

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2013 Fisheries Management Survey Report

Lake Conroe, Texas

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Conroe were surveyed from June 2013 through May 2014 using electrofishing, gill netting, and trap netting. Angler access, structural habitat, and aquatic vegetation surveys were conducted in September 2013. Anglers were surveyed from June 2012 through May 2013 with a creel survey. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Lake Conroe is a 20,118-acre reservoir on the West Fork of the San Jacinto River, Texas, built to provide water for municipal and industrial purposes. The reservoir was constructed in 1973 by the San Jacinto River Authority (SJRA), the Water Development Board, and the City of Houston. The Sam Houston National Forest borders most of the upper third of Lake Conroe, and considerable private and commercial real estate development surround the lower two-thirds of the reservoir.
- **Management History:** Important sport fishes in Lake Conroe include Largemouth Bass, White Bass, Palmetto Bass, Blue Catfish, Channel Catfish, White Crappie, and Black Crappie. Recent management includes control of hydrilla using triploid Grass Carp beginning in 2006. Hydrilla was brought under control by spring 2008, but native aquatic vegetation was reduced from over 1,000 acres in 2006 to about 150 acres in 2008. The plant communities (including the exotic species hydrilla, giant salvinia, and water hyacinth) have been monitored at least biannually. A native aquatic vegetation nursery has been established below the Lake Conroe Dam in cooperation with the Seven Coves Bass Club and SJRA. Plants from the nursery have been used to plant a five mile stretch of shoreline in the Caney Creek arm of the reservoir.
- **Fish Community**
 - **Prey species:** The predominant prey fish species at Lake Conroe were Bluegill, Gizzard Shad, Longear Sunfish, and Threadfin Shad.
 - **Catfishes:** Catfishes were the second most sought after group of fishes by anglers in recent years. Channel Catfish were the most abundant catfish species in Lake Conroe, but Blue Catfish also provide a substantial fishery.
 - **Temperate basses:** White bass and Palmetto Bass are present in Lake Conroe. Angling pressure for temperate basses increased in the 2012-2013 creel survey.
 - **Largemouth Bass:** Largemouth Bass is the most sought after species in Lake Conroe, and the population has provided high quality angling opportunities. The current lake record Largemouth Bass, caught in January 2009, weighed 15.93 pounds and measured 27 inches in length. The new record Largemouth Bass was one of four fish entered into the Toyota ShareLunker Program in the 2008-2009 season.
 - **Crappies:** Both White Crappie and Black Crappie have provided angling opportunities at Lake Conroe although angling pressure for crappie decreased in the 2012-2013 creel survey.

Management Strategies: The fisheries at Lake Conroe will continue to be managed with current length and bag limits. We will continue to work with SJRA, the Lake Conroe Association (LCA), the Seven Coves Bass Club, and other interested groups to address the ongoing problem of exotic vegetation control and native vegetation restoration at Lake Conroe. Palmetto Bass and Florida Largemouth Bass stockings will be requested annually. Largemouth Bass will be sampled biennially by electrofishing. The temperate basses and catfish populations will be sampled biennially with gill nets. All other fish populations will be sampled every four years.

INTRODUCTION

This document is a summary of fisheries data collected from Lake Conroe from June 2013 through May 2014. The purpose of this 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 is presented with the 2013 through 2014 data for comparison.

Reservoir Description

Lake Conroe is a 20,118-acre reservoir located on the West Fork of the San Jacinto River in Montgomery and Walker Counties, Texas, lying within the Piney Woods Vegetation Area. Soil types are generally a deep and moderately well drained combination of sand, loam, and clay (Conroe, Wicksburg-Susquehanna, and Ferris-Houston Black-Kipling Associations). The San Jacinto River Authority (SJRA), the Water Development Board (WDB), and the City of Houston constructed Lake Conroe in 1973 to supply water for municipal and industrial purposes. The Sam Houston National Forest borders most of the upper third of Lake Conroe, and considerable private and commercial real estate development surround the lower two-thirds of the reservoir. Water level at Lake Conroe has been generally stable with a typical 1- to 2-feet drop in water level during the summer. The exceptions have been in 2001 when drought conditions caused summer water level to fall 3 feet below pool, in 2005-2006 when damage to the dam caused by Hurricane Rita required the water level to be held at 4 feet below pool for about 6 months, and in the drought of 2010 through 2013 when the reservoir ranged from 3- to 8-feet low (Figure 1). Littoral habitat at Lake Conroe is provided by standing timber in the upper third of the reservoir; rock riprap along the dam, the FM 1097 bridge, and the FM 1375 bridge; and vegetation including submersed, emergent, and floating-leaved native vegetation.

Angler Access

Boat access is good with one free public ramp, two U.S. Forest Service ramps, and six marinas with fee ramps. However, public bank angling access is limited primarily to bank access at the U.S. Forest Service parks in the upper reservoir and one public park owned and maintained by the San Jacinto River Authority near the dam. When the reservoir was 8 feet low in 2011, only one marina and one Forest Service ramp provided public boat access to Lake Conroe. A renovation project for the FM 830 Boat Ramp is currently proposed by SJRA, Montgomery County, TPWD, and Texas Department of Transportation. The renovation would include increased security, low water access, and bank angling access. Public access points are listed in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Henson and Webb 2010) included:

1. Update the Lake Conroe Habitat Management Plan annually in conjunction with SJRA and with input from the Lake Conroe Advisory Board (LCAB), other agencies, government entities, and constituent groups.
Action: The Lake Conroe Habitat Management plan has not been updated annually; however, the LCAB along with SJRA and TPWD has met at least annually to discuss survey results and habitat management strategies.
2. Continue comprehensive vegetation surveys at the beginning and end of each growing season.
Action: Comprehensive vegetation surveys were conducted at the beginning and end of each growing season.

3. Continue to cooperate with SJRA, the Seven Coves Bass Club (SCBC), the U.S. Army Corps of Engineers (USACE) Lewisville Aquatic Ecosystem Research Facility (LAERF), and others to maintain the native aquatic plant nursery below Lake Conroe Dam.
Action: The Lake Conroe Aquatic Plant Nursery has been maintained as a cooperative effort between the partners.
4. Continue to cooperate with SJRA, the SCBC, the USACE, and others to plant Grass-Carp-tolerant native aquatic vegetation in Lake Conroe.
Action: A five mile stretch of shoreline was planted with Grass-Carp-resistant native plants during the summers of 2012 and 2013.
5. Continue to cooperate with SJRA in treating exotic vegetation when necessary using IPM methods outlined in the Lake Conroe Habitat Management Plan.
Action: SJRA and its contractors have treated giant salvinia, water hyacinth, and salt cedar as necessary.
6. Continue to meet with the LCAB whenever new information regarding habitat management or other issues is available.
Action: LCAB with SJRA and TPWD meets at least once annually and usually at least twice following comprehensive vegetation surveys.
7. Continue to publish magazine articles and press releases whenever possible highlighting fisheries and habitat management issues at Lake Conroe.
Action: On average, one or more magazine articles or news releases on Lake Conroe fisheries and habitat issues are submitted and published monthly.
8. Continue to present information at public meetings and other venues when requested highlighting fisheries and habitat management issues at Lake Conroe.
Action: On average, one or more magazine articles or news releases on Lake Conroe fisheries and habitat issues are submitted and published monthly.
9. Highlight conservation programs during the 2010 Toyota Texas Bass Classic to be held at Lake Conroe.
Action: Conservation programs focusing on Lake Conroe were highlighted at the 2010 through 2013 Toyota Texas Bass Classics on Lake Conroe and the subsequent national tournament television coverage.
10. Continue to highlight conservation efforts at Lake Conroe through the San Jacinto River Watershed Management Initiative.
Action: The Lake Conroe Conservation Coalition received the Governor's Award for Environmental Excellence in 2013. TPWD has been working with SJRA on the Lake Conroe Watershed Protection Plan which should be completed in 2015.
11. Increase opportunities for constituents to participate in conservation efforts at Lake Conroe through the formation of a local "Partnership for Fish-Friendly Waters" under the Friends of Reservoirs umbrella as part of the Reservoir Fisheries Habitat Partnership.
Action: The Lake Conroe Friends of Reservoirs (FOR) Chapter was formed in 2010 around the SCBC as the first FOR Chapter in the United States and has since continued work with native vegetation restoration, created four, 1-acre fish-attractor reefs, and are currently recently are working on a PVC fish attractor project in conjunction with other FOR Chapters. The Lake Conroe FOR Chapter received a \$20,000 grant in 2011.
12. Continue to support the efforts of the Lake Conroe Restocking Association (LCRA) and other organizations to stock Florida Largemouth Bass (FLMB) fingerlings.
Action: No private FLMB stockings have occurred in recent years. However, FLMB fingerlings have been stocked from TPWD hatcheries.
13. Monitor FLMB size distribution, body condition, growth, and genetics in the fall of 2010.
Action: The Lake Conroe Largemouth Bass population was sampled using fall electrofishing in 2010, 2012, and 2013.
14. Continue to manage the Largemouth Bass population under the special 16-inch minimum length limit. This regulation provides additional protection to stocked FLMB, enhances recruitment, and improves the quality of the fishery.

Action: The Lake Conroe Largemouth Bass population continued to be managed under the 16-inch minimum length limit.

15. Request stocking of additional FLMB at a rate of 25/acre annually if stocking criteria are met.

Action: FLMB were stocked in 2011, 2013, and 2014.

16. Request stocking of Palmetto Bass at 10 fish per acre annually.

Action: Palmetto Bass were stocked in 2011, 2013, and 2014.

17. Continue to monitor White Bass and Palmetto Bass biennially for any changes in relative abundance and size distribution.

Action: Gill netting was conducted in 2014.

18. Attempt to obtain Palmetto Bass catch records from alternate sources including Palmetto Bass guides, online forums, magazines, etc.

Action: Palmetto Bass catch records and other avid angler information have been obtained with the help of Lake Conroe Palmetto Bass guides. In response to a press release the District 3-E office received dozens of emails from Palmetto Bass anglers requesting continued stocking of Palmetto Bass. One guide reported taking 450 clients fishing for Palmetto Bass in 2012 with a catch of 2,250 Palmetto Bass.

19. Conduct a standard creel survey in 2012 through 2013 making every effort to contact all Palmetto Bass anglers including those trolling.

Action: 2012-2013 creel data indicated an increase in pressure for temperate basses, including Palmetto Bass.

20. Install Portland samplers under piers at the SJRA boat house, the USFS courtesy pier at Cagle Park, and other locations throughout Lake Conroe to monitor for possible zebra mussel infestations.

Action: Areas around boat ramps at Lake Conroe are surveyed frequently for zebra mussels. In addition, settlement samples, larval samples, and DNA samples to detect zebra mussels are being conducted by the TPWD Habitat Conservation Branch and contractors from the University of Texas Arlington.

Harvest regulation history: Sport fishes are currently managed under statewide fishing regulations with the exception of Largemouth Bass (Table 3). Largemouth Bass were under the statewide 14-inch minimum length limit until September 1, 1993 when the Lake Conroe limit was increased to 16 inches. White Bass regulations have fluctuated from a 10-inch minimum length limit (September 1, 1988) to a 12-inch minimum limit (September 1, 1992) and back to 10 inches (September 1, 2003); all have maintained a 25 fish bag limit. Channel Catfish were regulated under an experimental 14-inch minimum length limit beginning in 1992, but the regulation was changed in 1995 to the statewide 12-inch minimum length limit.

Stocking history: Fish stockings at Lake Conroe began in 1970 with pre-impoundment stockings of northern Largemouth Bass, Blue Catfish, and Channel Catfish (Table 4). Walleye were introduced in 1973, but a sustainable population was never created. Palmetto Bass were first introduced in 1978 and stocked for three consecutive years. Stocking was suspended after 1980 for fifteen years and then resumed in 1995. Palmetto Bass have been stocked annually since 1995, except for 2000, 2001, 2010, and 2012. Striped Bass were stocked one time in 1994 and remained part of the fishery until about 1999. FLMB were first introduced in 1979 and have been stocked periodically over the past 35 years with the most recent stockings in 2010, 2011, 2013, and 2014. The LCRA periodically stocked advanced-sized FLMB as well as Black Crappie and White Crappie into Lake Conroe beginning in 1988. Their efforts helped to increase the percentage of FLMB genes at Lake Conroe as well as helped to enhance the crappie population. Stowaway Marina stocked advanced crappie in 2012 and 2013. Beginning in 2006, incremental stockings of triploid Grass Carp began as a part of an integrated pest management plan for the control of hydrilla. A total of 124,030 Triploid Grass Carp were stocked from 2006 through 2008.

