

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

TEXAS

FEDERAL AID PROJECT F-221-M-4

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2013 Fisheries Management Survey Report

Lake Palestine

Prepared by:

Richard A. Ott, District Management Supervisor
and
Jacob D. Norman, Assistant District Management Supervisor

Inland Fisheries Division
District 3-C, Tyler, Texas



Carter Smith
Executive Director

Gary Saul
Director, Inland Fisheries

July 31, 2014

i
TABLE OF CONTENTS

Survey and Management Summary	1
Introduction.....	2
Reservoir Description.....	2
Angler Access.....	2
Management History.....	2
Methods	4
Results and Discussion.....	4
Fisheries Management Plan.....	7
Literature Cited	9
Figures and Tables	10-34
Water Level (Figure 1).....	10
Reservoir Characteristics (Table 1).....	1011
Boat Ramp Characteristics (Table 2)	11
Harvest Regulations (Table 3)	12
Stocking History (Table 4)	13
Aquatic Vegetation Survey (Table 5).....	15
Percent Directed Angler Effort per Species (Table 6).....	16
Total Fishing Effort and Fishing Expenditures (Table 7)	16
Gizzard Shad (Figure 2)	17
Bluegill (Figure 3)	18
Redear Sunfish (Figure 4)	19
Blue Catfish (Figures 5, 7; Table 8)	20
Channel Catfish (Figures 6, 8; Table 8)	21
White Bass (Figures 9, 11; Table 9).....	24
Palmetto Bass (Figures 10, 12; Table 9).....	25
Largemouth Bass (Figures 13, 14, 15; Tables 10, 11).....	28
White Crappie (Figures 16, 18; Table 12)	31
Black Crappie (Figures 17-19; Table 12).....	32
Proposed Sampling Schedule (Table 13).....	34
Appendix A	
Catch Rates for all Species from all Gear Types	35
Appendix B	
Map of 2013-2014 Sampling Locations.....	36
Appendix C	
Map of 2013 vegetation Survey	37
Appendix D	
Length-At-Age for Largemouth Bass.....	38

SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake Palestine were surveyed in 2013 using electrofishing and trap netting and in 2014 using gill netting. Anglers were surveyed from June 2013 through May 2014 with a creel survey. Historical data are presented with the 2013-2014 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir.

- **Reservoir Description:** Lake Palestine is a 23,434-acre reservoir on the Neches River, Texas, built to provide water for municipal and industrial purposes, and recreation. Boat access is adequate, but public bank angler access is limited to public boat ramps or at bridge crossings (where parking is limited). None of the public boat ramps have facilities marked as handicap-specific, but the courtesy pier nearest the dam has guard rails making wheelchair accessibility possible. Overall coverage of submersed aquatic vegetation remains approximately 1%. No nuisance levels of exotic species were detected.
- **Management History:** Important sport fishes include Blue, Channel, and Flathead Catfishes; Largemouth Bass; White Crappie and Black Crappie; White bass; and Palmetto Bass (*White x Striped Bass*). Florida Largemouth Bass stockings were conducted during 2008-2009 and again 2012-2013. Palmetto Bass stockings were conducted (at some level) most years since 2002. A revised Blue and Channel Catfish harvest regulation allowing 50 fish per day (of which no more than 5 could be greater than 20 inches) replaced the statewide regulation in September 2011. An aquatic vegetation introduction program was implemented in 2012; monitoring and maintenance continues annually.
- **Fish Community**
 - **Prey species:** Threadfin Shad and Gizzard Shad were abundant and represented the dominant prey items. Bluegill and Redear Sunfish ≤ 4 inches provided a supplemental prey source and their relative abundances increased over the previous survey.
 - **Catfishes:** Blue and Channel Catfishes continued to be the most sought after species group of all sport fishes at Lake Palestine. Angler catch rate of both species was high but overall effort has declined. There is evidence that anglers are taking advantage of the liberalized harvest regulation, but Channel Catfish size distribution continues to be poor. Size distribution of Blue Catfish continued to be better than Channel Catfish and abundance is very good. However, rod-and-reel harvest of Blue Catfish was approximately 20% that of Channel Catfish.
 - **Temperate basses:** Directed angling effort toward temperate basses continued to be low. Abundance of White Bass was substantially higher compared to previous surveys but Palmetto Bass abundance remained low, a consequence of low stocking rates.
 - **Black basses:** Black basses were the second most sought after species group and competitive angling represents 44% of the effort for this group. Largemouth Bass abundance was higher than previous surveys but size distribution was dominated by fish less than legal length, evidence of a strong 2013 year class. Body condition and growth rate were good.
 - **Crappies:** Directed angler effort for crappies has declined and likely reflects poor weather conditions in spring 2014. Trap net catch rates of White and Black Crappie were higher than 2009 but slightly lower than 2005. Body condition was good for both species and growth of Black Crappie was rapid.

Management Strategies: Conduct fall electrofishing in 2015 to assess Largemouth Bass population parameters and Florida Largemouth Bass genetics. Conduct additional gill netting in 2016 to monitor catfish population dynamics. Promote Blue Catfish angling opportunities. Continue requesting annual stockings of Palmetto Bass. Maintain Lake Palestine aquatic habitat enhancement structures. Continue monitoring invasive exotic species as necessary. A special study to evaluate exploitation rate and population dynamics of Flathead Catfish is currently underway.

2
INTRODUCTION

This document is a summary of fisheries data collected from Lake Palestine from June 2013 through May 2014. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2013-2014 data for comparison.

Reservoir Description

Lake Palestine is a 23,434-acre reservoir constructed in 1962 (enlarged to present size in 1971) on the Neches River, Texas, to supply water for municipal and industrial purposes. The reservoir is located in Cherokee, Anderson, Henderson, and Smith Counties and is operated and controlled by the Upper Neches Municipal River Authority. Lake Palestine is hyper-eutrophic with a mean TSI *chl-a* of 61.5, which was similar to previous samples (Texas Commission on Environmental Quality 2011). The littoral zone consists of a variety of physical habitat types (Ott and Bister 2002). The majority of the shoreline is featureless (55%), while combinations consisting of bulkhead, eroded shoreline, rocky shoreline, and boat docks make up the remainder. Previous habitat surveys have documented numerous aquatic vegetation species; however, vegetation presently occupies approximately <1% of the total surface area. Native submersed and emergent species are present, but the emergent species American lotus (*Nelumbo lutea*) is the most abundant. Non-native species present include alligatorweed (*Althernanthera philoxeroides*) and hydrilla (*Hydrilla verticillata*). Standing timber is present throughout the reservoir but is in decline due to decomposition at the water line. Other descriptive characteristics for Lake Palestine are found in (Table 1).

Angler Access

Boat access was adequate, but bank angler access was limited. Boats can be launched from 18 boat ramps surrounding the lake of which seven are designated as free public access. There were no handicap-specific facilities, but most were accessible (Table 2). Clean-Drain-Dry materials have been posted at all ramps.

Management History

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

1. Conduct additional electrofishing in fall of 2011; evaluate Largemouth Bass (*Micropterus salmoides*) allele frequencies at that time. Additional stockings may be recommended pending analysis.
Action: Electrofishing and genetic analysis was conducted in fall 2011 and 2013. Stocking was conducted in 2012 and at a reduced rate in 2013.
2. Request Palmetto Bass (*Morone saxatilis* x *M. chrysops*) fingerlings at a stocking rate of 15/acre annually.
Action: Fingerling stocking was requested at 15/acre but target stocking level was not achieved; additional fry were stocked in 2013.
3. Consider regulation options that liberalize harvest of small catfish; continue monitoring size distribution with optional gill netting in spring 2012.
Action: Harvest regulations on Blue and Channel Catfish (*Ictalurus furcatus* & *I. punctatus*) were modified and became active September 1, 2011. Optional spring gill netting was conducted in 2012.
4. Continue providing news releases to local media encouraging utilization of Blue Catfish. Inform anglers of alternative methods to increase chances of catching trophy Blue Catfish.
Action: News releases have continued; additional information was posted on social media.
5. Continue maintaining working relationships with UNRMWA and discuss strategies to increase bank fishing access on Lake Palestine.
Action: A long term lease has been established for shoreline property along the Neches River above Lake Palestine. A new parking lot has been constructed and improvements to the existing boat launch area are under way.
6. Continue soliciting funding for a fish-habitat enhancement program.

Action: Aquatic vegetation enhancement project was funded and implemented in 2012.

7. Continue reconnaissance surveys as necessary to monitor existing infestations and detect new infestations of exotic plant species.

Action: Reconnaissance surveys were continued and no additional infestations have been detected. In an effort to combat spread of invasive species, Clean-Drain-Dry materials and posters have been provided to the controlling authority and posted at all boat ramps.

Harvest regulation history: An experimental 12-inch minimum-length limit was established for White Bass (*Morone chrysops*) on September 1, 1992, but it reverted to the statewide 10-inch minimum-length limit on September 1, 2003. Beginning September 1, 2011 the 12-inch minimum-length, 25/day bag limit on Blue and Channel Catfish was revised to allow harvest of 50 per day of which no more than 5 could be 20 inches in length or longer. Remaining sport fishes in Lake Palestine are currently managed with statewide regulations (Table 2). A statewide change in legal means and methods allowed hand fishing for catfishes effective June 2011.

Stocking history: Palmetto Bass and Florida Largemouth Bass (*M. s. floridanus*), (FLMB) have been the most frequently stocked species at Lake Palestine. Palmetto bass fingerlings were first stocked in 1987. Stocking continues to maintain the fishery. Largemouth Bass were stocked in 1971 and FLMB were initially stocked in 1981 and have been stocked periodically since then to enhance the trophy potential of the fishery. Lake Palestine was initially stocked with Channel and Blue Catfish in 1971. Supplemental stockings of Blue Catfish were conducted in the late-1970s and mid-1980s. Walleye (*Stizostedion vitreum*) were stocked in the mid-1970s, but the population did not persist and additional stockings were not conducted. Threadfin Shad (*Dorsoma petenense*) were stocked as adults (1984) and have not required supplemental stocking. A complete stocking history is found in Table 3.

Vegetation fish/habitat management history: The aquatic vegetation community has historically been low in diversity and limited in distribution. The exotic aquatic invasive species hydrilla occupied nearly 900 acres, and was concentrated in the Kickapoo arm at the north end of the reservoir in 2005; however, coverage has since declined. Other non-native invasive species historically present included alligatorweed, water hyacinth (*Eichhornia crassipes*), and elephant ear (*Colocasia spp.*) giant salvinia (*Salvinia molesta*) was detected and removed in 2008 and 2009; water hyacinth was detected and removed in 2009 and was not detected in the current survey. The rate of residential shoreline development has slowed.

Local interest groups have established restoration and habitat improvement projects. The Palestine cypress Project began in 1996 and continues to date. Approximately 3,500 bald cypress (*Taxodium distichum*) trees have been planted in the upper end of the reservoir to replace timber that died as a result of inundation. The Reservoir Fisheries Habitat Partnership funded an aquatic vegetation enhancement project on Lake Palestine in 2012. Thirty three 8x16-foot mesh exclosures were installed in the lower third of the reservoir and planted with three species of native submersed aquatic vegetation: Illinois pondweed (*Potamogeton Illinoisensis*), water star-grass (*Heterantheria dubia*), and wild celery (*Vallisneria Americana*). Maintenance of the exclosures and replanting of vegetation will continue as needed.

Water transfer: There is currently no interbasin transfer of water into or out of Lake Palestine. An agreement between the City of Dallas and Tarrant Regional Water District proposes for a pipeline to be built extending from Lake Palestine to Dallas but construction has not started yet. The Project is scheduled for completion between 2020 and 2030. Upon completion, the pipeline will transfer water from the Neches River Basin to the Trinity River Basin. Tyler Water Utilities maintains a pipeline that transfers water directly from Lake Palestine to a treatment plant east of the reservoir. The City of Palestine pumps water from the Neches River downstream of Lake Palestine to their treatment plant east of the city.

4
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). A vegetation survey was conducted in September 2013. Roving creel surveys were conducted from June 2013 through May 2014. Surveys consisted of 9 creel days per quarter (4 weekdays and 5 weekend days). All survey dates were randomly selected and all surveys were conducted during daylight hours according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

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 X SE of the estimate/estimate) was calculated for all CPUE statistics and for creel statistics and SE was calculated for structural indices and IOV. For Black Crappie, ages were determined using otoliths from 13 specimens with lengths ranging from 9.0-10.9 inches, for Largemouth Bass, ages were determined using otoliths from 49 specimens with lengths ranging from 6.3-19.5 inches. Microsatellite DNA analysis was conducted on a 30-fish sample in 2013 to determine Largemouth Bass genetic composition. Prior to 2005, genetic analysis was done by electrophoresis. Water level data were obtained from the United States Geological Survey web site (USGS 2014).

RESULTS AND DISCUSSION

Habitat: A comprehensive vegetation survey of the littoral zone was conducted in September 2013 (Table 4). Hydrilla, which was the most abundant submersed species present in 2005, has declined to trace amounts and was confined to a shallow bay in the Kickapoo Creek arm above SH 315 bridge (Appendix 3). Native submersed species (American pondweed (*Potamogeton nodosus*) and muskgrass (*Chara vulgaris*)) were also present in this area but at an overall coverage of only 11 acres. Illinois pondweed, wild celery, and water star-grass were present after introduction into exclosures in the lower third of the reservoir. Native floating species: duckweed (*Lemna minor*) and frog's-bit (*Limnobium spongia*) which occupied approximately 646 and 624 acres in the 2005 and 2009 surveys, respectively, were not detected in 2013. Water hyacinth has not been detected since 2009 and is believed to have been eradicated. Emergent species, both native and non-native species, occupied the greatest area (239 acres), with American lotus (*Nelumbo lutea*) representing the most dominant individual species (203 acres). Water primrose (*Ludwigia spp.*) which occupied a substantial area (~330 acres) in 2009 was reduced to approximately 10 acres in 2013. Overall changes in the plant community were likely due to a six-foot reduction in water level during 2011 followed by rapid recovery in 2012 (Figure 1). Other native species present included: cattail (*Typha spp.*), giant cutgrass (*Zizaniopsis miliacea*), maidencane (*Panicum hemitomons*), unnamed Panicum (*P. spp.*), spatterdock (*Nuphar lutea*), and water-willow (*Justicia americana*).

