An Annotated Checklist of The Fishes of The Tallgrass Prairie Preserve, Osage County, Oklahoma

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The Sand Creek watershed and Hickory Creek in the Bird Creek system were surveyed during the summer and fall of 1991. The purpose was to provide baseline data on fish species occurrences and abundances for the streams that drained the Tallgrass Prairie Preserve at the time it was acquired as a holding of the Nature Conservancy. Twenty-three species were recorded from these sites. This fish fauna represented an ecotonal complex of fishes with representatives characteristic of both Ozarkian and Osage Plains river systems. Healthy populations of several fish species considered intolerant of degraded habitat and water quality indicated high-quality stream habitat within this system.

INTRODUCTION

The Tallgrass Prairie Preserve, owned and operated by The Nature Conservancy (TNC), is part of a conservation program called Last Great Places: An Alliance for People and the Environment (TNC promotional booklet) aimed at saving outstanding ecosystems. The preserve consists of >15,000 ha of native tallgrass prairie devoted to restoring a functioning tallgrass prairie ecosystem. The Nature Conservancy is striving to accomplish this goal through conservation and restoration of native organisms, controlled burns, and grazing by native bison (*Bison bison*). Controlled burns began in 1991, and the first bison were re-introduced to the preserve in the fall of 1993. Eventually, the herd will number ~1,800 to 2,000 animals (R.G. Hamilton, TNC, personal communication). TNC hopes to create a shifting mosaic of burned and unburned, grazed and ungrazed prairie patches, which functions, as closely as possible, like undisturbed native tallgrass prairie. Principal, historic land uses on the Tallgrass Prairie Preserve have been cattle grazing and petroleum production. The previous owners of this land proved to be exceptional land stewards, and the area was never extensively overgrazed or otherwise seriously abused. Petroleum production is primarily limited to two areas that make up a relatively small proportion of the preserve lands (J.G. Stewart, personal observation). Sand Creek, the primary stream draining the Tallgrass Prairie Preserve (Fig. 1), originates just northwest of the preserve boundary and flows diagonally, northwest to southeast, ~24 km to the southeast boundary. Of the 15,000 ha preserve, about 10,600 ha (71%) fall within the Sand Creek drainage. Sand Creek is a fourth-order tributary to the Caney River (Verdigris River Drainage). The fish fauna of Sand Creek was sampled during July and November 1991 to determine the presence and relative abundance of fish species. The data presented here will provide baseline information for long-term monitoring of the fish fauna of the Tallgrass Prairie Preserve. Descriptions of collecting stations will provide a basis for future qualitative comparisons of habitat, which will enable researchers to monitor the Sand Creek system over time as this large preserve is managed as a functional tallgrass prairie ecosystem.

METHODS

Fish were sampled at six permanent stations as well as at five other sites to document the species present in a complete range of habitats. Site locations and descriptions are listed below. Fish were sampled by using standardized seining techniques to provide equal collecting effort at each site. This involved thorough, systematic seining of all habitat types within a 100-300 m

reach of the stream. Each microhabitat present at a given site was worked to provide a comprehensive fish sample. Seines measuring 2.4 × 1.2 m and 4.6 × 1.2 m with 4.8-mm mesh were used, as appropriate for each habitat. Fish were fixed in the field in 10% formalin and later washed and transferred to 45% isopropyl alcohol for storage. Voucher specimens were deposited in the Oklahoma Museum of Natural History. All fish observations and hook and line collections were by J.G. Stewart. Hook and line collections were done opportunistically and included rod and reel angling and baited bank lines. Figure 1 shows a map of the Sand Creek drainage (adapted from U.S.Geological Survey, 7.5 minute series topographic maps).

