ANNUAL REPORT

OKLAHOMA DEPARTMENT OF WILDLIFE CONSERVATION

OKLAHOMA PADDLEFISH

RESEARCH AND MANAGEMENT

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EXECUTIVE SUMMARY

Statewide management of Oklahoma Paddlefish prioritizes sustainable fisheries in naturally recruiting stocks. Therefore, our regulatory framework provides recreational snagging opportunities with moderated harvest. Management activities in 2025 primarily consisted of standardized winter gillnetting, which encountered 1,323 Paddlefish on three reservoirs- Eufaula, Grand, and Keystone with the assistance of regional management staff and US Fish and Wildlife Service staff. The status of Paddlefish in Oklahoma is overall stable. Multiple observations of recruitment in recent years (i.e., 2017, 2019) have provided stocks with young fish that are recruiting to Oklahoma snag fisheries.

Net catches on Eufaula (n=371), Grand (n=470), and Keystone (n=482) provided a diversity of information relevant to management. Statewide standard sampling protocols were substantially modified in 2024, with full implementation in 2025, to provide more robust data for informed management of genetic management units. Revised methodologies were designed with a focus on estimation of population abundance. Additional efforts included a preliminary creel survey which encountered 90 snag anglers on the upper Keystone Lake / Kaw Dam fishery in spring 2025. Full implementation of this creel will occur in spring 2026. A key research and management focus will likely be concerned with the potential for snag and release mortality in warmer months. Increased popularity of live imaging sonar has expanded Oklahoma's Paddlefish snagging opportunities and it is now a year-round pursuit. Further, the growth of the licensed guide industry (and assisted by active sonar) may be responsible for a large share of the statewide annual harvest. To that end, we held a town hall meeting in March 2025 with paddlefish snagging guides operating on Keystone Lake. Discussions with guides initiated a collaborative effort to publish a suite of safe handling practices for distribution to guides. A deeper examination of existing databases (net catches, harvest / e-check, and angler survey results) provides further perspectives to evaluate the effectiveness of our current harvest regulatory framework in meeting the objectives of our Oklahoma Paddlefish Management Plan.

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INTRODUCTION

The American Paddlefish (*Polyodon spathula*) is the lone survivor of its family Polyodontidae since the declared extinction of the Chinese Paddlefish (*Psephurus gladius*) in 2020 (Zhang et al. 2020). Paddlefish is within the order Acipenseriformes- often regarded as one of the most imperiled groups of freshwater fishes (Paddlefish and sturgeons). Their unique morphology, conservation value, and value to recreational snag anglers make the Paddlefish an important species native to the major river watersheds in Oklahoma (Arkansas, Neosho, Verdigris, Canadian, and Red rivers). Paddlefish are common to abundant in larger rivers and reservoirs in Oklahoma, though primarily restricted to waters East of Interstate 35. Paddlefish are large-bodied, long-lived, pelagic, zooplanktivorous, and migratory, traveling upstream in springtime to spawn. The species primarily inhabits deeper waters within and adjacent to the inundated river channels in the upstream segments of reservoirs and will aggregate in pools or downstream of navigational barriers (both high and natural or artificial low-head dams). Historically, recreational angling for Paddlefish in Oklahoma was restricted to these seasonal aggregations in springtime (Gordon 2009), however, aided by consumer sonar technology, Paddlefish angling in Oklahoma is now a year-round pursuit (Scarnecchia and Schooley 2022).

Paddlefish investigations in Oklahoma by Oklahoma Department of Wildlife Conservation (ODWC) began in the 1960's-70's and continued to 2005, with various studies limited in scope and duration, but primarily focused in the Grand/Neosho River watershed (Houser and Bross 1959; Houser 1965; Combs 1982). Management activities were primarily limited to periodic capture and marking of fish paired with creel surveys at the Miami Park low-head dam fishery on the Neosho River in Ottawa County (for review of earlier studies, see Gordon 2009). With the advent of the Paddlefish Research Center (PRC; formerly the Paddlefish Research and Processing Center until 2012) in 2008, the research and management of Oklahoma Paddlefish intensified as ODWC invested substantial resources and personnel to focus on management of the species. Modeled after smaller programs on the upper Missouri River in Montana and North Dakota, the PRC utilized angler-harvested Paddlefish as study specimens for stock assessment while salvaging roe from female fish for production and sale of caviar to help fund conservation programs (Gordon et al. 2007).

In 2013, ODWC formalized a Comprehensive Plan for the Management of Paddlefish in Oklahoma (Scarnecchia et al. 2013) with ten fundamental hypotheses and eight management goals (see summary in Appendix A). The primary theme for the management of Paddlefish in Oklahoma is the importance of sustainable fisheries for naturally recruiting Paddlefish stocks within a regulatory framework informed by research. Since 2008, ODWC has developed large, long-term databases on Paddlefish stocks across the state, with enhanced focus 2008-2023 on the Neosho River / Grand Lake stock due to its linkage to the spring fishery and caviar production at the PRC.

Paddlefish angling regulations in Oklahoma prioritize opportunity while moderating harvest. Therefore, catch and release fishing is legal year-round during daytime (6am-10pm). The daily harvest limit is one fish (no size limit), and the annual harvest limit is two fish. A Paddlefish permit is required in addition to a fishing license and online harvest reporting is mandatory. Gear restrictions include barbless hooks, one rod per angler, no culling, and no gaffing. Bowfishing for Paddlefish is legal, though release is prohibited. Additional rules exist on harvest tagging, roe restrictions, and transport/export. https://www.wildlifedepartment.com/fishing/regs

RESEARCH AND MANAGEMENT ACTIVITIES / METHODS

Paddlefish Angler Surveys:
An online survey of 20,052 Paddlefish permit holders was performed in summer 2023 with enhanced focus on harvest assisted by licensed fishing guides. We received responses in part from 2,609 recipients. Due to enhanced effort on bowfishing management being prioritized in 2024, and staffing limitations in 2025, the analyses of these data and production of a report have been delayed. Among our priorities for 2026, we hope to develop a manuscript retrospectively summarizing Paddlefish angler surveys performed 2008-2023.

A preliminary angler survey was performed on the Arkansas River system in Spring 2025. Angler surveys are important in monitoring catch and harvest rates, as well as staying apprised of angler preferences and concerns. Efforts were largely focused on the popular fishery directly below Kaw Dam, where anglers can reliably target and catch Paddlefish from both sides of the river channel. The timeframe of the survey was from mid-April through May. The creel schedule was randomly created per the ODWC standardized sampling procedures, and was designated to survey only Paddlefish anglers on Arkansas River immediately below Kaw Dam.

Another objective of this survey was to gain a better understanding of the value and use of remote access locations on the Arkansas River between Kaw and Keystone reservoirs. This presented challenges as there are multiple remote access locations along this stretch of the Arkansas River, and likelihood of detecting angling pressure at any given site is largely dependent on flow patterns (i.e., Paddlefish anglers generally target these areas after high flows reside, resulting in higher densities of Paddlefish stranded in pools). Due to staff and time constraints, we installed signs with a QR code survey that could be completed after an angler had completed fishing for the day.

This survey was designed to sample eight locations on the Arkansas River and one location on the Salt Fork River (Figure 1). These locations consisted of five remote access areas, three boat ramps, and the Kaw Lake tailwater fishery. Each site was visited regularly to check for damaged or lost signs, and to place flyers with the QR survey on vehicle windows.

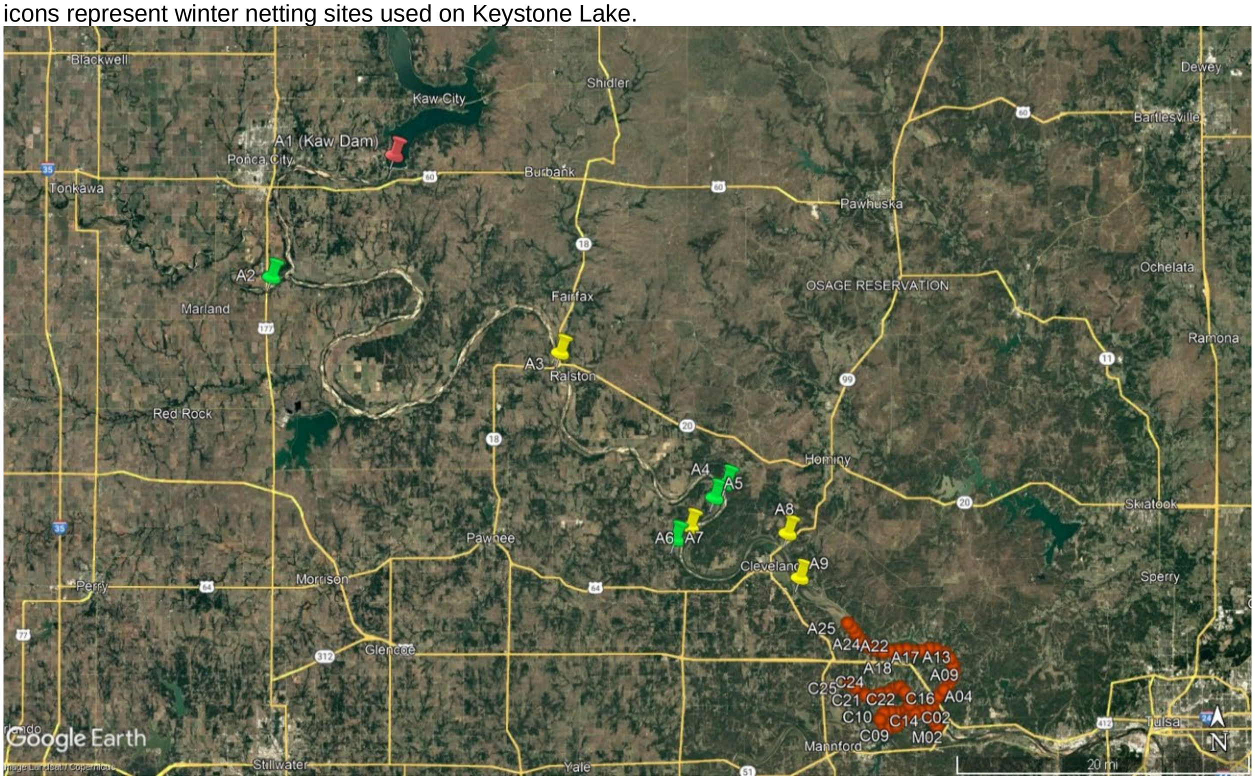
A total of 84 in-person surveys and six QR surveys were completed. Five of the six QR surveys were submitted from anglers fishing at the Kaw Lake tailwater, while one was submitted from an angler at a boat ramp near Cleveland, Oklahoma. Despite these efforts, we did not encounter Paddlefish anglers at any of the remote access sites.

Going forward, it seems QR surveys are likely not a great substitute for in-person surveys. Encouraging anglers to fill out the QR surveys on their next outing may prove effective, but this requires contact with anglers, which proved challenging for remote walk in areas. Trail cameras may serve as a good option for detecting pressure at select walk in areas of interest.

Where possible, harvested Paddlefish were salvaged for dentaries, otoliths, and gonadal data to supplement population metrics from standardized netting efforts.

The Arkansas River paddlefish creel survey efforts in 2025 were preliminary and exploratory, with full implementation of revised efforts scheduled for February-May 2026. Results from 2025 will be appended to those from 2026 and analyzed for the 2026 report.

Figure 1. Map of Arkansas River Paddlefish creel survey sites in 2025. In addition to Kaw Dam, eight access points on the Arkansas and Salt Fork rivers were included. These eight sites were divided equally into circuits of four sites (green or yellow). One circuit was visited on the way to or from Kaw Dam for each scheduled creel day. Additional red icons represent winter netting sites used on Keystone Lake.



Standardized Paddlefish Winter Gillnetting:

Standardized Paddlefish gillnetting was performed on Eufaula (January 2025) and Grand and Keystone lakes (December 2025). See lake maps in Appendix B.

Standardized netting methodologies were revised in summer 2024, and fully implemented on all three lakes. See Appendix C for revised netting protocols. (See the 2024 Annual Report, Appendix C for standardized methods used in prior years 2012-2024.)

Several small exceptions to standardized protocols were investigated in 2025. First, previous testing with multi-ply, mono-twist net mesh produced positive results in ease of deployment, retrieval, and storage, with comparable catches. Therefore, we ordered two 600’ nets in 7-ply mono-twist. This net mesh was not available in the typical clear/transparent monofilament color, only red mesh. Rather than ordering individual 300’ net segments and tying them together as a tandem pair to fish a 600’ net, we ordered two, continuous 600’ nets. The datasheet was modified to record net color for later examination of catch rates between red and clear nets. Catch rates and composition of red, mono-twist nets were statistically compared to standard nets.

Once captured and removed from the net, all Paddlefish were measured for body length eye to fork in mm (EFL; Ruelle and Hudson 1977), weighed (kg), assigned sex (male, female, or juvenile), and scanned for a coded wire tag (CWT), which would indicate hatchery origin. For these fish, the tip of the rostrum was removed and retained for later tag extraction, reading, and decoding to determine stocking cohort. All fish ≥3kg were affixed with an individually coded jaw band on the left dentary, anterior to the mesial bend. Jaw band codes were distinct to major watershed (e.g., coded with the prefix “A” for reservoirs on the Arkansas River) and individually numbered (i.e., A12345). Bands were newly affixed for “marked” fish and fish banded in previous years were noted as “recaptures”. Jaw bands allowed for the monitoring of individual growth or movements in addition to allowing for estimates of abundance or exploitation when paired with angler harvest recoveries. All fish were examined externally for injuries or deformities and observations were noted (e.g., hook scars).

Bycatch were recorded by species, but not consistently measured or weighed. Bycatch were often sacrificed to supplement ongoing age and growth studies by regional fisheries management crews (e.g., large catfishes) or for studies on nongame life history (e.g., buffalofishes).

All Paddlefish data were entered into a netting database and analyzed for summary statistics including catch rates, average length, weight, and relative weight (W_r) by sex, sex ratios, and frequencies of notations on condition. Histograms of length were examined as an approximator for age in identifying the presence or absence of recruitment. Relative abundance was approximated as catch per unit effort (number of Paddlefish per net per day [24 hrs]) and compared across years within reservoir and among reservoirs. The coefficient of variation of the mean (CV) catch rate was calculated for each standardized sample on each reservoir.

Although Paddlefish are sexually size dimorphic and growth is nonlinear, capture histories of recaptured Paddlefish were examined to estimate average daily growth (within reservoir) between initial capture and subsequent recapture. For hatchery-origin Paddlefish, known-age was back-estimated from coded wire tags (CWT, Figure 2) and a query of the stocking database. von Bertalanffy growth curves were generated for stocks with aged fish and catch curves were used to estimate mortality, where appropriate.

Figure 2. Paddlefish reared at Tishomingo Fish Hatchery are implanted with a coded wire tag (CWT) in the tip of the rostrum prior to stocking. These stainless, magnetized segments of wire are etched with a code unique to the stocking batch and are detectable with a proprietary device (yellow T-wand). CWT examples below represent the variety of observations- legible (left), scratched and faintly legible (middle), and binary coded with notches (right), a deprecated style used in the 1990's.

<u>Estimation of Population Abundance:</u>

When possible, abundance was estimated for each waterbody using standardized sampling. Fin punches were used as a marking methodology (in addition to the typical jaw bands) to provide a short-term and easily-recognizable mark for Schnabel series population estimation. New standardized protocols (Appendix C) focused on repeated samples over a broad spatial area in each reservoir with the intent to sample a large portion of the standing stock. All fish were marked using a fin punch on the first capture during the sample period. All first captures were considered a "Mark", and subsequent captures of fin-punched Paddlefish were considered "Recaptures" for this abundance estimation. For each gillnet deployed (*G*) on each day, the number of marks (*M*) and recaps (*R*) were totaled and summed across each day (*i...j*). These daily totals were entered into an Excel worksheet at the end of each netting day and the worksheet auto-calculated the Schnabel population estimate (*N*) with 95% confidence intervals. Any mortalities were excluded from estimation.

Schnabel Estimate $$N = \frac{\sum (C_t * M_t)}{\sum R_t}$$

Confidence intervals (95%) were calculated using two methods. When $\sum R_t \leq 50$, upper and lower table values from a Poisson distribution were used in place of $\sum R_t$. When $\sum R_t > 50$, confidence intervals were calculated from a normal approximation using Student's T table, using number of sample days (s-1) as df for Schnabel estimation.

Daily estimates and trends in estimate refinement (i.e., narrowing confidence intervals) on successive sampling days were examined in concert with a parallel examination of variability in catch rate (target CV ≤ 0.20) to determine when catches and estimates are adequate to describe the population abundance and stock composition.

Preliminary Sonar Net Catch Assessment using BioBase:
For select net deployments on Keystone and Grand (plus Eufaula in Jan 2026), gillnets were sonar-logged prior to retrieval. The objective of this investigation is to evaluate the use of down-scan sonar and the EcoFish tools from BioBase in enumeration and size-classification of Paddlefish and bycatch using known catches from gillnets (Figure 3). Transects were logged using two frequencies (83 kHz and 200 kHz) along the 600' length of selected gillnets (when depth and wind conditions were appropriate). Fish counts and "immensity" (both metrics provided by EcoFish algorithm sonar analyses by BioBase) outputs from 44 sonar logs (Keystone- 22, Grand- 24, and Eufaula- 10) will be compared for each frequency to the actual net yield, including species, length, and weight. These data will be evaluated in 2026.

Figure 3. Example of output from BioBase EcoFish displaying the Paddlefish net and the algorithm's interpretation of counts and size for fish entangled in the net.

Paddlefish Broodstock Collections and Restoration Stocking:
ODWC and US Fish and Wildlife Service Tishomingo National Fish Hatchery collaborated on broodstock collections from Keystone Lake (March 10, 2025) and Grand Lake (March 13, 2025) for restoration efforts in the Verdigris and Neosho rivers of Kansas. No fish were otherwise directly stocked in Oklahoma waters.

Other Paddlefish Research and Collaborations:

A University of Illinois PhD student, Shasta Kamara, accompanied by ODWC staff and authorized by a scientific collector's permit, collected female paddlefish gametes in March-April 2025 as part of a larger project to quantify egg characteristics across the range of paddlefish. Small ovary samples were taken from 27 females harvested by anglers on Grand Lake (Figure 4) to assess egg morphometrics (e.g., diameter and weight), egg characteristics (e.g., lipids, protein, enzyme activity, and cortisol). Other whole fish metrics, including female eye-to-fork length, girth, weight, ovary weight, and gonadal fat weight, were measured. Dentaries were also taken for aging. As mentioned, these data are part of a larger project in which egg samples were obtained from harvested females or hatchery broodstock females in five other states (Louisiana, Missouri, Illinois, South Dakota, and Montana).

Figure 4. A makeshift fish processing station was deployed at Twin Bridges (Grand Lake State Park) to accommodate collection of Paddlefish roe samples for Shasta Kamara's (pictured) PhD project on latitudinal gradients in gamete quality. This collection was facilitated through collaboration with Paddlefish snagging guides and through interaction with individual Paddlefish anglers.

RESULTS / DISCUSSION

Lake Eufaula

We used the new standardized Paddlefish gill-net sampling protocols (see Appendix C) for Lake Eufaula and encountered a total of 387 Paddlefish in 96 net deployments. Body length ranged 659-1,170 mm and weight ranged 4.1-35.9 kg (Table 1, 2). Average catch rates were 31.2 fish/net/day (SE=3.3, CV=0.11) for the two sampled arms, combined (Table 3). Catch rates in the individual arms were 18.3 fish/net/day (SE=2.5, CV=0.14) in the Deep Fork and 44.1 fish/net/day (SE=5.6, CV=0.13) in Gaines Creek. Male:Female sex ratio of the catch was quite skewed at 2.54:1 (264 males, 104 females, and 3 juveniles). Fish captured a second time (identifiable via the fin hole punch) were not measured or weighed a second time. All juveniles were banded because they exceeded our 3.0 kg minimum weight protocol for banding Paddlefish.

Table 1. Lake Eufaula Paddlefish catch summary 2025

Sex	Captured	Marks	Recaptures	Avg EFL (mm)	Avg Wt (kg)	Avg W_r
Male	264	256	8	959	16.6	106.3
Female	104	98	6	1,002	19.5	100.1
Juvenile	3	3	0	719	5.8	-
Totals	371[1]	357	14			

Table 2. Lake Eufaula Paddlefish combined catch summary from previous years (2013-24)[2]

Sex	Captured	Marks	Recaptures	Avg EFL (mm)	Avg Wt (kg)	Avg W_r
Male	686	676	10	943	15.8	107.2
Female	497	484	13	1,003	19.7	102.3
Juvenile	30	30	0	689	5.6	-
Unknown	55	55	0	861	11.1	
Totals	1,268	1,245	23			

Table 3. Winter Paddlefish netting effort summary for Lake Eufaula

Sample Period	Area Sampled	Total Nets	Total Catch	Catch Rate
January 2013	Entire lake	32	104	10.6 (SE=2.9, CV=0.27)
December 2016	Entire lake	16	72[3]	20.1 (SE=5.6, CV=0.28)
November 2018	Entire lake	10	35	16.9 (SE=2.4, CV=0.14)
January 2021	Entire lake	20	53	8.9 (SE=2.7, CV=0.30)
January 2022	Deep Fork & Gaines Creek	24	377	61.4 (SE=10.3, CV=0.17)
January 2023	Deep Fork & Gaines Creek	23	303	40.0 (SE=7.1, CV=0.18)
January 2024	Deep Fork & Gaines Creek	24	337	47.8 (SE=9.7, CV=0.20)
January 2025	Deep Fork & Gaines Creek	96	387	31.2 (SE=3.3, CV=0.11)
Totals		245	1,668	

Paddlefish catch rates typically increase at upstream sites. These trends were weak for Lake Eufaula in the Gaines Creek and Deep Fork arms (Figure 5). Downstream sites in Gaines Creek produced catch rates that were below average.

[1] Catch totals in this table exclude fish captured multiple times in the sample period.
[2] Data exclude 12 unsexed fish from 2016 (one M, 1 R, and 10 not processed) and one unsexed fish from 2021.
[3] A subset (n=12) of Paddlefish captured in 2016 were not weighed or measured due to darkness.

Figure 5. Catch rates for Lake Eufaula weakly follow historical patterns of higher relative abundance at upstream sites (lower site numbers). Average catch rate for each arm is indicated by the dashed lines and linear regression line is indicated by the dotted lines.

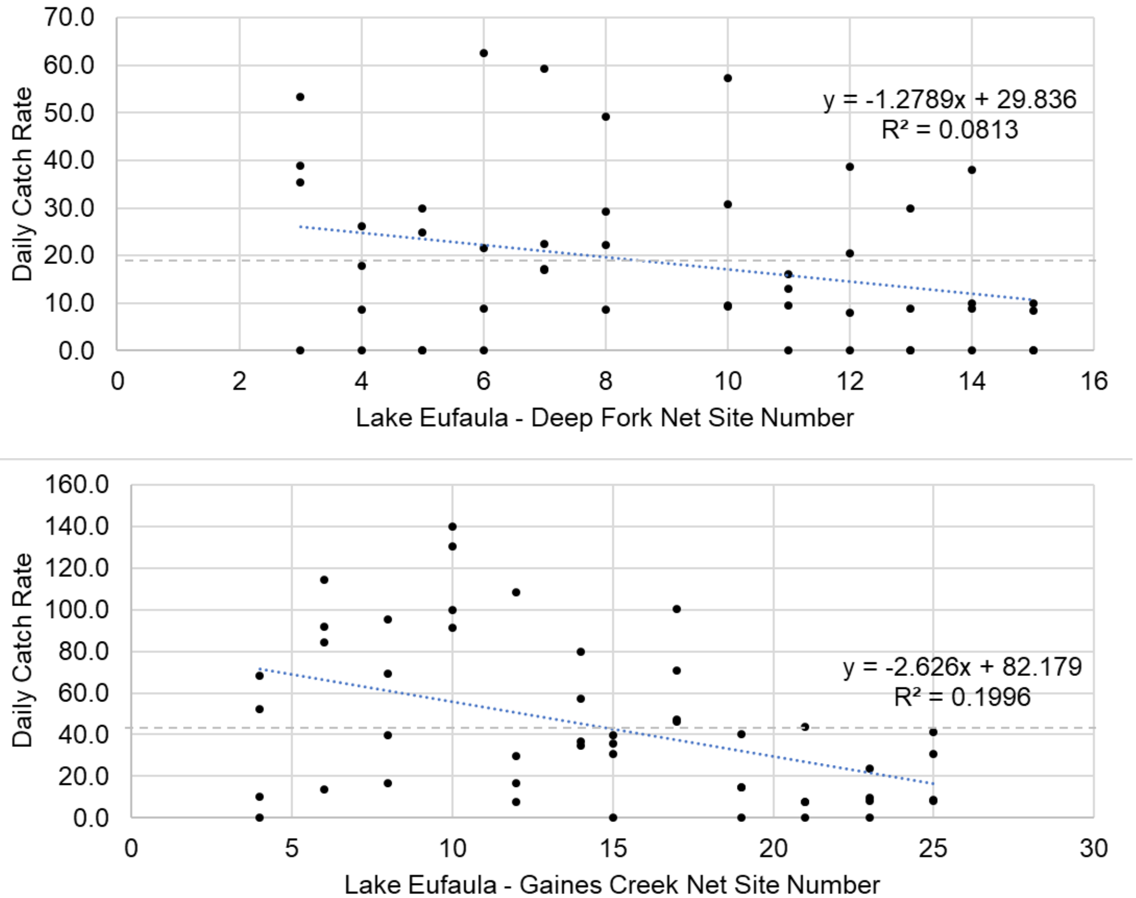
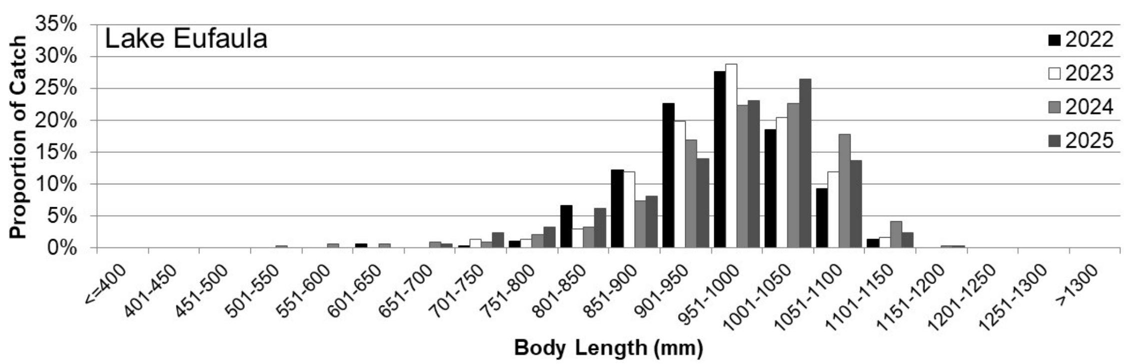


Figure 6. Size structure of Lake Eufaula Paddlefish comparing 2022, 2023, 2024, and 2025 catches



Size structure observed 2022-2025 (Figure 6) reflects a population typical of restoration stocks, which consists of mature, growing individuals with very few Paddlefish captured below the size at maturity (approximately 750 mm). Given that this reservoir was stocked for restoration 2007-2017 (n=217,280; see Appendix D for a summary table of Oklahoma Paddlefish restoration stocking), we would expect few small fish to exist in the stock unless the population were recruiting naturally. However, the catch includes a growing segment of smaller fish, which were unlikely (in previous collections) or impossibly (2023-2025) stocked fish based on expectations of growth rate (Figures 7 and 8).