Creel: Estimated total annual angling effort was 182,319 hours in 2013/2014 and had declined approximately 20% from the previous estimate of 223,497 hours in 2009/2010 and 42% from the 313,766 hours of effort in 2005/2006 (Table 7). Annual estimated direct angler expenditures (\$1,074,263) were similar to the 2009/2010 estimate (\$1,079,536) despite decreased effort. Directed angling effort was highest for catfishes (33.5%) followed by anything (26.2%) and black basses (25.2%); (Table 7). The proportion of directed effort for temperate basses (2.5%) was similar to 2009/2010 (2.7%) but is well below 7.7% in 2005/2006, and likely reflects angler response to reduced availability of Palmetto Bass, resulting from reduced stocking rates (Table 6).

Prey species: Prey base of Lake Palestine continued to be dominated by shad species. Electrofishing catch rate of Threadfin Shad was above 1,000/h in 2013 (Appendix A) compared to 2,243 in 2011 (unpublished data). Electrofishing catch rate of Gizzard Shad (*D. cepedianum*) was low (45/h) in 2009, peaked in 2011 (237/h) and was intermediate in 2013 (112/h); (Figure 2). Index of Vulnerability for Gizzard Shad was 73 in 2013, somewhat higher than in 2009 or 2011, indicating most were available as prey. Total catch rate of all sunfish species

combined was 318/h in 2013 (Appendix A). Low electrofishing catch rate of Bluegill (*Lepomis macrochirus*) in 2011 (24.5/h; Figure 3) was likely due to limited aquatic habitat at the time of sampling as a result of low water elevation (Figure 1) rather than actual low abundance. Redear Sunfish (*L. microlophus*) CPUE exhibited a similar trend (Figure 4). It is likely low abundance of aquatic vegetation and high ratio of pelagic to littoral area limited reproduction and recruitment of sunfishes relative to the shad species. Sunfishes accounted for approximately 1% of the directed angler effort in 2013/2014 (Table 6) but most anglers reported targeting sunfish as bait for other species.

Catfishes: Lake Palestine has historically supported a high-density Channel Catfish population with a poor size distribution that has resulted in angler complaints about low percentage of harvestable fish (Ott and Bister 2002). Following a species-specific fish kill in summer 2005 (Beck and Ott 2006) Channel Catfish catch rates in gill nets declined by approximately 50% and size distribution temporarily improved. Based on this information the bag and size limits on Channel and Blue Catfish were changed effective September 1, 2011 from the statewide 12-inch minimum length, 25-fish daily bag limit to no minimum length and a 50-fish daily bag limit (of which only 5 could be 20 inches or longer). To date, no changes in Channel Catfish population structure have been detected as a result of these liberalized harvest regulations. Gill net catch rate of Channel Catfish in 2014 (15.3/nn) was intermediate between surveys conducted in 2010 (17.1/nn) and 2012 (10.8/nn), but no specimens longer than 20 inches were collected in the most recent two survey years (Figure 6). Relative weight (W_r) showed an inverse trend with length except for the largest individuals. It appears that availability of benthic organisms limits channel catfish condition until they reach a threshold size at which their diet shifts to fish.

Gill net catch rate of Blue Catfish in 2014 (10.4/nn) was similar to the two past surveys (10.7/nn in 2010 and 9.8/nn in 2012). Although not as abundant as Channel Catfish, size distribution of Blue Catfish was much better (Figure 5). Fish 20 inches and longer made up 17% of the gill net catch in 2012 and 21% in 2014; however, preferred-length fish (≥ 30 inches) continued to be rare. Anecdotal observations of large Blue Catfish in low-frequency electrofishing sampling to collect Flathead Catfish (*Pylodictis olivaris*), verified the presence of larger Blue Catfish. Recent catches of larger fish in Lake Palestine confirms its potential of supporting a trophy fishery. The "all tackle" water body record (64.62 lb, 46.5 inch) Blue Catfish was submitted to the angler recognition program in March 2010, and a new rod-and-reel record (47.25 lb, 42.5 inch) was submitted in February 2014. Relative weight of Lake Palestine Blue Catfish continued to be high and reflects excellent prey availability.

Although catfishes represented the most popular species group in terms of directed effort (33.5% of total directed effort) and accounted for an estimated 61,054 angler-hours (2.6h/acre) during the 2013/2014 creel period (Table 8), there has been a decreasing trend in effort over the past 10 years. There has been a concomitant increase in angler catch rates from 1.4/h in 2005/2006 to 3.4/h in 2013/2014. Estimated harvest of Blue and Channel Catfish increased slightly from 121,174 fish in 2009/2010 to 158,985, but is still below the 184,315 fish harvested in 2005/2006. There is evidence that anglers are taking advantage of the revised length limit on Blue and Channel Catfish established September 1, 2011. Of the harvested catfish observed during 2013/2014 creel surveys, 35% of Blue Catfish and 39% of Channel Catfish were smaller than 12 inches, and fish as small as 7 inches were observed (Figures 7 and 8).

Temperate basses: The gill net catch rate of White Bass was 6.3/nn in 2014 and approached the peak of 7.1/nn reported for Lake Palestine in 2002 (Ott and Bister 2002). Size distribution was also substantially better than the past two surveys with a PSD-P of 94 compared to 53 in 2010 and 70 in 2012 (Figure 9). Abundant numbers of fish in the 13- to 15-inch size range accounted for the majority of white bass collected in 2014 and were likely from a strong year class produced in 2012. A similar pattern was observed in the lake in 2002 following high spring flows in the Neches River in the previous year (Ott and Bister 2002). Relative weights (W_r) for most size classes were ≥ 90 and indicative of adequate prey availability.

Gill net catch rate of Palmetto Bass was 2.1/nn in 2014 (Figure 10) and was within the recent historical range of 1.1/nn in 2012 and 2.2/nn in 2010. Gill net catch rates for the last three surveys are only 13% to 26% of the historical high of 8.4/nn in 1998, (Beck and Ott 2006), and are presumably related to reductions in annual stocking rates (Table 4). In 2014, the population sample was dominated by fish in the 11- to 13-inch size groups, corresponding to the 2013 stocking. Fingerling stocking in 2013 (201,656) was higher than the previous 10 year average and an additional 451,821 fry were stocked (Table 4). However, the relative contribution of fingerlings versus fry in the 2014 gill net sample is unknown. Relative weight (W_r) of all size classes was ≥ 95 and is indicative of adequate prey availability.

Directed angling effort for temperate basses has declined as stocking rate of Palmetto Bass has decreased. Throughout the 1990s, stocking rate ranged from 10 - 15 fingerlings/acre (Table 4); however, beginning in 2003, annual stocking rate was reduced to ≤ 5 /acre. Angling effort was still relatively high in 2005/2006 (24,028 h), but declined to 6,107 h in 2009/2010, and was only 4,592 h in 2013/2014. Although angler catch rate of temperate basses has remained close to 1.0/hr (Table 9), harvest has declined, reflecting decreased angler effort. Palmetto Bass represented 24% of the temperate bass harvest in the 2005/2006 survey but were only 8% of the harvest in 2013/2014; no harvest of Palmetto Bass was reported in the creel in 2009/2010 (Table 9).

Largemouth Bass: Total electrofishing CPUE of Largemouth Bass in 2013 (58/h) increased compared to 2011 (41/h) and 2009, (38/h) but CPUE of stock-sized (≥ 8 inches) fish remained consistent (Figure 13). Abundant sub-stock-sized Largemouth Bass, corresponding to age-0 individuals (Appendix D), contributed to the increased total CPUE. This change was attributed to improved aquatic habitat resulting from increased reservoir elevation following the drought of 2010-2012 (Figure 1). Reduced numbers of fish over 14 inches has resulted in a decline in structural indices of the population (PSD=32 and PSD-14=11) and suggest weak year classes related to low water in 2010-2012. Body condition was good with mean W_r for most size classes ≥ 95 . Growth rate of Largemouth Bass was moderately fast, with fish reaching the 14-inch minimum length by their third growing season (Appendix D). Rapid growth and good body condition are indicative of adequate prey availability and are supported by high catch rates of prey species discussed earlier. The genetics sample collected in 2013 had an FLMB frequency of 41% and all of the fish were intergrades between FLMB and Northern Largemouth bass (NLMB) (Table 11). Both of the ShareLunkers (angler-donated catches ≥ 13 lbs) submitted from Lake Palestine were identified as intergrades as well.

Despite a decline in total angler effort over the past 9 years (Table 7), directed effort for black basses (45,919 h) during 2013/2014 was intermediate between the surveys in 2005/2006 (67,288?) and 2009/2010 (38,979 h). The relative effort directed toward black basses increased to 25% in 2013/2014 and was the highest percentage of the three surveys (Table 10). Tournament fishing for largemouth bass contributed approximately 44% of the directed effort for black basses in 2013/2014. Angler catch rate of black basses was 0.6/hour, lower than in the previous two surveys (Table 10). Non-tournament anglers released 63% of the legal-sized fish that were caught. The majorities (95%) of black basses reportedly released by anglers during the creel survey were < 4.0 pounds and no fish larger than 7 pounds were reported (Table 10; figures 14 & 15). During 2013 and 2014, anglers submitted two trophy Largemouth Bass to the Toyota ShareLunker program (13.14 lbs. and 13.22 lbs., respectively).

Crappies: Historically, trap net catch rates of White Crappie (*Pomoxis annularis*) and Black Crappie (*P. nigromaculatus*) at Lake Palestine have been variable. White Crappie catch rate in 2013 (0.5/nn) is within the range of 0.4/nn in 2009 and 1.1 in 2005, but high RSE's of the estimates suggest minimal true change in abundance (Figure 16). Catch rate of Black Crappie at Lake Palestine (6.3/nn) is generally higher than White Crappie but has exhibited similar variability in annual estimates (8.1/nn in 2005; 0.9/nn in 2009) (Figure 17). Legal length (≥ 10 inch) Black Crappie represented a relatively low percentage (19%) of stock sized fish in fall 2013. However, body condition (W_r) of both species was above 95 for most size classes and suggests adequate prey availability. Growth of Black Crappie in Lake Palestine was rapid; average age at 10 inches (9.0-10.9 inches) was 1.1 years (N = 13; range = 1 – 2 years). Low sample size in 2013 precluded growth analysis for White Crappie. However, previous surveys have indicated White Crappie grew to legal length by age 2 (Beck and Ott, 2006).

Directed fishing effort for crappies (0.9 h/acre) decreased (Table 12) and the relative importance of this species group now ranks fourth in its contribution to total fishing effort (11.1%) (Table 6). Much of the decrease in effort directed toward crappies was likely due to the unusual weather during the normal peak fishing season in spring 2014. Angler catch rate of crappie (1.5/h) was also lower than in previous surveys (Table 12). Along with declines in directed effort and catch rate, estimated harvest (13,204) in 2013/2014 was similarly reduced. For the past two creel surveys, White Crappie were harvested in higher numbers than Black Crappie (Figures 18 & 19).

Fisheries management plan for Lake Palestine, Texas

Prepared – July 2014

ISSUE 1: Largemouth Bass continue to be an important component of the Lake Palestine fishery representing over 25% of the directed angler effort. Furthermore, two ShareLunker entries were produced from Lake Palestine in the last two years. A 13.14-lb fish, submitted in 2013, was certified as a new lake record and it was soon replaced in February 2014 by a 13.22-lb fish. These fish were genetically identified as FLMB x NLMB intergrades. Genetic analysis of a 30 fish sample conducted in fall 2013 showed an FLMB allele frequency of 41% but no pure FLMB were observed.

MANAGEMENT STRATEGIES

1. Conduct additional electrofishing in fall of 2015 to continue monitoring abundance and size distribution of Largemouth Bass.
2. Request additional stockings of FLMB fingerlings in 2015 and 2016 at 50/acre to replace those requested (but not stocked) in 2013.
3. Conduct standard electrofishing in fall 2017; evaluate FLMB allele frequencies for a 30 fish sample at that time.

ISSUE 2: Palmetto Bass stockings have not met requests since 2002, resulting in reduced availability of catchable adults and inconsistent angler interest.

MANAGEMENT STRATEGIES

1. Request Palmetto Bass fingerlings at a stocking rate of 10/acre annually.
2. Consider substituting and/or supplementing Sunshine Bass (White Bass females x Striped Bass males) fingerlings for Palmetto bass to reach a combined annual stocking rate of 10/acre.
3. Consider supplemental stocking with fry at 100/acre if fingerlings are not available

ISSUE 3: Beginning on September 1, 2011, the 12-inch minimum-length, 25-fish/day bag limit on Blue and Channel Catfish was revised to allow harvest of 50 per day, of which no more than 5 could be 20 inches in length or longer. Angler response to the change has been good and approximately 35% of Blue Catfish and 39% of Channel Catfish in the current creel survey were <12 inches in length.

MANAGEMENT STRATEGIES

1. Continue monitoring size distribution with optional gill netting in spring 2016.
2. Implement an annual roving creel survey from June 2017-May 2018 to monitor angler catch, harvest, and effort.

ISSUE 4: The Texas Legislature approved hand-fishing as a legal means and method for catfishes effective June 2011. Since that time Lake Palestine has become a popular location for anglers hand-fishing for Flathead Catfish. Because little was known about the sustainability of Flathead Catfish subjected to hand-fishing (in addition to conventional gears) a research project was initiated in 2013 to assess exploitation, size distribution, and growth of Flathead Catfish at Lake Palestine.

