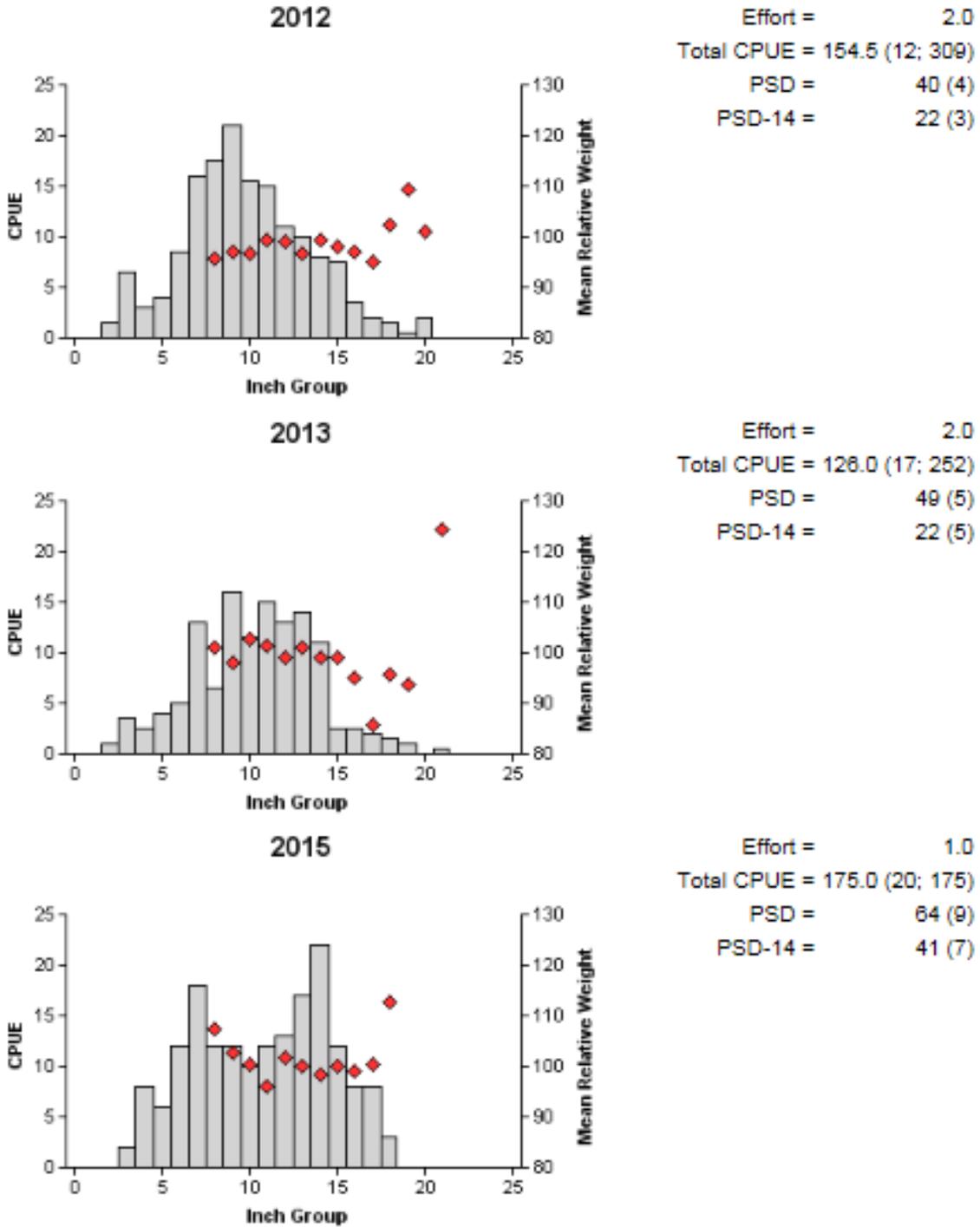


Figure 12. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Toledo Bend Reservoir, Texas, 2012, 2013, and 2015.

