URBAN FISH SURVEY IN NORTH CENTRAL TEXAS SHOWS VALUE OF RIPARIAN NATURE PRESERVES

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The state of Texas contains over 191,000 miles of stream across 15 major river basins (TWDB 2022) and is home to around 190 species of native freshwater fishes (Bonner and Craig 2019; Birdsong et al. 2020). Texas is known for its stream access laws, which allow anglers and researchers alike to traverse many of the state's waterways as long as they retain an average width of 30 feet from the mouth up (Adams 2017). Even with permissive stream access laws, there are still many smaller riverine waterbodies in Texas that lack basic fish distribution data. This presents a problem in fish conservation due to land access, since only around 5% of the state's area is public land: of 268,597 square miles of land in Texas, only around 13,340 are owned by federal, state, or local governments (Ramirez 2022). Though this is by no means a negligible amount, and stream access laws allow for public usage of many riverine waterbodies, miles and miles of streambed lie within the boundaries of private property. While the Texas Parks and Wildlife Department (TPWD) maintains many great private lands programs aimed at creating, restoring, protecting, or enhancing habitat for rare or at-risk species and protecting our valuable riparian areas and watersheds, the decision to act mostly lies with private landowners. This has the ability to create problems over time for a variety of reasons including landownership changes, impending development, and the simple fact that a landowner can refuse to be involved. This instability has the potential to impact freshwater fish communities as development continues throughout the state. Aside from protections set forth in federal legislation and species-specific regulations, lower and mid-order streams in Texas are essentially at the mercy of whoever owns the surrounding lands. This reinforces the importance of management of public lands; specifically, those surrounding riparian areas. In this article, I will present a fish survey I recently completed for a nature preserve that resulted in the collection of a regionally rare species, which emphasizes the necessity of the acquisition and management of riparian public lands. Spring Creek Forest Preserve is a city-owned urban nature preserve located in Garland, Dallas County, Texas (Figure 1).

The 200+ acre preserve consists of a relic Blackland Prairie bottomland forest dominated by species such as Burr Oak *Quercus macrocarpa,* Shumard Oak *Q. shumardii,* and Chinquapin Oak *Q.*

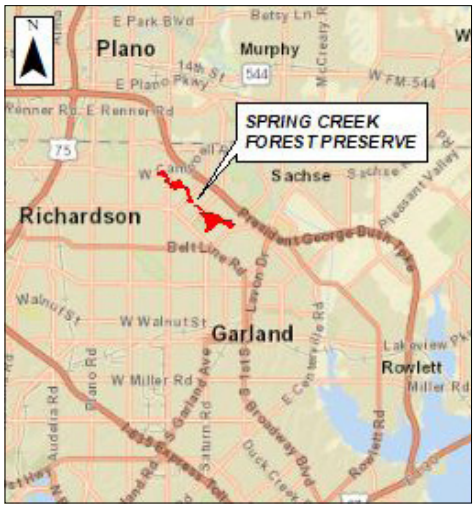

Figure 1. Location Map. (Source: Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community.)

Figure 2. Representative photograph of Spring Creek within Spring Creek Forest Preserve.

Photos and graphics by the author.

Jeremy Jordan is both a practicing Environmental Scientist in the consulting industry and an independent researcher out of north central Texas. He has knowledge and field experience with streams and stream ecology gained from on-the-job experience, academics, and a lifetime of angling. Jeremy is a member of both NANFA and the American Fisheries Society. He is a volunteer collector for the Fishes of Texas project, an online database of statewide fish records from a variety of sources ranging from around 40 institutions to state regulatory agencies to photographs submitted by the public. Jeremy's research focus is on freshwater fishes and mussels, but he enjoys all aspects of streams and rivers, including fishing, fly fishing. kayaking, and beach bumming with his wife. He is an Eagle Scout and maintains a strong bond with all things "outdoors."

muehlenbergii, with species such as Deciduous Holly *Ilex decidua,* Eastern Redbud *Cercis canadensis,* Virginia Wildrye *Elymus virginicus,* and greenbrier *Smilax* spp. dominating the understory. Some areas have been encroached by oriental privets *Ligustrum quihoui* and/or *Ligustrum sinense* and Eastern Red Cedar *Juniperus virginiana*. Additionally, some areas of the Preserve that were historically not forested now contain successional forest stands dominated by species such as Eastern Cottonwood *Populus deltoides,* Sugar Hackberry *Celtis laevigata,* American Elm *Ulmus americana,* or expanses of prairie/prairie-like vegetation communities. Soils are of orders Inceptisol, Entisol, Vertisol, and Mollisol, mostly derived from calcareous claystone, limestone, and mudstone. A keystone of the Preserve is Spring Creek, a tributary of Rowlett Creek, which ultimately drains into Lake Ray Hubbard (an impoundment of the East Fork Trinity River).