MANAGEMENT STRATEGIES

1. Continue collecting research data to achieve goals listed in the research proposal.
2. Continue working with research staff to complete analyses, interpretation, submission and possible publication of study results.
3. Continue informing anglers of preliminary and final results of research.
4. Use results to justify changes (if necessary) in Flathead Catfish harvest regulations.

ISSUE 5: Blue Catfish continue to be under-utilized compared to Channel Catfish at Lake Palestine. However, there is some evidence that interest in trophy Blue Catfish is developing. The "all

tackle" water body record (64.62 lb., 46.5 inch) Blue Catfish was submitted to the angler recognition program in March 2010 and a new rod-and-reel record (47.25 lb., 42.5 inch) was submitted in February 2014.

MANAGEMENT STRATEGIES

5. Continue providing news releases to local media encouraging utilization of this species.
6. Continue informing anglers of alternative baits and techniques to increase chances of catching trophy Blue Catfish.

ISSUE 5: Bank access is inadequate and limits fishing opportunities for area anglers. The Upper Neches River Municipal Water Authority (UNRMWA) has expressed interest in acquiring land to build fishing piers. A boating access grant has been submitted for dredging at the Saline Bay boat ramp to maintain access during low water conditions.

MANAGEMENT STRATEGY

1. Continue maintaining working relationships with UNRMWA and discuss strategies to increase bank fishing access on Lake Palestine.
2. Continue coordinating with UNRMWA regarding the status and implementation of the grant.

ISSUE 6: An aquatic vegetation enhancement program was funded by the Reservoir Fish Habitat Partnership. In August 2012 thirty three 8x16-foot mesh exclosures were constructed in the lower third of the reservoir and planted with three species of native submersed aquatic vegetation. Water willow was planted outside exclosures on the east side of the reservoir as an additional native emergent species.

MANAGEMENT STRATEGIES

1. Continue annual monitoring of exclosures and conduct repair and maintenance as necessary.
2. Continue annual monitoring and replacement of plant colonies (inside and outside exclosures) with the same species as necessary through 2015. If after 2015 individual species do not persist, replace plantings with species that do.
3. Use current project as a small scale demonstration to solicit groups to form a Lake Palestine Friends of Reservoirs Chapter.

ISSUE 7: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Provide replacement Clean-Drain-Dry signage to the controlling authority if current signage is damaged or removed.
2. Maintain communications with local media regarding the Clean-Drain-Dry campaign.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional electrofishing in 2015, additional gill netting in 2016, and mandatory monitoring in 2017/2018 (Table 13). The additional electrofishing survey in 2015 is necessary to monitor largemouth bass population dynamics. Optional gill netting in the spring of 2016 will provide additional trend data on the catfish population and identify changes in size distribution under the revised harvest regulation.

LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. *Fisheries techniques*, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Beck, P. A. and R. A. Ott. 2006. Statewide freshwater fisheries monitoring and management program survey report for Lake Palestine, 2005. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-31, Austin. 51 pp.
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimpert. 1996. Relations between reservoir trophic state and gizzard shad population characteristics in Alabama reservoirs. *North American Journal of Fisheries Management* 16:888-895.
- Guy, C. S., R. M. Newman, D. W. Willis, and R. O. Anderson. 2007. Proportional Size Distribution (PSD): A Further Refinement of Population Size Structure Index Terminology. *Fisheries*, vol. 32, no. 7.
- Ott, R. A. and T. J. Bister. 2002. Statewide freshwater fisheries monitoring and management program survey report for Lake Palestine, 2001. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-27, Austin. 45 pp.
- Texas Commission on Environmental Quality. 2011. Trophic Classification of Texas Reservoirs: 2010 Texas water quality inventory and 303 (d) list. 18 pp.
- United States Geological Survey. 2014. *Real-time Data for Texas lakes and Reservoirs*
http://waterdata.usgs.gov/tx/nwis/uv/?site_no=08063010&PARAMeter_cd=72020,00054

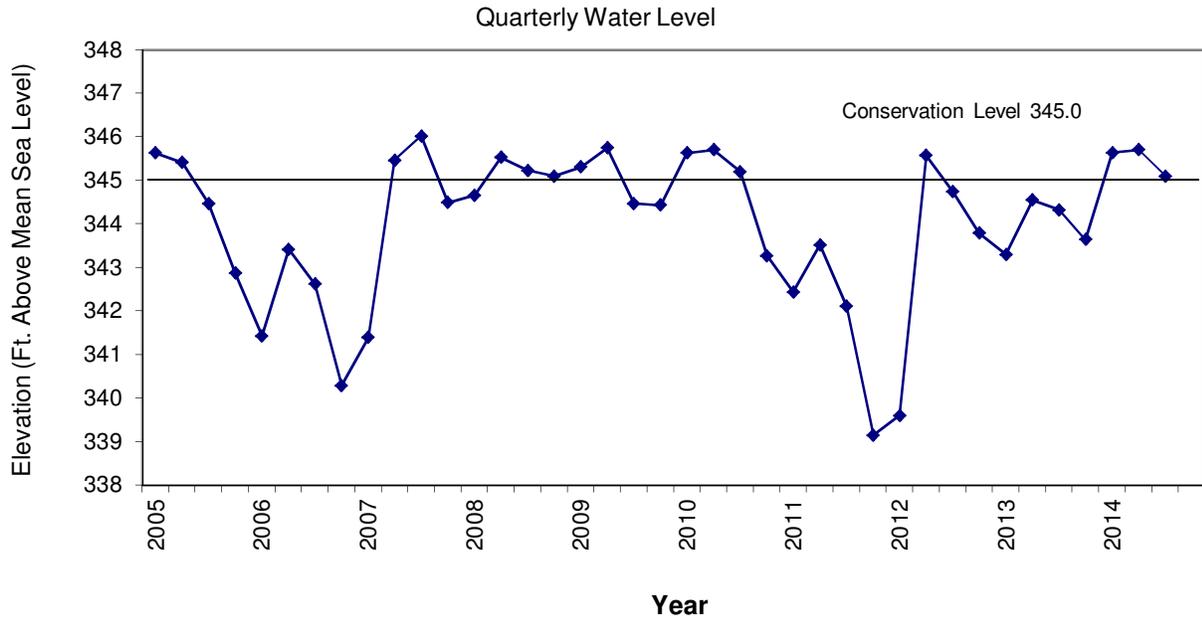


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Palestine, Texas.

Table 1. Characteristics of Lake Palestine, Texas.

Characteristic	Description
Year constructed	1962, enlarged to present size in 1971
Controlling authority	Upper Neches River Municipal Water Authority
Counties	Cherokee (dam), Anderson, Henderson, and Smith
Reservoir type	Mainstream
Shoreline Development Index (SDI)	6.1
Conductivity	150 umhos/cm

Table 2. Boat ramp characteristics for Lake Palestine, Texas, September, 2013. Reservoir elevation at time of survey was 343.6 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Chandler River Park	35.31508 -95.45243	Y	100		Accessible, shallow slope
Westberry Landing	32.27371 -95.45450	Y	15	342	Accessible, shallow slope
Villages Marina	32.21769 -95.46845	Y	200	337	Accessible
Kickapoo Public Ramp	32.26883 -95.50222	Y	50	339	Accessible, shallow slope
Flat Creek Public Ramp	32.19642 -95.51115	Y	40	338	Accessible
Flat Creek Marina	32.19383 -95.50816	Y	75		Accessible
Lake Palestine Marina	32.16607 -95.42659	Y	50		Accessible
Saline Bay Public Ramp	32.17317 -95.44653	Y	50	339	Accessible at full pool, limited access during low water
Lakeside Getaway	32.17026 -95.45250	Y	20		Accessible
Camper's Cove	32.15462 -95.44998	Y	30		Accessible
Palestine Pines	32.15711 -95.46541	Y	40		Accessible
Kiloland	32.14002 -95.47737	Y	40		Inaccessible, ramp damaged
Lake Palestine Motor Inn	32.13105 -95.48400	N	30		Temporarily out of service
Lake Palestine Resort	32.12325 -95.48809	Y	40	337	Accessible
Big Steve's RV Resort & Marina	32.68353 -95.47359	Y	10		Accessible, shallow slope
Deep End Public Ramp	32.05373 -95.44238	Y	75	337.6	Accessible

Table 2. continued...

Boat Ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Cherokee Landing Public Ramp	32.06236 -95.42881	Y	30		Inaccessible, ramp damaged
Chimney Creek Public Ramp	32.08145 -95.44167	Y	5		Accessible, shallow slope, suitable for small boats

Table 3. Harvest regulations for Lake Palestine, Texas.

Species	Bag Limit	Length limit
Catfishes: Channel and Blue, their hybrids and subspecies	50 (in any combination)	No minimum - no more than 5/day greater than 20 inches in length
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Palmetto	5	18-inch minimum
Bass, Spotted	5 (in any combination)	No minimum
Bass, Largemouth		14-inch minimum
Crappie: White and Black, their hybrids and subspecies	25 (in any combination)	10-inch minimum

Table 4. Stocking history of Lake Palestine, Texas. Size Categories are: FRY =<1 inch; FGL = 1-3 inches; AFGL = 8 inches, and ADL = adults.

Species	Year	Number	Size
Threadfin Shad	1984	<u>2,500</u>	ADL
		2,500	
Blue Catfish	1971	35,960	FGL
	1978	5,400	FGL
	1979	7,830	FGL
	1986	<u>250,140</u>	FGL
		299,330	
Channel Catfish	1971	154,746	FGL
	1972	45,000	FGL
	1973	<u>126,940</u>	FGL
		326,686	
Palmetto Bass	1978	139,615	FGL
	1979	227,800	FGL
	1982	295,035	FGL
	1991	257,270	FGL
	1992	390,867	FGL
	1993	1,093,700	FGL & FRY
	1994	385,747	FGL
	1995	385,400	FGL
	1996	281,670	FGL
	1997	255,021	FGL
	1998	255,217	FGL
	2002	191,250	FGL
	2003	58,530	FGL
	2004	122,131	FGL
	2005	101,117	FGL
	2007	1,195,830	FRY
2007	100,000	FGL	
2008	143,907	FGL	
2009	100,937	FGL	
2011	101,611	FGL	
2013	<u>653,517</u>	FGL & FRY	
		6,478,840	
Largemouth Bass	1971	<u>1,600,000</u>	FGL
		1,600,000	
Florida Largemouth Bass	1981	21,410	FGL
	1982	19,000	FGL
	1983	25,500	FGL
	1984	292,310	FGL
	1997	255,500	FGL
	1998	256,518	FGL
	1999	255,000	FGL
	2000	255,472	FGL
2004	441,191	FGL	

Table 4. continued...

Species	Year	Number	Size
	2005	589,360	FGL
	2008	499,961	FGL
	2009	651,015	FGL
	2012	642,967	FGL
	2013	1,923	FGL
		<u>4,222,337</u>	
ShareLunker Largemouth Bass	2013	<u>4,558</u>	FGL
Walleye	1974	2,580,000	FRY
	1975	2,250,000	FRY
	1976	<u>1,000,000</u>	FRY
		<u>5,830,000</u>	

Table 5. Survey of aquatic vegetation, Lake Palestine, Texas. Surface area (acres) is listed with percent coverage in parenthesis.

Vegetation	2005	2009	2013
Native submersed	4 (<0.1)		11 (<0.1)
Fanwort		10 (<0.1)	
Muskgrass		tr. (tr.)	4 (<0.1)
Pondweed		1 (<0.1)	7 (<0.1)
Wild celery			tr
Water stargrass			tr
Native floating	646 (2.8)	624 (2.7)	
Duckweed		616* (na)	
Frogsbit		8* (na)	
Native floating-leaved			
Spatterdock		7 (<0.1)	15 (<0.1)
Native emergent	471 (2.0)	385 (1.6)	239 (0.1)
American lotus		10 (<0.1)	203 (0.9)
Arrowhead		tr (tr)	
Cattail		2 (<0.1)	4 (<0.1)
Giant cutgrass		7 (<0.1)	13 (<0.1)
Maidencane		7 (<0.1)	2 (<0.1)
Panicum		27 (0.1)	1 (<0.1)
Smartweed		1 (<0.1)	
Water primrose		329 (1.4)	10 (<0.1)
Water willow		2 (<0.1)	6 (<0.1)
Non-native			
Alligatorweed (Tier III)	<1 (<0.1)		
Hydrilla (Tier III)	899 (3.8)		tr
Giant Salvinia (Tier I)		unk	
Water hyacinth (Tier I)	1.0 (<0.1)		

* Growing in combination with other species and does not represent discrete colonies

^{unk} Identified and removed no current infestation

Table 6. Percent directed angler effort by species for Lake Palestine, Texas, 2005 – 2014. Survey periods were from 1 June through 31 May.

Species	Year	Year	Year
	2005/2006	2009/2010	2013/2014
Catfish spp.	35.7	42.6	33.5
Temperate basses	7.7	2.7	2.5
Sunfishes	2.3	0.9	1.0
Black basses	21.4	17.4	25.2
Crappie spp.	17.5	18.8	11.1
Anything	15.4	17.6	26.2

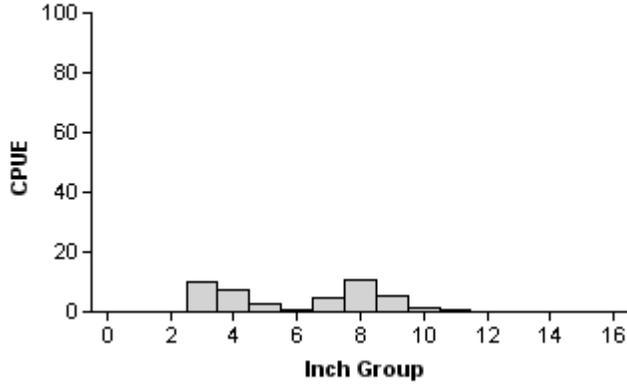
Table 7. Total fishing effort (h) for all species and total directed expenditures at Lake Palestine, Texas, 2005-2014. Survey periods were from 1 June through 31 May.