Vegetation/habitat management history: By 1979, Lake Conroe was infested with about 10,000 acres of hydrilla. The infestation seriously limited access and recreational use at the reservoir. To gain relief

from the overabundant exotic vegetation, the Texas Legislature directed the Lake Conroe Association in conjunction with Texas A&M University to stock 270,000 diploid Grass Carp into the reservoir from 1980 through 1982. By 1983, Klusman et al. (1988) reported that macrophytes had been almost completely removed from the reservoir, resulting in an increase in primary productivity. However, by 1986 most nutrients had returned to pre-treatment levels (Klusman et al. 1988). Lake Conroe remained largely devoid of aquatic vegetation until 1995 when TPWD in conjunction with USACE LAERF, SJRA, LCRA, and Texas Black Bass Unlimited (TBBU) began establishing native aquatic vegetation founder colonies at Lake Conroe. These efforts introduced several species of native submersed, emergent, and floating-leaved vegetation into the reservoir. In 1996, hydrilla re-emerged at Lake Conroe. For the next nine years, TPWD and SJRA successfully treated hydrilla with herbicides while allowing the native vegetation to expand. Over 868 acres of hydrilla were present by 2005, creating the need for a comprehensive hydrilla management plan including incremental stockings of triploid Grass Carp as part of an Integrated Pest Management (IPM) approach. In March 2006, 4,200 triploid Grass Carp were introduced into areas infested with hydrilla. Additional stockings continued through 2007 and 2008 as mandated by the Lake Conroe Hydrilla Management Plan. These stockings have been successful at reducing the hydrilla infestation to levels consistent with management goals, but they also greatly reduced native vegetation coverage from 1,078 acres in July 2007 to 152 acres in May 2008, with a shift in species composition from submersed species to more Grass Carp-resistant emergent species. To help re-establish the native vegetation population, TPWD, SJRA, and their partners, including the SCBC, BASS, TBBU, USFWS, and USACE have continued to plant Grass Carp-resistant native vegetation into Lake Conroe. A five-mile stretch of the Caney Creek arm shoreline was planted in the summers of 2012 and 2013. Giant salvinia and water hyacinth have also been present in Lake Conroe and have been controlled using herbicide and bio-control insects. Littoral habitat is also provided at Lake Conroe by standing timber in the upper third of the reservoir and riprap along the dam, the FM 1097 bridge, and the FM 1375 bridge.

Water transfer: To date, the only water discharge from Lake Conroe has been via the dam outflow gates. However, a water supply station has been constructed at the dam to feed water to a future water treatment plant in the Woodlands by means of a pipeline. The new system should be operational in 2015, but all water use will remain in the Lake Conroe basin.

METHODS

Fishes were collected by electrofishing (2 hours at 24, 5-min stations), gill netting (15 net nights at 15 stations), and trap netting (15 net nights at 15 stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and for gill and trap netting as the number of fish per net night (fish/nn). All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Structural shoreline habitat, vegetation, and boater access surveys were conducted in September 2013 according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Additional vegetation surveys were conducted at least biannually.

A roving creel survey was conducted from June 2012 through May 2013 according to Inland Fisheries Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Nine creel days were surveyed each quarter for a total of 36 creel days.

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD) as defined 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). Relative standard error (RSE = $100 \times \text{SE of the estimate/estimate}$)

was calculated for all CPUE statistics and for creel statistics, and SE was calculated for structural indices and IOV. Source for water level data was the United States Geological Survey (USGS 2014).

RESULTS AND DISCUSSION

Habitat: As of September 2013, Lake Conroe contained 114 acres of native vegetation, 1.04 acres of hydrilla and 114.2 acre of water hyacinth. No alligator weed or giant salvinia were observed in 2013 (Table 6). To help re-establish the native vegetation population, TPWD, SJRA, and their partners including the SCBC, BASS, TBBU, USFWS, and USACE-LAERF are continuing native vegetation planting in the reservoir. To supply native vegetation for these efforts, partners established a native aquatic vegetation nursery below Lake Conroe Dam. TPWD continues to cooperate with SJRA to monitor and treat hydrilla, giant salvinia, and water hyacinth according to the Lake Conroe Habitat Management Plan. Structural shoreline habitat has changed little since 2009. The predominant shoreline habitat is bulkhead and boat docks which encompass over 50% of the total shoreline. The upper third of the reservoir lies within the Sam Houston National Forest and is protected from commercial and residential development. Most of the ecologically functional shoreline habitat occurs in this section of the reservoir (Table 5).

Creel: Total angling effort was 184,408 h in 2012-2013 (Table 8). Total angling expenditures were \$1,244,774. Black basses account for the highest directed angling effort at Lake Conroe at 51.1%% of the total directed effort in 2012 through 2013 (Table 7). Catfishes were the second most sought after group with 29.9% of the angling pressure. Percentages of directed effort for crappies, temperate basses, and sunfish were 7.8%, 4.1%, and 0.9% respectively (Table 7).

Prey species: Bluegill was the dominant prey species in the 2013 electrofishing survey with a catch rate of 372.5/h (Figure 3). Longear Sunfish was the second most abundant species (141.0/h), followed by Gizzard Shad (135.5/h) and Threadfin Shad (63.5/h) (Appendix A). During the 2009 survey, Threadfin Shad were dominant at 450/h followed by Bluegill (118.5/hr) and Gizzard Shad (142.0/hr). The IOV for Gizzard Shad decreased from 56 in 2009 to 39 in 2013 (Figure 2).

Catfishes: Both Blue Catfish and Channel Catfish occur at Lake Conroe, but Channel Catfish are the dominant species (Figure 5; Figure 6; Appendix A). Gill net catches of Blue Catfish improved since 2008. The catch rate in spring 2014 was 4.6/nn compared to 1.6/nn in 2008 and 3.9/nn in 2010 (Figure 5). Blue Catfish to 30 inches total length and greater were observed in all samples. The length distribution of the 2014 sample indicates good reproduction and recruitment. Anglers harvested an estimated 9,072 Blue Catfish during the 2012 through 2013 creel period. The estimated number harvested is similar to the number harvested during the 2008 through 2009 creel period (9,865) (Figure 7). Blue catfish observed in the creel ranged in length from 14 to 30 inches (Figure 7).

The gill net catch rate of Channel Catfish in spring 2014 was 16.6/nn, similar to that of previous years (Figure 6). The size distribution of the population indicates a high proportion of the population available for harvest. During the 2012 through 2013 creel period, anglers harvested an estimated 69,759 Channel Catfish compared to an estimated harvest of 34,765 Channel Catfish during the 2008 through 2009 creel period. Channel catfish harvested ranged from 12 to 25 inches in length in 2012 through 2013 (Figure 7).

Temperate basses: The gill net catch rates of White Bass have been relatively low (<2.0/nn) during the previous three survey periods with no White Bass caught in gill nets during the 2014 survey (Figure 8). No White Bass were caught or harvested during the 2012 through 2013 creel survey (Table 11; Figure 10). Low seasonal (spring) inflows into Lake Conroe and associated lack of spawning habitat are likely responsible for the steady decline in the White Bass population.

The gill net catch rate of Palmetto Bass in 2014 was 3.4/nn, similar to that in 2010 (3.0/nn) and 2008 (2.8/nn) (Figure 9). Most Palmetto Bass collected ranged from 18 to 25 inches in total length (Figure 9).

The 2012 through 2013 creel survey indicated that directed pressure for Palmetto Bass increased from 706 h in 2008 through 2009 to 1,114 h during the 2012 through 2013 creel period (Table 11). Total catch per hour for anglers seeking palmetto bass was 3.41 in 2012 through 2013 (Table 11). Angler harvest was estimated at 15,584 fish with only 64 individual Palmetto Bass observed during the creel year (Figure 9). Feedback requests made to Palmetto Bass anglers through media outlets resulted in numerous emails indicating a relatively small but avid Palmetto Bass angling community at Lake Conroe. One guide reported taking 450 clients fishing for Palmetto Bass in 2012 with a catch of 2,250 fish.

Black basses: Both Largemouth Bass and Spotted Bass occur in electrofishing samples at Lake Conroe; however, Spotted Bass are few in number and do not contribute significantly to the black bass fishery. The electrofishing catch rate of Largemouth Bass in 2013 was 51.5/h. This catch rate was down from 2012 (104.5/h) but similar to 2010 (67.5/h) (Figure 11). The population size distribution is good with PSD nearly constant around 50. Although the majority of Largemouth Bass caught in electrofishing are less than the 16-inch minimum length limit, there are fish available for harvest with a PSD-16 of 8 in the 2013 survey and fish captured up to 19 inches in length (Figure 11). The Largemouth Bass fishery is the most popular with anglers at Lake Conroe with a directed effort of 92,177 h (4.58 h/acre) (Table 12). Angler catch rate was 0.13/h during the 2012 through 2013 creel survey. This catch rate was much lower than the 0.62/h estimate in 2008 through 2009. Angler harvest of bass was estimated to be 8,036 in the 2012 through 2013 creel, with bass ranging from 14 to 25 inches with one sub-legal fish observed in the creel (Figure 12).

Crappies: Trap nets in fall 2013 captured White Crappie (0.6/nn) and Black Crappie (0.3/nn) (Figures 13 and 14). Angling effort for crappies was 14,102 hours (Table 13). Catch rates for crappie anglers were high during the 2012-2013 creel period for White (2.3/h) and Black (1.7/h) Crappies. An estimated 4,186 White Crappie and 3,357 Black Crappie, ranging in length from 10 to 16 inches, were harvested by anglers (Figure 15). One sub-legal White Crappie (8 inches) was observed in the creel.

Fisheries management plan for Lake Conroe, Texas

Prepared – July 2014

ISSUE 1: Habitat management continues to be a major focus at Lake Conroe. Hydrilla, giant salvinia, and water hyacinth have all been brought under control using IPM methods outlined in the Lake Conroe Habitat Management Plan. However, native vegetation has also decreased sharply due to the stocking of 124,030 triploid Grass Carp for hydrilla control.

MANAGEMENT STRATEGIES

1. Update the Lake Conroe Habitat Management Plan as needed in conjunction with SJRA and with input from the LCAB and other stakeholders.
2. Continue comprehensive vegetation surveys at the beginning and end of each growing season.
3. Continue to cooperate with SJRA, the SCBC, the USACE-LAERF and others to maintain the native aquatic plant nursery below Lake Conroe Dam.
4. Continue to cooperate with SJRA, the SCBC, the USACE and others to plant Grass Carp-tolerant native aquatic vegetation in Lake Conroe.
5. Continue to cooperate with SJRA in treating exotic vegetation when necessary using IPM methods outlined in the Lake Conroe Habitat Management Plan.
6. Cooperate with all partners to determine timing of minimal triploid Grass Carp stockings to maintain balance between native plant expansion and hydrilla control.

ISSUE 2: Lake Conroe is a high-profile reservoir with diverse constituent groups who have great interest in all aspects of the reservoir's management.

MANAGEMENT STRATEGIES

1. Continue to meet with the Lake Conroe Advisory Board at least annually, or more frequently as new information regarding habitat management or other issues is available.
2. Continue to publish magazine articles and press releases whenever possible highlighting fisheries and habitat management issues at Lake Conroe.

ISSUE 3: Largemouth Bass provide a very popular fishery at Lake Conroe.

MANAGEMENT STRATEGIES

1. Monitor Largemouth Bass size distribution, body condition, growth, and genetics (allele frequencies and proportion of pure FLMB in the stock) in the fall of 2015.
2. Request stocking of additional FLMB at a rate of 25/acre annually.

ISSUE 4: Palmetto Bass provide a fishery at Lake Conroe and the most recent creel survey indicates an increase in effort directed toward Palmetto Bass.

MANAGEMENT STRATEGIES

1. Request stocking of Palmetto Bass at a rate of 10/acre annually.
2. Continue to work with Palmetto Bass guides and anglers to access Palmetto Bass fishery.

ISSUE 5: Lake Conroe needs better bank angling access and deep water access during low water.

MANAGEMENT STRATEGY

1. Work with SJRA, Montgomery County, and TXDOT to enhance the FM 830 Boat Ramp and Park for better boating and bank angling access including dredging to allow access during low water events.

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.
6. Support efforts by the TPWD Habitat Conservation Branch and contractors from the University of Texas Arlington to conduct settlement samples, larval samples, and DNA samples to detect zebra mussels in Lake Conroe.

SAMPLING SCHEDULE JUSTIFICATION:

Fall electrofishing surveys are conducted biennially to monitor Largemouth Bass and prey fish populations. Gill netting surveys are conducted every two years to monitor temperate bass and catfish populations. Crappie populations will be monitored using multi-night-set trap netting every four years. Creel surveys are conducted every four years to monitor sport fish catch and harvest and angler expenditures. Vegetation surveys are currently conducted biannually to monitor exotic and native vegetation as part of the Lake Conroe Habitat Management Plan. Structural habitat surveys and access surveys are conducted every 4 years (Table 14).