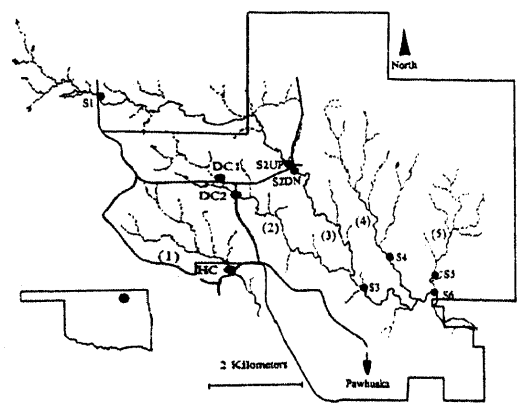

Figure 1. The Sand Creek drainage. Collecting localities (solid circles) are labeled as in Methods. Numbers indicate stream names as follows: (1) Hickory Creek (Bird Creek drainage), (2) Dry Creek, (3) Sand Creek, (4) North Fork of Sand Creek, (5) Wild Hog Creek. The outer line approximates the boundary of the Tallgrass Prairie Preserve.

Collecting Stations

The following sites were sampled (TPPHQ = Tallgrass Prairie Preserve Headquarters). Abbreviations match sites in Figure 1.

HC (T27N R8E Sec21 & 16) Hickory Creek (Cr), Bird Cr drainage, 0.8 km north of Pearsonia, OK, N side of county road-open prairie; soil banks, substrate of limestone bedrock with shelves, large boulders, and some gravel and mud.

DC1 (T27N R8E Sec9 NW1/4) Dry Cr, 2.4 km west of TPPHQ, upstream of county road-open prairie; steep soil banks, mud and gravel substrata in pools and riffles. Riffles were dry during the hottest summer weather.

DC2 (T27N R8E Sec4 SW1/4) Dry Cr, 2.0 km west and 0.15 km south of TPPHQ, upstream and downstream of bridge on county road-open prairie; steep soil banks, substrate was limestone bedrock riffles with some mud and gravel in pools. Riffles were dry in heat of summer.

S1 (T28N R8E Sec30 & 31) Headwaters of Sand Cr, 7.2 km east of Foraker, OK-open prairie; soil banks, with mud and gravel substrata; flow intermittent.

S2UP (T27N R8E Sec3 NE1/4) Sand Cr, upstream of bridge on county road 0.3 km west of TPPHQ-dense deciduous gallery forest; soil banks, with well developed pools to about 1.5 m deep at base flow, with gravel, sand, and mud substrata; riffles gravel. Riffles may dry up in times of drought.

S2DN (T27N R8E Sec3 SE1/4) Sand Cr, downstream of bridge on county road 0.3 km west of TPPHQ-dense deciduous gallery forest; soil banks, with well developed pools to about 2 m deep at normal flow; riffles gravel, similar to S2UP.

S3 (T27N R8E Sec24) Sand Cr, from TPPHQ 2 km west, ~5.6 km south on county road and 1.2 km east on ranch road-primarily open prairie with scattered trees along the reach; soil banks, with well developed pools and riffles with gravel, sand, and some bedrock substrata. Pools to ~1.5 m at normal flow; and gravel low-water crossing (unimproved) at upstream end of site.

S4 (T27N R9E Sec19) North Fork of Sand Cr, tributary of Sand Cr ~1.6-air km east of station S3-primarily open prairie with scattered trees; dense water willow (*Justicia americana*) along the soil banks; gravel, sand, and mud substrata with some exposed bedrock in riffles.

S5 (T27N R9E Sec20 NW1/4) Wildhog Cr, tributary of Sand Cr ~2.4-air km east north-east of station S4 at old, low-water crossing-open deciduous gallery forest interspersed with prairie; gravel, sand, and boulder banks; well developed riffles and pools with gravel and cobble substrata; gravel/cobble low-water crossing (unimproved) at upper end of site.

S6 (T27N R9E Sec20 SW1/4) Sand Cr ~1.6-air km east of S4 at site of historic cattle dipping vat-open deciduous gallery forest; soil banks with large, exposed boulders and overhanging trees; gravel, cobble, and boulder substrata in well developed pools and riffles; large pools to ~3 m deep at normal flow.

ANNOTATED CHECKLIST of SPECIES

Lepisosteidae-Gars

Lepisosteus oculatus (Winchell)-spotted gar

This species was observed at three different locations and was caught on hook and line on one occasion. One skull with skin was found at S6. This was the most common gar species present.
L. osseus (Linnaeus)-longnose gar. One adult was captured by hook and line at S6.