Figure 7. Percent of Lake Eufaula Paddlefish catch for “immature fish” (≤750 mm) for 2022-2025

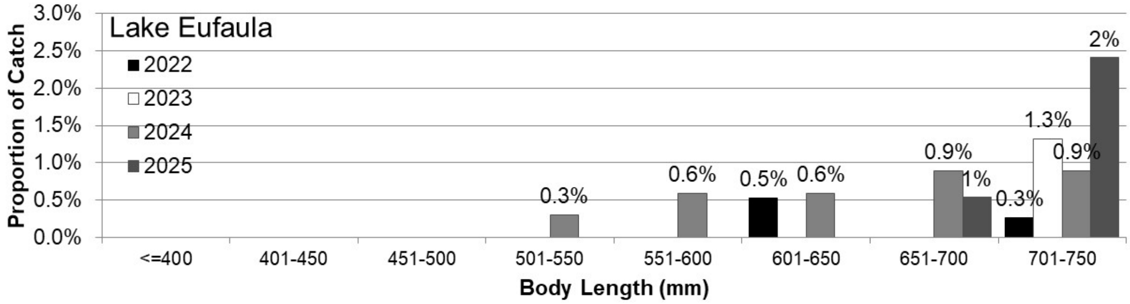
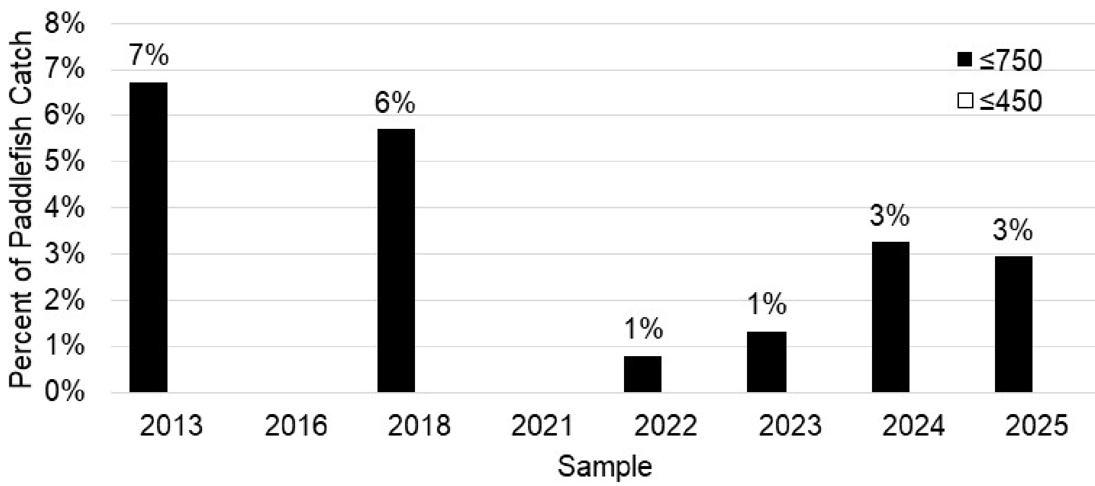


Figure 8. Percent of Lake Eufaula Paddlefish catch for “immature fish” (≤750 mm) and presumptive age-1 fish (≤450 mm). Bars represent fish grouped by size only, and data are irrespective of sex ID (M, F, J). Although no fish ≤450 mm have been encountered even during active stocking 2006-2017, a progressive increase in the population segment ≤750 mm during 2022-2025 reflects putative, though low, natural recruitment in this restoration stock.

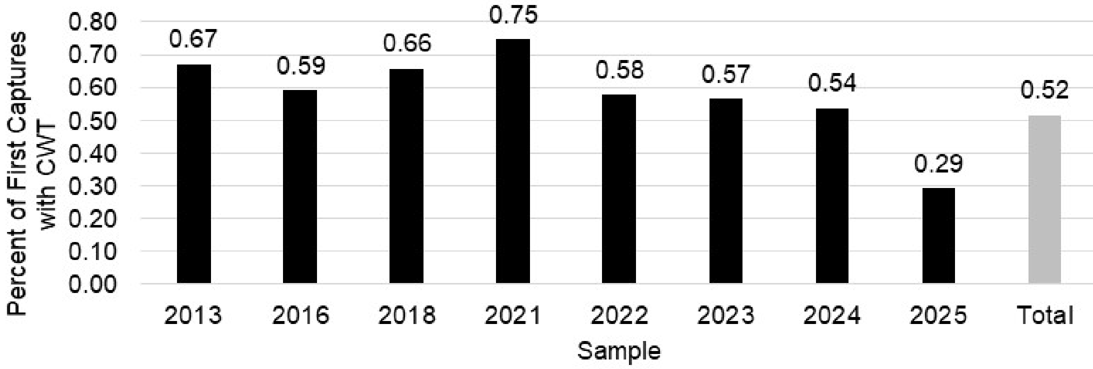


A total of 105 (29%) Paddlefish first-captured[4] in Lake Eufaula in 2025 were detected with a coded wire tag (CWT) indicating hatchery origin and the rostrum tips were retained for later extraction, decoding, and database query. However, it cannot be assumed that the 71% of fish without a detected CWT are of wild origin. Equipment malfunctions (T-Wand detector) resulted in several days with reduced ability to detect CWTs (e.g., sharing one functional detector among two boats). Further, tag loss is known to be high for CWT used in certain circumstances and species. Loss of CWT in hatchery-reared Paddlefish has been documented to range from 71% in concrete raceways (Pitman and Isaac 1995) to 10% in circular fiberglass tanks (Fries 2001) to <3% in pond culture (Guy et al. 1996), where presumably Paddlefish less frequently bump their rostrum tip on their enclosure. The rate of tag loss at Tishomingo National Fish Hatchery, which uses a combination of raceways and circular tanks, is not known, however the mechanism of tag loss is presumed to be confined within the period of hatchery residence and is assumed to

[4] As recaptures are often recorded with a rostrum notation on the healing of “old CWT” removal wounds, only first captures are considered when examining the prevalence of CWT in the catch.

be zero post-stocking. Prevalence of CWT in the Lake Eufaula catch has varied (Figure 9), with the 2025 catch representing the lowest observation to date. However, due to the known equipment issues, this statistic is of limited value in assessing natural recruitment. For these reasons, 2025 CWT detection data were not appended to the probability models described below.

Figure 9. Percent of first-capture Paddlefish on Lake Eufaula with CWT detected, indicating hatchery origin

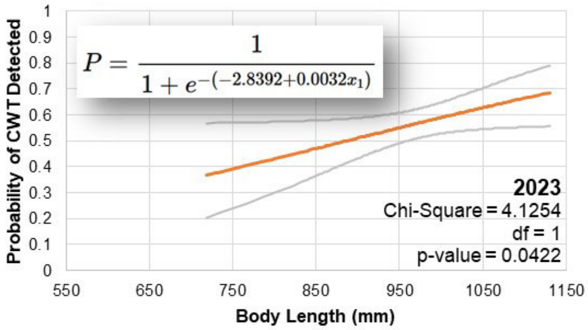


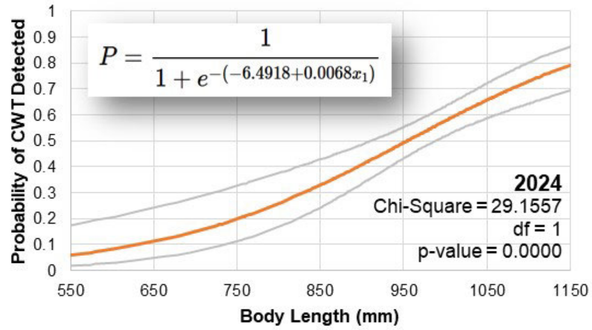
Our catches of young Paddlefish on Lake Eufaula, well-after the culmination of stocking supports a hypothesis of natural recruitment in this restoration stock. However, it is not known whether recruitment is a new phenomenon, or if it has been occurring within the period of restoration stocking (though presumably after the first repatriated Paddlefish reached sexual maturity in approximately 2012-2015). To begin examining this, we can model the detection of CWT related to body length using logistic regression, where the probability of a fish being captured with a CWT is influenced by fish size.

Using data from 2013-2016 (i.e., during the stocking period) compared to 2023-2024 (i.e., well after the stocking period), we would predict that smaller fish would have a lower probability of having a CWT in 2023-2024 than they would in 2013-2016. When probability of CWT detection was modeled against body length independently for 2013 and 2016, the models were found to be non-significant (X^2=2.8214, df=1, p-value=0.093 and X^2=0.0261, df=1, p-value=0.872, respectively). This would support a hypothesis that most, if not all catches are hatchery origin fish and any tag loss was instantaneous (i.e., prior to stocking) and not related to fish size or age.

However, significant models for 2023 and 2024 were independently produced (Figure 10). In contrast to 2024, the 2023 model was not well-informed by data from small fish, as the smallest fish in that dataset was 718 mm. In 2023, 16 fish were captured <850 mm and five of these (31%) had wire tags. In 2024, 29 fish were captured <850 mm and only two of these (7%, 726 mm and 832 mm) had wire tags. Based on these limitations, direct comparison of the two models is generally restricted to fish ≥750 mm. The 2024 model predicts that a 750 mm Paddlefish has only a 20% probability of being hatchery-origin (presuming no tag loss). This estimate lies outside of the confidence interval of the 2023 model (though the two models' 95% confidence intervals overlap), which predicts double the probability at approximately 40%. Independent examination of the 2024 model supports the hypothesis that small fish captured have a very high probability of being wild recruits (e.g., ~95% probability for 550 mm fish and ~90% for 650 mm fish). As monitoring of the Lake Eufaula stock continues and logistic models are updated, we would expect the slope of the curve to increase and the asymptote to shift to the right, such that progressively larger fish would have higher probabilities of being wild recruits.

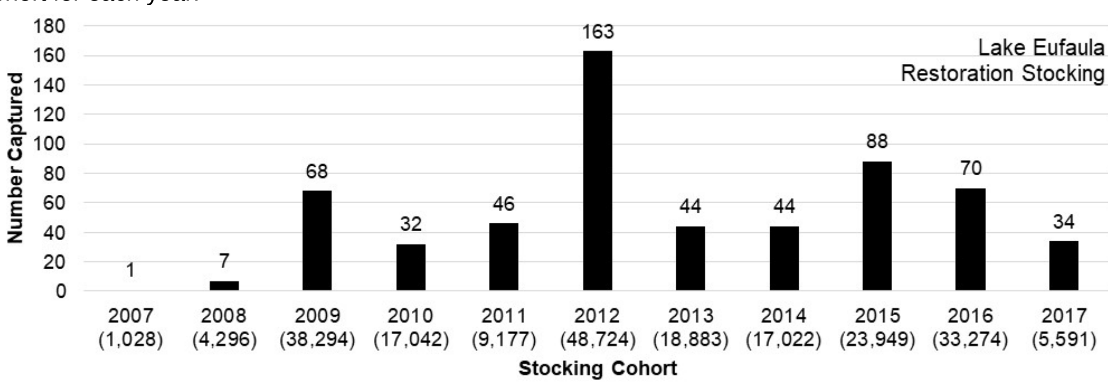
Figure 10. Logistic regression models for Lake Eufaula Paddlefish 2023 (n=299) and 2024 (n=323) catch data. Model curves are depicted in orange with 95% confidence intervals in grey. Capture of smaller fish in 2024 allowed for development of a model for a larger size range.





Within the 2025 catch with CWT, a subset of 86 were successfully dissected, readable, and linked to stocking records (see Appendix D), allowing the fish to serve as known-age individuals for examination of length at age, growth rates, and other population metrics. One first-captured fish had healed evidence of previous removal of rostrum tip. These data from 86 fish were appended to a known-age Paddlefish database for analyses. To date, we have recovered, decoded, and database-matched 570 CWT from fish stocked in Lake Eufaula (Figure 11), with a general pattern of higher recoveries from larger stocking cohorts and all stocking cohorts are represented by at least one recovery.

Figure 11. Count of Paddlefish captured in Lake Eufaula from each restoration stocking cohort. The total number of Paddlefish stocked for each year is noted in parentheses (grand total n=217,280). Multiple stocking events occurred per year, and they varied in average length at stocking, however these stockings are pooled into a single production cohort for each year.



Due to the inconsistent seasonality of Lake Eufaula collections (Table 1), development of the length at age models was restricted to fish captured 2021-2025. All these fish were captured in January and fish are considered to be hatched in their stocking year (e.g., a fish stocked in 2017 and captured in 2021 would be four years old). Inconsistencies in detection of CWT has resulted in some fish being captured and banded with no detected CWT, but later recaptured and detected with CWT. Therefore, only the date at first capture and length at first capture were used for consistency. In total, valid records for 570 known-age Paddlefish have been accumulated for Lake Eufaula (340 males, 229 females, and 1 juvenile). Separate length at age models were developed for each sex (Figure 12, Table 4) and the juvenile was excluded.

Figure 12. Average length at age for hatchery origin Paddlefish captured on Lake Eufaula. Von Bertalanffy growth curves modeled for Lake Eufaula Paddlefish (male [n=340]- left, female [n=229]- right) using the Fisheries Analysis and Modeling Simulator (FAMS). Model development was informed by 2021-2025 sex-specific data from known-age, hatchery-origin fish.

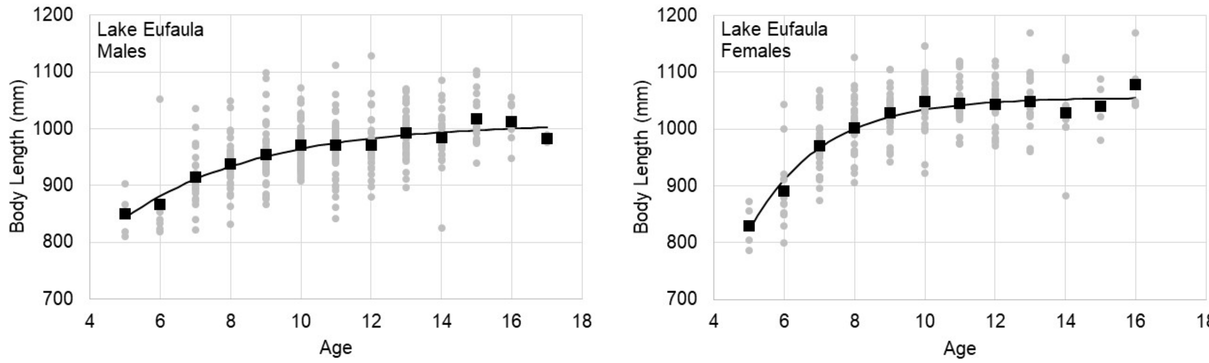


Table 4. Coefficients for von Bertalanffy growth equations for Lake Eufaula male (n=340) and female (n=229) Paddlefish

Coefficient	Male Paddlefish	Female Paddlefish
L_∞	1,009	1,055
K	0.264	0.482
t_0	-1.823	1.871
R^2	0.949661	0.963607
Prob>F	0.0001	0.0001

Due to the absence of small, known-age fish in addition to the absence of large fish (i.e., those older than the onset of stocking in the lake), the growth models depicted above should be interpreted with caution. Oklahoma Paddlefish have been aged to 30 years and are known to grow to >1,300 mm in body length. We would expect, based on the notable sexual size dimorphism of Paddlefish, that maximum size would differ to a greater magnitude than these models suggest. For example, Scarnecchia et al. (2011) reported L_∞ values for male and female Paddlefish from Grand Lake as 968 mm and 1,336 mm, respectively. However, low densities and an abundance of zooplankton resources (evident in *Wr*; see below) may result in growth patterns divergent from those observed in Grand Lake. A more thorough dataset including younger (naturally recruited) and older (stocked) fish will allow for more meaningful interpretation of the population dynamics of Lake Eufaula Paddlefish.

The size and age truncation of this stocked population in Lake Eufaula renders catch curve modeling of mortality problematic, therefore this exercise was not completed.

Additional notations on condition of Paddlefish encountered in Lake Eufaula included hook scars (16 fish, 4%), prop scars (three fish, <1%), or rostrum injuries/deformations (five fish, 1%). These low frequencies of scars and injuries likely indicate that the stock is not heavily pressured by snag angling or other sources of injury.

Relative weights of Paddlefish vary across Oklahoma stocks, with exceptional individuals exceeding 100. Average *Wr* for both sexes in Lake Eufaula exceeded 100 (Table 1), indicating that the population is not limited by availability of zooplankton prey. This trend in high *Wr* has been consistent through time. An examination of gonadal fat bodies (GFB) and gonadosomatic index (GSI) with known ages (from CWT) and estimated ages (from dentary bones) would be a valuable investigation if harvested fish from this restoration stock were available in the future.

Fifteen Paddlefish caught in Lake Eufaula in 2025 were recaptures from previous collections. Two of these recaptures were not able to be matched to initial captures in the tagging database. Therefore, thirteen fish from 2025 were added to another 18 recaptured 2022-2024 for calculation of growth rates (Table 5) and analyses of movements. Time at large ranged from approximately one to seven years. All fish showed positive growth in length with the exception of three males whose mark and recap length measurements differed by 1 mm, 4mm, and 1cm, likely within the variance of measurement error. Most fish showed positive growth in weight, with several exceptions for both males and females. It is plausible that females with negative growth in weight, but positive growth in length may have been gravid at first capture and in a period of gonadal recrudescence at recapture, therefore weighing less. Overall, small reductions in weight at recapture may simply still be within the margin of error when weighing a live fish on a watercraft in motion. Regardless, the estimated average daily growth rates from Lake Eufaula Paddlefish are generally comparable to those of Grand Lake.

Field assignment of sex was consistent across multiple captures with the exception of one fish initially classified as “unknown” in 2016 and later assigned as male (C00204) and another fish assigned as female in 2023, but later assigned as male in 2025 (C03374). Given the length and weight of this latter fish, it is more likely that the fish is female (2012 stocking cohort), based on length at age data (Figure 12).

Table 5. Back-calculated daily growth rates of Lake Eufaula Paddlefish recaptured in 2025 (boldface type) and previous years. For fish of confirmed hatchery origin, stocking cohort is noted.

BandCode	Mark Date (Site)	Recap Date (Site)	At large (days)	Growth Rate (mm/d)	Growth Rate (g/d)	Sex	Cohort
C00305	01/11/21 (D03)	01/10/22 (D07)	364	-0.003	0.275	M	
C00302	01/11/21 (D03)	01/13/22 (G15)	367	0.052	-1.362	M	
C00279	01/11/22 (D03)	01/10/23 (D07)	364	0.014	1.923	F	
C00986	01/12/22 (D10)	01/11/23 (G21)	364	0.146	2.390	F	2016
C00820	01/12/22 (G10.5)	01/11/23 (G09)	364	0.203	5.632	F	2017
C04196	01/13/23 (D14)	01/10/24 (D9)	362	0.135	3.453	F	2016
C00936	01/12/22 (G09)	01/10/24 (G11)	728	0.155	9.615	F	
C00400	01/14/21 (S12)	01/23/24 (G15)	1104	0.032	2.880	F	
C00280	01/10/22 (D05)	01/23/24 (G16)	743	0.097	4.078	F	
C00902	01/13/22 (G19)	01/23/24 (G19)	740	0.084	6.081	M	2015
C00204	12/12/16 (G03)	01/24/24 (G07)	2599	0.053	2.432	M	
C00870	01/13/22 (G13)	01/24/24 (G02)	741	0.047	0.175	M	2014
C03372	01/10/23 (G22)	01/24/24 (G2)	379	0.071	1.953	M	
C03261	01/11/23 (G09)	01/24/24 (G05)	378	0.026	-11.111	F	
C00985	01/12/22 (G06)	01/24/24 (G05)	742	0.013	-1.819	F	
C00918	01/12/22 (G10.5)	01/24/24 (G06)	742	0.032	0.404	F	2012
C00896	01/12/22 (G10.5)	01/24/24 (G10)	742	0.031	1.550	F	2012
C00678	01/11/22 (D09)	01/24/24 (G07)	743	0.043	3.943	F	2009
C00955	**01/12/22 (G06)**	**01/15/25 (G08)**	**1099**	**-0.004**	**1.247**	**M**	
C04054	**01/10/23 (G25)**	**01/15/25 (G12)**	**736**	**0.015**	**0.543**	**M**	
C03254	**01/11/23 (G09)**	**01/15/25 (G06)**	**735**	**0.041**	**0.408**	**M**	
C04369	**01/24/24 (G05)**	**01/16/25 (G06)**	**358**	**0.056**	**5.084**	**M**	**2016**
C04156	**01/11/23 (G11)**	**01/16/25 (G25)**	**736**	**0.094**	**5.842**	**F**	
C00820	**01/12/22 (G09)**	**01/16/25 (G04)**	**1100**	**0.169**	**2.482**	**F**	**2017**
C04731	**01/24/24 (G10)**	**01/16/25 (G14)**	**358**	**0.149**	**6.369**	**F**	**2016**
C03314	**01/11/23 (G05)**	**01/17/25 (G10)**	**737**	**0.009**	**-2.714**	**F**	**2015**
C03246	**01/11/23 (G05)**	**01/17/25 (G04)**	**737**	**0.008**	**-0.271**	**F**	
C00381	**01/13/21 (G22)**	**01/17/25 (G04)**	**1465**	**0.018**	**-1.604**	**F**	
C00046	**-**	**01/17/25 (G14)**	**-**	**-**	**-**	**-**	
C04876	**-**	**01/23/25 (D03)**	**-**	**-**	**-**	**M**	
C03930	**01/10/24 (D11)**	**01/24/25 (D11)**	**380**	**-0.026**	**-3.947**	**M**	
C00982	**01/11/22 (D13)**	**01/24/25 (D10)**	**1109**	**0.018**	**1.307**	**M**	
C03374	**01/13/23 (D07)**	**01/24/25 (D05)**	**742**	**0.013**	**-2.682**	**M**	**2012**
		Overall Averages:	737	0.058	1.437		

The marking and subsequent recapture of individual Paddlefish also provides the ability to examine movements and habitat selection. Although Paddlefish are known for their long distance, migratory, riverine movements, multiple fish were recaptured in Lake Eufaula at the exact same location or in very close proximity (e.g., 0.29 km) to their initial capture (Table 5).

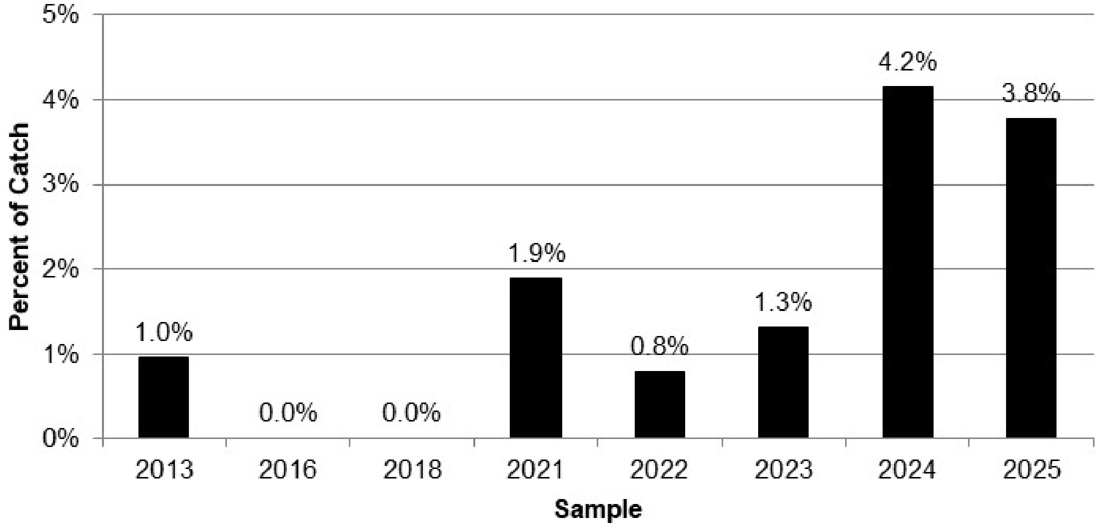
For example, fish C00902 and C03930 were each marked and recaptured at the exact same location, with encounters separated by 740 and 380 days, respectively. Fish C00896 was marked at site G10.5 and recaptured 742 days later at site G10, only 0.18 miles (0.29 km) away. Given the size of Lake Eufaula, these observations indicate that at least a portion of the population may be demonstrating some site or habitat fidelity. In contrast to these putatively small home ranges, another fish C00678 was marked and later recaptured approximately 30 miles (48 km) between sites D09 and G07, respectively.

Though Paddlefish were stocked in Lake Eufaula at chiefly one location (Cardinal Point in upper Gaines Creek), capture of the fish at other locations in the lake indicates that the fish can and do move about freely. However, in the examination of marking locations compared to recapture locations for individual fish, some interesting trends emerge. Although nearly all fish recaptured in Gaines Creek had been initially captured in Gaines Creek, this phenomenon was reduced for fish in the Deep Fork (Table 6). These fish captured in the Deep Fork have already potentially dispersed away from Gaines Creek post-stocking. However, of fish caught in the Deep Fork and subsequently recaptured, 4 of 10 have been recaptured after having returned to Gaines Creek. It would likely be speculation to hypothesize motivation for these movements, however, additional habitat and hydrology studies on the Deep Fork and Gaines Creek have been performed by Oklahoma State University (Wolfenkoehler 2025). Also, as standardized collections accumulate more recaptures (Figure 13) of individual fish in these two major lake arms, more robust interpretation of findings on growth, movements, habitat use/selection in Lake Eufaula will be possible.

Table 6. Paddlefish movement in Lake Eufaula. For 31 Paddlefish with paired captures described in above Table 5, a disproportionately high fraction of fish originally captured in Gaines Creek (95%) were recaptured in Gaines Creek, whereas a much lower fraction of fish originally captured in the Deep Fork (60%) were recaptured in the Deep Fork.

Mark Loc.	Recap. Loc.		
	Deep Fork	Gaines Creek	
Deep Fork	6	4	10
Gaines Creek	1	19	20
Other	0	1	1
	7	24	31

Figure 13. Percent of Lake Eufaula Paddlefish for recaptures (i.e., fish captured and marked with a jaw band in previous collections). Typically, studies on wild populations with >10% of individuals marked can provide robust estimates of population abundance. In the absence of recruitment, we would expect the percentage of recaptures to increase consistently and rapidly, unlike that observed on Grand Lake.



Bycatch encountered in standardized Paddlefish gillnets on Lake Eufaula included Blue Catfish, Bigmouth Buffalo, Smallmouth Buffalo, and Flathead Catfish.

Grand Lake

We used new standardized Paddlefish gill-net sampling protocols (Appendix D) for Grand Lake and encountered a total of 482[5] Paddlefish in 96 nets. Body length ranged 715-1,140 mm and weight ranged 4.5-29.7 kg (Tables 7,8). Average catch rates were 36.5 fish/net/day (SE=3.7, CV=0.10), ranging 5.8-139.7 [excluding ten nets with zero catches]). Male:Female sex ratio was 2:1.

Table 7. Grand Lake Paddlefish catch summary 2025-26

Sex	Captured	Marks	Recaptures	Avg EFL (mm)	Avg Wt (kg)	Avg W_r
Male	310	270	40	943	13.3	90.2
Female	156	147	9	958	14.6	84.5
Juvenile	4	4	0	745	5.2	-
Totals	470[6]	421	49			

Table 8. Grand Lake Paddlefish combined catch summary from previous years (2011-25)

Sex	Captured	Marks	Recaptures	Avg EFL (mm)	Avg Wt (kg)	Avg W_r
Male	7,271	6,631	640	937	14.1	96.7
Female	3,851	3,653	198	970	16.6	91.8
Juvenile	2,414	1,320	5	617	3.5	-
Unknown	123	122	1	810	8.5	-
Totals	13,659	11,726	844			

[5] Total catch includes 12 fish captured twice.
[6] Capture total excludes 12 fish captured two times, which were used for population abundance estimation, but not weighed and measured twice.

Paddlefish catch rates were significantly lower than in December 2024 (83.8 fish/net/day). Average catch rate was generally aligned with long term trend data, while 2024 catch would be considered high. Therefore, this year-over-year difference may not be meaningful. Additional context is provided in the section on abundance estimation on page 34.

