NEW RECORDS OF AN ESTABLISHED INLAND POPULATION OF NON-NATIVE SHEEPSHEAD MINNOW CYPRINODON VARIEGATUS FROM ROCK CREEK, BRAZOS RIVER BASIN, TEXAS



Grapevine, Texas

INTRODUCTION

The Sheepshead Minnow Cyprinodon variegatus is a hardy freshwater and estuarine fish found primarily within coastal drainages of the Atlantic and Gulf coasts in the United States from Maine south through the Gulf of Mexico and the Caribbean to Venezuela (Hubbs et al. 2008). In Texas, the species is currently known to occur well upstream in coastal drainages and has been documented within the following drainage units: Sabine Lake (including minor coastal drainages west to Galveston Bay), Galveston Bay (including minor coastal drainages west to mouth of Brazos River), Brazos River, Colorado River, San Antonio Bay (including minor coastal drainages west of mouth of Colorado River to mouth of Nueces River), and Nueces River (Bonner et al. 2007; Hubbs et al. 2008) (Figure 1). Furthermore, the Sheepshead Minnow has been introduced to several inland drainage units, including the upper Brazos River, San Antonio basin, and in several localities throughout the Trans-Pecos region (Bonner et al. 2007; Nico and Fuller 2023).

Within the upper Brazos River basin, introduced Sheepshead Minnow is considered to be invasive since the species can cause rapid genetic changes in populations of other native pupfishes through hybridization, as documented with the Red River Pupfish *C. rubrofluviatilis* (Shepta et al. 2021). While this species is known from the upper Brazos River basin, distribution of Sheepshead Minnow in other parts of the basin (particularly within tributaries to the Brazos River) is poorly documented, except for several dated occurrence records collected after 2011 (Shepta et al. 2023; Hendrickson and Cohen 2022; Nico and Fuller 2023). This paper documents new, multi-age class, voucher specimen-backed occurrence records of Sheepshead Minnow collected in early May of 2023 and verifies a reproducing population in Rock Creek, a tributary to the Brazos River, located outside of Blum, Texas (Fig-

Photos and graphics by the author.

Jeremy Jordan is a practicing Stream Ecologist in the natural resources consulting industry and owns a flyfishing guide service out of north-central Texas. ure 1; 32.114529, -97.401022). The population of Sheepshead Minnow was first observed serendipitously in Rock Creek on April 17, 2023, during a fly-fishing trip, on United States Army Corps of Engineers (USACE) project lands associated with Lake Whitney, which surround Rock Creek.

MATERIALS AND METHODS

The primary research objective was to document the occurrence of an introduced population of Sheepshead Minnow (Figure 2) via the collection and submittal of a representative subset of voucher specimens from Rock Creek where they were first observed to the Fishes of Texas project (FoTX). A secondary objective was to collect and submit a representative subset of voucher specimens of other fishes collected within Rock Creek to provide updated occurrence records to FoTX. Following definitions and methodology within the American Fisheries Society publication *Standard Methods for Sampling North American Freshwater Fishes* (Bonar et al. 2009), Rock Creek was considered a wadeable warmwater stream, which could best be sampled via seining (Figure 3).

Based on the observed habitat within Rock Creek (Figure 3), a 30 ft \times 6 ft \times ¹/₄ in mesh straight seine was utilized to sample fishes for this study. Seining consisted of completing at least six effective seine hauls covering at least 60 meters. An effective seine haul is a completed seining effort that was not negatively affected in such a way as to have fishes avoid capture (e.g, getting snagged on vegetation, wood debris, etc.). The seining crew consisted of two persons operating the seine in an upstream direction parallel to the bank, with the person on the bank slightly behind the person in the channel. Collected fishes were then quickly placed in 5-gallon buckets with battery-operated aerators. Fishes were identified utilizing Craig and Bonner (2019), enumerated, photographed in a Photarium, and either released or vouchered in small numbers in 10% formalin. After one week, vouchered fishes were rinsed and placed in 70% ethanol for accessioning with FoTX. All fish lengths were reported as total length (TL) in millimeters (mm). Results of the survey were provided to both FoTX and United States Geological Survey (USGS) Nonindigenous Aquatic Species (NAS) staff.



Figure 1. Map of Texas showing known occurrences of Sheepshead Minnow (orange) and new record (red).

RESULTS

A 500-foot segment of Rock Creek was sampled on May 6, 2023, to document the occurrence of Sheepshead Minnow as well as other species. Water temperature was approximately 70°F. Habitat within the sample reach consisted of 50% riffles, 25% runs, and 25% pools. Average water depth was approximately 1 foot or less across all instream habitat types (deepest in pools at approximately 2.5 feet and shallowest in riffles at approximately 6 inches or less). Substrate within the sampled reach of Rock Creek consisted of mostly bedrock with sparse gravel/cobble fragments in pools, with increased gravel and cobble in runs and riffles especially along the channel margins.

Sampling consisted of 13 effective seine hauls. In total, 274 specimens of seven species were collected (Table 1).

CONCLUSION

Fish data provided herein, as well as the donated voucher specimens and dataset reported to USGS NAS, formally document a population of Sheepshead Minnow within Rock Creek in the Brazos River basin in Texas. A records search utilizing the FoTX database and USGS NAS indicated that this population is introduced. As an introduced species, the Sheepshead Minnow is known to compete with native *Cyprinodon* (pupfish) species, therefore war-





Figure 2. Adult Sheepshead Minnow collected at Rock Creek.

Table 1. Fishes collected in Rock Creek.			
Scientific Name	Caught and Released	Vouchered	Incidental Mortalities
Red Shiner Cyprinella lutrensis	40	10	1
Blacktail Shiner Cyprinella venusta	0	4	0
Sheepshead Minnow Cyprinodon variegatus	2	19	0
Western Mosquitofish Gambusia affinis	119	10	0
Plains Longear Sunfish Lepomis aquilensis ¹	2	1	0
Bigscale Logperch Percina macrolepida	0	2	0
Bullhead Minnow Pimephales vigilax	51	10	3
Totals	214	56	4
Total fish collected		274	

¹As this dataset is being provided to the FoTX project, scientific names utilized in the current database are shown above. Based on the current FoTX database, all *Lepomis megalotis* occurrence records within the database are now considered *L. aquilensis*.

ranting classification as an invasive species. Although no other pupfishes are known from the Rock Creek basin, the Sheepshead Minnow is omnivorous and likely competes with species native to the drainage for food; therefore, the species should be considered invasive in the Rock Creek-Nolan river drainage unit where they were collected during this study (HUC12 – 120602020207). Additionally, adults as large as 45 mm and juveniles as small as 11 mm were collected and vouchered during this study, thus demonstrating that this population is established (Figure 4).

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Figure 3. Rock Creek along the sampling reach.



Figure 4. Sheepshead Minnow specimens vouchered demonstrating the occurrence of multiple ages classes within Rock Creek at the time of sampling.

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