PERFORMANCE REPORT

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FEDERAL AID IN SPORT FISH RESTORATION ACT

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FEDERAL AID PROJECT F-221-M-2

INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2011 Survey Report

# Nocona Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Nocona Reservoir were surveyed in 2011 using an electrofisher and trap nets and in 2012 using gill nets. Habitat was surveyed in 2011. A spring creel survey was conducted in 2009. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir description:** Nocona Reservoir is a 1,362-acre impoundment of Farmers Creek, a tributary of the Red River, in Montague County. Water level was below conservation elevation (827.5 ft-msl) since July 2010. Habitat features consisted mainly of rocky shoreline, and native emergent vegetation.

- **Management history:** Important sport fishes include blue and channel catfish, white bass, largemouth bass, and white crappie. The management plan from the 2008 survey report included recommendations for a spring creel survey in 2009, supplemental electrofishing survey in the fall of 2008, and supplemental trap netting survey.

- **Fish community**

  - **Prey species:** Electrofishing catch rate of gizzard shad has increased over previous surveys. Prey-size gizzard shad (7-inch group and below) greatly improved. Although electrofishing catch rates of bluegill decreased this survey, high electrofishing catch rates of gizzard and threadfin shad indicated the prey base was more than adequate.

  - **Catfishes:** The gill net catch rate of blue catfish improved over the 2008 survey. Most of the sample population was legal size, with the larger fish in excellent condition. Recruitment was evident. Few blue catfish were harvested by anglers.

    Gill net catch rate of channel catfish was second highest on record, but relative weights were depressed. Recruitment was evident, but growth was slow. Anglers did harvest a fair number of channel catfish.

  - **Temperate basses:** The historical gill net catch rate of white bass was low and during this survey we recorded the lowest catch rate since 1991. The entire sample was legal size, but their body condition was poor. Although not highly sought-after by anglers, they produced the second most fish in angler's baskets.

    Palmetto bass were not collected. The last stocking was in 1997. They were not observed during the angler survey. They may no longer be present.

  - **Largemouth bass:** Electrofishing catch rate of largemouth bass was the highest in years, growth rates were slow, and the larger fish were in good condition. Largemouth bass were the most sought-after fish by anglers and catch rates were good. High live-release tournament harvest versus non-tournament harvest indicated most largemouth bass angling was by tournament anglers.

  - **White crappie:** Trap net catch rate of white crappie was below the average. The crappie were in good condition and growth rates were good. White crappie were the second most sought-after fish by anglers. Their harvest was the highest of the sportfishes.

  - **Management strategies:** Based on current information, Nocona Reservoir should continue to be managed with existing fish harvest regulations. Improvements to fishery should be publicized through the social media. Inform the North Montague County Water Supply District about new exotic species threats to Texas waters, and work with them to display appropriate signage, and educate constituents.

# INTRODUCTION

This document is a summary of fisheries data collected from Nocona Reservoir in 2011-2012. A creel survey was conducted in the spring 2009. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2011-2012 data for comparison.

*Reservoir Description*

Nocona Reservoir is a 1,362-acre impoundment on Farmers Creek, a tributary of the Red River, in Montague County. It was constructed in 1961 by the North Montague County Water Supply District for municipal water supply and recreation. The average depth is 17 feet with a maximum depth of 44 feet. Water level has been up to 7 feet below conservation elevation (827.5 ft-msl) since July 2010 (Figure 1). The reservoir has a drainage area of approximately 94 square miles and a shoreline length of 24 miles. Approximately 49% of the reservoir was $\leq$ 15 feet deep. Nocona Reservoir was eutrophic with a mean TSI chl-*a* of 48.66 (Texas Commission on Environmental Quality 2011). A TSI chl-a below 45 is considered mesotrophic; hence, the reservoir was moderately productive. However the reservoir is becoming more eutrophic since the 2008 mean TSI chl-a was 47.48 (Texas Commission on Environmental Quality 2008). Habitat at time of sampling consisted of rocky shoreline, and native emergent and submergent vegetation. Standing timber was also present. Eurasian watermilfoil, a non-native aquatic plant, was also present, but in small quantities. Boat access consisted of three public boat ramps with parking, boarding piers, and ample illumination. Bank fishing access near each boat ramp was augmented by a fishing pier. Further information about Nocona Reservoir and its facilities can be obtained by visiting the Texas Parks & Wildlife Department (TPWD) website at www.tpwd.state.tx.us and navigating within the fishing link. Other descriptive characteristics for Nocona Reservoir are in Table 1.

*Management History*

**Previous management strategies and actions:** Management strategies and actions from the previous survey report (Hysmith and Moczygemba 2008) included:

1. Conduct an 18—day spring-quarter creel survey in spring 2009.
   **Action:** A 9-day spring-quarter creel survey was considered adequate. The creel was conducted in spring 2009. Results of the survey were discussed in this report.
2. Conduct a supplemental electrofishing survey in the fall of 2008 to monitor the largemouth bass population.
   **Action:** Supplemental electrofishing was conducted in the fall of 2008, but legal-size largemouth decreased. More results are discussed in this report.
3. Increase the trap netting to 10nn in fall 2008 and 2009.
   **Action:** Supplemental trap netting was conducted in 2008 (10 net nights [nn]) and 2009 (5 nn) and the standard trap netting survey was increased to 10 nn to gain more information on the crappie population. Results of extra effort are discussed in this report.

**Harvest regulation history:** Sport fishes in Nocona Reservoir are currently managed with statewide regulations (Table 2).

**Stocking history:** Nocona Reservoir was first stocked in 1976 with 8,500 adult threadfin shad (Table 3). In 2003 another 1,295 adult threadfin shad were stocked. Florida largemouth bass fingerlings were stocked at 57/acre in 1981 and 56/acre in 1982. ShareLunker largemouth bass fingerlings (2,220) were stocked in 2010 after a ShareLunker largemouth bass was caught in spring of 2010. From 1983 through 1997, 104,256 Palmetto bass fingerlings were stocked.

**Vegetation/habitat history:** Nocona Reservoir supported mostly native emergent vegetation (Table 4). Other fish habitat consisted of rocky shoreline and native submergent vegetation. Historically, non-native Eurasian watermilfoil was common and problematic (Hysmith and Moczygemba 1994 and 1997). Currently it occupies approximately 1 acre and is not problematic (Table 4).

**Water Transfer:** Nocona Reservoir is primarily used for municipal water supply, recreation, and, to a lesser extent, flood control. Nocona Reservoir receives no water from nor transfers any water to another water body.

## METHODS

Fishes were collected by electrofishing (1 hour at 12 5-min stations), gill netting (5 net nights at 5 stations), and trap netting (10 net nights at 10 stations). A supplemental bass-only electrofishing (1 hour at 12 5-min stations) survey was conducted in fall 2008. Supplement trap net surveys were carried out in fall of 2008 (10 net nights at 10 stations) and 2009 (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 gill and trap nets, as the number of fish caught 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). Habitat, vegetation, and access surveys were also conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

Sampling statistics (CPUE for various length categories) and 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 SE was calculated for structural indices and IOV. Ages were determined using Category 2 protocol according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011). The manual specifies procedures for largemouth bass age-and-growth analysis, but we adapted channel catfish and white crappie to the protocol. Source for water level data was the United States Geological Survey (USGS) website.

A creel survey was conducted over a 3-month period from March, 2009 to May, 2009. Interviews were conducted on 5 weekend days and 4 weekdays per quarter, to assess angler use and fish catch/harvest rate in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2011).

## RESULTS AND DISCUSSION

**Habitat:** Littoral zone habitat consisted primarily of native emergent vegetation, and rocky shoreline (Table 4). Native emergent vegetation provided good habitat and has expanded since July 2010 because of the prolonged drought.

**Creel:** This was the first survey for Nocona Reservoir. Survey statistics for the 3-month creel survey are shown in Tables 5 and 6. The creel showed largemouth bass and white crappie to be the most sought-after fish, which is what anecdotal information had indicated. Together they accounted for over 60% of the directed angling pressure. Anglers spent almost $85,000 in their pursuit of sportsfish at Nocona Reservoir during the spring of 2009.

**Prey species:** Electrofishing catch rates of gizzard shad and bluegill were 274.0/h and 79.0/h, respectively. Index of vulnerability (IOV) for gizzard shad was higher than 2007, indicating over 80% of gizzard shad sampled were available to existing predators (Figure 2). The electrofishing CPUE of 79.0 for bluegill was lower than previous surveys and the lake average (Figure 3 and Appendix C). The catch rate of threadfin shad (1284.0/h) was the highest since their successful re-introduction in 2003 (Appendix C). The excellent shad abundance provides more than an adequate forage base.