Creel Statistic	Year	Year	Year
	2005/2006	2009/2010	2013/2014
Total fishing effort	313,766	223,497	182,319
Total directed expenditures	\$1,590,899	\$1,079,536	\$1,074,263

Gizzard Shad

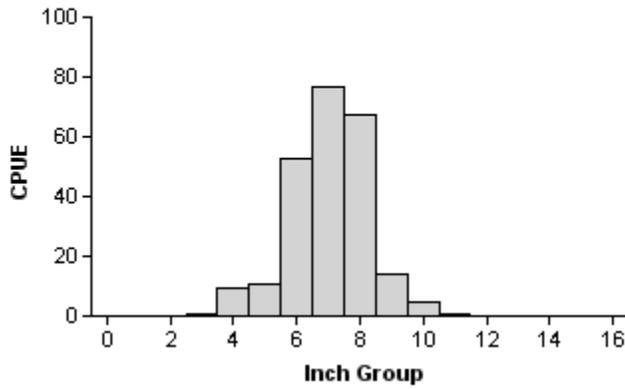
2009

Effort = 2.0
 Total CPUE = 45.0 (34; 90)
 Stock CPUE = 23.5 (25; 47)
 IOV = 59 (14.2)



2011

Effort = 2.0
 Total CPUE = 237.0 (9; 474)
 Stock CPUE = 163.5 (11; 327)
 IOV = 64 (5)



2013

Effort = 2.0
 Total CPUE = 112.0 (16; 224)
 Stock CPUE = 67.5 (20; 135)
 IOV = 73 (6)

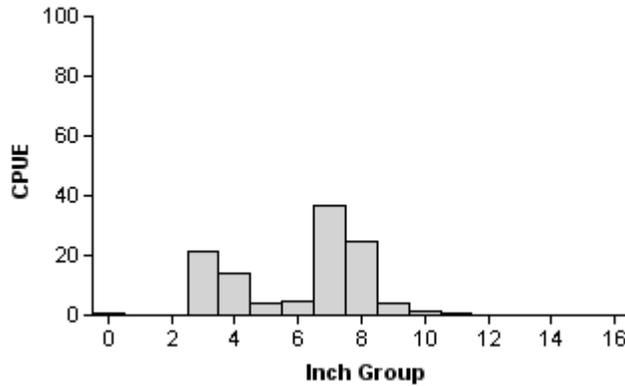
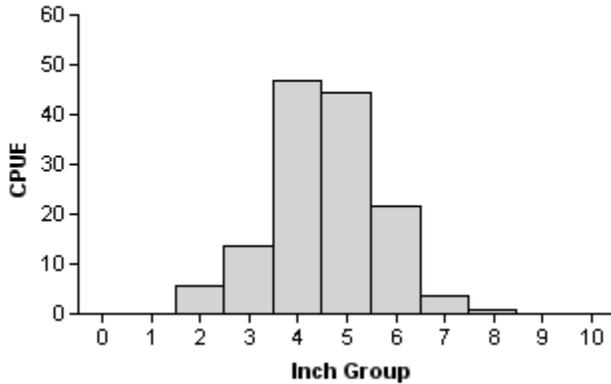


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Palestine, Texas, 2009, 2011, and 2013.

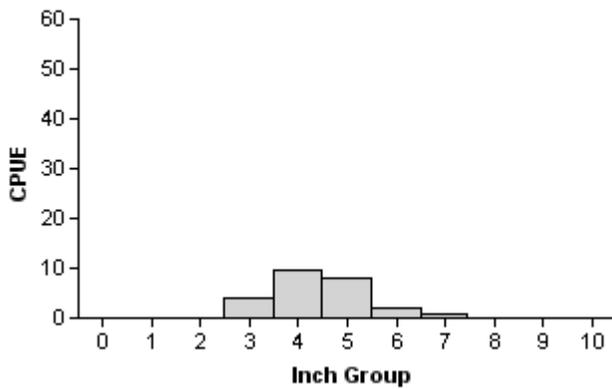
Bluegill

2009



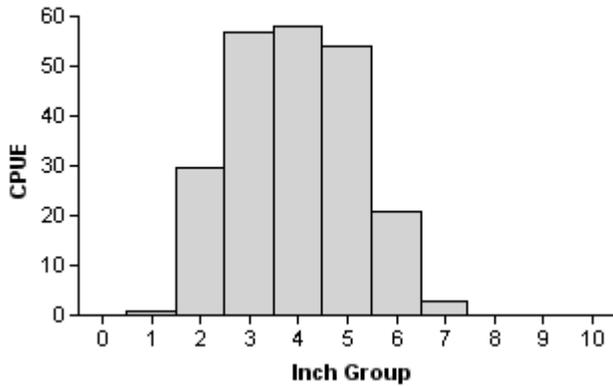
Effort = 2.0
 Total CPUE = 136.5 (22; 273)
 Stock CPUE = 131.0 (22; 262)
 PSD = 20 (5.1)

2011



Effort = 2.0
 Total CPUE = 24.5 (46; 49)
 Stock CPUE = 24.5 (46; 49)
 PSD = 12 (2.9)

2013



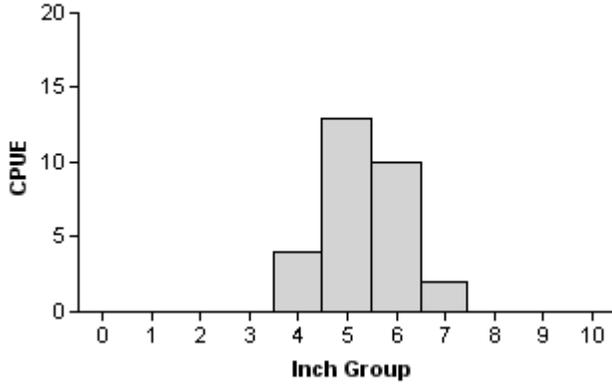
Effort = 2.0
 Total CPUE = 223.5 (18; 447)
 Stock CPUE = 193.0 (19; 386)
 PSD = 12 (3.2)

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 Palestine, Texas, 2009, 2011, and 2013.

Redear Sunfish

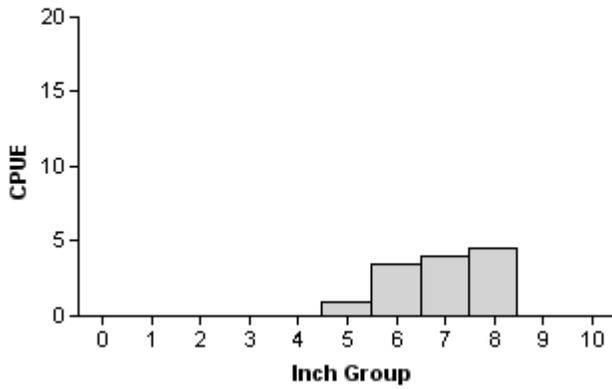
2009

Effort = 2.0
 Total CPUE = 29.0 (42; 58)
 Stock CPUE = 29.0 (42; 58)
 PSD = 7 (2.8)



2011

Effort = 2.0
 Total CPUE = 13.0 (58; 26)
 Stock CPUE = 13.0 (58; 26)
 PSD = 65 (10.5)



2013

Effort = 2.0
 Total CPUE = 17.5 (27; 35)
 Stock CPUE = 13.0 (31; 26)
 PSD = 35 (6.6)

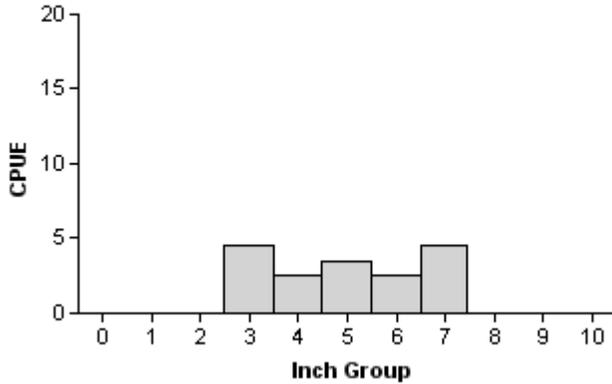


Figure 4. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Palestine, Texas, 2009, 2011, and 2013.

Blue Catfish

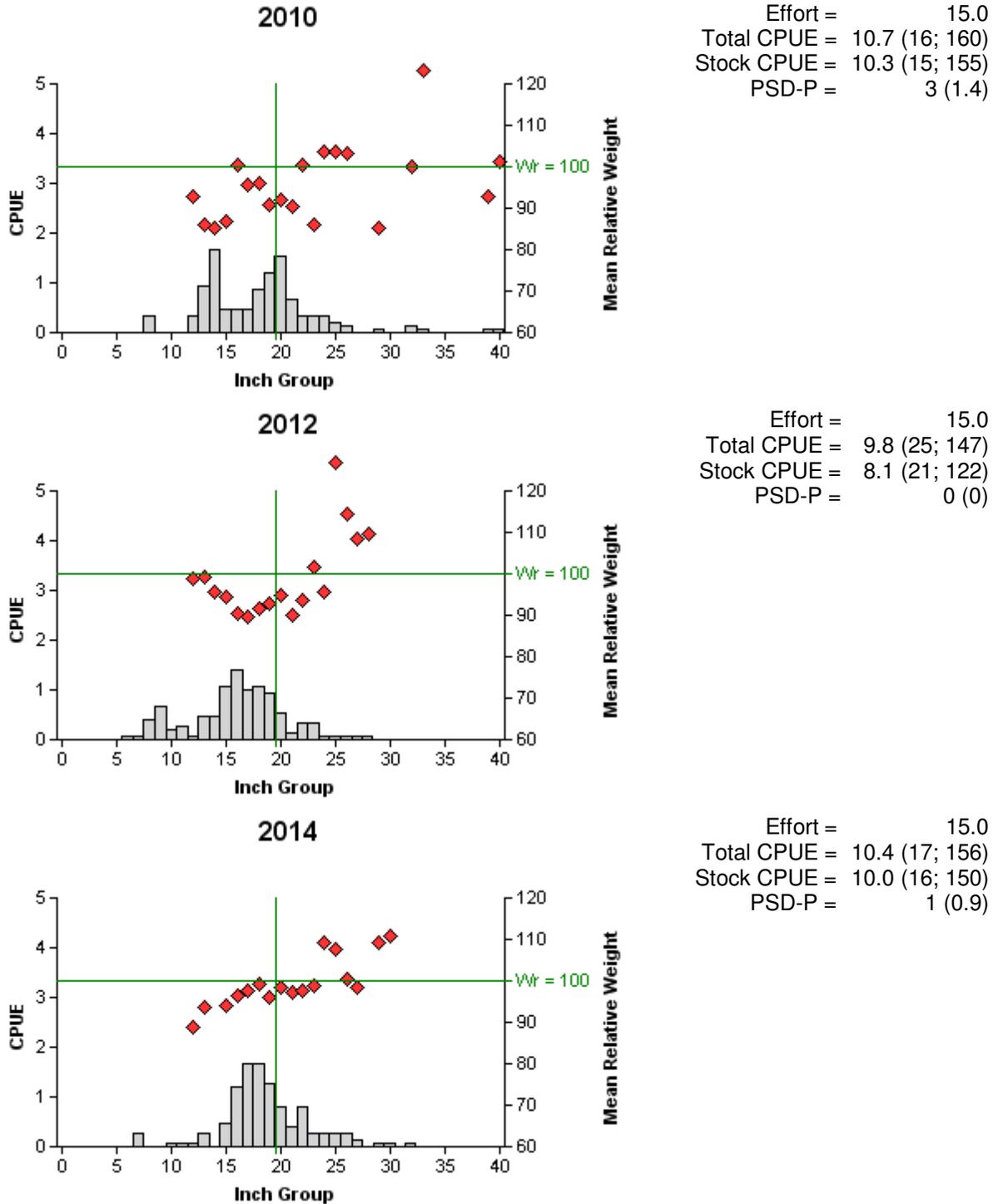


Figure 5. Number of Blue Catfish caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Palestine, Texas, 2010, 2012, and 2014. Vertical lines represents minimum length for restricted bag limit and horizontal lines represent mean relative weight of 100.

