

PERFORMANCE REPORT

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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 Athens

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SURVEY AND MANAGEMENT SUMMARY

The Lake Athens fish community was surveyed from June 2013 through May 2014 using electrofishing and gill netting. Anglers were surveyed from March 2014 through May 2014 with a creel survey. A vegetation survey was conducted in August 2013. 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 based on those findings.

- **Reservoir Description:** Lake Athens is a 1,799-acre reservoir on Flat Creek, a tributary of the Neches River, Texas, built for water supply and recreation. Boat access is adequate, but public bank angling access is limited to the marina area and at bridge crossings where parking is limited. There are no handicap-specific facilities but the convenience pier at the marina allows limited wheelchair use. The reservoir contains a diverse aquatic plant community.
- **Management History:** Important sport fishes include sunfishes, Largemouth Bass, White Bass, Channel Catfish, and Black Crappie. The length limit for Largemouth Bass was changed in 1996 from the statewide 14-inch minimum length to a 14- to 21-inch slot-length limit. Monitoring of the Largemouth Bass growth rate has continued. Boat access and angling access are available and improvements have been recommended, but not implemented. Invasive aquatic plant species, hydrilla, waterhyacinth, and alligatorweed have been present in the system and are under management by the controlling authority.
- **Fish Community**
 - **Prey species:** Threadfin Shad are present in the reservoir. Electrofishing catch rate of Gizzard Shad remained low, and few Gizzard Shad were available as prey to most sport fish. Despite low Shad catch rates, sunfish (≤ 4 inches) provide an adequate prey base for sport fishes.
 - **Catfishes:** Channel Catfish gill net catch rates remained relatively low; however, catch rates were slightly higher than in the 2010 survey. Low and variable catch rates suggest limited production and recruitment.
 - **White Bass:** White Bass were present in the reservoir, although gill net catch rates remain low.
 - **Largemouth Bass:** Largemouth Bass continue to be the dominant game species within Lake Athens and catch rates have been relatively high over the last two surveys. Size distribution remains favorable and growth up to and within the slot remain moderate. Genetic analysis revealed adequate frequency of Florida Largemouth Bass alleles in the population, and have remained stable over recent surveys. Two ShareLunkers (Largemouth Bass > 13 lbs.) were caught from lake Athens over the last season (October 2013 – April 2014), indicating the trophy potential of the reservoir.
 - **Crappies:** White and Black Crappie are present within the reservoir and are occasionally seen during fall electrofishing; however, trap net catch rates have been too variable to accurately assess the population and have not been conducted during the last two management reports (2009, 2013).
- **Management Strategies:** Largemouth Bass are of high importance in this system; therefore additional monitoring of size distribution and abundance will be conducted in fall 2015. Standard sampling conducted in the fall of 2017 will continue to monitor these population trends, and provide additional population characteristics (e.g. growth within the slot). Genetic analysis will be conducted to monitor the allele frequency of the Largemouth Bass population. Channel Catfish and White Bass population structure will continue to be monitored in 2018 through gill netting.

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INTRODUCTION

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

Reservoir Description

Lake Athens is a 1,799-acre reservoir constructed in 1962 on Flat Creek, a tributary of the Neches River, Texas, built to supply water and recreation. The lake is located in Henderson County and is operated and controlled by the Athens Municipal Water Authority (AMWA). Lake Athens is eutrophic, exhibiting a mean TSI *chl-a* of 49.5 (Texas Commission on Environmental Quality 2011). The shoreline at Lake Athens is primarily featureless or a combination of featureless/bulkhead and boat docks. A diverse native emergent and submersed aquatic plant community forms a beneficial fringe around the reservoir. Invasive aquatic plants, hydrilla (*Hydrilla verticillata*) and water hyacinth (*Eichhornia crassipes*) were discovered in 1995 and 2005, respectively. Alligatorweed (*Alternanthera philoxeroides*) is also present.

Angler Access

Boat access is limited to two boat ramps at one access area (no fee required), and public bank angling access is restricted to the marina area and bridge crossings although parking at bridge crossings is limited. There are no handicap-specific facilities but the convenience pier at the marina allows wheelchair use. Other descriptive characteristics of Lake Athens are recorded in Table 1.

Management History

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

1. Continue monitoring Florida Largemouth Bass (*Micropterus salmoides floridanus*) alleles in the population.
Action: Florida Largemouth Bass fingerlings were stocked in 2011 and 2012. Genetic analysis was conducted with microsatellite DNA analysis in fall of 2013.
2. Conduct additional vegetation surveys as necessary to determine the status of exotic species including hydrilla, water hyacinth and alligatorweed, and recommend treatment when warranted.
Action: Vegetation surveys were conducted during 2011, 2012, 2013, and 2014 to monitor the aquatic macrophyte community.
3. Investigate obtaining alligatorweed flea beetles for release as a control measure.
Action: Alligatorweed flea beetles (*Agasicles Hygrophila*) were released in Lake Athens in 2012 and 2014.

Harvest regulation history: Sport fishes in Lake Athens are currently managed with statewide regulations with the exception of Largemouth Bass (Table 2). From 1985 to 1995, Largemouth Bass were managed with a 14-inch minimum length limit. A 14- to 21-inch slot-length limit was implemented in 1996 to improve the population size structure and growth rates.

Stocking history: Initial stockings of Lake Athens began in 1973 with Channel Catfish (*Ictalurus punctatus*) fingerlings. Florida Largemouth Bass (FLMB) fingerlings were first stocked at 3 fish/acre in 1978; however, their contribution to the population was presumably minimal. In 1993, FLMB fingerlings were stocked at a higher rate of 83 fish/acre. FLMB stockings have continued in most years through 2012. Walleye (*Sander vitreum*) and Blue Catfish (*I. furcatus*) were stocked, but they have not persisted. A complete stocking history is provided in Table 3.

Vegetation/habitat management history: Lake Athens has historically contained a stable, diverse aquatic macrophyte community primarily composed of native species. Coontail, wild celery, American pondweed, American lotus and white water-lily have been the dominant species present; although several other native species have persisted in trace amounts. However, hydrilla, water hyacinth, and alligatorweed have all been

identified within Lake Athens. Both hydrilla and water hyacinth have the potential to interfere with boat and angling access. The invasive aquatic vegetation present at Lake Athens has been monitored closely and prompt action has been taken thus far to decrease the chances of these exotics spreading. Trace amounts of hydrilla were first discovered in 1995. In recent years, herbicide treatments were conducted in a limited area adjacent to the boat ramp by the AMWA, which have successfully limited the spread of hydrilla. Water hyacinth has been manually removed by AMWA personnel whenever identified. In recent years the stable native macrophyte community has out-competed the invasive species, resulting in expansion of desirable plants while limiting the growth of exotics. Twenty-two brush reefs were deployed with the help of the Athens Bass Club in January, 2013.

Water transfer: Lake Athens is primarily used for water supply and recreation. Two permanent pump stations are present on the reservoir. Both AMWA and the Texas Freshwater Fisheries Center (TFFC) pump water from the reservoir. Water also returns to Lake Athens after it cycles through TFFC. No inter-basin transfers are known to exist.

METHODS

Fishes were collected by electrofishing (1 hour at 12, 5-min stations) and gill netting (5 net nights at 5 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 gillnets, as the number of fish per net night (fish/nn). All survey sites were randomly selected, and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Aquatic vegetation survey was performed according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Vegetation surface coverage (ac.) was estimated using ArcView GIS software. Angler access and facility characteristics were conducted through on-site inspection and end of boat ramp depth was calculated using down and side scan sonar imaging.

An access-point creel survey was conducted from March 2014 through May 2014. Angler interviews were conducted on 5 weekend days and 4 weekdays to assess angler use and fish catch/harvest statistics in accordance with 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), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of Vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error ($RSE = 100 \times SE \text{ of the estimate/estimate}$) was calculated for all CPUE statistics and for creel statistics. Largemouth Bass ($N=75$) ranging from 5.6 – 20.1 inches were aged using sagittal otoliths.

Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). Micro-satellite DNA analysis was used to determine genetic composition of 30 individual fish from fall 2013.

Source for water level data was the United States Geological Survey website (USGS 2014).

RESULTS AND DISCUSSION

Habitat: The vegetation survey conducted in August 2013 revealed a diverse aquatic macrophyte community, totaling approximately 15% (214.8 ac) of total surface coverage of Lake Athens. Native floating and submersed species including pondweed (*Potamogeton Spp.*), coontail (*Ceratophyllum demersum*), wild celery (*Vallisneria americana*) and American lotus (*Nelumbo lutea*) offered the fish assemblage excellent shallow water habitat. Hydrilla had historically been present along select shorelines of Lake Athens; however, the most recent survey (2014) only documented trace amounts. A complete list of species identified in Lake Athens from 2011-2014 can found in Table 4.

Creel: Fishing effort on Lake Athens for the spring quarter (March 2014 – May 2014) was overwhelmingly directed at Largemouth Bass (91.4%; Table 7). Total angling hours during the spring 2014 creel were comparable to the previous creel in spring 2004; 15,497 hours and 13,188 hours, respectively (Table 7).

However, total expenditures over the three month creel more than doubled from \$46,447 in 2004 to \$136,624 in 2014 (Table 7).

Prey species: Gizzard Shad (*Dorosoma cepedianum*) and threadfin Shad (*D. petenense*) are present in Lake Athens; however, catch rates are typically low and variable. The most recent survey displayed a large increase in Threadfin Shad CPUE (822/h), up from only 8/h during the 2009 survey (Bennett and Ott 2010); however, electrofishing does not accurately reflect true Threadfin Shad abundance. Gizzard Shad catch rates from the most recent survey remained low (27/h) and are similar to the previous two surveys in 2009 and 2011 (Figure 2). Most Gizzard Shad collected during the last three surveys were large and not a viable prey source for most game fishes; IOV = 8, 0, and 11 in 2009, 2011 and 2013, respectively. Abundant sunfish communities ≤ 4 inches persist in Lake Athens, making an ample prey base for most game fish species. Bluegill (*Lepomis macrochirus*) catch rates remained high (489/h) and comparable to previous surveys (Figure 3). Both Redear Sunfish (*L. macrolophus*) (Figure 4) and Redbreast Sunfish (*L. auritus*) (Figure 5) catch rates have varied over the last three surveys (2009, 2011, and 2013), but were moderate in 2013 (108/h and 180/h, respectively). The number of Redear Sunfish ≥ 8 inches collected in the most recent survey, represented the potential for a panfish fishery. Directed effort for sunfish species was not observed during the 2014 spring creel; however, there was evidence of some sunfish harvest by anglers targeting other species (Table 8, Figure 6).