**Catfishes:** Gill net CPUE of 1.4/nn for blue catfish in 2012 almost doubled the CPUE of 2008 (Figure 4). There was evidence of reproduction with collection of a 10-inch blue catfish. Although no directed pressure was recorded for blue catfish, anglers harvested 87 fish, all legal size (Table 7 and Figure 5).

The gill net CPUE of 3.6/nn for channel catfish in 2012 (Figure 6), was higher than recent surveys. Growth was slow with channel catfish taking 4 years to reach legal size (N=5; range 4-6 years), and average relative weights for stock-size fish indicated poor body condition ($W_r$ range = 74 – 80). Reproduction was evident. Catfish anglers spent 532 hours fishing for channel catfish with a 0.25/hour catch rate (Table 8). They harvested 214 channel catfish from 16- to 19-inches (Figure 7).

**Temperate basses:** Gill net CPUE of 0.2/nn for white bass in 2012 (Figure 8) was the lowest on record (Appendix C). Historically, CPUE of white bass has been <2.0/nn since 1996 (Appendix C). The drought conditions for the past two years have severely restricted inflow into Nocona Reservoir; therefore not providing good conditions for white bass reproduction. The population will always be minimal because inflow fluctuates greatly from year to year. The angling effort was also low; especially considering this was a spring survey, when white bass would be running the creeks to spawn (Table 9). However anglers did manage to harvest over 1,400 fish, which was the second highest sportfish harvest for spring 2009 (Table 9). The harvested white bass were between 11 and 13 inches total length (TL; Figure 9).

Last stocked in 1997, palmetto bass were not collected during this survey (Figure 10). The highest CPUE was in 1999 when 13.2/nn was recorded. Since then the catch rate has dropped with the last palmetto bass being caught in 2008, which was 11 years since the last stocking. Anecdotal information indicated no palmetto bass have been caught by anglers in several years and none were observed during the spring creel, 2009. Therefore it unlikely that any palmetto bass still exist in Nocona Reservoir.

**Largemouth bass:** Electrofishing total CPUE (123.0/h) was the highest recorded for largemouth bass since 1996 (Figure 11, Appendix C). The stock CPUE increased over past surveys (Figure 11). A PSD of 27 was lower than past surveys, but a PSD-14 of 16 was the highest in past surveys, and for the first time since 2005 fish up to 24 inches TL were collected. In contrast, a supplemental electrofishing survey in 2008 found the stock CPUE of largemouth bass decreased from the 2007 survey and no bass over 17 inches were collected (Figure 11). Relative weight of stock largemouth bass indicated poor body condition (average $W_r$ 83.6 [range = 49 – 110]), however the $W_r$'s increased with the larger fish (Figure 11). Largemouth bass exhibited slow growth, requiring 4 years to become legal (N = 7; range 2 - 4 years). Largemouth bass were the most sought-after fish at Nocona Reservoir (Table 5) with anglers spending 4.17 hours/acre seeking this species (Table 10). Largemouth bass anglers harvested 932 fish up to 18 inches TL (Figure 12), which included mostly released bass from tournament anglers. The tournament catch/ non-tournament harvest ratio was 4.75, exceeding the 3.0 ratio, recognized by Allen et al. (2004) to have detrimental effects on a largemouth bass population over 12 inches TL. The improved largemouth bass size structure observed this survey may indicate tournaments are not having a harmful effect on the adult largemouth bass population.

**White crappie:** Trap net CPUE of 9.9/nn (Figure 13) for white crappie was well below the reservoir's average CPUE of 17.1/nn (Appendix C). However, the cyclical nature of crappie populations is shown by the 2009 supplemental trap netting, when the white crappie CPUE was 38.8, the highest on record, while the 2008 supplemental trap netting produced the lowest on record (Figure 13 and Appendix C). Average relative weight was higher than in previous years. Growth was good and white crappie grew to 10 inches in 2 years (N=11; all 2 years old). The white crappie angler catch rate of 1.13/hour (Table 11) was the highest catch rate for any sportsfish during the spring of 2009. The harvest was made up of mostly 10- and 11-inch fish (Figure 14).

**Fisheries management plan for Nocona Reservoir, Texas**

Prepared – July 2012.

**ISSUE 1:** The sport fishery in Nocona Reservoir, especially largemouth bass and crappie, is improving.

MANAGEMENT STRATEGY

1. Publicize these improvements through news releases and TPWD social media.

**ISSUE 2:** 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 North Montague County Water Supply District personnel to post appropriate signage at access points around the reservoir.
2. Contact and educate North Montague County Water Supply District personnel about invasive species, and provide them with posters, literature, etc… so that they can in turn educate their reservoir visitors.
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) future inter-basin water transfers to facilitate potential invasive species responses.

**SAMPLING SCHEDULE JUSTIFICATION:**

The proposed sampling schedule consists of mandatory monitoring in 2015/2016 (Table 12).

LITERATURE CITED

Allen, M. S., M.W. Rogers, R.A. Myers, and W.M. Bivin. 2004. Simulated impacts of tournament-associated mortality on largemouth bass fisheries. North American Journal of Fisheries Management 24: 1252-1261.

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.

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. 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

Hysmith, B. T. and J. H. Moczygemba. 2008. Statewide freshwater fisheries monitoring and management program survey report for Nocona Reservoir, 2007. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-33, Austin.

Hysmith, B. T. and J. H. Moczygemba. 1997. Statewide freshwater fisheries monitoring and management program survey report for Nocona Reservoir, 1996. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-22, Austin.

Hysmith, B. T. and J. H. Moczygemba. 1994. Statewide freshwater fisheries monitoring and management program survey report for Nocona Reservoir, 1993. Texas Parks and Wildlife Department, Federal Aid Report F-30-R-19, Austin.

Texas Commission on Environmental Quality. 2011. Trophic classification of Texas reservoirs. 2010 Texas Water Quality Inventory and 303(d) List, Austin. 18 pp.

Texas Commission on Environmental Quality. 2008. Reservoir and lake use support assessment report. 15 pp.

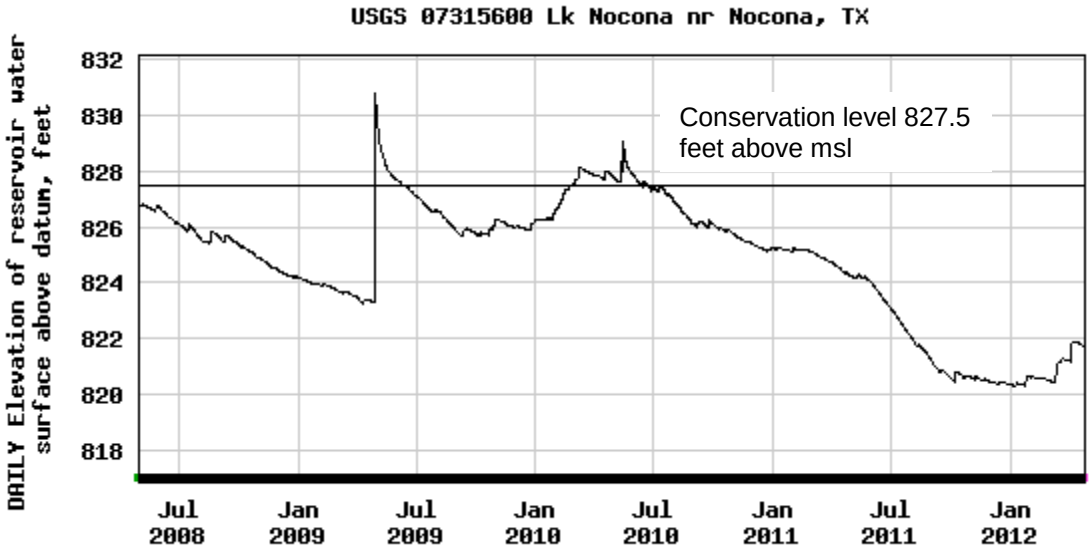



Figure 1. Daily mean average water level elevations in feet above mean sea level (msl) recorded for Nocona Reservoir (U.S. Geological Survey. 2012. USGS real time water data for USGS 07315600 Lk Nocona near Nocona, Texas. http://waterdata.usgs.gov/nwis/dv), Texas, May 2008-April, 2012.

