Black Bass Population Dynamics in Honey Creek, Oklahoma

Oklahoma Department of Wildlife Conservation, Streams Program

Black Bass Report No. 10

Federal Aid Project F24AF00402

2025

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Objective(s):

I. Establish contemporary baseline black bass population dynamics data in Oklahoma streams using standardized sampling techniques.

II. Use historical black bass population dynamics data, when available, to analyze potential changes in black bass population growth rates, size structure, and mortality.

III. Evaluate the effectiveness of current stream black bass fishing regulations.

Executive Summary:

Beginning in 2016, the Oklahoma Department of Wildlife Streams Program instituted a black bass monitoring program for Largemouth Bass, Spotted Bass, and the Smallmouth Bass species complex. As part of the monitoring program, streams will be sampled on a rotational basis. In October of 2025, three sites on Honey Creek were sampled for black basses using backpack electrofishing and angling. Forty-three bass within the Smallmouth Bass complex were measured, weighed, sexed, and aged in this creek. Due to their low L_∞ (262.9 mm) and the oldest individual being 3 years old, this report will assume all individuals are Neosho Bass. This cannot be confirmed until genetic analysis of these individuals is completed in 2026. Therefore, this will serve as a provisional report.

Introduction

Stream fishing represents an important fisheries resource for freshwater anglers (Fisher et al. 1998). In Oklahoma, it is estimated that between 24-31% of anglers fish in rivers or streams each year (Fisher et al. 1998; Fisher et al. 2002; U.S. Department of the Interior et al. 2011). Consequently, recreational fishing in Oklahoma streams provides a substantial boost to the economy of the region (Fisher et al. 2002; Boyer and Fisher 2007). Black bass are the most sought-after sport fish in eastern Oklahoma streams despite survey results indicating that most anglers (>75%) rated black bass fishing as fair or poor (Fisher et al. 2002). Black bass catch rates, harvest rates, angling pressure and yield have been observed to differ substantially between northeastern and southeastern streams in Oklahoma (Martin and Fisher 2008). Additionally, black bass densities, lifespans, recruitment, and growth rates have been reported to differ between ecoregions in Oklahoma (Stark and Zale 1991; Brewer and Long 2015). Therefore, management recommendations that benefit stream black bass populations in northern Oklahoma may not be adequate for black bass populations in southern Oklahoma. Ultimately, this may require different regions or waterbodies to be managed independently to improve black bass fisheries in these systems (Fisher et al. 2002; Williamson et al. 2019).

Largemouth Bass (*Micropterus nigricans*) and Spotted Bass (*Micropterus punctulatus*) are both native to Oklahoma streams. Historically, there were two taxonomically recognized subspecies of Smallmouth Bass, *Micropterus dolomieu*: the northern, wide-ranging subspecies *M. d. dolomieu* and the Neosho subspecies *M. d. velox* (Hubbs and Bailey 1940), which is native to the Arkansas River basin. Additionally, a genetically distinct lineage of Smallmouth Bass (Ouachita Smallmouth Bass), occurs in southeastern Oklahoma in the Ouachita Mountains ecoregion (Stark and Echelle 1998; Brewer and Long 2015). However, recent work has since elevated the Neosho Bass (*Micropterus velox*) in Arkansas River tributaries to its own species (Kim et al. 2022).

Historical stockings of non-native Smallmouth Bass have led to the introduction and establishment of several populations in streams and reservoirs throughout Oklahoma (ODWC, unpublished data). Smallmouth stockings were halted by the Oklahoma Department of Wildlife (ODWC) after genetic results confirmed the taxonomic status of Neosho and Ouachita Smallmouth Bass. Nevertheless, introgressive hybridization between Smallmouth Bass and both Neosho Bass and Little River bass has been documented (Malloy et al. 2000; Taylor et al. 2016; Taylor et al. 2018). In this report, when discussing statewide regulations and populations, "Smallmouth Bass complex" will refer to each of these three species as they are sister taxa (Kim et al. 2022). Individual populations for which genetic work has confirmed species identity will be referred to as such throughout the methods and results.

Historical sampling of stream black bass occurred sporadically in Oklahoma, but, like elsewhere across their range, basic population dynamics studies were predominantly conducted in reservoirs (Fajen 1975). Consequently, the ODWC has never incorporated a standardized monitoring program to monitor black bass population dynamics in streams. Therefore, historical data related to recruitment, growth, and mortality of stream black bass populations is sparse (but see Leonard and Jenkins 1952; Orth et al. 1983; Stark and Zale 1991). Based on a survey of stream black bass in eastern Oklahoma, Stark and Zale (1991) recommended a 229 to 305-mm (9.0-12.0 in) protected-slot length-regulation on Smallmouth Bass in northeastern streams; however, in southeastern streams a high minimum length regulation (>381 mm or 15 in) for Smallmouth Bass and liberal harvest regulations for Largemouth Bass and Spotted Bass were recommended. Prior to 2014, the statewide daily limit was six combined Largemouth Bass and Smallmouth Bass (no daily limit for Spotted Bass) with no length restrictions, but Smallmouth Bass in the upper Illinois River and its tributaries were subjected to a 229 to 305-mm protected slot limit. Additionally, within a daily bag of 6 combined black bass, only one Smallmouth Bass over the slot limit was allowed. Currently, size regulations for Largemouth and Smallmouth Bass in streams are set at a 356 mm (14 in) minimum length limit. Statewide harvest regulations limit anglers to six combined black bass; however, anglers fishing in rivers and streams are only allowed to harvest one Smallmouth Bass as part of their daily limit. Spotted Bass harvest is limited within the combined daily limit of six black bass with no size restriction except on the Blue River Public Fishing and Hunting Area (PFHA), which has a 356 mm minimum size limit.

