

FISHES OF THE LITTLE MISSOURI RIVER, SOUTH DAKOTA¹

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ABSTRACT

Objectives of this study were to determine the distribution and relative abundance of the fish species found in the South Dakota portion of the Little Missouri River. Twenty-five collection sites were visited, and 48 collections made during May, June and July, 1976. All sampling was done using seines. Twenty-two species were collected during the study. Previous reports listed 20 species from all of the Little Missouri River and 16 species from the South Dakota portion of the river. New species reported for the Little Missouri River were northern pike, *Esox lucius*, golden shiner, *Notemigonus crysoleucas*, largemouth bass, *Micropterus salmoides*, and Iowa darter, *Etheostoma exile*. The sturgeon chub, *Hybopsis gelida*, green sunfish, *Lepomis cyanellus*, and sauger, *Stizostedion canadense*, were new records for the river in South Dakota.

INTRODUCTION

The Little Missouri River originates in northeastern Wyoming and flows through the southeastern corner of Montana, the northwestern portion of South Dakota and then into North Dakota. It drains into the Missouri River 892 km from its origin. In South Dakota the river comprises less than one percent of the total river drainage of the state. A total of 20 species were reported from the Little Missouri River drainage by previous investigators including 16 species from two sites in South Dakota (Bailey and Allum 1962), 10 in Montana (Brown 1971), 13 in Wyoming (Baxter and Simon 1970), 13 in Wyoming and North Dakota (Personius and Eddy 1955) and 14 in North Dakota (Hankinson 1929). The purpose of this study was to conduct a comprehensive survey of the distribution and relative abundance of fish species in the South Dakota portion of the Little Missouri River.

MATERIALS AND METHODS

All fishes were captured during May, June and July, 1976. Twenty-five sites were visited, and 48 collections were made (Figure 1).

Seines were used for sampling. The size of the seine used for a specific collection was determined by the width, depth and bottom

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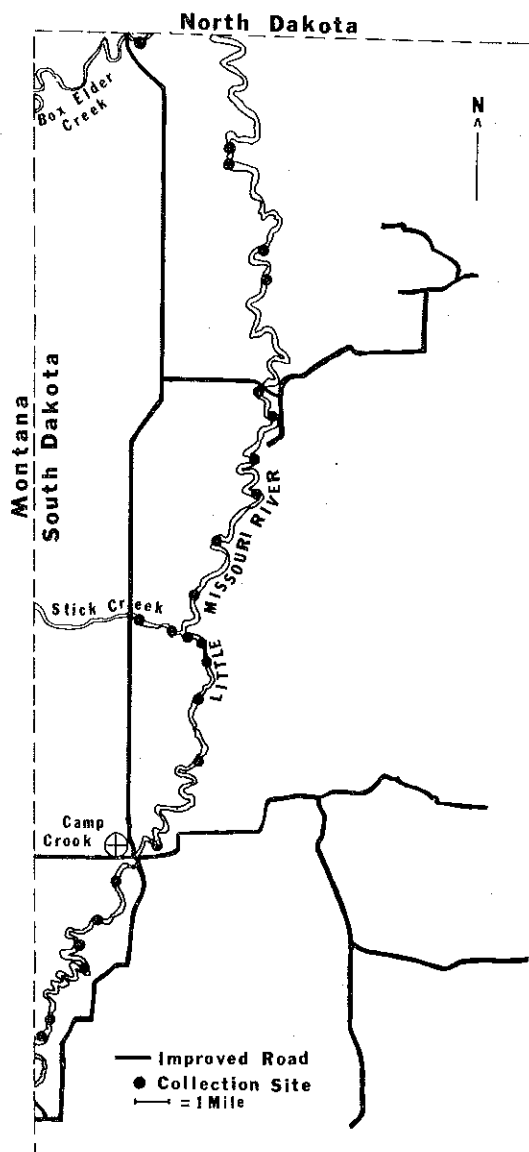


Figure 1. Location of collection sites on the Little Missouri River, South Dakota, Summer 1976.

characteristics of the river. In narrow shallow areas of the river a 1.2 m x 3.1 m seine with a 4.8 mm mesh or a 1.2 m x 3.1 m seine with a 3.2 mm mesh was used. A kick method of seining was used in areas which were either too narrow or shallow to be effectively sampled by pulling the seine. With this method, the seine was held stationary across the river and the immediate upstream area was then kicked to drive fishes into the seine. A 1.2 m x 6.1 m seine with a 3.2 mm mesh or a 1.8 m x 9.1 m seine with a 6.4 mm mesh was used in wider areas of moderate depth. A 2.4 m x 24.3 m seine with a 19.1 mm mesh was used at one site. This seine had a 2.4 m square bag.