Table 1. Characteristics of Nocona Reservoir, Texas.

| Characteristic | Description |
|---|---|
| Year constructed | 1961 |
| Controlling authority | North Montague County Water Supply District |
| County | Montague |
| Reservoir type | Offstream |
| Shoreline development index | 9.3 |
| Conductivity | 707 µmhos/cm |

Table 2. Harvest regulations for Nocona Reservoir.

| Species | Bag Limit | Length Limit (inches) |
|---|---|---|
| Catfish: channel and blue catfish, their hybrids and subspecies | 25 (in any combination) | 12 minimum |
| Catfish, flathead | 5 | 18 minimum |
| Bass, white | 25 | 10 minimum |
| Bass, palmetto | 5 | 18 minimum |
| Bass, largemouth | 5 | 14 minimum |
| Crappie: white and black crappie, their hybrids and subspecies. | 25 (in any combination) | 10 minimum |

Table 3. Stocking history of Nocona, Texas. Life stages are fingerlings (FGL), advanced fingerlings (AFGL), adults (ADL) and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

| Species | Year | Number | Life Stage | Mean TL (in) |
|---|---|---|---|---|
| Florida Largemouth Bass | 1981 | 75,600 | FGL | 2.0 |
| | 1982 | 73,692 | FGL | 2.5 |
| | Total | 149,292 | | |
| Northern Pike x Muskellunge | 1976 | 747 | | UNK |
| | Total | 747 | | |
| Palmetto Bass (striped X white bass hybrid) | 1983 | 16,362 | UNK | UNK |
| | 1994 | 23,700 | FGL | 1.6 |
| | 1995 | 29,439 | FGL | 1.3 |
| | 1996 | 20,055 | FGL | 1.9 |
| | 1997 | 14,700 | FGL | 1.3 |
| | Total | 104,256 | | |
| ShareLunker Largemouth Bass | 2010 | 2,220 | FGL | 2.5 |
| | Total | 2,220 | | |
| Threadfin shad | 1976 | 8,500 | ADL | 2.9 |
| | 1984 | 1,500 | ADL | 3.0 |
| | 1985 | 700 | ADL | 3.0 |
| | 2003 | 1,295 | ADL | 3.1 |
| | Total | 11,995 | | |

Table 4. Survey of shoreline habitat and littoral and pelagic habitat types, Nocona Reservoir, Texas, 2011. A linear shoreline distance (miles) and percent of total was recorded for each shoreline habitat type found. Surface area (acres) and percent of total was determined for each type of littoral and pelagic habitat type found.

| | Shoreline distance | | Surface area | |
|---|---|---|---|---|
| | Miles | % of total | Coverage (acres) | % of total |
| Shoreline habitat type | | | | |
| Bulkhead | 0.5 | 2.2 | | |
| Gravel | 1.0 | 4.4 | | |
| Natural shoreline | 1.5 | 6.5 | | |
| Rocky shoreline | 0.3 | 1.3 | | |
| Littoral and pelagic habitat type | | | | |
| Standing timber, stumps | | | 5.0 | 0.4 |
| Native emergent$_a$ | | | 66.2 | 5.0 |
| Native submersed$_b$ | | | 1.0 | <0.1 |
| Eurasian watermilfoil | | | 1.0 | <0.1 |
| Open water | | | 1247.6 | 94.3 |
| Piers, boat docks, marinas | | | 2.2 | 0.2 |

$_a$Common cattail, Bulrush, & Common buttonbush
$_b$ Muskgrass

Table 5. Percent directed angler effort by species for Nocona Reservoir, Texas, March 2009 - May 2009.

| | Year |
|---|---|
| Species | 2009 |
| Channel catfish | 3.7 |
| White bass | 0.8 |
| Largemouth bass | 39.2 |
| White crappie | 30.8 |
| Anything | 25.5 |

Table 6. Total fishing effort (h) for all species and total directed expenditures at for Nocona Reservoir, Texas, March 2009 - May 2009.

| | Year |
|---|---|
| Creel Statistic | 2009 |
| Total fishing effort | 14,497h |
| Total directed expenditures | $84,881.00 |

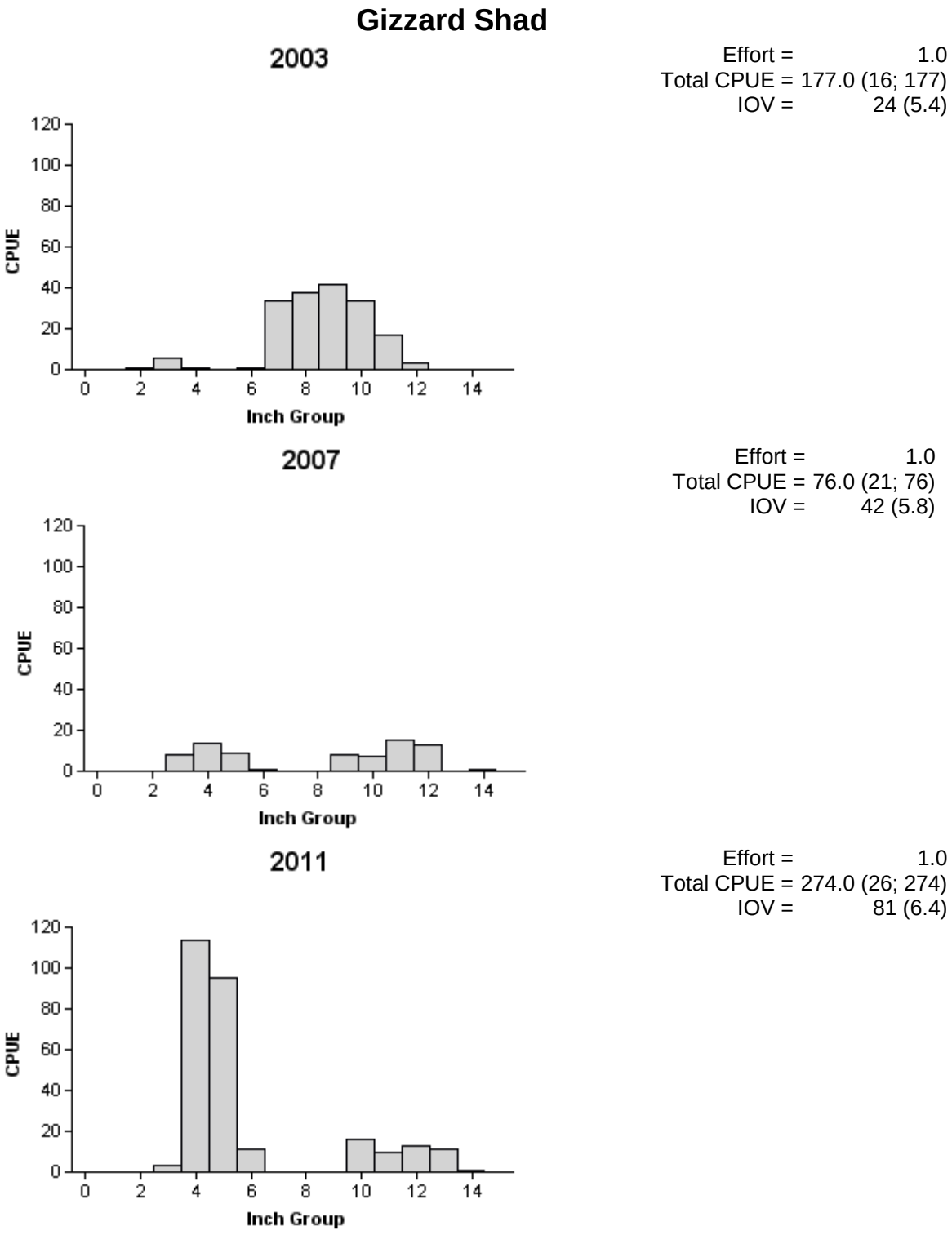
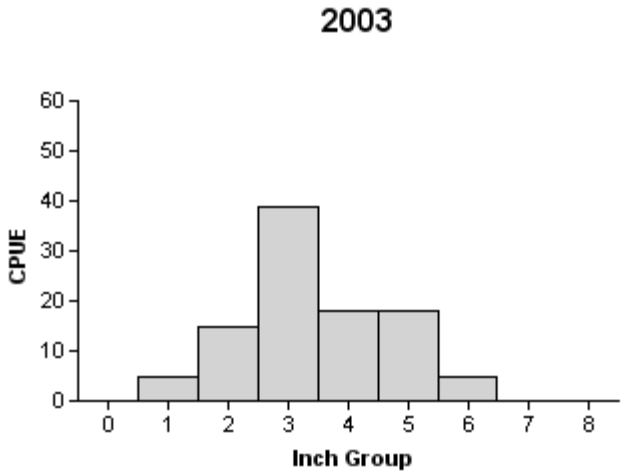
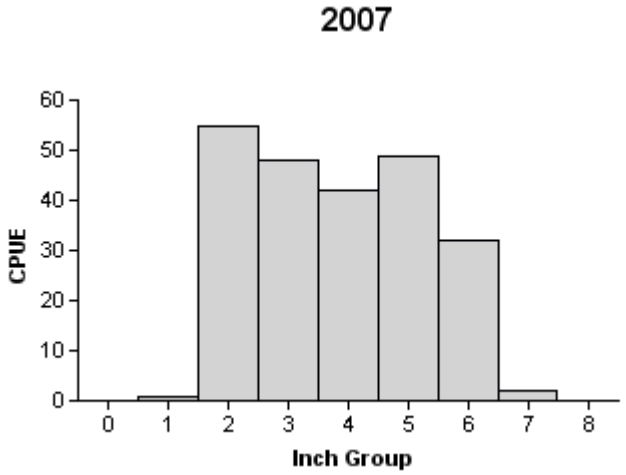



Figure 2. Number of gizzard shad caught per hour (CPUE) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Nocona Reservoir, Texas 2003, 2007, and 2011.