Due to the popularity of black bass with stream anglers in Oklahoma, and the paucity of population dynamics data for informing management decisions, the ODWC Stream Program instituted a black bass monitoring program in 2016. As part of the monitoring program, streams will be sampled on a rotational basis. Data collected within this program will document contemporary black bass population dynamics data and serve as the foundation for a long-term black bass population dynamics dataset for evaluating temporal trends. The data collected will be instrumental in evaluating the effectiveness of current stream black bass regulations in place to maximize fishing opportunities valued by constituents.

Methods

Study Area

Honey Creek flows approximately 30 river km, arising near Beaty, AR, flowing northwest through Southwest City, MO, and then west once it enters Oklahoma. Within Oklahoma, Honey Creek travels ~15 km before it meets Grand Lake near Grove. This creek is in the Ozark highlands ecoregion, which is characterized by its cherty limestone, oak-hickory forests, and cool, spring fed creeks. Land use in this area is predominantly poultry and livestock farming.

Field surveys

While present in all the rivers sampled by the Stream Program to date, low sample sizes of Largemouth Bass preclude calculation of population dynamics needed to manage populations. Additionally, there are a myriad of self-sustaining, actively managed Largemouth Bass populations in reservoirs around the state of Oklahoma. For these reasons, the Stream Program ceased collection of Largemouth Bass in black bass surveys in 2021. In addition, no population dynamics will be calculated for Spotted Bass since none were encountered during sampling.

Due to lack of landowner access and bridge crossings within Oklahoma, only three sites on Honey Creek were sampled (Figure 1). Care was taken to ensure sites were representative of the entire longitudinal gradient of the river. One site, “Barking Dog”, was sampled twice due to the lack of larger individuals. Sampling sites are typically delineated at the reach scale. A reach was defined as whichever is greater: 40x wetted width, or a length of the stream containing three of each primary channel unit types (i.e., run, riffle, pool).

Surveys were conducted during October 2025. Only one site was shocked via backpack electrofisher (ETS Electrofishing Systems ABP-4-MR) while the other two were sampled by angling. Angling was conducted mainly due to lack of accessibility and landowner access. Backpack electrofishing was conducted using pulsed direct current (DC), 60 Hz, and 25% duty cycle. Water conductivity was measured on site and voltage was adjusted to maintain adequate

target power as outlined in Miranda (2009). Electrofishing was conducted upstream in a zigzag pattern and care was taken to sample all available habitat types.

Laboratory methods

Mature black bass were collected and put on ice for transportation to the laboratory. Individuals ≤ 100 mm were recorded as YOY and weighed, measured, and released on site. Only specimens that had bi or tri-colored tails indicative of Spotted and Smallmouth Bass complex YOY were recorded. Laboratory processing included measuring length (mm) and weight (g), sexing, and removing sagittal otoliths. Otoliths are known to provide accurate age estimates for black bass and have been shown to be superior age estimators when compared to scales and pectoral fin rays, especially when aging older specimens (Long and Fisher 2001; Phelps et al. 2017; Starks and Rodger 2020). Sagittal otoliths were read whole while under a microscope (Nikon SMZ25, Nikon Co., Tokyo, Japan) with the aid of an external light source. To prevent any potential underestimating bias, any whole otolith that was determined to be ≥ 4 years was sectioned and re-aged. The sagittal otolith was fixed to the support arm of a low-speed saw (Buehler, Lake Bluff, Illinois) and sectioned. If growth rings were not visible, the cross section was sanded using 1500-grit sandpaper. Annual growth rings were counted independently by two experienced readers. In instances where the age estimate varied between the two readers, an additional reader was brought in to verify the age estimate. Reader agreement was 100% and all otoliths were retained for growth analyses. All otoliths were photographed using Nikon SMZ25 camera mounted on the microscope to facilitate ease of reading and long-term data storage.

Analyses

Usually, proportional size distribution (PSD) indices are calculated for each species in each stream using published black bass length values for stock, quality, preferred, memorable, and trophy calculations (Gabelhouse 1984). Since Neosho Bass do not get as big as Northern Smallmouth Bass, there will not be any PSD values included in this report.

Black bass were pooled together by species to estimate growth rates. Comparison of black bass growth rates was accomplished by fitting a nonlinear estimation of a von Bertalanffy (VB) growth equation (von Bertalanffy 1938) to age/length data from each stream. The VB growth equation formula is as follows:

$$L_t = L_\infty\left[1 - e^{-k(t-t_0)}\right]$$

where t is time units (y), L_t is the length of the fish at age t, L_∞ is the maximum mean (asymptotic) length, K is the Brody growth coefficient, and t_0 is the theoretical age at which a fish would have a length of zero. The VB growth model has become the standard analysis among

fisheries scientists for modeling growth (Isely and Grabowski 2007). Upper and lower 95% confidence intervals (CI) were calculated using 10,000 iteration bootstrapping methods. Predicted length at ages and associated 95% CIs were calculated from the VB growth model. VB growth equation calculations were conducted using the FSA package (Ogle 2016) in R (R version 3.5.2; R Core Team, 2022).