Due to its location in a highly urbanized part of the Dallas-Fort Worth area, natural resources within the preserve—including freshwater fishes—are under constant stress. Urbanized stream systems such as the Spring Creek catchment are subject to a phenomenon known as "urban stream syndrome," which can be generally defined as "the ecological degradation of streams draining urban land" (Walsh et al. 2005). As it pertains to fishes in streams subject to "urban stream syndrome," no two urban streams are alike—meaning fish assemblages within different urban streams may vary even within the same region, and comparisons between urban streams in different parts of the country must be done with great caution. According to research produced by the United States Geological Survey, urban fish assemblages must be sampled and monitored on local levels to truly manage or assess them effectively (Brown et al. 2009). In coordinating with the Preservation Society for Spring Creek (an organization committed to the conservation of the preserve), I had the privilege of helping establish the first comprehensive baseline of fish species found in Spring Creek within the preserve.

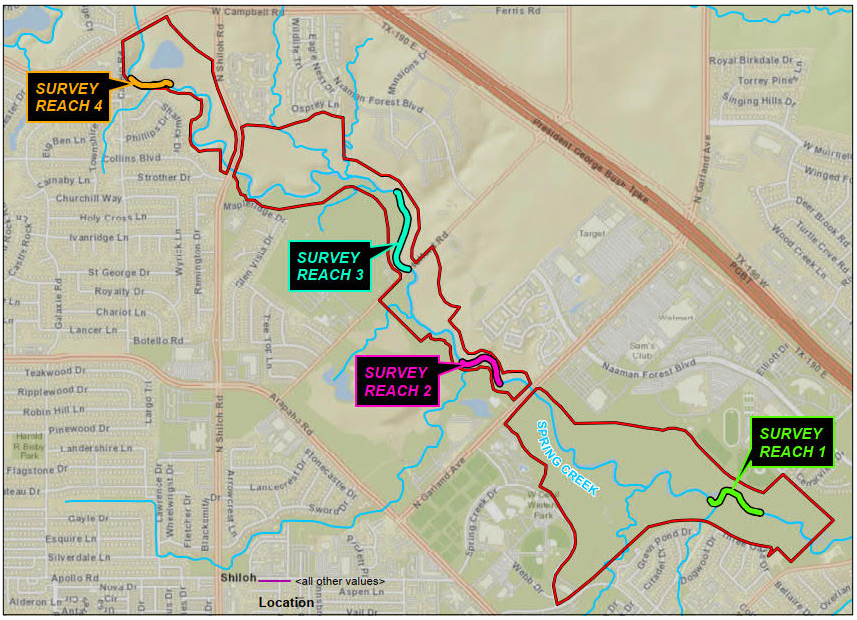

Figure 3. Map showing locations where fishes were sampled in Spring Creek within Spring Creek Forest Preserve.

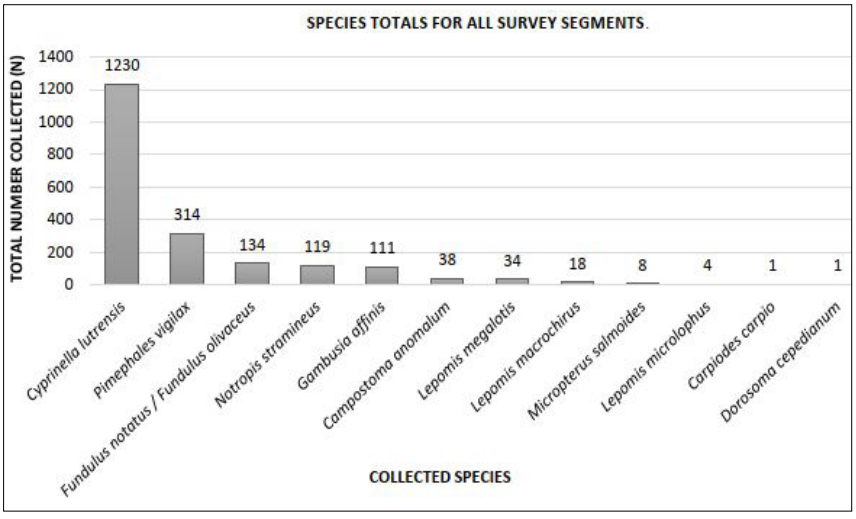

Figure 4. Fish species live-captured in Spring Creek during seine surveys.