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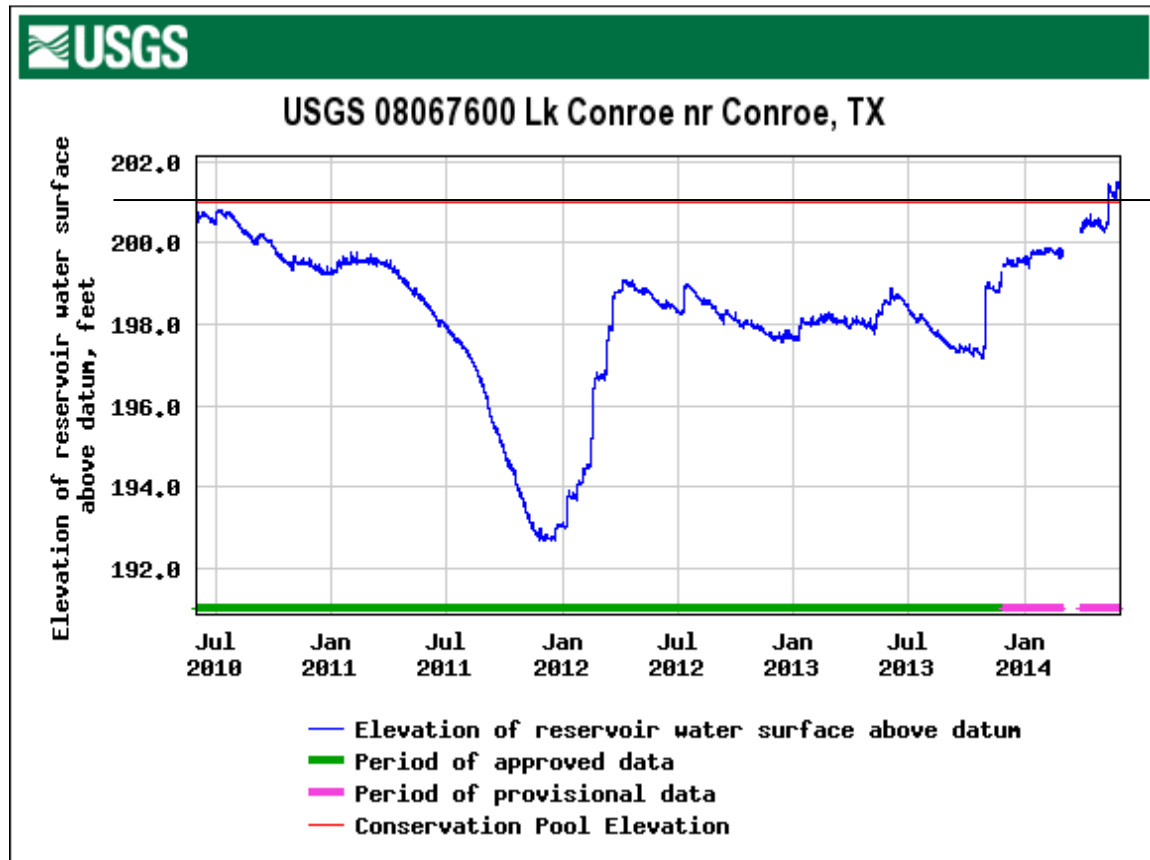


Figure 1. Daily water level elevations in feet above mean sea level (MSL) recorded for Lake Conroe, Texas.

Table 1. Characteristics of Lake Conroe, Texas.

Characteristic	Description
Year constructed	1973
Controlling authority	San Jacinto River Authority
Counties	Montgomery and Walker
Reservoir type	Main stream
Shoreline Development Index (SDI)	7.4
Conductivity	140-260 $\mu\text{mhos/cm}$

Table 2. Boat ramp characteristics for Lake Conroe, Texas, August 2013. Reservoir elevation at time of survey was 199 feet above mean sea level.

Boat ramp	Latitude, Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp	Condition
Stubblefield Lake	30.563786 -95.635954	Y	5	199	Good
Cagle Recreation Area	30.518659 -95.591728	Y	45	192	Good
Stow-a-way Marina	30.473740 -95.567825	N	36	195	Good
Scott's Ridge	30.453716 -95.629961	Y	32	195	Good
FM 830 Ramp	30.413250 -95.571670	Y	20	194	Needs improvement
April Plaza Marina	30.373256 -95.633740	N	46	195	Good
Inland Marina	30.363538 -95.596496	N	40	192	Good
Lakeview Marina	30.356824 -95.581341	N	56	195	Good

Table 3. Harvest regulations for Lake Conroe, Texas.

Species	Bag limit	Length limit (inches)
Catfishes: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12 – inch minimum
Catfish, Flathead	5	18 – inch minimum
Bass, Palmetto	5	18 – inch minimum
Bass, White	25	10 – inch minimum
Bass, Largemouth	5 ^a	16 – inch minimum
Bass, Spotted	5 ^a	
Crappies: White and Black, their hybrids and subspecies	25 (in any combination)	10 – inch minimum

^aLargemouth Bass and Spotted Bass 5 fish bag in aggregate.

Table 4. Stocking history of Lake Conroe, Texas. FGL = fingerling; AFGL = advanced fingerling.

Year	Number	Size	Year	Number	Size
<u>Blue Catfish</u>			<u>Largemouth Bass</u>		
1971	27,440	FGL	<u>ShareLunker Largemouth Bass</u>		
			1970	75,000	FGL
			2004	5,180	FGL
			2006	4,592	FGL
			2008	2,779	FGL
			2009	<u>3,014</u>	FGL
			Species Total	15,565	
<u>Channel Catfish</u>			<u>Florida Largemouth Bass</u>		
1970	2,000	FGL	1979	549,104	FGL
1971	193,852	FGL	1988	55,278	FGL
1973	<u>68,570</u>	FGL	1989	52,148	FGL
Species Total	264,422		1990	51,256	FGL
			1991	151,453	FGL
			1992	209,310	FGL
			1993	101,217	FGL
			1994	103,416	FGL
			1995	526,806	FGL
			1996	543,871	FGL
			1997*	40,000	FGL
			1999	29,607	FGL
			2000	296,696	FGL
			2000*	31,050	FGL
			2001	448,267	FGL
			2002*	40,000	FGL
			2004	5,180	FGL
			2007	504,192	FGL
			2008	501,191	FGL
			2010	267,517	FGL
			2011	503,719	FGL
			2013	517,886	FGL
			2014	<u>184,959</u>	FGL
			Species Total	2,484,644	
			<u>Sunshine Bass</u>		
2014	101,198	FGL			

* Stocking conducted by the Lake Conroe Restocking Association (LCRA).

** Stocking authorized by Texas Legislature in cooperation with Texas A&M University for research study on the effectiveness of white amur at removal of the exotic plant hydrilla.

Table 4 Continued. Stocking history of Lake Conroe, Texas. Size categories are FRY =<1 inch, FGL = 1-3 inches, AFGL = 8 inches, and ADL = adults.

Year	Number	Size	Year	Number	Size
<u>White Crappie</u>			<u>Walleye</u>		
1990*	10,000	FGL	1973	5,900,000	FGL
1992*	5,371	FGL	1974	<u>4,500,000</u>	FGL
1995*	18,200	FGL	Species Total	10,400,000	
1996*	<u>26,444</u>	FGL			
Species Total	60,015		<u>White Amur (diploid Grass Carp)</u>		
<u>Black Crappie</u>			1981**	166,835	AFGL
1989*	99,850	FGL	1982**	<u>103,165</u>	AFGL
1992*	6,371	AFGL	Species Total	270,000	
1994*	41,970	AFGL	<u>White Amur (triploid Grass Carp)</u>		
1996*	22,000	AFGL	2006	27,441	AFGL
1998*	41,466	AFGL	2007	58,750	AFGL
1999*	13,300	AFGL	2008	<u>37,839</u>	AFGL
2000*	<u>36,500</u>	AFGL	Species Total	124,030	
Species Total	261,457				

* Stocking conducted by the Lake Conroe Restocking Association (LCRA).

** Stocking authorized by Texas Legislature in cooperation with Texas A&M University for research study on the effectiveness of Grass Carp at removal of the exotic plant hydrilla.

Table 5. Survey of structural habitat type, Lake Conroe, Texas, September 2013. Shoreline habitat type units are in miles.

Habitat Type	Estimate	% of total
Bulkhead	13.2 miles	4.2
Natural shoreline	8.4 miles	8.5
Natural shoreline/Flooded terrestrial	9.8 miles	7.4
Natural shoreline/Native emerged	0.3 miles	0.2
Rock	6.5 miles	5
Under development	1.4 miles	1.1
Bulkhead/ Boat dock	70.2 miles	54.2
Bulkhead/ Standing timber	1.1 miles	0.9
Natural shoreline/ Standing timber	12.4 miles	9.4
Natural shoreline/Flooded terrestrial/ Standing timber	2.4 miles	1.8
Natural shoreline/Flooded terrestrial/ Native emergent	9.4 miles	7.2
Natural shoreline/Flooded terrestrial/ Native submersed	0.1 miles	0.1
Natural shoreline/ Native emergent	0.3 miles	0.2
Natural shoreline/Flooded terrestrial/ Standing timber/Native emergent	0.2 miles	0.1
Natural shoreline/Flooded terrestrial/ Native emergent/Native submersed	0.4 miles	0.3

Table 6. Survey of aquatic vegetation, Lake Conroe, Texas, 2009 through 2013. In 2011 low water levels resulted in no notable vegetation in Lake Conroe. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2009	2010	2011	2012	2013
Native submersed	145.62 (0.7)	25.16 (<0.1)		0	4.4 (0)
Native floating-leaved	27.6(<0.1)	33.75 (0.2)		6.52 (<0.01)	52.9 (0.2)
Native emergent	<u>0.16 (<0.01)</u>	<u>25.13 (<0.1)</u>		<u>1480.43 (7)</u>	<u>56.9 (0.3)</u>
Total native	173.38 (1)	84.04 (0.4)		1486.95 (7)	114.2 (0.6)
Alligator Weed	25.26 (<0.1)	0.5 (<0.01)		33.87 (0.2)	0
Giant salvinia	582.1 (3)	0.84 (<0.01)		0	0
Hydrilla	0	3.02 (<0.01)		0.08 (<0.01)	1.04 (>0.01)
Water hyacinth	<u>0.2 (<0.01)</u>	<u>2 sq. ft</u>		<u>1.87 (<0.01)</u>	<u>114.2 (0.6)</u>
Total non-native	607.56 (3)	4.36 (<0.01)		35.82 (<0.1)	115.24 (0.6)

Table 7. Percent directed angler effort by species for Lake Conroe, Texas, 2008 through 2009 and 2012 through 2013. Survey periods were from 1 June through 31 May.

Species	2008/2009	2012/2013
All Catfishes	18.4	29.9
Blue Catfish	3.5	0.0
Red Drum	0.0	0.2
All Temperate Basses	0.6	4.1
Palmetto Bass	0.4	0.6
All Black Basses	40.0	51.1
Largemouth Bass	9.5	8.0
Sunfishes	1.8	0.9
Crappies	11.7	7.8
Anything	13.6	6.0

Table 8. Total fishing effort (h) for all species and total directed expenditures at Lake Conroe, Texas, 2008 through 2009 and 2012 through 2013. Survey periods were from 1 June through 31 May. Relative standard error is in parentheses.

Creel statistic	2008/2009	2012/2013
Total fishing effort	216,063 (15)	184,408 (19)
Total directed expenditures	\$970,236 (27)	\$1,244,774 (27)

Gizzard Shad

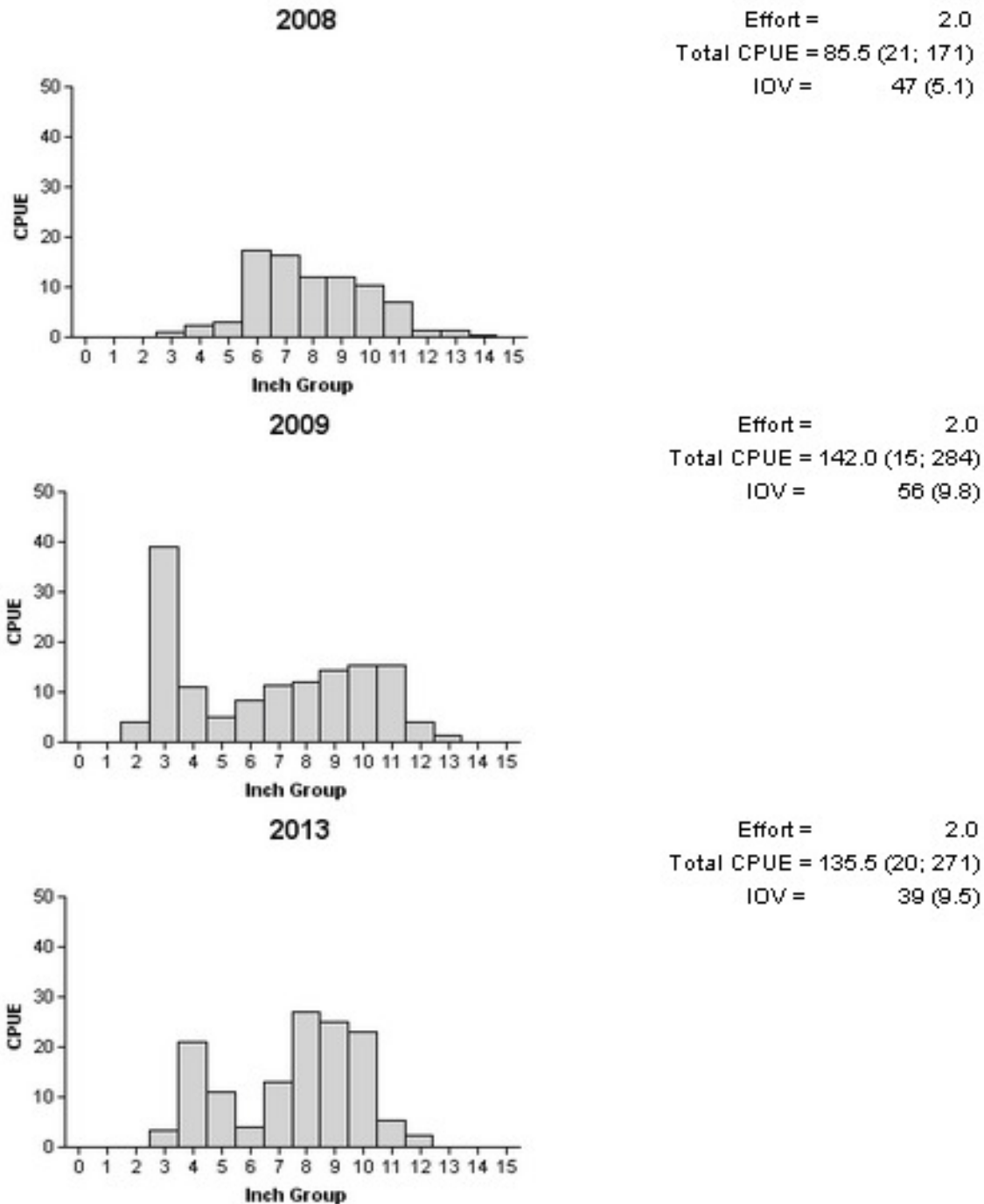


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Conroe, Texas, 2008, 2009, and 2013.