Largemouth Bass

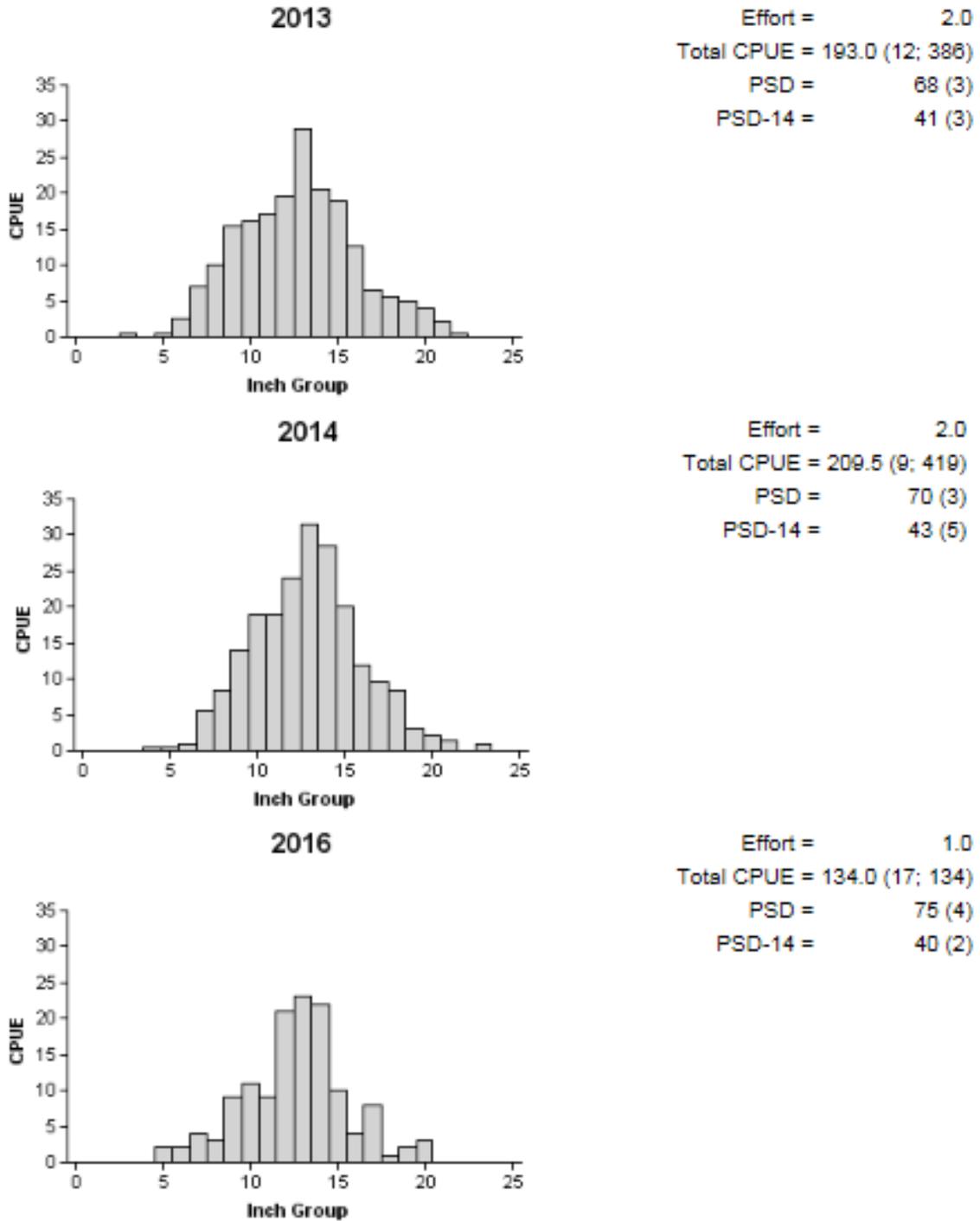


Figure 13. Number of Largemouth Bass caught per hour (CPUE, bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring electrofishing surveys, Toledo Bend Reservoir, Texas, 2013, 2014, and 2016.

Black basses

Table 12. Creel survey statistics for black basses at Toledo Bend Reservoir, Texas from June through August 2011/March through May 2012, June 2013 through May 2014, and June 2015 through May 2016. Catch rate is for all anglers targeting black basses. 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 caught by weight category is for all anglers. Relative standard errors (RSE) are in parentheses.

