

The Fishes of Council Creek, Payne County, Oklahoma

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The fishes of Council Creek were surveyed from 1993-1995 to provide base-line data on species occurrences in this Cimarron River tributary. Sixteen seine collections at 4 stations confirmed the presence of 28 species and 1 hybrid. Cyprinids (70.4%) and centrarchids (19.04%) numerically dominated the fish fauna. Results are compared to Stillwater Creek, an adjacent Cimarron River tributary.

INTRODUCTION

This paper reports a fish survey of Council Creek, a first- through fourth-order tributary of the Cimarron River, located in north-central Payne Co., Oklahoma (Fig. 1). The stream originates south of Glencoe (T20N R04E S19) and maintains a gradient of 2.3 m/km, flowing about 35 km to its confluence with the Cimarron River (USGS 7.5-minute topographic maps). A USGS stream flow gauge is located at the State Highway 51 bridge 16.09-km east of Stillwater (T19N R04E S22). Council Creek ceases to flow an average of 106 days a year (USGS, unpublished data). Permanent pools of water persist year-round in the mainstem, except in the driest of years. The substrate is gravel, cobble, and sand in upstream areas gradating to shifting sand in downstream areas.

Qualitative surveys of fishes at four stations on Council Creek were conducted from 1993 through 1995. The intent of this study was to provide base-line data on fish species occurrences in Council Creek.

METHODS

Nylon seines, 3.9 m and 7.6 m long (both 1.8 m deep with 3.2-mm mesh), were used to sample the fish community at four stations on 20 March 1993, 9 June 1993, 16 May 1994, and 9 August 1995. At each station two persons intensively seined all habitats in a 150-m stream reach. On 9 August 1995, a monofilament gill net (2.4×9.1 m with 15-cm mesh) was used in a "seine-like manner", to sample pools at each station that were > 1 m deep. All fish were preserved in 10% formalin and transported to the laboratory for identification. Voucher specimens were deposited in Oklahoma State University's Vertebrate Collections (OSUS).

Morisita's index (I_M) of community similarity (1) was used to examine temporal differences in the fish community within stations, and to compare longitudinal changes between stations along the stream. Values for I_M range from 0 (no similarity) to slightly greater than 1 (identical), with 0.4 considered "low" and 0.74 being "high" (2).

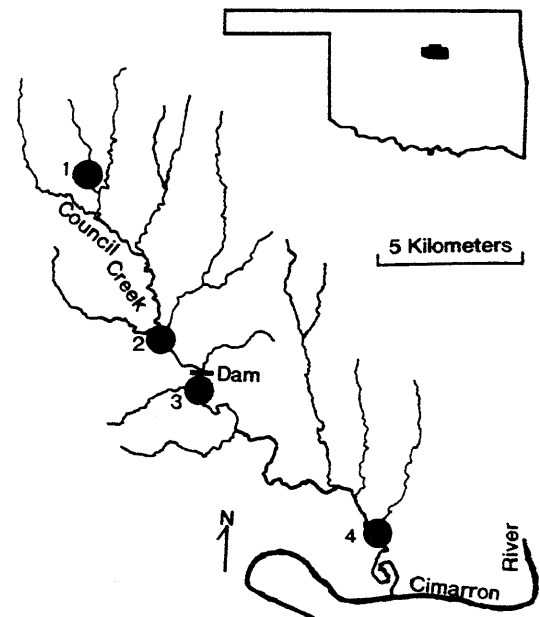


Figure 1. Location of sampling stations on Council Creek, north-central Payne Co., Oklahoma. Station 1: T20N R04E S31; Station 2: T19N R04E S16; Station 3: T19N R04E S15 and S22; Station 4: T19N R05E S32 and T18N R05E S05.

RESULTS and DISCUSSION

TABLE 1. Fishes taken in 16 collections from four stations on Council Creek, Payne Co., Oklahoma from 1993-1995. N = total number of individuals of a species; % of Total = portion, by number, of total catch consisting of that species; Station = location where species was captured; ranges (e.g., 1-4) are inclusive.