Bluegill

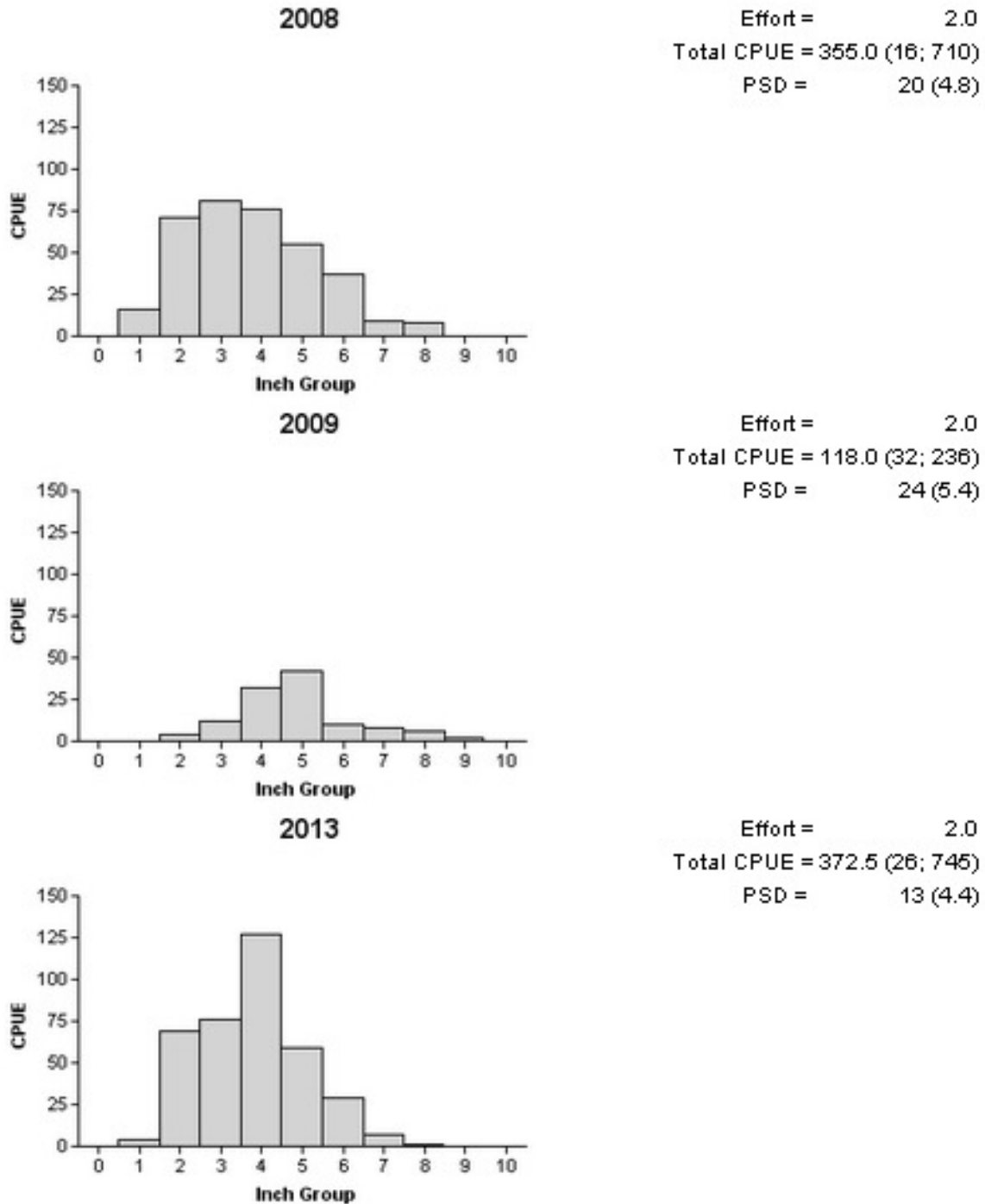


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Conroe, Texas, 2008, 2009, and 2013.

Bluegill

Table 9. Creel survey statistics for Bluegill at Lake Conroe, Texas, from August 2008 through May 2009 and June 2012 through March 2013. Total catch per hour is for anglers targeting all sunfish species and total harvest is the estimated number of Bluegill harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Statistic	Year	
	2008/2009	2012/2013
Directed effort (h)	4,287.66 (53)	1,573.90 (67)
Directed effort/acre	0.21 (53)	0.08 (67)
Total catch per hour	4.40 (61)	3.31 (121)
Total harvest	4,800.31 (84)	1,523.92 (198)
Harvest/acre	0.24 (84)	0.08 (198)
Percent legal released	72.34 (58)	70.70 (154)

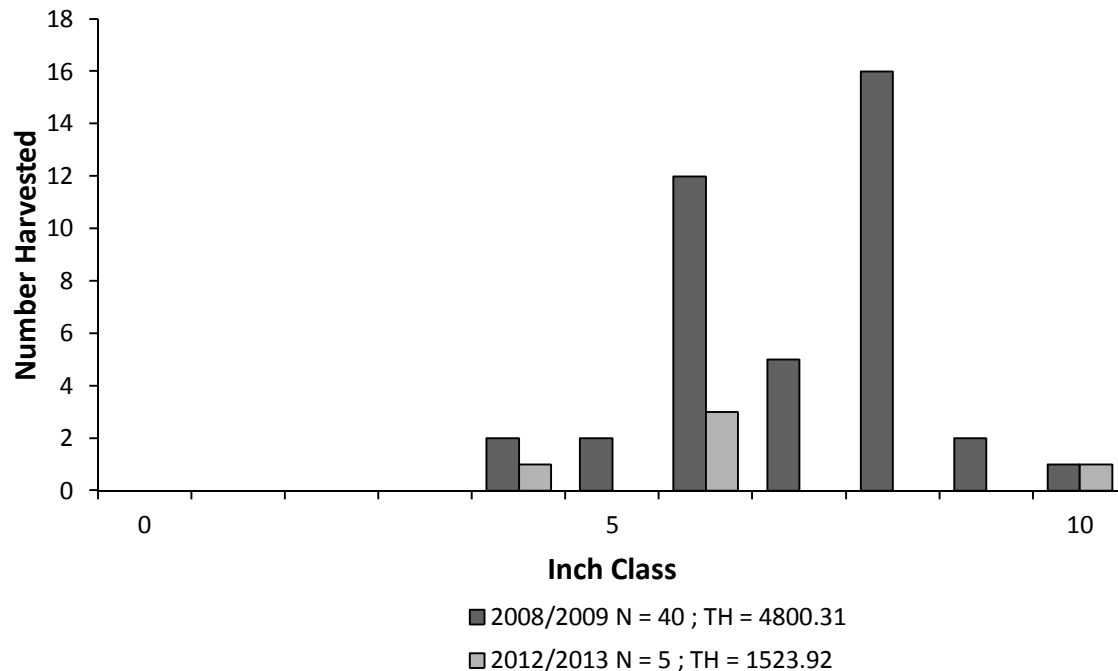


Figure 4. Length frequency of harvested Bluegill observed during creel surveys at Lake Conroe, Texas, June 2008 through May 2009 and June 2012 through May 2013, all anglers combined. N is the number of harvested Bluegill observed during creel surveys, and TH is the total estimated harvest for the creel period.

Blue Catfish

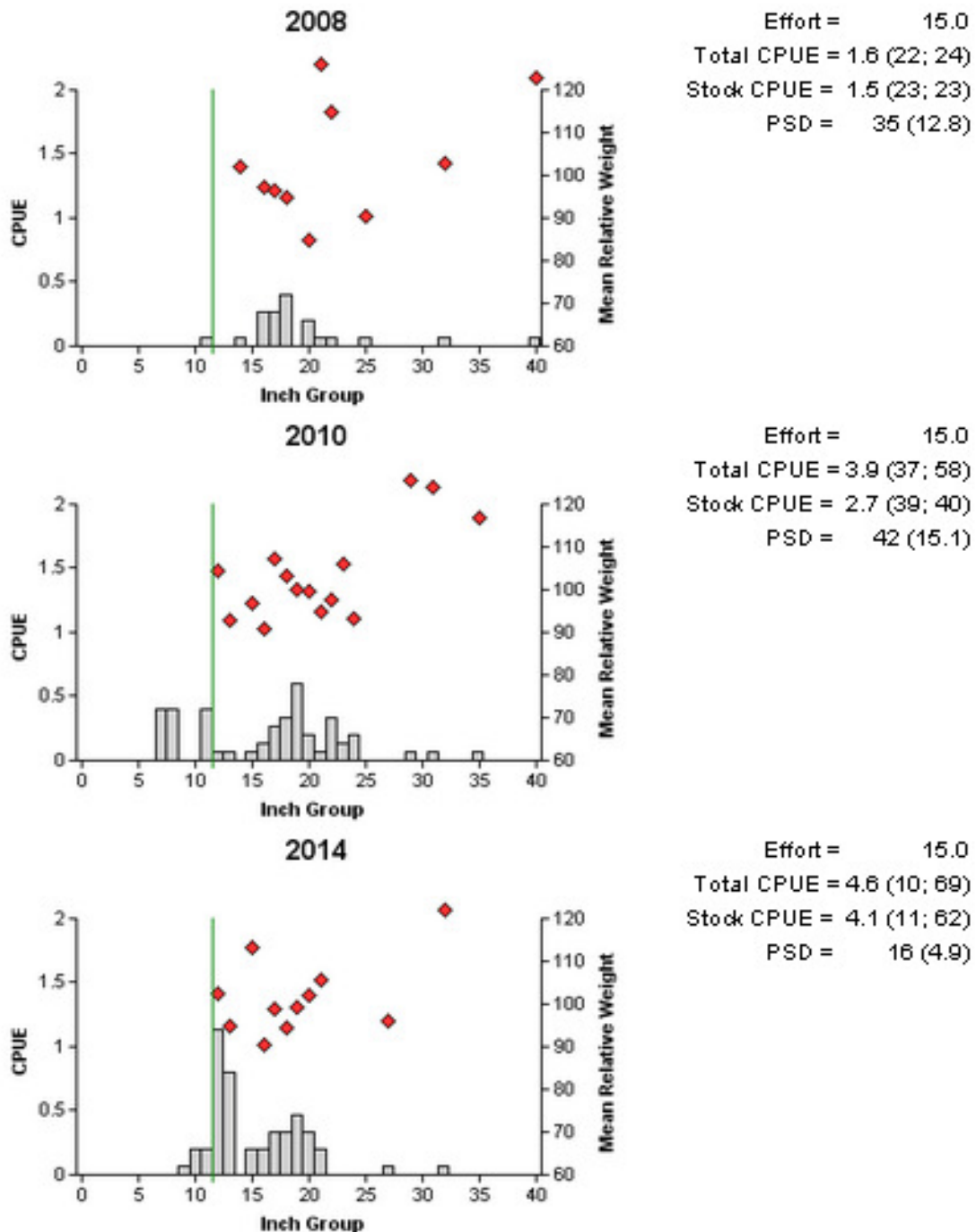


Figure 5. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N are in parentheses) for spring gill net surveys, Lake Conroe, Texas, 2008, 2010, and 2014. Vertical line indicates length limit.