Black bass mortality rates were calculated using a weighted linearized catch curve. Catch curve methods estimate mortality rates by regressing counts of fish in each age class as a function of age. Age classes on the ascending limb of catch curve plots were removed as they are underrepresented in the sample and heavily influence mortality rate estimation. The gears used in this study have been found to select against age-0 fish, which necessitates their removal from analysis (Balkenbush and Fisher 1999). The descending limb of the catch-curve is linear when the natural logarithm of catch is plotted against age, and the negative slope of the linear regression model fit to the data is an estimate of instantaneous mortality (Z; Ogle 2016). Because old age classes are typically represented by fewer individuals, weighted regression methods were used to decrease their impact on estimates of Z and in turn total annual mortality (A; Maceina and Bettoli 1998). One assumption not commonly met when estimating mortality rates using catch curves is constant recruitment in the population. Black bass exhibit annual variation in recruitment (Lukas and Orth 1995; Maceina and Bettoli 1998; Smith et al. 2005). However, nominal, random fluctuations in recruitment (as is the case in most black bass populations due to varying environmental conditions during the spawning season) are acceptable. Directional change in recruitment, either constantly increasing or decreasing over time confounds catch curve analyses (Miranda and Bettoli 2007), but this is not suspected to be the case for stream black bass populations in eastern Oklahoma based on examination of trends in fall young of year (YOY) black bass densities (ODWC, unpublished data). Upper and lower 95% CI were estimated for Z and A. All mortality calculations were conducted using the FSA package (Ogle 2016) in R (R version 4.2.2; R Core Team, 2022).

Results

Surveys on Honey Creek yielded 43 Neosho Bass and zero Spotted Bass. Sex ratios were 47% male, 42% female, and 11% YOY/undetermined. Predicted mean length at age was calculated as seen in Table 1. Neosho Bass ages ranged from 0-3, with two-year-olds being the strongest age class (Figure 2). Lengths ranged from 72-285 mm (mean = 200 mm) pictured in Figure 3. Enough individuals were collected to calculate a Von Bertalanffy growth curve (Figure 4) which yielded an $L\infty$ of 262.9. Figure 5 shows a log-transformed length-weight regression. The oldest individual captured was three years of age.

Discussion

Stark and Zale (1991) reported a negative association between abundances of Smallmouth Bass complex species and congeners in streams of Oklahoma. In that study, most communities were dominated by Spotted Bass. This pattern appears to be cyclical, as most of Honey Creek was dominated by Neosho Bass. The only area where Largemouth Bass occurred was where the creek flowed into Grand Lake. While the factors affecting year-class strength and nesting success of lotic dwelling Spotted Bass are not well understood, both factors have been found to significantly correlate with hydrology in lotic Smallmouth Bass populations. Fluctuations in abundance of Neosho Bass are also likely dependent on spawn and post-spawn period flows (Smith et al. 2005; Lukas and Orth 1995; Miller and Brewer 2020).

Honey Creek likely contains a pure stock of Neosho Bass, but genetics will later confirm this. The Neosho Bass L∞ was lower than all Oklahoma populations sampled. Since the L_∞ *i*s ~92 mm smaller than the minimum size limit for Smallmouth Bass, it can be inferred that it is unlikely for anglers to harvest a Neosho Bass in Honey Creek. This may warrant a regulation change in the future to accommodate for anglers wanting to harvest Neosho Bass within this watershed.

Statistics were run with the assumption that all bass collected in the Smallmouth Bass Complex were Neosho Bass. Forty-three fin clips will be sent off for genetic testing to ensure they were Neosho Bass and not Smallmouth Bass or intergrades due to the introduction of Smallmouth Bass in Grand Lake.

Management recommendations

It is recommended that Honey Creek remain in future stream black bass monitoring surveys. Because of an increasing human population in the Ozarks, agriculture, water consumption, and runoff are also significantly increasing. All these changes negatively impact cool, spring fed streams in this ecoregion, and Honey Creek is no exception. It can be inferred that Neosho Bass will decline in the future due to these changes. Therefore, it is essential that population densities are focused on in the future rather than genetics and growth. To achieve this, it is recommended that snorkel and depletion studies are conducted.

Evaluation of regulations will be conducted after all streams in the black bass monitoring program have been sampled. Region specific population models (i.e., pooled northeast and southeast data) will be used to increase sample sizes and evaluate differences between regions and species (i.e. Little River Bass, Neosho Bass, and Smallmouth Bass). Evaluation of the current size and harvest regulations will be facilitated by the data collected within the black bass monitoring program, as well as ancillary data collected for other concurrent projects.

References

Balkenbush, P. E., and W. L. Fisher. 1999. Population characteristics and management of black bass in eastern Oklahoma streams. Proceedings of the Southeastern Association of Fish and Wildlife Agencies 53:130-143.