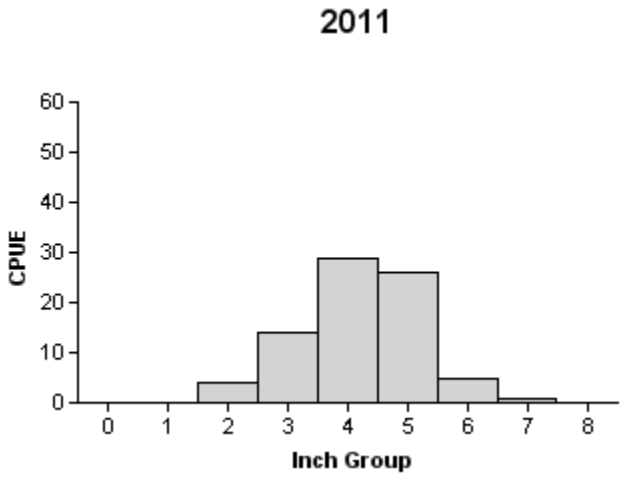
# Bluegill




Effort = 1.0
Total CPUE = 100.0 (39; 100)
PSD = 6 (2)




Effort = 1.0
Total CPUE = 229.0 (16; 229)
PSD = 20 (3.7)




Effort = 1.0
Total CPUE = 79.0 (21; 79)
PSD = 8 (4.2)

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, Nocona Reservoir, Texas, 2003, 2007, and 2011.

# Blue Catfish

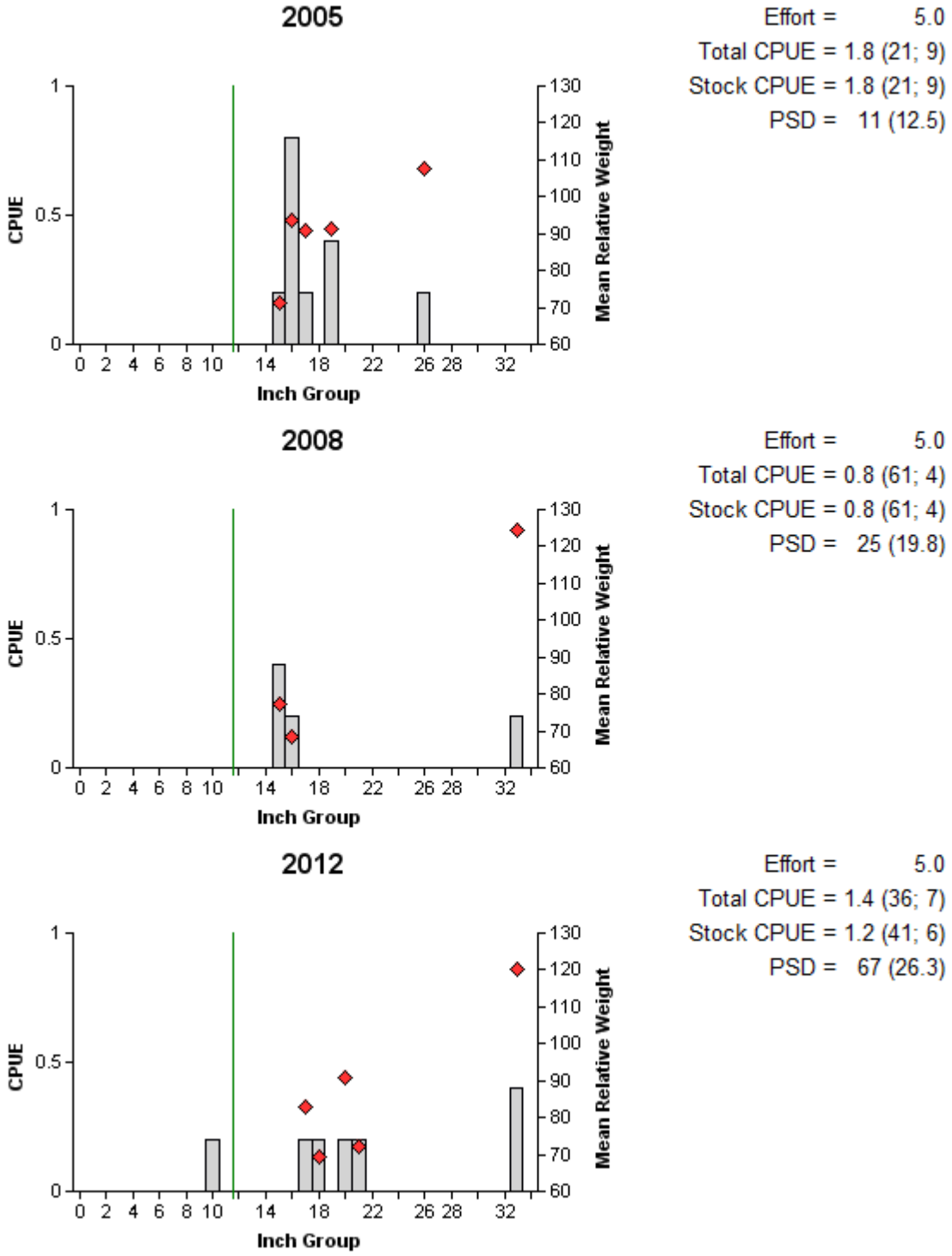



Figure 4. Number of blue catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Nocona Reservoir, Texas, 2005, 2008, and 2012. Vertical lines represent length limit at time of collection.

Table 7. Creel survey statistics for blue catfish at Nocona Reservoir, Texas from March 2009 – May 2009, where the total harvest is the estimated number of blue catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

| | Year |
|---|---|
| Creel Survey Statistic | 2009 |
| Total harvest | 87 (270) |
| Harvest/acre | 0.06 |

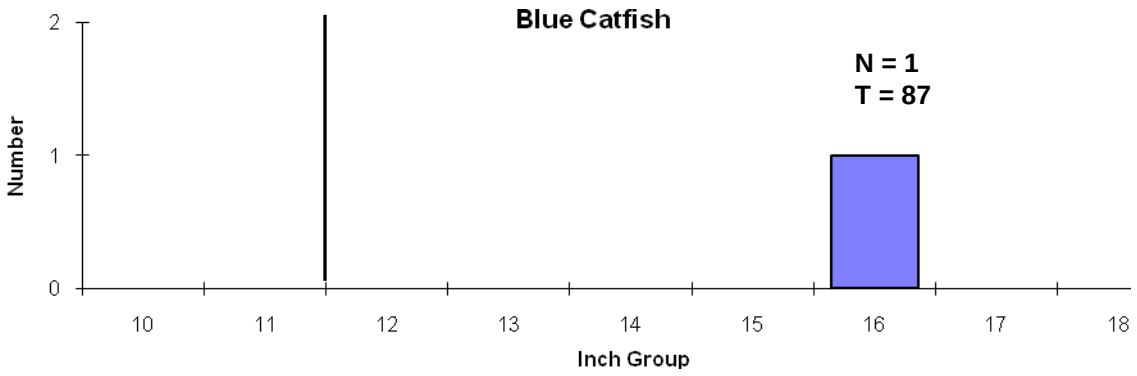



Figure 5. Length frequency of harvested blue catfish observed during creel surveys at Nocona Reservoir, Texas, March 2009 through May 2009, all anglers combined. N is the number of harvested blue catfish observed during creel surveys, and T is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

