

PERFORMANCE REPORT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2014 Fisheries Management Survey Report

Lake O' the Pines

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Lake O' the Pines were surveyed in 2014 using electrofishing and tandem trap netting and in 2015 using baited hoop nets. Historical data are presented with the 2014-2015 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Lake O' the Pines is a 16,269-acre reservoir on Big Cypress Creek, which was constructed in 1956 by the U. S. Army Corps of Engineers (USACE) for flood control, municipal and industrial water supply, and public recreation. Habitat features consisted of inundated timber, brush, creek channels, and riprap. Native aquatic vegetation covered about 10% of the reservoir, while non-native invasive species (i.e., hydrilla, water hyacinth, and alligatorweed) accounted for 13% of the reservoir surface.
- **Management History:** Important sport fish include Largemouth Bass, Channel Catfish, White Bass, sunfish, and crappie. Palmetto Bass stocking was discontinued due to low angler utilization. All fish species are currently managed under statewide harvest regulations except for crappie. From 1 December until the last day in February, anglers are required to keep the first 25 crappie they catch each day regardless of size to minimize excess mortality due to fish being caught in deep water.
- **Fish Community**
 - **Prey species:** Threadfin Shad continued to be present in the reservoir. Electrofishing catch of Gizzard Shad has increased over the past few surveys, and about half of Gizzard Shad were available as prey to most sport fish during the 2014 survey. Electrofishing catch of Bluegills was high, providing excellent prey for sport fish. Redear Sunfish were present up to 8 inches long, providing an excellent angling opportunity.
 - **Catfishes:** Baited tandem hoop nets were used for the first time to sample Channel Catfish in this reservoir. Average body condition of fish was good. However, no fish longer than 19 inches was collected. Future sampling with these nets will allow us to monitor trends.
 - **White Bass:** White Bass catch rates in gill nets have historically been low. Few anglers have been documented targeting White Bass during previous creel surveys. While fish can be caught during their spring spawning run, only a negligible fishery exists for them during the remainder of the year. Therefore, they were not sampled during this survey period.
 - **Largemouth Bass:** Largemouth Bass growth has improved in recent years. The catch of smaller fish increased since the last survey, but there were less fish >8 inches compared to previous years.
 - **Crappie:** An attempt to use dual-cod trap nets to sample crappie did not collect the desired number of fish. However, crappie growth was good. The average age of 10 inch Black Crappie was 2.2 years, and 2.0 years for White Crappie.
- **Management Strategies:** Continue to stock Florida Largemouth Bass every other year. Conduct electrofishing in 2016 and 2018. Investigate new ways to sample crappie. Conduct baited tandem hoop netting for Channel Catfish and low frequency electrofishing for Flathead Catfish in 2018. Conduct annual vegetation surveys to monitor invasive plant species.

INTRODUCTION

This document is a summary of fisheries data collected from Lake O' the Pines in 2014-2015. 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 2014-2015 data for comparison.

Reservoir Description

Lake O' the Pines is a 16,269-acre impoundment located in Marion, Morris, Upshur, and Camp Counties on Big Cypress Creek. It was constructed in 1956 by the U. S. Army Corps of Engineers (USACE) for flood control, municipal and industrial water supply, and public recreation. Shoreline length is 144 miles with a shoreline development index of 7.5. Normal annual water level fluctuation is 2-3 feet, however the reservoir experienced a drought in 2006, high water at the end of 2009, drought 2011 to 2013, and recent high water levels in 2015 (Figure 1). Other descriptive characteristics for Lake O' the Pines are in Table 1.

Angler Access

Lake O' the Pines has 16 boat ramps operated by USACE and 9 boat ramps that are either county-controlled or privately owned. Bank angling access is available at numerous USACE parks. Additional boat ramp characteristics are in Table 2.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Bister 2011) included:

1. Conduct annual surveys for invasive aquatic vegetation and work with USACE to develop any needed management strategies.

Action: Annual invasive aquatic species surveys have been conducted as well as periodic inspections of high-use boat ramps throughout the year. USACE staff surveyed boat ramps and boat trailers for the presence of invasive species. When found, pictures of the invasive plants are taken, plants are removed and disposed of, and a notification is placed on the windshield of offending vehicle stating that the plants were found and that the TPWD Game Warden has been forwarded all information so a citation can be issued. A memorandum of understanding (MOU) was entered into by TPWD, USACE, and the Northeast Texas Municipal Water District (NETMWD) to create an invasive species management task force.
2. Continue to monitor and manage the Largemouth Bass population with electrofishing, genetic sampling, and stocking of Florida Largemouth Bass.

Action: Florida Largemouth Bass were stocked in 2011, 2013, and 2015. Genetic analysis of the Largemouth Bass population was assessed in 2012 and 2014. Additional electrofishing was conducted in 2012 to monitor the population and important prey species.
3. Inform the public about fisheries related information.

Action: Lake O' the Pines fisheries information has been released to the public through traditional media, social media, and public presentations.
4. Develop strategies to inform anglers about Bighead Carp in Big Cypress Bayou below Lake O' the Pines and take steps to avoid transport of these invasive fish to other waters.

Action: Informational signs were created and provided to USACE to be posted at the spillway.

Harvest regulation history: Sport fishes in Lake O' the Pines are currently managed with statewide regulations, except for the winter crappie fishery (Table 3). A special regulation for White Bass and Palmetto Bass (10-inch minimum length limit, daily aggregate bag limit of 25 fish of which only 5 may be 18 inches or greater) was removed after Palmetto Bass stocking was discontinued. Largemouth Bass have been managed with a 14-inch minimum length and 5-fish daily bag since 1986. Other black bass were included under this regulation in 1988. The minimum length limit on Spotted Bass was removed in 2000, but the daily bag for black bass in any combination remains at 5 fish/day. The 12-inch minimum length limit and 25 fish daily bag for Channel and Blue Catfish (in any combination) has been in effect since 1994. The minimum length limit for Flathead Catfish was reduced from 24 inches to 18 inches in 1994. There is a 5-fish daily bag limit on Flathead Catfish. In 1991, a special winter season regulation for crappie was implemented, which states that for Black and White Crappie caught from 1 December through the last day of February, there is no minimum length limit, the daily bag limit is 25 fish in any combination, and all crappie caught must be retained.

Stocking history: Channel Catfish stockings in the late 1960s and 1970 established a self-sustaining population. Blue Catfish were stocked in 1971 and 1994 but a self-sustaining population was not established. Florida Largemouth Bass were most recently stocked in 2011, 2013, and 2015. Palmetto Bass were stocked from 1977 to 2000 to create and sustain the fishery. The stocking was discontinued due to low angler utilization. The complete stocking history is in Table 4.

Vegetation/habitat management history: Historically, hydrilla has not caused any access issues at the reservoir and has not required any treatment. Giant salvinia has been discovered at several boat ramps in recent years and immediate containment, physical removal, and herbicide treatment have been effective in eliminating these infestations. Alligatorweed and water hyacinth have recently required treatment to prevent excessive growth and provide access to boaters in the Lone Star Landing area of the reservoir. The USACE has conducted herbicide treatments in 2014 and 2015 for both species. Alligatorweed flea beetles were released by USACE in 2015. An aquatic vegetation management plan was developed by TPWD, USACE, and NETMWD in January 2015 to guide invasive plant management in the reservoir.

Water transfer: Lake O' the Pines provides water for eight cities, numerous rural water districts, and several steel manufacturers and electricity generators. Current authorized inter-basin transfers include the City of Longview and Brandy Branch Reservoir (American Electric Power), which are both in the Sabine River watershed.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations), tandem trap netting (10 net series at 10 stations using 2-night sets), and baited tandem hoop nets (10 net series at 10 stations using 2-night sets). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing and, for trap nets and hoop nets, as the number of fish per net series (fish/ns). Surveys were conducted to achieve survey and sampling objectives in accordance with objective-based sampling (OBS) plan (Appendix C). All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2014).

A structural habitat survey was conducted in 2010. Visual inspection of invasive aquatic plants was conducted in 2011 and 2013 to identify any potential angler access issues, but acreage estimates were not calculated. A hydrilla only survey was conducted in 2012. A full aquatic vegetation survey was conducted in 2014. Habitat was assessed with the digital shapefile method (TPWD, Inland Fisheries Division, unpublished manual revised 2014).

Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_t)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE statistics. Average age-at-length was determined using otoliths for Largemouth Bass 13.2 to 14.8 inches in 2012 (N = 16) and 13.1 to 14.4 inches in 2014 (N = 13). Otoliths were collected on 16 January 2015 from angler-caught White Crappie (9.6 to 10.8 inches, N = 13) and Black Crappie (9.3 to 10.1 inches, N = 13) to estimate average age at 10 inches.

Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2014). Micro-satellite DNA analysis was used to determine genetic composition of individual fish.

Source for water level data was the USACE website.

RESULTS AND DISCUSSION

Habitat: The majority of the reservoir perimeter consists of natural shoreline (Table 5). Water level fluctuations in recent years have had an impact on the aquatic plant community. However, hydrilla has returned to 1,650 acres in 2014 (Table 6).

Prey species: Electrofishing effort for prey species was dictated by the target precision RSE of 25 for the CPUE of stock-length Largemouth Bass. This target was reached after 12, 5-minute electrofishing stations. The RSE for Gizzard Shad CPUE was 23 (225.0 fish/h) (Figure 2). The IOV for Gizzard Shad indicated 54% of fish were small enough to be available as prey to most predators. The Gizzard Shad CPUE and IOV is an improvement compared to the 2012 survey. The RSE for Bluegill CPUE was 27 (560.0 fish/h) (Figure 3). This CPUE was higher than the 2012 survey (391.5 fish/h). Redear Sunfish were also collected during 2014 electrofishing with fish up to 8 inches (Figure 4).

Channel Catfish: The OBS plan for Lake O' the Pines (Appendix C) called for the use of baited tandem hoop nets to sample Channel Catfish. This species has been surveyed at Lake O' the Pines using 15 gill nets set at random locations since 1996. Since 2003, this amount of effort has always collected more than 150 stock-length fish with CPUE RSE ≤ 22 . However, because of the OBS plan to not survey the white bass population, we used baited hoop nets to survey the Channel Catfish population. We achieved our target sample size of 300 fish (N = 342) for size structure analysis from 10 net series. However, the RSE for CPUE of stock-size fish was 33, which was higher than the target RSE. We caught 19.2 fish/ns in 2015 (Figure 5).

White Bass: White bass are present in Lake O' the Pines, but population abundance has been low. Gill net surveys from 2007 and 2011 showed CPUE of White Bass ranged from 2.3 to 3.7 fish/nn (Bister 2011). A creel survey in 2010/2011 indicated that directed effort for White Bass was only 0.4% of total angling effort during the survey period (Bister 2011). Even though White Bass can be caught during their spring spawning run, only one harvested White Bass was documented during the 2010/2011 creel survey (Bister 2011). Therefore, gill netting, which is traditionally used to sample White Bass and catfish populations, was not conducted. Instead, baited tandem hoop nets were used to sample the Channel Catfish population to minimize bycatch of non-target species.

Black Bass: Spotted Bass were present in Lake O' the Pines. However, in the past fish have generally been <14 inches and abundance observed during electrofishing surveys has been low. This species has comprised only an incidental portion of the black bass fishery at the reservoir. No specific directed

angling effort toward Spotted Bass was documented in the 2010/2011 creel survey, and estimated harvest during the survey was only 203 fish for the entire year (Bister 2011). Therefore, sampling this population was unnecessary during this survey period (Appendix C).

In 2014, OBS objectives for Largemouth Bass were met after 12 stations, as 69 stock-sized fish were collected with an RSE-S of 21. This catch rate was lower than 2012 (88.5/h) and 2010 (197.0/h) (Figure 6). Growth of Largemouth Bass has improved compared to previous years. Bister (2011) reported that the average age at 14 inches was 2.7 years in 2010. During this survey period, the average age at 14 inches (13.2-14.8 inches) was 2.0 years in 2012 (N = 16; range 1-5 years) and 1.4 years (13.1-14.4 inches; N = 13; range 1-2 years) in 2014. Body condition in 2012 and 2014 was good (W_r above 95) for most size classes of fish (Figure 6), which indicated adequate prey availability. Florida Largemouth Bass influence has remained relatively constant as Florida alleles have been above 20% since 2002 (Table 7). However, only one pure Florida Largemouth Bass has been collected for genetic analysis in recent years (2012).

Crappie: Historically, the catch of White and Black Crappie in standard trap nets has been poor. Therefore, the OBS plan called for the use of dual-cod trap nets set offshore for two nights to attempt to increase the traditional sample size for each species (Appendix C). Even after 10 net series, the number of stock-size fish collected was low (Figure 7, Figure 8). Therefore, we relied on angler-caught fish for otolith collection to be used for age and growth analysis. Otoliths were collected at a popular boat ramp on a weekday. Samples were collected in less than 1 hour. These fish were collected in January 2015, so caution should be used when comparing to average age of 10-inch crappie traditionally collected during November. Even though otolith collection is only 2 months apart, the fish collected in January will be one year older than November sampled fish. The average age of 10 inch (9.6-10.8 inch) White Crappie was 2.0 years (N = 13; every fish was age 2). The average age of 10 inch (9.3-10.1 inch) Black Crappie was 2.2 years (N = 13; range 2-4 years).

Fisheries management plan for Lake O' the Pines, Texas

Prepared – July 2015.

ISSUE 1: Lake O' the Pines has experienced infestations of invasive aquatic plants. In recent years, giant salvinia was discovered at two boat ramps on the reservoir. Containment and eradication efforts were made immediately following the discovery of giant salvinia at these locations. USACE staff continues to detect giant salvinia on boat trailers at their boat ramps. Even though no giant salvinia has established in the reservoir, monitoring should be conducted to identify future giant salvinia infestations. Hydrilla, water hyacinth, and alligatorweed also occur in the reservoir. The coverage of alligatorweed and water hyacinth has the potential to cause boater access issues and have been treated by the USACE in recent years. Access restrictions due to these invasive plants should be monitored. An aquatic vegetation management plan was developed in January 2015 to guide nuisance species management in the reservoir.

MANAGEMENT STRATEGY

1. Maintain communication with the USACE regarding invasive aquatic plant infestations.
2. Review and update Aquatic Vegetation Management Plan annually.
3. Work with USACE and NETMWD to develop aquatic vegetation treatment proposals as necessary to manage nuisance aquatic plant species.
4. Conduct an annual survey of invasive aquatic plants in the reservoir.

ISSUE 2: Lake O' the Pines has a quality Largemouth Bass fishery and has demonstrated the ability to produce trophy fish. During the 2009/2010 Toyota ShareLunker season, a 13.2-lb. and a 15.13-lb largemouth bass (the current lake record) were contributed to the program. Bister (2011) reported results from the 2010-2011 angler creel survey in which anglers caught fish up to 23 inches in length. The reservoir is popular for big bass fishing. During the 2009 KYKX Big Bass Bonanza, anglers brought 8 bass >8 lbs to the scales. In order to maintain the trophy potential of the Largemouth Bass fishery, supplemental stocking of Florida Largemouth Bass (FLMB) should be conducted. In addition, supplemental electrofishing surveys should be conducted to monitor the Largemouth Bass population, FLMB genetic influence, and prey fish populations

MANAGEMENT STRATEGIES

1. Conduct electrofishing survey in fall 2016 to monitor Largemouth Bass and prey species populations and assess FLMB genetic influence.
2. Conduct electrofishing survey in fall 2018 to monitor Largemouth Bass and prey species.
3. Request FLMB stocking every other year at a rate of 1,000 fish/km of shoreline beginning in 2017.

ISSUE 3: Lake O' the Pines supports a popular crappie fishery. However, traditional trap netting techniques have not been successful in collecting reliable data to monitor the populations.

MANAGEMENT STRATEGIES

1. Investigate opportunities to work with Louisiana Department of Wildlife and Fisheries to evaluate their lead net design and procedures for collecting crappie in Lake O' the Pines.

ISSUE 4: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example,

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

MANAGEMENT STRATEGIES

1. Cooperate with the controlling authority to post appropriate signage at access points around the reservoir.
2. Contact and educate 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.

ISSUE 5: Bighead Carp were discovered in the spillway below Lake O' the Pines during fall 2010. Additional Bighead Carp were removed from the spillway during a dewatering operation in spring 2011. Currently, the dam at Lake O' the Pines is a barrier to the upstream movement of Bighead Carp. Anglers should be aware of the presence of this invasive species so they will not transport them to other waters.