Channel Catfish: Channel Catfish catch rates have remained low but stable over the past several surveys from 2002-2014 (Bennett and Ott 2010). The most recent CPUE of 3.6/nn is consistent with previous data (Figure 6). The size structure continues to be primarily comprised of larger fish (PSD – P = 22). The heavily vegetated littoral zone, coupled with a high Largemouth Bass density, most likely limit catfish recruitment.

White Bass: Gill net catch rates of White Bass (*Morone chrysops*) have been low over the last two surveys in 2010 (1.2/nn) and 2014 (1.6/nn) (Figure 8). White Bass have not historically accounted for a robust fishery, and abundance has declined since 2002 (4.0/nn) (Bennett and Ott 2010) and 2006 (4.5/nn). Below average rainfall each spring in recent years has reduced or eliminated tributary connectivity to Lake Athens, limiting White Bass reproduction. Few White Bass were observed during the 2014 spring creel, and no directed effort was recorded (Table 9, Figure 9).

Largemouth Bass: Electrofishing catch rate of Largemouth Bass in the 2013 survey (200/h) continued to be relatively high; however, size distribution (PSD = 45) declined from previous years (62 and 56; 2011 and 2009, respectively) (Figure 10). Catch rates of stock-length (≥ 8 inches) fish increased from 42/h (2011) to 77/h (2013); however, PSD-P declined from 38 to 18. This can likely be attributed to an abundant 2012 year class and successful recruitment of those fish above stock length. Relative weights (W_t) fluctuated greatly between individual fish; however, average W_t for fish below the slot and within the slot were good (97 and 96 respectively). Sagittal otoliths were removed from seventy-five Largemouth Bass (range: 5.5-20.5 inches) collected during fall electrofishing in 2013 and aged (Figure 11). Growth below and in the protected range was average over the last three management reports; fish at 14 inches averaged 2.5, 2.3, and 2.8 years old in 2005, 2009 and 2013 respectively. Previous management reports have suggested a concern about decreased growth of fish within the protected slot (Bister and Ott 2002, Beck and Ott 2006, Bennett and Ott 2010). The consistent annual recruitment of juvenile Largemouth Bass in Lake Athens facilitates the potential for stock piling within the slot; however there currently is not strong enough evidence to suggest this.

Largemouth Bass were the dominant species pursued by anglers (14,000 hours; 91.4% of the total effort) at Lake Athens during the spring 2014 creel survey (Table 6). Angler catch rate was 1.13/h, and increased over the 2004 catch rate (0.44/h). As in 2004, 90% of legal-sized Largemouth Bass caught during the 2014 creel survey were released. Of those, an estimated 10,635 were < 4.0 pounds (87.5%), 1,435 were between 4.0 and 6.9 pounds (11.8%), and 90 were between 7.0 and 9.0 pounds (0.7%). Harvest of Largemouth Bass continued to be limited; only 15 harvested fish were observed during the 2014 creel, resulting in an estimated 599 fish for the entire spring quarter (Figure 12).

Microsatellite DNA analysis conducted in 2013 revealed a stable proportion of FLMB alleles (55%, N = 30) in Lake Athens over the last nine years (Table 11). However, only one pure FLMB was collected in the 2013 sample and none were present in the 2009 sample. Two pure FLMB > 13 lbs. caught from Lake Athens during the last ShareLunker season (October 2013 – April 2014) were donated to the program.

Black Crappie: The crappie fishery on Lake Athens continues to be limited, accounting for 4.1% of total directed fishing effort in 2014 (Table 6). Catch rates were 0.69/h in 2014 and 1.13/h in 2004. Total harvest and harvest/acre were similar (Table 12; Figure 13).

Fisheries management plan for Lake Athens, Texas

Prepared – July 2014.

ISSUE 1: Lake Athens has a history of producing trophy-sized Largemouth Bass. The current lake record (14.19 lbs.) was caught in 1988, and is likely the result of stockings of Florida Largemouth Bass in the late 1970s and early 1980s. Two pure FLMB ShareLunkers (> 13 lbs.) were caught during the last season (October 2013- April 2014), further indicating the trophy potential of Lake Athens. Due to the close proximity of TFFC Lake Athens routinely receives surplus Largemouth Bass of all size classes (fry, fingerling, adult) from the hatchery. However, to maintain trophy potential, periodic requested stockings of FLMB fingerlings is recommended.

MANAGEMENT STRATEGIES

1. Continue monitoring Largemouth Bass allele frequencies with microsatellite DNA analysis in fall of 2017 to monitor the impact of stockings.
2. Continue stocking FLMB fingerlings when surplus fish are available.

ISSUE 2: The quality littoral habitat present within Lake Athens has resulted consistent recruitment of juvenile fish. This does not present an issue by itself; however it can increase the potential for stockpiling of Largemouth Bass within the slot. Although the prey-base on Lake Athens is abundant, the high relative abundance of Largemouth Bass, and low harvest of legal-sized fish under the slot may further support stockpiling.

MANAGEMENT STRATEGIES

1. Organize a meeting with the local Bass club and all interested anglers to discuss the current status of the Largemouth Bass fishery on Lake Athens. Reiterate the intended purpose of the slot limit set in place and the importance of harvesting legal, sub-slot bass.
2. Discuss possible motivations and opportunities for increasing harvest of legal, sub-slot length Largemouth Bass.
3. Conduct additional fall electrofishing in 2015 to monitor the status of Largemouth Bass and prey populations in Lake Athens.
4. Conduct age and growth analysis during 2017 electrofishing on fish from the mid-range of the protected slot-size limit (15-17 inches) to monitor potential stockpiling effects.

ISSUE 3: The presence of exotic aquatic vegetation (i.e. hydrilla, waterhyacinth, and alligatorweed) is of concern. Currently hydrilla and waterhyacinth are under control, but they have the propensity to exhibit rapid growth and expansion, which could negatively impact the ecosystem. Although alligatorweed is not currently a biological problem, it has the potential to limit access and recreation if it continues to expand in distribution.

MANAGEMENT STRATEGIES

1. Conduct annual aquatic vegetation surveys (as necessary) to determine the status of these species and recommend treatment when warranted.
2. Continue to release alligatorweed flea beetles as a control measure, as needed and as availability permits.
3. Continue reporting results of aquatic vegetation surveys and management to Lake Athens property owners associations to maintain their support for controlling invasive aquatic plant species.

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.

SAMPLING SCHEDULE JUSTIFICATION:

The proposed sampling schedule includes additional fall electrofishing in 2015 and standard fall electrofishing in 2017 and spring gill netting in 2018 (Table 6). Additional electrofishing in 2015 is necessary to closely monitor the Largemouth Bass population within the protected slot limit. Additional vegetation surveys will be conducted annually in order to monitor the status of hydrilla, water hyacinth, and alligatorweed.

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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 Athens, 2005. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-31, Austin.
- Bennett, D.L. and R.A. Ott. 2010. Statewide freshwater fisheries monitoring and management program survey report for Lake Athens, 2009. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-35, Austin. 21 pp.
- Bister, T. J., and R. A. Ott. 2002. Statewide freshwater fisheries monitoring and management program survey report for Lake Athens, 2001. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-27, Austin.
- DiGenzo, 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.
- Texas Commission on Environmental Quality. 2011. Trophic classification of Texas reservoirs. 2010 Texas Water Quality Inventory and 303 (d) List, Austin. 18 pp.
- United States Geological Survey. 2014. *Real-time Data for Texas lakes and Reservoirs*
http://waterdata.usgs.gov/tx/nwis/uv/?site_no=08031290&

Quarterly Water Level

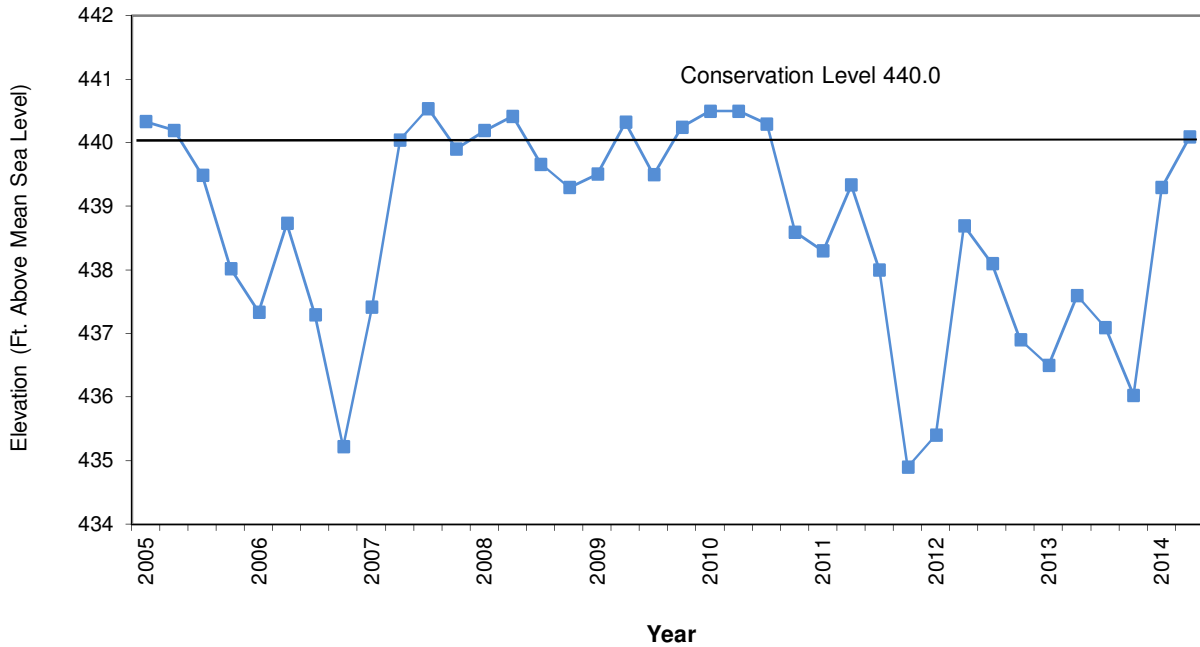


Figure 1. Mean quarterly water level elevations in feet above mean sea level (MSL) recorded for Lake Athens, Texas.