Statistic	2011/2012*	2013/2014	2015/2016
Surface area (acres)	49,112	70,469	70,469
Directed angling effort (h)			
Tournament	38,418 (20)	148,956 (22)	94,766 (17)
Non-tournament	56,991 (15)	269,089 (18)	251,564 (17)
All black bass anglers combined	95,411 (15)	418,045 (19)	346,331 (16)
Angling effort/acre	1.94 (15)	5.89 (19)	4.91 (16)
Catch rate (number/h)	1.19 (15)	1.06 (16)	1.21 (15)
Harvest			
Non-tournament harvest	22,500 (15)	96,783 (19)	43,572 (29)
Harvest/acre	0.46 (15)	1.36 (19)	0.62 (29)
Tournament weigh-in and release	11,368 (8)	43,983 (11)	25,983 (30)
Total catch	151,471 (22)	490,999 (45)	424,137 (23)
< 4.0 lbs	147,131 – 97.1%	473,230 – 96.4%	410,071 – 96.7%
≥ 4–6.9 lbs	3,922 – 2.6%	16,460 – 3.4%	12,728 – 3.0%
≥ 7–9.9 lbs	418 – 0.3%	1,309 – 0.3%	1,338 – 0.3%
≥ 10 lbs	0	0	0
Percent legal released (non-tournament)	32	43	58

*2011/2012 survey only included summer and spring quarters

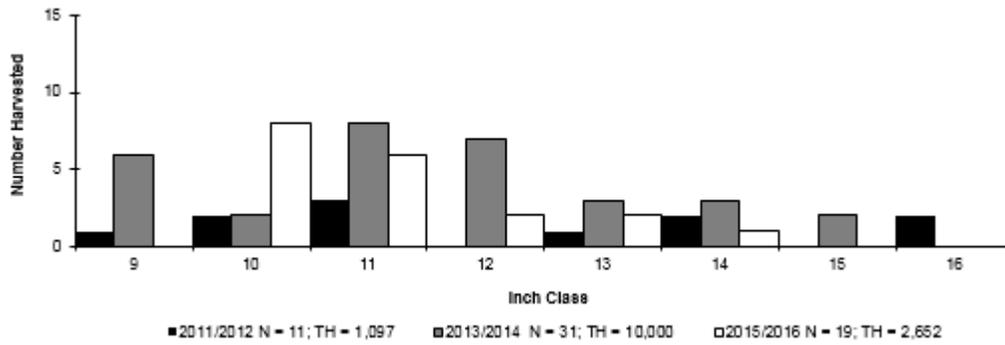


Figure 14. Length frequency of harvested Spotted Bass observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested Spotted Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