Boyer, T. B., and W. L. Fisher. 2007. Economic impact of trout fishing on the lower Illinois River on the economy of Sequoyah County, Oklahoma. Oklahoma Department of Wildlife Conservation, Final Report F-58-R, Oklahoma City, Oklahoma.

Brewer, S. K., and J. M. Long. 2015. Biology and ecology of Neosho Smallmouth Bass and the genetically distinct Ouachita lineage. Pages 281-295 *in* M. D. Tringali, J. M. Long, T. W. Birdsong, and M. S. Allen, editors. Black bass diversity: multidisciplinary science for conservation. American Fisheries Society, Symposium 82, Bethesda, Maryland.

Carlander, K.D. 1977. Handbook of freshwater fishery biology volume II. Iowa State University Press, Ames, Iowa.

Environmental Protection Agency. 2013. Primary distinguishing characteristics of level III ecoregions of the continental United States. https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states, accessed October 2019).

Fajen, O. 1975. Population dynamics of bass in rivers and streams. Pages 195-203 *in* H. Clepper and R.H. Stroud, editors. Black Bass Biology and Management. Sport Fishing Institute, Washington, D.C.

Fisher, W. L., A. F. Surmont, and C. D. Martin. 1998. Warmwater stream and river fisheries in the southeastern United States: are we managing them in proportion to their values? Fisheries 23:16-24.

Fisher, W. L., D. F. Schreiner, C. D. Martin, Y. A. Negash, and E. Kessler. 2002. Recreational fishing and socioeconomic characteristics of eastern Oklahoma stream anglers. Proceedings of the Oklahoma Academy of Science 82:79-87.

Fiss, F.C., T.A. Cleveland, B.D. Carter, R.D. Bivens, and J.M. Swearengin. 2001. Population characteristics of riverine Smallmouth Bass in Tennessee, simulated effects of length limits, and management recommendations. Tennessee Wildlife Resources Agency, Fisheries Report 01-09, Nashville, Tennessee.

Gabelhouse, D. W. 1984. A length-categorization system to assess fish stocks. North American Journal of Fisheries Management 4:273-285.

Hart, J. 2005. Characteristics of the Spotted Bass and Largemouth Bass in a Northeastern Mississippi steam, the Buttahatchee River. Master's thesis. Mississippi State University, Starkville, Mississippi.

Hubbs, C.L., and R.M. Bailey. 1940. A revision of the black bass (*Micropterus* and *Huro*) with descriptions of four new forms. Miscellaneous Publications museum of Zoology university of Michigan 48.

Isely, J. J., and T. B. Grabowski. 2007. Age and growth. Pages 187-228 *in* C. S. Guy and M. L. Brown, editors. Analysis and Interpretation of Freshwater Fisheries Science Data. American Fisheries Society, Bethesda, Maryland.

Leonard, E. M., and R. M. Jenkins. 1952. Growth of basses of the Illinois River, Oklahoma. Proceedings of the Oklahoma Academy of Science 33:21-29.

Long, J. M., and W. L. Fisher. 2001. Precision and bias of Largemouth, Smallmouth, and Spotted Bass ages estimated from scales, whole otoliths, and sectioned otoliths. North American Journal of Fisheries Management 21:636-645.

Kim, D., A.T. Taylor, and T.J. Near. 2022. Phylogenomics and species delimitation of the economically important Black Basses (*Micropterus*). Scientific Reports 12:9113.

Lukas, J. A., and D. J. Orth. 1995. Factors affecting nesting success of Smallmouth Bass in a regulated Virginia stream. Transactions of the American Fisheries Society 124:726-735.

Maceina, M. J., and P. W. Bettoli. 1998. Variation in Largemouth Bass recruitment in four mainstream impoundments on the Tennessee River. North American Journal of Fisheries Management 18:998-1003.

Malloy, T. P., A. A. Echelle, R. A. Van Den Bussche, and W. L. Fisher. 2000. Genetic structure and age and growth of Smallmouth Bass in two Oklahoma reservoirs. Oklahoma Department of Wildlife Conservation, Final Report F-41-R, Oklahoma City, Oklahoma.

Martin, C. D., and W. L. Fisher. 2008. Recreational fishing for black bass in eastern Oklahoma streams. Proceedings of the Annual Conference of Southeastern Fish and Wildlife Agencies 62:168-176.

Meneau, K.J. 2010. Stream black bass special management area summary for Smallmouth Bass. Missouri Department of Conservation, Jefferson City, Missouri.

Miller, A.D., and S.K. Brewer. 2020. Age-0 Smallmouth Bass abundance depends on physicochemical conditions and stream network position.

Miranda, L. E., and P. W. Bettoli. 2007. Mortality. Pages 229-278 *in* C. S. Guy and M. L. Brown, editors. Analysis and Interpretation of Freshwater Fisheries Data. American Fisheries Society, Bethesda, Maryland.

Miranda, L. E. 2009. Standardized electrofishing power for boat electrofishing. Pages 223-230 *in*

S. A. Bonar, W. A. Hubert, and D. W. Willis, editors. Standard Methods for Sampling North American Freshwater Fishes. American Fisheries Society, Bethesda, Maryland.

Ogle, D. H. 2016. Introductory fisheries analyses with R. Chapman & Hall/CRC, Boca Raton, FL.