Table 1. Characteristics of Lake Athens, Texas.

| Characteristic | Description |
|-----------------------------------|----------------------------------|
| Year constructed | 1962 |
| Controlling authority | Athens Municipal Water Authority |
| Counties | Henderson |
| Reservoir type | City lake |
| Shoreline Development Index (SDI) | 1.8 |
| Conductivity | 80 umhos/cm |

Table 2. Boat ramp characteristics for Lake Athens, Texas, August, 2013. Reservoir elevation at time of survey was 436.6 feet above mean sea level.

| Boat ramp | Latitude Longitude (dd) | Public | Parking capacity (N) | Elevation at end of boat ramp (ft) | Condition |
|-----------|-------------------------------|--------|----------------------------|--|-----------------------------|
| Marina | 32.21609 -95.76980 | Y | 42 | 432.0 | Excellent, no access issues |

Table 3. Harvest regulations for Lake Athens, Texas.

| Species | Bag Limit | Length limit |
|---|-----------------------------------|---------------------|
| Catfishes: 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: Largemouth | 5 (no more than 1 > 21 inches) | 14- to 21-inch slot |
| Crappies: White and Black Crappie, their hybrids and subspecies | 25 (in any combination) | 10-inch minimum |

Table 4. Stocking history of Lake Athens, Texas. FGL = fingerling; AFGL = advanced fingerling; ADL = adults.

| Species | Year | Number | Size |
|-------------------------|---------|------------|------|
| Blue Catfish | 1987 | 15,117 | FGL |
| Channel Catfish | 1973 | 5,500 | FGL |
| Largemouth Bass | 1982 | 25 | ADL |
| Florida Largemouth Bass | 1978 | 6,000 | FGL |
| | 1982 | 627 | ADL |
| | 1993 | 149,670 | FGL |
| | 1995 | 190 | ADL |
| | 1996 | 91,934 | FGL |
| | 1997 | 155,184 | FGL |
| | 1998 | 151,055 | FGL |
| | 1999 | 31 | ADL |
| | 2000 | 253 | ADL |
| | 2003 | 10,041 | FGL |
| | 2004 | 76,955 | FGL |
| | 2004 | 292,159 | FRY |
| | 2005 | 90,022 | FGL |
| | 2005 | 87,643 | FRY |
| | 2008 | 91,196 | FGL |
| | 2009 | 46,063 | FRY |
| | 2009 | 180,524 | FGL |
| 2010 | 31,200 | FRY | |
| 2011 | 690,740 | FRY | |
| 2011 | 15 | ADL | |
| 2012 | 183,130 | FGL | |
| 2012 | 109,809 | FRY | |
| 2014 | 849,667 | FRY | |
| | Total | 3,294,108 | |
| Walleye | 1978 | 6,000,050 | FRY |
| | 1979 | 4,581,680 | FRY |
| | 1980 | 6,688,000 | FRY |
| | Total | 17,269,730 | |

Table 5. Survey of aquatic vegetation, Lake Athens, 2011 – 2013. Surface area (acres) is listed with percent of total reservoir surface area in parentheses.

| Vegetation | 2011 | 2012 | 2013 |
|---------------------------|-------------|------------|-----------|
| Native submersed | | | |
| Pondweed | 27 (1.5) | 38 (2.0) | 31 (2.2) |
| Coontail | 490 (27.4) | 525 (29.0) | 25 (1.8) |
| Wild celery | 40 (2.2) | 1 (<0.1) | 24 (1.7) |
| Chara | 39 (2.2) | | 25 (1.8) |
| Lyngbya | | | 1 (<0.1) |
| Native floating-leaved | | | |
| American Lotus | 20 (1.1) | 39 (2.0) | 90 (6.4) |
| White water-lilly | 6.5 (0.4) | 6 (<0.1) | 2 (<0.1) |
| Cattail | | | <1 (<0.1) |
| Native Emergent | | | |
| Primrose | | | <1 (<0.1) |
| Water willow | | | <1 (<0.1) |
| Non-native | | | |
| Alligator weed (Tier II)* | <1.0 (<0.1) | 28 (1.5) | |
| Hydrilla (Tier III)* | 123 (6.8) | 10 (0.5) | <1 (<0.1) |

*Tier I is immediate Response, Tier II is management status, Tier III is Watch Status

Table 6. Percent directed angler effort by species for Lake Athens, Texas, 2004 and 2014. Survey periods were from 1 March through 31 May.

| Species | 2004 | 2014 |
|------------|------|------|
| Black Bass | 64.0 | 91.4 |
| Crappie | 6.8 | 4.1 |
| Catfish | 2.6 | - |
| Sunfish | 14.4 | - |
| White Bass | 0.6 | - |
| Anything | 11.7 | 4.5 |

Table 7. Total fishing effort (h) for all species and total directed expenditures at Lake Athens, Texas, 2004 and 2014. Survey periods were from 1 March through 31 May. Relative standard error is in parentheses.

| Creel statistic | 2004 | 2014 |
|-----------------------------|----------------|----------------|
| Total fishing effort | 13,188 (N/A) | 15,497 (31) |
| Total directed expenditures | \$46,447 (N/A) | \$136,624 (47) |

Gizzard Shad

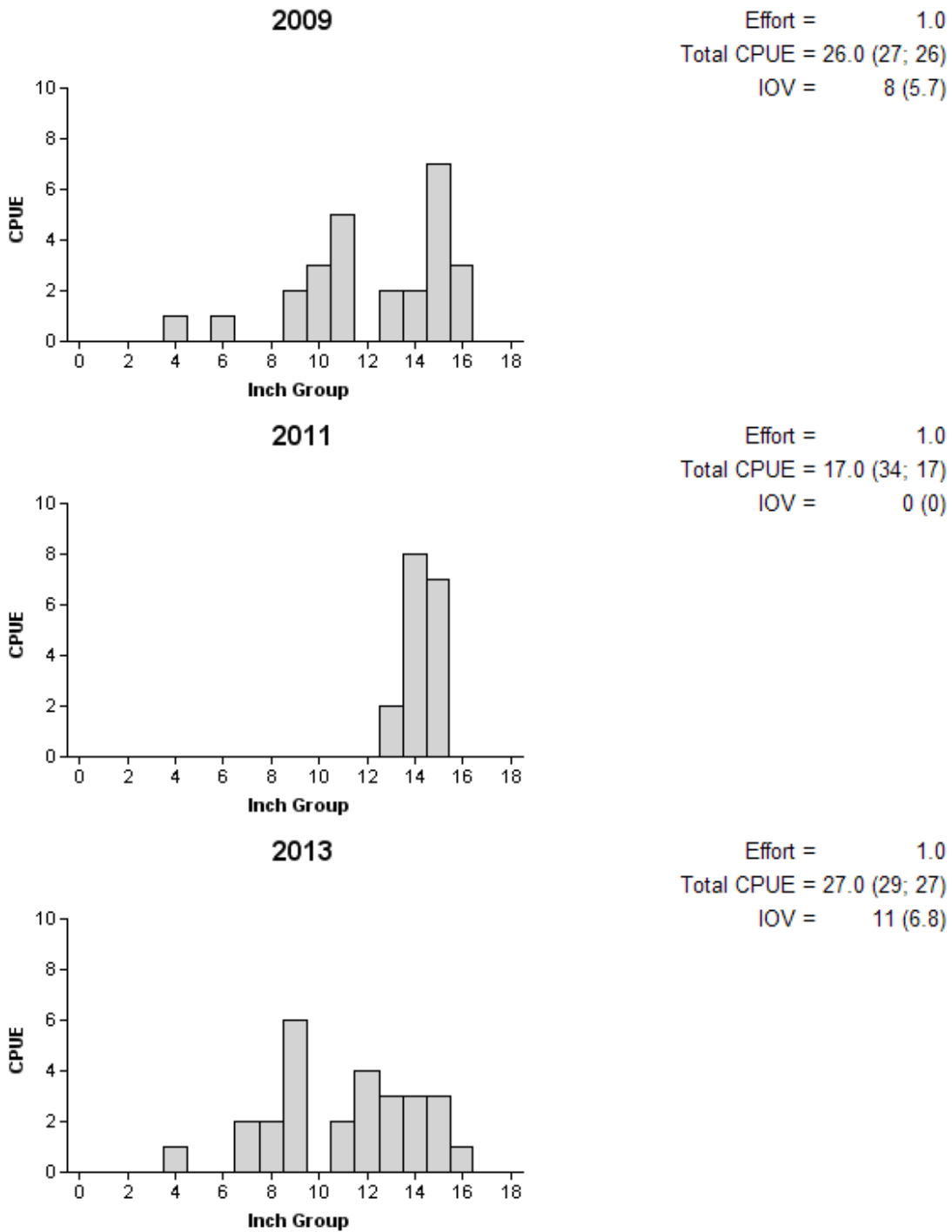


Figure 2. Number of Gizzard Shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Lake Athens, Texas, 2009, 2011, and 2013.