Channel Catfish

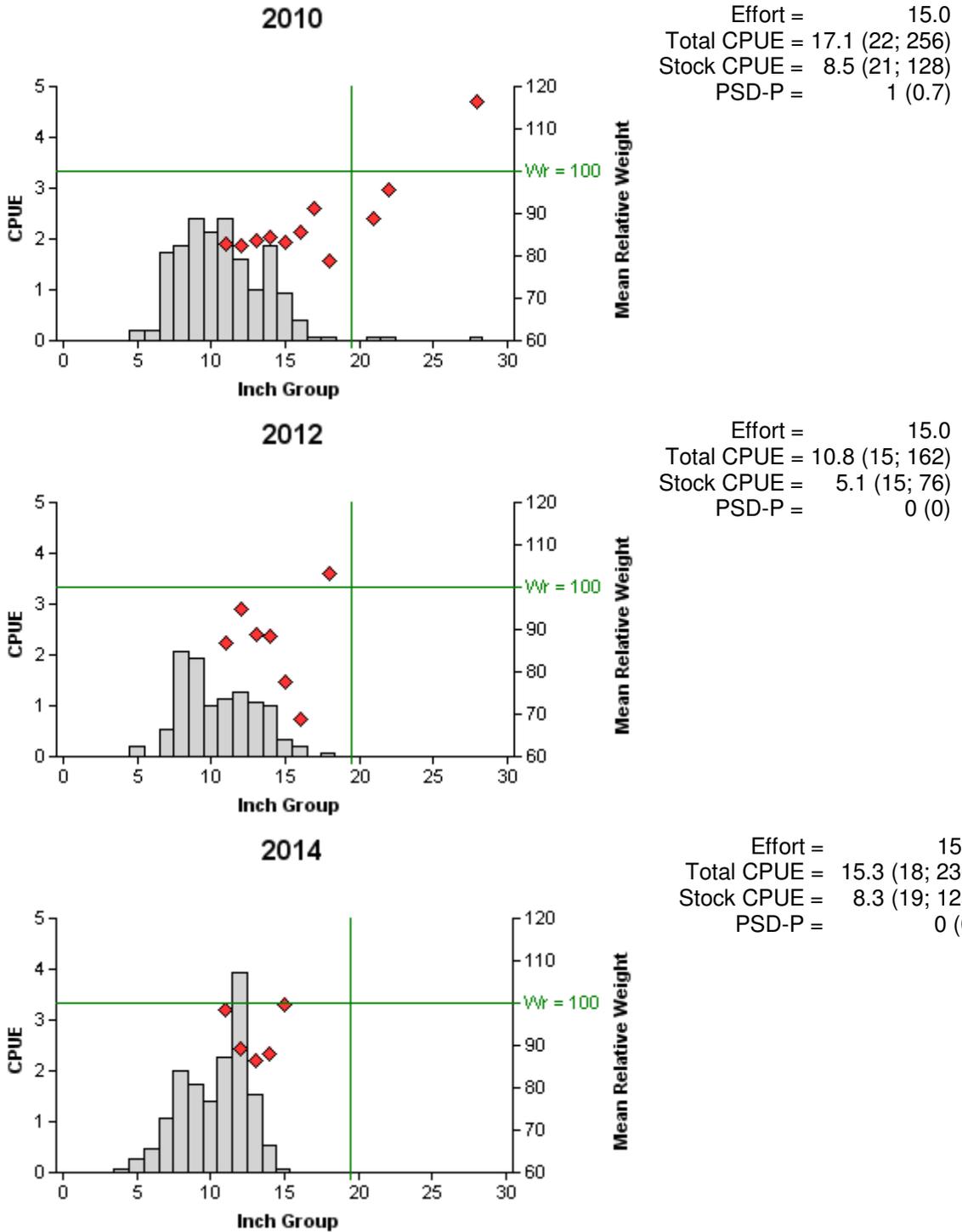


Figure 6. Number of Channel Catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Palestine, Texas, 2010, 2012, and 2014. Vertical lines represent minimum length for bag limit restriction and horizontal lines represent mean relative weight of 100.

Catfish

Table 8. Creel survey statistics for catfish at Lake Palestine, Texas June 2005 through May 2006, June 2009 through May 2010, and June 2013 through May 2014, where total catch per hour is for anglers targeting catfish and total harvest is the estimated number of catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	Year	Year
	2005/2006	2009/2010	2013/2014
Directed effort (h)	112,037 (16)	95,132 (18)	61,054 (15)
Directed effort/acre	4.8 (16)	4.1 (18)	2.6 (15)
Total catch per hour	1.4 (43.1)	2.3 (39)	3.4 (33)
Total harvest	184,315 (29)	121,174 (29)	158,985 (29)
Blue	36,288 (43)	32,246 (38)	25,070 (46)
Channel	148,027 (26)	88,927 (46)	133,915 (26)
Harvest/acre	7.9 (29)	5.2 (29)	6.8 (29)
Blue	1.5 (43)	1.4 (38)	1.7 (46)
Channel	6.3 (26)	3.8 (46)	5.7 (26)
Percent legal released	9	5	32

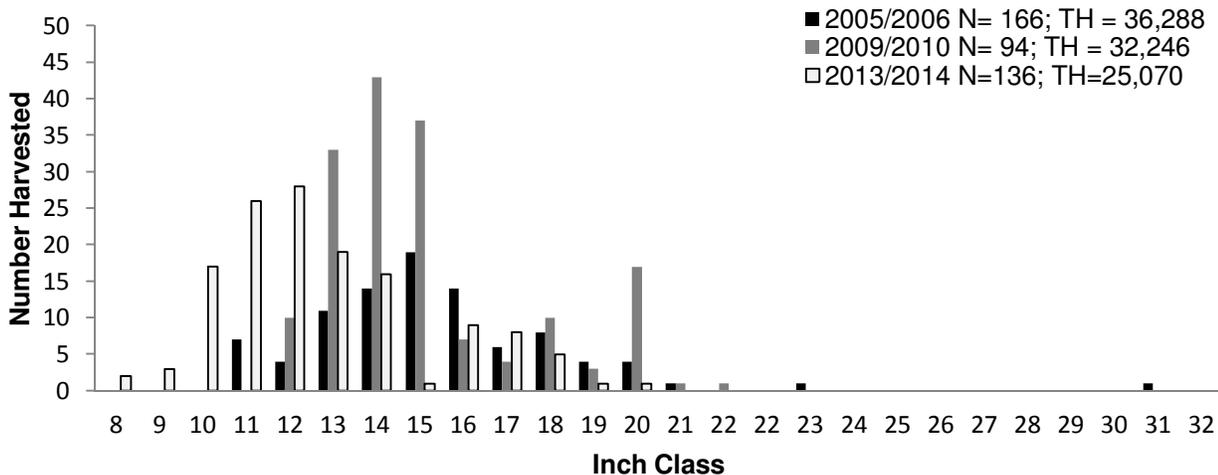


Figure 7. Length frequency of harvested Blue Catfish observed during creel surveys at Lake Palestine, Texas, June 2005 through May 2014, all anglers combined. N is the number of harvested Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

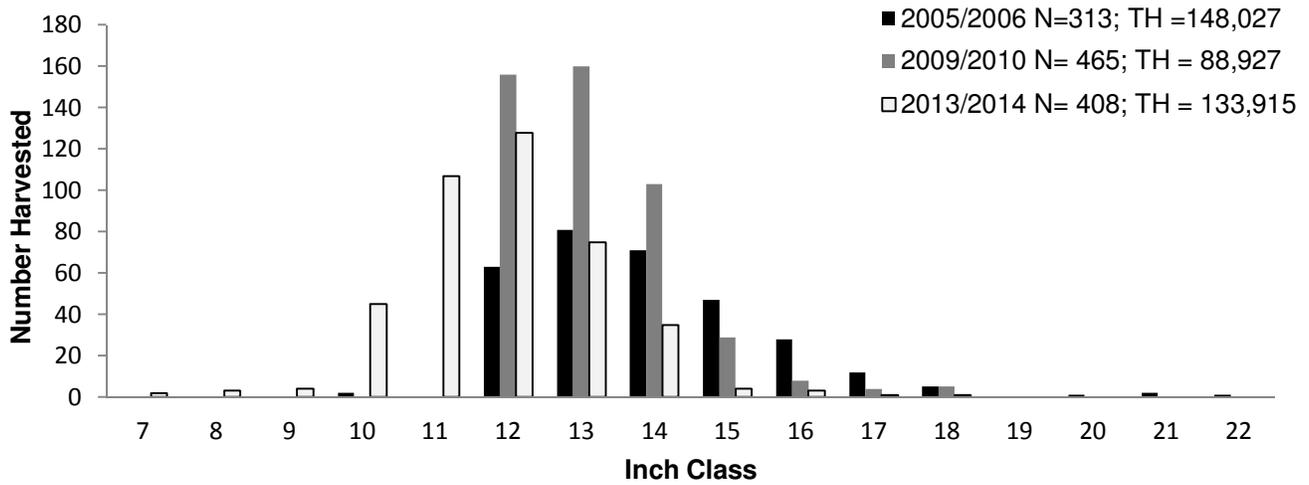
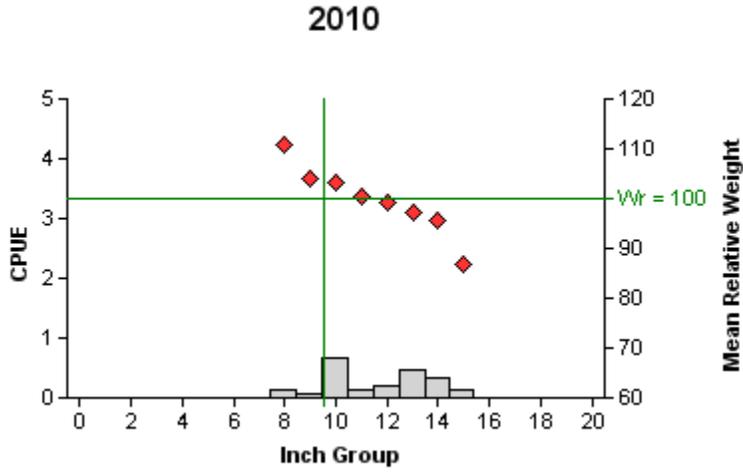
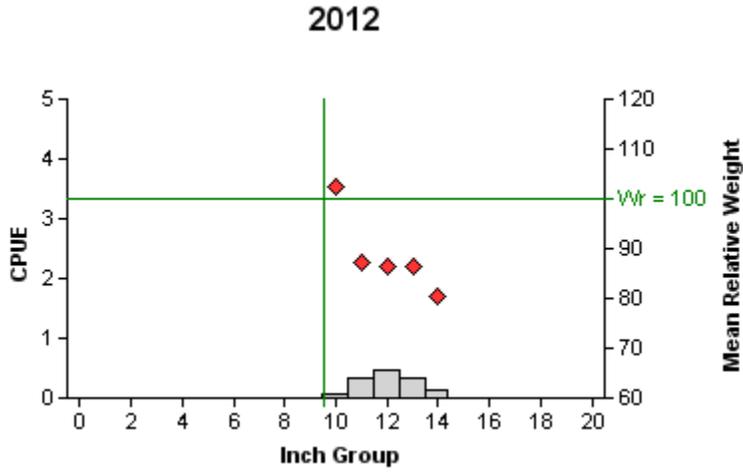


Figure 8. Length frequency of harvested Channel Catfish observed during creel surveys at Lake Palestine, Texas; June 2005 to May 2006, June 2009 to May 2010, and June 2013 to May 2014, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

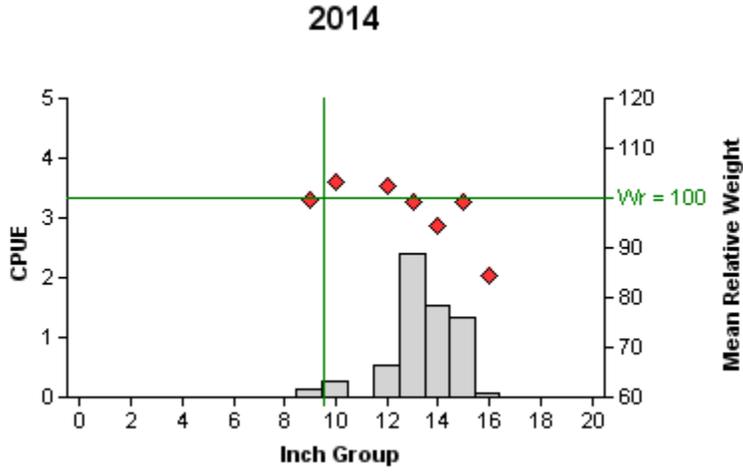
White Bass



Effort = 15.0
 Total CPUE = 2.1 (21; 32)
 Stock CPUE = 2.1 (21; 32)
 PSD = 94 (3.5)
 PSD-P = 53 (11.7)



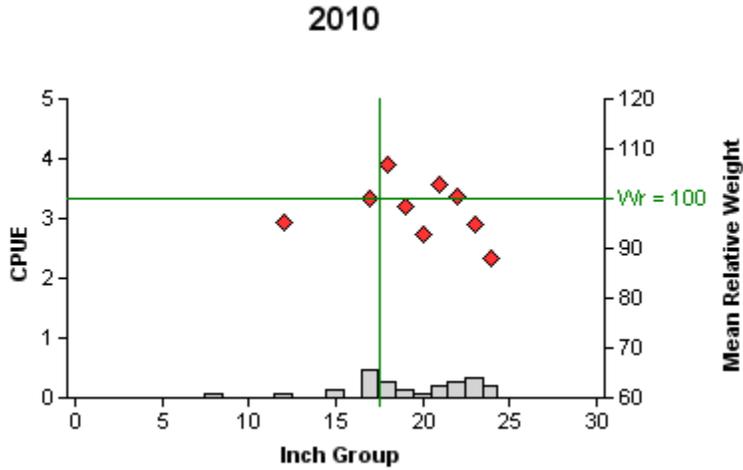
Effort = 15.0
 Total CPUE = 1.3 (44; 20)
 Stock CPUE = 1.3 (44; 20)
 PSD = 100 (0)
 PSD-P = 70 (11.8)



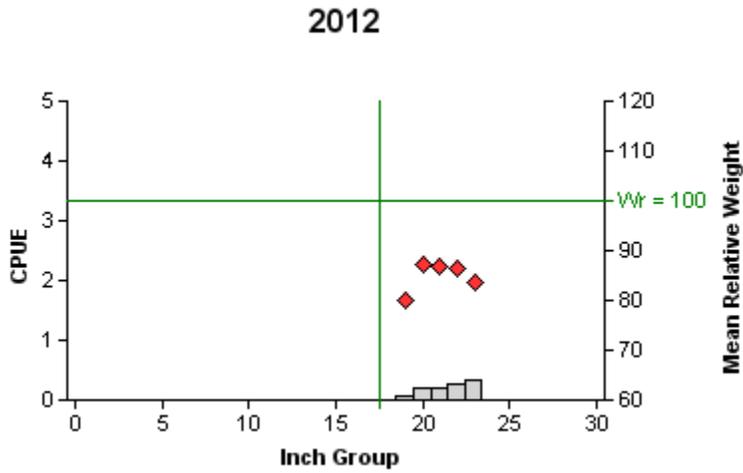
Effort = 15.0
 Total CPUE = 6.3 (25; 94)
 Stock CPUE = 6.3 (25; 94)
 PSD = 100 (0)
 PSD-P = 94 (3.3)

Figure 9. Number of White Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Palestine, Texas, 2010, 2012, and 2014. Vertical lines represent minimum length limit at time of survey and horizontal lines represent mean relative weight of 100.