# Channel Catfish

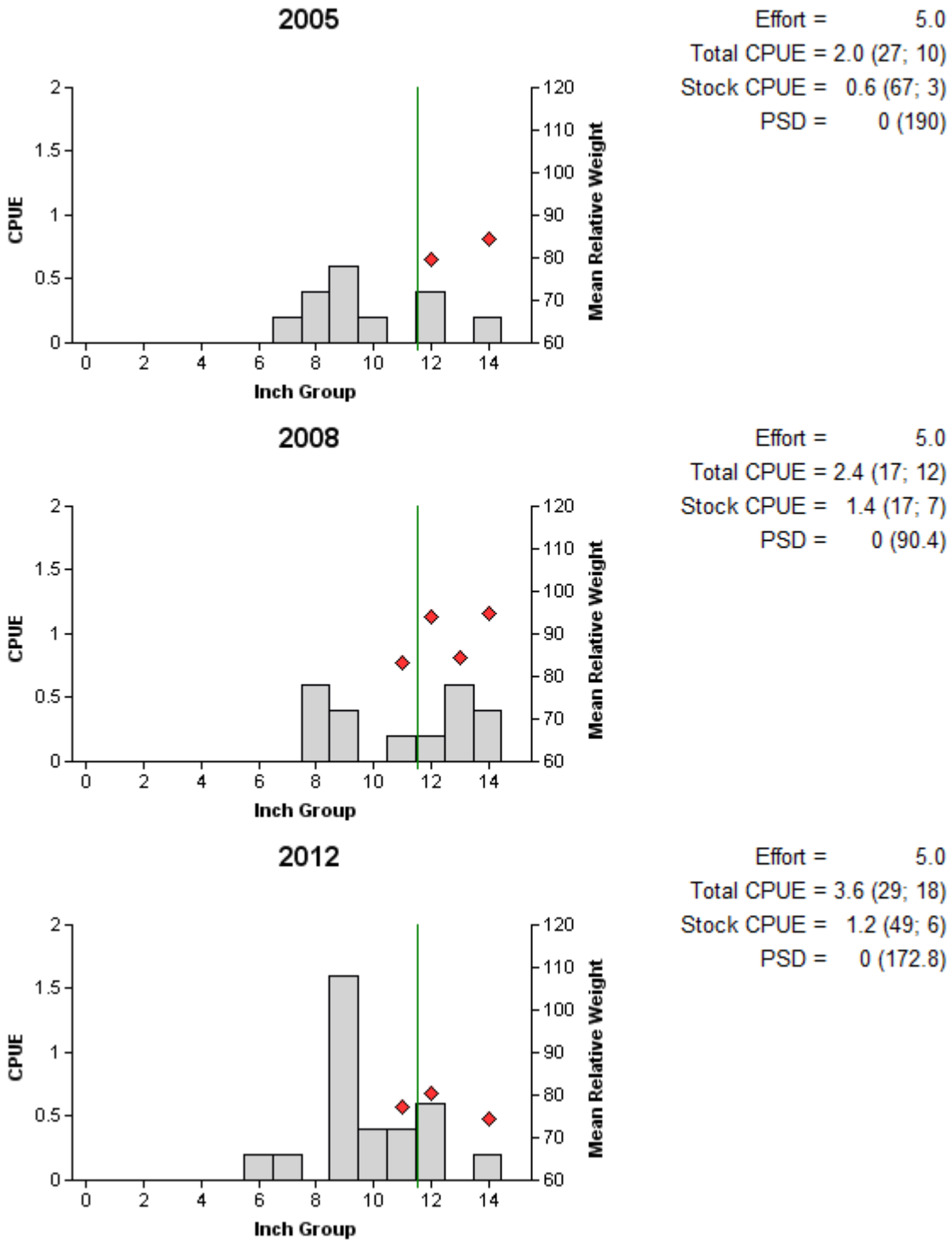



Figure 6. Number of channel catfish caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Nocona Reservoir, Texas, 2005, 2008, and 2012. Vertical lines represent length limit at time of collection.

Table 8. Creel survey statistics for channel catfish at Nocona Reservoir, Texas from March 2009 – May 2009, where total catch per hour is for anglers targeting channel catfish and total harvest is the estimated number of channel catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses.

| | Year |
|---|---|
| Creel Survey Statistic | 2009 |
| Directed effort (h) | 532.09 (66) |
| Directed effort/acre | 0.39 |
| Total catch per hour | 0.25 (100) |
| Total harvest | 214 (183) |
| Harvest/acre | 0.15 |

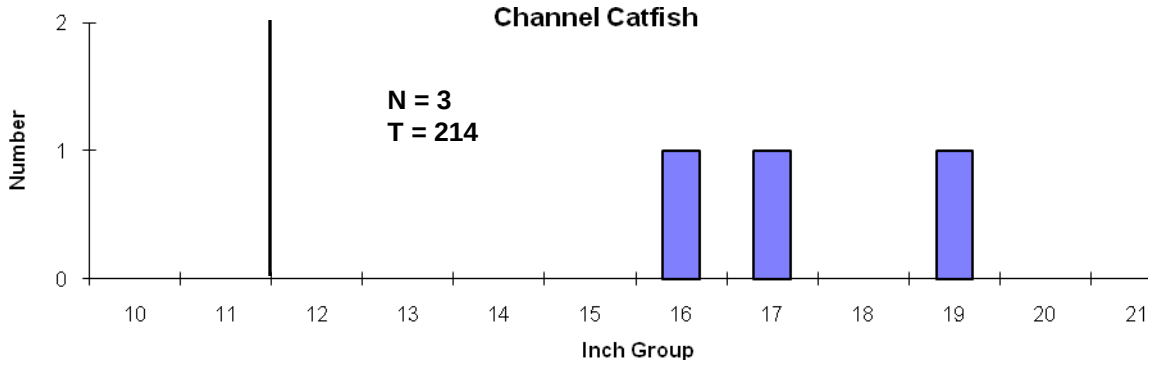



Figure 7. Length frequency of harvested channel catfish observed during creel surveys at Nocona Reservoir, Texas, March 2009 through May 2009, all anglers combined. N is the number of harvested channel catfish observed during creel surveys, and T is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

# White Bass

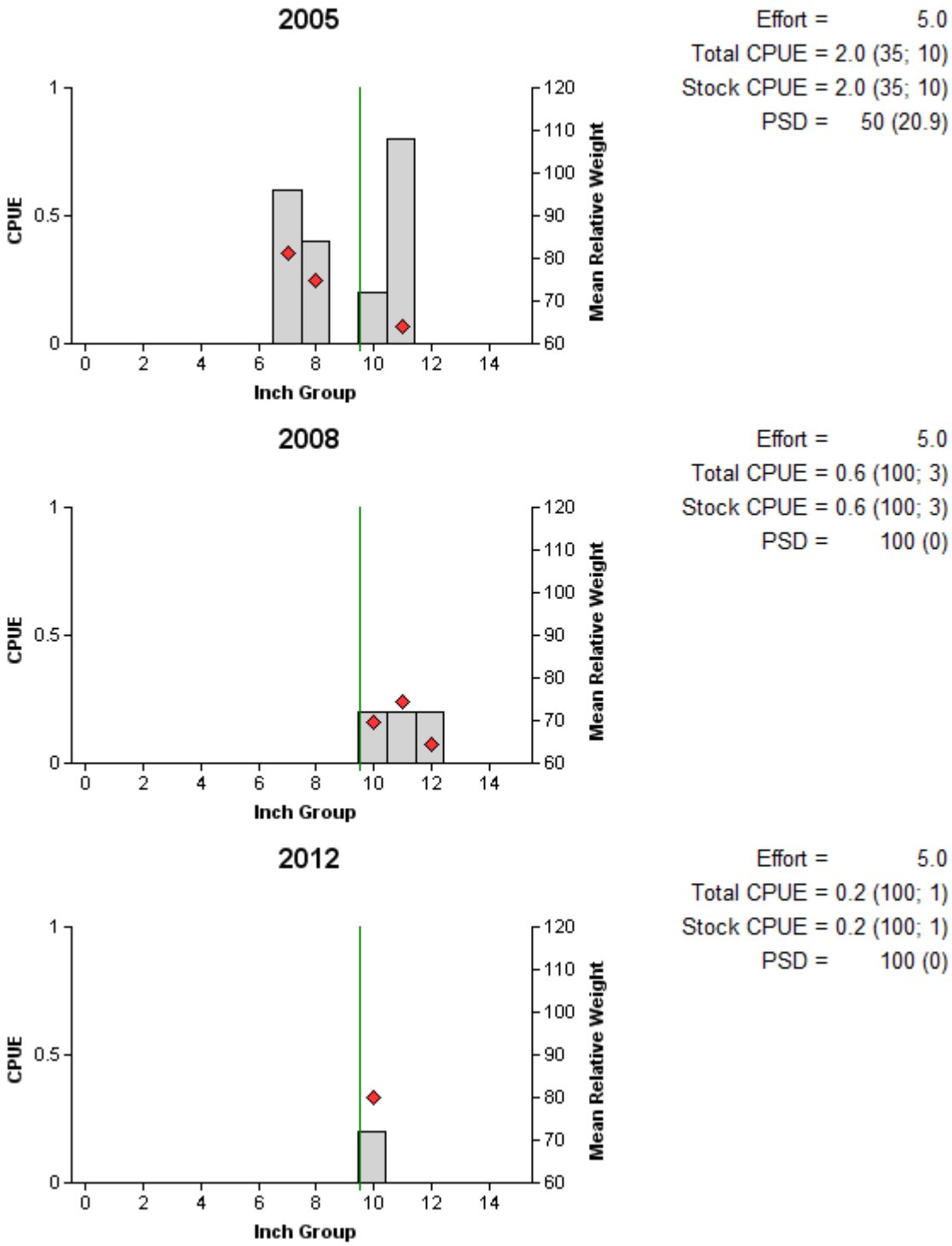



Figure 8. Number of white bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Nocona Reservoir, Texas, 2005, 2008, and 2012. Vertical lines represent length limit at time of collection.