Bluegill

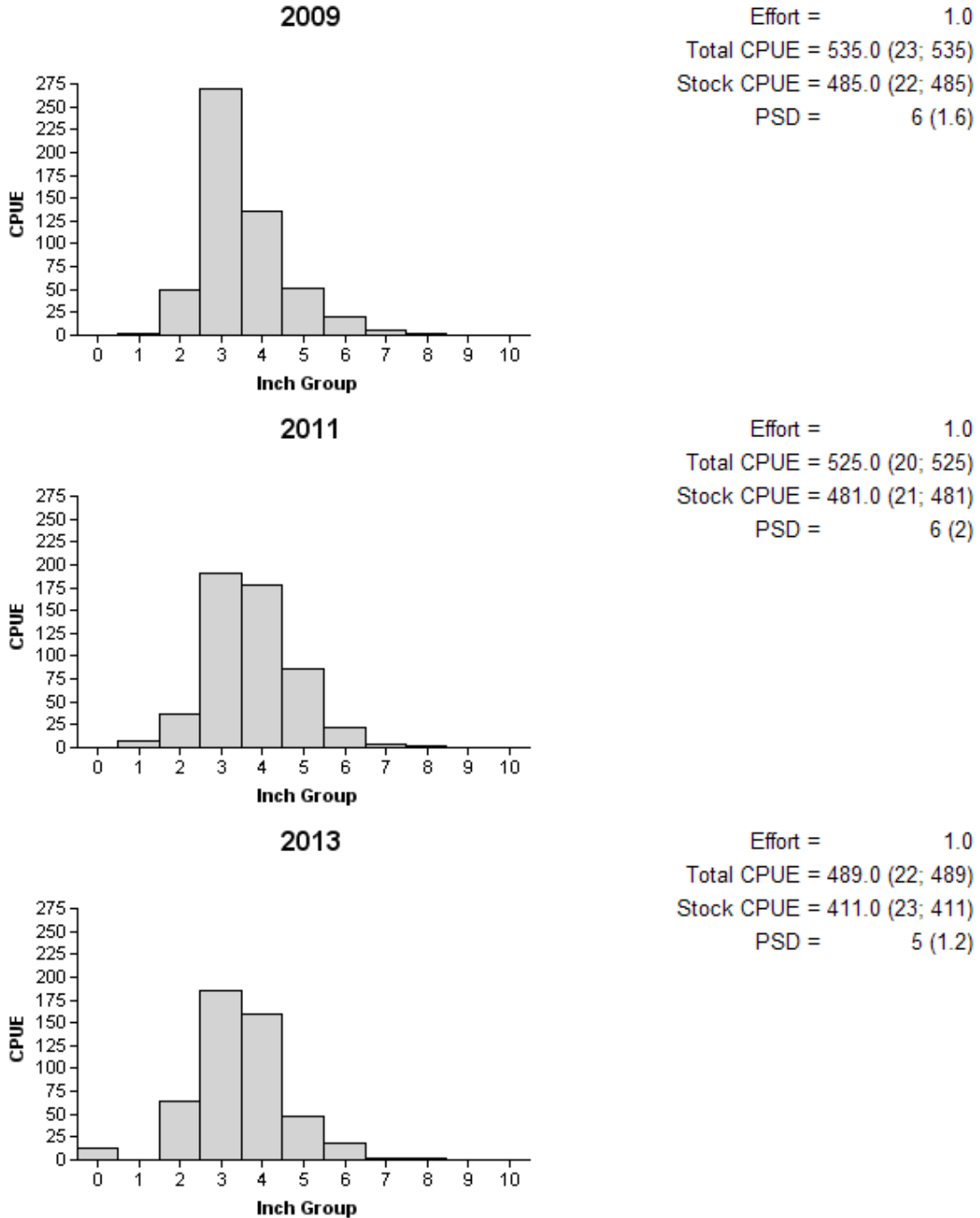


Figure 3. Number of Bluegill caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Athens, Texas, 2009, 2011, and 2013.

Redear Sunfish

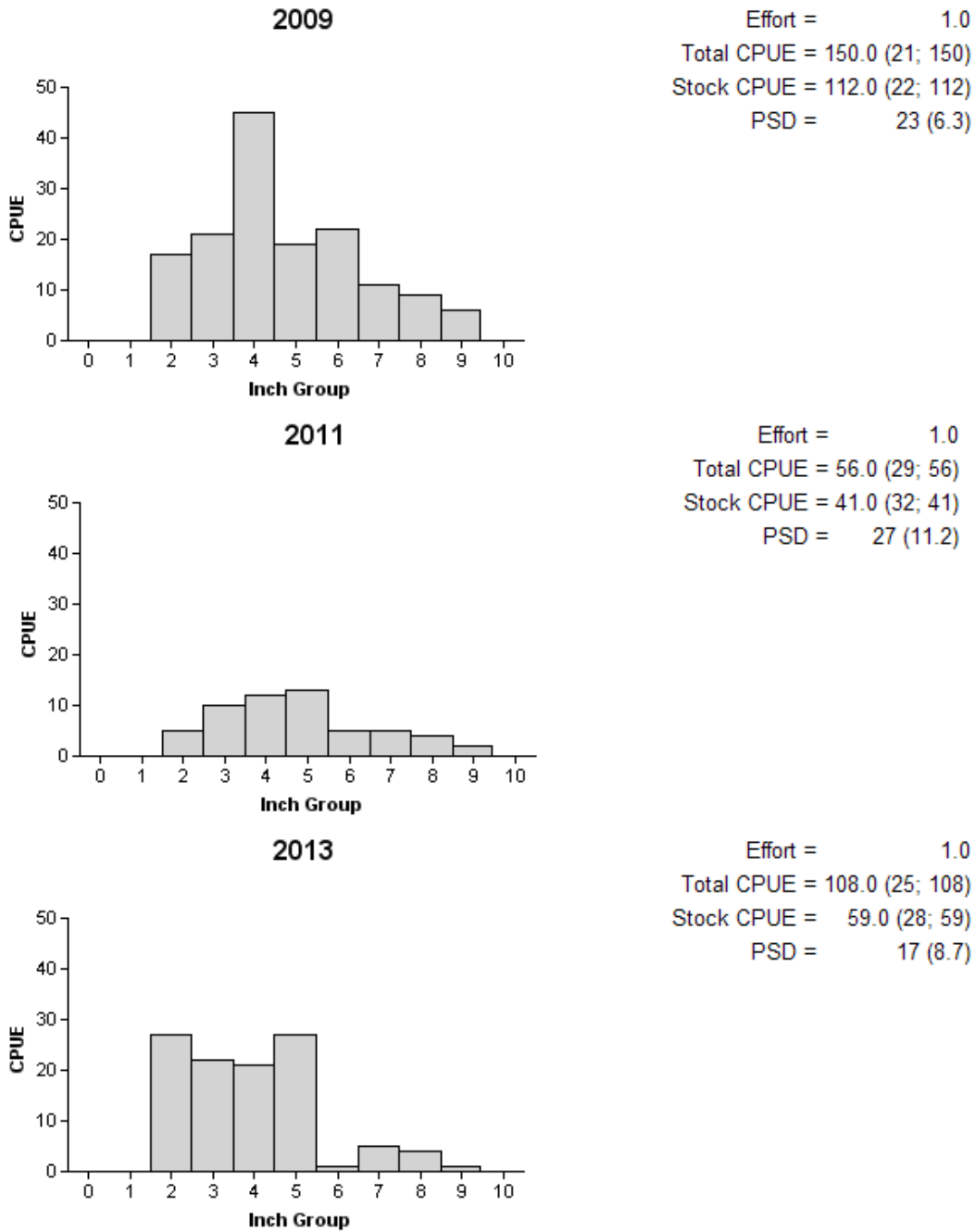


Figure 4. Number of Redear Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Athens, Texas, 2009, 2011, and 2013.