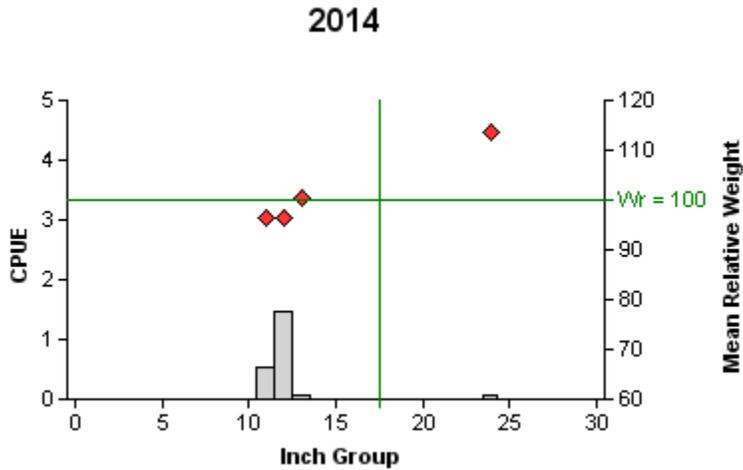
Palmetto Bass



Effort = 15.0
 Total CPUE = 2.2 (58; 33)
 Stock CPUE = 2.1 (59; 32)
 PSD = 91 (3.1)
 PSD-P = 50 (7.9)



Effort = 15.0
 Total CPUE = 1.1 (69; 16)
 Stock CPUE = 1.1 (69; 16)
 PSD = 100 (0)
 PSD-P = 94 (2.5)



Effort = 15.0
 Total CPUE = 2.1 (50; 32)
 Stock CPUE = 2.1 (50; 32)
 PSD = 3 (3.3)
 PSD-P = 3 (3.3)

Figure 10. Number of Palmetto Bass caught per net night (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Palestine, Texas, 2010, 2012, and 2014. Vertical lines represent minimum length limit at time of survey and horizontal lines represent mean relative weight of 100.

Temperate bass

Table 9. Creel survey statistics for temperate basses at Lake Palestine, Texas June 2005 through May 2006, June 2009 through May 2010, and June 2013 through May 2014, where total catch per hour is for anglers targeting catfish and total harvest is the estimated number of temperate basses harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	Year	Year
	2005/2006	2009/2010	2013/2014
Directed effort (h)	24,028 (28)	6,107 (40)	4,592 (38)
Directed effort/acre	1.0 (28)	0.3 (40)	0.2 (38)
Total catch per hour	1.2 (40)	1.0 (47)	0.9 (70)
Total harvest	32,212 (77)	1,574 (315)	4,161 (161)
White Bass	24,489 (76)	1,574 (315)	3,824 (102)
Palmetto Bass	7,723 (78)	0.0 (na)	337 (839)
Harvest/acre	1.4 (77)	<0.1 (315)	0.2 (161)
White Bass	0.3 (78)	<0.1 (315)	0.2 (102)
Palmetto Bass	0.3 (78)	0.0 (na)	<0.1 (839)
Percent legal released	78	54	58

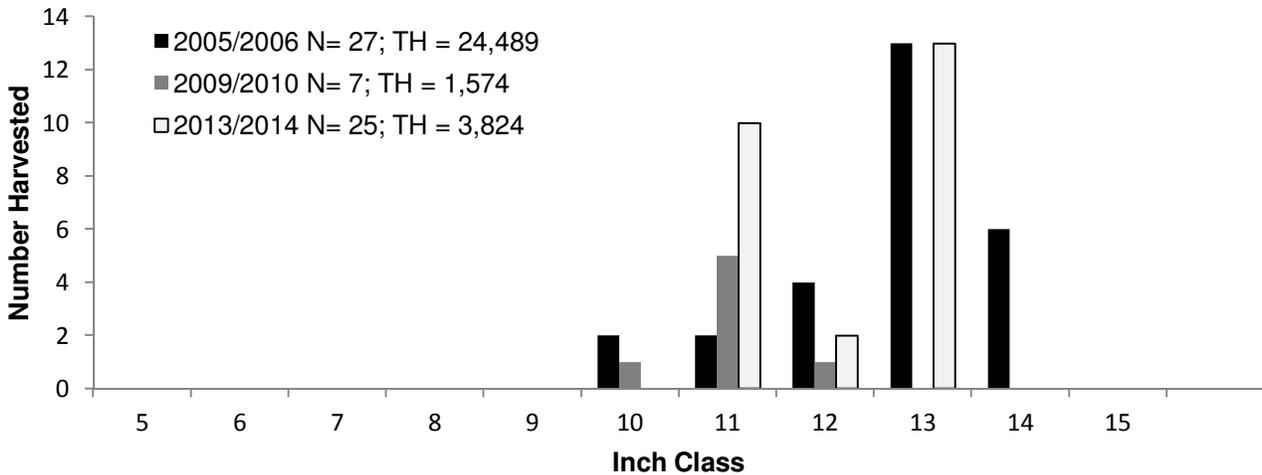


Figure 11. Length frequency of harvested White Bass observed during creel surveys at Lake Palestine, Texas, June 2005 to May 2006, June 2009 to May 2010, and June 2013 to May 2014, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

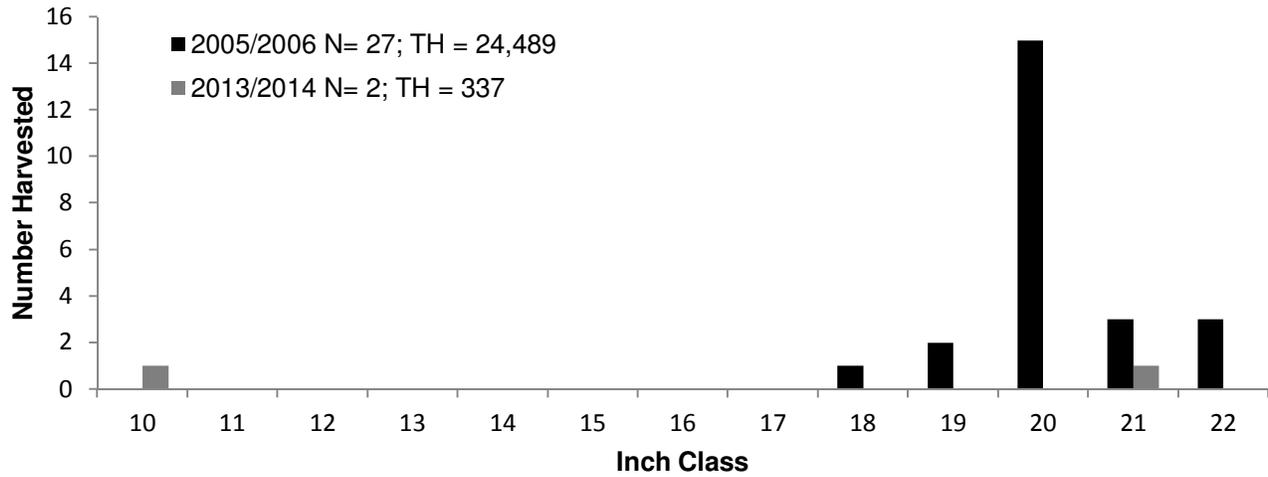


Figure 12. Length frequency of harvested Palmetto Bass observed during creel surveys at Lake Palestine, Texas, June 2005 to May 2006 and June 2013 to May 2014, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period. No harvested Palmetto Bass were observed during 2009/2010 creel survey.

Largemouth Bass

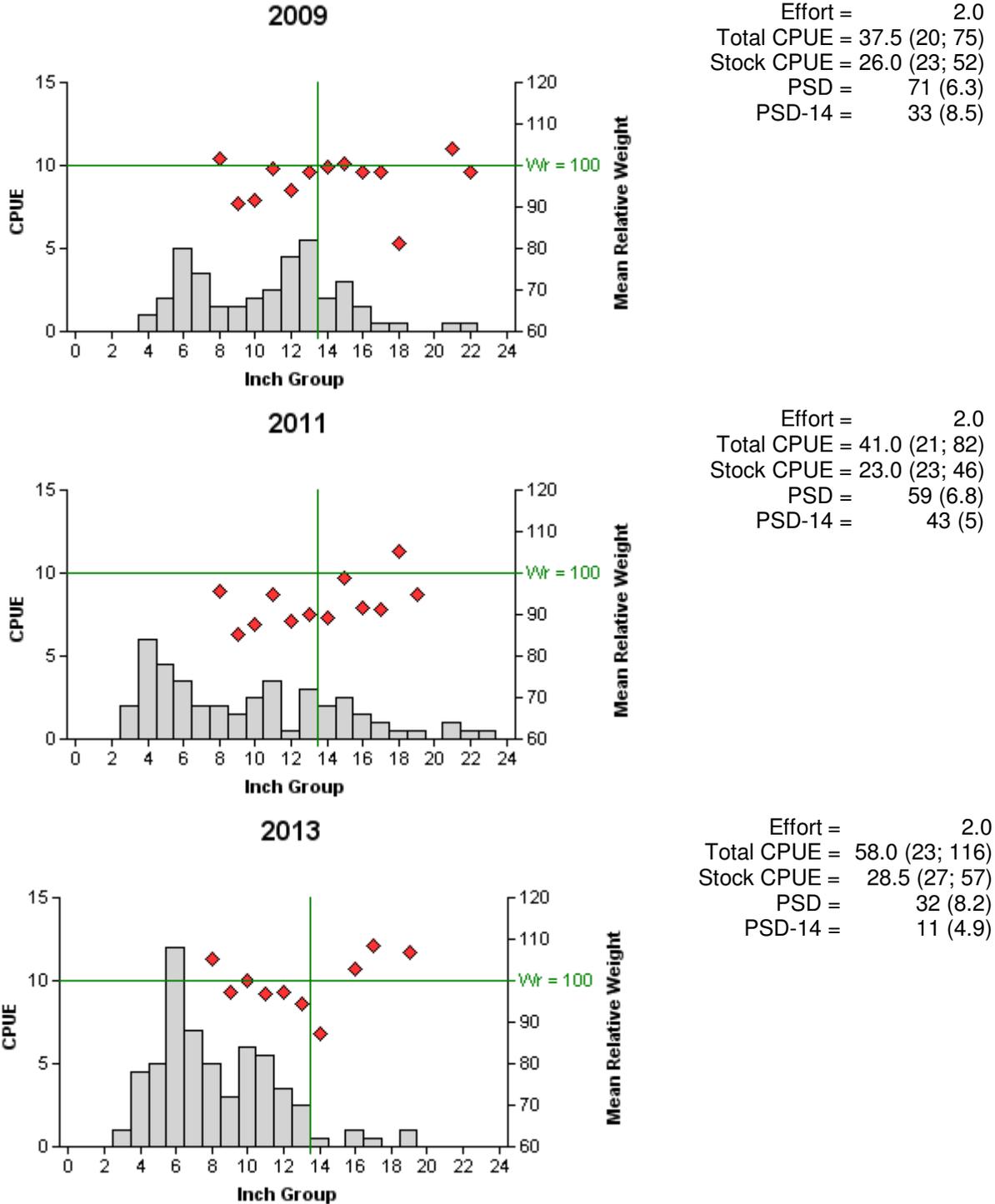


Figure 13. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Palestine, Texas, 2009, 2011, and 2013. Vertical lines represent minimum length limit at time of survey and horizontal lines represent mean relative weight of 100.

Table 10. Creel survey statistics for Largemouth Bass at Lake Palestine, TX from June 2005 through May 2014. 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 released by weight category is for anglers targeting black basses. Relative standard errors (RSE) are in parentheses.

Statistic	2005/2006	2009/2010	2013/2014
Directed angling effort (h)			
Tournament	na	na	20,102 (24)
Non-tournament	na	na	25,817 (22)
All black bass anglers combined	67,288 (17)	38,979 (23)	45,919 (19)
Angling effort/acre	2.9 (17)	1.7 (23)	2.0 (19)
Catch rate (number/h)	0.8 (38)	1.1 (44)	0.6 (29)
Harvest	13,453 (88)		
Non-tournament harvest	na	1,137 (101)	2,967 (286)
Harvest/acre	0.6 (88)	0.3 (101)	0.1 (286)
Tournament weigh-in and release	na	5,458 (101)	5,176 (89)
Release by weight			
<4.0 lbs	na	na	6,367 (102)
4.0-6.9 lbs	na	na	316 (121)
7.0-9.9 lbs	na	na	0
≥10.0 lbs	na	na	0
Percent legal released (non-tournament)	60	70	63

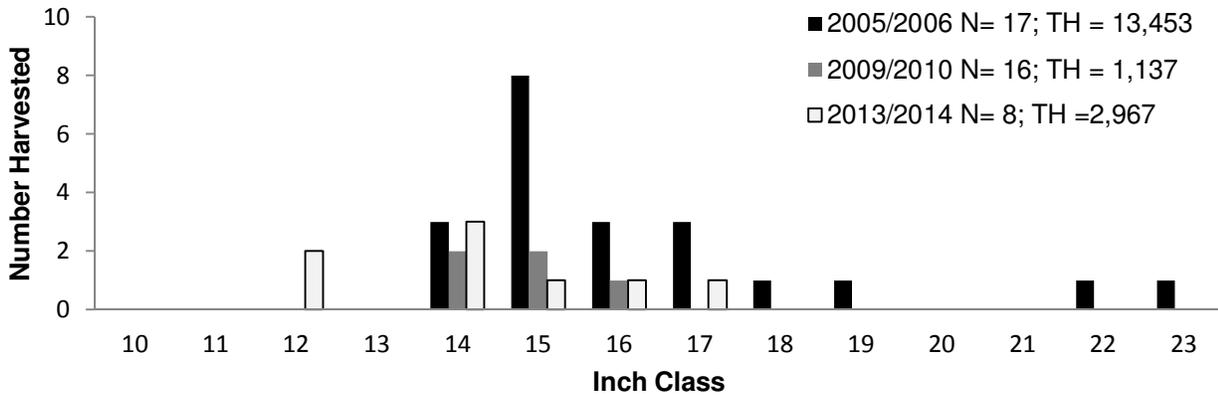


Figure 14. Length frequency of harvested Largemouth Bass observed during creel surveys Lake Palestine, Texas, June 2005 to May 2006, June 2009 to May 2010, and June 2013 to May 2014, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total harvest for the creel period.