Species	N	% of Total	Station
<i>Dorosoma cepedianum</i>	22	0.65	3,4
<i>Cyprinella lutrensis</i>	1722	50.80	1-4
<i>Cyprinus carpio</i>	1	0.03	3
<i>Macrhybopsis storeriana</i>	2	0.06	4
<i>Notemigonus crysoleucas</i>	51	1.50	1,2,4
<i>Notropis atherinoides</i>	291	8.58	3,4
<i>Notropis bairdi</i>	1	0.03	1
<i>Notropis stramineus</i>	12	0.35	4
<i>Phenacobius mirabilis</i>	13	0.38	2-4
<i>Pimephales vigilax</i>	296	8.73	2-4
<i>Carpionotus carpio</i>	21	0.62	3,4
<i>Ictiobus bubalus</i>	1	0.03	3
<i>Ictiobus niger</i>	5	0.15	4
<i>Ameiurus melas</i>	20	0.59	1,2
<i>Ameiurus natalis</i>	3	0.09	2
<i>Ictalurus punctatus</i>	86	2.54	2-4
<i>Gambusia affinis</i>	96	2.83	2-4
<i>Labidesthes sicculus</i>	77	2.27	3
<i>Morone chrysops</i>	4	0.12	4
<i>Lepomis cyanellus</i>	130	3.83	1-4
<i>Lepomis humilis</i>	39	1.15	1-3
<i>Lepomis hybrid</i>	1	0.03	4
<i>Lepomis macrochirus</i>	269	7.93	1-4
<i>Lepomis megalotis</i>	171	5.04	1-4
<i>Lepomis microlophus</i>	16	0.47	1,4
<i>Micropterus salmoides</i>	19	0.56	1-4
<i>Pomoxis annularis</i>	1	0.03	2
<i>Percina caprodes</i>	19	0.56	3
<i>Aplodinotus grunniens</i>	3	0.09	3-4

A total of 3,392 fish representing 28 species and one hybrid were taken in 16 seine collections (Table 1). All fish species captured in the gill net were equally represented in seine samples. The families Cyprinidae (70.4%) and Centrarchidae (19.04%) numerically dominated the fauna of Council Creek. The remainder of the fauna (10.56%) was comprised of eight families: Ictaluridae, Poeciliidae, Atherinidae, Catostomidae, Clupeidae, Percidae, Percichthyidae, and Sciaenidae.

Collections at station 1 contained ten species; only *Notropis bairdi* was unique to this site. Two species (*Lepomis cyanellus* and *L. macrochirus*) numerically dominated collections at this site across three years of sampling. The mean similarity at this station ($I_M=0.72$), indicated a "high" similarity between collections (Table 2). Station 1 dries to a single shallow (< 1 m deep) pool during low rainfall periods. Matthews (3) considered values of $I_M<0.5$ to be indicative of a faunal break (i.e., sharp change in assemblage structure). Seemingly, a faunal break ($I_M=0.294$) exists in this stream between stations 1 and 2. This 'break' coincides with a change in stream order from second-order at station 1 to fourth-order at station 2. However, the relationship between stream order and faunal breaks may be illusory (3). The faunal break between stations 1 and 2 was present in all except the June 1993 collection (Table 2).

Station 2 collections contained 14 species, two of which (*Ameiurus natalis* and *Pomoxis annularis*) were collected only at this site. The mean similarity at this station ($I_M=0.67$) indicated only "moderate" similarity between

collections. Collections made in March 1993 and August 1995 were numerically dominated by cyprinids (97 and 70%, respectively), whereas collections made in June 1993 and May 1994 were numerically dominated by centrarchids (70 and 52%, respectively). These differences may be related to centrarchid movements in search of spawning habitat.

Station 3 collections contained 18 species, two of which (*Labidesthes sicculus* and *Percina caprodes*) were collected only at this site. Cyprinids numerically dominated (37-99%) all collections at this site. A low-water dam (2.5 m wide and 1.4 m high) present at this station apparently had little effect on species distributions. The fish community at station 3, downstream of the dam, was very similar ($I_M=0.85$) to that at station 2, upstream of the dam. The mean similarity ($I_M=0.73$) between collections at this site was higher than at any other station. Qualitative observations suggested that this station had a greater habitat diversity and more stability in substrate conditions, whereas considerable scouring of substrate was noted at other stations.

Station 4 collections contained 19 species and one hybrid; of these, four species and one hybrid were unique to this station. These four species (*Macrhybopsis storeriana*, *Notropis stramineus*, *Ictiobus niger*, *Morone chrysops*) are typically more common in slightly larger streams with more permanent flow (4,5). The habitat at station

TABLE 2. Comparisons of Council Creek fish collections 1993-1995 using Morisita's index (I_M). Collection designations are: A = 20 March 1993, B = 9 June 1993, C = 16 May 1994, and D = 9 August 1995.