Paddlefish catches followed a pattern with highest relative abundance and larger variability in catch at sites below Sailboat Bridge (site numbers 24-49; Figure 14). All off-channel sites (i.e., Elk River, Wolf Creek, and Honey Creek) had lower than average catches. Historically, Paddlefish catch rates in Grand Lake typically increase at upstream sites (Figure 15), though some inter-annual variability is evident (i.e., 2019-2020). Overall, the randomly selected sites (12 sites per day over 8 days) provided adequate spatial coverage and the CV of 0.10 exceeded the objective for standard sampling.

Figure 14. Catch rates for Grand Lake were variable (with average catch rate 36.5 indicated by the dashed line), but generally followed historical patterns of relative abundance with upstream sites (particularly sites 10-20) with higher catches. Main channel sites (numbered 1-49) generally had higher catch rates upstream. With only two exceptions at site 91, all side-channel sites (e.g., Elk River 86-89, Wolf Creek 90, and Honey Creek 91-93) had catch rates below the average, irrespective of their upstream or downstream position in the system.

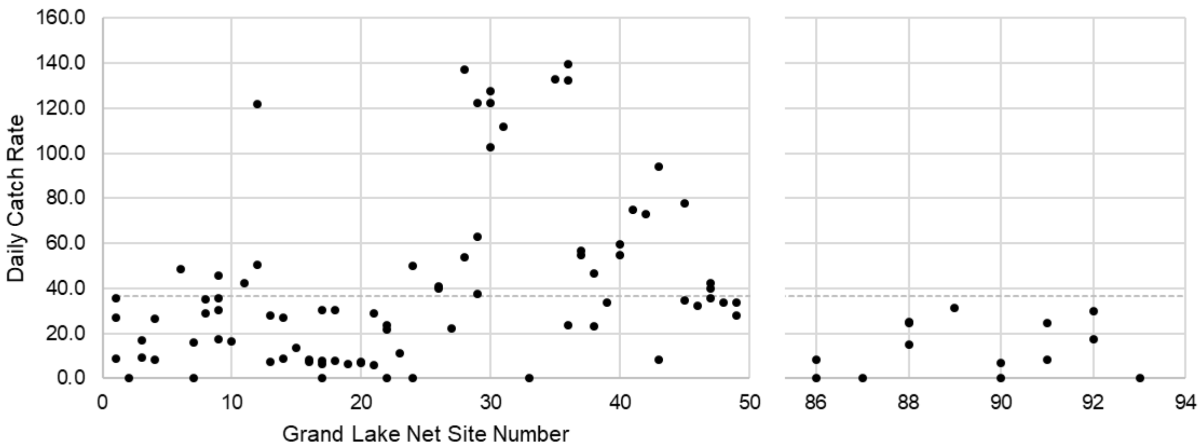


Figure 15. Historically, spatial patterns of relative abundance would predict higher catches in upstream sites in addition to an overall greater catch rate, however this pattern was disrupted in 2019-2020 and, to a lesser extent, 2023-2024. Data from 2024-2025 include multiple net deployments at the same sites, necessitating a change in how these data were displayed.

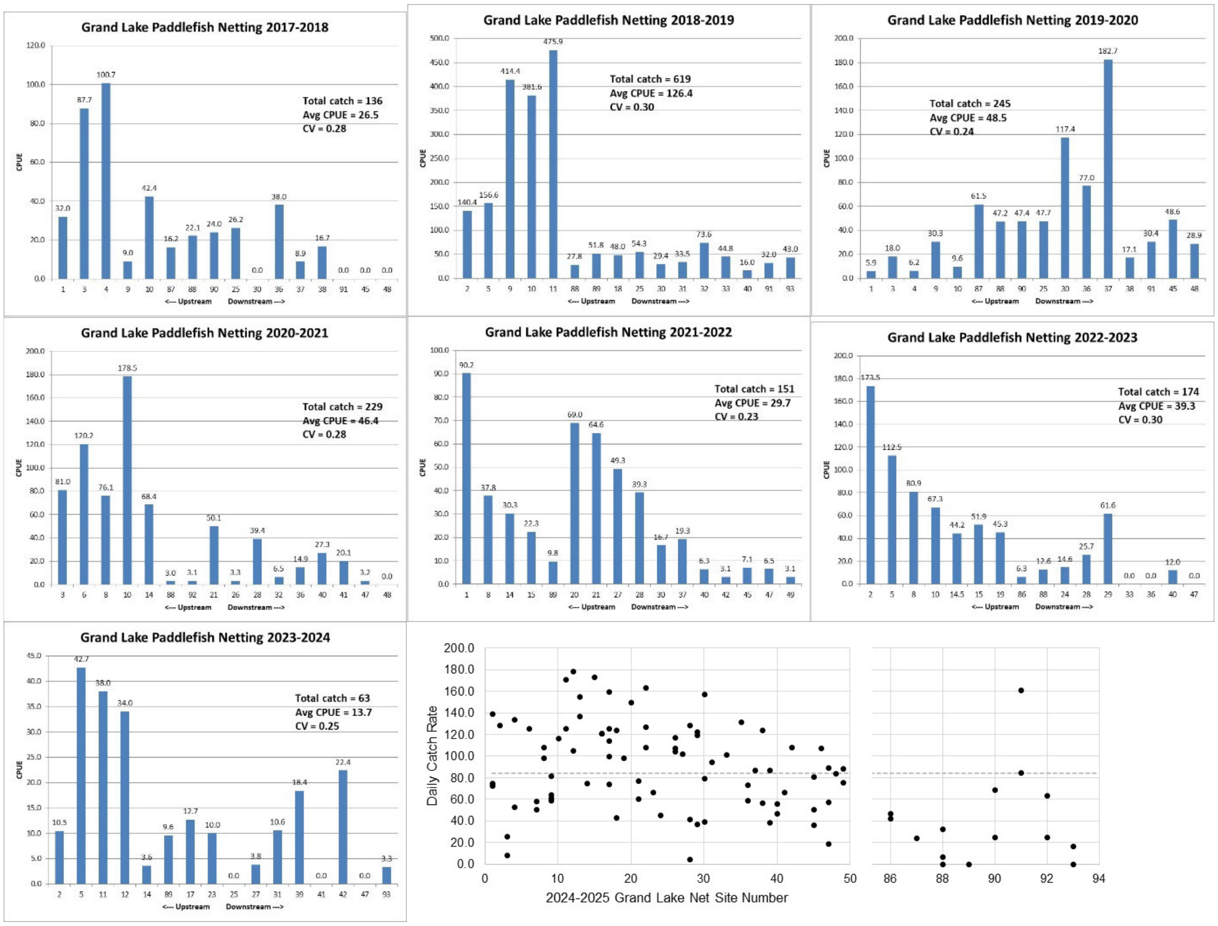
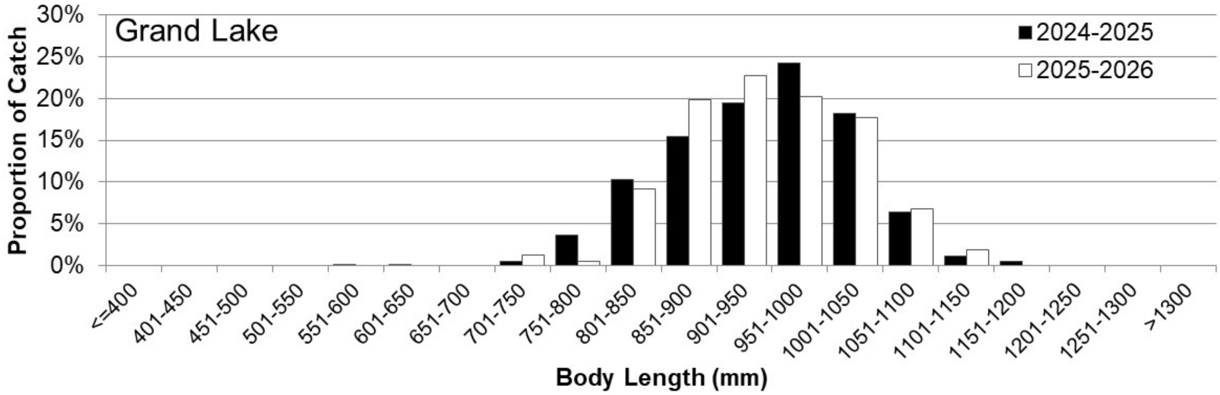
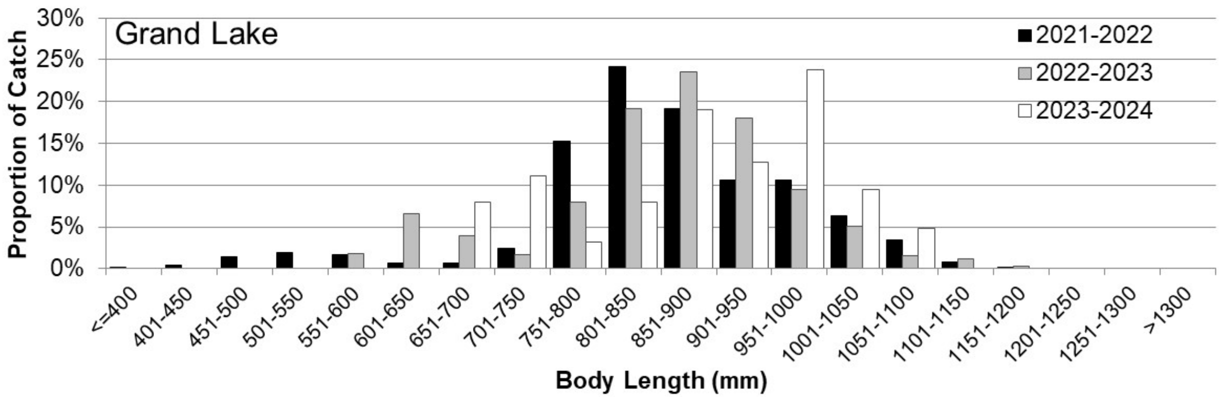


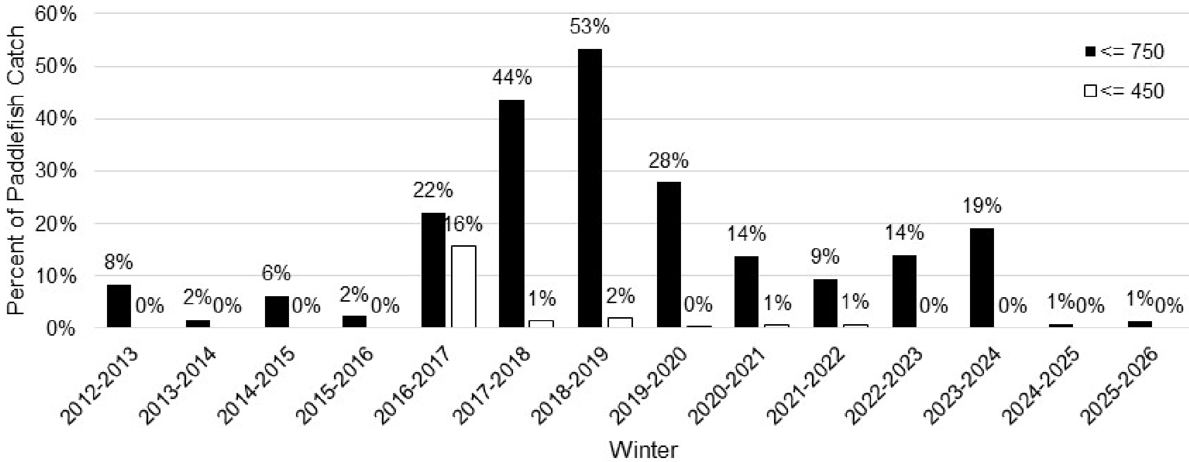
Figure 16. Size structure of Grand Lake Paddlefish catch. For comparison, size structure from previous collections is also included. The anomalous distribution in 2023-2024 is due to low sample size.





Population size structure (Figure 16) observed in 2021-24 likely reflects recruitment in 2019 and the continued somatic growth of this year class from 601-650 mm (2022-23) to 651-750 mm (2023-24). Continued growth of this cohort has made them indistinguishable from the remainder of the stock. Long-term trends in Grand Lake indicate that medium-to-large recruitment events are readily detectable when the fish are age-1. Though the yearling Paddlefish are far too small for our large mesh gillnets to accurately assess their abundance, we do catch age-1 Paddlefish when they are present. Based on additional trawl collections and information from Paddlefish anglers in 2016, we know that a large recruitment event occurred in 2015. This was the first observation of a large successful recruitment on record since 1999. As reflected in our standardized netting catch, the detection of age-1 Paddlefish was evident in winter 2016-2017 (efforts in December 2016; Figure 17). We know that spawning and recruitment occurred in 2015, 2016, 2017, and 2019 due to hydrology characteristics, the observation of spawned out females in the spring harvest, and the eventual detection of age-1 recruits. However, the netting results indicate that the strength of those cohorts was far from equivalent, with substantially more age-1 Paddlefish captured from the 2015 spawn. Therefore, the remaining spawn years observed in recent years likely represent a typical low-level of recruitment punctuated by episodic large cohorts, as is known to be typical for the species in Oklahoma and elsewhere (Scarnecchia et al. 2011, 2014). Conservative harvest regulations as currently implemented by the Department (e.g., daily limit of one, annual limit of two) are designed to buffer against population depletion through harvest during periods of low recruitment. The absence of yearling Paddlefish in the 2025-26 catch is not remarkable considering the low observation rate in previous years.

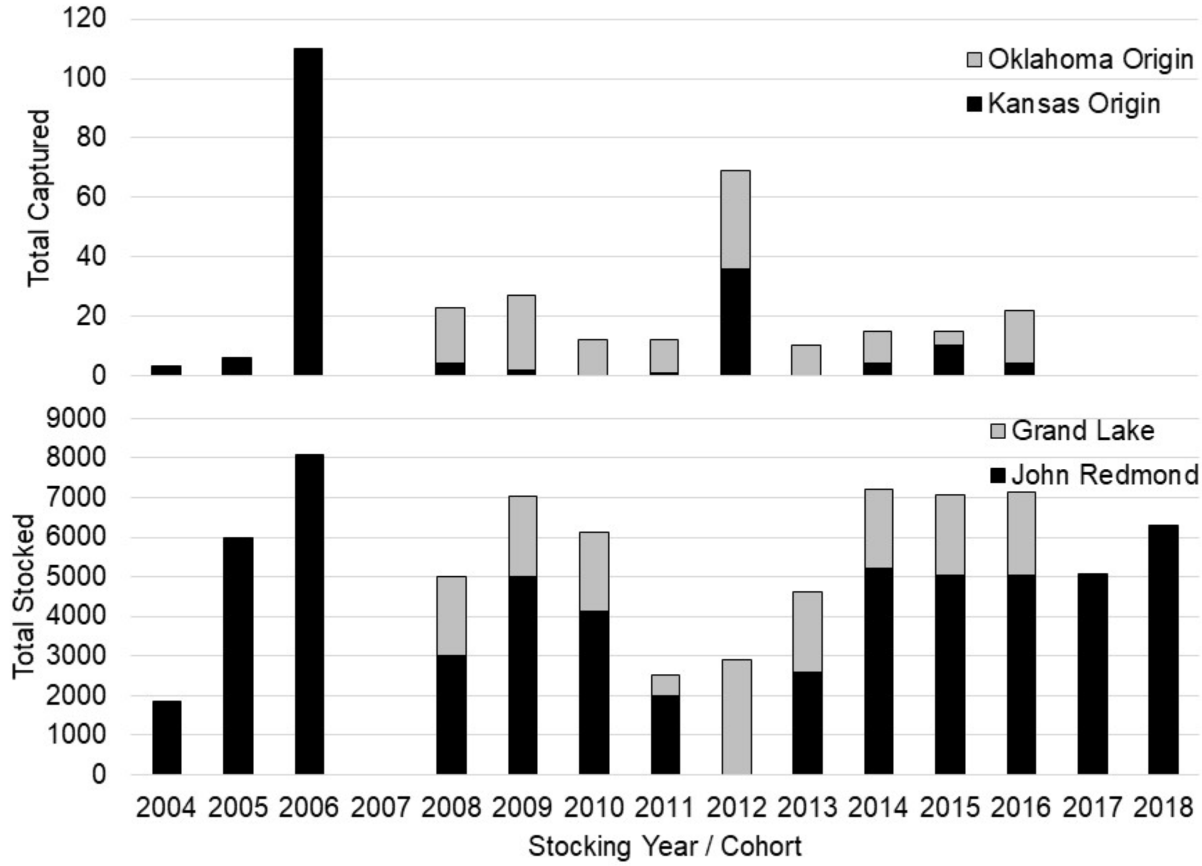
Figure 17. Percent of Grand Lake Paddlefish catch for “immature fish” (≤750 mm) and presumptive age-1 fish (≤450 mm). Bars represent fish grouped by size only, and data are irrespective of sex ID (M, F, J).



Five Paddlefish captured in Grand Lake were detected with a coded wire tag (CWT) indicating hatchery origin and the rostrum tips were retained for later extraction, decoding, and database query. Three additional Paddlefish were recaptured displaying a healed rostrum tip following previous removal of a CWT. Detection of hatchery-origin Paddlefish is not uncommon in Grand Lake, as there is a long-term restoration stocking program on the upper Neosho River in John Redmond Reservoir in central Kansas and these fish readily migrate downstream. Also, several experimental stockings have occurred in Grand Lake (i.e., not for restoration purposes; see Appendix E).

Decoding of the CWT removed from Paddlefish netted in Grand Lake December 2025 will occur in 2026 with the larger batch of tags recovered from Lake Eufaula. However, previous CWT captures from Grand Lake are summarized here. A total of 324 Paddlefish encountered in nets or harvested at the PRC were successfully decoded and linked to stocking records. Due to database inconsistencies after 2017, several additional Paddlefish have unconfirmed origins or other database uncertainties and are not included here. These fish have origins in approximately 77,000 Paddlefish stocked into John Redmond Reservoir (59,000) on the Neosho River in Kansas or directly into Grand Lake (17,500). The largest proportional returns (n=110) have been from the 8,000 fish stocked into Redmond in 2006, however, since 2008, most CWT recoveries in Grand Lake have been fish stocked directly into Grand Lake (Figure 18).

Figure 18. Summary of Grand Lake Paddlefish CWT captures with stocking origin 2004-2018. Due to inconsistencies in maintenance of the MICRA stocking database, it is possible that not all stocking events to John Redmond Reservoir in Kansas are accurately reflected here (see 2012).



Additional notations on condition of fish encountered included hook scars (28%), prop scars (three fish), or rostrum injuries/deformations (3%). Four were recaptured bearing scars suggesting that their jaw bands were removed, therefore their identities were unknown, and they received new bands. Four fish were recaptured with healed fin punch marks from 2024. In all cases, the wound was healed closed, but still visible and was not noticeably advanced in distance toward the end of the fin rays (i.e., growing outward). One fish was captured and the band was damaged, warranting replacement. The new band code was appended to the capture history for this fish.

Relative weights of the Grand Lake stock are typically in the 90's with exceptional individuals exceeding 100. *Wr* for both sexes was lower than historical trends. Additional examination or statistical analyses may be warranted to examine whether condition is declining.

Two exceptionally heavy and exceptionally light male Paddlefish were recorded for Grand Lake in 2025, with relative weights of 158.16 and 47.11, respectively. It is possible that the heavy fish (G31045, 1030 mm, 29.68 kg) was mistakenly recorded as male instead of female, as it would be the heaviest male ever observed in Grand Lake from our tagging database. If assigned as a female, the relative weight would be 145.8, which is still high, but less remarkable (47^{th} largest). Therefore, this fish was reassigned as female. The light fish (G32741, 1026 mm, 8.74 kg) likely represents an error in length or weight, as it represents the lowest relative weight observed for a

Grand Lake male in the tagging database. For 26 other male Grand Lake Paddlefish of the same length, the average weight was 17.95 kg. No comments noting condition were recorded for this fish that would explain the poor condition. Therefore, the weight was presumed to be incorrect and it was deleted.

Forty-nine Paddlefish caught in Grand Lake were recaptures from previous collections and 44 had paired lengths and weights. Due to this high number of recaptures, the histories of these fish were not examined individually, but growth rates were summarized by sex below (Table 9).

Table 9. Average back-calculated daily growth rates of Grand Lake recaptured Paddlefish, grouped by sex.

Sex	At large (days)	Growth Rate (mm/d)	Growth Rate (g/d)
Male (37)	2,241	0.035	0.264
Female (7)	2,457	0.066	1.908

Grand Lake is a heavily-studied stock of Paddlefish- perhaps one of the most studied range-wide. Annual and long-term tagging efforts have resulted in a sizeable portion of the stock as marked, with many fish encountered multiple times. Having a high fraction of the population marked allows for more robust estimations of abundance and exploitation (Figure 19). One notable capture in December 2025 was a fish recaptured from ODWC's first tagging efforts for Paddlefish (Figure 20). Over the period December 2002 to April 2003, ODWC captured, measured and banded 1,549 Paddlefish in Grand Lake. Fish G08906 was originally captured February 12, 2003, and measured 745 mm. Based on age and growth data from the Grand Lake stock, it is likely that the fish was four years old at tagging. After spending 8,342 days at large (22.9 years) in Grand Lake, the fish was recaptured December 15, 2025. At the second capture, the fish was a 960 mm, 13.3 kg male. Presuming the age of this fish is ~27 years old, it is near the expected maximum longevity of Paddlefish in Oklahoma. Understandably, this old fish is slightly underweight compared to what we would expect for its length (W_r=87). Additionally, the fish was noted at recapture to be bearing a prop scar, indicating a putative boat strike (or similarly significant wound). This injury and any chronic effects could compound with the age of the fish to result in its reduced overall condition. Relatively few (34, 2%) of these original 1,549 fish have been subsequently recaptured in our nets since 2002-2003 and a higher fraction (143, 9%) were harvested and cleaned at the PRC during 2008-2023. The fact that some fish from this group are still at large in 2025 is remarkable.

Figure 19. Percent of Grand Lake Paddlefish for recaptures (i.e., fish captured and marked with a jaw band in previous collections). Typically, studies on wild populations with >10% of individuals marked can generally provide robust estimates of population abundance.

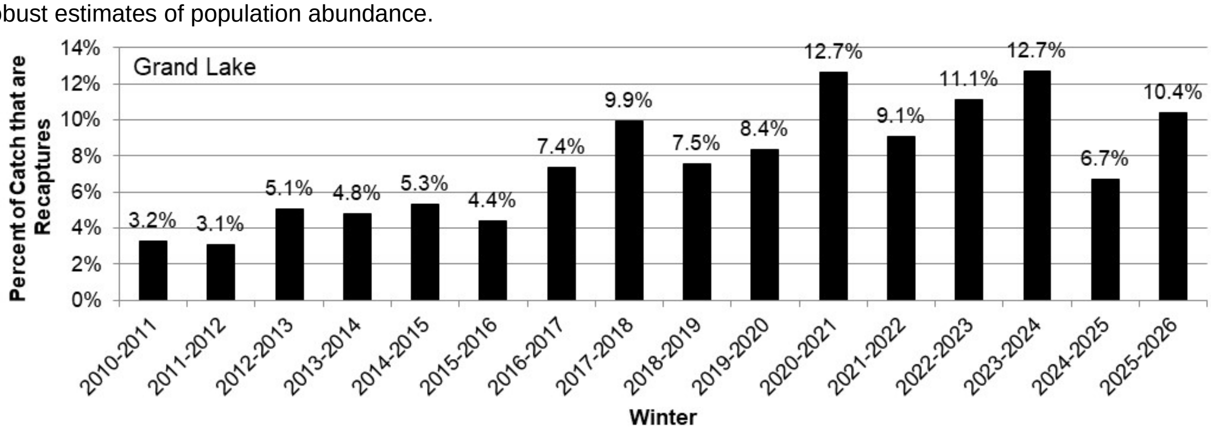


Figure 20. Male Paddlefish initially banded in February 2003 and recaptured December 2025.

Bycatch encountered in standardized Paddlefish gillnets on Grand Lake included Largemouth Bass, White Crappie, White Bass, Blue Catfish (many), and Bigmouth Buffalo. Numerous Flathead Catfish were measured, weighed, and tagged for a long-term study by the regional management personnel.

Keystone Lake

We used standardized Paddlefish gill-net sampling protocols (Appendix D) for Keystone Lake and encountered a total of 484[7] Paddlefish in 72 nets. Body length ranged 334-1,334 mm and weight ranged 0.65-40.9 kg (Tables 10, 11). Average catch rates were 48.7 fish/net/day (SE=4.5, CV=0.09), ranging 6.9-201.1 [excluding five nets with zero catches]). Male:Female sex ratio was 1.6:1. Paddlefish catch rates were marginally higher than long term trend data from Keystone Lake (Table 14).

Table 10. Keystone Lake Paddlefish catch summary 2025-26

Sex	Captured	Marks	Recaptures	Avg EFL (mm)	Avg Wt (kg)	Avg W_r
Male	292	292	0	956	17.5	113.5
Female	188	188	0	1010	21.8	111.7
Juvenile	2	2	0	555	4.5	-
Totals	482[8]	482	0			

[7] Total catch includes one fish captured twice.
[8] Capture total excludes one fish captured two times, which were used for population abundance estimation, but not weighed and measured twice.

Table 11. Keystone Lake Paddlefish combined catch summary from previous years (2011-12, 2018-20)

Sex	Captured	Marks	Recaptures	Avg EFL (mm)	Avg Wt (kg)	Avg W_r
Male	336	330	6	1005	20.6	112.6
Female	283	281	2	1013	22.6	108.3
Juvenile	91	91	0	708	6.4	-
Unknown	30	30	0	827	9.6	-
Totals	740	732	8			

Paddlefish catches were higher on average in the Cimmaron River arm (64.0 fish/net/day) than in the Arkansas River arm (36.3 fish/net/day, Figure 21). Four net deployments in the Arkansas River arm and only one net deployment in the Cimarron River arm produced zero catches. However, all but one of these sites were selected a second, third or fourth time and caught Paddlefish. A single, exceptional catch (201.1 fish/net/day) was observed at site C11, however a subsequent effort at this site yielded a reduction in catch (47.7 fish/net/day), exemplifying the daily variability in catches. Overall, the randomly selected sites (12 sites per day over 6 days) provided adequate spatial coverage and the CV of 0.09 exceeded the objective for standard sampling.

Figure 21. Catch rates for net sites in Keystone Lake. Average catch rates within river arm are indicated by dashed blue lines while overall average catch rate is indicated by dashed grey line.