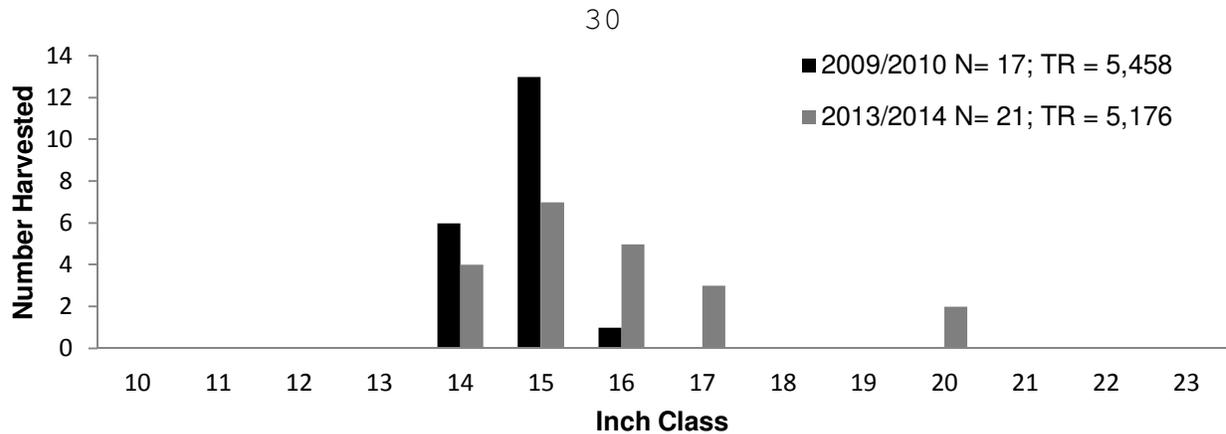


Figure 15. Length frequency of tournament-retained Largemouth Bass observed during creel surveys Lake Palestine, Texas; June 2009 to May 2010, and June 2013 to May 2014, all anglers combined. N is the number of tournament-retained Largemouth Bass observed during creel surveys, and TR is the number tournament-retained for the creel period.

Largemouth Bass

Table 11. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Lake Palestine, Texas, 1994, 1995, 1996, 1997, 2001, 2003, 2007, 2011, and 2013. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
1994	59	4	42	13	42	6.8
1995	30	2	32	6	42	6.9
1996	30	1	17	12	31	3.3
1997	32	0	26	6	32	0.0
2001	24	1	21	2	38	4.1
2003	30	5	19	5	42	14.3
2007	30	0	30	0	50	0.0
2011	30	0	29	1	50	0.0
2013	30	0	30	0	41	0.0

White Crappie

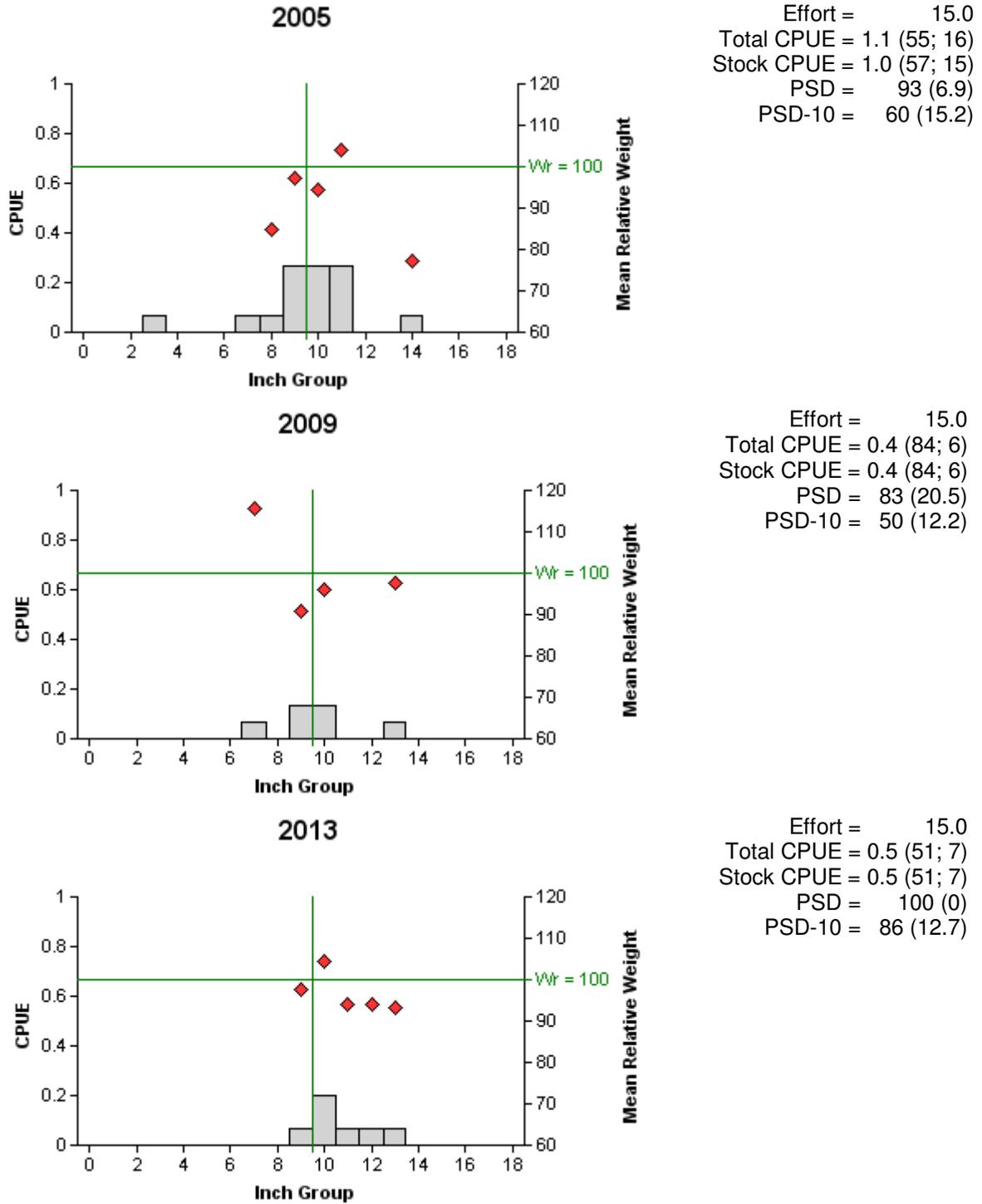


Figure 16. Number of White Crappie caught net night (CPUE, bars), and population indices (RSE and N for CPUE and SE are in parentheses) for fall trap-net survey, Lake Palestine, Texas, 2013. Vertical lines represent minimum length limit at time of survey and horizontal lines represent mean relative weight of 100.

Black Crappie

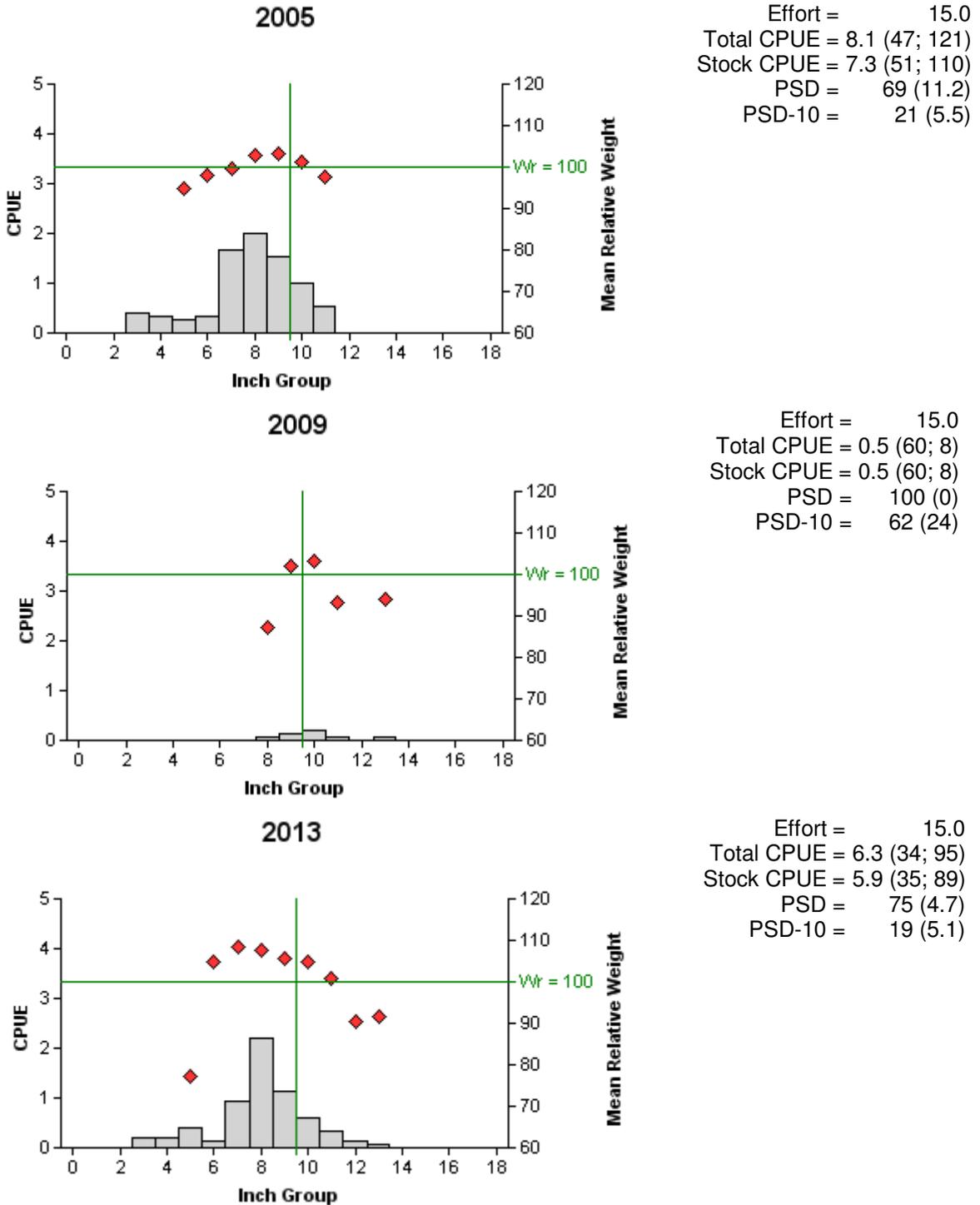


Figure 17. Number of Black Crappie caught net night (CPUE, bars), and population indices (RSE and N for CPUE and SE are in parentheses) for fall trap-net survey, Lake Palestine, Texas, 2013. Vertical lines represent length limit at time of survey and horizontal lines represent mean relative weight of 100.