Pair-wise Comparisons	Station Number			
	1	2	3	4
A:B	0.524	0.338	0.896	0.250
A:C	0.778	0.608	0.961	0.237
A:D	0.427	0.858	0.438	0.534
B:C	0.929	0.927	0.980	0.931
B:D	0.814	0.502	0.533	0.874
C:D	0.859	0.786	0.544	0.909
Mean	0.722	0.670	0.725	0.623
Between Stations				
	1:2	2:3	3:4	
Overall	0.294	0.850	0.936	
Within Collections				
	1:2	2:3	3:4	
A	0.040	0.967	0.263	
B	0.603	0.437	0.945	
C	0.323	0.673	0.958	
D	0.152	0.537	0.523	

4, broad sandy-bottomed channel with shallow runs, resembles that of the nearby Cimarron River where these species are more common. A single specimen of a *Lepomis* hybrid, putatively identified as *Lepomis cyanellus* $\times$ *L. macrochirus*, was taken at station 4. This hybrid has also been reported from Stillwater Creek (6-8). The mean similarity between collections at this station ($I_M=0.62$) was lower than at stations 1, 2, or 3. The relatively smooth bottom and little instream cover would suggest that sampling at this station was probably more precise than at stations 1, 2, or 3. Presumably, the low similarity between collections at this site was due to periodic emigration and immigration of species between this station and the nearby Cimarron River.

Surveys of Stillwater Creek, an adjacent western Cimarron River tributary, have included more sites with little difference in faunal composition. Wade and Craven (8) sampled 10 sites on Stillwater Creek and captured 27 species. Of those 27 species, twenty-two (81%) were taken from Council Creek in this study. Two of the five

additional species found by Wade and Craven (8) (*Macrhybopsis aestivalis* and *Hybognathus placitus*) are rarely found in streams the size of Council Creek. Two other species (*Lepisosteus osseus* and *Pylodictis olivaris*) were not captured in this study but are occasionally taken by anglers in the lower reaches of Council Creek (G. Luttrell, personal observations). The absence of *Pimephales promelas* from Council Creek collections is puzzling. Suitable habitat for the species is present and it occurs in other portions of the Cimarron River drainage (4,5). Five species (*Notropis bairdi*, *Ictiobus bubalus*, *I. niger*, *Labidesthes sicculus*, *Percina caprodes*) that were taken in Council Creek have not been reported from Stillwater Creek (6-8). Two of these species (*Labidesthes sicculus* and *Percina caprodes*) are of limited distribution in the Cimarron River drainage (G. Luttrell, L. Williams, and R. Larson, unpublished data).

Fish community assemblages in Council Creek varied longitudinally with species additions occurring from headwaters (Station 1: 10 species) to downstream locations (Station 4: 19 species plus one hybrid). Except for the apparent faunal break between stations 1 and 2, similarity (I_M) between adjacent stations was greater than similarity within stations (Table 2). Faunal breaks between adjacent stations varied across the years that collections were made (Table 2). These aspects suggest that seasonality exists in fish community structure in Council Creek. Unfortunately, the sporadic sampling (i.e., non-seasonal) and small number of collections made in this study limits further statistical analyses (e.g., tests of community persistence and stability - only five species occurred at all stations) of these data and thus prevents more complete elucidation of seasonal variation in community composition in this system. The intent of this study was to provide base-line data on species occurrences in a small Cimarron River tributary. Comparisons of species occurrences in this study with those in Stillwater Creek indicate that sampling in this study was adequate to characterize species occurrences in Council Creek.

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REFERENCES

1. Brower, J.E., and Zar, J.H., *Field and Laboratory Methods for General Ecology*. Wm. C. Brown Co., Dubuque, IA (1977).
2. Ross, S.T., Matthews, W.J., and Echelle, A.A., Persistence of stream fish assemblages: effects of environmental change. *Am. Nat.* **126**, 24-40 (1985).
3. Matthews, W.J., Fish faunal 'breaks' and stream order in the eastern and central United States. *Environ. Biol. Fish.* **17**, 81-92 (1986).
4. Miller, R.J., and Robison, H.W., *The Fishes of Oklahoma*. Oklahoma State University Press, Stillwater, OK (1973).
5. Pflieger, W.L., *The Fishes of Missouri*. Missouri Department of Conservation, Jefferson City, MO (1978).
6. Moore, G.A., and Mizelle, J.D., A fall survey of the fishes of Stillwater Creek drainage system (Payne and Noble Counties, Oklahoma). *Proc. Okla. Acad. Sci.* **19**, 43-44 (1939).
7. Cross, F.B., Effects of sewage and of a headwaters impoundment on the fishes of Stillwater Creek in Payne County, Oklahoma. *Am. Midl. Nat.* **43**, 128-145 (1950).
8. Wade, W.F., and Craven, R.E., Changes in fish fauna of Stillwater Creek, Payne and Noble Counties, Oklahoma from 1938 to 1965. *Proc. Okla. Acad. Sci.* **46**, 60-66 (1966).