Cyprinidae-Minnows and Carps
Campostoma anomalum (Rafinesque)-central stoneroller. Collected at all stations except S1, stonerollers were one of the dominant cyprinids in this system. Because stonerollers, are difficult to collect by seining (*1*), they were no doubt under represented in our collections.
Cyprinella lutrensis (Baird and Girard)-red shiner. Red shiners were common in pools and runs of Hickory and Dry Creeks, but uncommon in Sand Creek.
Lythrurus umbratilis (Girard)-redfin shiner. Redfin shiners were abundant in shallow pools throughout the system.
Notropis boops Gilbert-bigeye shiner. This minnow was the numerically dominant species collected in the Sand Creek drainage and was abundant in pools. It is indicative of relatively high water quality, occurring in streams that have clear water most of the time (*2*, *3*). It has been characterized as moderately intolerant of water quality degradation and intolerant of habitat alteration (*4*).
Pimephales notatus (Rafinesque)-bluntnose minnow. This widespread species was abundant in the system.

Catostomidae - Suckers
Moxostoma erythrurum (Rafinesque)-golden redhorse. Although not common, this sucker was collected at two sites on Sand Creek and at Hickory Creek in the Bird Creek drainage. One large adult (356 mm total length) was collected and released at S3.

Ictaluridae-Bullhead Catfishes
Ameiurus natalis (Lesueur)-yellow bullhead catfish. This species was collected by hook and line in several stock ponds in the Sand Creek drainage. Further collections may indicate the presence of yellow bullheads in Sand Creek proper as this species probably moves from stock ponds during heavy rains.
Ictaluris punctatus (Rafinesque)-channel catfish. One adult was collected by hook and line in Sand Creek. This species is frequently taken by anglers from sites on Sand Creek several kilometers downstream of S6. (M. Perrier and J. Perrier, personal communication; J.G. Stewart personal observation)
Pylodictis olivaris (Rafinesque)-flathead catfish. Two adults were taken in a deep pool at S6 on hook and line. Another adult was observed in a riffle immediately upstream of S6.

Fundulidae-Topminnows
Fundulus notatus (Rafinesque)-blackstripe topminnow. Blackstripe topminnows were occasional in pools.

Atherinidae-Silversides
Labidesthes sicculus (Cope)-brook silversides. Brook silversides were occasional in pools throughout system.

Centrarchidae-Sunfishes
Lepomis cyanellus Rafinesque-green sunfish. This species was a dominant piscivore in Sand Creek pools. Green sunfish were collected at all stations by seining and on numerous occasions by hook and line throughout the system.
L. humilis (Girard)-orangespotted sunfish. This species was common throughout the system.
L. macrochirus Rafinesque-bluegill. Bluegill occurred in low numbers throughout the system.
L. megalotis (Rafinesque)-longear sunfish. This species was the numerically dominant centrarchid collected, occurring in substantial numbers throughout the system.
L. microlophis (Günther)-redear sunfish. This non-native species, collected by seining and hook and line, was uncommon in collections and is probably present because of stock pond introductions.
Micropterus punctulatus (Rafinesque)-spotted bass. Spotted bass were most common in deeper pools. This species was captured on numerous occasions by hook and line throughout the system.
M. salmoides (Lacépède)-largemouth bass.This species was collected at all sites within the Sand Creek system. Largemouth bass were observed on numerous occasions as well as collected on hook and line.

Percidae-Perches and Darters
*Etheostoma spectabile (A*gassiz)-orangethroat darter. The most common darter in this system, this species is moderately tolerant of turbidity but prefers clear streams (*5*). Along with the

other two darters collected, this species has been characterized as moderately intolerant of water quality and habitat degradation (*4*).

E. whipplei (Girard)-redfin darter. This darter was occasional in riffles in the lower portion of Sand Creek.

Percina caprodes (Rafinesque)-logperch. This species was uncommon and was collected in pools and riffles at S2 only.