Captured fishes were counted and their numbers recorded. At the completion of the study, totals were calculated and relative abundance was determined for each species. The following designations were used: <0.1% rare, 0.1–1.0% uncommon, 1.1–4.0% common and >4.1% abundant. A representative sample of each species was placed in a 10% formalin solution. Fishes over 150 mm total length were slit on the right side to ensure proper preservation. The fishes were transported to the laboratory where they were positively identified. A 10x to 25x dissecting microscope was used to aid in identification. The collections are stored in the Collection of Fishes, Department of Wildlife and Fisheries Sciences, South Dakota State University. Carbon dioxide, dissolved oxygen, hardness, alkalinity and pH were measured at each collection site using a Model DR-EL Hach kit. Water temperature, current velocity and Secchi disc visibility were determined. Stream width and depth were measured and vegetation and bottom described. Bottom substrates were categorized as silty-clay, sand, small gravel (less than 20 mm diameter), medium gravel (21–30 mm diameter), large gravel (31 to 40 mm diameter) or rock (over 40 mm diameter).

RESULTS

DESCRIPTION OF STUDY AREA

The maximum depth recorded in the Little Missouri River in South Dakota was 3.0 m. Most sites ranged from 0.2 to 0.9 m in depth. Maximum width was 46.0 m with 9.0 to 18.0 being most common. The banks varied from gradual slopes to vertical cliffs. Bottom and shorelines consisted of varying amounts of silty-clay, sand, gravel and rock. Shoreline woody vegetation generally consisted of cottonwood (*Populus*) and willow (*Salix*). Terrestrial, herbaceous plants were common close to the edge of the river. Aquatic plants were also present at many sites; the most common were bulrushes (*Scirpus*), spike rushes (*Eleocharis*), sedges (*Carex*) and horsetails (*Equisetum*). Other aquatic plants found in small numbers were buttercups (*Ranunculus*), cattails (*Typha*), coontails (*Ceratophyllum*) and arrowheads (*Sagittaria*).

The physical-chemical water parameters which were measured ranged as follows: carbon dioxide — 4 to 40 mg/l, dissolved oxygen — 5 to 14 mg/l, hardness — 110 to 750 mg/l CaCO₃, alkalinity — 60 to 420 mg/l CaCO₃, pH — 7.4 to 8.0, water current velocity — 0 to 1.8 m/sec and Secchi disc visibility — 0 to 610 mm.

COLLECTION SITES

- 1A. T17N, R1E, center of Sec. 5, 26 May 76. Water slightly turbid; depth to 0.3 m; width 10.7 m; current velocity 0.7 m/sec; bottom mostly rock; few rushes; water temperature 12 C; time 0800; used as vehicle crossing. Species: 8, 10, 12 (See Fishes Collected).
- 1B. Repeat of collection location 1A, 10 July 76. Water very turbid; depth to 0.6 m; width 15.2 m; current 0.9 m/sec; bottom mostly large and small gravel, some rock; few rushes; water temperature 23 C; time 0800. Species: 5, 6, 8, 10, 12, 13, 15, 17, 19.
- 2A. Four hundred meters upstream from 1A, T17N, R1E, southwest quarter of Sec. 5, 26 May 76. Water slightly turbid; depth to 1.2 m; width 7.6 m; current 0.3 m/sec; bottom mostly medium gravel, some sand and silty-clay; no vegetation; water temperature 16 C; time 1200. Species: 5, 6, 8, 10, 12, 13, 14, 22.
- 2B. Ninety meters upstream from 2A, 27 May 76. Water somewhat turbid; depth to 0.9 m; width 1.8 m; current 0.1 m/sec; bottom rock and silty-clay; no vegetation; water temperature 15 C; time 0900. Species: 5, 6, 8, 10, 12, 13, 15, 18.
- 2C. East across island from 2A, 27 May 76. Water somewhat turbid; depth to 0.9 m; width 7.6 m; current 0.4 m/sec; bottom mostly rock; few rushes; water temperature 17 C; time 1100. Species: 1, 6, 8, 10, 12, 15.
- 3A. T18N, R1E, northeast quarter of Sec. 28, 29 May 76. Water quite turbid; depth to 1.2 m; width 19.8 m; current 0.2 m/sec; bottom mostly silty-clay and sand; few rushes; water temperature 18 C; time 0830. Species: 4, 5, 6, 8, 10, 13, 14.
- 3B. Repeat of collection location 3A, 14 July 76. Water very turbid; depth to 0.8 m; width 24.4 m; current 0.3 m/sec; bottom mostly sand, some small gravel and silty-clay; few rushes; water temperature 20 C; time 0900. Species: 1, 5, 6, 8, 10, 13.
- 4A. T18N, R1E, southwest quarter of Sec. 21, 31 May 76. Water somewhat turbid; depth to 0.3 m; width 24.4 m; current 0.8 m/sec; bottom rock and medium gravel; few rushes; water temperature 17 C; time 0830. Species: 8, 10, 12.
- 4B. Thirty meters downstream from 4A, 31 May 76. Water somewhat turbid; depth to 1.2 m; width to 15.2 m; current 0.3 m/sec; bottom small gravel, sand and silty-clay; some rushes;