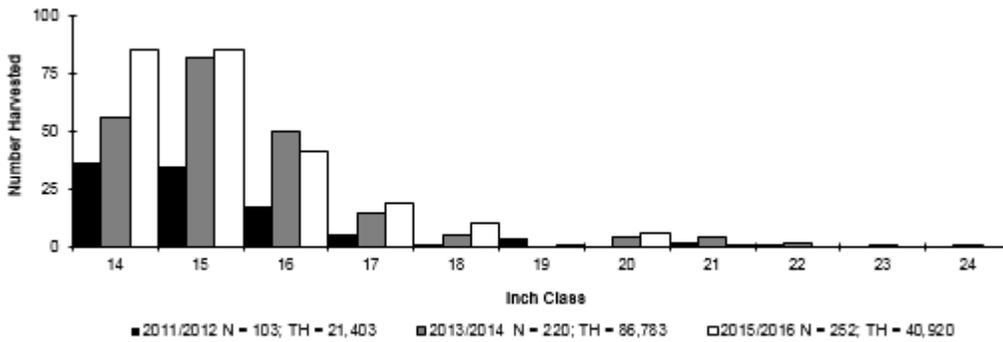


Figure 15. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

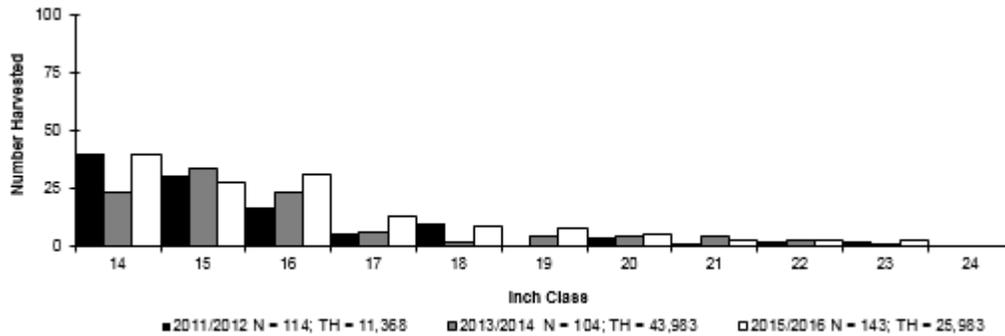


Figure 16. Length frequency of tournament-retained and released Largemouth Bass observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 13. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Toledo Bend Reservoir, Texas, 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.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
2007	30	0	28	2	29	0
2011	30	0	29	1	29	0
2015	30	0	25	5	25	0

Crappies

Table 14. Creel survey statistics for crappies at Toledo Bend Reservoir, Texas from June through August 2011/March through May 2012, June 2013 through May 2014, and June 2015 through May 2016. Total catch per hour is for anglers targeting crappies, and total harvest is the estimated number of crappies harvested by all anglers. Relative standard errors (RSE) are in parentheses

Statistic	2011/2012*	2013/2014	2015/2016
Surface area (acres)	49,112	70,469	70,469
Directed effort (h)	30,795 (18)	85,289 (22)	42,718 (22)
Directed effort/acre	0.63 (18)	1.20 (22)	0.60 (22)
Total catch per hour	2.83 (26)	2.12 (33)	2.19 (36)
Total harvest	73,092 (30)	208,955 (41)	51,898 (38)
Harvest/acre	1.49 (30)	2.94 (41)	0.74 (38)
Percent legal released	28	40	34

*2011/2012 survey only included summer and spring quarters

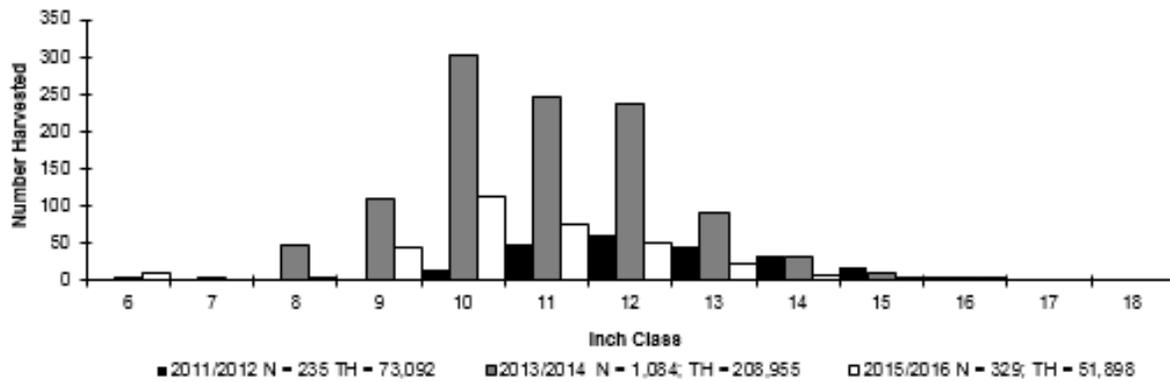


Figure 17. Length frequency of harvested crappies observed during creel surveys at Toledo Bend Reservoir, Texas, June 2011 through May 2016, all anglers combined. N is the number of harvested crappies observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 15. Proposed sampling schedule for Toledo Bend Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the winter, while electrofishing surveys are conducted in the fall and spring. Standard survey denoted by S and additional survey denoted by A.