Orth, D. J., D. D. Oakey, and O. E. Maughan. 1983. Population characteristics of Smallmouth Bass in Glover Creek, southeast Oklahoma. Proceedings of the Oklahoma Academy of Science 63:37-41.

Phelps, Q. E., S. J. Tripp, M. J. Hamel, R. P. Koenigs, and Z. J. Jackson. 2017. Choice of structure for estimating fish age and growth. Pages 81-105 *in* M.C. Quist and D.A. Isermann, editors. Age and growth of fishes. American Fisheries Society, Bethesda, Maryland.

R Development Core Team. 2022. R: a language and environment for statistical computing, version 4.2.2. R Foundation for Statistical Computing, Vienna.

Stark, W. J., and A. V. Zale. 1991. Status of Smallmouth Bass populations in eastern Oklahoma. Oklahoma Department of Wildlife Conservation, Final Report F-41-R, Oklahoma City.

Stark, W.J., and A. A. Echelle. 1998. Genetic structure and systematics of Smallmouth Bass, with emphasis on Interior Highlands populations. Transactions of the American Fisheries Society 12:393-416.

Starks, T. A., M. Skoog, and A. W. Rodger. 2017. Black bass population dynamics in Glover River, Spring Creek, and Black Fork of the Poteau River, Oklahoma. Black Bass Report No. 2. Final Report to Oklahoma Department of Wildlife Conservation Federal Aid Project F13AF00191, Porter, Oklahoma.

Starks, T.A., and A.W. Rodger. 2020. Black bass population dynamics in the upper Mountain Fork, Oklahoma. Black Bass Report No. 4. Final Report to the Oklahoma Department of Wildlife Conservation, Federal Aid Project F20AF00131, Porter, Oklahoma.

Starks, T.A., and A.W. Rodger. 2020. Otolith and scale-based growth standards for lotic Smallmouth Bass. North American Journal of Fisheries Management 40: 986-994.

Smith, S. M., J. S. Odenkirk, and S. J. Reeser. 2005. Smallmouth Bass recruitment variability and its relation to stream discharge in three Virginia rivers. North American Journal of Fisheries Management 25:1112-1121.

Taylor, A. T., J. M. Long, M. R. Schwemm, M. D. Tringali, and S. K. Brewer. 2016. Identification of Neosho Smallmouth Bass (*Micropterus dolomieu velox*) stocks for possible introduction into Grand Lake, Oklahoma. Report provided by the Cooperative Fish and Wildlife Research Unit Program under agreement with the U.S. Fish and Wildlife Service. U.S. Department of Interior, Fish and Wildlife Service, Cooperator Science Series FWS/CSS-121-2016, National Conservation Training Center.

Taylor, A.T., J.M. Long, M.R. Schwemm, and S.K. Brewer. 2018. Hybridization and genetic structure of Neosho Smallmouth Bass in the Ozark Highlands. Norther American Journal of Fisheries Mangement 38: 1226-1240.

Tillma, J.S., and C.S. Guy. 1998. Growth of Spotted Bass in Kansas streams and impoundments. The Prairie Naturalist 30: 143-149.

Tyszko, S.M., and J.J. Pritt. 2017. Comparing otoliths and scales as structures used to estimate ages of Largemouth Bass: consequences of biased age estimates. North American Journal of Fisheries Management 37: 1075-1082.

U.S. Department of the Interior, U.S. Fish and Wildlife Service, and U.S. Department of Commerce, U.S. Census Bureau. 2011. 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Oklahoma. U.S. Department of the Interior, Washington D.C.

Von Bertalanffy, L. 1938. A quantitative theory of organic growth (inquiries on growth laws II). Human Biology 10: 181-213.

Williamson, C., N. Girondo, P. Cieslewicz, D. Knuth, M. Reed, J. Ackerson, A.J. Pratt, S. Peper, and J. Girondo. 2019. Exploitation of Smallmouth Bass from selected ozark streams and simulated effects of higher minimum length limits. Pages 111-128 *in* M.J. Siepker and J.W. Quinn, editors. Managing Centrarchid Fisheries in River and Streams. American Fisheries Society, Symposium 87, Bethesda, Maryland.