Table 9. Creel survey statistics for white bass at Nocona Reservoir, Texas from March 2009 – May 2009, where 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.

| | Year |
|---|---|
| Creel Survey Statistic | 2009 |
| Directed effort (h) | 112.68 (120) |
| Directed effort/acre | 0.08 |
| Total catch per hour | 0.00 (0) |
| Total harvest | 1,418 (55) |
| Harvest/acre | 1.04 |

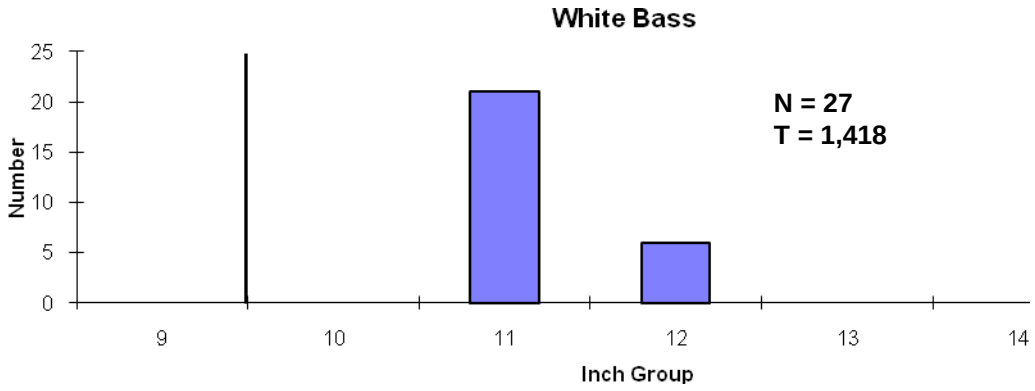



Figure 9. Length frequency of harvested white bass observed during creel surveys at Nocona Reservoir, Texas, March 2009 through May 2009, all anglers combined. N is the number of harvested white bass observed during creel surveys, and T is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

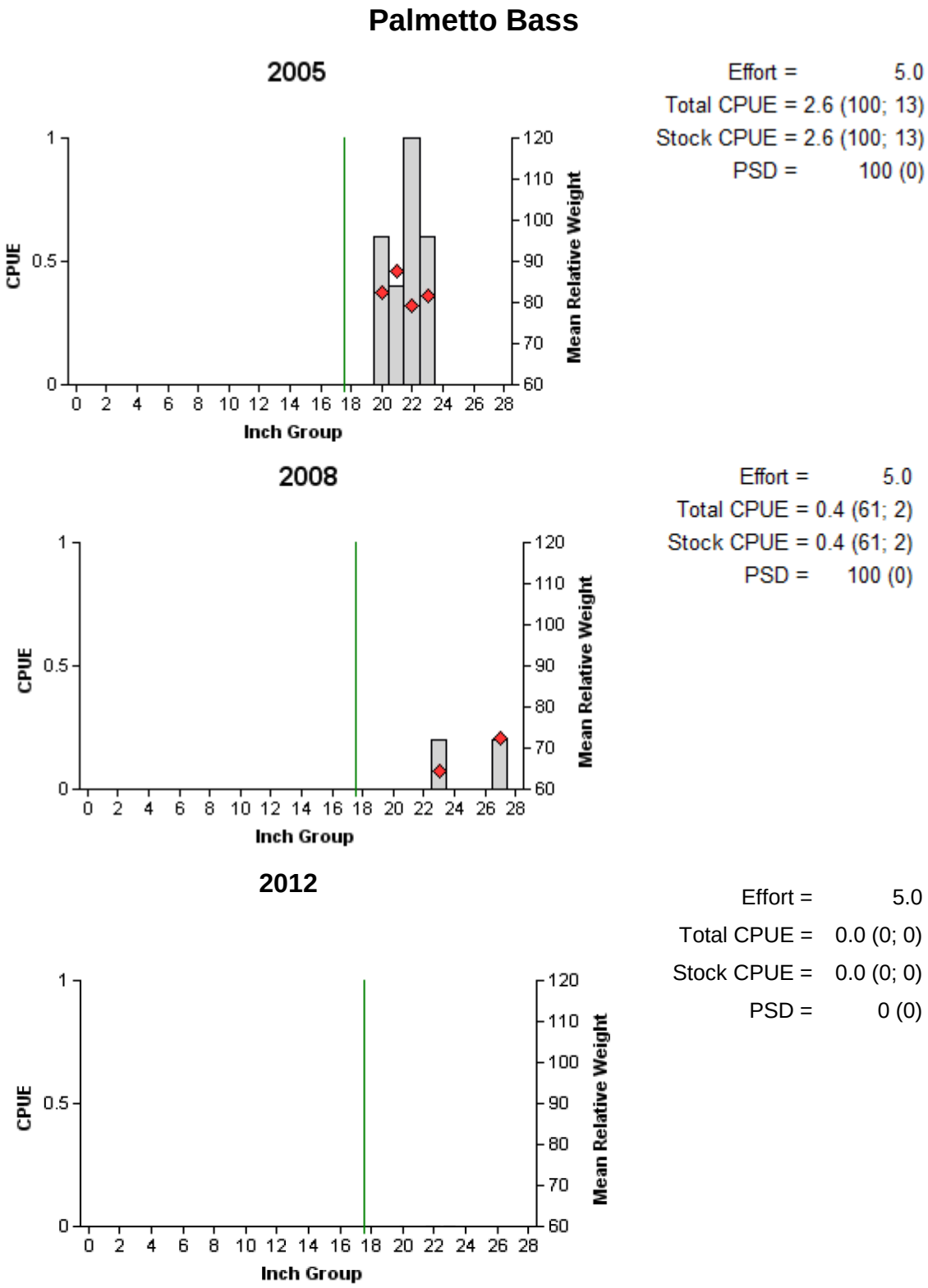
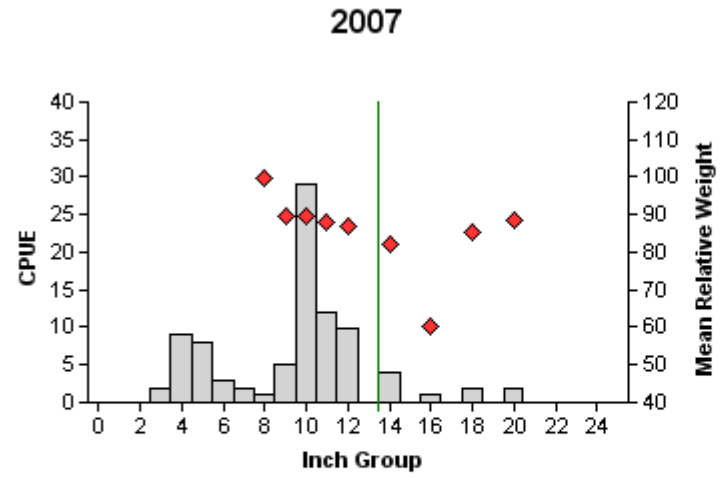
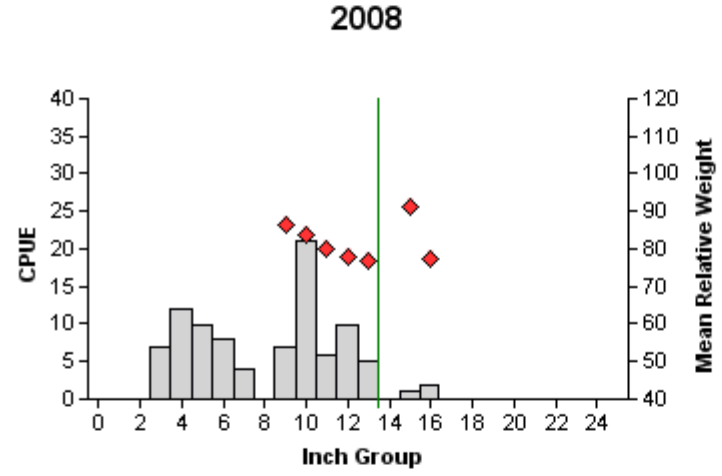



Figure 10. Number of palmetto bass caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Nocona Reservoir, Texas, 2005, 2008, and 2012. Vertical lines represent length limit at time of collection.