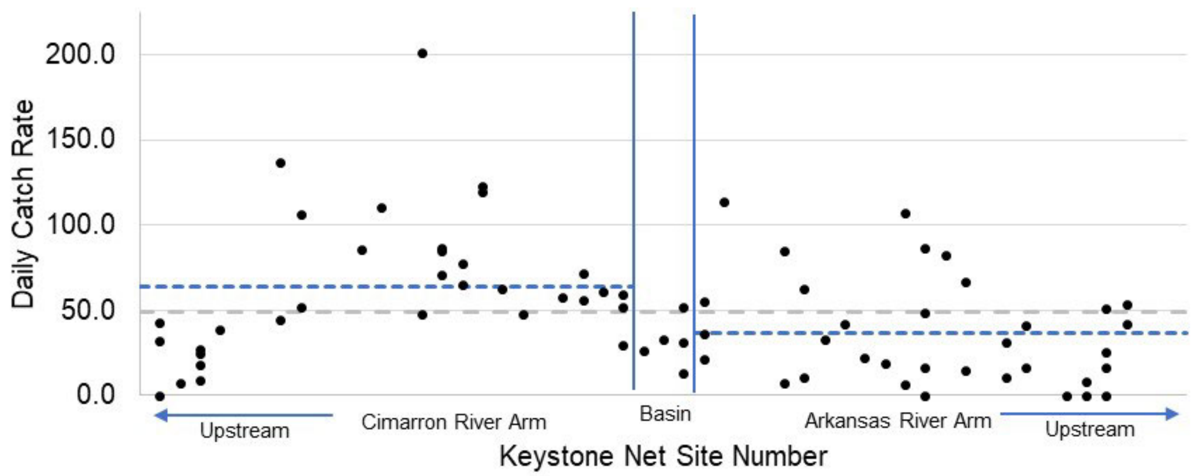
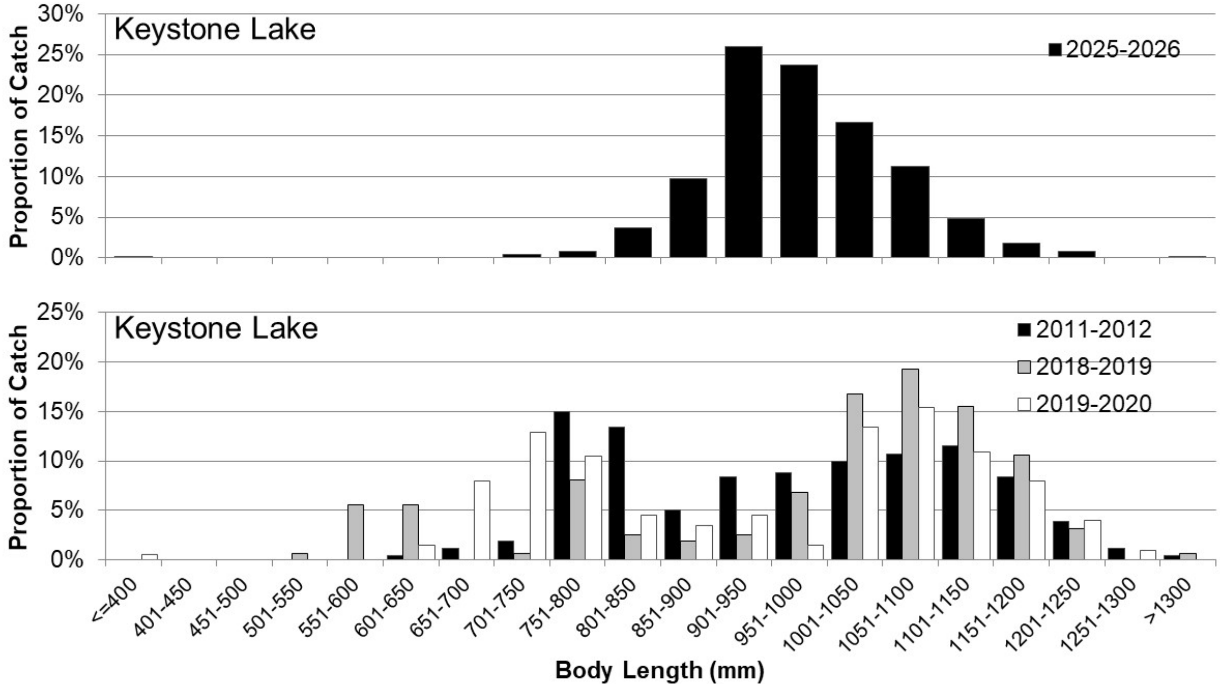


Figure 22. Size structure of Keystone Lake Paddlefish catch for current and previous collections.



Size structures of the Keystone Lake Paddlefish stock (Figure 22) in both 2011-12 and 2018-20 were bimodal or trimodal distributions, indicating recent recruitment events in the stock. However, the latest catch data have revised the size structure to reflect absence of younger and smaller fish (with the exception of one fish 337 mm). The largest fish captured was a 40.9 kg female, which would appear to be unremarkable given the growth potential in this stock and the observance of world record fish well-exceeding 60 kg. However, this fish is the 16th heaviest Paddlefish in our tagging database for Keystone (n=1,261) and 33rd heaviest statewide (n=31,372; 99th percentile).

No Paddlefish captured were detected with a CWT indicating hatchery origin, despite Kaw Lake immediately upstream of Keystone having been stocked for restoration (Appendix D). Additional notations on condition of fish encountered included hook scars (26%), prop scars (4%), or rostrum injuries/deformations (7%). Significant rostrum injuries are less common in Keystone Lake than in other stocks downstream of a reservoir dam, however, seven fish had full or partial amputations, potentially indicating that they may have passed through Kaw Dam. Hook scars were historically uncommon in the Keystone Lake stock, however, an increase in snagging pressure resulting from the world record frenzy in 2020-2021 has manifested in a higher frequency of fish in the population bearing scars of catch and release. With more than 25% of the catch having hook scars, this compares to rates seen in Grand Lake- a stock with historically higher snagging pressure.

Average relative weights appear to have slightly improved for both sexes in the Keystone Lake stock, though individual fish in Keystone Lake generally have higher than average W_r than other stocks.

No Paddlefish caught in Keystone Lake were recaptures from previous collections. This stock has not been thoroughly examined since 2011-2012 (Nealis 2013), though it has warranted additional attention due to increased snagging pressure. Additional netting in 2026-2027 will allow for a greater number of fish to be tagged in this system.

Bycatch encountered in standardized Paddlefish gillnets on Keystone Lake included Flathead Catfish, Blue Catfish, and Bigmouth Buffalo.

<u>Net Type Analysis</u>

CPUE of Paddlefish for red and white/clear nets were similar both across lakes as well as within each lake sampled (Figure 23, Table 12). Furthermore, Wilcoxon rank sum tests indicated there were no statistically significant differences in Paddlefish CPUE's within each lake (Eufaula: W-Statistic=148, p=0.76; Keystone: W=324, p=0.59; Grand: W=492, p=0.15) or for all lakes combined (All; W=2,813, p=0.21). We evaluated the length frequency distributions of both net types and found that they were not significantly different from one another (Kolmogorov-Smirnov test D=0.08, p=0.19; Figure 24). Further examination of catch composition of the two net types indicated additional similarities. The ratio of male to female Paddlefish captured were not statistically different between the two types: 2.01 for red nets and 2.09 for clear nets (χ^2=0.026, p=0.87).

Figure 23. Comparison of Paddlefish catch rates between two net types. Data are for fish captured in winter 2025-2026 in clear (gray bars) and red (red bars) gillnets in Eufaula (January 2026 data), Grand, and Keystone lakes. The set of bars labeled "All" is the CPUE of all three lakes combined. Error bars represent 95% confidence intervals.

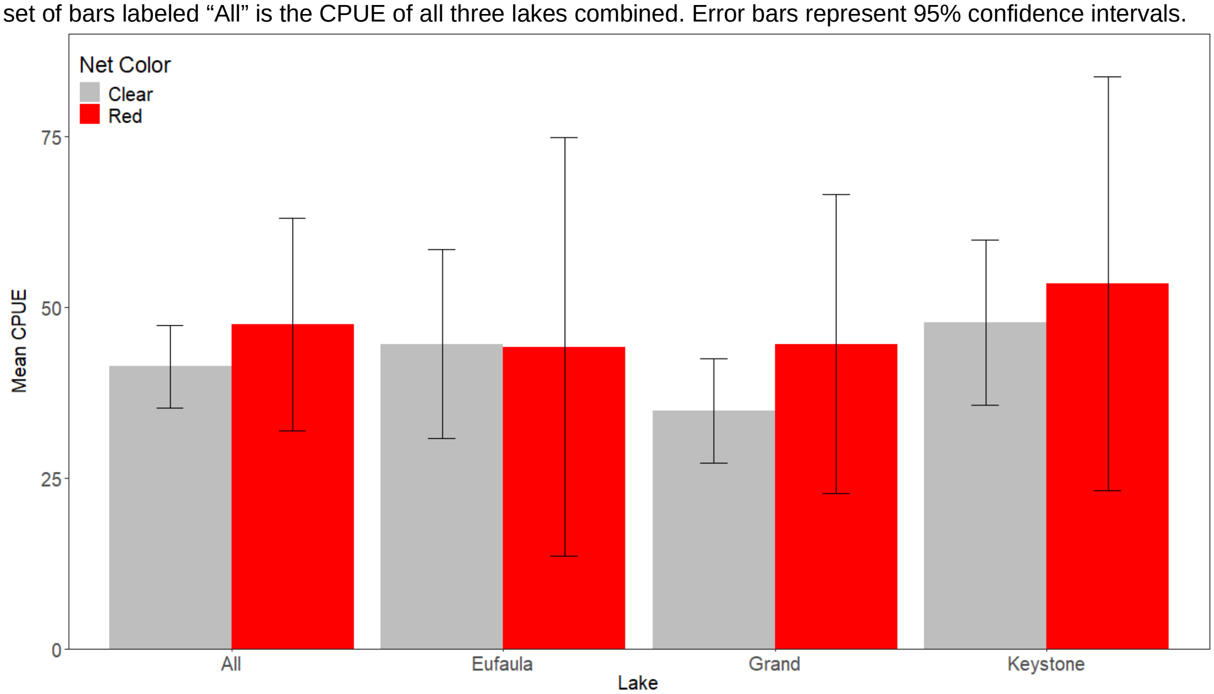
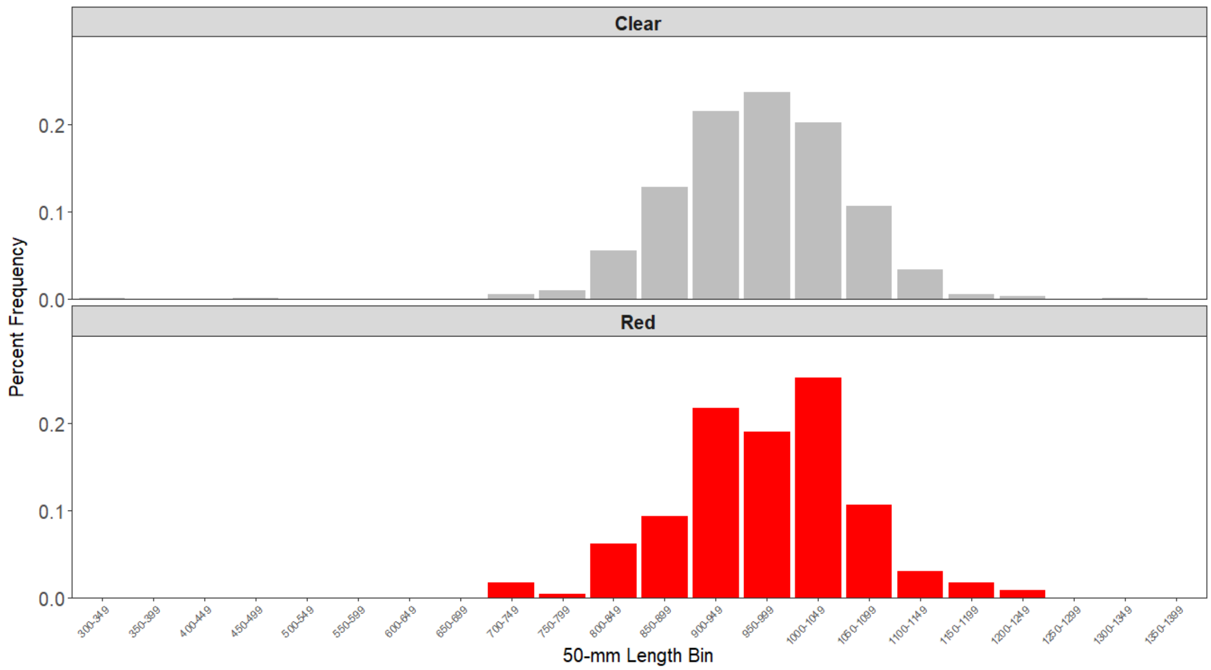


Table 12. Catch rate summary for Paddlefish and bycatch species across all sampled lakes in winter 2025-2026. W statistic and p-values are indicative of the output of a Wilcoxon rank sum test on CPUE's between net colors (clear and red) for each species.

	Clear (n = 180)				Red (n = 36)					
Species	# Individuals	Mean CPUE	SD	95% CI	# Individuals	Mean CPUE	SD	95% CI	W statistic	p-value
Paddlefish *Polyodon spathula*	1062	41.30	34.68	35.26-47.33	245	47.47	35.15	31.96-62.97	2813	0.21
Bigmouth Buffalo *Ictiobus cyprinellus*	65	2.77	7.29	2.36-3.17	17	3.62	9.47	2.44-4.80	3248	0.97
Smallmouth Buffalo *Ictiobus bubalus*	4	0.18	1.24	0.16-0.21	0	0.00	0.00	0.00-0.00	3312	0.37
Blue Catfish *Ictalurus furcatus*	105	4.10	9.66	3.50-4.70	48	9.32	24.95	6.28-12.37	2800	0.11
Flathead Catfish *Pylodictis olivaris*	28	1.10	3.11	0.94-1.26	9	1.64	5.24	1.11-2.18	3267	0.89
Channel Catfish *Ictalurus punctatus*	1	0.05	0.61	0.04-0.05	1	0.18	1.06	0.12-0.23	3169	0.21
White Bass *Morone chrysops*	1	0.04	0.51	0.03-0.04	0	0.00	0.00	0.00-0.00	3258	0.66
Largemouth Bass *Micropterus nigricans*	1	0.04	0.58	0.04-0.05	0	0.00	0.00	0.00-0.00	3258	0.66
White Crappie *Pomoxis annularis*	1	0.05	0.64	0.04-0.05	0	0.00	0.00	0.00-0.00	3258	0.66

Figure 24. Percent frequencies of Paddlefish in 50-mm length bins captured by clear (top panel) and red (bottom panel) gill nets in Winter 2025-2026.



Examination of catch composition for bycatch across the two net types yielded mixed results. Average catch rates were not significantly different between net types for any of the 8 bycatch species encountered. In total, clear nets captured 8 species of bycatch whereas red nets captured 4 species of bycatch (Table 12). These differences in species of bycatch are likely an artifact of high numbers of clear net deployments (n=180) compared to the numbers of red nets deployed (n=36). Additionally, even with the high rate of deployment of clear nets, 4 of the bycatch species for clear nets were only represented by 1 individual. Wilcoxon rank sum tests were conducted within each bycatch species to assess differences in CPUE between the two net types and no statistical differences were found (Table 12).

Based on our results, the overall catch of red mono-twist nets appears to be similar to the standard single-strand monofilament clear nets for both our target species (Paddlefish) and bycatch species. Additionally, both the sizes and sex ratios of captured Paddlefish captured appear to be similar, meaning we can still draw long-term conclusions, even with a change in gear. Future use of the red nets may provide benefit due to their ease of use, without sacrificing the quality of data collected. However, a higher sample size of red nets may be needed to reinforce the results so far, inspiring greater confidence in these conclusions. This preliminary examination could not specifically segregate any catch effects due to net type (mono-twist vs. single-strand) or net color (red vs. clear). If clear mono-twist nets are available in the future, we may be able to examine this further. However, the longer wavelength colors of red and orange are readily absorbed by water, therefore the reduced perception of red mesh by Paddlefish or bycatch at depths used for our gear (typically >30' deep and often turbid) may be unworthy of such concern.

ESTIMATION OF POPULATION ABUNDANCE

During January 2025 (Lake Eufaula) and December 2025 (Keystone and Grand lakes), new collection protocols (Appendix C) allowed for estimation of population abundance using a series Schnabel estimator (Table 13).

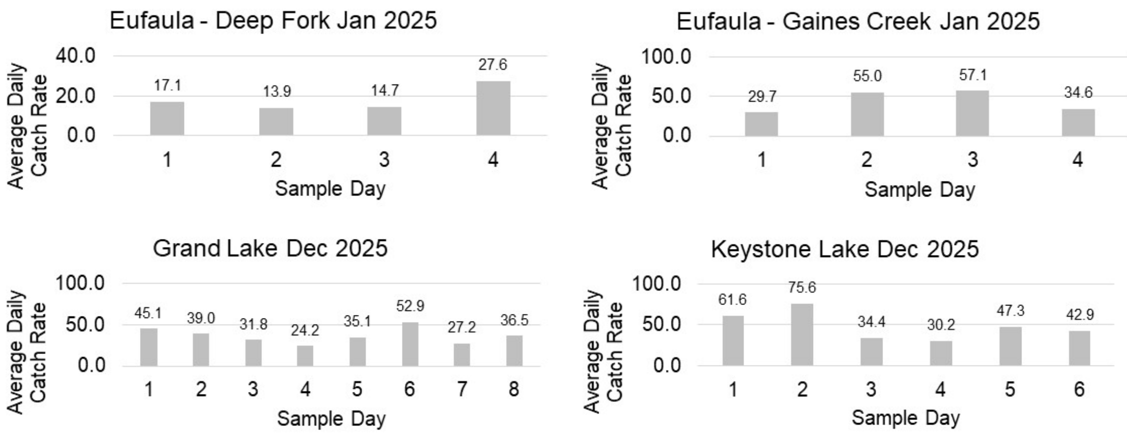
Table 13. Schnabel estimation summary for Oklahoma Paddlefish stocks, Jan 2025 (Eufaula) and Dec 2025 (Grand and Keystone)

Stock	Sample Days	Total Nets	Captured	Recaptured	*N* (95%CI)
Eufaula – Gaines Creek Arm	4	48	279	8	3,535 (1,896-8,610)
Eufaula – Deep Fork Arm	4	48	108	5	822 (368-2,087)
Grand	8	96	482	12	8,278 (4,885-14,858)
Keystone	6	72	483	1	*NA*

Estimates above cannot accurately capture the entire stock, as fish are free to disperse throughout the reservoirs and outside of our sample area limitations (e.g., adequate depth for large gill nets). The sheer size of Lake Eufaula limits our feasibility of performing stock assessments and estimating abundance. The decision to sample the two distinct river arms (Gaines Creek and Deep Fork) is based on prior success encountering Paddlefish in these habitats. As our recapture data demonstrate (Table 6), stocked fish have readily dispersed from Gaines Creek and are free to roam about the reservoir. Though our efforts do not strictly adhere to the assumption of a closed population, sampling was performed in a condensed timeframe to help mitigate the movement of fish in or out of the sample area.

Similarly, on Grand Lake, we know that Paddlefish inhabit the uppermost stretches of the reservoir (below Twin Bridges), however, including this area creates logistical issues due to shallow water between Oogeeche Bend and Campbell Point. Further, standard protocols have excluded the lower portion of the reservoir due to low catch rates. Abundance estimates for the sampled area of Grand Lake therefore provide insights on the upper reservoir population segment, not the larger population. Again, efforts in Grand Lake do not strictly adhere to the closed population assumption. Timing of collections (and associated water temperatures or river discharge) may elicit fish movements during or prior to our collections. This could explain, in part, low or variable catch rates if a large segment of the population is staging upstream of our sample area. Fish densities appear to be variable day to day, perhaps due in part to our intense collection efforts in the area plus the simultaneous fishing pressure by winter snagging guides and their clients. Daily average catch rates on Grand Lake were not an indicator that Paddlefish were leaving the area (Figure 23).

Figure 23. Gillnetting daily catch rates for Eufaula, Grand and Keystone.

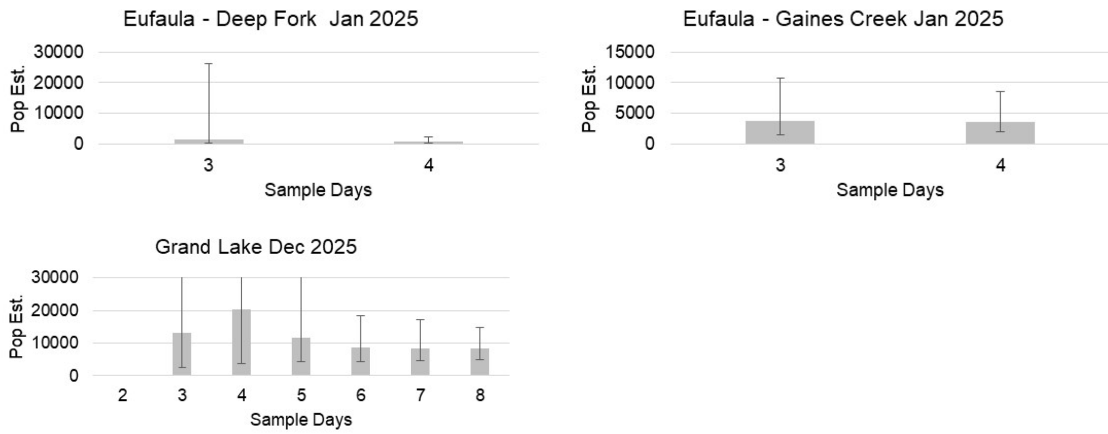


Collections on Keystone Lake, however, are performed on a large segment of the reservoir with appropriate depths (i.e., deeper than the net height). While a portion of the population may already be staging in holes upstream of the lake (in either the Cimarron or Arkansas river arm), shallow water immediately upstream of the sampled area and lack of appreciable river discharge likely restricted movements of Paddlefish within our sample period. The difficulty recapturing Paddlefish for generation of the series estimate ($R=1$) indicates that perhaps more sampling effort is recommended. With only one recapture, a population estimate can be generated, however the lack of precision (wide 95% confidence interval) makes the estimate essentially useless. Despite the relative size of the sampled portion of Grand Lake compared to the sampled portion of Keystone Lake and the near-equivalent catches, it might follow that additional days on Keystone Lake should be adequate for abundance estimation.

In all examples, netting collections for abundance estimation are as thorough as practicable. Estimates therefore might be more responsibly interpreted qualitatively (i.e., comparing year to year within reservoir) or coarsely (i.e., large differences exist when comparing stocks) rather than quantitatively (i.e., direct comparison of X to Y). Using estimates as a means to quantify population density may be a reasonable alternative to consideration of raw numbers.

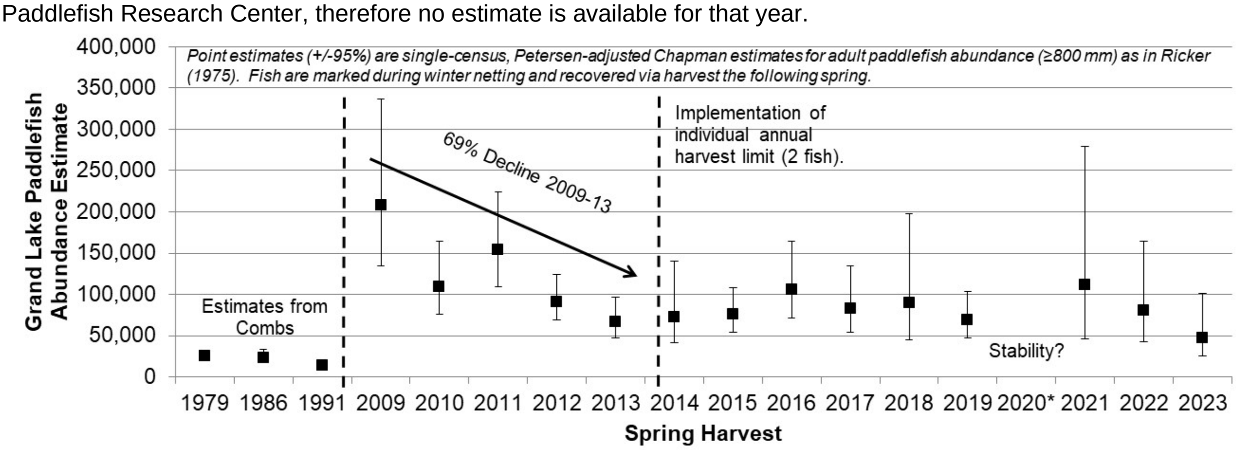
To evaluate daily efforts and to inform refinement of protocols, abundance estimate calculations were completed and evaluated daily (Figure 24) in context of daily catch rates and variability (Figure 23). It appears that eight days of sampling on Grand Lake resulted in refinement of the estimate and narrowing of the 95% confidence intervals. Earlier successes in encountering recaptures resulted in relatively precise estimates on day six. Duplication of sampling effort on Grand Lake in 2024-2025 and 2025-2026 reinforced the assumption that eight days may be adequate. However, with other reservoirs, determining the adequate sampling effort may require some flexibility (i.e., adding more sample days as needed or stopping early if recaptures are adequate for a precise estimate). Perhaps a good rule of thumb for evaluation is whether or not the upper bound of the 95% confidence interval exceeds 2x the estimate. This was not achieved on Lake Eufaula in either the Deep Fork or Gaines Creek arms but was reached on Grand only after the 8th sample (96 nets). Based on the results in Eufaula, Gaines Creek was scheduled for five days in January 2026. These results will be described in the 2026 report.

Figure 24. Comparison of abundance estimates derived from sequential days' catches



Earlier efforts to estimate abundance of Paddlefish in Oklahoma have been restricted to the Neosho River / Grand Lake stock. Recent population abundance estimates from Grand Lake used marked fish from winter netting that were later recovered from harvest at the Paddlefish Research Center (Figure 25). The trend in estimated abundance following the 2014 harvest regulation changes indicated stability of the "catchable" population (≥800 mm). The estimate for 2023 was the lowest in the modern era of Paddlefish management, however this estimate is known to exclude a segment of the stock upstream (and perhaps downstream, though to a lesser extent) of our netting boundary. As our focus has expanded from the Grand Lake stock to other statewide Paddlefish snag fisheries, revised sampling protocols allow for abundance estimation on all distinct Paddlefish reservoir stocks. New sampling protocols do not rely on the recovery of recaptures from angler harvest, therefore the consideration of what is "catchable" is less relevant and the exclusion of fish <800 mm from mark/recapture would likely hinder the viability of estimates. For this and a list of various other reasons, direct comparison of estimates across the two methodologies should be done with high caution.

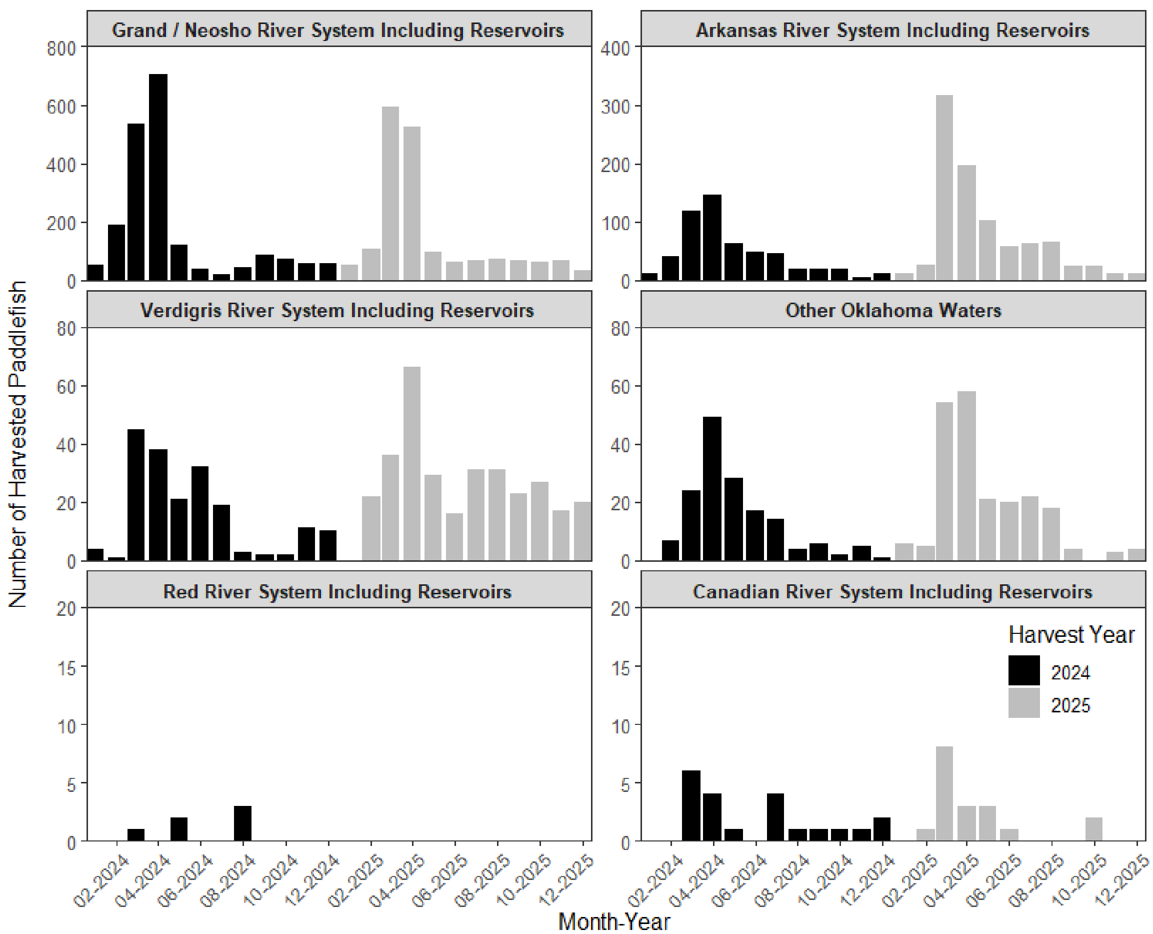
Figure 25. Modified single-census estimates of catchable Paddlefish abundance on Grand Lake, with estimates from Combs 1979-1991 for comparison. The harvest season in 2020 was abbreviated due to COVID closure of the Paddlefish Research Center, therefore no estimate is available for that year.