MANAGEMENT STRATEGIES

1. Continue to work with the USACE to maintain signage at the Lake O' the Pines spillway to alert anglers to the presence of Bighead Carp and the environmental threat they pose to surrounding waters.

Objective-Based Sampling Plan for Lake O' the Pines

2015 - 2019

Sport fish, forage fish, and other important fishes

Sport fishes in Lake O' the Pines include Largemouth Bass, White Crappie, Black Crappie, Channel Catfish, Flathead Catfish, and White Bass. Known important forage species include Bluegill, Redear Sunfish, Gizzard Shad, and Threadfin Shad.

Negligible fisheries

White Bass: White Bass are present in Lake O' the Pines, but population abundance has been low. Gill net surveys from 2007 and 2011 showed CPUE of White Bass ranged from 2.3 to 3.7 fish/nn. A creel survey in 2010/2011 indicated that directed effort for White Bass was only 0.4% of total angling effort during the survey period. Even though White Bass can be caught during the spring spawning run, only one harvested White Bass was documented during the 2010/2011 creel survey. This single fish expanded to an estimated harvest of only 139 fish for the entire survey year. Sampling this population is unnecessary.

Spotted Bass: Spotted Bass are present in Lake O' the Pines, however fish are generally <14 inches and

abundance observed during electrofishing surveys has been low. This species comprises only an incidental portion of the black bass fishery at the reservoir. No specific directed angling effort toward Spotted Bass was documented in the 2010/2011 creel survey, and estimated harvest during the survey was only 203 fish for the entire year. Sampling this population is unnecessary, but their presence will be noted during other surveys.

Survey objectives, fisheries metrics, and sampling objectives

Complete sampling schedule is in Table 8.

Largemouth Bass: Largemouth Bass are the most popular sport fish in Lake O' the Pines. Almost 50% of angling effort was directed toward black bass during a 2010/2011 creel survey. The popularity and reputation for quality Largemouth Bass fishing at this reservoir warrant sampling time and effort. Results from a 2010/2011 creel survey estimated angling catch of black bass to be 1.01 fish/hour. Largemouth Bass have always been managed with the statewide 14-in MLL regulation. Trend data on relative abundance, size structure, growth, and body condition have been collected biennially since 1996 with fall nighttime electrofishing. The average age of Largemouth Bass at 14 inches (13.0 – 14.9 inches) has also been calculated to monitor how long it takes fish to reach legal harvest length. Genetic analysis of the population has been evaluated at least every 4 years to assess Florida Largemouth Bass (FLMB) influence and stocking success. The population is abundant, and anglers are anecdotally satisfied with the fishing. Continuation of biennial trend data listed above in this reservoir with night electrofishing in the fall will allow for determination of any large-scale changes in the largemouth bass population that may spur further investigation. Genetic analyses will be conducted every 4 years (beginning 2018) to monitor changes in populations genetics due to FLMB stocking efforts.

Fall nighttime electrofishing surveys will be conducted in 2016 and 2018. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled, but sampling will continue at random sites until 100 stock-size fish are collected and the RSE of CPUE-S is ≤ 25 (even though this objective was met after 12 stations in 2014, the anticipated effort to meet both sampling objectives is 14-16 stations with 80% confidence). Eight random stations will be determined for the first night of electrofishing. Another 8 random stations will be determined for the second night of electrofishing. In the case that 16 stations are not sufficient to meet sampling objectives, 8 additional random stations will be pre-determined in the event some extra sampling is necessary. Fin samples will be taken from 30 fish and submitted for genetic analysis in 2018. Otoliths from 13 fish between 13.0 and 14.9 inches will be collected in 2016 and 2018 to determine mean age at 14 inches.

Crappie: Traditional trap netting and dual cod trap netting has not been successful for adequately sampling the Crappie populations at Lake O' the Pines. A very popular fishery exists for crappie at the reservoir, and there is a special harvest regulation in place from December through February that requires anglers to keep the first 25 fish they catch regardless of size to reduce unnecessary mortality of fish caught from deep water. For these reasons, it is important to determine the best way to sample the crappie populations. The Louisiana Department of Wildlife and Fisheries (LDWF) uses a net configuration that is different than TPWD. We propose to evaluate the LDWF nets and determine if there is utility for their nets in Texas. We will set a minimum of 10 nets. The nets will be considered effective if 50 stock-size fish of each species is collected with RSE of 25 for CPUE-S. If nets are not successful for sampling fish, we will collect otoliths from 13 angler-caught fish (range 9.0-10.9 inches) in January 2019 to monitor growth of Black Crappie and White Crappie.

Channel Catfish: Channel Catfish were the third most popular species for anglers to fish for during the 2010/2011 creel survey (16.5% directed effort). Baited tandem hoop nets used to sample Channel Catfish in 2015 caught an adequate number of fish, but the precision for the CPUE-S estimate was

slightly higher than desired. We set 10 tandem hoop net series using 2-night soak times in 2015. Because we only had 5 net series to set, this sampling strategy required 3 days in the field. We propose to use tandem hoop nets in 2018 establish trend information on relative abundance and size structure, but we will obtain additional nets prior to sampling so we can increase our sample effort without adding additional sampling days. Our target sampling precision will be $RSE \leq 25$ for CPUE-S. Our targeted minimum sample size for size structure will be 300-400 fish. We will set a maximum of 20 net series.

Flathead Catfish: Flathead Catfish are present in Lake O' the Pines; however traditional gill netting has not been an effective gear to sample the population. While no directed effort by rod and reel anglers was documented during the 2010/2011 creel survey, this population is likely utilized by passive gear anglers and hand fishers. Low-pulse electrofishing (LFE) will be utilized in 2018 to obtain exploratory estimates of CPUE and size structure of the population.

Bluegill and Gizzard Shad: Bluegill, Redear Sunfish, and Gizzard Shad are the primary forage at Lake O' the Pines. Trend data on relative abundance and size structure of forage species have been collected biennially since 1996. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill, Redear Sunfish, and Gizzard Shad relative abundance and size structure. Sampling effort based on achieving sampling objectives for Largemouth Bass will result in sufficient numbers of Bluegill and Gizzard Shad for size structure estimation (PSD and IOV; 50 fish at a minimum of 12 stations with 80% confidence). RSE for relative abundance estimates has been ≤ 25 of CPUE-Total using the traditional 24 randomly-selected stations. No additional effort will be expended to achieve an RSE25 for CPUE of Bluegill and Gizzard Shad if not reached from designated largemouth bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density. Relative weight of Largemouth Bass ≥ 8 " TL will be determined from their length/weight data (maximum of 10 fish weighed and measured per inch class).

LITERATURE CITED

- Anderson, R. O., and R. M. Neumann. 1996. Length, weight, and associated structural indices. Pages 447-482 in B. R. Murphy and D. W. Willis, editors. Fisheries techniques, 2nd edition. American Fisheries Society, Bethesda, Maryland.
- Bister, T. J. 2011. Statewide freshwater fisheries monitoring and management program survey report for Lake O' the Pines, 2010. Texas Parks and Wildlife Department, Federal Aid Report F-30-R, Austin.
- DiCenzo, V. J., M. J. Maceina, and M. R. Stimert. 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. Neumann, D. W. Willis, and R. O. Anderson. 2007. Proportional size distribution (PSD): a further refinement of population size structure index terminology. Fisheries 32(7): 348.