Redbreast Sunfish

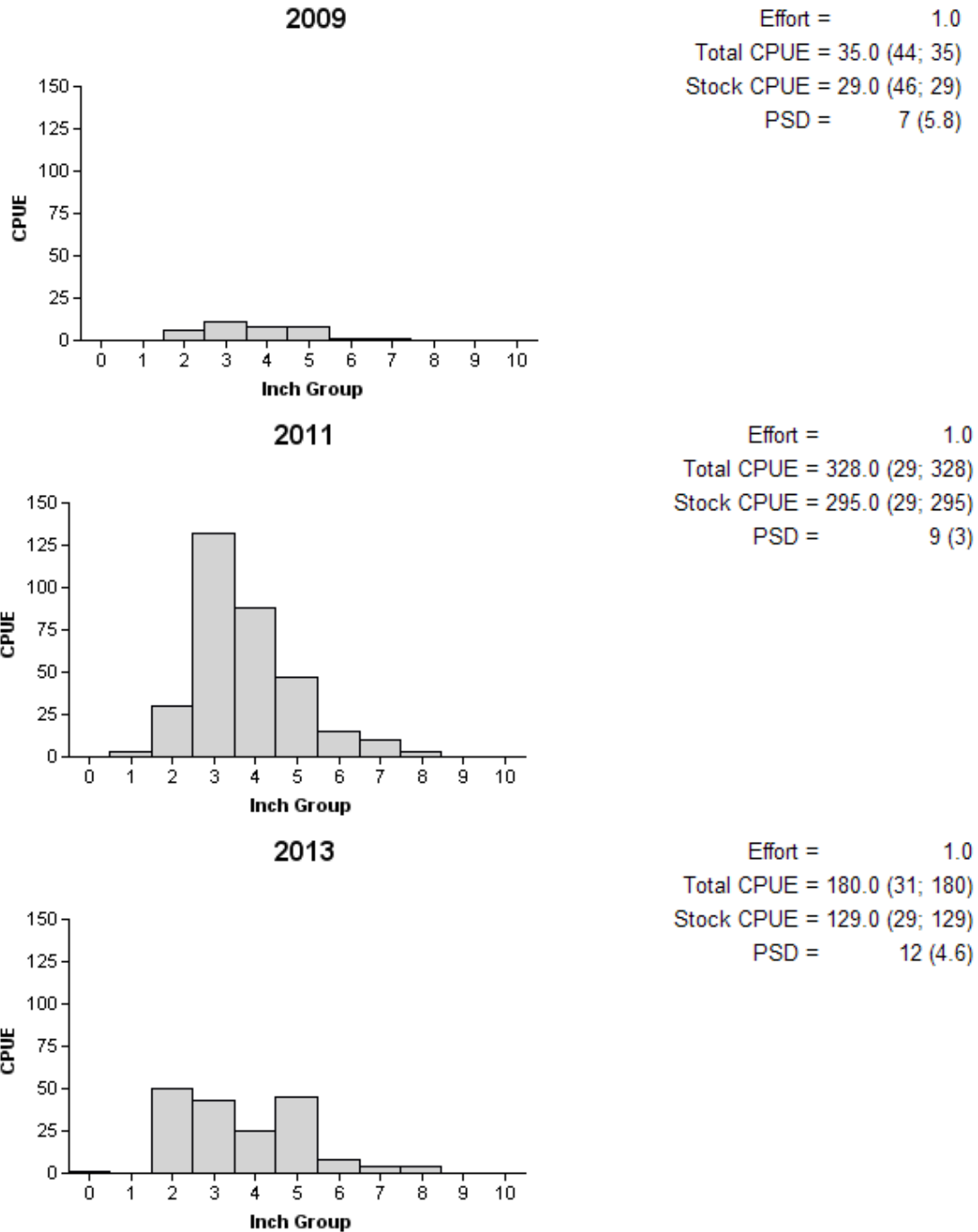


Figure 5. Number of Redbreast Sunfish caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Athens, Texas, 2009, 2011, and 2013.

Sunfish

Table 8. Creel survey statistics for all sunfish at Lake Athens from March 2004 through May 2004 and March 2014 through May 2014. Total catch per hour is for anglers targeting sunfish and total harvest is the estimated number of sunfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

| Creel survey statistic | Year | |
|------------------------|-------------|---------------|
| | 2004 | 2014 |
| Directed effort (h) | 1,888 (34) | |
| Directed effort/acre | 1.05 (34) | |
| Total catch per hour | 3.1 | |
| Total harvest | 3,251 (377) | 261 (115.10) |
| Harvest/acre | 1.80 (377) | 0.15 (115.10) |
| Percent legal released | 0 | 41 |

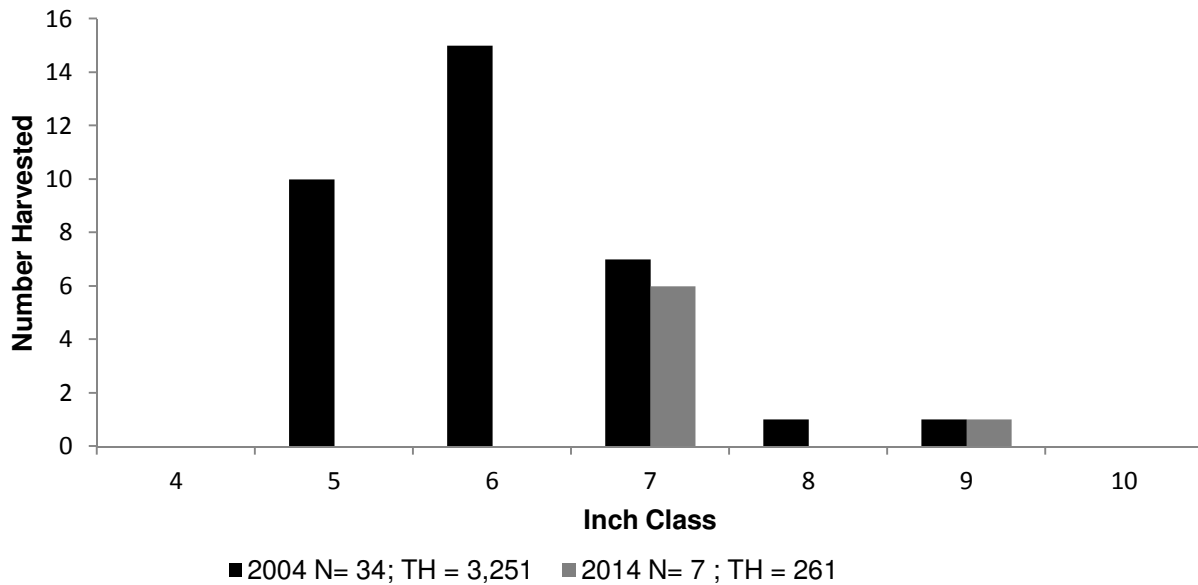


Figure 6. Length frequency of harvested sunfish observed during creel surveys at Lake Athens, Texas, March 2004 through May 2004 and March 2014 through May 2014, all anglers combined. N is the number of harvested sunfish observed during creel surveys, and TH is the total estimated harvest for the creel period.

Channel Catfish

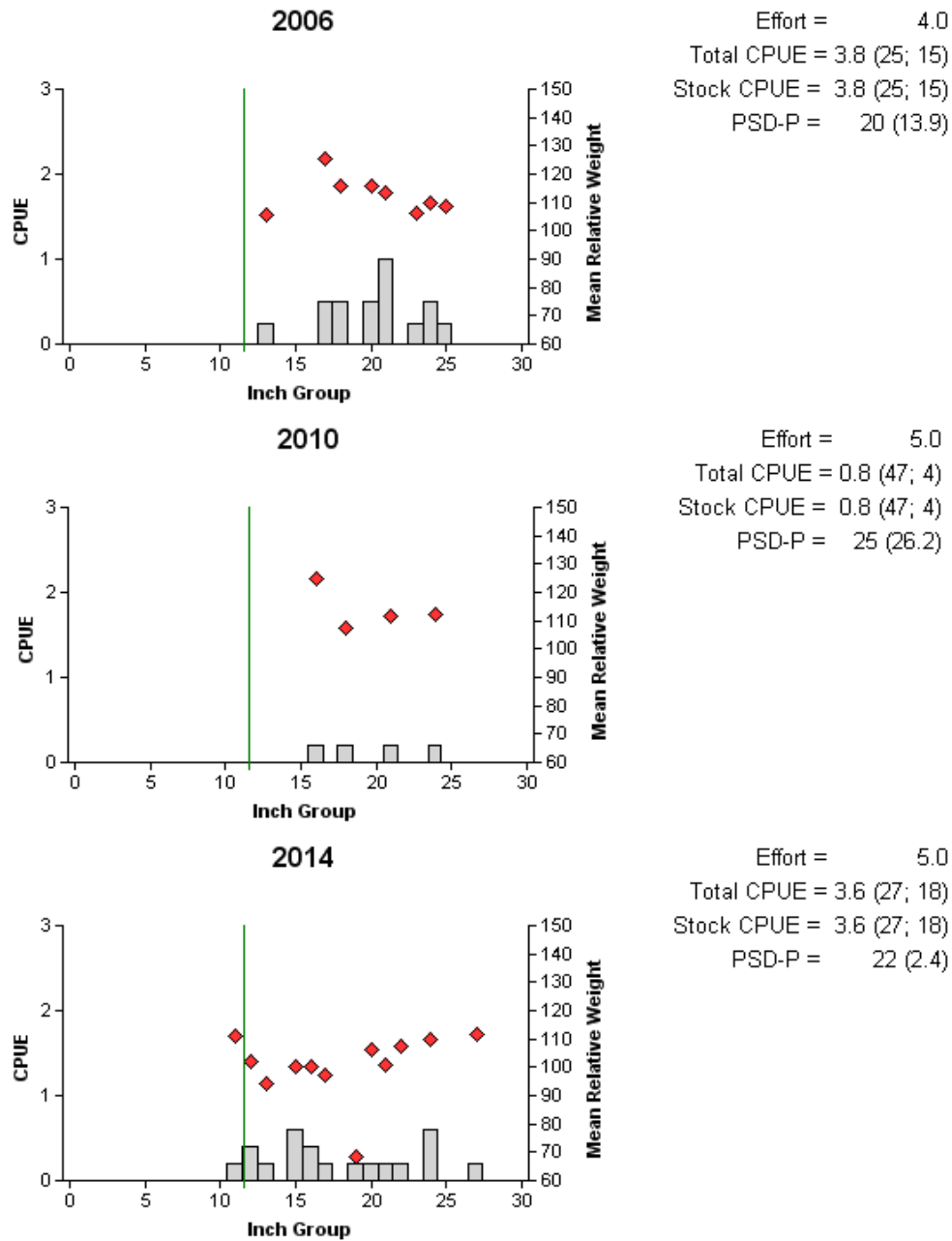


Figure 7. Number of Channel Catfish caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Athens, Texas, 2006, 2010 and 2014. Vertical line represents minimum length limit at time of survey.