Crappie

Table 12. Creel survey statistics for Crappie at Lake Palestine from June 2005 through May 2006, June 2009 through May 2010, and June 2013 through May 2014. Total catch per hour is for anglers targeting Crappie and total harvest is the estimated number of White Crappie and Black Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

Creel Survey Statistic	Year	Year	Year
	2005/2006	2009/2010	2013/2014
Directed effort (h)	54,889 (18)	42,009 (18)	20,296 (24)
Directed effort/acre	2.3 (18)	1.8 (18)	0.9 (15)
Total catch per hour	1.7 (49)	2.2 (33)	1.5 (49)
Total harvest	84,459 (44)	45,273 (61)	13,204 (3)
White	41,062 (43)	30,627 (33)	8,193 (4)
Black	43,397 (44)	14,646 (59)	5,011 (2)
Harvest/acre	3.6 (44)	1.9 (51)	0.6 (3)
White	1.8 (43)	1.3 (33)	0.4 (4)
Black	1.8 (44)	0.6 (59)	0.2 (2)
Percent legal released	2	4	22

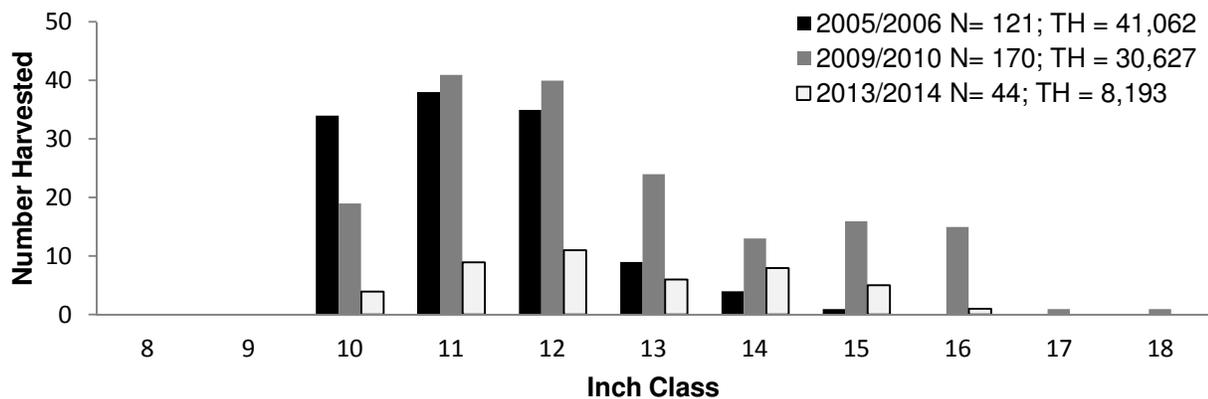


Figure 18. Length frequency of harvested White Crappie observed during creel surveys at Lake Palestine, Texas, June 2005 to May 2006, June 2009 to May 2010, and June 2013 to May 2014, all anglers combined. N is the number of harvested White Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

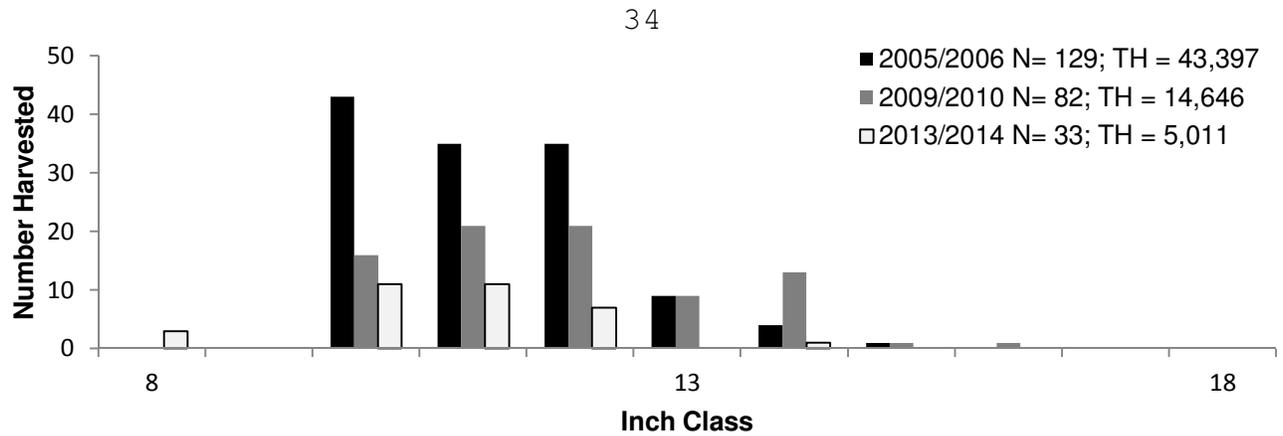


Figure 19. Length frequency of harvested Black Crappie observed during creel surveys at Lake Palestine, Texas, June 2005 to May 2006, June 2009 to May 2010, and June 2013 to May 2014, all anglers combined. N is the number of harvested Black Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 13. Proposed sampling schedule for Lake Palestine, 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

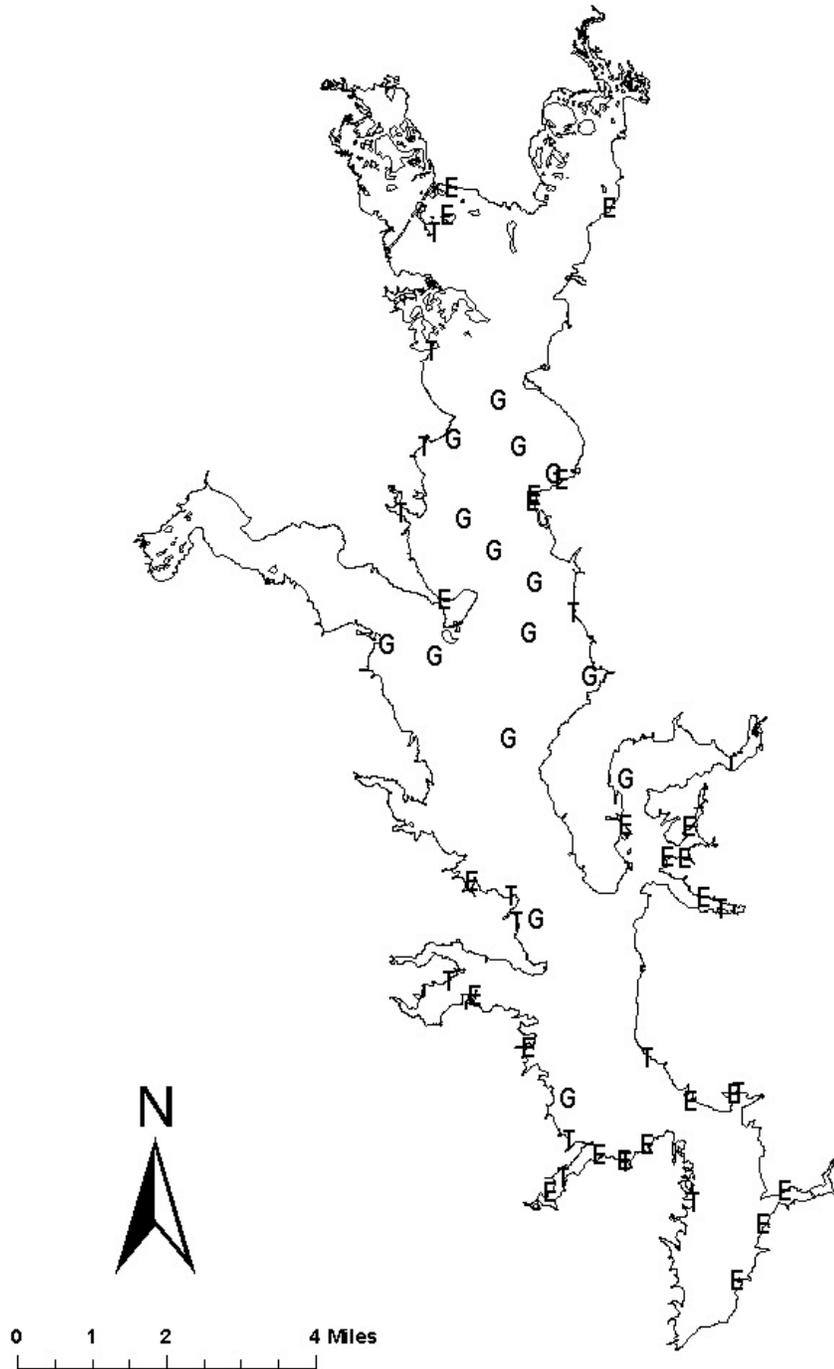
Survey year	Electrofishing Fall (Spring)	Trap net	Gill net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2014-2015								
2015-2016	A		A					
2016-2017								
2017-2018	S	A	S		S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake Palestine, Texas, 2013-2014. Sampling effort was 15 net nights for gill netting, 15 net nights for trap netting, and 2 hours for electrofishing.

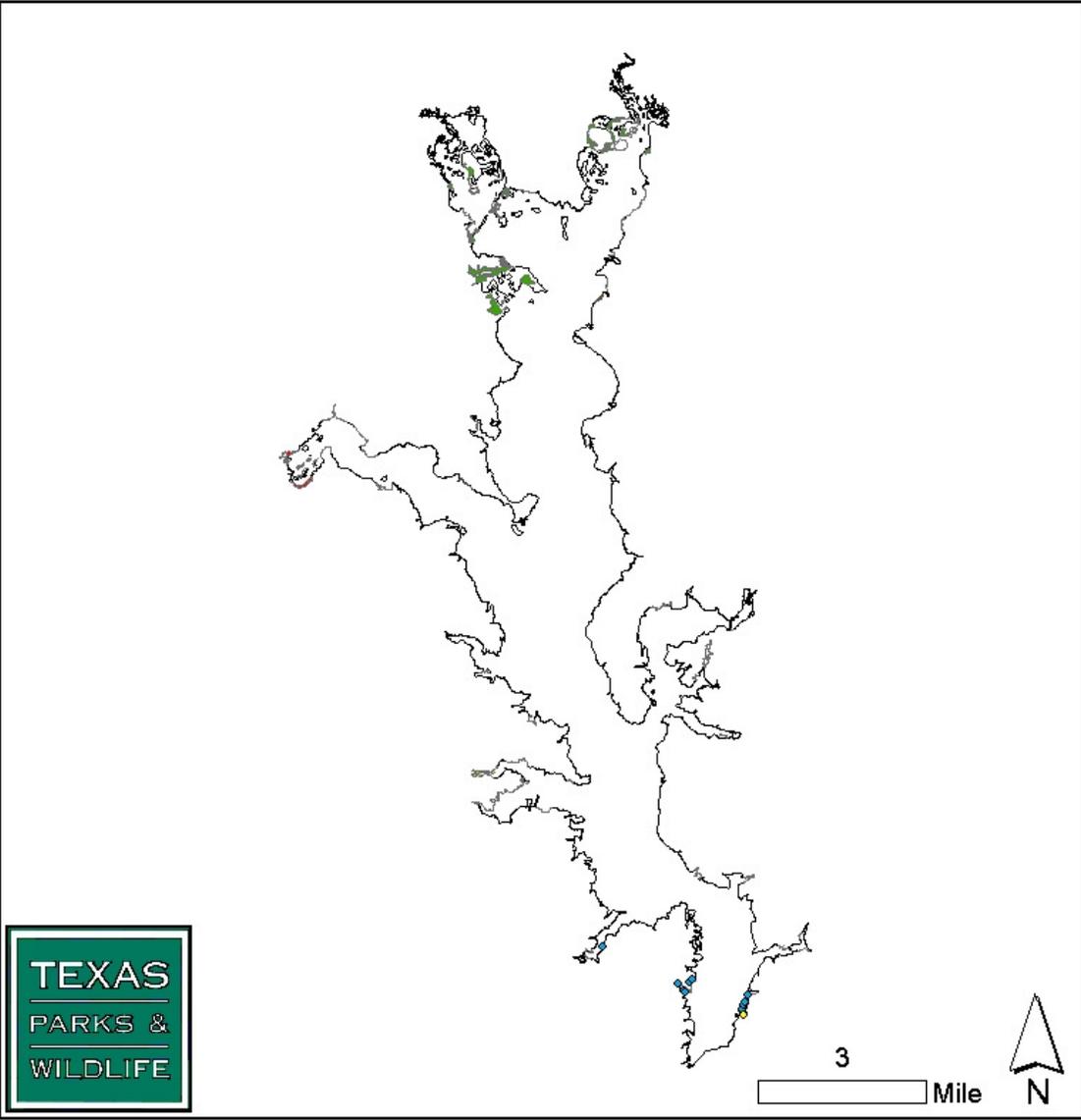
Species	Gill netting		Trap netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					224	112
Threadfin Shad					2,016	1,008
Blue Catfish	156	10.4				
Channel Catfish	230	15.3				
White Bass	94	6.3				
Palmetto Bass	32	2.1				
Redbreast Sunfish					39	19.5
Warmouth					2	1.0
Bluegill					447	223.5
Longear Sunfish					113	56.5
Redear Sunfish					35	17.5
Spotted Bass					66	33.0
Largemouth Bass					116	58.0
White Crappie			7	0.5		
Black Crappie			94	6.3		

36
APPENDIX B



Location of sampling sites, Lake Palestine, Texas, 2013-2014. Trap netting, gill netting, and electrofishing stations are indicated by T, G, and E, respectively.

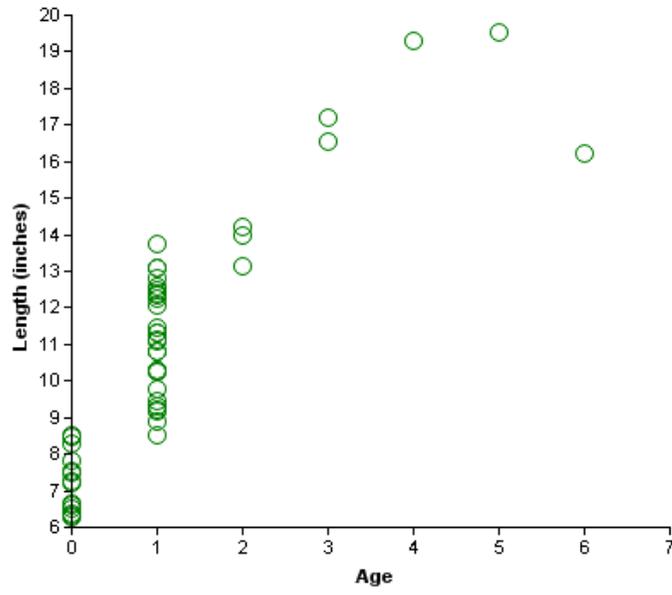
Lake Palestine Vegetation Survey 09/09/13



Inland Fisheries Division Texas Parks and Wildlife Department		Species ~ acreage		
Prepared by: Jacob Norman, Bill Hughes and Ken Kay Texas Parks and Wildlife: Inland Fisheries Division Projection: NAD 83 UTM Zone 15 N	Lotus~203	Pondweed~7.1	Maidencane~1.7	
This Map is for Reference Only The requestor must be aware of data conditions and ultimately bear responsibility for the appropriate use of the information with respect to possible errors, original map scale, collection methodology, currency of data, and other conditions specific to certain data.	Spatterdock~15.1	Water willow~5.6	Panicum~1	
	Cut grass~13.3	Chara~4.1	Hydrilla~tr	
	Water primrose~9.7	Cattail~3.6	Stargrass~tr	

Distribution and coverage of native and exotic aquatic vegetation for Lake Palestine, Texas, 2013

38
Appendix D



Length-at-age (sexes combined) for Largemouth Bass ≥ 6 inch collected by electrofishing at Lake Palestine, Texas, October 2013.