Table 1. *Predicted mean length-at-age for Neosho Bass in Honey Creek.*

Age	Mean TL
0	81.8
1	175.5
2	213.2
3	241.9

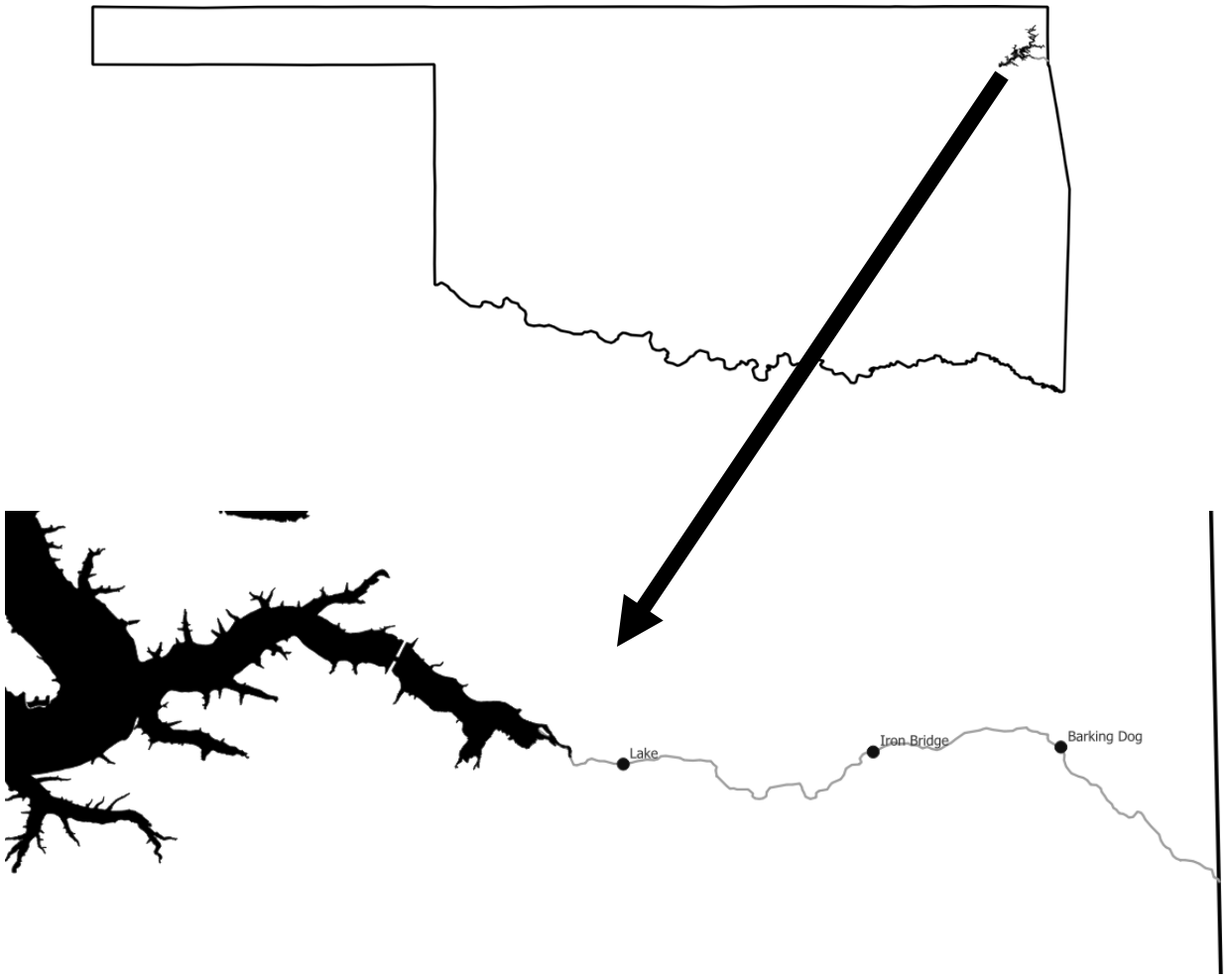

Figure 1. *Sampling sites surveyed by the ODWC in Honey Creek for Black Bass in fall of 2025.*

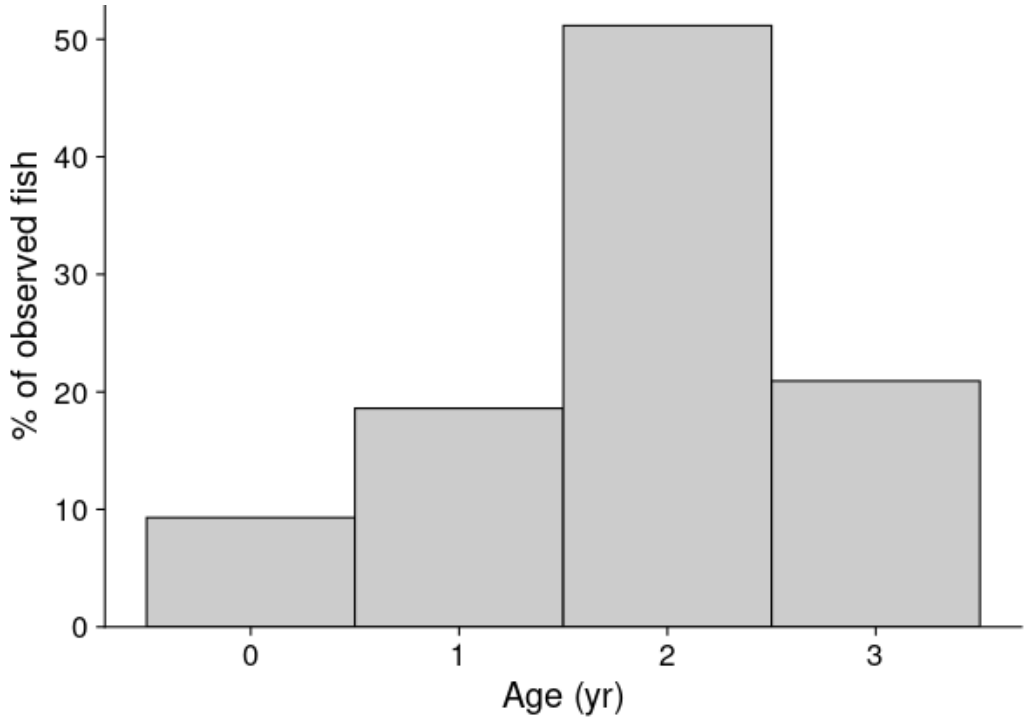

Figure 2. *Age frequency histogram for Neosho Bass (N=43) collected in Honey Creek.*