Channel Catfish

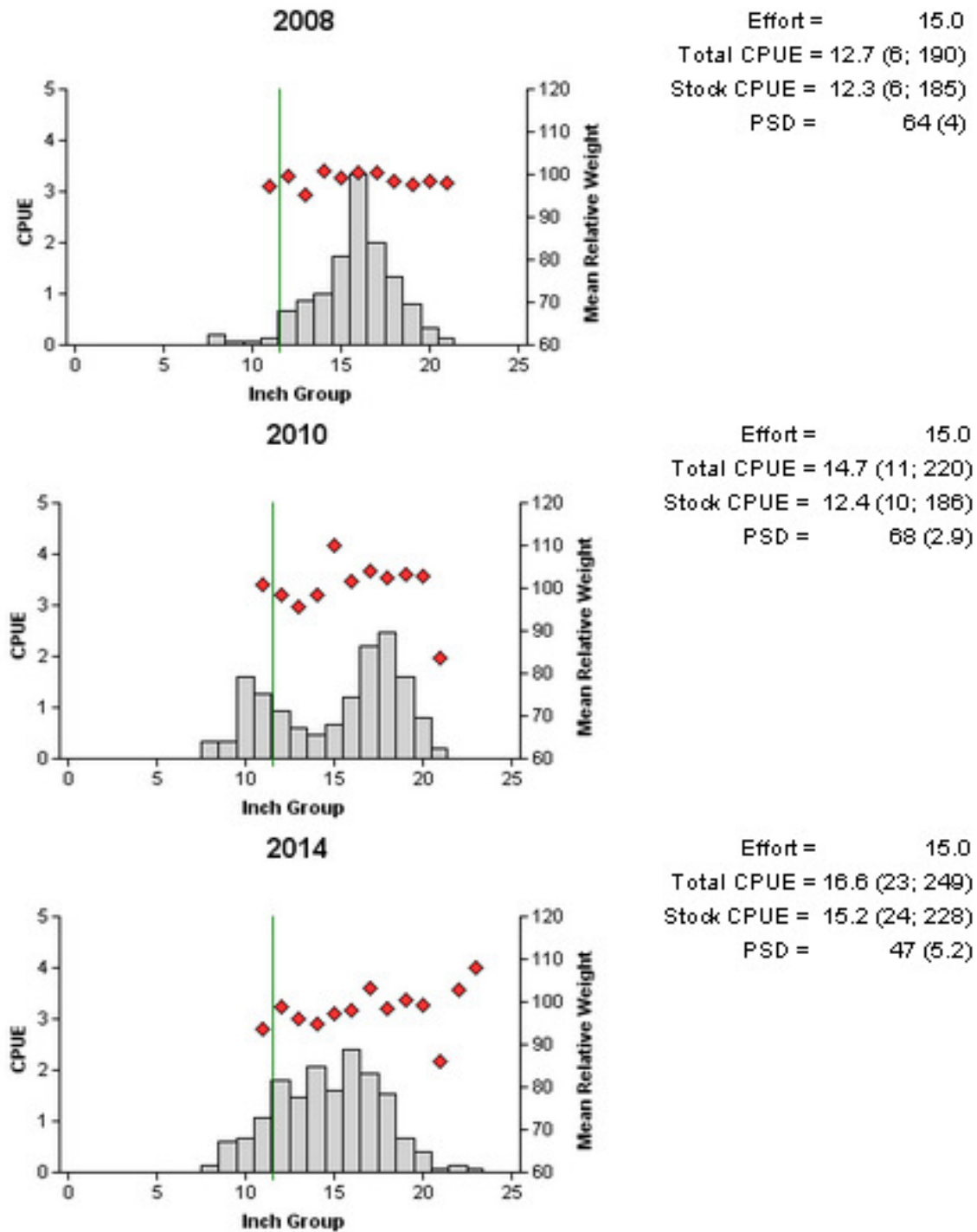


Figure 6. Number of Channel Catfish caught per net night (CPUE) and population indices (RSE and N are in parentheses) for spring gill net surveys, Lake Conroe, Texas, 2008, 2010, and 2014. Vertical line indicates length limit.

Catfishes

Table 10. Creel survey statistics for Catfishes at Lake Conroe, Texas, from August 2008 through May 2009 and June 2012 through May 2013. Total catch per hour is for anglers targeting all catfish species, and total harvest is reported for the estimated number of Blue Catfish and Channel Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Statistic	Year	
	2008/2009	2012/2013
Directed effort (h)	39,001.34 (25)	53,854.16 (19)
Directed effort/acre	1.94 (25)	2.68 (19)
Total catch per hour		
Blue Catfish	0.50 (28)	0.24 (26)
Channel Catfish	1.39 (24)	1.77 (22)
Total harvest		
Blue Catfish	19,585.81 (33)	9,072.10 (70)
Channel Catfish	33,919.21 (31)	69,758.68 (30)
Harvest/acre		
Blue Catfish	0.97 (33)	0.45 (70)
Channel Catfish	1.69 (31)	3.47 (30)
Percent legal released		
Blue Catfish	0.39 (33)	3.15 (56)
Channel Catfish	8.17 (25)	1.83 (23)

Catfishes

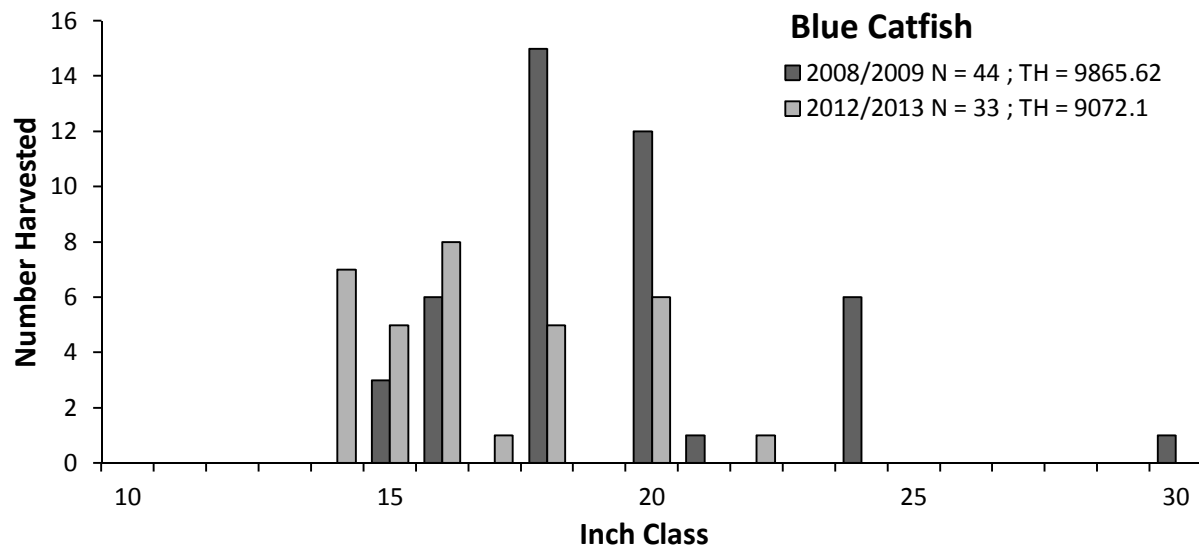
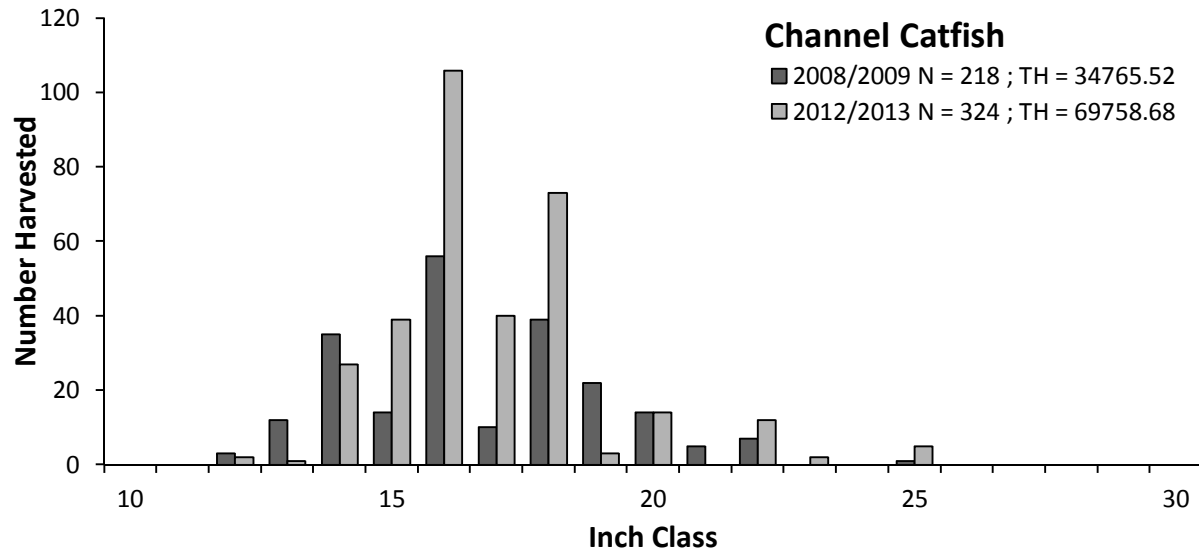


Figure 7. Length frequency of harvested Blue and Channel Catfish observed during creel surveys at Lake Conroe, Texas,, Texas, June 2008 through May 2009 and May 2013 through June 2013 all anglers combined. N is the number of harvested Channel Catfish and Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

White Bass

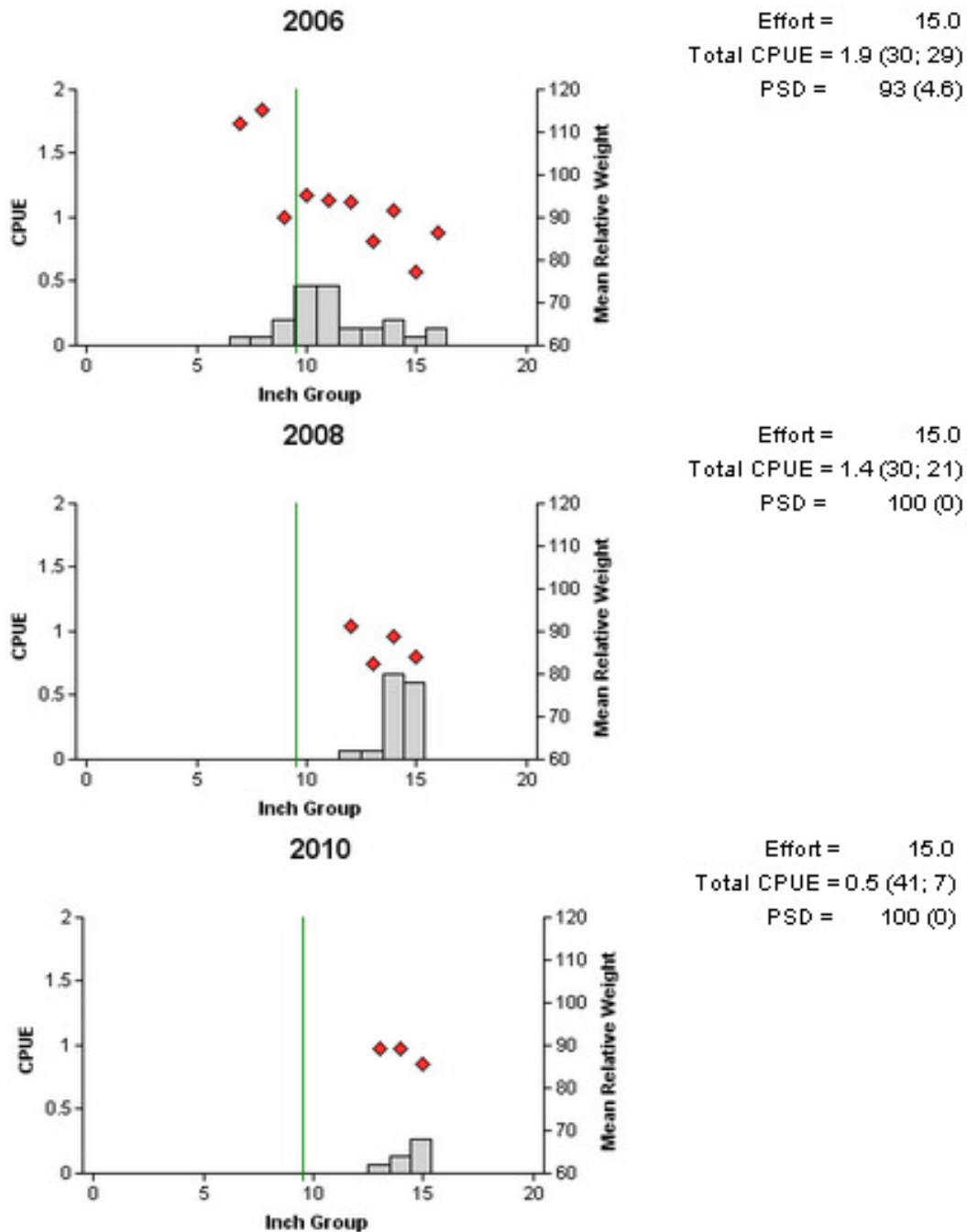


Figure 8. Number of White Bass caught per net night (CPUE) and population indices (RSE and N are in parentheses) for spring gill net surveys, Lake Conroe, Texas, 2006, 2008, and 2010. Vertical line indicates length limit.