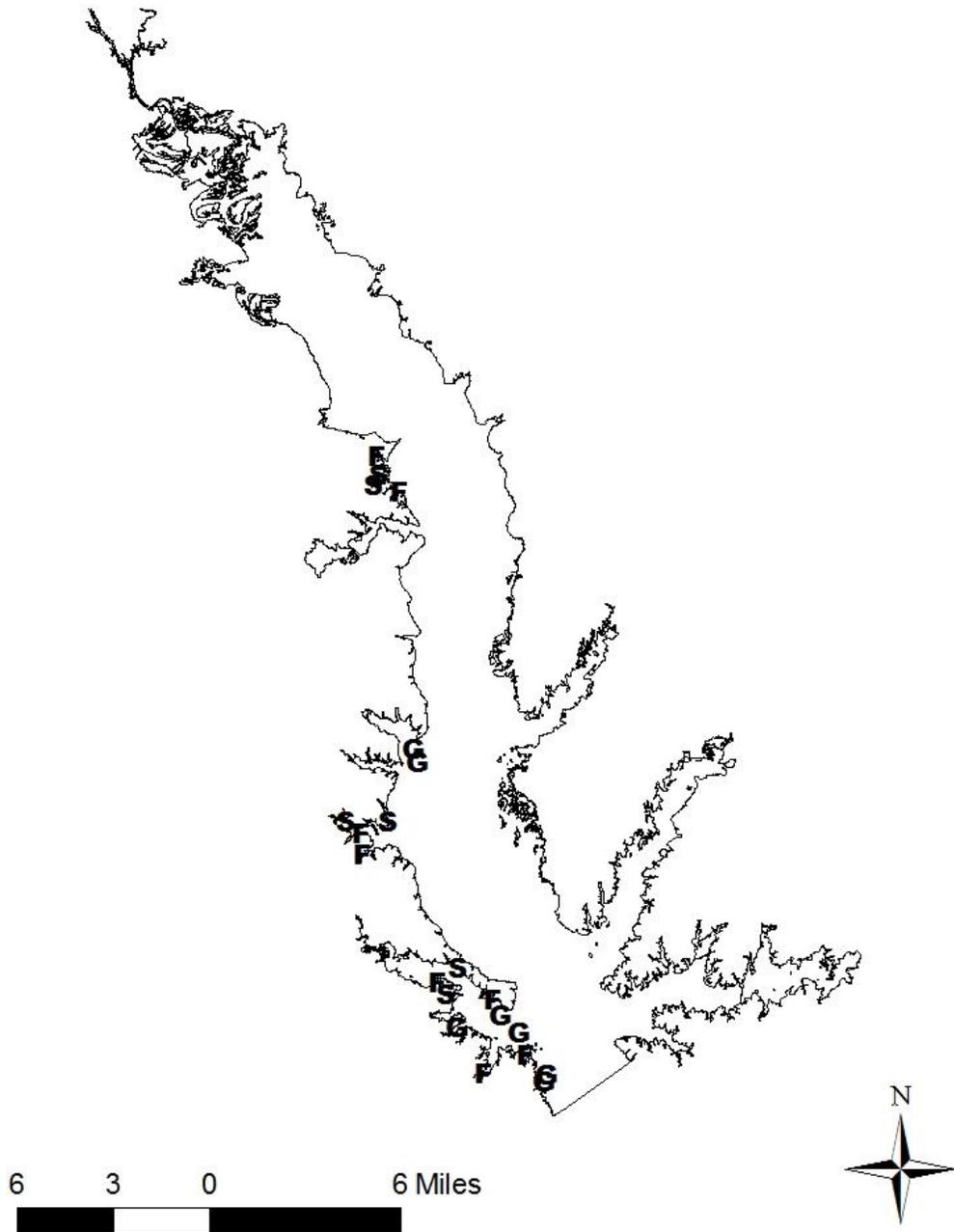
Survey year	Electrofishing Fall (Spring)	Gill net	Habitat			Creel survey	Report
			Structural	Vegetation	Access		
2016-2017				A			
2017-2018	A (A)	A		A			
2018-2019				A			
2019-2020	S (A)	S		S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Toledo Bend Reservoir, Texas, 2015-2016. Sampling effort was 15 net nights for gill netting and 1 hour for electrofishing.