White Bass

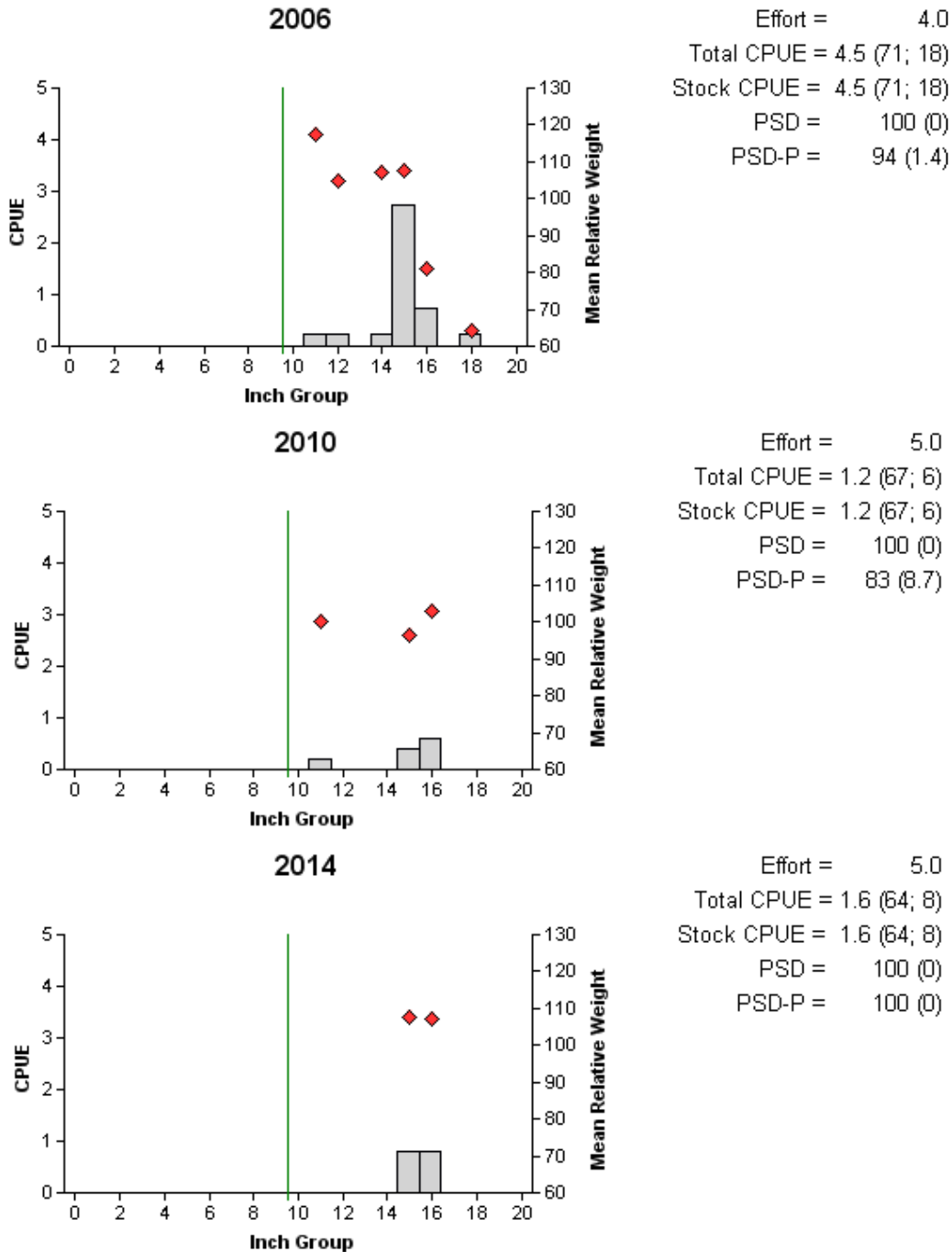


Figure 8. Number of White Bass caught per net night (CPUE), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Lake Athens, Texas, 2006, 2010 and 2014. Vertical line represents minimum length limit at time of survey.

White Bass

Table 9. Creel survey statistics for White Bass at Lake Athens from March 2004 through May 2004 and March 2014 through May 2014. Total catch per hour is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

| Creel survey statistic | Year | |
|------------------------|-------------|---------------|
| | 2004 | 2014 |
| Directed effort (h) | 75.66 (166) | |
| Directed effort/acre | 0.04 (166) | |
| Total catch per hour | 0.33 | |
| Total harvest | 177 (194) | 37 (284.92) |
| Harvest/acre | 0.10 (194) | 0.02 (284.92) |
| Percent legal released | 55 | 31 |

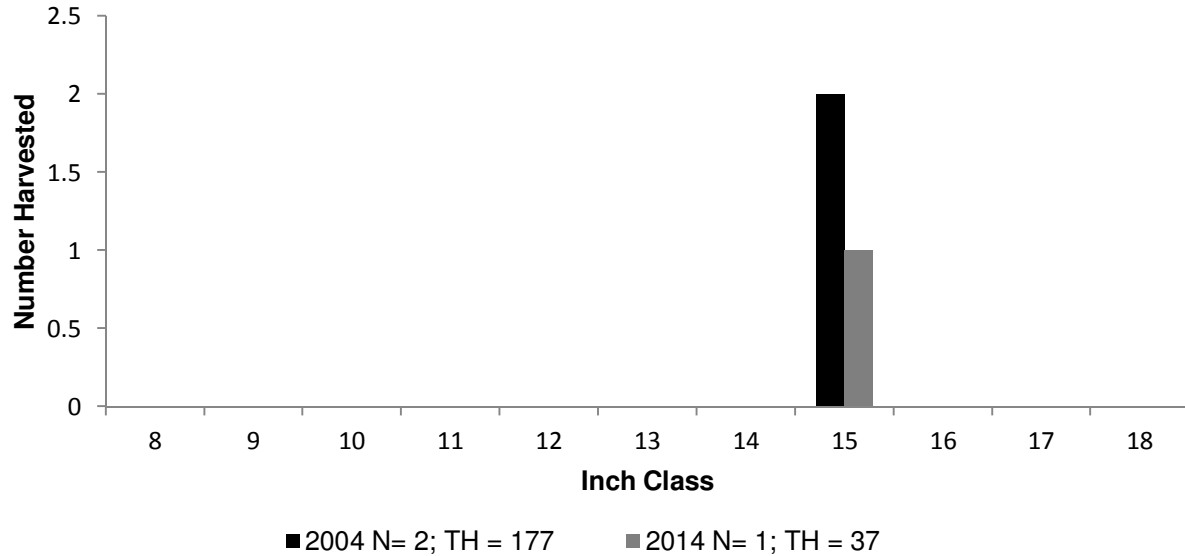


Figure 9. Length frequency of harvested White Bass observed during creel surveys at Lake Athens, Texas, March 2004 through May 2004 and March 2014 through May 2014, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

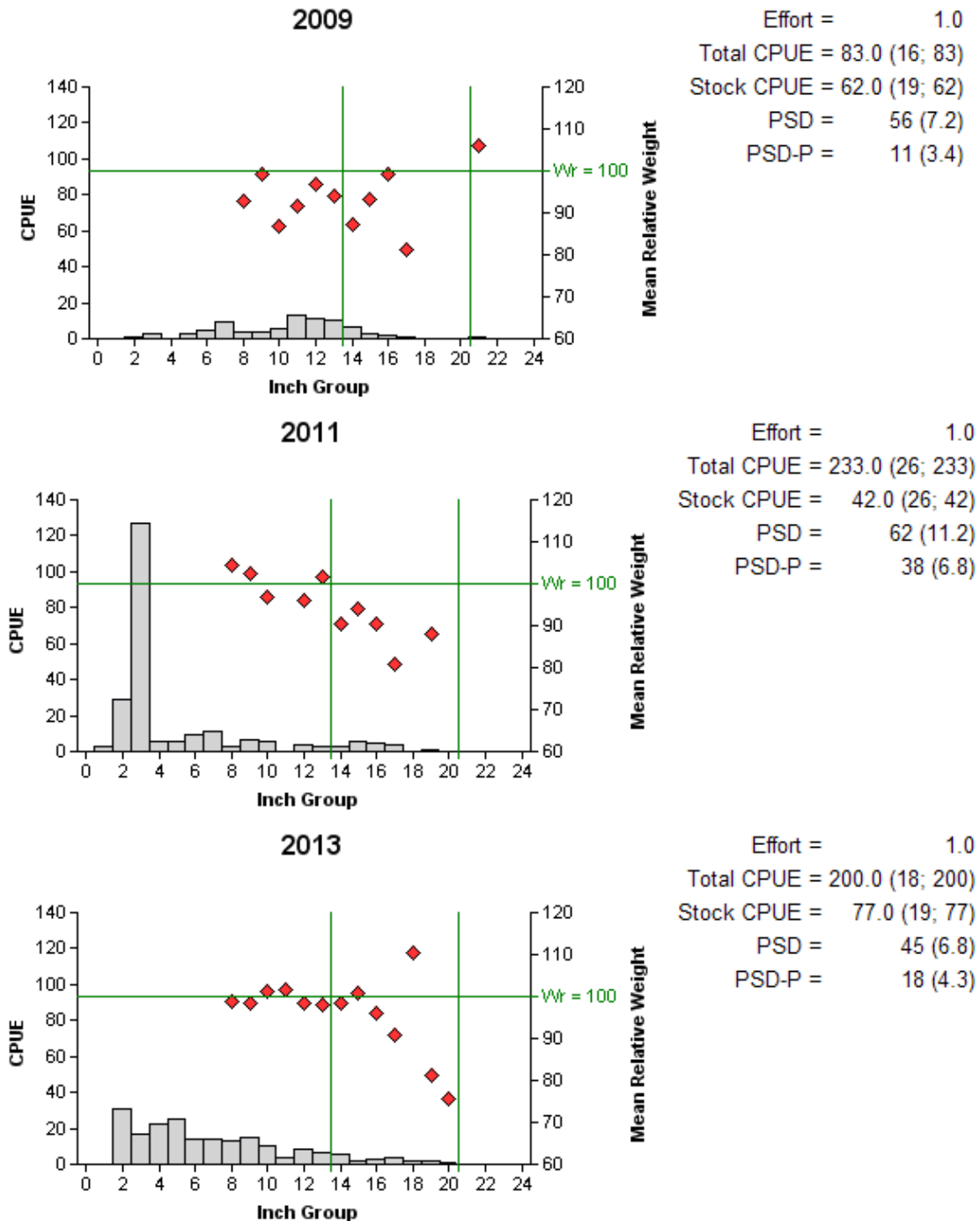


Figure 10. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Lake Athens, Texas, 2009, 2011, and 2013. Vertical lines represent lower and upper end of protected slot limit at time of survey.