Palmetto Bass

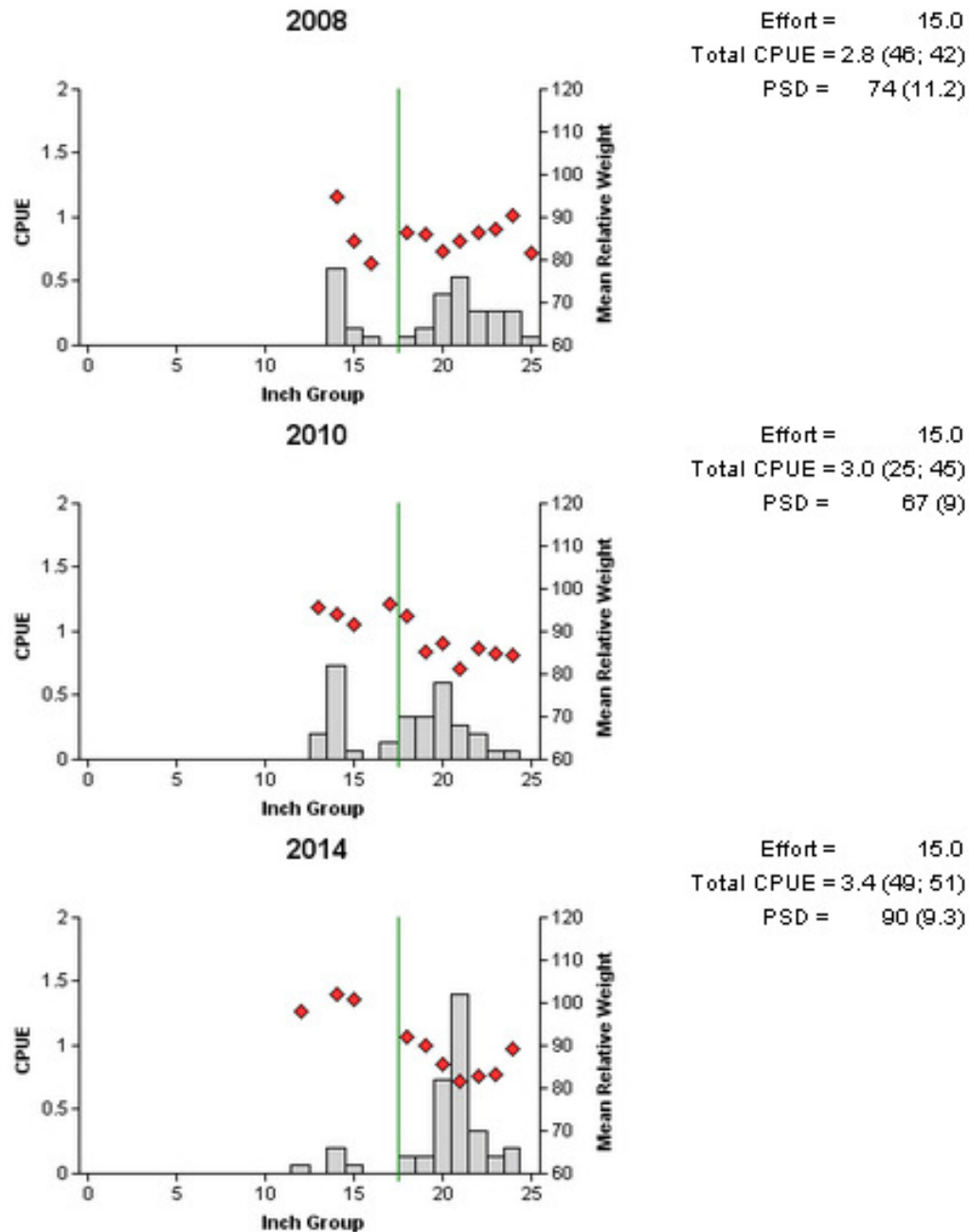


Figure 9. Number of Palmetto Bass caught per net night (CPUE) and population indices (RSE and N are in parentheses) for spring gill net surveys, Lake Conroe, Texas, 2008, 2010, and 2014. Vertical line indicates length limit.

Temperate Bass

Table 11. Creel survey statistics for Temperate Bass at Lake Conroe, Texas, from August 2008 through May 2009, and June 2012 through May 2013. Total catch per hour is for anglers targeting White Bass or Palmetto Bass, and total harvest is the estimated number of White Bass or Palmetto Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Statistic	Year	
	2008/2009	2012/2013
Directed effort (h)		
All Temperate Bass	2,183.61 (96)	7,475.21 (40)
White Bass	443.28 (126)	0.00
Palmetto Bass	706.72 (100)	1,114.48 (65)
Directed effort/acre	0.11 (96)	0.37 (40)
Total catch per hour		
White Bass	0.58 (192)	0.00
Palmetto Bass	3.93 (173)	3.41 (47)
Total harvest		
White Bass	275.02 (435)	0.00
Palmetto Bass	1,450.20 (141)	15,584.51 (69)
Harvest/acre		
White Bass	0.01 (424)	0.00
Palmetto Bass	0.07 (352)	0.77 (69)
Percent legal released		
White Bass	50.25 (365)	0.00
Palmetto Bass	9.63 (272)	19.50 (51)

Temperate Bass

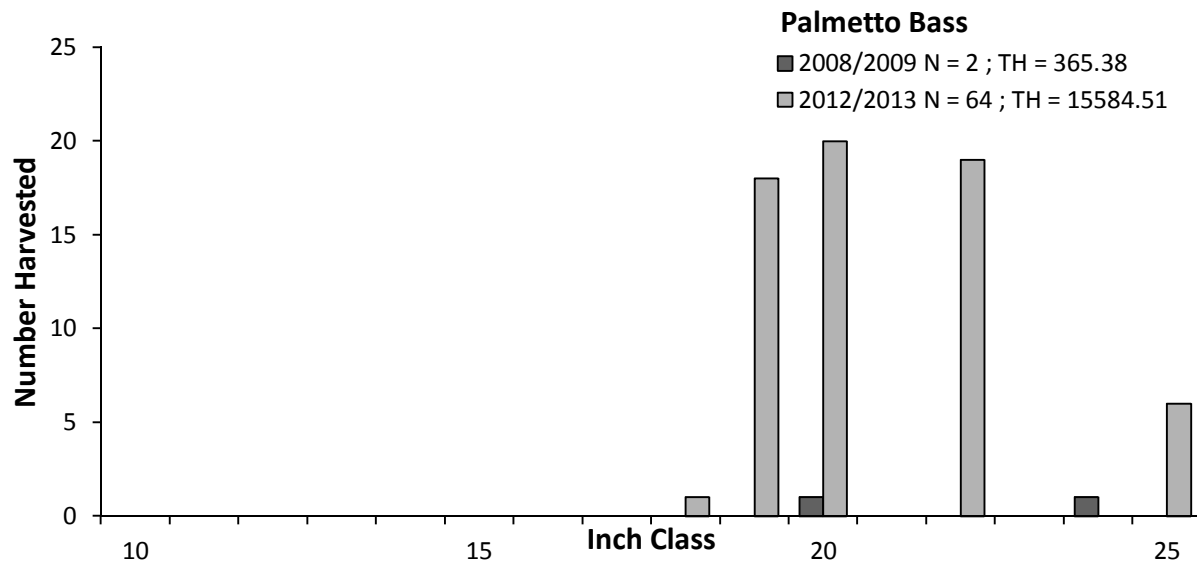
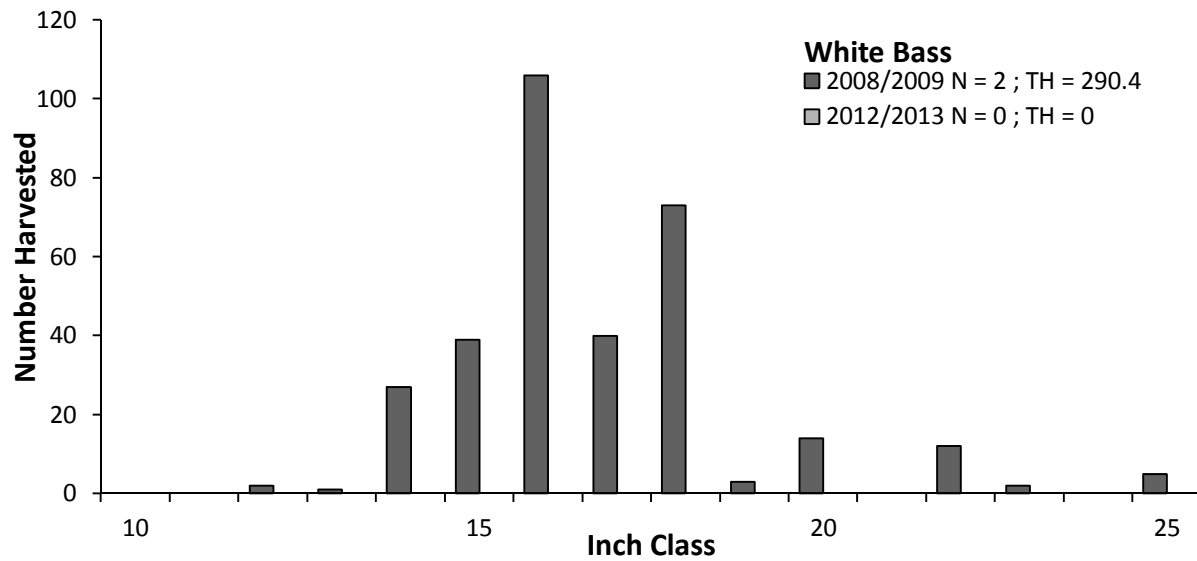


Figure 10. Length frequency of harvested Palmetto Bass observed during creel surveys at Lake Conroe, Texas, June 2009 through May 2013, all anglers combined. N is the number of harvested Palmetto Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