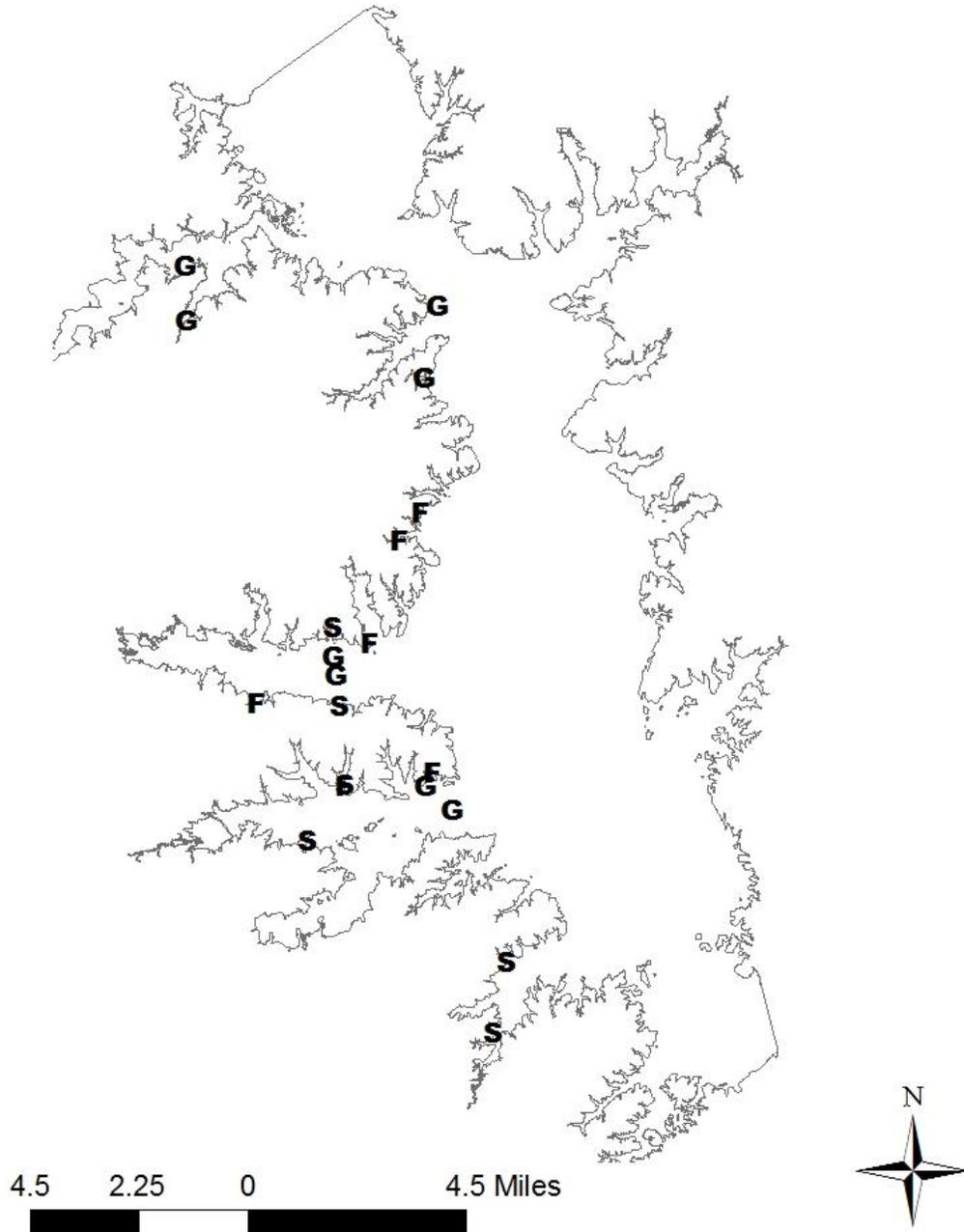
Species	Gill Netting		Electrofishing	
	N	CPUE	N	CPUE
Gizzard Shad			90	90.0
Threadfin Shad			9,117	9,117.0
Blue Catfish	92	6.1		
Channel Catfish	112	7.5		
White Bass	14	0.9		
Redbreast Sunfish			5	5.0
Warmouth			4	4.0
Bluegill			359	359.0
Longear Sunfish			12	12.0
Redear Sunfish			111	111.0
Redspotted Sunfish			5	5.0
Spotted Bass			1	1.0
Largemouth Bass			175	175.0

APPENDIX B



Location of sampling sites, north Toledo Bend Reservoir, Texas, 2015-2016. Gill net, fall electrofishing, and spring electrofishing stations are indicated by G, F, and S, respectively. Water level was at or 2-3 feet below full pool at time of sampling.