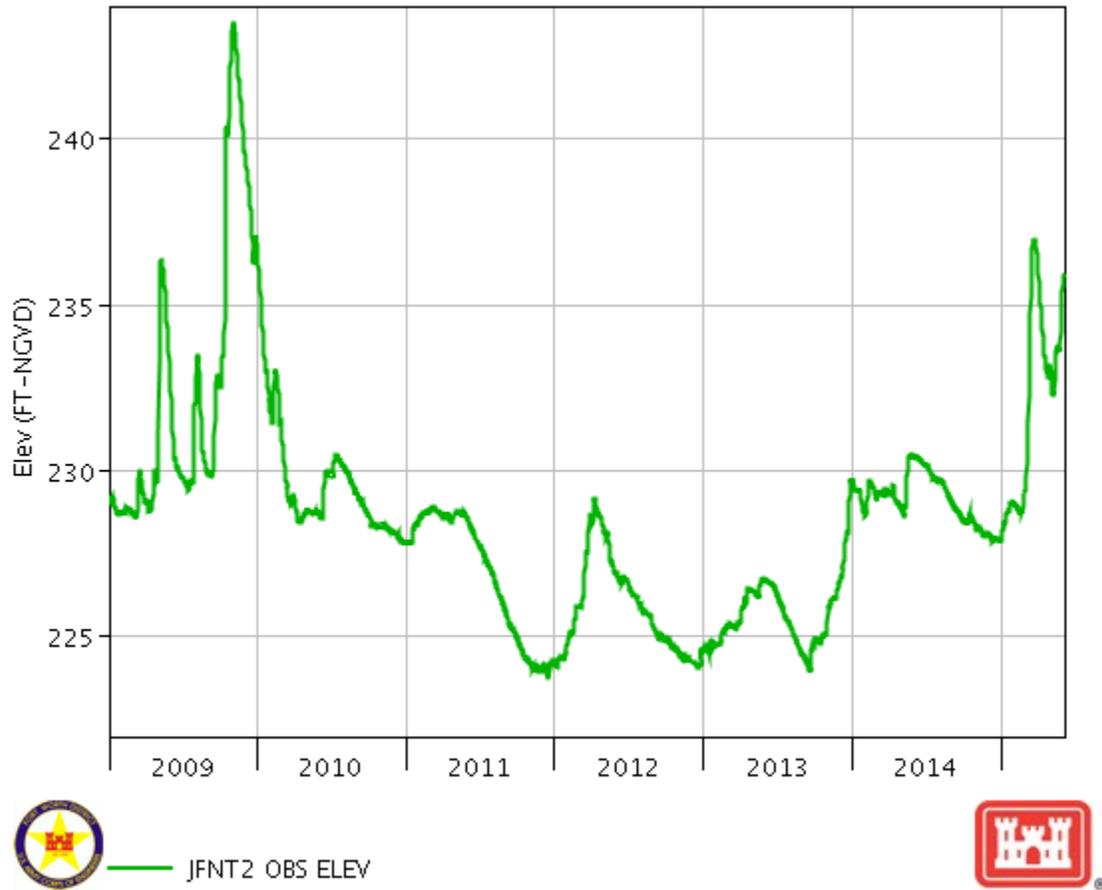


Figure 1. Quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake O' the Pines, Texas. Conservation pool elevation is 228.5 feet. Source for water level data is U. S. Army Corps of Engineers website.

Table 1. Characteristics of Lake O' the Pines, Texas.

Characteristic	Description
Year constructed	1956
Controlling authority	U. S. Army Corps of Engineers
Counties	Marion, Morris, Upshur, and Camp
Reservoir type	Mainstream
Shoreline development index (SDI)	7.5
Conductivity	178 umhos/cm

Table 2. Boat ramp characteristics for Lake O' the Pines, Texas, June 2015. Reservoir elevation at time of survey was 236 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Lone Star Landing	32.901055 -94.715666	Y	15	222	Good
Highway 155	32.848450 -94.708011	Y	10	225	Good
Cedar Springs	32.842407 -94.696842	Y	25	226	Good
Pine Hill	32.802333 -94.654667	Y	15	222	Good
Pop's Landing	32.798812 -94.639817	Y	10	227	Good
Oak Ridge	32.787618 -94.628884	Y	5	227	Good
Woody's	32.759955 -94.609482	Y	5	*	Under water
Copeland Creek	32.754607 -94.597067	Y	10	224	Good
Island View Marina	32.763465 -94.553684	Y	15	*	Under water
Tejas	32.740709 -94.546065	Y	15	224	Good
Brushy Creek (day use)	32.739067 -94.523765	Y	15	223	Good
Brushy Creek (park)	32.744889 -94.534965	Y	5	224	Good
Lakeside Park	32.749776 -94.510197	Y	15	223	Good
Hurricane Creek	32.785813 -94.514513	Y	10	222	Good
Pine Harbor	32.769332 -94.506584	Y	5	225	Ramp in good condition, but road leading to ramp is poor.
Holiday Harbor	32.764255 -94.498785	Y	5	227	Poor – needs repair
Big Cypress Marina	32.762829 -94.496966	Y	20	228	Good
Overlook Park	32.754756 -94.498329	Y	35	*	Closed due to high water
Buckhorn Creek	32.758198 -94.496686	Y	15	222	Good
Bull Frog Marina	32.795569 -94.546075	Y	15	224	Good
Johnson Creek Marina	32.789987 -94.541464	Y	8	*	Dirt ramp
Johnson Creek Park (day use)	32.788982 -94.547710	Y	30	221	Good
Johnson Creek Park (campground)	32.780667 -94.547367	Y	5	223	Good
Alley Creek Park (day use)	32.798761 -94.589058	Y	35	222	Good
Alley Creek Park (campground)	32.795868 -94.598268	Y	10	224	Good
Mims Chapel	32.818591 -94.629681	Y	5	225	Good
Oak Valley Park	32.828958 -94.663758	Y	5	*	Closed

* Unable to measure elevation at end of boat ramp at time of survey.

Table 3. Harvest regulations for Lake O' the Pines, Texas.

Species	Bag limit	Length limit
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12-inch minimum
Catfish, Flathead	5	18-inch minimum
Bass, White	25	10-inch minimum
Bass, Palmetto	5	18-inch minimum
Bass, Largemouth	5 ^a	14-inch minimum
Bass, Spotted	5 ^a	None
Crappie: White and Black crappie, their hybrids and subspecies	25 (in any combination)	10-inch minimum ^b

^a Daily bag for Largemouth Bass and Spotted Bass = 5 fish in any combination.

^b For black and white crappie caught from 1 December through the last day of February, there is no minimum length limit, daily bag = 25 in any combination, and all crappie caught must be retained.

Table 4. Stocking history of Lake O' the Pines, Texas. Size categories are FRY =<1 inch, FGL = 1-3 inches, AFGL = 8 inches, and UNK = unknown.

Species	Year	Number	Size
Blue Catfish	1971	19,654	UNK
	1994	<u>307,248</u>	FGL
	Total	326,902	
Channel Catfish	1968	206,000	AFGL
	1969	27,000	AFGL
	1970	<u>317,763</u>	AFGL
	Total	550,763	
Florida Largemouth Bass	1982	500	AFGL
	1982	59,838	FGL
	1983	306,332	FGL
	1992	468,146	FGL
	1993	458,002	FGL
	1998	467,500	FGL
	2000	447,154	FGL
	2009	408,658	FGL
	2010	407,949	FGL
	2011	408,862	FGL
	2013	408,581	FGL
	2015	<u>184,935</u>	FGL
	Total	4,026,457	
ShareLunker Largemouth Bass	2010	2,017	FGL
	2013	<u>4,677</u>	FGL
	Total	6,694	
Paddlefish	1992	15,401	UNK
	1998	<u>9,646</u>	UNK
	Total	25,047	
Palmetto Bass	1977	157,505	UNK
	1979	180,000	UNK
	1981	177,815	UNK
	1994	191,338	FGL
	1995	280,754	FGL
	1996	140,612	FRY
	1997	50,658	FGL
	1998	191,837	FGL
	1999	62,182	FGL
	2000	<u>44,931</u>	FGL
	Total	1,477,632	
Smallmouth Bass	1980	285,000	UNK
	1982	<u>30,000</u>	UNK
	Total	315,000	

Table 5. Survey of structural habitat types, Lake O' the Pines, Texas, 2010. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Bulkhead	2.0	1.4
Natural shoreline	124.8	86.7
Natural shoreline & boat docks	1.7	1.2
Rocky shoreline	14.1	9.8
Rock bluff	1.0	0.7
Gravel shoreline	0.3	0.2

Table 6. Survey of aquatic vegetation, Lake O' the Pines, Texas, 2012 and 2014. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

Vegetation	2012 ^a	2014
Native submersed		436 (2.7)
Native floating-leaved		913 (5.6)
Native emergent		313 (1.9)
Non-native		
Alligatorweed (Tier II)*		470 (2.9)
Giant salvinia (Tier I)*		
Hydrilla (Tier III)*	421 (2.6)	1,650 (10.1)
Water hyacinth (Tier II)*		53 (0.3)

* Tier I is immediate Response, Tier II is maintenance, Tier III is Watch Status.

^a Hydrilla only survey.