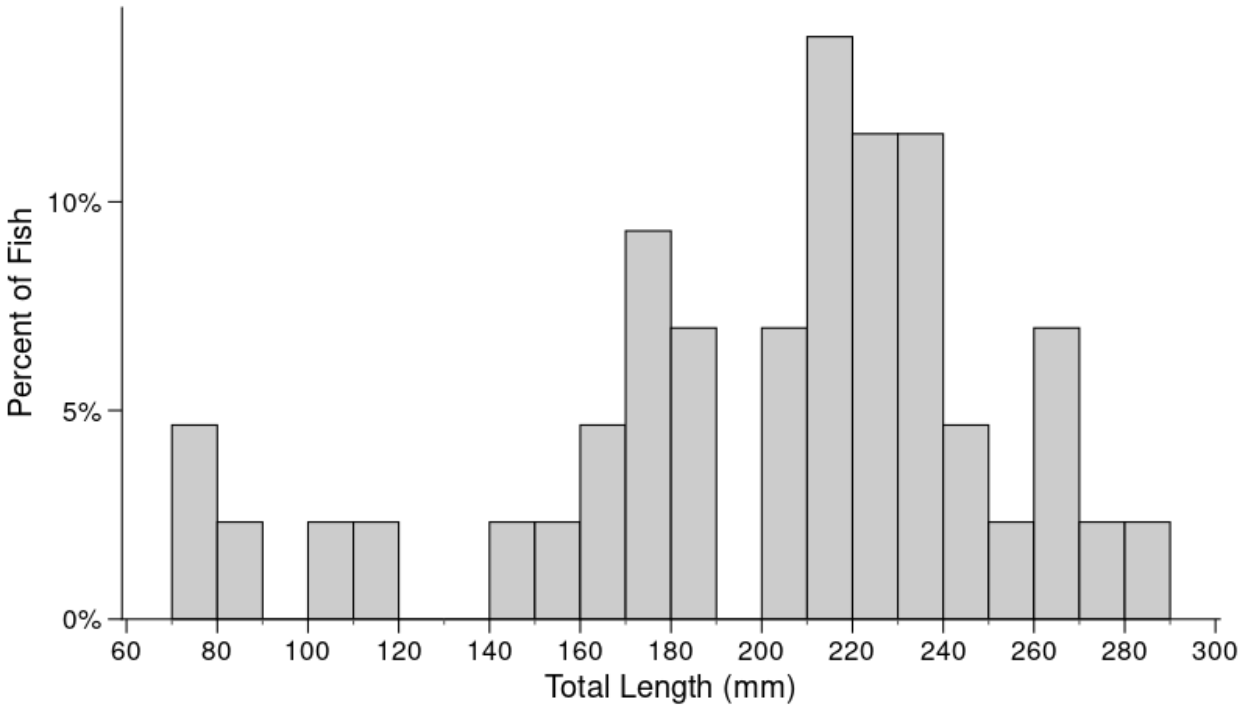

Figure 3. *Length-frequency histogram for Neosho Bass in Honey Creek.*

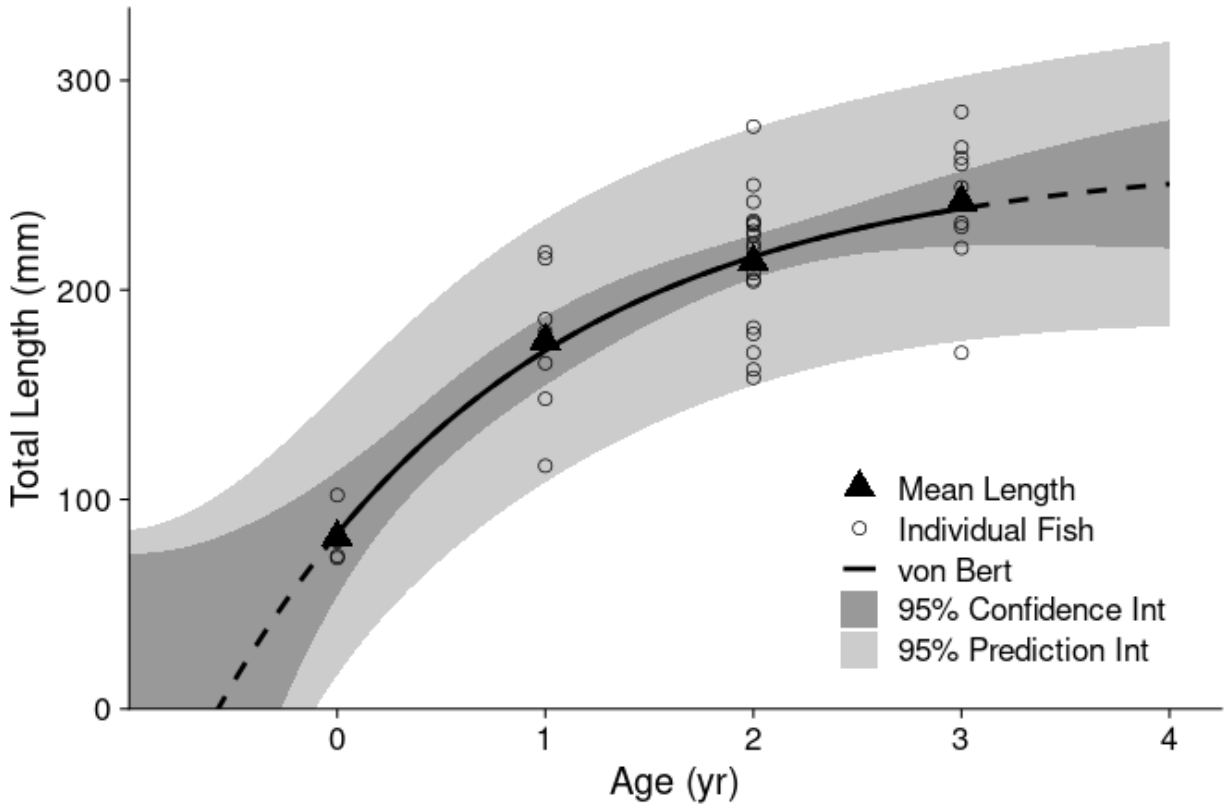

Figure 4. *Age-length relationship for Honey Creek Neosho Bass in 2025. Equation is a non-linear