STATEWIDE HARVEST REPORTING (E-CHECK)

Beginning in 2014, when the species became a *de facto* trophy species with an annual limit of two fish, harvest reporting became compulsory for Paddlefish in Oklahoma via the online e-check system used for large game in Oklahoma. Since then, the online system was integrated into the GoOutdoors license system here: https://gooutdoorsoklahoma.com/ Harvest reporting data, including angler identity, customer ID, harvest date and time, U.S. citizenship status, river system of harvest, and whether the fish was banded by ODWC are self-reported by anglers and can be queried via the ODWC service desk (admin side of GoOutdoors). Quality control of harvest data primarily included de-duplication of records, which is common when users self-report multiple fish in the same day (presumably by mistake). These duplicative records were deleted. Data for calendar years 2025 and 2024 (for comparison) are summarized below. Both years represent post-PRC harvest activities, where self-reporting should be expected of the angler versus ODWC reporting their harvest automatically when they had their fish cleaned at the PRC. Reporting rate (compliance) is not known, nor is it understood to be equivalent across various paddlefish snag fisheries. Therefore, these data provide some context about distribution of harvest across time and space (i.e., major river systems), but not detailed information about specific fisheries (Figure 26).

Figure 26. Angler-reported Paddlefish harvest grouped by month for 2024 and 2025 within major river watershed.



For both years examined, reported harvest primarily occurred in the Grand/Neosho and Arkansas river watersheds. Each of these are comprised of multiple fisheries. For example, the Grand/Neosho stock includes river fisheries in the Neosho River above Grand Lake and the Grand River below Ft. Gibson Lake in addition to three reservoirs- Grand, Hudson, and Ft. Gibson. The Arkansas River strata contains a larger number of distinct fisheries, but they are less popular overall (at least for harvest). Within the Arkansas, are two high-dam reservoirs (Kaw and Keystone), two lock and dam reservoirs (Webbers Falls and R. S. Kerr), plus a prominent tailwater fishery at Kaw Dam. An overall 13% increase in harvest reporting was evident between 2024 and 2025 (Figure 26, Table 14).

Despite the annual harvest limit of two Paddlefish per person, multiple anglers reported harvest of more than two fish in 2024 or 2025. After each instance was examined to account for and correct plausible errors, only a few remained. One of these anglers is a prominent Paddlefish snagging guide, so it is likely that he was attempting to assist a client in reporting their harvest and reported five fish in 2024 year by mistake. Average Paddlefish reported per angler (1.13 in 2024 and 1.14 in 2025) was consistent.

Additional information in the harvest reporting database demonstrates that the harvest includes banded and unmarked Paddlefish (Table 14). Unfortunately, despite instructions provided to the user on the format of band codes (a letter prefix indicating the watershed [e.g., “G” for Grand River] followed by a five-digit number), many band code entries do not follow the format and are missing prefixes, digits, or are otherwise incomplete. Therefore, database matching the harvest to the tagging data can be problematic. Where possible and logical based on location of harvest reported, missing prefixes were appended to band codes. We would expect that the percentage of harvest reported with bands to be far lower than the marked % of any individual lake (i.e., 10.4% in Grand Lake), however, there is likely a combination of harvest bias and reporting bias for banded fish. A banded fish is more likely to be harvested AND more likely to be reported than an unmarked one, therefore using self-reported data for estimation of exploitation would be problematic.

Table 14. Summary data from Paddlefish online harvest reporting (e-check).

Harvest Year	Total Harvest Records	Total Anglers	Fish with BandCodes (%)	Fish without Bands (%)
2024	2,882	2,544	6.0%	94.0%
2025	3,256	2,865	4.9%	95.1%

LONG-TERM, STATEWIDE TREND DATA[9]

Ten major reservoirs in Oklahoma have been repeatedly selected for Paddlefish stock assessment since 2010 (Table 15). Limited time in winter to adequately sample these reservoirs required a rotational schedule, which generally resulted in reservoirs being sampled on two consecutive years to help overcome inter-annual variability in catches. Local conditions and catches have necessitated modifications in protocols for certain reservoirs, though Grand Lake has been consistently sampled for the duration.

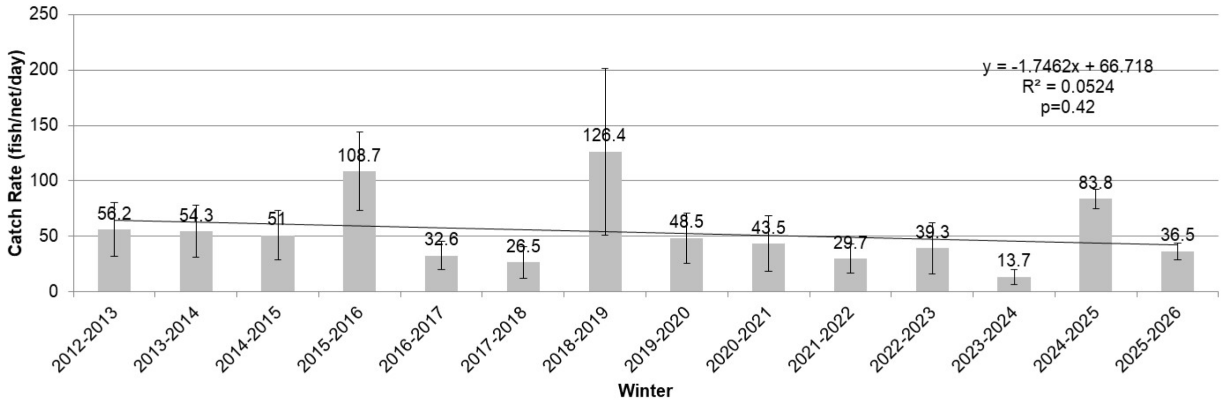
Table 15. Summary matrix of average Paddlefish catch rates (with coefficients of variation of the mean [CV] in parentheses) from all Oklahoma lakes sampled 2010-2025. Lakes indicated by an asterisk (*) are recipients of restoration stocking. Lakes with planned collections in 2026-27 are shaded in grey.

Year	Grand	Eufaula*[10]	Webber's Falls	R.S. Kerr	Texoma*[11]	Kaw*	Oologah*	Hudson	Ft. Gibson	Keystone
2010-11[12]	*NS*									
2011-12	24.9 (0.29)								94.6 (0.10)	32.5 (0.13)
2012-13	56.2 (0.22)	10.0 (0.28)						69.6 (0.12)	166.7 (0.11)	
2013-14	54.3 (0.22)						143.7 (0.22)	93.0 (0.28)		
2014-15	51.0 (0.22)					32.4 (0.23)	80.4 (0.16)			
2015-16	108.7 (0.16)				0 (0)	12.7 (0.18)				
2016-17	32.6 (0.20)			43.6 (0.53)	*NS*					
2017-18	26.5 (0.28)		15.4 (0.56)	28.2 (0.44)						
2018-19	126.4 (0.30)		*NS*[13]							31.5 (0.14)
2019-20	48.5 (0.24)								50.1 (0.31)	41.2 (0.21)
2020-21	43.5 (0.29)	8.9 (0.30)						100.2 (0.21)	33.2 (0.29)	
2021-22	29.7 (0.23)	61.6 (0.17)					43.2 (0.17)	88.0 (0.27)		
2022-23	39.3 (0.30)	39.6 (0.17)				132.7 (0.27)	121.4 (0.28)			
2023-24	13.7 (0.25)	47.8 (0.20)		45.5 (0.32)		125.2 (0.13)				
2024-25[14]	83.8 (0.05)	31.2 (0.11)	76.0 (0.12)	*NS*						
2025-26	36.5 (0.10)	*Jan 2026*	*NS*							48.7 (0.09)
2026-27	*Dec 2026*	*Jan 2027*								*Dec 2026*

Standardized catch rates on Grand Lake using old methods are variable (with large peaks in 2016 and 2019; Figure 27). New netting methodologies as of 2024-25 may not be directly comparable to those of prior years, but may indicate that enhanced effort (more nets over a consistent spatial coverage) yields higher quality data compared to fewer nets across the same sample area. Although historical sampling (2012-24) appears to be in a long-term decline, occasional high catch produces variability that renders the linear trend not statistically significant (linear regression, R^2= 0.0524, p=0.42).

[9] Relevant long-term trend data are included here, although all collections prior to July 1, 2023, were state funded.
[10] Paddlefish collections on Eufaula Lake were restricted to the Deep Fork and Gaines Creek arms in 2021-22 after poor lake wide catch rates in previous years.
[11] Standardized sampling encountered only one Paddlefish in 2015-16, therefore enhanced effort was used in 2016-17 and no additional Paddlefish were encountered. This stock was concluded as a restoration failure and no additional collections have occurred.
[12] Standardized winter Paddlefish gillnetting was refined in 2012-13 and effort was reduced from 24 nets to 16 nets.
[13] Due to shallow water, highly variable catch rates in 2017-18, and a companion project at Ft. Gibson Dam, collections in 2018-19 did not follow standardized protocols to enhance catch.
[14] New standardized netting protocols were developed and implemented for winter 2024-25. Average catch rates are calculated the same way; however, net soak times were shorter across more nets deployed per day.

Figure 27. Mean Paddlefish catch rates from standardized winter gillnetting on Grand Lake



FUTURE EFFORTS AND MANAGEMENT RECOMMENDATIONS

Standardized Collections in 2024 and beyond: As of this report, new standardized winter collections have been implemented on Grand, Keystone, Webber's Falls, R.S. Kerr, and Eufaula lakes. Evaluation of these changes is ongoing. One key modification was the ended use of bullet floats at 75' intervals on the float line. This simplified net deployment and retrieval, particularly in wind and wave lake conditions. On one occasion, a Paddlefish snagging guide on Grand Lake complained on Facebook that they had encountered our net, stating that it was inadequately marked. Among the complaints was that our nets were abundant, and widely distributed. They were indeed. At this time, we do not foresee a need to attach bullet floats in addition to the three inflatable buoys.

Deployment and retrieval of six 600' nets was spatially challenging on the boats. Using no bullet buoys allowed for the stowing of two nets in one barrel, reducing the number of containers on the boat. However, the additional inflatable buoys and anchors filled the space quickly, making the boat crowded for the 5th and 6th net retrieval. This spatial challenge is exacerbated on the rare occasions that the crew exceeds four, the catch rate is high, or the wind and waves are substantive.

One a priori concern was that deployment of 12 nets would result in excessive catches and longer days. After two years, we feel that this concern was assuaged. Given that we are not "checking" the nets and retrieving them later, the catches from shorter net soaks were manageable with a maximum of 25 fish in a net on Keystone (avg. 7), 23 on Grand Lake (avg. 5), and 18 on Eufaula (avg. 4). On reservoirs where the Paddlefish abundance is known to be high (e.g., Oologah Lake), deployment of 12 nets may result in extreme catches and the amount of netting effort required to adequately estimate the population size would be equally unreasonable. Perhaps a simplified or cautious approach would be warranted.

Previous protocols resulted in more crew loitering time compared to a more consistent activity level with the new protocols. Paired with the likelihood of longer boat rides to distant net sites, potentially in inclement weather (wind and waves), the new protocols may be viewed as substantially more "difficult", challenging our abilities to fill the crews with willing participants. It should therefore be a goal to consider any and all efficiencies that could enhance crew safety and comfort. Consistent among complaints is the inadequacy of the Blue Wave boat for this type of work. Though the v-hull and 250hp outboard are appropriate for efficient travel on large reservoirs, additional effort is required to hoist a net weighed down by large fish over the side or the bow. Further, the slanted gunwales at the fore end of the deck are a slip/trip hazard, resulting in consistent issues with crew losing their footing and/or falling into the lake. The addition of a non-slip coating to the entire deck of Bertha in summer 2025 made a large improvement in crew safety and footing. If budgets allow, it should become a priority to replace this watercraft with one that is more appropriately suited to performing this work in a safe manner.

Assessment of Natural Recruitment of Oklahoma Paddlefish: The generalized outlook of Oklahoma Paddlefish recruitment as depicted by catches in the three reservoirs described here is good. All three reservoirs have a size structure indicating that a visible component of the stock represents one or more recent recruitment events. Given that a primary objective of Paddlefish management in Oklahoma (see Appendix A.) is to maintain sustainable fisheries in naturally recruiting stocks, these collection results would indicate that the future of these fisheries and the status of Paddlefish in Oklahoma is positive. Natural recruitment should continue to be a priority focus for future management efforts. Although methodologies for early detection of age-0 Paddlefish are not well defined for Oklahoma waters, detection of age-1 Paddlefish in standard gillnetting collections is adequate to evaluate the presence of rare, large recruitment events among smaller, low-level recruitment on a more regular frequency. Continued evaluation of the 2015 cohort in the Grand Lake stock will determine if the abundance of this cohort will adequately buffer current and future harvest levels within the current regulatory framework or if adjustments are needed.

Sex Ratios and Harvest Bias for Female Paddlefish: A known size-bias for larger Paddlefish exists in the harvest fishery. Multiple lines of evidence have demonstrated this phenomenon- e.g., a disproportionate prevalence of hook scars on smaller males compared to fewer scars on larger females, trophy-seeking guides harvest more females than males. When sex ratio of netting catch is compared across reservoirs, the long-term effects of this harvest bias can be observed. For example, the Male:Female sex ratio of Grand Lake is skewed at 2:1, whereas this ratio was observed as 2.54:1 and 1.6:1 in Eufaula and Keystone, respectively. A wild stock without a severe harvest (trophy-seeking) bias may be closer to a presumed natural 1:1 sex ratio. While the harvest pressure is disproportionately felt by female Paddlefish in Oklahoma's more heavily fished stocks (e.g., Grand Lake), it is unknown at what level this ratio may cause concern. A less biased sex ratio in Keystone may be simultaneously due to a higher catch and release ethic for trophy fish (typically female) and a higher difficulty in assigning sex based on external characteristics. Given that Paddlefish are promiscuous with individual spawning females attended by multiple males and the same males likely spawning with multiple females over the spawning season (whereas females only spawn once), a severe imbalance in sex ratio (skewed to an abundance of males) may still result in adequate maintenance of genetic diversity and recruitment in a heavily fished stock. A genetic assessment which estimates the effective breeding population size may better illustrate this phenomenon. Previous genetic efforts on Grand Lake found no cause for concern regarding the effective breeding stock size (Schwemm et al. 2015, 2019). In other stocks such as Keystone and Kaw Lake, where the sex-linked size dimorphism is less pronounced (i.e., males are heavier by length than in Grand Lake), this may buffer against the long-term effects of harvest bias for females and the sex ratio may remain less-skewed.

Angler Surveys and Human Dimensions: An in-depth examination of the influences of the licensed fishing guide industry on Paddlefish snagging and harvest in Oklahoma is warranted due to an apparent growth of the industry fueled by the advent of live imaging sonar technology.

The snag fishery has expanded far beyond the historical spatial and temporal limitations of a springtime, primarily bank fishery at aggregating sites such as low head dams in a few locations. As of 2023, Paddlefish snagging in Oklahoma occurs throughout the distribution of the species and in rivers and reservoirs year-round, as anglers (many assisted by licensed fishing guides) pursue this large and distinctly shaped fish using live imaging sonar. A preliminary *ad hoc* creel survey of harvest anglers at the PRC in 2023 determined the following:

1. a majority of Paddlefish harvested by anglers March 1 – April 30, 2023, were assisted by licensed fishing guides (58%) and early season cumulative harvest was heavily dominated by guided anglers (86% of harvest up to March 27, 2023)
2. guided Paddlefish harvest anglers caught and subsequently released more fish per day (1.18) than unguided anglers (0.50)
3. guided Paddlefish anglers harvested larger fish (combined sexes) than unguided anglers (35mm longer and 1.5kg heavier)
4. guided Paddlefish anglers harvested proportionally more females (43%) than unguided anglers (29%)

These observations indicate that in off-peak conditions (i.e., outside of historical springtime "snagging season"), angler harvest is likely driven by or enhanced by guides. Further, this harvest likely targets larger, older female Paddlefish of greater conservation value. The expertise and technology offered by a guide likely has a significant impact on the statewide snagging pressure and harvest of Paddlefish. Pairing these results with the Oklahoma Licensed Fishing Guide Survey performed by ODWC in summer/fall 2023 (York and Schooley 2024) will likely provide important insights on whether fisheries in reservoirs across Oklahoma continue to support sustainable Paddlefish snagging opportunities.

<u>Research to Inform Management:</u> The substantial amounts of data generated by the Paddlefish Research Center 2008-2023 will likely continue to yield analyses and products relevant to management of Oklahoma Paddlefish in the years to come. A study is in progress on validated age estimation using dentaries, otoliths, and pectoral fin rays as age structures in comparison to known age from coded wire tags for hatchery origin fish. A study is nearing completion on validated field sex identification using two methods. And a long-term monitoring study for the introgression of Arkansas River genetics into the Neosho and Verdigris river Paddlefish stocks has been funded and began in 2025.

Although catch and release mortality for Paddlefish is presumed to be low due to lack of evidence for such mortality (Bettoli et al. 2019) and a common observation of healed hook scars on harvested and netted fish (ODWC, unpublished data), the expansion of the Oklahoma snag fishery into warmer summer months may call for further investigation. A key research need for Oklahoma Paddlefish is to enhance our understanding of the cryptic mortality from warmer season snagging catch and release. This may be best achieved via short-term, active telemetry tracking of adult fish snagged and released via live-imaging sonar in summer on Keystone Lake with a comparison to fish snagged and released in cooler months.

<u>Validated Age Estimation for Oklahoma Paddlefish from Dentaries:</u> Recovery of coded wire tags (CWT) indicating hatchery origin are valuable for our long-term assessment of validated age estimation for Paddlefish. During the era of the Paddlefish Research Center, thousands of Grand Lake Paddlefish were aged using annular rings on dentary bones. Recovery of CWTs on Grand Lake from fish stocked in John Redmond Reservoir, Kansas, and on Lake Eufaula have provided the opportunity to validate dentaries on known-age fish with the additional comparison of age estimates from other structures (otoliths and pectoral fin rays). This research is ongoing.

Restoration Stocking and Genetic Management: There are no ongoing or planned restoration stocking efforts for Paddlefish within the state of Oklahoma. However, restoration stocking is ongoing in the Neosho and Verdigris rivers of Kansas, which flow into Oklahoma reservoirs Grand and Oologah, respectively. In an attempt to maximize genetic diversity and to mimic patterns of historic connectivity (Schwemm et al. 2019), ODWC has partnered with U.S. Fish and Wildlife Service Tishomingo National Fish Hatchery (TNFH) and Kansas Department of Wildlife and Parks (KDWP) to capture adult Paddlefish from Keystone Lake for production of fish to be stocked in Elk City Reservoir (Verdigris River) and John Redmond Reservoir (Neosho River). This genetic introgression project began in 2021 and includes the translocation of adult Paddlefish from Keystone Lake to Grand Lake each spring during broodstock collection in addition to the release of Keystone Lake broodstock into Grand Lake after propagation. A long-term genetic monitoring program with periodic screening from Grand Lake Paddlefish began in 2025.

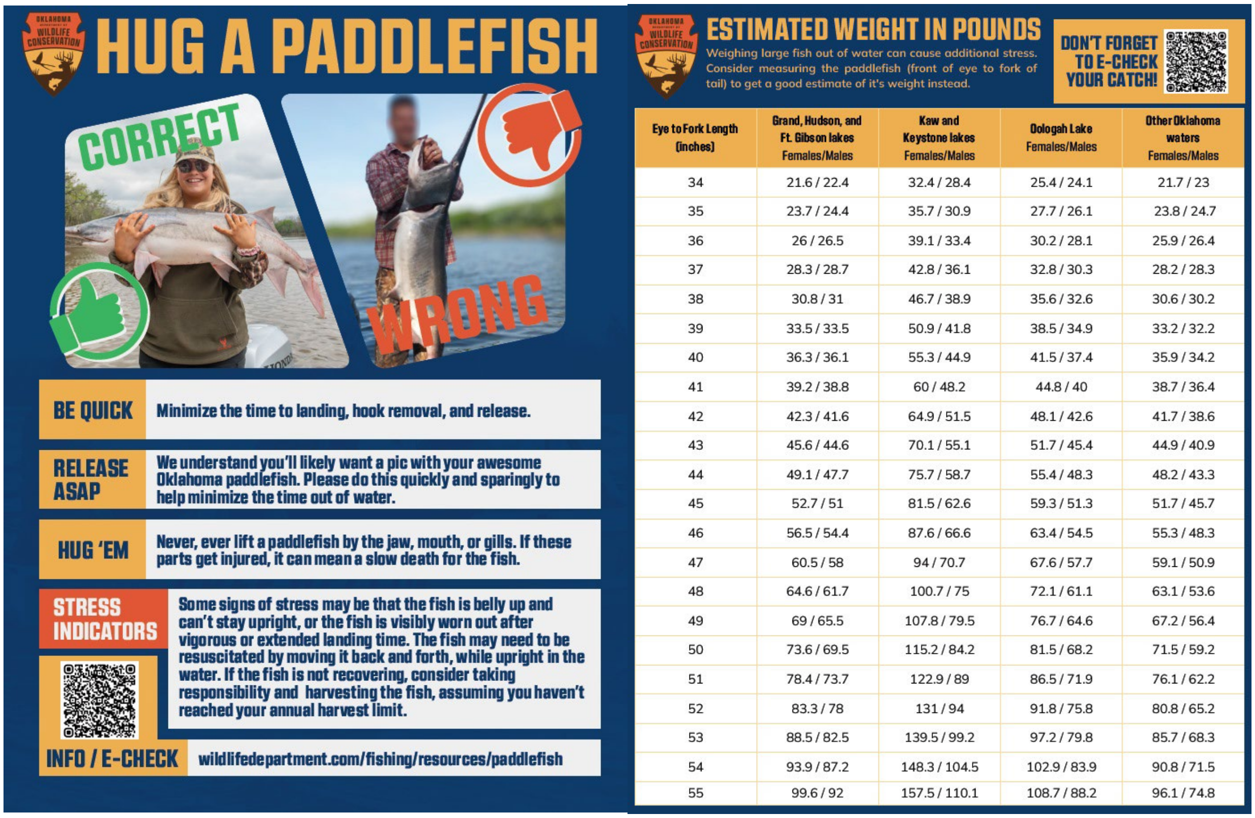
Harvest Management through Regulation: Although the harvest regulation and reporting framework implemented in 2014 (including the annual limit and mandatory reporting; Schooley et al. 2014) has been successful in moderating statewide harvest while maintaining ample opportunities for snagging, changes in the fishery may warrant a reappraisal and consideration of a different regulatory strategy. This framework was developed at a time when springtime harvest from the Grand Lake / Neosho River stock comprised a majority of the annual, statewide take for Paddlefish. However, the fishery has expanded to other stocks and is no longer concentrated in springtime. These changes are due, in part, to the development of live imaging sonar and the proliferation of Paddlefish fishing guides. No longer does the information gathered from Grand Lake springtime harvest anglers suffice to inform the statewide management of the species and different approaches may be needed. The harvest regulatory framework developed in 2014 was a proactive one, in that it prescribed for future regulation changes to be made within “management units” (i.e., Genetic Management Units; GMUs) rather than blanket statewide regulations. Further, rule changes could be recommended and implemented via the Wildlife Commission rather than through the full state regulatory review process.

> 800:10-1-4. Size and bag limits on fish
> (11) The statewide daily bag limit for paddlefish is one (1) per day, statewide. The catch and release of paddlefish is permitted by use of rod and reel, trotline and throwlines.
>
> > (A) Individual annual harvest limit- An individual harvest limit for paddlefish may be set or amended annually by the Wildlife Conservation Commission and will be listed in the Oklahoma Fishing and Hunting Regulations. Special area (or management unit) paddlefish harvest caps, a general statewide paddlefish harvest cap, and the total number of paddlefish permits issued may be set or amended annually by the Wildlife Conservation Commission for use in determining the individual annual harvest limit. Once an individual angler has reached their annual harvest limit, continued catch and release is permitted.

A thorough review of recent harvest trends (since the development of online reporting for Paddlefish) and all other sources of data is forthcoming to determine if the current harvest regulations continue to serve as intended. Pressure on Keystone Lake after the world record frenzy of 2020-2021 has greatly increased. Pursuit of larger (predominantly female) Paddlefish using live-imaging sonar in all waters and in all times of the year has resulted in the development of a trophy-hunting fishery, the impacts of which are not fully known. In light of the fishery’s expansion into warmer months, where catch and release mortality is likely elevated in warmer water temperatures, key consideration must be given to a summer fishery closure, which would align Oklahoma with most other states where Paddlefish are recreationally fished.

A town hall meeting with Keystone Lake fishing guides was held in March 2025. This meeting was developed at the request of several Paddlefish guides with an interest in discussing the status of the Keystone population and potential regulations. A key outcome of this meeting was the development of an official ODWC safe handling protocol (Figure 28). We hoped that licensed guides would keep this on their boats as a reference and aid in educating clients.

Figure 28. ODWC safe handling protocols for Paddlefish were developed and distilled into an infographic for distribution to Oklahoma fishing guides. Laminated copies were produced for use on watercraft.