APPENDIX B



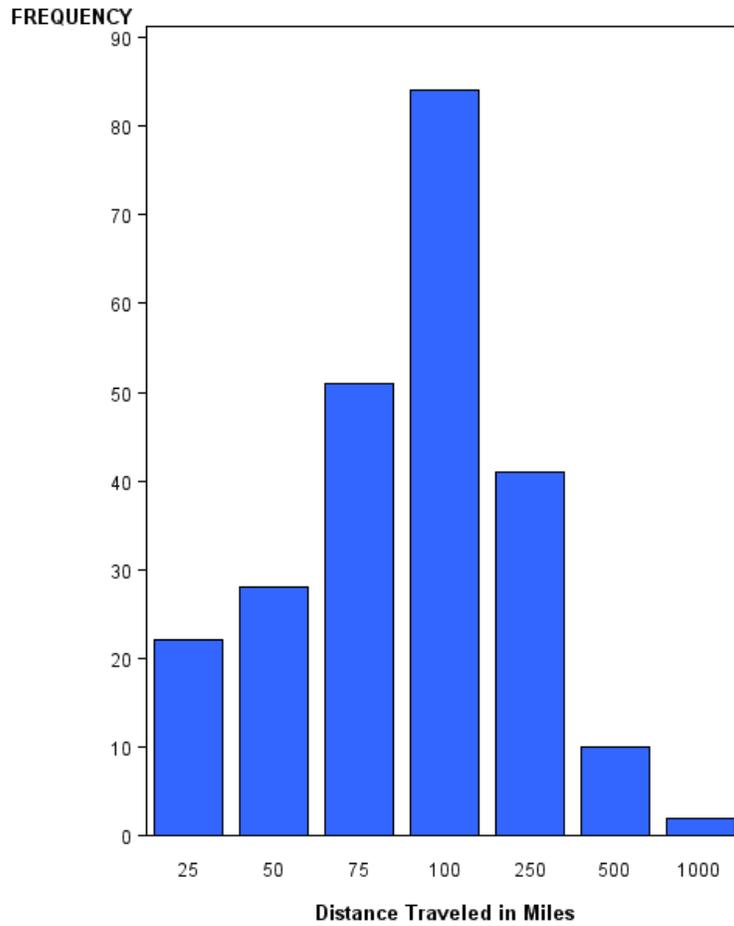
Location of sampling sites, south Toledo Bend Reservoir, Texas, 2015-2016. Gill net, fall electrofishing, and spring electrofishing stations are indicated by G, F, and S, respectively. Water level was at or 2-3 feet below full pool at time of sampling.

APPENDIX C

Average results from individual and team format bass tournaments at Toledo Bend Reservoir, 2011-2015. Only tournaments with 5-fish bag limits and > 50 individuals or teams were included. Weights are expressed in pounds.

Year	N	1 st place weight	2 nd place weight	3 rd place weight	% total weights > 15 lbs.	% catching limit	Big bass weight
Individual							
2011	4	19.7	18.6	17.6	7.2	35.8	8.0
2012	9	22.7	20.5	19.5	15.7	49.5	8.2
2013	4	22.8	22.1	21.7	32.4	81.8	8.1
2014	1	19.1	19.0	18.6	7.8	13.2	8.1
2015	5	25.6	23.4	22.0	25.9	60.9	8.9
Team							
2011	6	27.1	23.7	21.8	22.0	51.7	9.0
2012	7	27.6	24.5	21.7	22.0	56.2	9.5
2013	6	24.9	23.7	21.5	15.7	46.6	8.6
2014	15	26.4	23.7	23.0	17.4	28.1	9.3
2015	10	27.0	24.3	23.1	21.2	46.0	10.7

APPENDIX D



Frequency of anglers that traveled various distances (miles) to Toledo Bend Reservoir, Texas, as determined from the June 2015 through May 2016 creel survey.