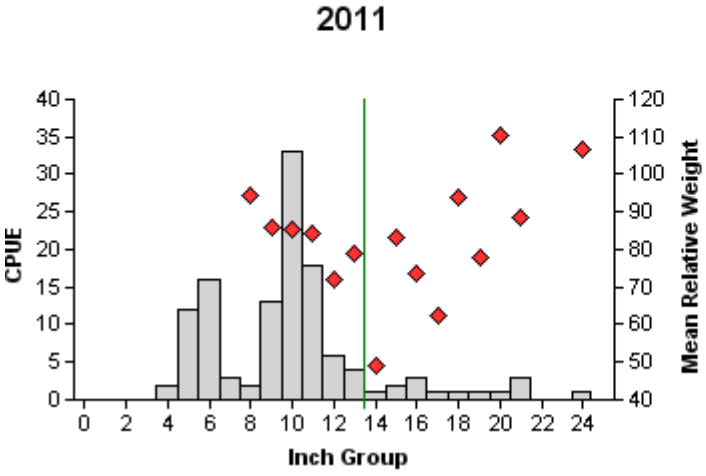
# Largemouth Bass




Effort = 1.0
Total CPUE = 90.0 (14; 90)
Stock CPUE = 66.0 (17; 66)
PSD = 29 (5.1)
PSD-14 = 14 (3.8)




Effort = 1.0
Total CPUE = 93.0 (11; 93)
Stock CPUE = 52.0 (11; 52)
PSD = 35 (5.8)
PSD-14 = 6 (3.3)




Effort = 1.0
Total CPUE = 123.0 (14; 123)
Stock CPUE = 90.0 (18; 90)
PSD = 27 (6.1)
PSD-14 = 16 (4.7)

Figure 11. Number of largemouth bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Nocona Reservoir, Texas, 2007, 2008, and 2011. Vertical lines represent length limit at time of collection.

Table 10. Creel survey statistics for largemouth bass at Nocona Reservoir, Texas from March 2009 – May 2009, where total catch per hour is for anglers targeting largemouth bass and total harvest is the estimated number of largemouth bass harvested by all anglers. Relative standard errors (RSE) are in parentheses.

| | Year |
|---|---|
| Creel Survey Statistic | 2009 |
| Directed effort (h) | 5,685.53 (20) |
| Directed effort/acre | 4.17 |
| Total catch per hour | 0.86 (14) |
| Total harvest | 932.28 (70) |
| Harvest/acre | 0.68 |

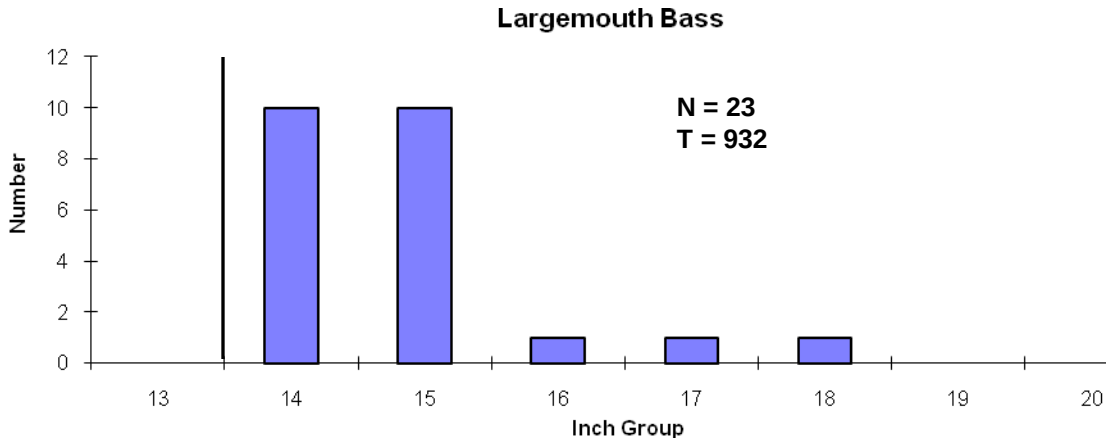



Figure 12. Length frequency of harvested largemouth bass observed during creel surveys at Nocona Reservoir, Texas, March 2009 through May 2009, all anglers combined. N is the number of harvested largemouth bass observed during creel surveys, and T is the total estimated harvest for the creel period. Vertical lines represent length limit at time of creel survey.

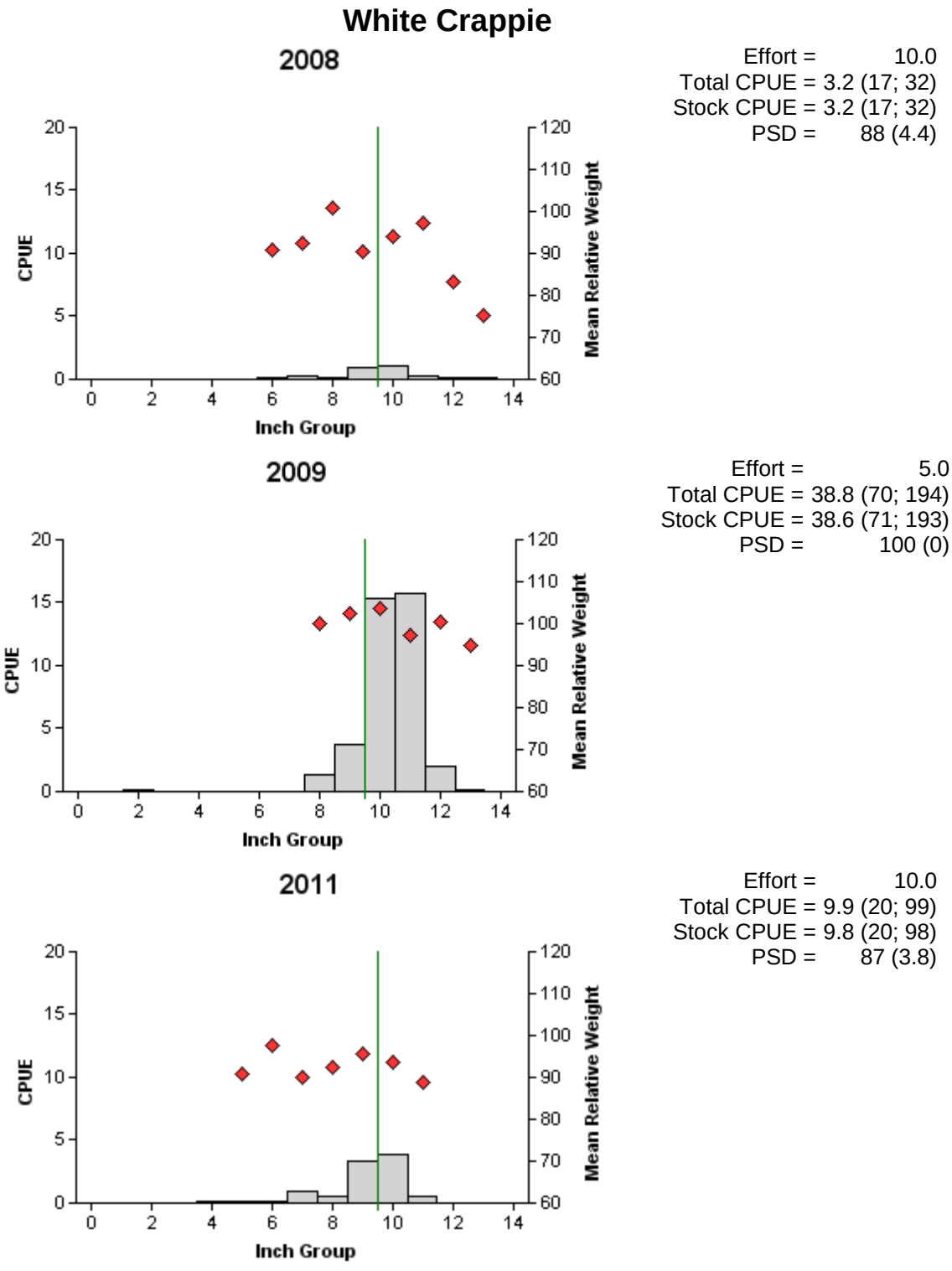



Figure 13. Number of white crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap netting surveys, Nocona Reservoir, Texas, 2008, 2009, and 2011. Vertical lines represent length limit at time of collection.