Eye to Fork Length (inches)	Grand, Hudson, and Ft. Gibson lakes Females/Males	Kaw and Keystone lakes Females/Males	Oologah Lake Females/Males	Other Oklahoma waters Females/Males
34	21.6 / 22.4	32.4 / 28.4	25.4 / 24.1	21.7 / 23
35	23.7 / 24.4	35.7 / 30.9	27.7 / 26.1	23.8 / 24.7
36	26 / 26.5	39.1 / 33.4	30.2 / 28.1	25.9 / 26.4
37	28.3 / 28.7	42.8 / 36.1	32.8 / 30.3	28.2 / 28.3
38	30.8 / 31	46.7 / 38.9	35.6 / 32.6	30.6 / 30.2
39	33.5 / 33.5	50.9 / 41.8	38.5 / 34.9	33.2 / 32.2
40	36.3 / 36.1	55.3 / 44.9	41.5 / 37.4	35.9 / 34.2
41	39.2 / 38.8	60 / 48.2	44.8 / 40	38.7 / 36.4
42	42.3 / 41.6	64.9 / 51.5	48.1 / 42.6	41.7 / 38.6
43	45.6 / 44.6	70.1 / 55.1	51.7 / 45.4	44.9 / 40.9
44	49.1 / 47.7	75.7 / 58.7	55.4 / 48.3	48.2 / 43.3
45	52.7 / 51	81.5 / 62.6	59.3 / 51.3	51.7 / 45.7
46	56.5 / 54.4	87.6 / 66.6	63.4 / 54.5	55.3 / 48.3
47	60.5 / 58	94 / 70.7	67.6 / 57.7	59.1 / 50.9
48	64.6 / 61.7	100.7 / 75	72.1 / 61.1	63.1 / 53.6
49	69 / 65.5	107.8 / 79.5	76.7 / 64.6	67.2 / 56.4
50	73.6 / 69.5	115.2 / 84.2	81.5 / 68.2	71.5 / 59.2
51	78.4 / 73.7	122.9 / 89	86.5 / 71.9	76.1 / 62.2
52	83.3 / 78	131 / 94	91.8 / 75.8	80.8 / 65.2
53	88.5 / 82.5	139.5 / 99.2	97.2 / 79.8	85.7 / 68.3
54	93.9 / 87.2	148.3 / 104.5	102.9 / 83.9	90.8 / 71.5
55	99.6 / 92	157.5 / 110.1	108.7 / 88.2	96.1 / 74.8

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APPENDIX A. COMPREHENSIVE PLAN FOR THE MANAGEMENT OF PADDLEFISH IN OKLAHOMA

Oklahoma Department of Wildlife Conservation (summarized from Scarnecchia, et al. 2013)

Philosophy and fundamental hypotheses

1. The paddlefish is an irreplaceable species of historical, recreational, commercial, and aesthetic significance in Oklahoma and throughout the Mississippi and Missouri river drainages.
2. Maintaining natural habitat conditions and numbers of wild fish adequate to sustain natural reproduction, growth and survival are critical to the long-term survival of the species.
3. Benefits from the paddlefish resource should accrue to the entire public, rather than to just a few individuals or groups.
4. Sustainable recreational harvest and non-harvest fishing opportunities are desirable at the level appropriate within the productive capacity of the stocks.
5. The management plan for harvest and habitat should lead to sustainability of the resource and be matched to the life history of the species.
6. High-quality data is critical to stock assessment and sustainable management; fish harvest should be a key source of necessary data.
7. Goals, objectives, and actions, including management regulations and monitoring, should be as uniform as practicable among the stocks but remain sensitive to stock-specific and location-specific fisheries constraints and conditions.
8. A thorough knowledge of the stock-recruitment relationship and factors affecting year class strength should be high priorities for stock assessment.
9. The plan for Oklahoma paddlefish stocks and harvest management units need not be consistent with, but should not be detrimental to, broader (regional or national) paddlefish conservation and management goals and activities. The plan should strive for consistency with other in-state and tri-state regional fisheries management plans, including those for paddlefish.
10. Evaluation, regulation, enforcement, information, and education are keys to the success of the plan and should be assessed annually for effectiveness.

Goals for paddlefish management in Oklahoma

1. Provide a basis for cooperative, coordinated management of Oklahoma paddlefish in consultation with the appropriate federal agencies and Native American Tribes.
2. Provide for an orderly, equitable, and sustainable recreational fishery for paddlefish and a harvest consistent with the productive capacity of the stocks. This goal should include similar regulations between in-state harvest areas and between states, to the extent possible.
3. Develop and maintain a standardized database for stock assessment and yield forecasting.
4. Maintain and enhance existing paddlefish habitat and obtain additional information to better define and provide for paddlefish habitat requirements.
5. Conduct research necessary for successful long-term management.
6. Integrate and define the role of artificial propagation and stocking in the successful long-term management.
7. Increase public awareness of the paddlefish and its habitat requirements.
8. Incorporate public acceptance and compliance with the regulatory framework established for long-term management.

APPENDIX B. MAPS OF OKLAHOMA RESERVOIRS MANAGED FOR PADDLEFISH

Management authority is noted with an asterisk (*) for Grand River Dam Authority. All others are under the authority of U.S. Army Corps of Engineers.

Basin	Tributary Rivers	Reservoir	Completion	Surface Acres	Paddlefish Status
Arkansas	Arkansas, Salt Fork	Kaw	1976		Restoration, naturally recruiting
	Arkansas, Cimarron	Keystone	1964	23,610	Wild, naturally recruiting
	Arkansas, Grand, Verdigris	Webbers Falls	1970	11,600	Wild, unknown[15]
	Arkansas, Illinois, Canadian	Robert S. Kerr	1970	43,800	Wild, unknown
Arkansas	Verdigris	Oologah	1974	29,460	Restoration, naturally recruiting
Arkansas	Neosho, Spring, Elk	Grand Lake O' the Cherokees	1940*	41,749	Wild, naturally recruiting
	Neosho	Hudson	1964*	11,029	Wild, unknown
	Neosho	Fort Gibson	1953	19,896	Wild, unknown
Arkansas	Canadian, S. Canadian	Eufaula	1964	105,500	Restoration, evidence of low-level recruitment
Red	Red, Washita	Texoma	1944	88,000	Restoration, failure

[15] Reservoir stocks with unknown recruitment are recipients of upstream reproduction which cannot be differentiated from potential *in situ* reproduction.

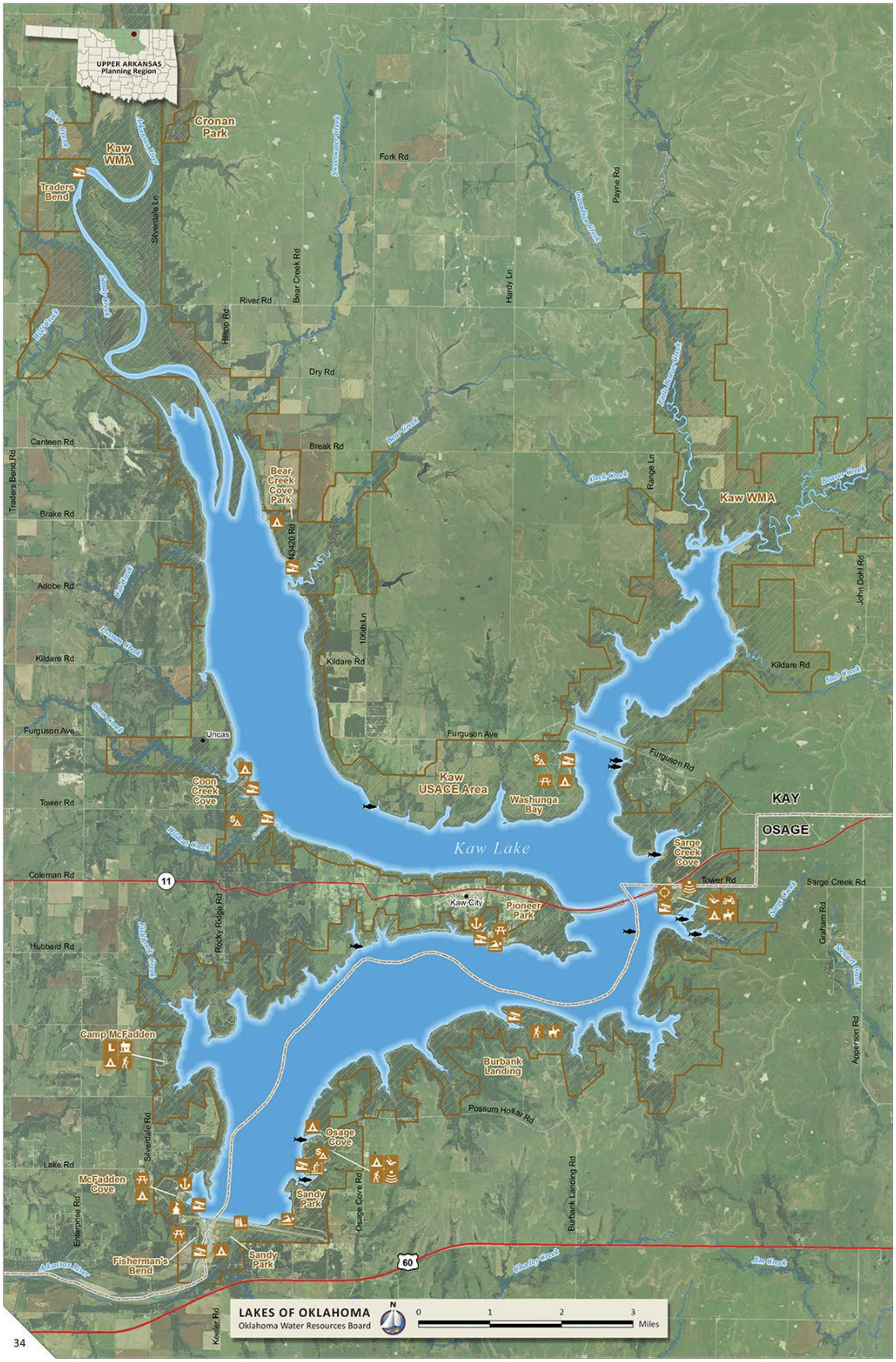
Kaw

US ARMY CORPS OF ENGINEERS

36.76435°N 96.81071°W
Normal Elevation: 1,010 ft

Area: 23,610 ac
Shoreline: 149 mi

Capacity: 428,600 ac-ft
Maximum Depth: 74.5 ft



Keystone

US ARMY CORPS OF ENGINEERS

36.14020°N 96.25991°W
Normal Elevation: 723 ft

Area: 23,610 ac
Shoreline: 296.5 mi

Capacity: 557,600 ac-ft
Maximum Depth: 73 ft

35.57434°N 95.17980°W
Normal Elevation: 490 ft

Area: 11,600 ac
Shoreline: 232.2 mi

Capacity: 165,200 ac-ft
Maximum Depth: 54.1 ft

Webbers Falls

US ARMY CORPS OF ENGINEERS

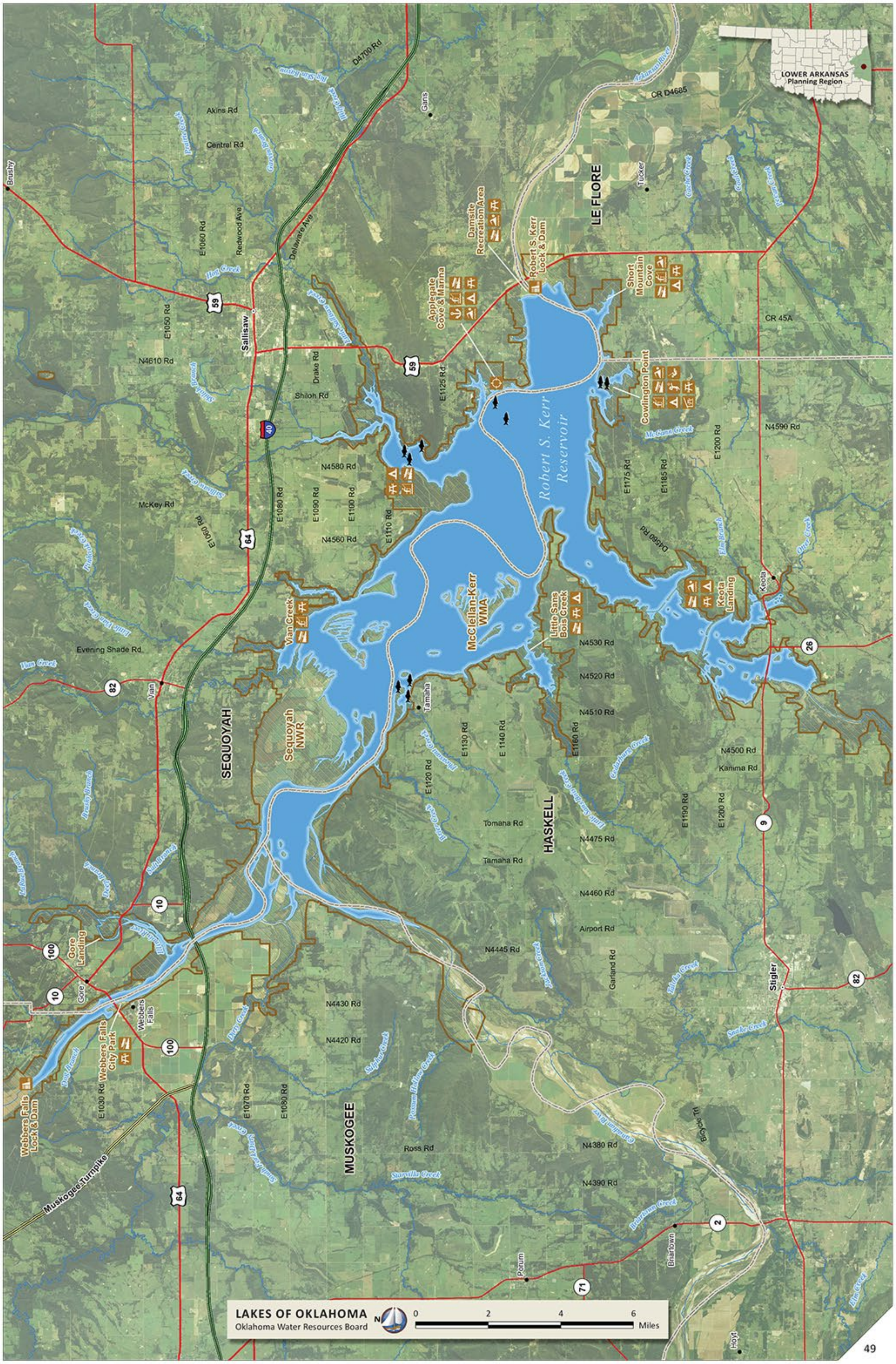
35.36450°N 94.82454°W
Normal Elevation: 460 ft

Area: 43,800 ac
Shoreline: 278 mi

Capacity: 493,600 ac-ft
Maximum Depth: 52.5 ft

Robert S. Kerr

US ARMY CORPS OF ENGINEERS

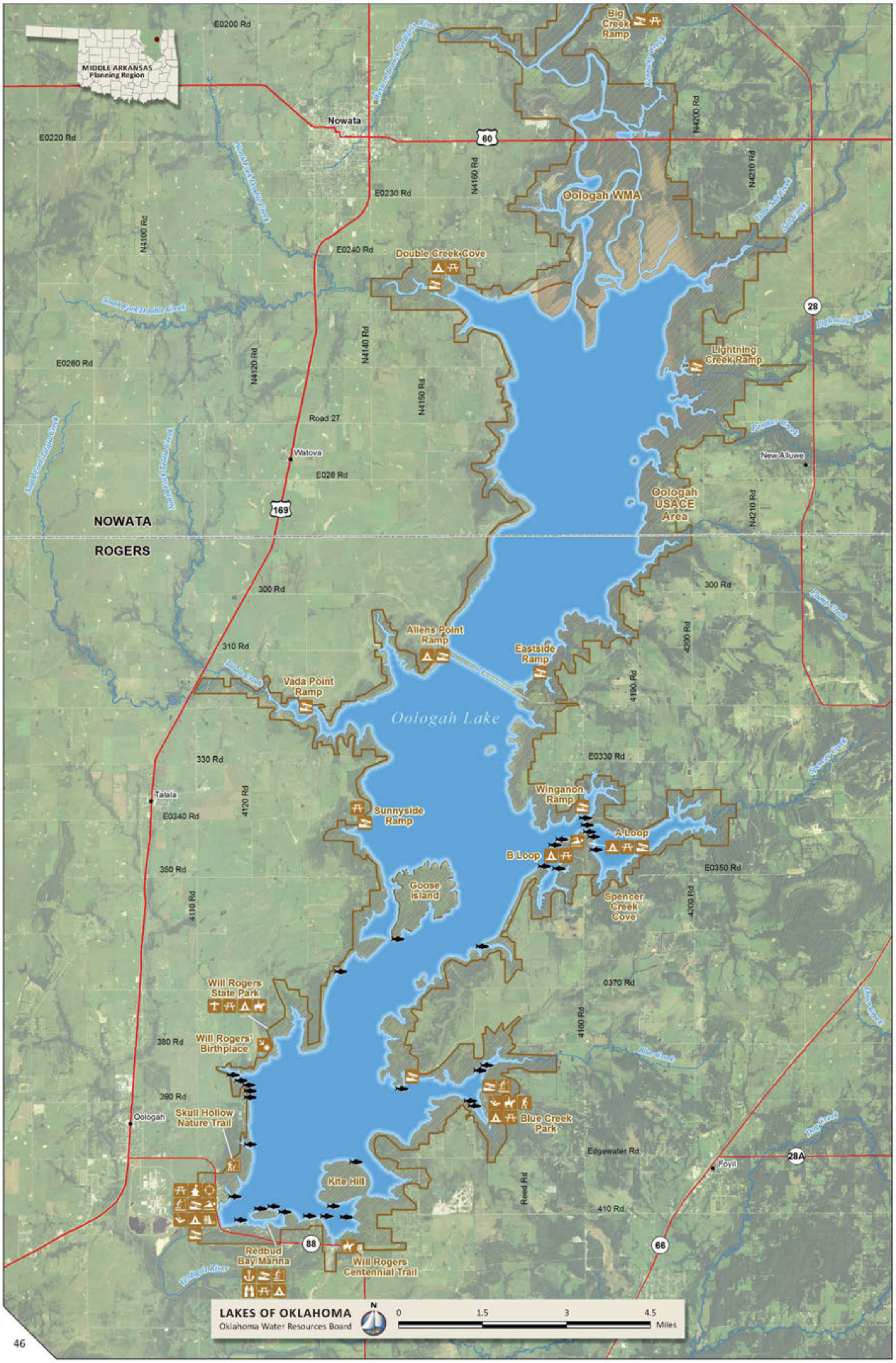


Oologah
US ARMY CORPS OF ENGINEERS

36.42815°N 95.68108°W
Normal Elevation: 638 ft

Area: 29,460 ac
Shoreline: 216.9 mi

Capacity: 544,100 ac-ft
Maximum Depth: 72.2 ft



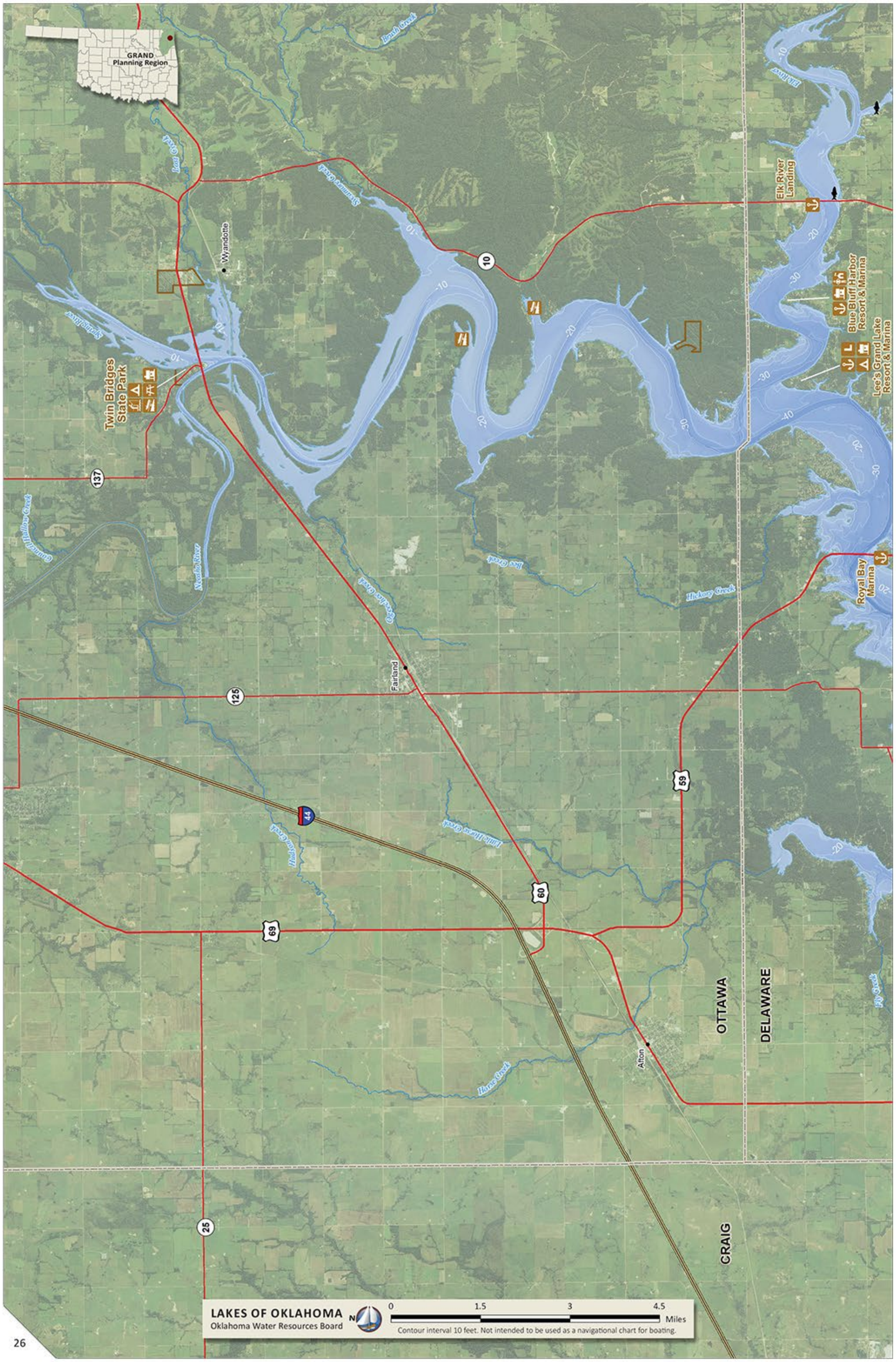
Grand

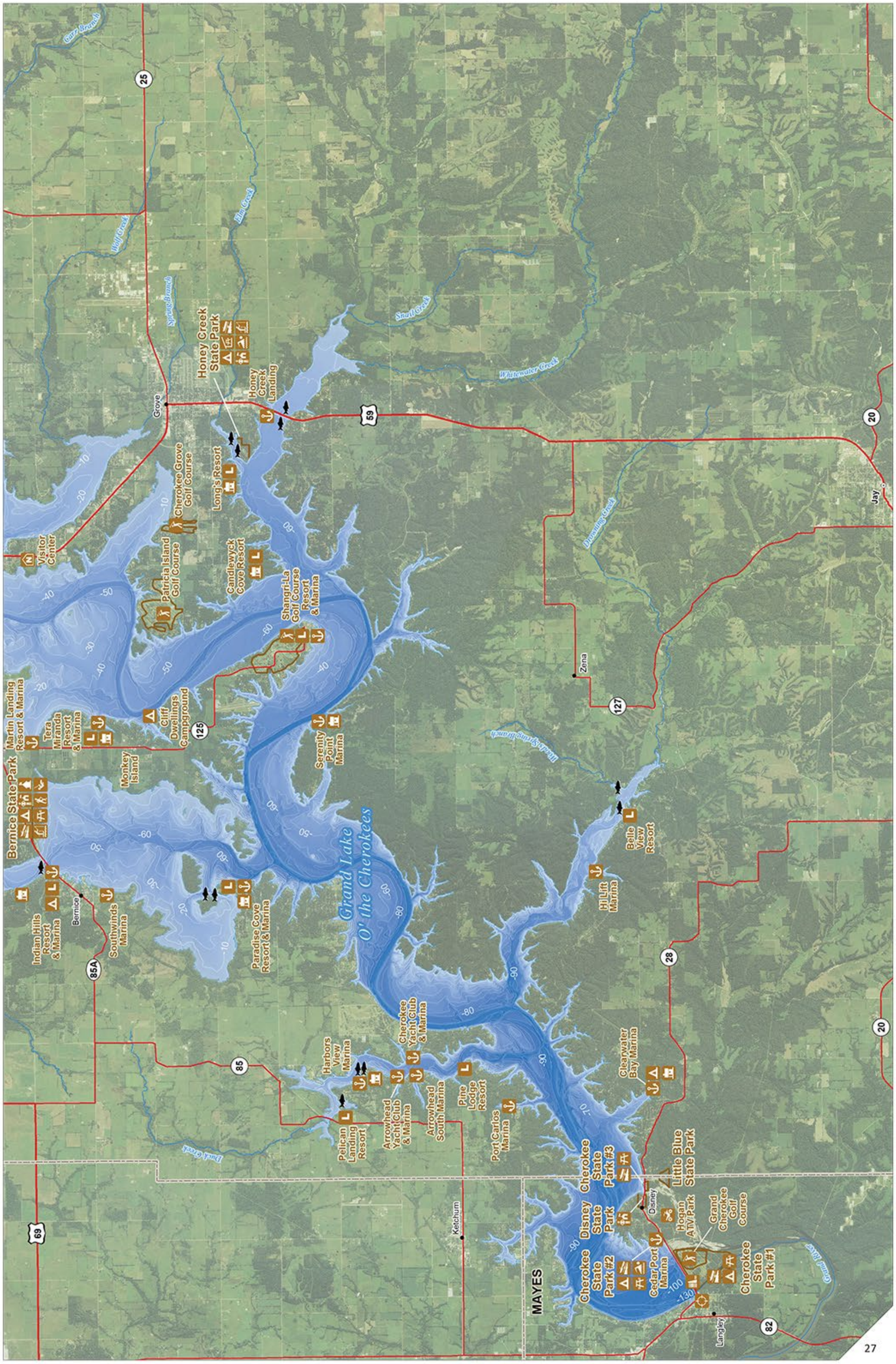
GRAND RIVER DAM AUTHORITY

36.46813°N 95.04262°W
Normal Elevation: 745 ft

Area: 41,749 ac
Shoreline: 460 mi

Capacity: 1,515,414 ac-ft
Maximum Depth: 133 ft




Grand Lake O' the Cherokees
Honey Creek State Park
Honey Creek Landing
Grove
Long's Resort
Cherokee Grove Golf Course
Visitor Center
Patricia Island Golf Course
Candlewyck Cove Resort
Shangri-La Golf Course Resort & Marina
Martin Landing Resort & Marina
Tera Miranda Resort & Marina
Cliff Dwellings Campground
Serenity Point Marina
Monkey Island
Bernice State Park
Indian Hills Resort & Marina
Bernice
Southwinds Marina
Paradise Cove Resort & Marina
Belle View Resort
Hi Lift Marina
Zena
Jay
Harbors View Marina
Cherokee Yacht Club & Marina
Pelican Landing Resort
Arrowhead Yacht Club & Marina
Arrowhead South Marina
Pine Lodge Resort
Port Carlos Marina
Clearwater Bay Marina
Cherokee State Park #3
Little Blue State Park
Disney State Park
Disney
Hogan ATV Park
Grand Cherokee Golf Course
Cherokee State Park #2
Cedar Port Marina
Cherokee State Park #1
Ketchum
MAYES
Langley
Grand River
Spring Branch
Wolf Creek
Elm Creek
Snuff Creek
Whitewater Creek
Drowning Creek
Duck Creek
Cave Branch
Brush Spring Branch
25
59
20
125
127
85A
85
28
69
82
27