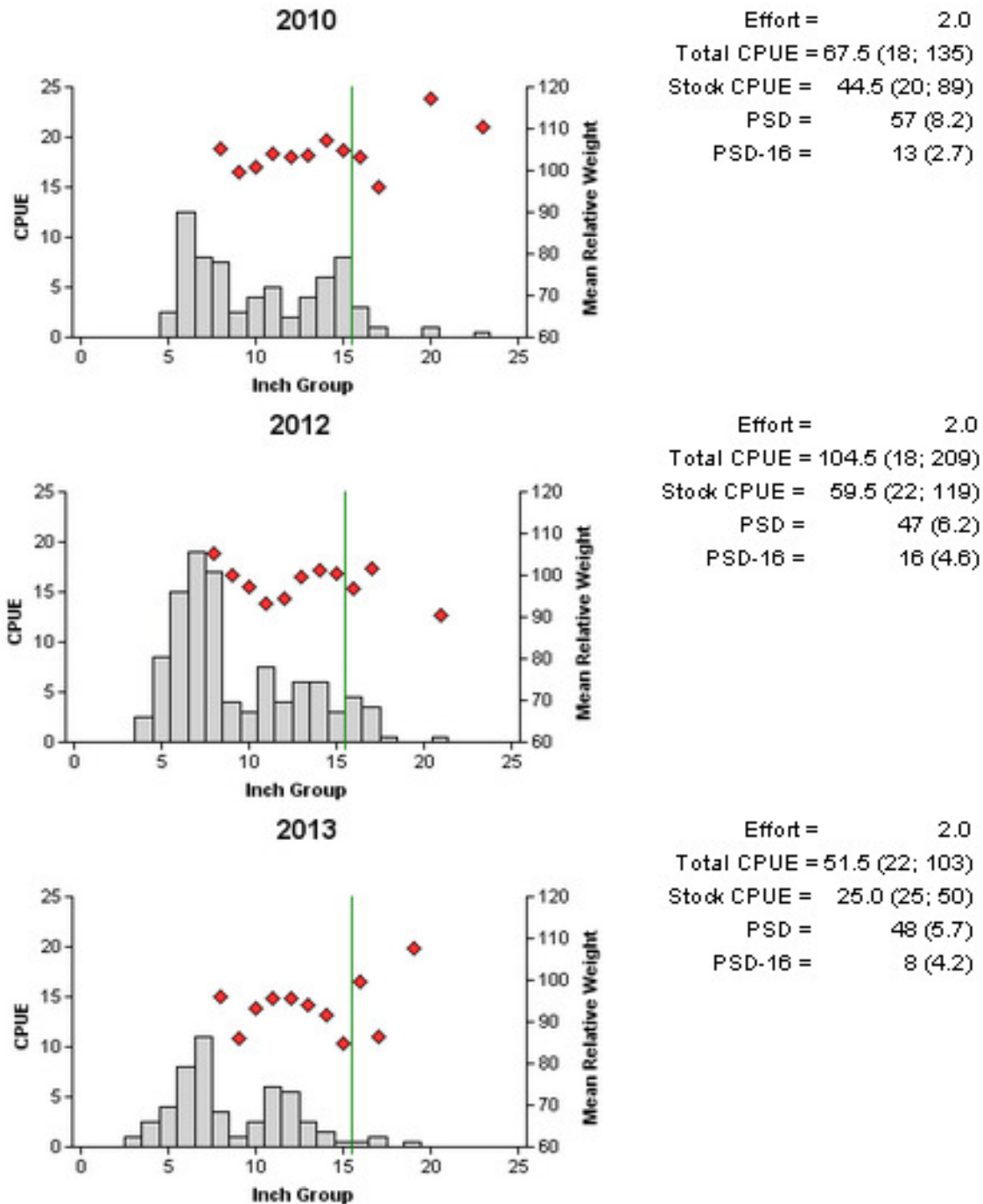


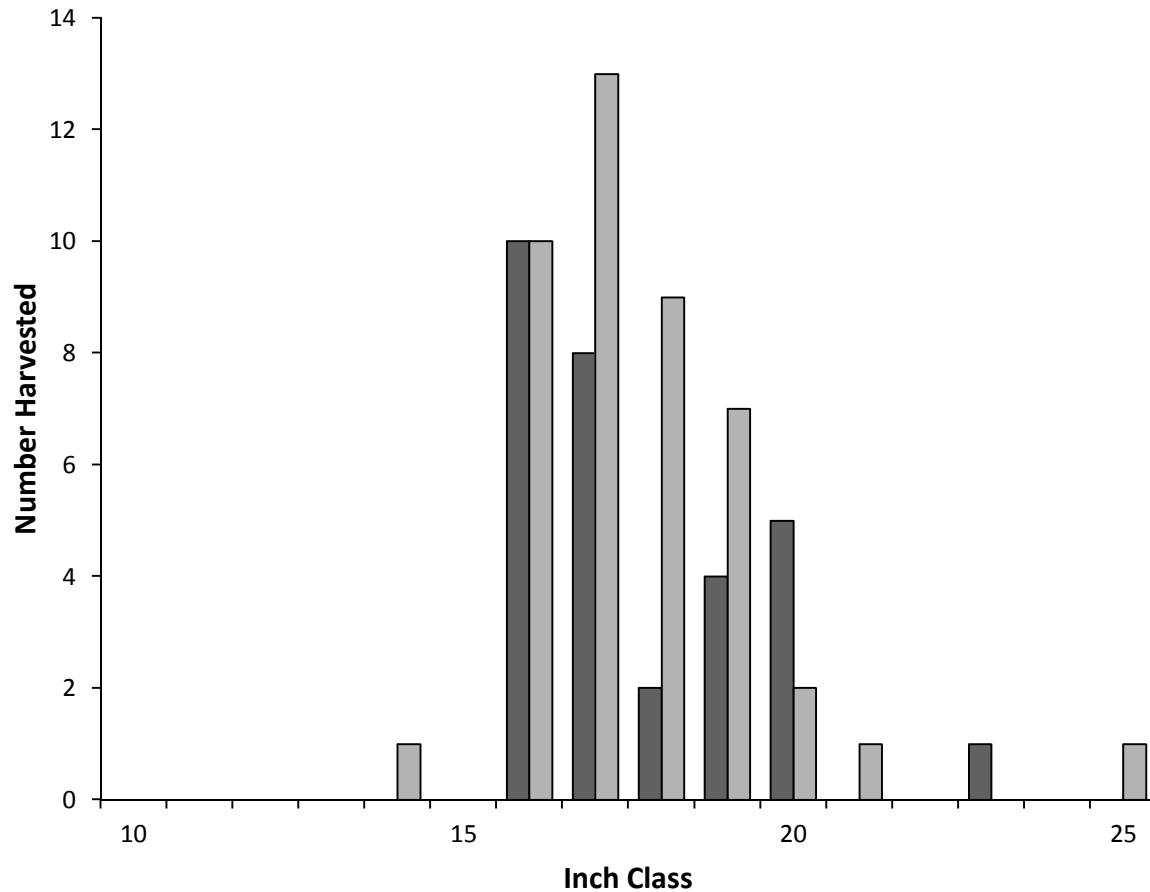
Figure 11. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Conroe, Texas, 2010, 2012, and 2013. Vertical line indicates length limit.

Largemouth Bass

Table 12. Creel survey statistics for Largemouth Bass at Lake Conroe, Texas, from June 2009 through May 2010 and June 2012 through May 2013. 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. Relative standard errors (RSE) are in parentheses

Creel Statistic	Year	
	2008/2009	2012/2013
Directed effort (h)		
Tournament	930.42 (75)	3,092.27 (47)
Non-Tournament	99,270.51 (49)	89,084.64 (53)
All Black Bass Anglers Combined	100,200.93 (124)	92,176.91 (100)
Angling effort/acre	4.98 (124)	4.58 (100)
Catch rate	0.62 (77)	0.63 (62)
Harvest		
Non-tournament harvest	5,404.41 (44)	6,895.64 (49)
Harvest/acre	0.27 (44)	0.34 (49)
Tournament weigh-in and release	135.60 (592)	1,170.75 (153)
Release by Weight		
< 4.0 lbs	NA	16,058.00 (42)
4-6.9 lbs	NA	963.00 (59)
7.0-9.9 lbs	NA	0.00
≥ 10.0 lbs	NA	0.00
Percent legal released (non-tournament)	26.19 (22)	17.14 (24)

Largemouth Bass



■ 2008/2009 N = 30 ; TH = 5690.52

□ 2012/2013 N = 44 ; TH = 8036.39

Figure 12. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Lake Conroe, Texas, June 2008 through May 2009 and June 2012 through May 2013, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and NTH is the estimated non-tournament harvest for the creel period

White Crappie

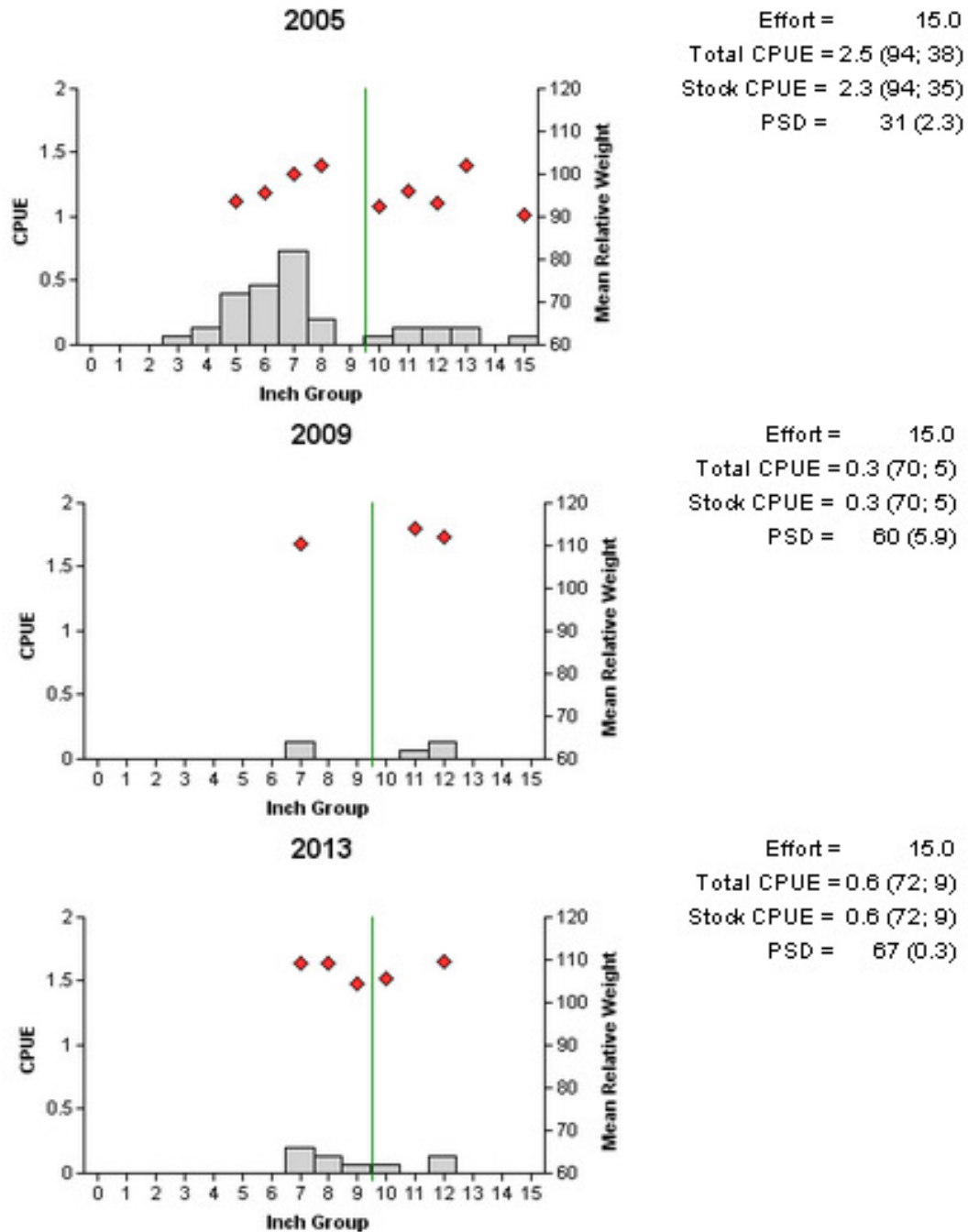


Figure 13. Number of White Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Conroe, Texas, 2005, 2009 and 2013. Vertical line indicates length limit.

Black Crappie

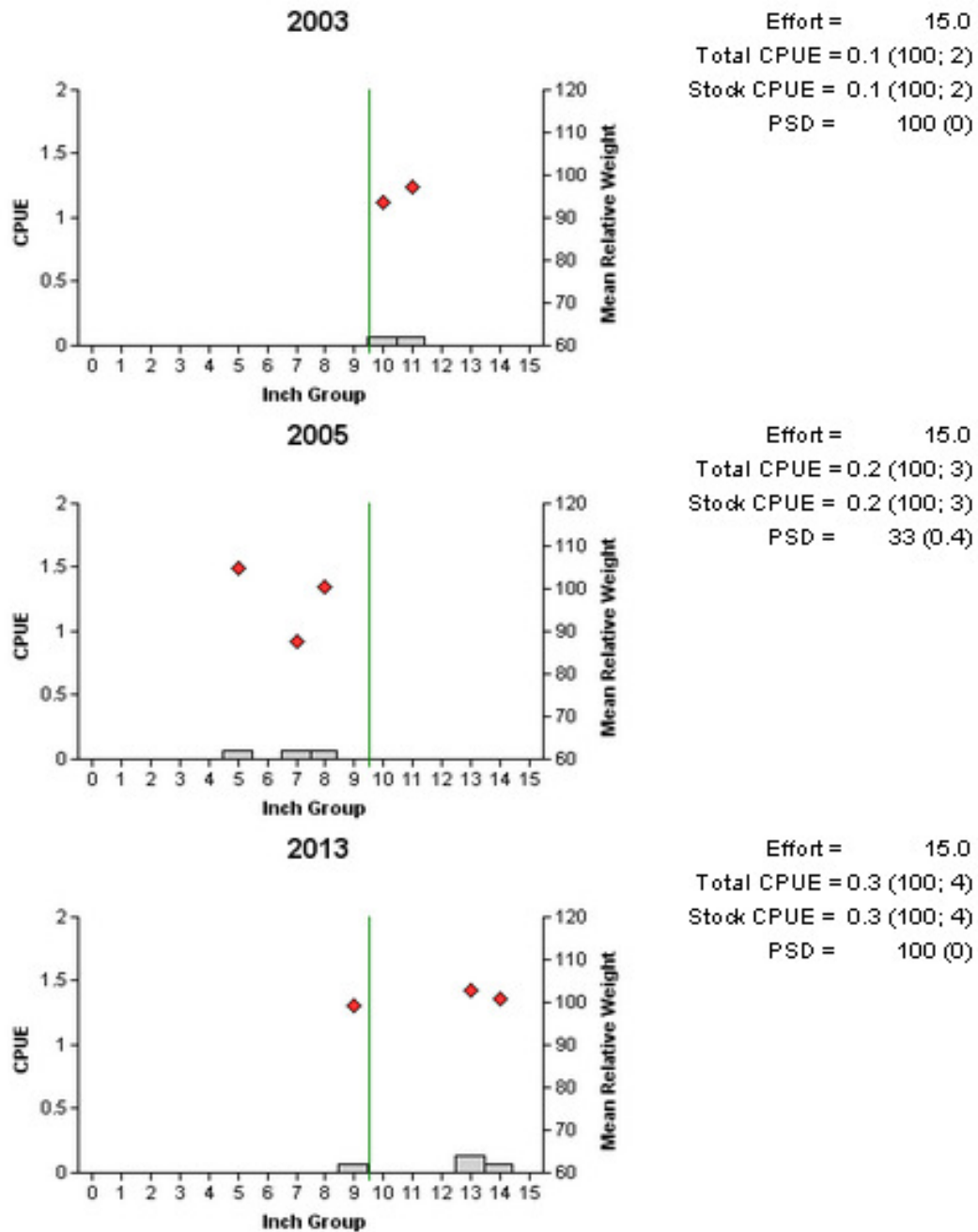


Figure 14. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Lake Conroe, Texas, 2003, 2005 and 2013. Vertical line indicates length limit.

Crappie

Table 13. Creel survey statistics for Crappie at Lake Conroe, Texas, from June 2008 through May 2009 and June 2012 through May 2013. Total catch per hour is for anglers targeting Crappie species, and total harvest for White Crappie and Black Crappie are the estimated number of each species harvested by all anglers. Relative standard errors (RSE) are in parentheses

Creel Statistic	Year	
	2008/2009	2012/2013
Directed effort (h)	23,492.85 (25)	14,101.81 (28)
Directed effort/acre	1.17 (25)	0.70 (28)
Total catch per hour		
White Crappie	2.30 (26)	0.37 (52)
Black Crappie	0.15 (41)	0.27 (60)
Total harvest		
White Crappie	15,773.14 (44)	4,186.13 (134)
Black Crappie	1,811.53 (225)	3,356.73 (200)
Harvest/acre		
White Crappie	0.78 (44)	0.21 (134)
Black Crappie	0.09 (225)	0.17 (200)
Percent legal released		
White Crappie	2.80 (28)	7.74 (127)
Black Crappie	0.00	0.00