estimation of the von Bertallanfy curve with 95% CI. Estimates of the growth parameters are* $L\infty = 262.9$, $k = 0.668$, $t_0 = -0.573$.

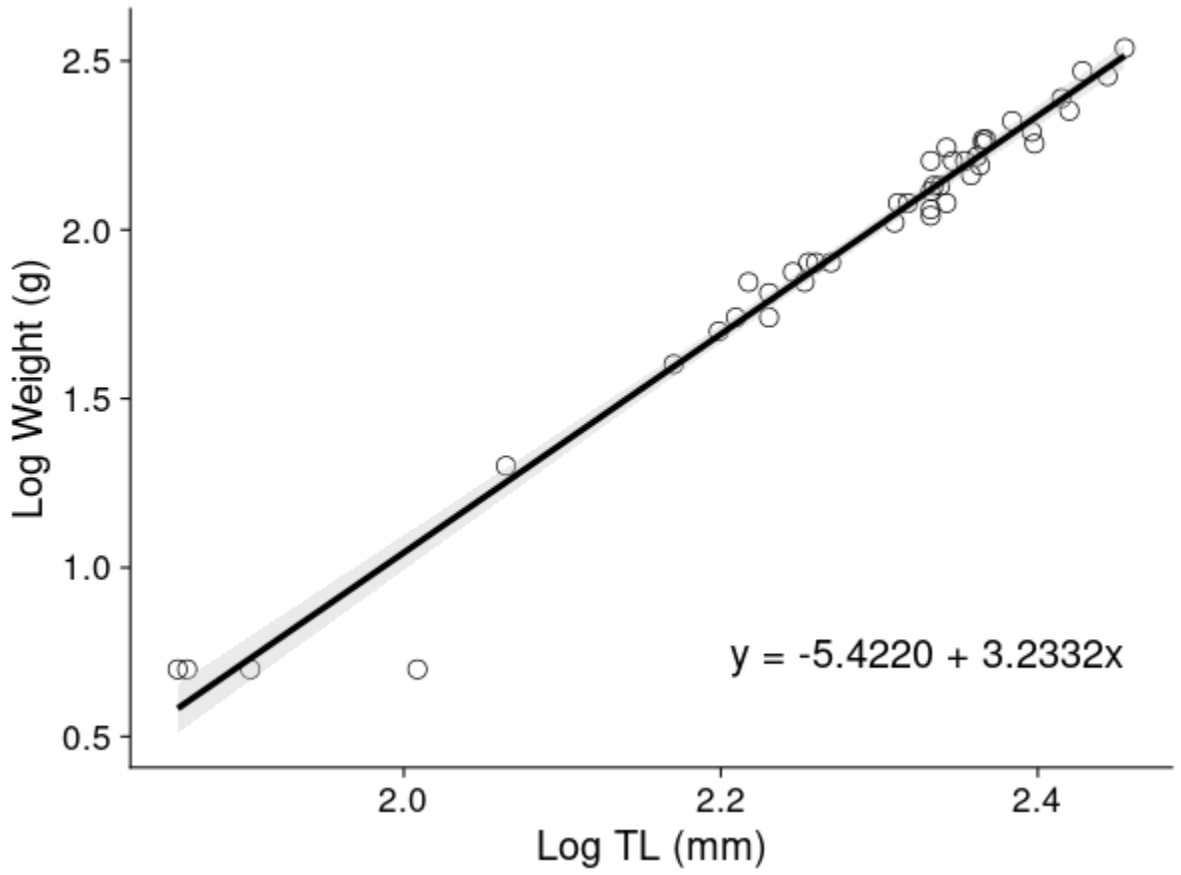

Figure 5. *Length-weight regression for Neosho Bass in Honey Creek.*