Largemouth Bass

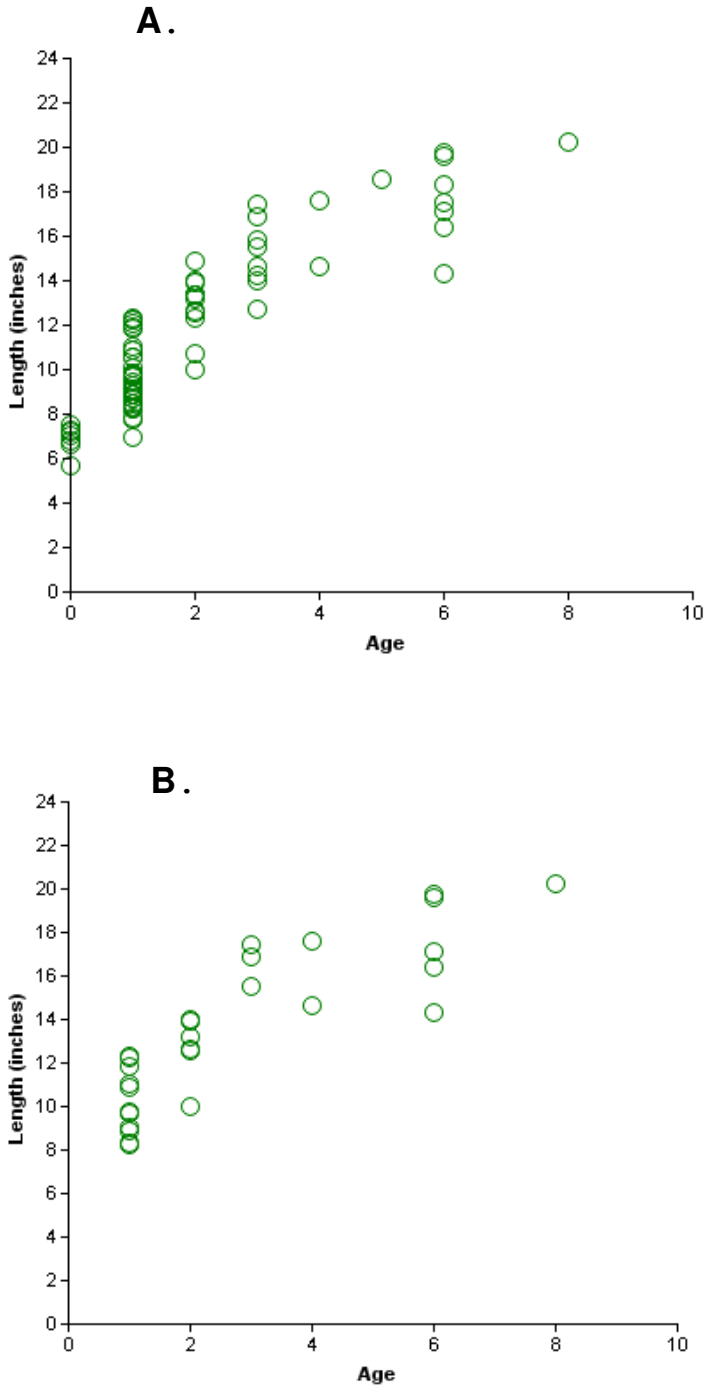


Figure 11. Length-at-age for: A. Largemouth Bass (sexes combined; N = 75; age range = 0 – 8) and B. Largemouth Bass (females only; N = 28; age range = 1 – 8) collected from fall electrofishing, Lake Athens, Texas, 2013.

Largemouth Bass

Table 10. Creel survey statistics for Largemouth Bass at Lake Athens, TX from March 2004 through May 2004 and March 2014 through May 2014. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses.

| Statistic | 2004 | 2014 |
|---|---------------|-------------------|
| Directed angling effort (h) | | |
| Tournament | | 3,207.67 (37) |
| Non-tournament | | 10,963.65 (32) |
| All black Bass anglers combined | 8,440.77 (19) | 14,171.32 (33.07) |
| Angling effort/acre | 4.69 (19) | 7.87 (33) |
| Catch rate (number/h) | 0.44 (30) | 1.13 (11) |
| Harvest | | |
| Non-tournament harvest | 177.04 (105) | 559 (85) |
| Harvest/acre | 0.10 (105) | 0.31 (85) |
| Tournament weigh-in and release* | | |
| Release by weight | | |
| <4.0 lbs | | 10,635 (36) |
| 4.0-6.9 lbs | | 1,435 (46) |
| 7.0-9.9 lbs | | 90 (124) |
| ≥10.0 lbs | | 0 |
| Percent legal released (non-tournament) | 90 | 90 |

* Because creel survey was an access design there were no tournament-caught fish in possession during interview

Largemouth Bass

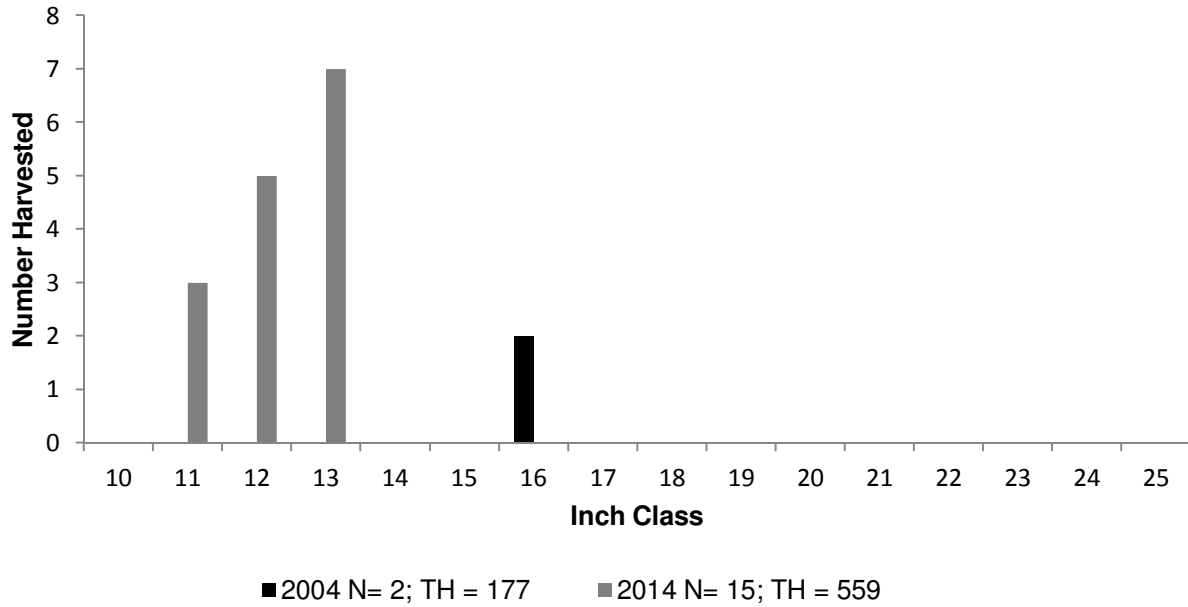


Figure 12. Length frequency of harvested Largemouth Bass observed during creel surveys at Lake Athens, Texas, March 2004 through May 2004 and March 2014 through May 2014, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and TH is the total estimated harvest for the creel period.

Largemouth Bass

Table 11. Results of genetic analysis of Largemouth Bass collected by fall electrofishing at Lake Athens, Texas, 1998, 2001, 2003, 2009 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 | | |
| 1998* | 13 | 4 | 9 | 0 | 69 | 30.8 |
| 2001 | 30 | 4 | 26 | 0 | 59 | 13.3 |
| 2003* | 30 | 4 | 25 | 1 | 58 | 13.3 |
| 2009* | 26 | 0 | 26 | 0 | 68 | 0.0 |
| 2013 | 30 | 1 | 29 | 0 | 55 | 3.0 |

*Analysis in same year fish were stocked

Black Crappie

Table 12. Creel survey statistics for Black Crappie at Lake Athens from March 2004 through May 2004 and March 2014 through May 2014. Total catch per hour is for anglers targeting Crappie and total harvest is the estimated number of Black Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

| Creel survey statistic | Year | |
|------------------------|--------------|------------|
| | 2004 | 2014 |
| Directed effort (h) | 893.1 (49) | 628.2 (60) |
| Directed effort/acre | 0.50 (49) | 0.38 (60) |
| Total catch per hour | 1.13 (39) | 0.69 (67) |
| Total harvest | 1239.31 (81) | 1043 (91) |
| Harvest/acre | 0.69 (81) | 0.58 (91) |
| Percent legal released | 0 | 6.0 |

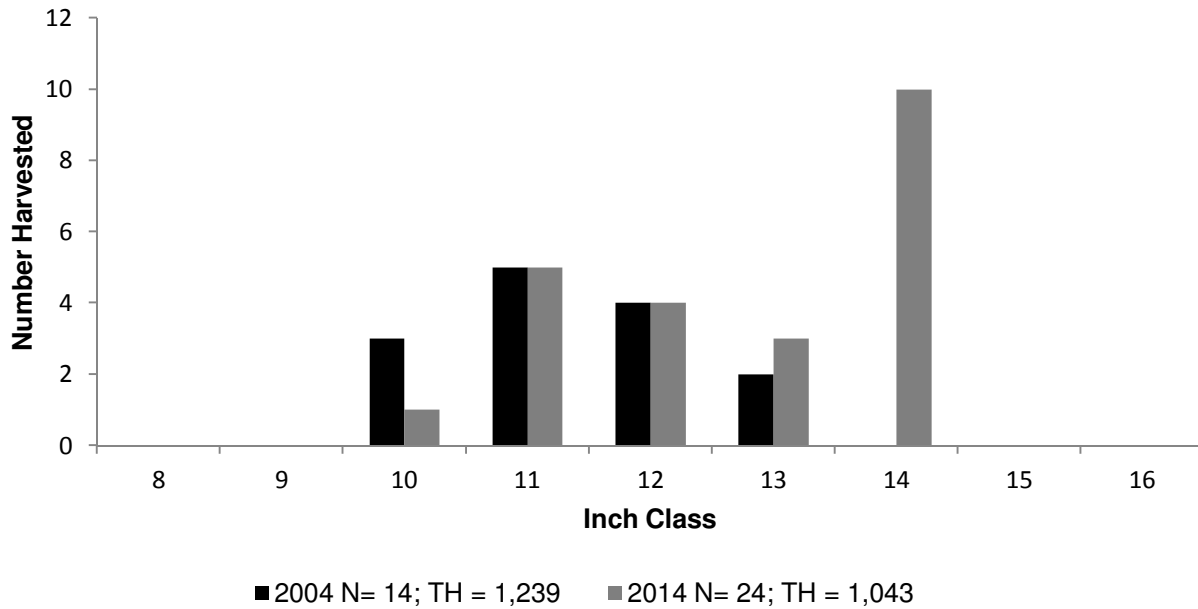


Figure 13. Length frequency of harvested Black Crappie observed during creel surveys at Lake Athens, Texas, March 2004 through May 2004 and March 2014 through May 2014, all anglers combined. N is the number of harvested Black Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period.