Gizzard Shad

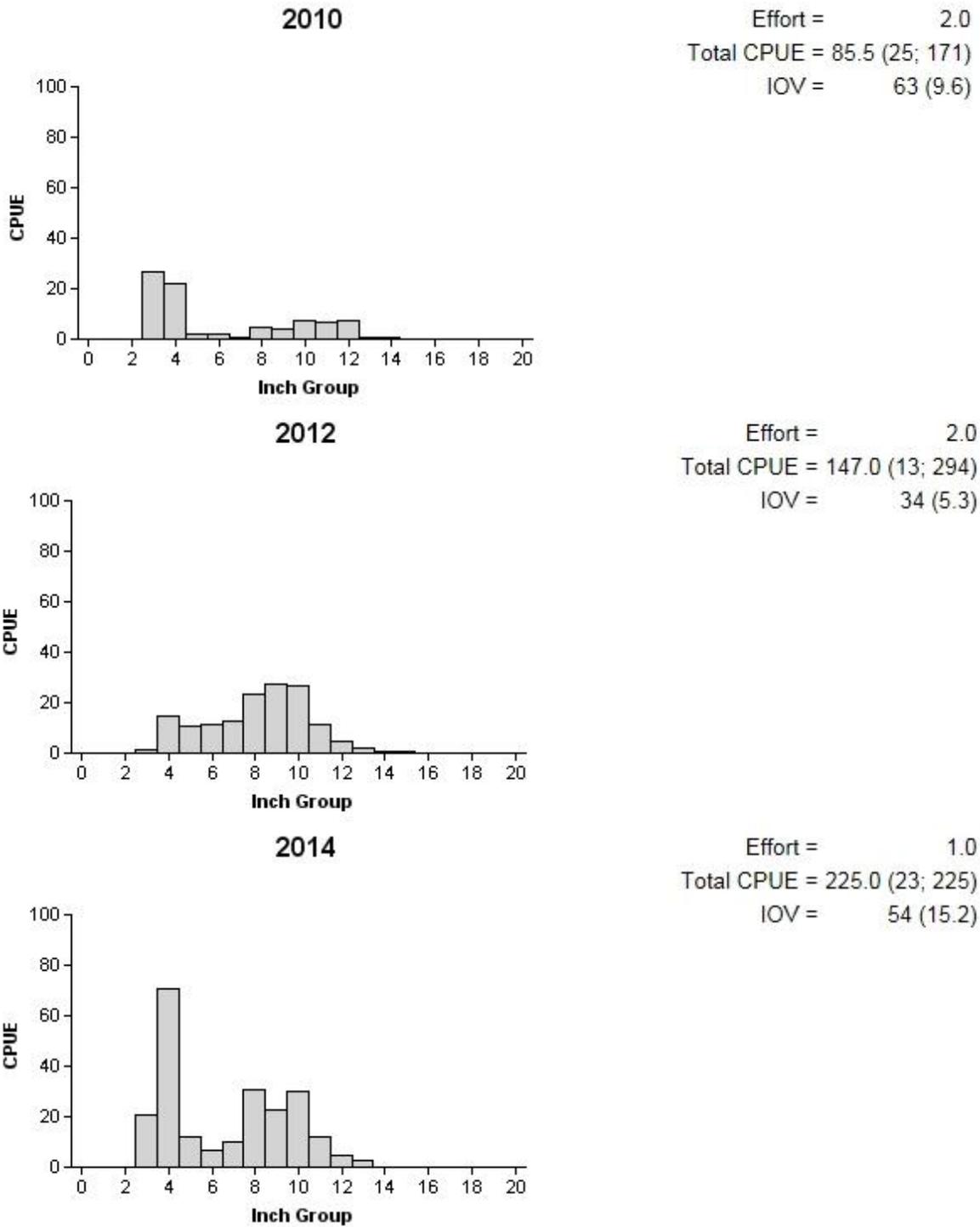


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake O' the Pines, Texas, 2010, 2012, and 2014

Bluegill

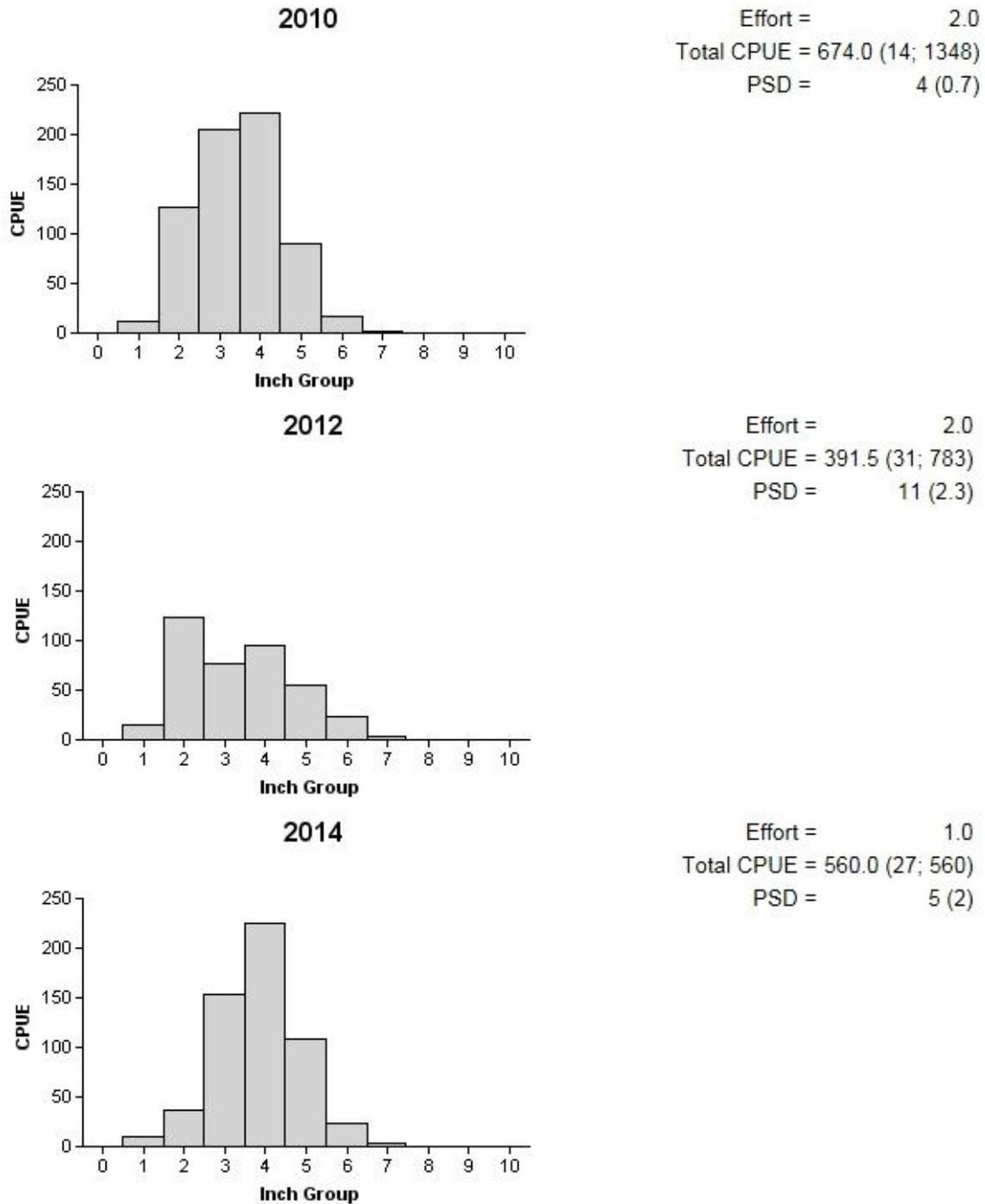


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake O' the Pines, Texas, 2010, 2012, and 2014.