METHODOLOGY

Under the authority of my TPWD-issued Scientific Permit for Research, a team of volunteers and I sampled fishes at four locations in the Preserve. At each location, we seined fishes until no new species were collected. All live-captured fishes were enumerated and identified to the species level. Additionally, a representative subset of collected fishes were fixed in formalin and then preserved in ethanol. These voucher specimens will be donated to the Fishes of Texas project. Several of the specimens to be donated represent the first official records of the species in Spring Creek and may assist future researchers and resource managers in managing species within the Preserve in years to come. In addition to sampling via seining, a limited creel survey was performed where knowledgeable fly-fishing anglers were interviewed to determine species that may occur within the Preserve that may not have been collected by the seining crew.

RESULTS

As a result of the seine surveys, limited creel survey, and a review of historical online databases, it was determined that approximately 22 species of fishes are likely to be found in Spring Creek within the preserve over a calendar year. Of these, 13 were formally documented among the 2,012 live-captured fish seined (Figure 4).

Along with the 13 species collected by seining, an additional nine species were determined to likely exist within the preserve (according to historical database records and verifiable species observations documented during the creel survey). The full list of species determined to possibly exist in Spring Creek within the preserve is shown in Table 1.

DISCUSSION

With its 22 species of fishes, Spring Creek within the preserve remains at least somewhat ecologically resilient, despite increasing urbanization outside of the preserve within the overall catchment area. The presence of the nature preserve surrounding this urban stream assists in slowing the effects of urbanization on the ecological and hydrological functionality

Table 1. Spring Creek Forest Preserve fish list.

Scientific Name	Common Name	Justification
Ameiurus melas	Black Bullhead	H
Ameiurus natalis	Yellow Bullhead	H
Campostoma anomalum	Central Stoneroller	H,C
Carpiodes carpio	River Carpsucker	C
Cyprinella lutrensis	Red Shiner	H,C
Cyprinus carpio	Common Carp	H,CR,VO
Dorosoma cepedianum	Gizzard Shad	C
Fundulus notatus	Blackstripe Topminnow	H,C
Fundulus olivaceus	Blackspotted Topminnow	C (possible)
Fundulus sp. (hybrid)	*F. notatus/olivaceus* hybrids	C (possible)
Gambusia affinis	Western Mosquitofish	C
Ictalurus punctatus	Channel Catfish	CR,VO
Lepisosteus oculatus	Spotted Gar	VO
Lepomis cyanellus	Green Sunfish	H,CR,VO
Lepomis macrochirus	Bluegill	H,C
Lepomis megalotis	Longear Sunfish	H,C
Lepomis microlophus	Redear Sunfish	H,C
Lepomis sp. (hybrid)	Various *Lepomis* hybrids	CR
Micropterus salmoides	Largemouth Bass	H,C,CR,VO
Morone chrysops	White Bass	CR (seasonally only)
Notropis stramineus	Sand Shiner	H,C
Pimephales vigilax	Bullhead Minnow	H,C
H=Historical Record; C=Collected during Seine Surveys; CR=Creel Survey; VO=Visual Observation		

of the Spring Creek system. This is exemplified by the number of fishes determined to exist within the preserve. One species, the Sand Shiner *Notropis stramineus (*Figure 5), which was represented by 119 individuals collected during seining events, had previously been recorded in the Dallas-Fort Worth area very few times (<7) since 1957 (GBIF.org 2021).

CONCLUSION

Based on observations made during the survey, the ample assemblage of fishes found in Spring Creek can be directly attributed to the beneficial ecohydrological effects of the surrounding nature preserve. A major component of stream habitat for freshwater riverine fishes is the presence of woody debris (fallen trees, stumps, etc.). A single fallen tree can provide cover for many stream fishes and can help currents naturally sculpt pools and undercut banks that add to instream habitat complexity. The intact native forests of the preserve provide a constant source of woody debris for Spring Creek and will contribute to maintaining fish assemblages for years to come. This simple fish survey provided additional evidence that urban nature preserves surrounding urbanized stream systems are crucial to maintaining fish diversity. By formally documenting the presence of 13 species of freshwater fishes, including the regionally rare Sand Shiner, and demonstrating that a total of 22 fish species may occur in Spring Creek within the preserve, this survey shows that designated urban riparian natural areas provide beneficial ecological services to aquatic organisms, such as contributing to overall species diversity.

Figure 5. An adult Sand Shiner *Notropis stramineus* collected during seining events.

AFTERWORD

This fish survey would not have been possible without the unwavering support of several highly motivated, hard-working volunteers, the support of the Preservation Society for Spring Creek Forest, and Fishes of Texas staff. The following individuals deserve the highest of praises for assisting in the completion of this fish survey: Ms. Ashleigh Miller, Mr. Finley Miller, Mrs. Judy Aschner, Mr. Landry Pogue, and Mr. Ryan Triebel. For more information on this fish survey, search the following DOI on Researchgate: 10.13140/RG.2.2.19592.75521.

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