water temperature 20 C; time 1130. Species: 1, 4, 5, 6, 8, 10, 13, 17.

- 5A. T18N, R1E, southwest quarter of Sec. 15, 1 June 76. Water slightly turbid; depth to 0.4 m; width 6.1 m; current 1.1 m/sec; bottom rock and small gravel; few rushes; water temperature 28 C; time 1430. Species: 8, 10, 12.
- 5B. Repeat of collection location 5A, 2 June 76. Water slightly turbid; depth to 0.4 m; width 6.1 m; current 1.1 m/sec; bottom rock and small gravel; few rushes; water temperature 19 C; time 0800. Species: 6, 10, 12.
- 5C. Thirty meters upstream from 5B, 2 June 76. Water slightly turbid; depth to 1.1 m; width 18.3 m; current 0.2 m/sec; bottom mostly small gravel, some sand and silty-clay; few rushes; water temperature 19 C; time 0830. Species: 1, 6, 8, 10, 12, 17.
- 5D. Repeat of collection location 5C, 12 July 76. Water very turbid; depth to 1.1 m; width 18.3 m; current 0.9 m/sec; bottom mostly sand, some small gravel; some rushes; water temperature 23 C; time 0930. Species: 1, 5, 6, 8, 10, 13, 17.
- 6A. T18N, R1E, northeast quarter of Sec. 10, 3 June 76. Water quite turbid; depth to 1.2 m; width 12.2 m; current 0.2 m/sec; bottom silty-clay and sand; few rushes and sedges; water temperature 19 C; time 0800. Species: 1, 5, 8, 10, 12, 13, 22.
- 6B. Twenty meters downstream from 6A, 3 June 76. Water quite turbid; depth to 0.2 m; width 7.6 m; current 0.7 m/sec; bottom rock and medium gravel; many rushes; water temperature 20 C; time 1030. Species: 8, 10, 12.
- 7A. T18N, R1E, northeast quarter of Sec. 2, 4 June 76. Water quite turbid; depth to 0.9 m; width 15.2 m; current 0.1 m/sec; bottom mostly silty-clay, some sand; few rushes; water temperature 19 C; time 0800. Species: 1, 8, 10, 15.
- 7B. Forty-five meters upstream from 7A, 4 June 76. Water quite turbid; depth to 0.8 m; width 6.1 m; current 0.6 m/sec; bottom rock and sand; some rushes; water temperature 19 C; time 1000. Species: 6, 8, 10, 12.
8. T20N, R2E, southeast quarter of Sec. 31, 7 June 76. Water quite turbid; depth to 0.6 m; width 12.2 m; current 0.4 m/sec; bottom mostly sand, some rock and silty-clay; few rushes; water temperature 21 C; time 0900; used by livestock. Species: 1, 5, 6, 8, 10, 12, 13, 17.
9. T20N, R2E, southeast quarter of Sec. 31, 7 June 76, 200 m downstream from 8. Water quite turbid; depth to 0.6 m; width 21.3 m; current 0.6 m/sec; bottom mostly sand, some rock,