Redear Sunfish

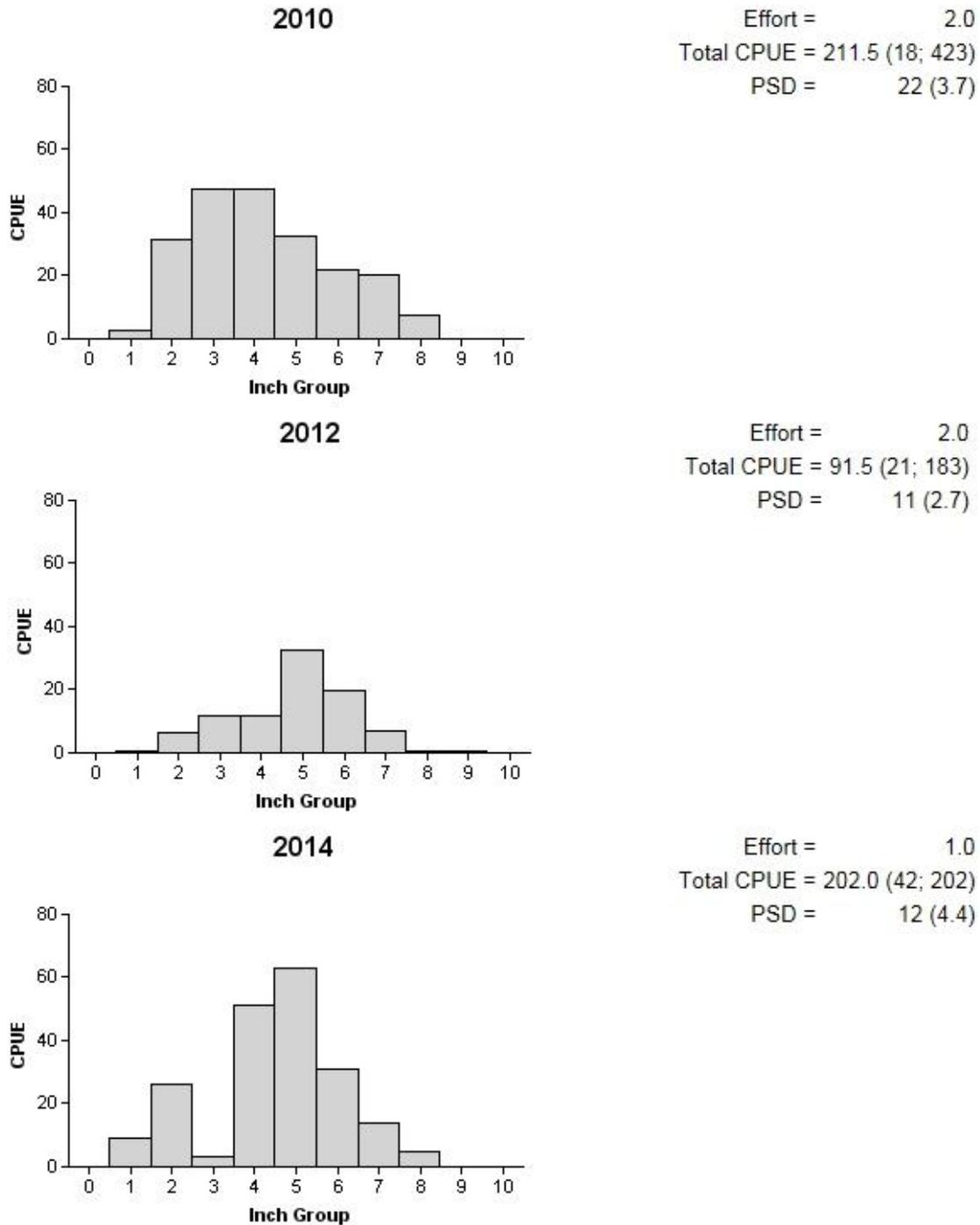


Figure 4. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake O' the Pines, Texas, 2010, 2012, and 2014.

Channel Catfish

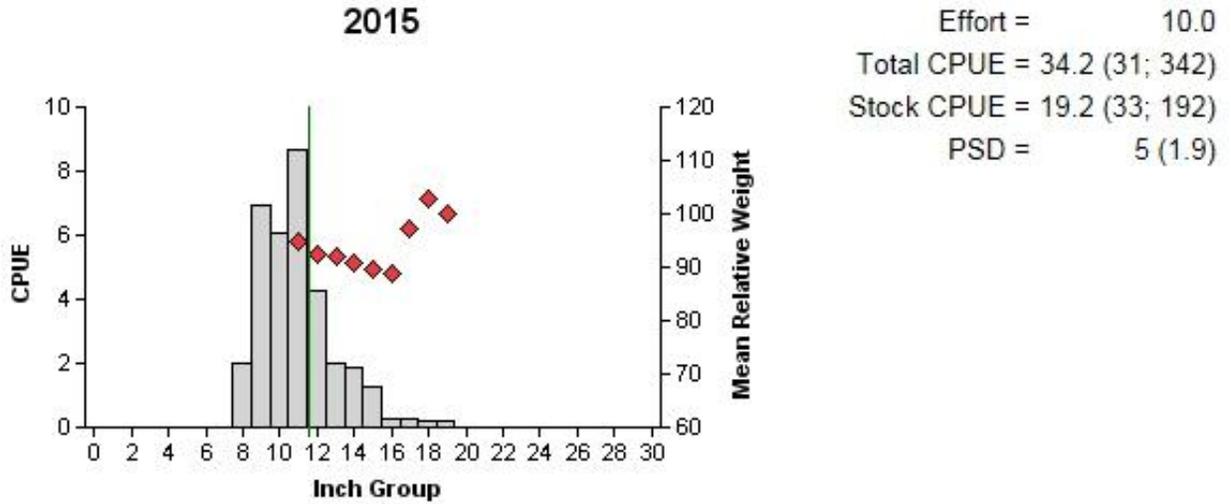


Figure 5. Number of Channel Catfish caught per net series (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for June baited tandem hoop netting surveys (2-night sets), Lake O' the Pines, Texas, 2015.

Largemouth Bass

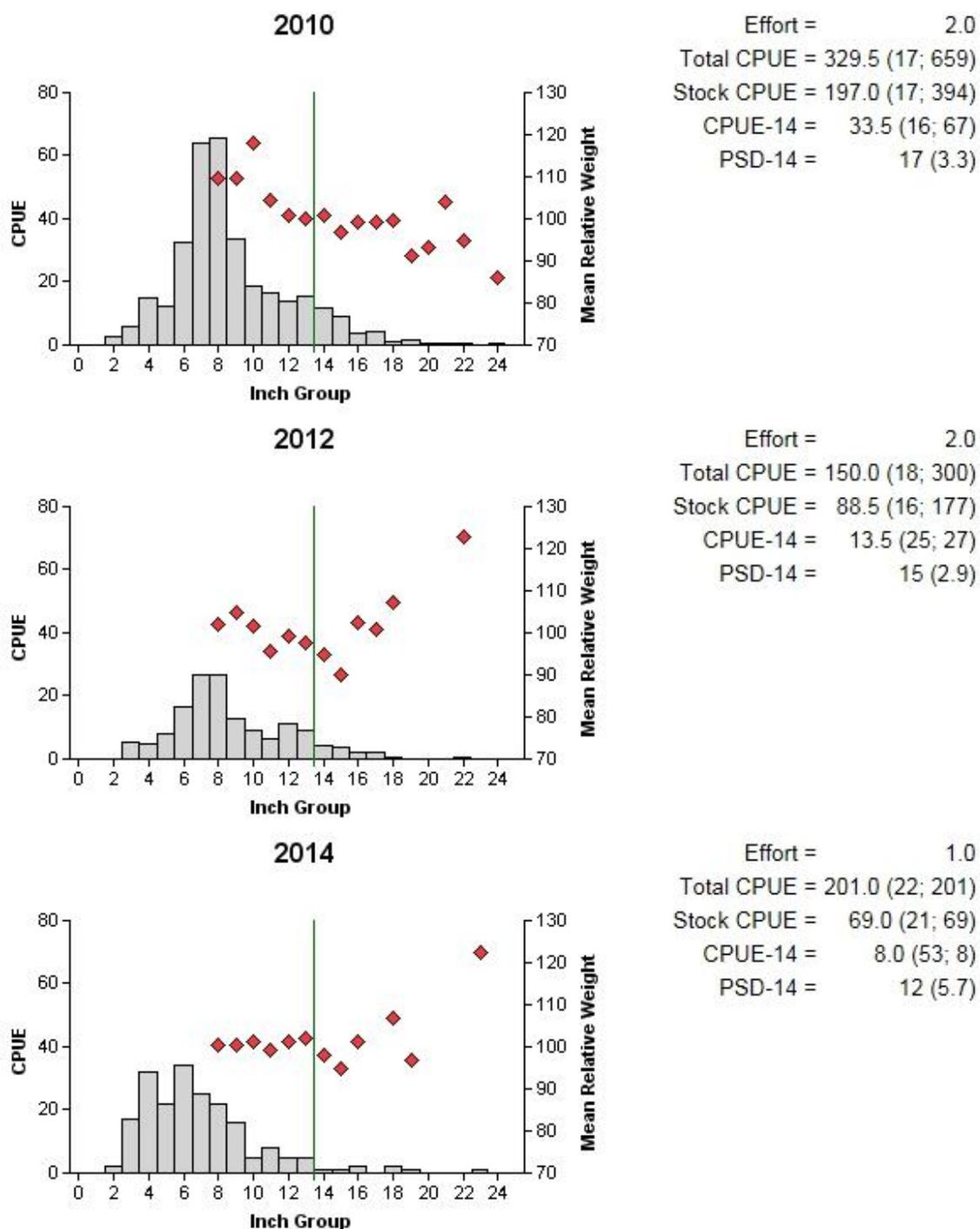


Figure 6. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake O' the Pines, Texas, 2006, 2008, and 2010. Vertical line indicates minimum length limit.