RESULTS and DISCUSSION

During the summer and fall of 1991, 4,371 fish specimens were collected in 19 samples from 10 stations on the Tallgrass Prairie Preserve. Species occurrence and abundances are summarized in Table 1. Nineteen fish species were identified in seining collections. An additional four species were collected by angling. The Cyprinidae and the Centrarchidae were the numerically dominant families, making up 57.5% and 31.9% of the samples, respectively. The number of species collected at each site ranged from six (smallest upstream site) to 17 (site S3) (Table1). At 23, the total number of species recorded is in the upper range for rural streams (adjusted for size of stream) in Oklahoma (*6*).

The fishes of the Tallgrass Prairie Preserve represent an ecotonal complex of fishes with representatives from the Ozark and Ouachita uplands (e.g., *Notropis boops, Micropterus punctulatus, Etheostoma whipplei, Lythrurus umbratilis*) as well as the Osage plains river systems (e.g., *Cyprinella lutrensis, Lepomis humilis, Micropterus salmoides*) (*7*). The range of habitats included in the Sand Creek drainage within the Tallgrass Prairie Preserve include potential sites for reproduction by most of the fish species collected, and young-of-the-year of many of these species were present. Thus, this faunal list represents resident populations and not merely transients within the drainage. The distribution of fishes within the Sand Creek drainage follow a longitudinal pattern of increasing numbers of species downstream that is similar to that expected in drainages of its size (*8*). No unusual breaks in this pattern of abundance or species richness were noted during these collections. Bass (*9*) noted high water quality for the Sand Creek drainage, as indicated by a diverse and pollution-intolerant macroinvertebrate community. Several fish species that are relatively sensitive to the degradation of water quality and habitat conditions were present in Sand Creek and provide additional evidence of high water and habitat quality. Thus, in 1991 the fishes of the Tallgrass Prairie Preserve were an interesting and complex fauna of an ecotonal nature, likely present because of the combination of its biogeographic situation and the relatively uncompromised distribution of natural habitats and water quality within the stream system. This study constitutes a baseline for all future studies of fishes in the Tallgrass Prairie Preserve.

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TABLE 1. Summary of species occurrence and abundance from seining collections during July and November 1991.

	Stations											
SPECIES	HC	DC1	DC2	S1[1]	S2UP	S2DN	S3	S4	S5	S6	Totals	%[2]
Longnose gar	0	0	0	0	0	0	0	0	0	1	1	0.02
Stoneroller	123	3	23	0	105	4	124	37	106	28	553	12.60
Redfin shiner	187	7	1	0	66	24	37	66	2	19	409	9.36
Red shiner	45	39	5	0	0	0	3	0	0	0	92	2.10
Bigeye shiner	0	11	0	0	183	105	324	14	189	147	973	22.26
Bluntnose minnow	57	7	36	9	68	22	266	5	2	2	474	10.80
Golden redhorse	7	0	0	0	0	2	4	0	0	0	13	0.30
Blackstripe topminnow	0	9	11	0	0	0	16	10	9	5	60	1.37
Brook silversides	0	0	21	0	31	21	40	1	3	55	172	3.94
Green sunfish	62	37	10	3	55	25	66	16	8	11	293	6.70
Orangespotted sunfish	18	1	6	0	26	31	44	2	0	7	135	3.09
Bluegill	1	43	14	1	11	15	1	5	0	0	91	2.08
Longear sunfish	31	13	11	0	167	161	371	35	13	40	842	19.29
Redear sunfish	0	0	0	0	2	2	1	1	2	0	8	0.18
Spotted bass	0	0	0	0	2	0	6	0	3	1	12	0.27
Largemouth bass	0	1	1	1	1	4	1	1	1	1	12	0.27
Orangethroat darter	6	0	0	11	28	25	37	22	67	13	209	4.78
Redfin darter	0	0	0	1	3	7	1	5	0	1	18	0.41
Logperch	0	0	0	0	3	1	0	0	0	0	4	0.09
Total # of species	10	12	11	6	15	15	17	14	13	14	19	
Total # of specimens	537	171	139	26	751	449	1342	220	405	331	4371	

[1] collected July only

[2] percent of the total catch.