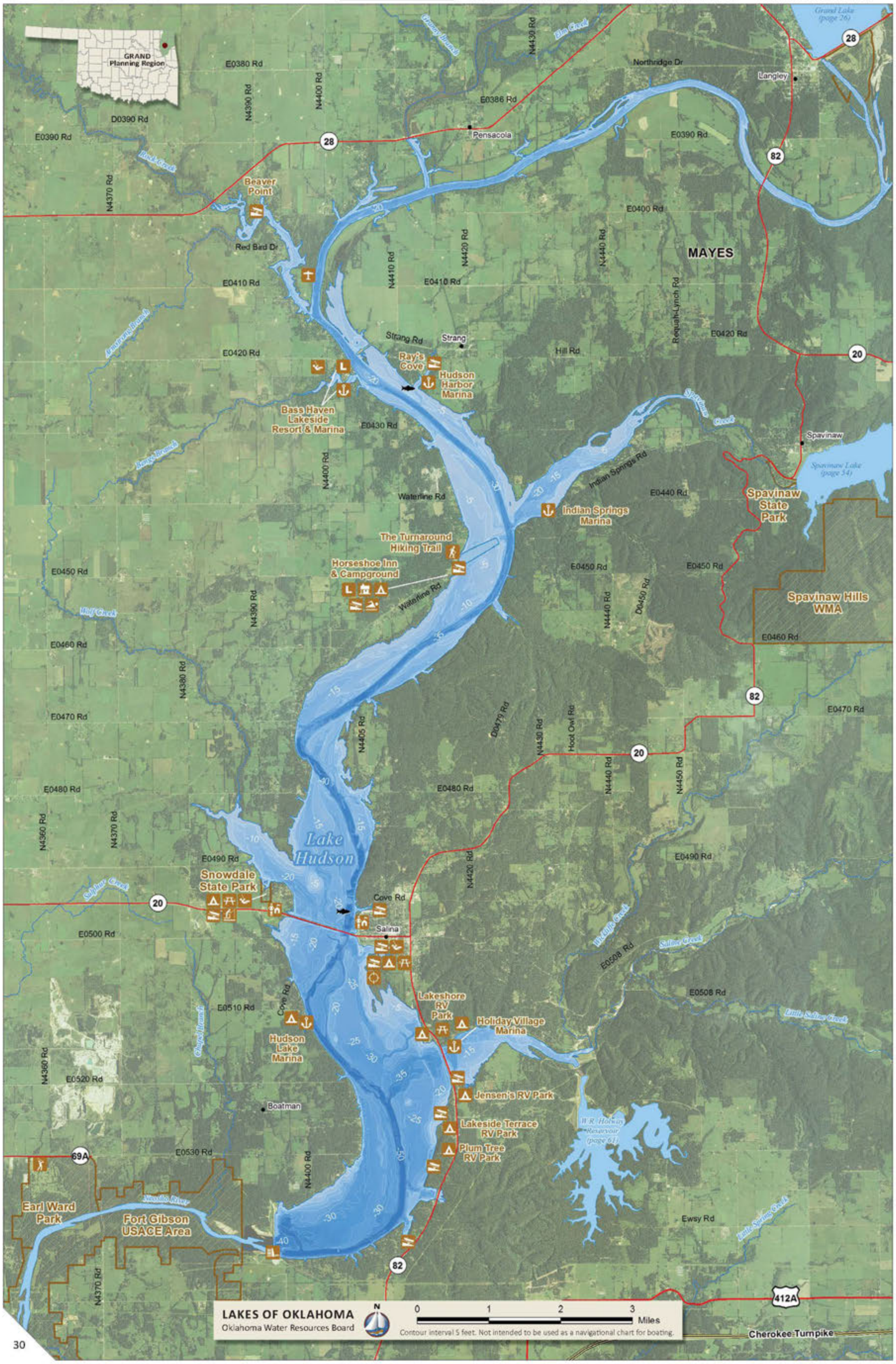
Hudson/Markham Ferry

GRAND RIVER DAM AUTHORITY

36.28912°N 95.15537°W
Normal Elevation: 619 ft

Area: 11,029 ac
Shoreline: 143.3 mi

Capacity: 200,185 ac-ft
Maximum Depth: 65 ft



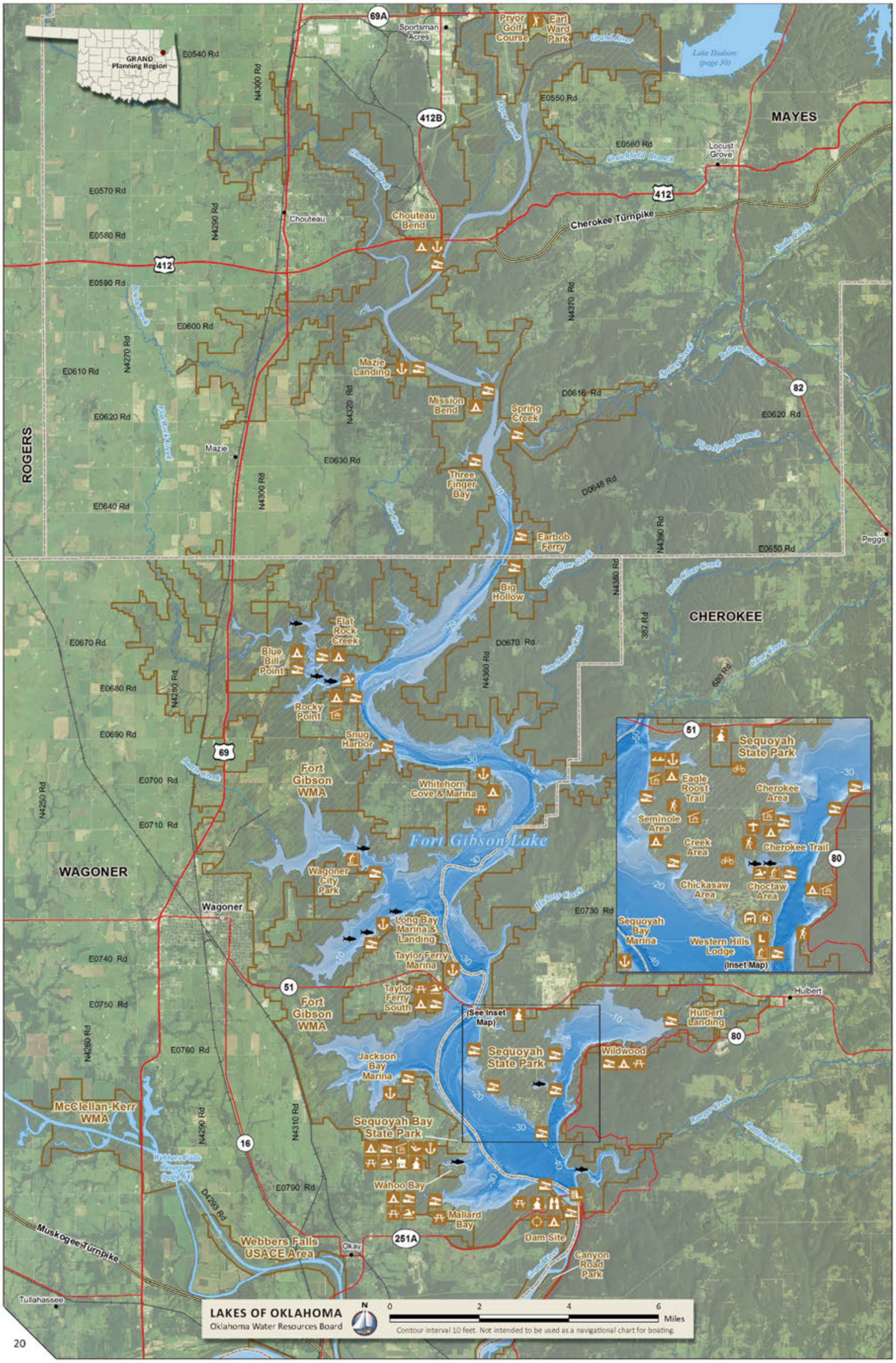
Fort Gibson

US ARMY CORPS OF ENGINEERS

35.86521°N 95.24108°W
Normal Elevation: 554 ft

Area: 19,896 ac
Shoreline: 211 mi

Capacity: 306,133 ac-ft
Maximum Depth: 60.2 ft



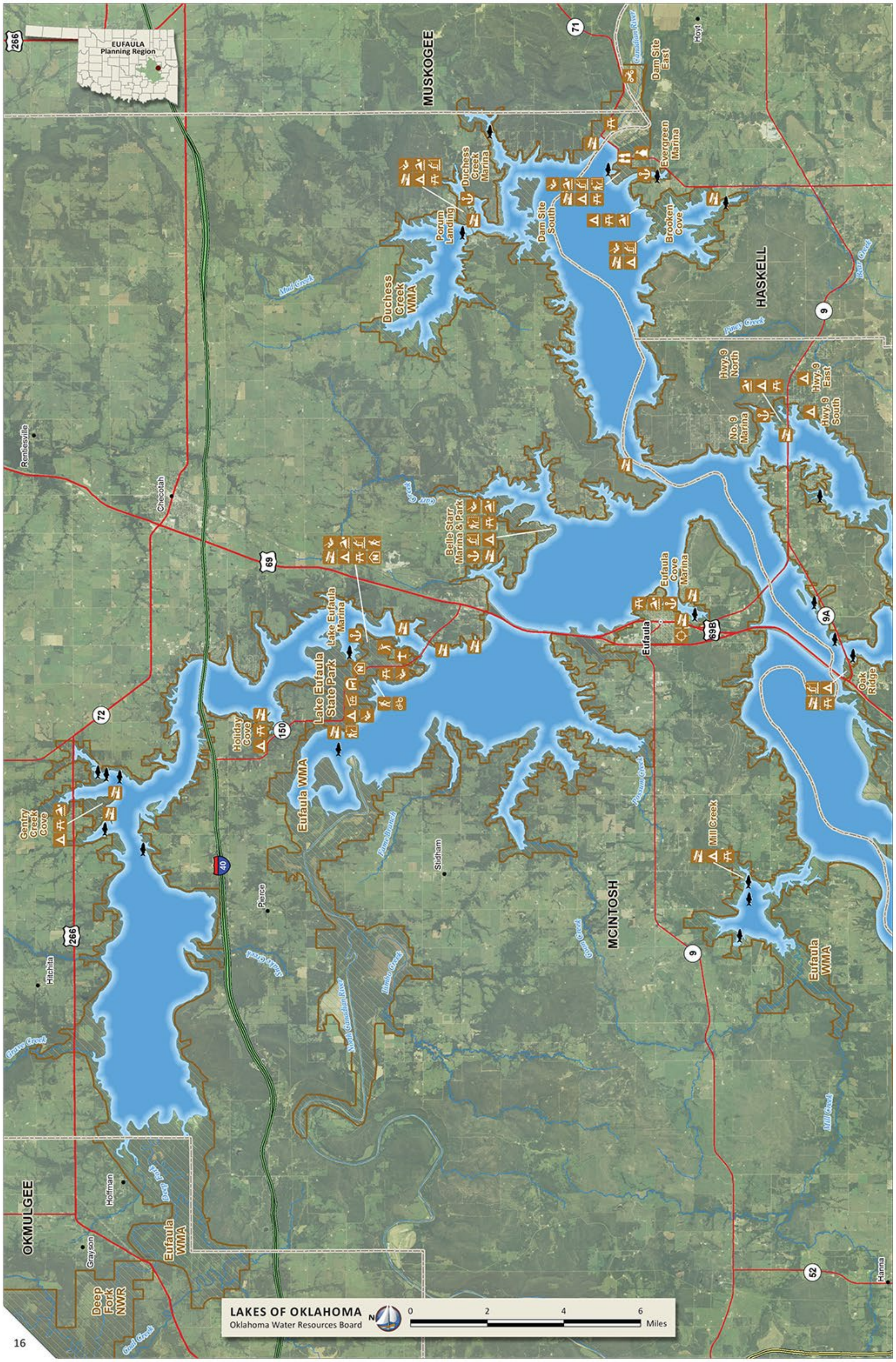
Eufaula

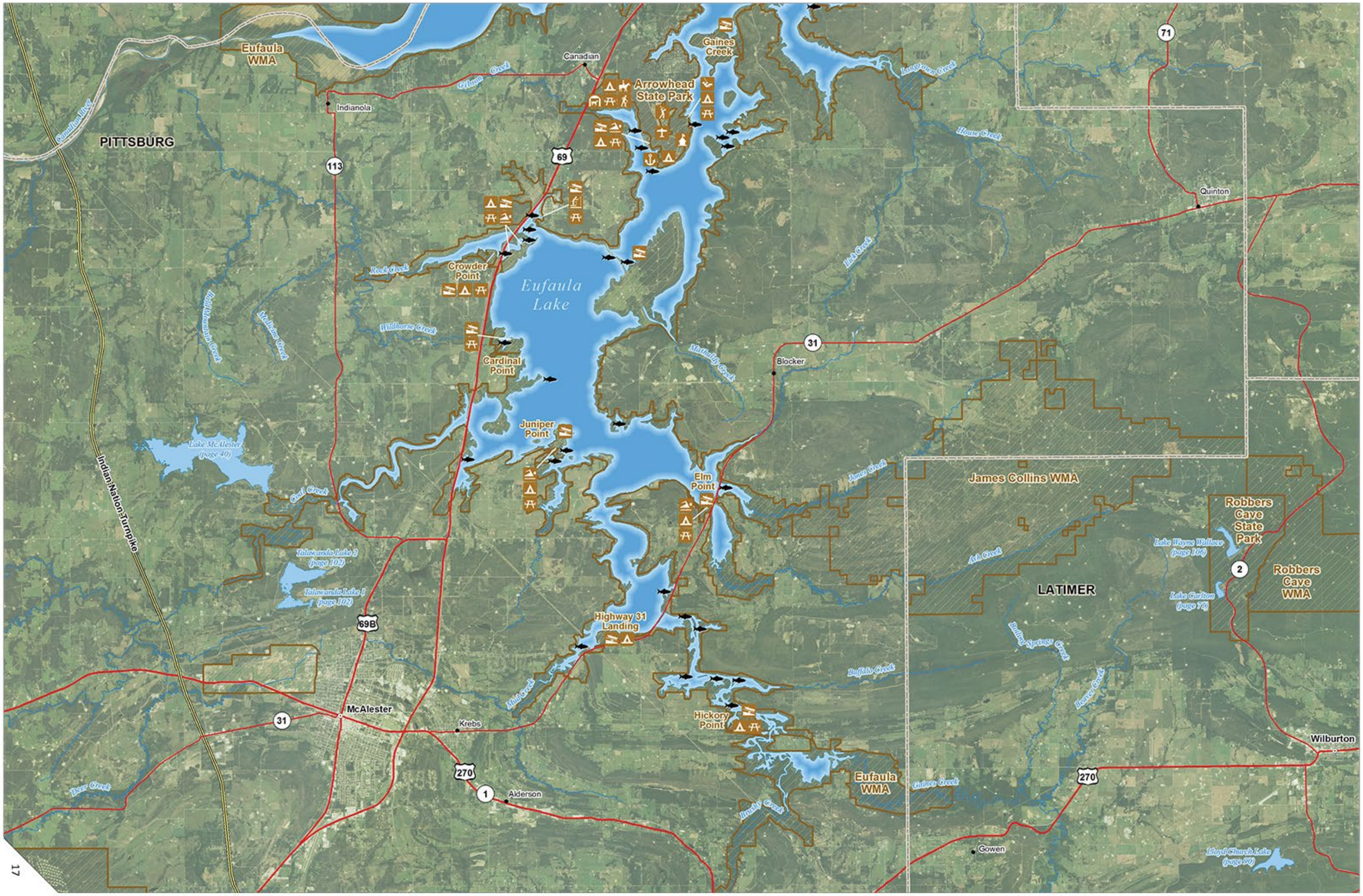
US ARMY CORPS OF ENGINEERS

35.27963°N 95.57849°W
Normal Elevation: 585 ft

Area: 105,500 ac
Shoreline: 833.9 mi

Capacity: 2,330,000 ac-ft
Maximum Depth: 90.2 ft




Eufaula Lake
Eufaula WMA
Canadian
Gibson Creek
Indianola
Canadian River
PITTSBURG
113
69
Arrowhead State Park
Gaines Creek
Longtown Creek
House Creek
71
Quinton
Crowder Point
Rock Creek
Cardinal Point
Wildhorse Creek
Bald Mountain Creek
Medicine Creek
Juniper Point
Lake McAlester (page 40)
Coal Creek
Talawanda Lake 2 (page 102)
Talawanda Lake 1 (page 102)
69B
Indian Nation Turnpike
Elm Point
Highway 31 Landing
31
Blocker
Mathuldy Creek
Lick Creek
Jones Creek
James Collins WMA
Ash Creek
LATIMER
Robbers Cave State Park
Robbers Cave WMA
2
Lake Wayne Wallace (page 106)
Lake Carlton (page 78)
Buffalo Creek
Brushy Creek
Hickory Point
Eufaula WMA
Gaines Creek
Beaver Creek
Wilburton
270
McAlester
Krebs
1
Alderson
Gowen
Lloyd Church Lake (page 99)
Deer Creek
Mill Creek

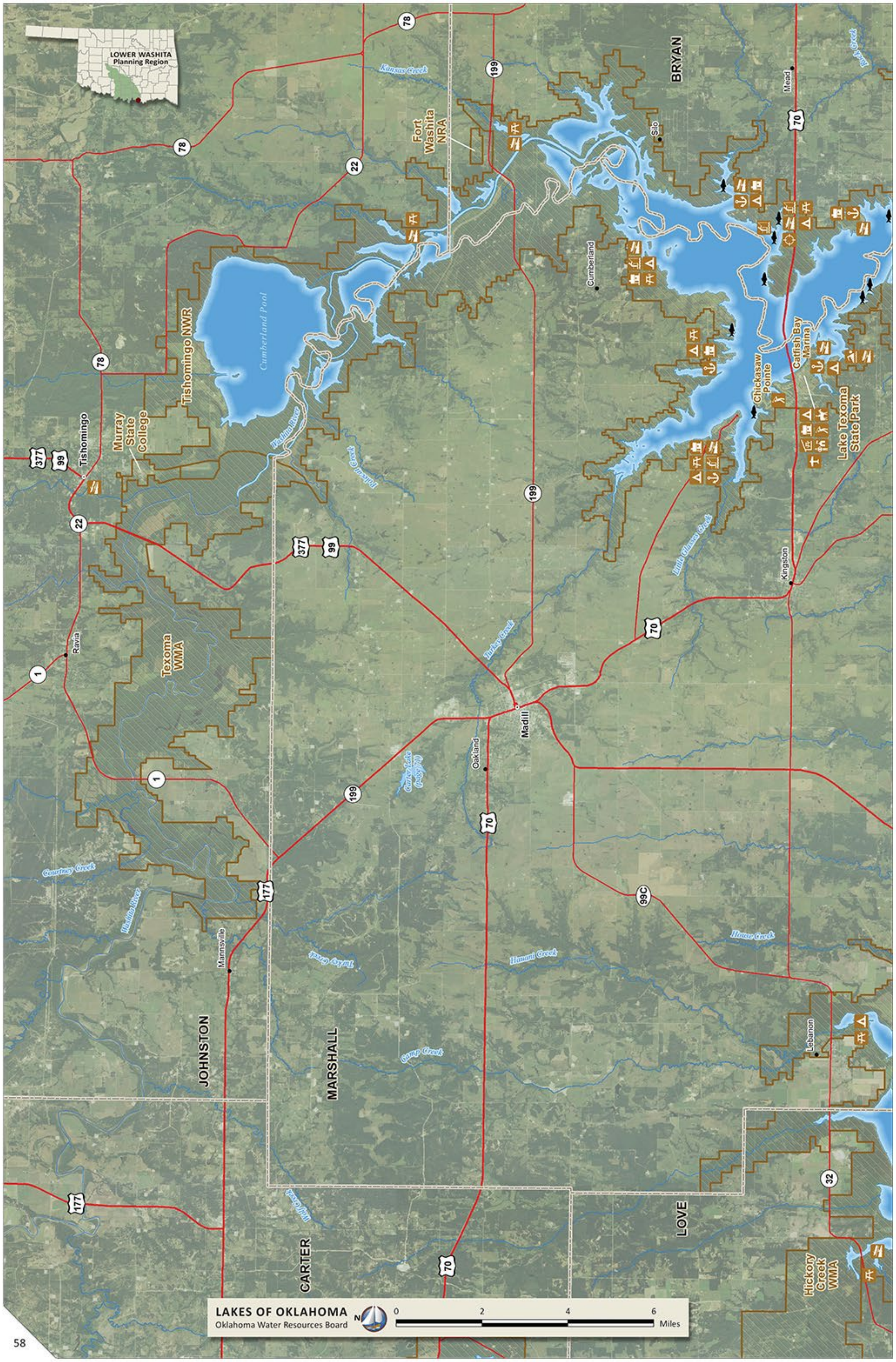
Texoma

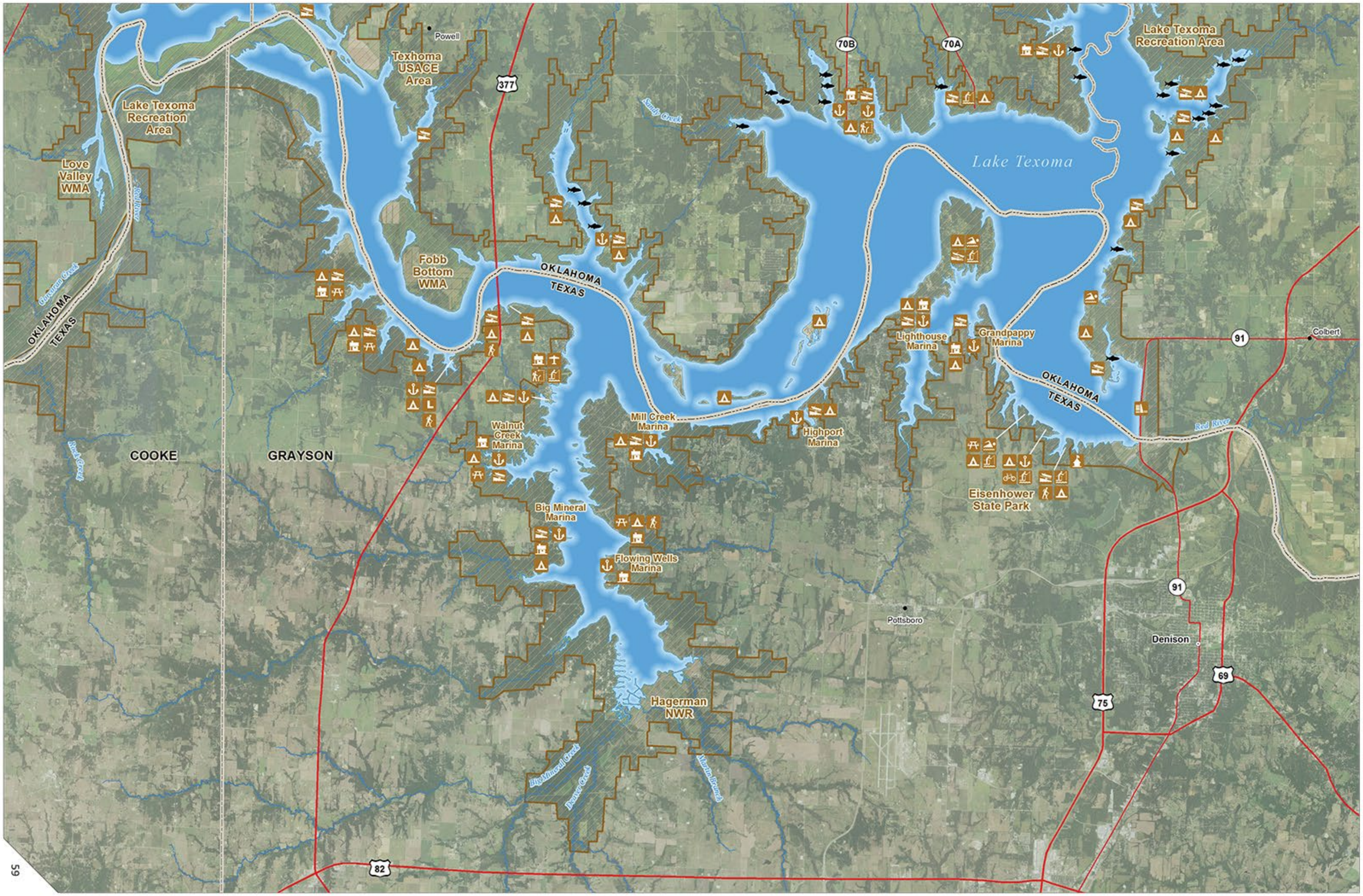
US ARMY CORPS OF ENGINEERS

33.99933°N 96.57257°W
Normal Elevation: 616 ft

Area: 88,000 ac
Shoreline: 592.7 mi

Capacity: 2,722,000 ac-ft
Maximum Depth: 142 ft





Lake Texoma
Lake Texoma Recreation Area
Texhoma USACE Area
Powell
Lake Texoma Recreation Area
Love Valley WMA
Red River
Fobb Bottom WMA
OKLAHOMA
TEXAS
Sandy Creek
70B
70A
377
Lighthouse Marina
Grandpappy Marina
Highport Marina
Mill Creek Marina
Walnut Creek Marina
Big Mineral Marina
Flowing Wells Marina
Hagerman NWR
Eisenhower State Park
COOKE
GRAYSON
Colbert
91
Pottsboro
Denison
69
75
82
Big Mineral Creek
Deaver Creek
Martin Branch
Rock Creek

APPENDIX C. REVISED PADDLEFISH GILLNETTING POPULATION ASSESSMENT STANDARDIZED PROTOCOLS – IMPLEMENTED SUMMER 2024

Objectives – standardized sampling methods for population assessment of Oklahoma Paddlefish reservoir stocks will focus on abundance estimation techniques in addition to standardized examination of population size structure, fish health/condition, sex ratios, relative weights, and catch rates. These revised methodologies will allow for assessment of angler exploitation when paired with self-reported harvest from e-check.

1. Equipment Specifications:
    a. Monofilament gillnets – Constructed of monofilament #208, 6” bar mesh (12” stretch with 3/8” poly foam float lines and 30# lead core, net segments have the dimensions of 300’ x 30’ (tied down/hobbled to 300’ x 24’ with nylon hobbles laced through the mesh). Two net segments are linked to create a standard 600’ net that is negatively buoyant.
    b. Expanded foam bullet buoys – Bullet buoys are 14” long x 6” diameter tethered to the net using a 6’ polypropylene rope and stainless net clips. Each segment of net is marked at 75’ intervals on the float line for spacing of bullet floats (max of three per segment).
    c. Inflatable buoys – Each net is marked with a large (24”) inflatable buoy at each end and a smaller (12” buoy) where the segments are joined. The buoys are tethered to the net’s float line leads with 6’ of polypropylene rope and stainless net clips.
    d. Anchors – Anchors are 24” and constructed from 5/8” steel oilfield sucker rod. At least 60’ of polypropylene rope is affixed to each anchor and additional 60’ segments are added when needed to maintain a safe ratio (i.e., anchor rope > 7 x distance from bottom of net to substrate) and prevent net drift in wind or channel current. Anchor ropes are tied to steel rings attached to the lead line of each net (one on each end of the net). When the inundated channel is near shore, anchoring the net on shore is preferred such that the net is fishing the nearest channel margin, if not the entire channel width.
2. Site Selection:
    a. Candidate sites for selection will be initially established at approximately 0.5 mi intervals along the inundated river channel (including side channels and tributaries) where water depth exceeds 30’. Netting boundaries may be individually defined within a reservoir based on depth, siltation, stands of timber, navigation channels, hazards, or other justification. Sample sites will be selected from a suite of all viable sample sites between the reservoir dam and the upper netting boundary. If the total number of candidate sites totals fewer than 60, then “half” site numbers may be used to increase the total number of sites available for random selection. For example, Kaw Lake only contains 39 sites, and the upper 6 sites are not utilized due to siltation, so sites 7.0, 7.5, 8.0 ... 38.0, 38.5, and 39.0 are used for random assignment for a total of 65 possible.

b. Randomized vs. Stratified vs. Fixed site selection – As the target species is a large, roaming, pelagic species with only vague association to the inundated river channel (compared to strong association to particular microhabitats observed with other sport fishes) catch rates will often vary among similar sites within reservoir. Therefore, at the biologists' discretion, randomly selected or fixed sites may be used within a reservoir. Smaller reservoirs may be adequately covered by a total of 12 sites in a single day, therefore fixed sites that avoid hazards may be prudent. However, for larger reservoirs with an abundance of possible sites and minimal hazards, daily randomization may allow for more adequate coverage of the entire reservoir during the sample period. For this latter site selection methodology, repetition of sites need not be avoided. Regardless of selection technique, selected sites are daily ordered numerically upstream to downstream and equally divided between the two crews. Twelve sites are sampled per day over the duration of 5-8 days, therefore a total of 60-96 sites are needed.

c. Exceptions –

   i. Grand Lake – historical samples in lower Grand Lake between Shangri La and Pensacola Dam resulted in very few Paddlefish captured, indicating a generalized preference for the remainder of the lake above Shangri La. Therefore, only those sites are considered candidates for selection. Depth limitations and the inability to navigate safely through Oogeechee flats necessitated that the upper netting boundary being established at Wilson Point. Although Paddlefish can be captured above Oogeechee flats, this upstream segment is not typically sampled due to the need for portage.

   ii. Lake Eufaula – Lake-wide samples of Lake Eufaula have revealed concentrations of Paddlefish in the Deep Fork and Gaines Creek arms of the reservoir, whereas catches were otherwise low. Therefore, efforts are currently targeted in those two areas.