Largemouth Bass

Table 7. Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Lake O' the Pines, Texas. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, F1 = first generation hybrid between a FLMB and a NLMB, Fx = second or higher generation hybrid between a FLMB and a NLMB. Genetic composition was determined with micro-satellite DNA analysis.

Year	Sample size	Number of fish				% FLMB alleles	% pure FLMB
		FLMB	F1	Fx	NLMB		
2006	38	0	NA	34 ^a	4	27.9	0
2012	28	1	1	26	0	39.0	3.6
2014	30	0	0	28	2	27.0	0

^a Determination of hybrid status not conducted.

White Crappie

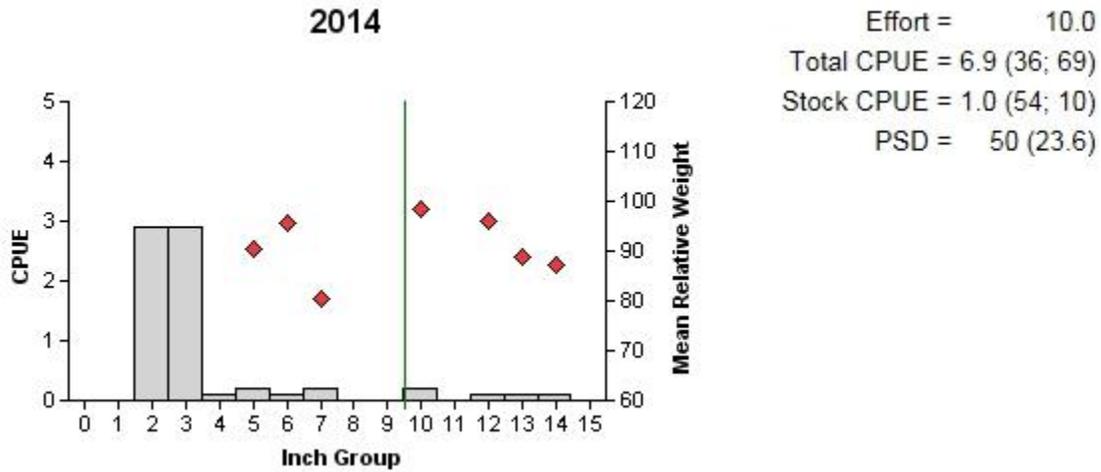


Figure 7. Number of White Crappie caught per net-series (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall dual-cod trap netting surveys, Lake O' the Pines, Texas, 2014. Vertical line indicates minimum length limit.

Black Crappie

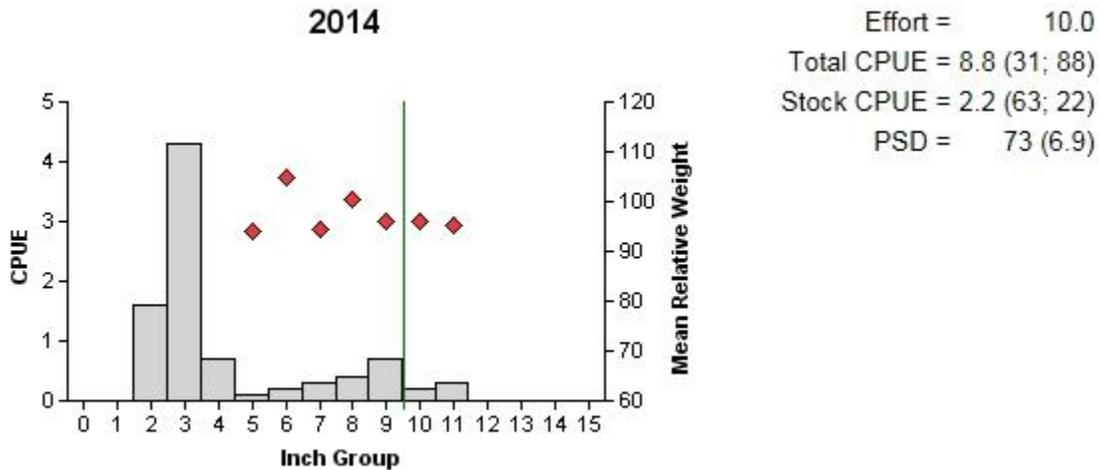


Figure 8. Number of Black Crappie caught per net-series (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall dual-cod trap netting surveys, Lake O' the Pines, Texas, 2014. Vertical line indicates minimum length limit

Table 8. Proposed sampling schedule for Lake O' the Pines, Texas. Survey period is June through May. Hoop 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.

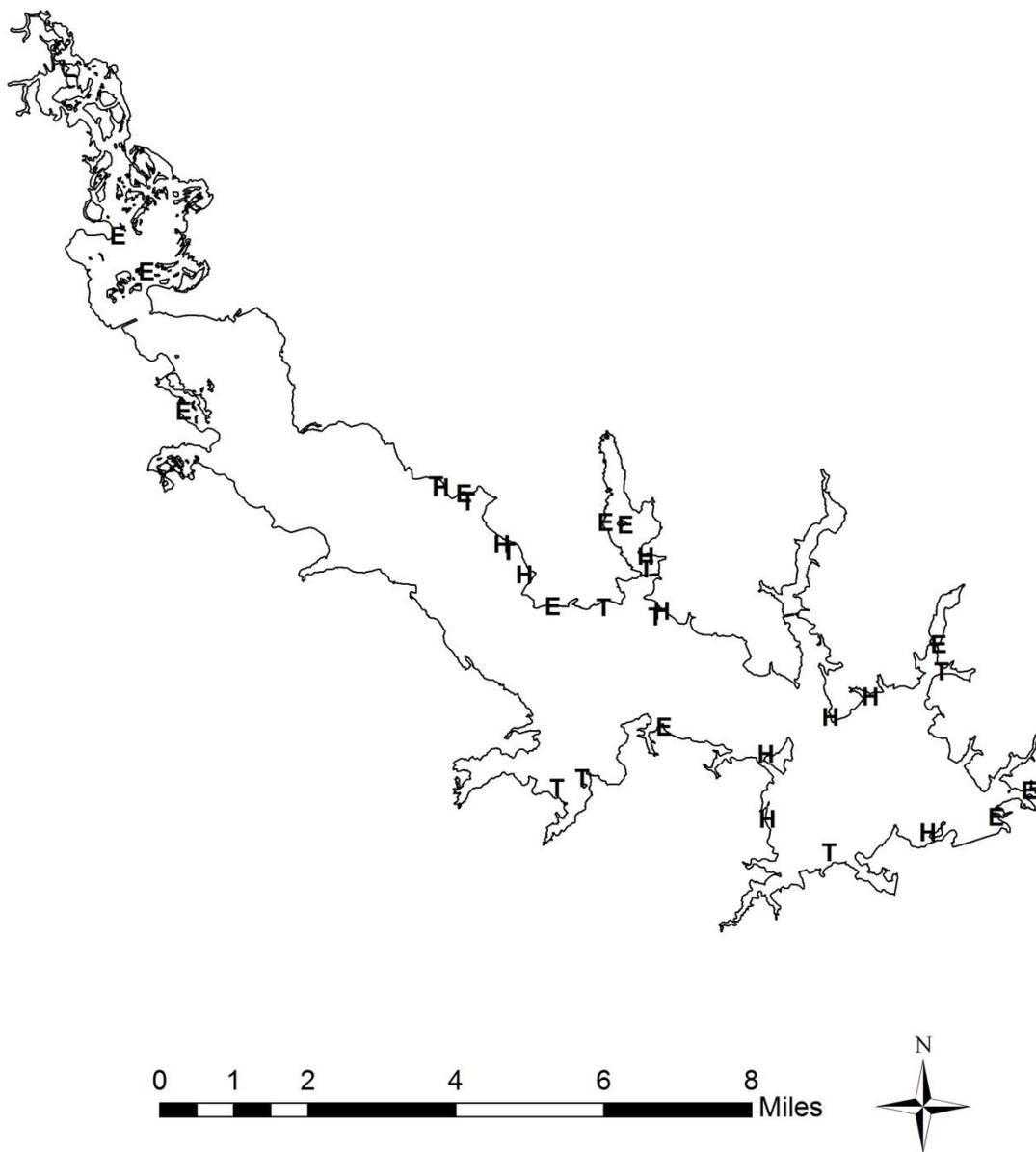
Survey year	Electrofishing Fall(Spring)	Trap net	Hoop net	Habitat			Creel survey	Report
				Structural	Vegetation	Access		
2015-2016					A			
2016-2017	A				A			
2017-2018					A			
2018-2019	S	S	S		S	S	A	S

APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Lake O' the Pines, Texas, 2014-2015. Sampling effort was 10 net series for hoop netting, 10 net nights for tandem trap netting, and 1 hour for electrofishing.

Species	Hoop Netting		Tandem Trap Netting		Electrofishing	
	N	CPUE	N	CPUE	N	CPUE
Gizzard Shad					225	225.0
Threadfin Shad					156	156.0
Channel Catfish	342	34.2				
Redbreast Sunfish					10	10.0
Bluegill					560	560.0
Longear Sunfish					1	1.0
Redear Sunfish					202	202.0
Largemouth Bass					201	201.0
White Crappie			69	6.9		
Black Crappie			88	8.8		

APPENDIX B



Location of sampling sites, Lake O' the Pines, Texas, 2014-2015. Tandem trap net, hoop net, and electrofishing stations are indicated by T, H, and E, respectively. Water level was near full pool at time of electrofishing and trap netting, but almost 7 feet high at time of hoop netting.

APPENDIX C**Objective-Based Sampling Plan for Lake O' the Pines****2014 - 2015****Sport fish, forage fish, and other important fishes**

Sport fishes in Lake O' the Pines include Largemouth Bass, White Crappie, Black Crappie, Channel Catfish, Flathead Catfish, and White Bass. Known important forage species include Bluegill, Redear Sunfish, Gizzard Shad, and Threadfin Shad.

Negligible fisheries

White Bass: White Bass are present in Lake O' the Pines, but population abundance has been low. Gill net surveys from 2007 and 2011 showed CPUE of White Bass ranged from 2.3 to 3.7 fish/nn. A creel survey in 2010/2011 indicated that directed effort for White Bass was only 0.4% of total angling effort during the survey period. Even though white bass can be caught during the spring spawning run, only one harvested white bass was documented during the 2010/2011 creel survey. This single fish expanded to an estimated harvest of only 139 fish for the entire survey year. Sampling this population is unnecessary in FY 2015.

Spotted Bass: Spotted Bass are present in Lake O' the Pines, however fish are generally <14 inches and abundance observed during electrofishing surveys has been low. This species comprises only an incidental portion of the black bass fishery at the reservoir. No specific directed angling effort toward Spotted Bass was documented in the 2010/2011 creel survey, and estimated harvest during the survey was only 203 fish for the entire year. Sampling this population is unnecessary in FY 2015.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Lake O' the Pines. Almost 50% of angling effort was directed toward black bass during a 2010/2011 creel survey. The popularity and reputation for quality Largemouth Bass fishing at this reservoir warrant sampling time and effort. Results from a 2010/2011 creel survey estimated angling catch of black bass to be 1.01 fish/hour. Largemouth Bass have always been managed with the statewide 14-in MLL regulation. Trend data on CPUE, size structure, and body condition have been collected biennially since 1996 with fall nighttime electrofishing. The population appears to be in good shape, and anglers are anecdotally satisfied with the fishing. Continuation of biennial trend data in this reservoir with night electrofishing in the fall will allow for determination of any large-scale changes in the Largemouth Bass population that may spur further investigation. A minimum of 12 randomly selected 5-min electrofishing sites will be sampled in 2014, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is ≤ 25 (the anticipated effort to meet both sampling objectives is 14-16 stations with 80% confidence). Eight random stations will be determined for the first night of electrofishing. Another 8 random stations will be determined for the second night of electrofishing. In the case that 16 stations are not sufficient to meet sampling objectives, 8 additional random stations will be pre-determined in the event extra sampling is necessary. Largemouth Bass electrofishing data from 2012 resulted in 95% confidence that RSE for CPUE was 20. Therefore, it is fully anticipated that our sampling objective will be met. Fin samples will be taken from 30 fish and submitted for genetic analysis. Otoliths from 13 fish between 13.0 and 14.9 inches will be collected to determine mean age at 14 inches.

Crappie: Both White and Black Crappie are present in Lake O' the Pines and there is a popular fishery.

Directed angling effort toward crappie was 34% of total effort in a 2010/2011 creel survey. Previous single-cod, shoreline trap nets have not been successful for catching crappie in this reservoir. Trap net catch rates have been <1.0 fish/nn for both species since at least 2002. These data only allowed us to determine presence or absence of the population. We would like to collect information allowing us to monitor size structure and time required for fish to grow to the MLL. We propose switching from single-cod, shoreline trap nets set overnight to dual-cod, offshore trap nets set for two nights. We anticipate that setting a minimum of 10 dual-cod trap nets, with a soak time of 2 nights, will achieve our sampling objective (50 fish each of Black and White Crappies >5 inches, and 13 between 9.0 and 10.9 inches for aging). Failure to meet this sampling objective will be augmented by otoliths collection from fish during a winter (December through February) access point creel survey.

Channel Catfish: Channel Catfish were the third most popular species for anglers to fish for during the 2010/2011 creel survey (16.5% directed effort). Channel Catfish have been surveyed at Lake O' the Pines using 15 gill nets set at random locations since 1996. Since 2003, this amount of effort has always collected more than 150 stock-length fish with CPUE RSE ≤ 22 . Because of the proposal in this plan to not survey the white bass population, we would like to explore the use of baited hoop nets to survey the Channel Catfish population. Switching to baited hoop nets will reduce the by-catch and unnecessary mortality of non-target species. We will set 10 tandem hoop net series using 2-night soak times. Our target sampling precision is RSE = 25 for CPUE of stock size fish. Our targeted minimum sample size for size structure is 300-400 fish. If we fail to achieve desired sampling objectives for Channel Catfish using new baited hoop net procedures, we will return to the use of gill nets in spring 2017.

Flathead Catfish: Flathead Catfish are present in Lake O' the Pines; however traditional gill netting has not been an effective gear to sample the population. While no directed effort by rod and reel anglers was documented during the 2010/2011 creel survey, this population is likely utilized by passive gear anglers and hand fishers. New procedures for low-pulse electrofishing to sample Flathead Catfish will be available soon. We would like to use these new procedures to help guide sampling objectives to obtain CPUE and size structure data of the population.

Bluegill and Gizzard Shad: Bluegill, Redear Sunfish, and Gizzard shad are the primary forage at Lake O' the Pines. Like Largemouth Bass, trend data on CPUE and size structure of Bluegill, Redear Sunfish, and Gizzard Shad have been collected biennially since 1996. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill, Redear Sunfish, and Gizzard Shad relative abundance and size structure. Sampling effort based on achieving sampling objectives for Largemouth Bass will result in sufficient numbers of Bluegill and Gizzard Shad for size structure estimation (PSD and IOV; 50 fish at a minimum of 12 stations with 80% confidence). RSE for relative abundance estimates has been ≤ 25 of CPUE-Total using the traditional 24 randomly-selected stations. No additional effort will be expended to achieve an RSE of 25 for CPUE of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density. Relative weight of largemouth bass ≥ 8 " TL will be determined from their length/weight data (maximum of 10 fish weighed and measured per inch class).