Table 13. Proposed sampling schedule for Lake Athens, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A

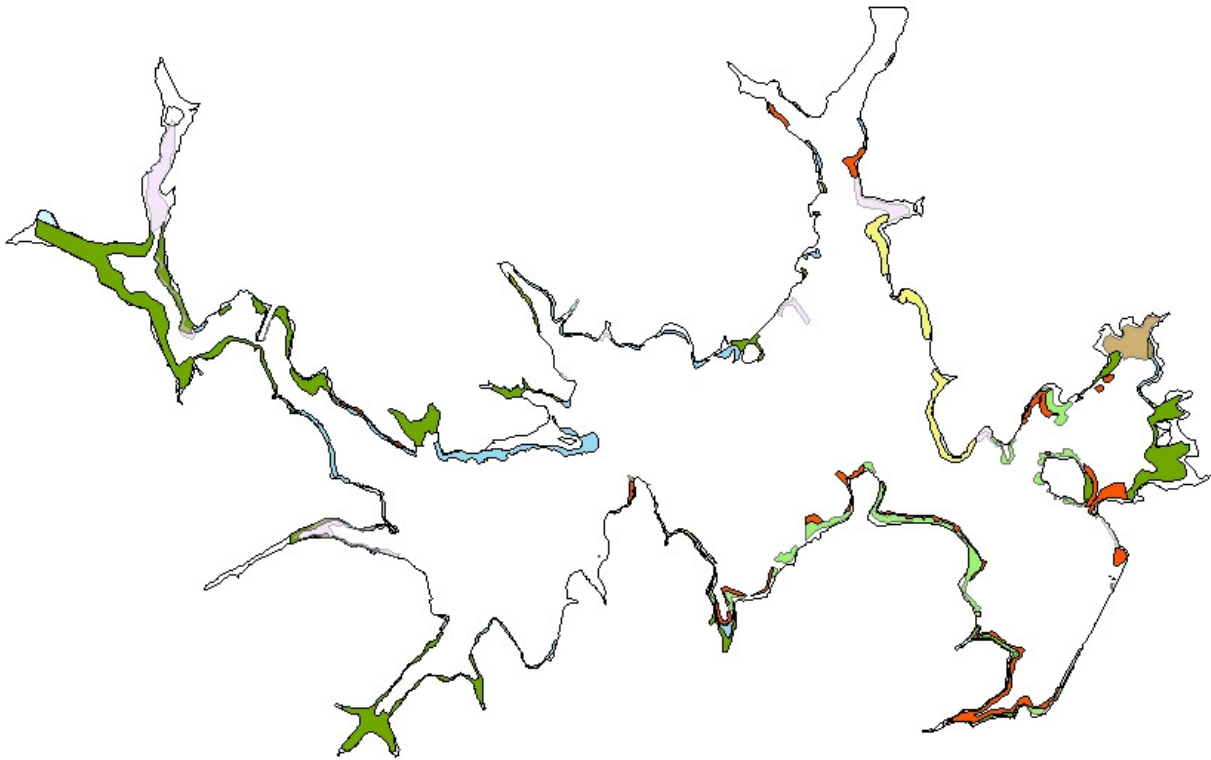
| Survey year | Electrofishing | Gill net | Habitat | | | Creel survey | Report |
|-------------|----------------|----------|------------|------------|--------|--------------|--------|
| | | | Structural | Vegetation | Access | | |
| 2014-2015 | | | | A | | | |
| 2015-2016 | A | | | A | | | |
| 2016-2017 | | | | A | | | |
| 2017-2018 | S | S | | S | S | A | S |

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APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected by gill netting and electrofishing from Lake Athens, Texas 2013-2014.

| Species | Gill netting | | Electrofishing | |
|--------------------|--------------|------|----------------|-------|
| | N | CPUE | N | CPUE |
| Gizzard Shad | | | 27 | 27.0 |
| Threadfin Shad | | | 822 | 822.0 |
| Channel Catfish | 18 | 3.6 | | |
| White Bass | 8 | 1.6 | | |
| Redbreast Sunfish | | | 180 | 180.0 |
| Warmouth | | | 1 | 1.0 |
| Bluegill | | | 489 | 489.0 |
| Redear sunfish | | | 108 | 108.0 |
| Redspotted Sunfish | | | 4 | 4.0 |
| Longear Sunfish | | | 7 | 7.0 |
| Largemouth Bass | | | 200 | 200.0 |

Lake Athens Vegetation Survey 08/05/2013 Current Surface Acreage ~ 1392 Acres



Inland Fisheries Division
Texas Parks and Wildlife Department

Prepared by: Jacob Norman & Richard Oll
Texas Parks and Wildlife: Inland Fisheries Division
Projection: NAD 83 UTM Zone 15 N

This Map is for Reference Only.
The requester 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.

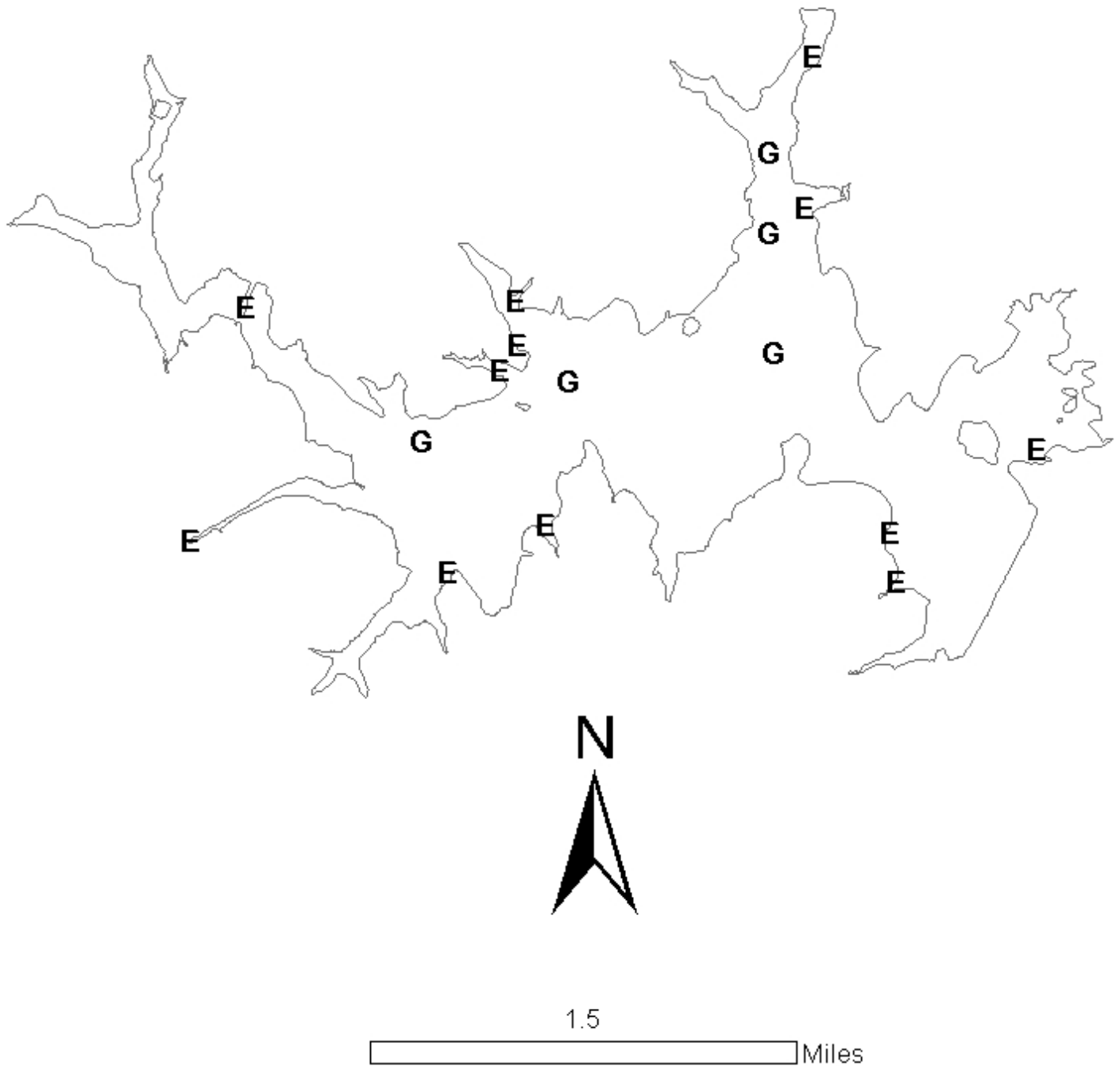
Species ~ Acreage
Total Coverage ~ 214.8 Acres: 15% Lake Coverage

| | | |
|--|---|---|
| Lotus ~ 89.7 | Coontail/Hydrilla Mix ~ 1.4 | Nitella ~ 8.7 |
| Pondweed ~ 31.3 | Cattail ~ 1 | Water Willow < 1 |
| Coontail ~ 24.6 | Chara ~ 25.3 | White Water Lilly ~ 1.8 |
| Wild Celery ~ 24.0 | Coontail/Chara Mix ~ 12.8 | Primrose < 1 |
| Hydrilla < 1 | Lyngbia ~ 1.2 | |

550
Meters



31
APPENDIX C



Location of sampling sites, Lake Athens, Texas, 2013-2014. Gill net and electrofishing stations are indicated by G and E, respectively.