3. <u>Standardized Units of Netting Effort:</u>

   a. Standard sample duration for Paddlefish stock assessment in reservoirs is 5 days. Exceptions include Grand Lake (8 days) and Lake Eufaula (8 days, split between Deep Fork and Gaines Creek arms). Sample is repeated each day, such that a day's sample achieves broad spatial coverage of the lake. This may be achieved by sequential randomization, or repetition of fixed sites (due to other limitations on site selection).

   b. Within a sample, two crews will deploy and retrieve 6 nets per crew, per day. Crews will launch from a central location when possible and disperse upstream and downstream. Nets will be deployed "outside-in" such that each crew's 6^{th} net is proximal to that of the other crew. Once all nets are deployed, after a minimum soak time of 2 hours for any single net, the crews may begin retrieving nets in the order they were deployed. Catches will be variable, but perhaps predictably higher in known areas. Therefore, crews should alternate upstream or downstream on subsequent sample days and the crew with the lighter catch will assist the crew with the heavier catch in retrieval of their remaining net(s).

4. <u>Net Deployment and Retrieval Protocols:</u>

   a. Starting at 8am, nets are deployed generally perpendicular to the inundated river channel, the angle of which may be discretionarily selected based on wind forecasts, current, or other local variables. When the inundated river channel is wider than the length of the net, the net should be deployed to fish one of the channel margins.

b. Prior to deploying the net, a transect covering the intended deployment location should be floated while examining the substrate, depth profile, presence of sonar returns indicating fish, and to determine if there are any underwater hazards such as trees. Due to the cost of replacing nets, extra diligence to avoid hazards is necessary. When appropriate, the deployment location may be shifted upstream or downstream to avoid hazards. The shift distance may require use of an alternative site number, if appropriate (e.g., site G08 shifted to site G07.5).
c. Nets should be deployed in a linear fashion unless local conditions prevent it. Net should be free of twists and any significant snarls should be removed prior to deployment.
d. Use of bullet floats – Net segments are pre-marked at 75' intervals on the float line for attachment of bullet floats. The purpose of bullet floats is to clearly mark the net as a warning to boaters. Bullet floats will be used when water depth is ≤30'. When deploying a net across the inundated channel, only part of the net may meet this depth criterion, therefore, only the shallow section should be affixed with bullet floats.
e. After a minimum soak time of 2 hours, nets should be fully retrieved and fish processed in real time. Fish should not be left waiting on the deck to be processed, therefore, pacing the net retrieval to match the rate of fish processing is essential to reduce fish stress and mortality.
f. Due to the cost of replacing nets, all fish should be extracted without intentionally damaging the net (except in very rare circumstances where fish removal requires cutting the net).

5. <u>Fish Processing:</u>
    a. Length - Body length measured flat on a table from anterior edge of eye to fork of tail. Measured in mm.
    b. Weight - Body weight measured in a sling/cradle from a hanging scale to nearest 0.1 kg.
    c. Sex - Sex is assigned for all fish based on external examination. For mature-sized fish (generally ≥750 mm), tuberculation on caudal fin determines assignment as male. Lack of tuberculation determines assignment as female. Immature fish may be labeled as juvenile and fish ≥750 mm for which sex cannot be confidently assigned may be labeled as unknown.
    d. Notations on fish condition - External morphology is examined for common observations (e.g., hook scars [HS], prop scars [PS], injuries [IN] or deformities [DF] with location noted, rostrum [RO] damages, etc.). Standardized terminology for locations and common notations will be used.
    e. Coded Wire Tags - Fish rostrums are scanned with T-Wand coded wire tag (CWT) detector to determine hatchery origin. Positive detections are noted and the anterior tip of the rostrum containing the CWT are removed with a knife, scanned to confirm presence of CWT in the sample, and the rostrum tip placed in an envelope with the band code from the fish for later dissection and decoding.
    f. Marking / Tagging Paddlefish – All fish will be uniquely marked with a jaw band containing an alpha-numeric code. The prefix of the band code will be a single letter corresponding to the river system of capture (e.g., G – Grand/Neosho

River, A – Arkansas River, C – Canadian River, V – Verdigris River, and R – Red River). Following the prefix, the band code will contain five numerical digits ranging 00001 to 99999. Some band codes produced in the early 2000's contained only four numerical digits, however for database purposes, the format of five numerical digits is required for validation (i.e., G0123 is recorded as G00123).

   g. Secondary marking within sample period – Within a sample period, fish are marked secondarily for rapid identification using a 4mm punch on the 2nd to 3rd soft rays of the left pectoral fin at approximately ≥50% of the length of the fin. As the utility of this secondary mark is intended to be brief (only within the sample period), placing the punch closer to the tip of the fin than the fin's origin will likely render the mark undetectable by the following year. For the purposes of population estimation (see below), application of the fin punch will serve as the estimation "Mark" and subsequent captures of fin-punched fish within the sample period will serve as the "Recaptures". This will allow rapid daily summarization of Mark/Recapture statistics prior to full data entry and analysis of individual capture histories using band codes.
      i. Within the sample period, fish captured bearing a fin punch will not be weighed, measured, or examined subsequent times, as no growth or physical changes are expected and additional measurements would only introduce variability. However, any observations of physical issues potentially related to capture stress or injury sustained during the sample period should be noted.
   h. All fish should be released in the immediate vicinity of the capture location and not displaced.

6. Stock Assessment and Analyses:
   a. Population estimation will utilize a Schnabel Census with repeated sampling. Model assumptions are met within the sampling period because angler harvest is known via e-check and fish are unlikely to enter or leave the system via other means during the sample duration. Fin punches will serve as a secondary mark that is immediately identifiable as a recapture within the sample, though band codes will serve as the primary mark. The presence of a fin punch with no band will be evidence of tag loss (i.e., band removal by angler).
      i. Full population estimation within a reservoir stock will be performed based on all fish captured.
      ii. "Harvestable" size population estimation will be restricted to fish ≥800 mm in body length, based on earlier precedent. If catch rates and size structure allows it, estimation of abundance for other population sub-segments may be performed.
      iii. Any observed mortalities, which are rare, will be removed from estimation calculation. Any fish captured during the sample period, banded, and then harvested (verified via e-check) will also be removed from analyses.
   b. Size structure of individual fish will be examined through the construction of length histograms with 25 mm size bins (for all fish, males only, and females only). Specific attention will be given to multi-modal length distributions, as they likely represent episodic recruitment events.

i. Comparison of population length groups to known length-at-age data for the reservoir stock will be performed when possible.
ii. Presence of Paddlefish ≤450mm in body length (putative age-1 fish) will be evidence of probable recruitment in the previous year.

c. Relative weights will be calculated for all fish for which sex was determined at capture. Average relative weight by sex will be calculated for comparison to other reservoir stocks.
d. Frequency of external deformities and injuries will be summarized by type and frequency for comparison to other stocks.

7. Sampling for Age Structure within a Stock:
   a. Periodically, stocks should be examined for age/size structure. Harvested fish should be preferentially utilized for collection of dentary bones. These efforts should be aligned with access point creel surveys and/or coordinated with fishing guides. Additional samples can be taken from voucher specimens captured via nets. Voucher specimens should be taken after the completion of population estimate.
   b. When paddlefish are taken from angler harvest or sacrificed, sex should be verified internally, and weights of gonad and gonadal fat should be collected for calculation of gonadosomatic index (GSI) and gonadal fat bodies (GFB).

APPENDIX D. SUMMARY OF PADDLEFISH STOCKING IN OKLAHOMA WATERS 2006-2017

Stocking Year	Tag Date	Agency	Data 1	Data 2	Sequence Range	Sequence Range	Release Location	Number of Fish Tagged	Year Class	Release Date	Age @ Release (Months)	Mean Total Length (mm)
2006	6/27/06	25	56	08	16803	18493	Lake Texoma	852	2006	6/27/06	2.9	
2006	6/28/06	25	56	08	18496	20357	Lake Texoma	869	2006	8/30/06	5.0	
2006	6/29/06	25	56	08	20358	21911	Lake Texoma	405	2006	6/29/06	3.0	
2006	7/5/06	25	56	08	21942	23485	Lake Texoma	437	2006	8/29/06	5.0	
2006	7/6/06	25	56	08	23490	24673	Lake Texoma	852	2006	8/24/06	4.8	
2006	6/27/06	25	56	09	10696	13213	Lake Texoma	700	2006	6/27/06	2.9	
2006	6/28/06	25	56	09	13221	17912	Lake Texoma	750	2006	8/31/06	5.1	
2006	6/29/06	25	56	09	17913	19776	Lake Texoma	400	2006	6/29/06	3.0	
2006	7/5/06	25	56	09	19788	21304	Lake Texoma	300	2006	8/30/06	5.0	
2006	7/6/06	25	56	09	21309	24930	Lake Texoma	500	2006	8/24/06	4.8	
2006	7/6/06	25	56	10	00229	03409	Lake Texoma	500	2006	8/24/06	4.8	
2006	7/6/06	25	56	10	03430	03549	Lake Texoma	500	2006	8/25/06	4.9	
2006	7/6/06	25	56	10	03564	07275	Lake Texoma	500	2006	8/25/06	4.9	
2006	6/29/06	25	56	10	07280	08652	Lake Texoma	400	2006	6/29/06	3.0	
2006	7/5/06	25	56	10	08661	09215	Lake Texoma	300	2006	8/30/06	5.0	
2006	6/28/06	25	56	10	09222	12245	Lake Texoma	750	2006	9/21/06	5.8	
2006	7/6/06	25	56	10	25159	26838	Lake Texoma	500	2006	8/25/06	4.9	
2007	8/21/07	25	56	10	27222	29963	Lake Eufaula	1,028	2007	8/21/07	4.7	
2007	8/22/07	25	56	10	29968	35173	Lake Texoma	2,029	2007	8/22/07	4.8	
2008	7/23/08	25	56	10	35506	36775	Lake Eufaula	503	2008	7/23/08	3.8	
2008	7/24/08	25	56	10	36783	40746	Lake Eufaula	1,853	2008	7/24/08	3.8	
2008	8/19/08	25	56	10	40812	42188	Lake Eufaula	440	2008	8/19/08	4.7	
2008	7/23/08	25	56	11	00129	01630	Lake Eufaula	500	2008	7/23/08	3.8	
2008	7/24/08	25	56	11	01638	05970	Lake Eufaula	1,000	2008	7/25/08	3.8	
2008	7/23/08	25	56	14	00152	02507	Grand Lake	1,000	2008	7/30/08	4.0	
2008	7/23/08	25	56	14	04701	07340	Grand Lake	1,000	2008	7/30/08	4.0	
2009	7/7/09	25	56	10	42620	45507	Lake Eufaula	2,067	2009	7/7/09	3.2	
2009	7/8/09	25	56	10	48645	49638	Lake Eufaula	1,731	2009	7/9/09	3.3	
2009	7/7/09	25	56	11	05995	08811	Lake Eufaula	2,000	2009	7/8/09	3.3	
2009	7/8/09	25	56	11	11384	16964	Lake Eufaula	1,000	2009	7/9/09	3.3	
2009	7/13/09	25	56	11	16971	20823	Lake Eufaula	1,178	2009	7/15/09	3.5	
2009	7/14/09	25	56	11	20830	22883	Grand Lake	500	2009	7/22/09	3.7	
2009	7/14/09	25	56	11	22890	25175	Lake Eufaula	800	2009	7/15/09	3.5	
2009	7/8/09	25	56	11	25176	30088	Lake Eufaula	1,000	2009	7/9/09	3.3	
2009	7/13/09	25	56	11	30093	32715	Lake Eufaula	1,000	2009	7/15/09	3.5	
2009	7/14/09	25	56	11	32722	33794	Grand Lake	500	2009	7/22/09	3.7	
2009	7/14/09	25	56	11	33800	42234	Lake Eufaula	800	2009	7/15/09	3.5	
2009	7/15/09	25	56	11	42241	49755	Lake Eufaula	2,250	2009	7/16/09	3.5	
2009	7/15/09	25	56	12	00103	01649	Lake Eufaula	1,500	2009	7/16/09	3.5	
2009	7/16/09	25	56	12	01655	06839	Lake Eufaula	2,261	2009	7/17/09	3.6	
2009	7/20/09	25	56	12	06845	13410	Lake Eufaula	2,694	2009	7/21/09	3.7	

2009	7/21/09	25	56	12	13416	20461	Lake Eufaula	2,789	2009	7/22/09	3.7	
2009	7/22/09	25	56	12	20467	24666	Lake Eufaula	1,647	2009	7/23/09	3.8	
2009	7/15/09	25	56	13	00105	01104	Lake Eufaula	1,500	2009	7/16/09	3.5	
2009	7/16/09	25	56	13	01110	06492	Lake Eufaula	1,500	2009	7/17/09	3.6	
2009	7/20/09	25	56	13	06498	12380	Lake Eufaula	2,000	2009	7/21/09	3.7	
2009	7/21/09	25	56	13	12386	19978	Lake Eufaula	2,500	2009	7/23/09	3.8	
2009	7/22/09	25	56	13	19984	24781	Lake Eufaula	1,500	2009	7/24/09	3.8	
2009	7/14/09	25	56	14	02532	04694	Grand Lake	525	2009	7/14/09	3.5	
2009	7/14/09	25	56	14	07360	08956	Grand Lake	500	2009	7/14/09	3.5	
2009	7/24/09	25	95	01	00157	03560	Lake Eufaula	1,354	2009	7/24/09	3.8	
2009	7/29/09	25	95	01	03566	06363	Lake Eufaula	1,223	2009	7/31/09	4.0	
2009	7/24/09	25	95	01	15024	17950	Lake Eufaula	1,000	2009	7/24/09	3.8	
2009	7/29/09	25	95	01	17956	21143	Lake Eufaula	1,000	2009	7/31/09	4.0	
2010	7/19/10	25	56	15	00139	04508	Lake Eufaula	1,500	2010	7/19/10	3.6	
2010	7/19/10	25	56	15	04519	05989	Lake Eufaula	500	2010	7/20/10	3.7	
2010	7/20/10	25	56	15	06000	08252	Lake Eufaula	941	2010	7/20/10	3.7	
2010	7/20/10	25	56	15	08263	12615	Lake Eufaula	1,500	2010	7/21/10	3.7	
2010	8/9/10	25	56	15	12626	14977	Grand Lake	500	2010	8/11/10	4.4	
2010	8/9/10	25	56	15	14986	18657	Lake Eufaula	1,878	2010	8/11/10	4.4	
2010	8/10/10	25	56	15	18668	21835	Lake Eufaula	1,556	2010	8/11/10	4.4	
2010	10/12/10	25	56	15	22009	26067	Lake Eufaula	1,493	2010	10/13/10	6.5	
2010	8/9/10	25	56	15	28876	30075	Grand Lake	500	2010	8/11/10	4.4	
2010	8/9/10	25	56	15	30081	34048	Lake Eufaula	1,000	2010	8/11/10	4.4	
2010	8/10/10	25	56	15	34059	38326	Lake Eufaula	1,200	2010	8/11/10	4.4	
2010	7/19/10	25	95	01	06404	11683	Lake Eufaula	2,059	2010	07/19/10	3.6	
2010	7/19/10	25	95	01	11695	13129	Lake Eufaula	597	2010	7/20/10	3.7	
2010	7/20/10	25	95	01	13140	22655	Lake Eufaula	1,000	2010	7/20/10	3.7	
2010	7/20/10	25	95	01	22666	27363	Lake Eufaula	1,818	2010	7/21/10	3.7	
2010	8/9/10	25	95	01	27374	29461	Grand Lake	1,000	2010	8/11/10	4.4	
2011	8/3/2011	25	56	15	26116	28750	Lake Eufaula	1,000	2011	8/4/2011	4.2	306
2011	8/3/2011	25	56	15	28751	42931	Lake Eufaula	1,000	2011	8/4/2011	4.2	306
2011	8/8/2011	25	56	15	42974	45639	Lake Eufaula	1,057	2011	8/10/2011	4.4	333
2011	8/9/2011	25	56	15	45673	47771	Lake Eufaula	982	2011	8/10/2011	4.4	298
2011	8/9/2011	25	56	15	47778	49498	Lake Eufaula	600	2011	8/11/2011	4.4	311
2011	8/29/2011	25	56	15	49535	51438	Lake Eufaula	700	2011	8/30/2011	5.0	383
2011	8/29/2011	25	56	15	51444	52226	Grand Lake	250	2011	9/1/2011	5.1	383
2011	8/29/2011	25	56	15	52232	52917	Lake Eufaula	247	2011	12/6/2011	8.3	482
2011	8/3/2011	25	56	15	57501	57660	Lake Eufaula	905	2011	8/4/2011	4.2	306
2011	8/9/2011	25	56	15	58640	61707	Lake Eufaula	1,000	2011	8/10/2011	4.4	298
2011	8/9/2011	25	56	15	61726	63388	Lake Eufaula	692	2011	8/11/2011	4.4	311
2011	8/29/2011	25	56	15	63434	65216	Lake Eufaula	744	2011	8/30/2011	5.0	383
2011	8/29/2011	25	56	15	65217	65945	Grand Lake	255	2011	9/1/2011	5.1	383
2011	8/29/2011	25	56	15	65954	66691	Lake Eufaula	250	2011	12/6/2011	8.3	482
2012	7/23/2012	25	56	15	52947	57319	Lake Eufaula	1,500	2012	7/23/2012	3.8	288
2012	7/23/2012	25	56	15	66733	72219	Lake Eufaula	1,503	2012	7/23/2012	3.8	288
2012	7/23/2012	25	56	16	00206	02330	Lake Eufaula	1,500	2012	7/23/2012	3.8	288
2012	7/24/2012	25	56	16	02336	10119	Lake Eufaula	2,569	2012	7/24/2012	3.8	297
2012	7/25/2012	25	56	16	10125	17547	Lake Eufaula	2,831	2012	7/25/2012	3.8	280

2012	7/30/2012	25	56	16	17553	22836	Lake Eufaula	1,500	2012	7/31/2012	4.0	306
2012	7/31/2012	25	56	16	22861	28057	Lake Eufaula	1,755	2012	8/1/2012	4.1	323
2012	8/1/2012	25	56	16	28090	28532	Lake Eufaula	1,538	2012	8/1/2012	4.1	334
2012	7/24/2012	25	56	17	00144	05710	Lake Eufaula	2,500	2012	7/24/2012	3.8	297
2012	7/25/2012	25	56	17	05716	12462	Lake Eufaula	2,500	2012	7/26/2012	3.9	280
2012	7/30/2012	25	56	17	12470	15820	Lake Eufaula	1,798	2012	7/31/2012	4.0	306
2012	7/31/2012	25	56	17	15849	19767	Lake Eufaula	1,750	2012	8/1/2012	4.1	323
2012	8/1/2012	25	56	17	19796	25466	Lake Eufaula	1,500	2012	8/2/2012	4.1	334
2012	8/2/2012	25	56	17	25662	28516	Lake Eufaula	1,000	2012	8/2/2012	4.1	310
2012	8/1/2012	25	56	18	00115	05895	Lake Eufaula	1,500	2012	8/2/2012	4.1	334
2012	8/2/2012	25	56	18	05924	09065	Lake Eufaula	481	2012	8/2/2012	4.1	310
2012	8/8/2012	25	56	18	09096	18778	Lake Eufaula	2,924	2012	8/15/2012	4.5	300
2012	8/14/2012	25	56	18	18802	28553	Lake Eufaula	2,500	2012	8/15/2012	4.5	312
2012	8/2/2012	25	56	18	28870	29846	Lake Eufaula	1,000	2012	8/2/2012	4.1	310
2012	8/8/2012	25	56	18	29882	38101	Lake Eufaula	3,000	2012	8/8/2012	4.3	300
2012	8/14/2012	25	56	18	38124	48135	Lake Eufaula	3,022	2012	8/15/2012	4.5	312
2012	10/17/2012	25	56	18	48163	54099	Lake Eufaula	2,158	2012	10/23/2012	6.8	436
2012	8/14/2012	25	56	18	57599	60234	Lake Eufaula	2,500	2012	8/15/2012	4.5	312
2012	8/23/2012	25	56	18	60259	60324	Grand Lake	20	2012	8/28/2012	5.0	448
2012	8/23/2012	25	56	18	60329	62497	Grand Lake	881	2012	8/28/2012	5.0	390
2012	10/15/2012	25	56	18	62530	70020	Grand Lake	2,003	2012	10/17/2012	6.6	423
2012	10/16/2012	25	56	18	70070	79180	Lake Eufaula	3,062	2012	10/17/2012	6.6	423
2012	10/17/2012	25	56	18	79200	80449	Lake Eufaula	466	2012	10/18/2012	6.7	395
2013	8/7/2013	25	56	18	54162	57224	Lake Eufaula	1240	2013	8/9/2013	4.3	300
2013	8/13/2013	25	56	20	00125	02080	Lake Eufaula	756	2013	8/14/2013	4.5	283
2013	8/14/2013	25	56	20	02100	08959	Lake Eufaula	2698	2013	8/15/2013	4.5	290
2013	8/19/2013	25	56	20	08992	22009	Lake Eufaula	4,977	2013	8/20/2013	4.7	290
2013	7/9/2013	25	56	20	28958	38996	Lake Eufaula	4058	2013	7/10/2013	3.3	302
2013	8/7/2013	25	56	20	39029	48585	Lake Eufaula	3781	2013	8/9/2013	4.3	300
2013	8/12/2013	25	56	20	48624	53775	Grand Lake	2052	2013	8/14/2013	4.5	283
2013	8/13/2013	25	56	20	53811	57218	Lake Eufaula	1373	2013	8/14/2013	4.5	283
2014	7/15/2014	25	56	19	28751	34620	Lake Eufaula	1517	2014	7/15/2014	3.5	292
2014	7/16/2014	25	56	19	34656	42368	Lake Eufaula	2777	2014	7/16/2014	3.5	257
2014	7/17/2014	25	56	19	42376	48520	Lake Eufaula	2110	2014	7/18/2014	3.6	257
2014	7/23/2014	25	56	19	48549	51355	Lake Eufaula	975	2014	7/23/2014	3.8	259
2014	8/14/2014	25	56	19	52782	57501	Grand Lake	1000	2014	8/15/2014	4.5	294
2014	3/24/2014	25	56	20	22024	23647	Lake Eufaula	367	2012	3/24/2014	24	745
2014	7/15/2014	25	56	20	23695	57228	Lake Eufaula	1500	2014	7/15/2014	3.5	292
2014	7/15/2014	25	56	21	00000	01216	Lake Eufaula	1500	2014	7/15/2014	3.5	292
2014	7/16/2014	25	56	21	01243	07720	Lake Eufaula	2500	2014	7/16/2014	3.5	257
2014	7/17/2014	25	56	21	07722	12737	Lake Eufaula	2000	2014	7/18/2014	3.6	257
2014	7/23/2014	25	56	21	12753	14641	Lake Eufaula	800	2014	7/23/2014	3.8	259
2014	10/6/2014	25	56	21	14671	16421	Lake Eufaula	600	2014	10/6/2014	6.3	275
2014	8/14/2014	25	56	21	28751	29613	Grand Lake	1005	2014	8/15/2014	4.5	294
2014	10/6/2014	25	56	21	34709	36594	Lake Eufaula	743	2014	10/6/2014	6.3	275
2015	8/18/2015	25	56	19	00000	02890	Lake Eufaula	2000	2015	8/20/2015	4.7	278
2015	9/2/2015	25	56	19	03466	05116	Lake Eufaula	406	2015	9/3/2015	5.2	428
2015	9/2/2015	25	56	19	05117	12138	Lake Eufaula	1825	2015	9/3/2015	5.2	297

2015	9/8/2015	25	56	19	12535	17952	Lake Eufaula	2092	2015	9/10/2015	5.4	307
2015	7/13/2015	25	56	21	16444	26708	Lake Eufaula	3820	2015	7/13/2015	3.4	276
2015	7/14/2015	25	56	21	26723	28751	Lake Eufaula	2558	2015	7/14/2015	3.5	264
2015	7/13/2015	25	56	21	36626	44266	Lake Eufaula	3000	2015	7/15/2015	3.5	276
2015	7/14/2015	25	56	21	44284	51735	Lake Eufaula	2000	2015	7/15/2015	3.5	264
2015	9/2/2015	25	56	21	51773	52569	Lake Eufaula	300	2015	9/3/2015	5.2	428
2015	9/2/2015	25	56	21	52569	56464	Lake Eufaula	1500	2015	9/3/2015	5.2	297
2015	7/14/2015	25	56	21	57609	66978	Lake Eufaula	2400	2015	7/14/2015	3.5	264
2015	8/7/2015	25	56	21	67002	72157	Grand Lake	2035	2015	8/11/2015	4.4	288
2015	8/18/2015	25	56	21	72175	80702	Lake Eufaula	2048	2015	8/20/2015	4.7	278
2016	7/11/2016	25	56	19	20198	23516	Lake Eufaula	1006	2016	7/11/2016	3.4	263
2016	7/11/2016	25	56	19	23531	28750	Lake Eufaula	1861	2016	7/12/2016	3.4	270
2016	9/6/2016	25	56	22	00000	02720	Lake Eufaula	880	2016	9/8/2016	5.3	265
2016	7/11/2016	25	56	23	00000	02461	Lake Eufaula	1000	2016	7/11/2016	3.4	263
2016	7/11/2016	25	56	23	02468	06057	Lake Eufaula	1000	2016	7/12/2016	3.4	270
2016	8/2/2016	25	56	23	06126	09995	Lake Eufaula	1000	2016	8/2/2016	4.1	315
2016	8/2/2016	25	56	23	10007	14590	Lake Eufaula	1695	2016	8/3/2016	4.1	305
2016	8/3/2016	25	56	23	14613	25010	Lake Eufaula	3079	2016	8/4/2016	4.2	275
2016	8/16/2016	25	56	23	25030	28750	Grand Lake	1112	2016	9/28/2016	6.0	377
2016	8/2/2016	25	56	23	28751	32029	Lake Eufaula	1564	2016	8/2/2016	4.1	315
2016	8/2/2016	25	56	23	32035	35365	Lake Eufaula	1000	2016	8/3/2016	4.1	305
2016	8/3/2016	25	56	23	35383	42587	Lake Eufaula	3000	2016	8/4/2016	4.2	275
2016	8/16/2016	25	56	23	42610	45200	Grand Lake	1000	2016	9/28/2016	6.0	377
2016	8/16/2016	25	56	23	45202	49227	Lake Eufaula	1000	2016	8/18/2016	4.6	304
2016	8/16/2016	25	56	23	49232	52937	Lake Eufaula	1000	2016	8/18/2016	4.6	304
2016	8/22/2016	25	56	23	52953	57501	Lake Eufaula	2000	2016	8/23/2016	4.8	304
2016	8/16/2016	25	56	23	57502	61227	Lake Eufaula	1521	2016	8/18/2016	4.6	304
2016	8/16/2016	25	56	23	61239	65145	Lake Eufaula	1572	2016	8/18/2016	4.6	304
2016	8/22/2016	25	56	23	65166	73687	Lake Eufaula	2967	2016	8/23/2016	4.8	304
2016	9/6/2016	25	56	23	74508	83649	Lake Eufaula	2829	2016	9/7/2016	5.3	265
2016	9/6/2016	25	56	23	83656	86252	Lake Eufaula	800	2016	9/8/2016	5.3	265
2016	9/6/2016	25	56	23	86253	92803	Lake Eufaula	2500	2016	9/7/2016	5.3	265
2017	8/24/2017	25	56	19	57615	59980	Lake Eufaula	1053	2017	8/25/2017	4.9	335
2017	10/24/2017	25	56	19	59995	65729	Lake Eufaula	2040	2017	10/24/2017	6.9	387
2017	11/29/2017	25	56	19	65745	66249	Lake Eufaula	198	2017	11/29/2017	8.1	387
2017	8/24/2017	25	56	22	28907	31521	Lake Eufaula	800	2017	8/25/2017	4.9	335
2017	10/24/2017	25	56	22	31549	35190	Lake Eufaula	1500	2017	10/24/2017	6.9	387