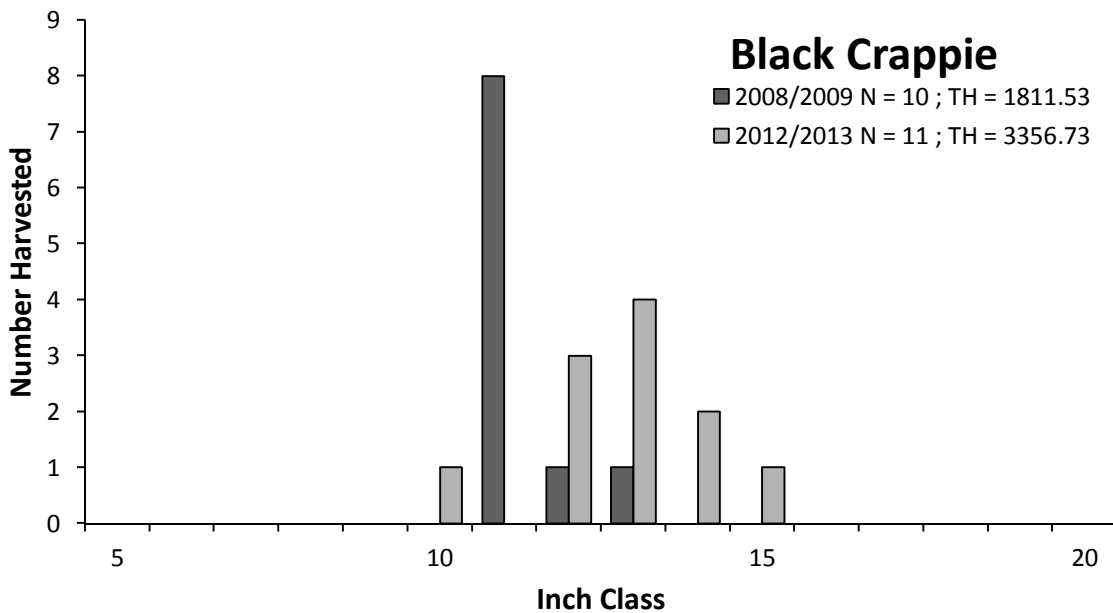
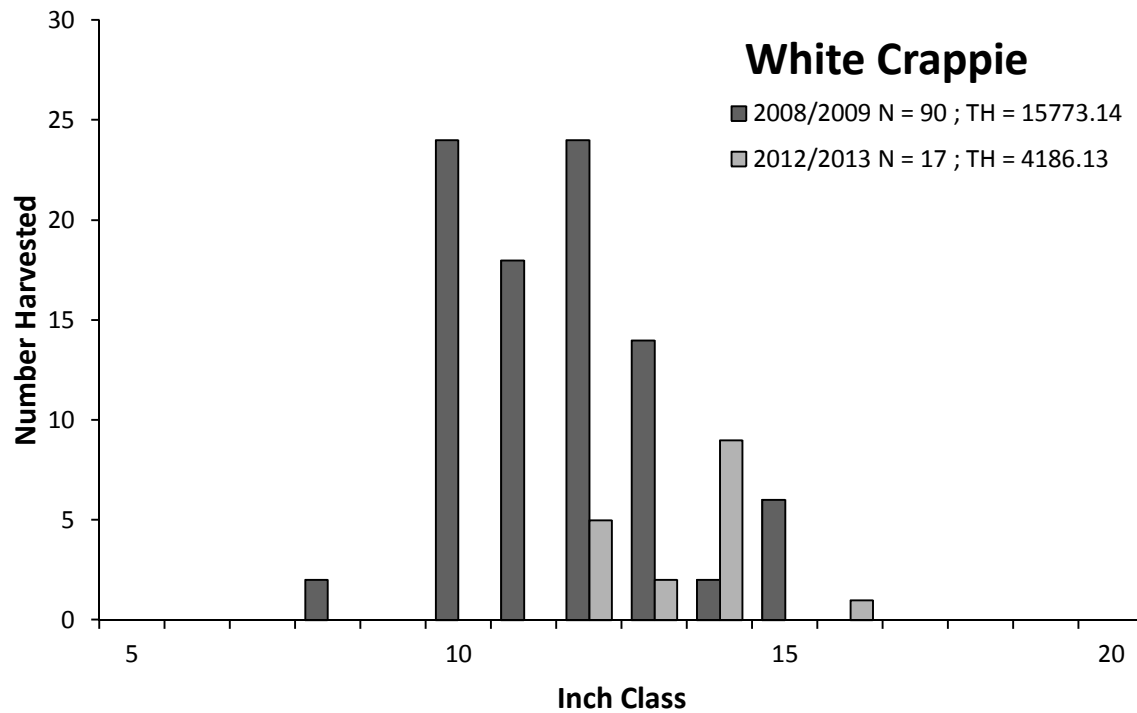


Figure 15. Length frequency of harvested White Crappie and Black Crappie observed during creel surveys at Lake Conroe, Texas, June 2008 through May 2009 and June 2012 through May 2013, all anglers combined. N is the number of harvested White Crappie and Black Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

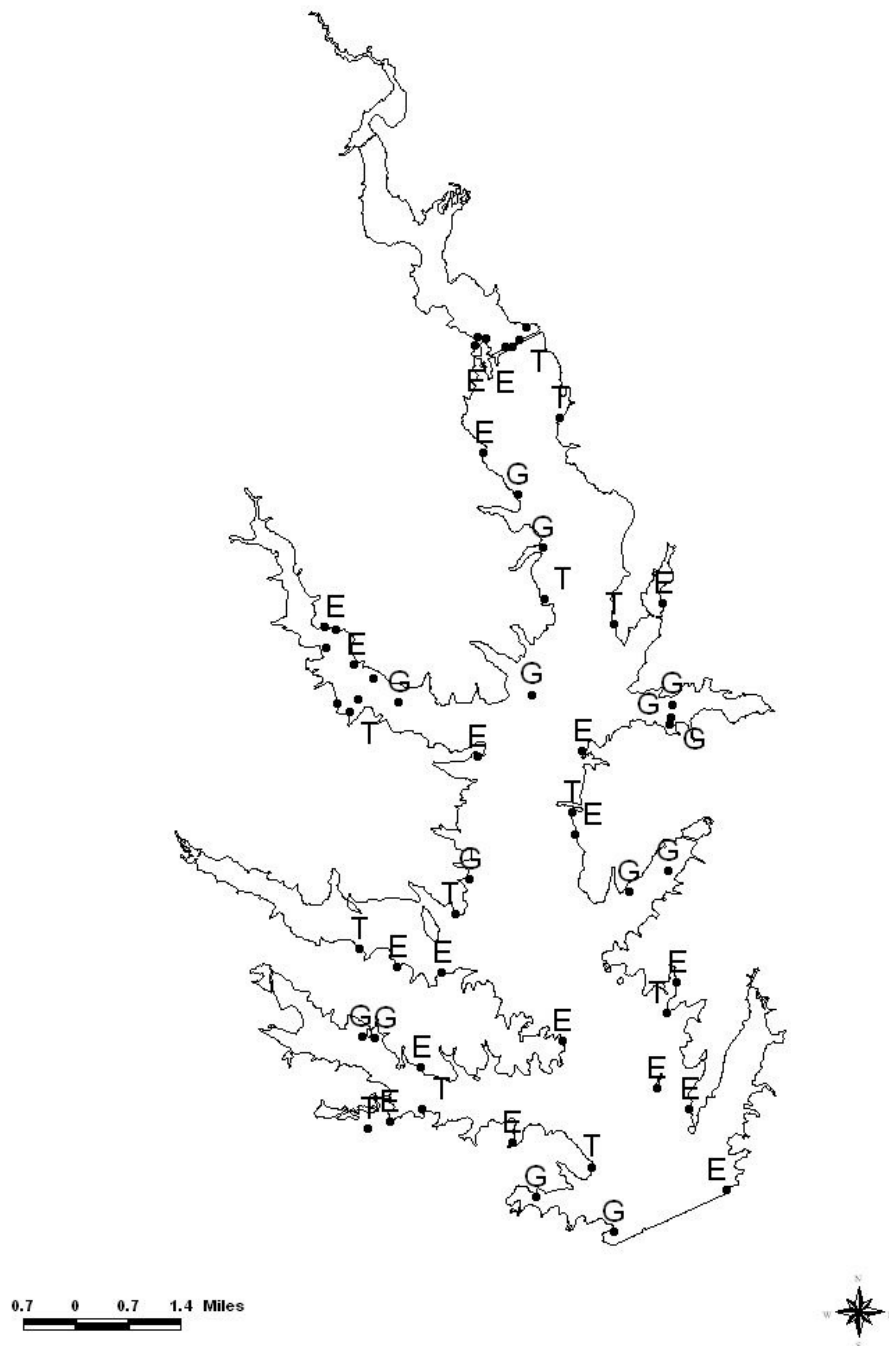
Table 14. Proposed sampling schedule for Lake Conroe, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

Survey year	Electrofishing Fall(Spring)	Trap net	Gill net	Habitat		Access	Creel survey	Report
				Structural	Vegetation Fall (Spring)			
2014-2015					A (A)			
2015-2016	A		A		A (A)			
2016-2017					A (A)		A	
2017-2018	S	A	S	S	S (A)	S		S

APPENDIX A

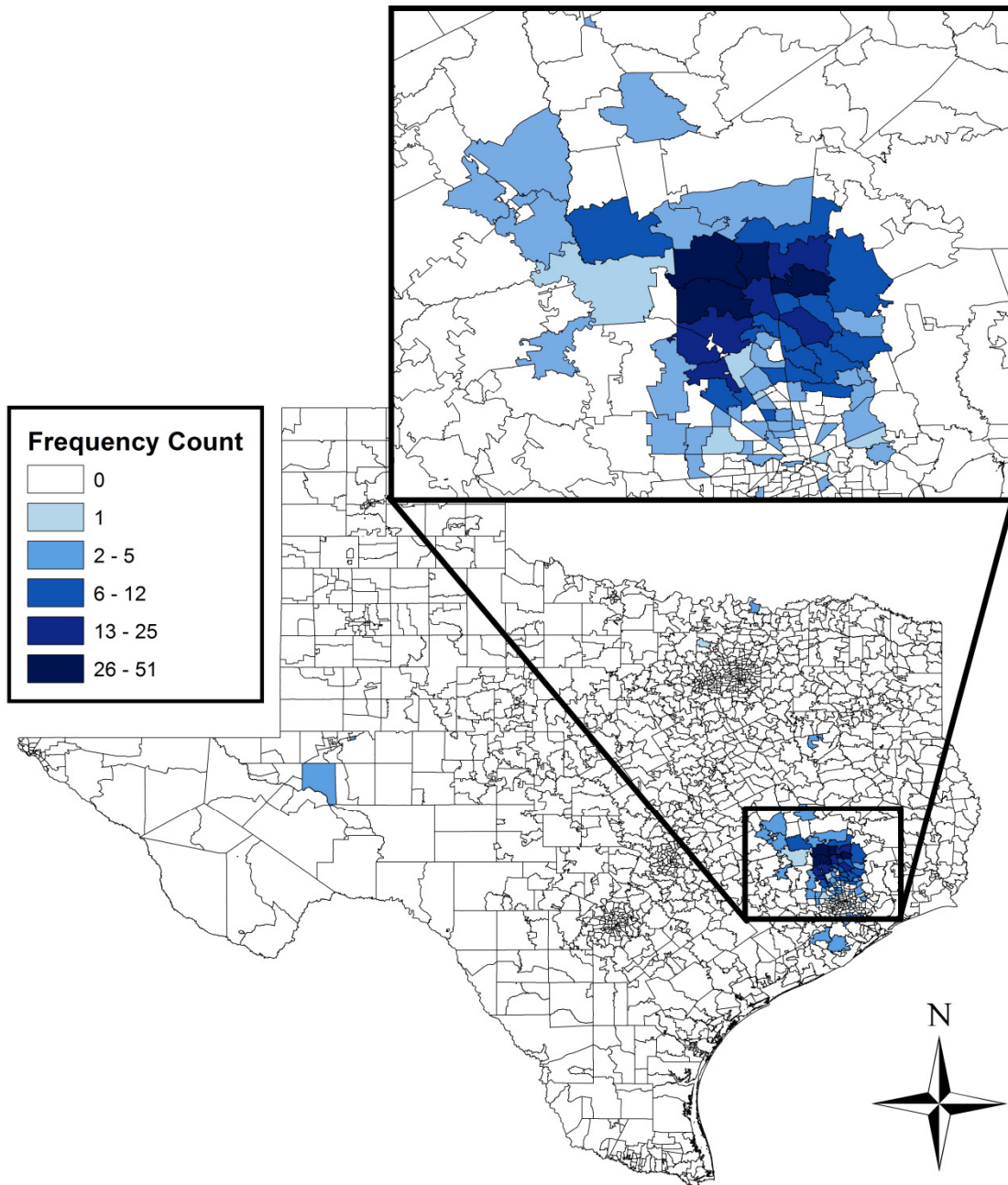
Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Conroe, Texas, 2012-2013. Sampling effort was 15 net nights for gill netting, 15 net nights for trap netting, and 2 hours for electrofishing.

Species	Electrofishing		Gill Netting		Trap Netting	
	CPUE	N	CPUE	N	CPUE	N
Gizzard Shad	135.5	271				
Threadfin Shad	63.5	127				
Bullhead Minnow	18.0	36				
Inland Silverside	7.5	15				
Brook Silverside	0.5	1				
Blacktail Shiner	0.5	1				
Blue Catfish			4.6	69		
Channel Catfish			16.6	249		
Yellow Bass			0.6	9		
Palmetto Bass			3.4	51		
Warmouth	1.0	2				
Bluegill	372.5	745				
Longear Sunfish	141.0	282				
Redear Sunfish	13.5	27				
Spotted Bass	3.0	6				
Largemouth Bass	51.5	103				
White Crappie					0.6	9
Black Crappie					0.3	4
Blue Tilapia	0.5	1				

APPENDIX B

Location of sampling sites, Lake Conroe, Texas, 2012-2013. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Water level was approximately 2 feet low at time of electrofishing and trap netting and near full pool at time of gill netting.

APPENDIX C



Location, by ZIP code, and frequency of anglers that were interviewed at Lake Conroe, Texas, during the June 2012 through May 2013 creel survey.