Table 11. Creel survey statistics for white crappie at Nocona Reservoir, Texas from March 2009 – May 2009, where total catch per hour is for anglers targeting white crappie and total harvest is the estimated number of white crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses.

| | Year |
|---|---|
| Creel Survey Statistic | 2009 |
| Directed effort (h) | 4,463.23 (26) |
| Directed effort/acre | 3.28 |
| Total catch per hour | 1.13 (35) |
| Total harvest | 3873.63 (61) |
| Harvest/acre | 2.84 |

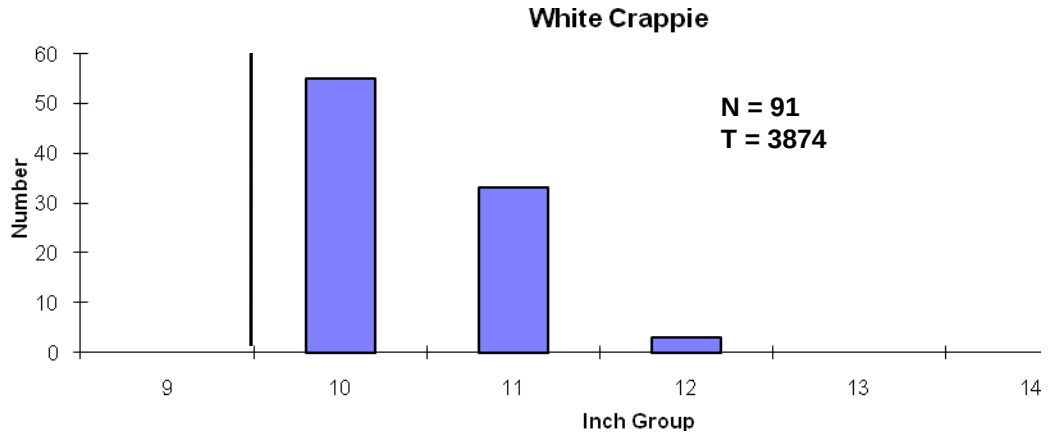



Figure 14. Length frequency of harvested white crappie observed during creel surveys at Nocona Reservoir, Texas, March 2009 through May 2009, all anglers combined. N is the number of harvested white crappie observed during creel surveys, and T is the total estimated harvest for the creel period. Vertical line represents length limit at time of creel survey.

Table 12. Proposed sampling schedule for Nocona Reservoir, Texas. Electrofishing and trap netting surveys are conducted in the fall, while gill netting surveys are conducted during the following spring. Standard survey denoted by S.

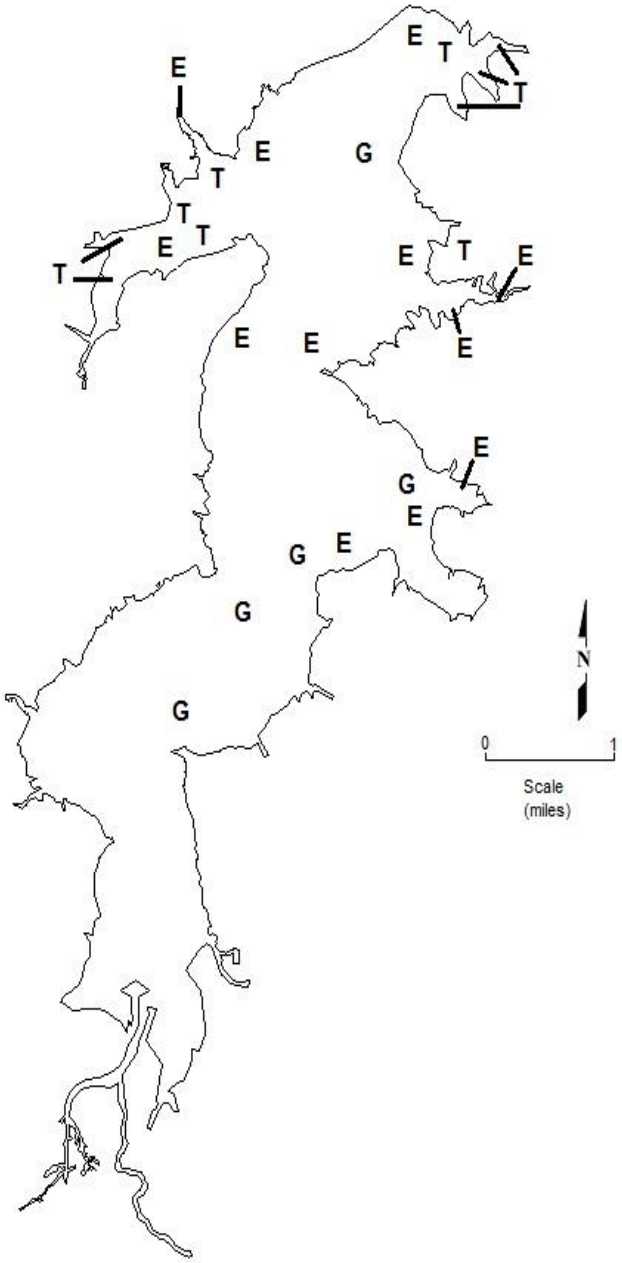
| Survey Year | Electrofisher | Trap Net | Gill Net | Creel Survey | Vegetation Survey | Access Survey | Report |
|---|---|---|---|---|---|---|---|
| Fall 2012-Spring 2013 | | | | | | | |
| Fall 2013-Spring 2014 | | | | | | | |
| Fall 2014-Spring 2015 | | | | | | | |
| Fall 2015-Spring 2016 | S | S | S | | S | S | S |

## APPENDIX A

Number (N) and catch rate (CPUE) of all target species collected from all gear types from Nocona Reservoir, Texas, 2011-2012.

| | Gill Netting | | Trap Netting | | Electrofishing | |
|---|---|---|---|---|---|---|
| Species | N | CPUE | N | CPUE | N | CPUE |
| Gizzard shad | | | | | 274 | 274.0 |
| Threadfin shad | | | | | 1284 | 1284.0 |
| Blue catfish | 7 | 1.4 | | | | |
| Channel catfish | 18 | 3.6 | | | | |
| Flathead catfish | 2 | 0.4 | | | | |
| White bass | 1 | 0.2 | | | | |
| Green sunfish | | | | | 1 | 1.0 |
| Warmouth | | | | | 3 | 3.0 |
| Bluegill | | | | | 79 | 79.0 |
| Longear sunfish | | | | | 11 | 11.0 |
| Redear sunfish | | | | | 3 | 3.0 |
| Largemouth bass | | | | | 123 | 123.0 |
| White crappie | | | 99 | 9.9 | | |

**APPENDIX B**




Location of sampling sites, Nocona Reservoir, Texas, 2011-2012. Trap netting, gill netting, and electrofishing are indicated by T, G, and E, respectively. Water level was 6 feet below conservation for trap netting, electrofishing, and gill netting.

## APPENDIX C

Catch rates (CPUE) of targeted species by gear type for Nocona Reservoir, Texas, 1996, 1999, 2003- 2005, 2007-2009, 2011, and 2012.

| | | Year | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gear | Species | 1996 | 1999 | 2003 | 2004[a] | 2005[b] | 2007[c] | 2008[a] | 2009 | 2011 | 2012 | **Avg.** |
| Gill Net | Blue catfish | 6.8 | 4.4 | | 1.4 | 1.8 | | 0.8 | | | 1.4 | **2.8** |
| (fish/net night) | Channel catfish | 1.8 | 1.0 | | 5.0 | 2.0 | | 2.4 | | | 3.6 | **2.6** |
| | Flathead catfish | 0.4 | 0.0 | | 0.2 | 0.0 | | 0.2 | | | 0.4 | **0.2** |
| | White bass | 1.4 | 1.8 | | 1.4 | 2.0 | | 0.6 | | | 0.2 | **1.2** |
| | Palmetto bass | 2.6 | 13.2 | | 0.0 | 2.6 | | 0.4 | | | 0.0 | **3.1** |
| Electrofisher | Gizzard shad | 120.7 | 362.0 | 177.0 | | 80.0 | 76.0 | | | 274.0 | | **181.6** |
| (fish/hour) | Threadfin shad | 0.0 | 0.0 | 138.0 | | 22.0 | 656.0 | | | 1284.0 | | **350.0** |
| | Green sunfish | 10.0 | 3.0 | 5.0 | | | 10.0 | | | 1.0 | | **5.8** |
| | Warmouth | 4.7 | 2.0 | 0.0 | | | 2.0 | | | 3.0 | | **2.9** |
| | Bluegill sunfish | 36.0 | 41.0 | 100.0 | | | 229.0 | | | 79.0 | | **97.0** |
| | Longear sunfish | 4.0 | 7.0 | 30.0 | | | 70.0 | | | 11.0 | | **24.4** |
| | Redear sunfish | 4.0 | 3.0 | 6.0 | | | 9.0 | | | 3.0 | | **5.0** |
| | Largemouth bass | 129.3 | 80.0 | 70.0 | 72.0 | 48.0 | 90.0 | 93.0 | | 123.0 | | **88.2** |
| Trap Net | White crappie | 28.4 | 16.0 | 17.8 | | | 5.4 | 3.2 | 38.8 | 9.9 | | **17.1** |
| (fish/net night) | | | | | | | | | | | | |

[a]Bass only electrofishing survey.
[b]Bass and shad only electrofishing survey.
[c]Electrofishing survey was conducted using a 7.5 Smith-Root GPP (Gas Powered Pulsator). Electrofishing surveys prior to 2007 were conducted using a Smith-Root 5.0 GPP.