- medium gravel and silty-clay; many rushes; water temperature 25 C; time 1130. Species: 1, 4, 5, 6, 8, 10, 12, 13.
- 10A. T19N, R2E, southwest quarter of Sec. 19, 8 June 76. Water very turbid; depth to 0.4 m; width to 9.1 m; current 1.0 m/sec; bottom mostly rock, some large gravel; many rushes; water temperature 22 C; time 0830. Species: 6, 8, 10, 12, 18.
- 10B. Repeat of collection location 10A, 14 July 76. Water very turbid; depth to 0.6 m; width 12.2 m; current 1.7 m/sec; bottom large gravel and rock; few rushes; water temperature 23 C; time 1100. Species: 1, 5, 6, 8, 10, 12, 13.
- 10C. Fifteen meters upstream from 10A, 8 June 76. Water very turbid; depth to 0.6 m; width 18.3 m; current 0.1 m/sec; bottom mostly silty-clay, some sand and rock; few rushes; water temperature 25 C; time 1100. Species: 1, 4, 8, 10, 17.
- 10D. Repeat of collection location 10C, 14 July 76. Water very turbid; depth to 0.6 m; width 24.4 m; current 0.3 m/sec; bottom mostly sand, some rock and small gravel; few rushes; water temperature 24 C; time 1200. Species: 1, 5, 6, 8, 10, 17, 19.
- 11A. T19N, R2E, southwest quarter of Sec. 7, 9 June 76. Water very turbid; depth to 0.5 m; width 24.4 m; current 0.2 m/sec; bottom mostly sand and medium gravel, some rock and silty-clay; few rushes; water temperature 21 C; time 0830. Species: 1, 5, 6, 8, 10, 13, 15, 17, 18.
- 11B. Repeat of collection location 11A, 13 July 76. Water very turbid; depth to 0.6 m; width 24.4 m; current 0.7 m/sec; bottom mostly medium gravel, some rock; few rushes; water temperature 21 C; time 0830. Species: 4, 5, 6, 8, 10, 12, 13, 15, 17, 19.
- 11C. Just downstream from 11A, 9 June 76. Water very turbid; depth to 0.2 m; width 2.4 m; current 0.3 m/sec; bottom sand and small gravel; few rushes; water temperature 25 C; time 1100. Species: 5, 6, 8, 10, 12.
- 12A. T20N, R2E, northwest quarter of Sec. 30, 10 June 76. Water very turbid; depth to 0.5 m; width 15.2 m; current 0.3 m/sec; bottom mostly sand, some rock; many rushes; water temperature 20 C; time 0900. Species: 1, 6, 8, 10, 12, 13.
- 12B. Repeat of collection location 12A, 15 July 76. Water very turbid; depth to 0.6 m; width 24.4 m; current 0.5 m/sec; bottom sand; few rushes; water temperature 17 C; time 0900. Species: 1, 6, 8, 10.
13. T20N, R1E, southeast quarter of Sec. 27, Stick Creek, under and west of bridge on Harding County Highway #867, 29 June 76. Water quite turbid; depth to 1.1 m; width 36.6 m; no current; bottom mostly silty-clay, some small gravel; many rushes,

- cattails, water buttercups; water temperature 18 C; time 0915. Species: 1, 4, 5, 6, 8, 9, 10, 11, 12, 14, 16, 19, 20, 21.
14. T20N, R1E, northeast quarter of Sec. 36, confluence of Stick Creek with Little Missouri River, 30 June 76. Water very turbid; depth to 0.6 m; width 1.8 m; current 0.2 m/sec; bottom mostly silty-clay, some sand and small gravel; no vegetation; water temperature 17 C; time 0900. Species: 1, 2, 5, 10, 11, 12, 13, 15, 16, 19.
15. T20N, R1E, northeast quarter of Sec. 36, near confluence with Stick Creek with Little Missouri River, 30 June 76. Water very turbid; depth to 0.6 m; width 15.2 m; current 0.7 m/sec; bottom sand and small gravel; few rushes; water temperature 18 C; time 1030. Species: 1, 5, 6, 8, 10, 12, 19.
16. T23N, R1E, northeast quarter of Sec. 22, Box Elder Creek, 1 July 76. Water very turbid; depth to 0.6 m; width 24.4 m; current 0.7 m/sec; bottom mostly medium gravel; no vegetation; water temperature 18 C; time 0900. Species: 1, 5, 6, 8, 10, 12.
- 17A. T20N, R2E, northeast quarter of Sec. 18, 2 July 76. Water very turbid; depth to 0.6 m; width 18.3 m; current 0.6 m/sec; bottom mostly medium gravel, some sand and rock; few rushes; water temperature 18 C; time 0830; used for vehicle crossing. Species: 5, 8, 10, 11, 12, 13, 19.
- 17B. Just upstream from 17A, 2 July 76. Water very turbid; depth to 0.6 m; width 15.2 m; current 1.2 m/sec; bottom mostly rock, some large gravel; few rushes; water temperature 19 C; time 1100. Species: 5, 6, 10, 13, 14.
18. T20N, R2E, southwest quarter of Sec. 4, 3 July 76. Water quite turbid; depth to 0.5 m; width 30.5 m; current 0.9 m/sec; bottom sand and small gravel; no vegetation; water temperature 17 C; time 0830. Species: 1, 6, 8, 10, 12.
- 19A. T21N, R2E, southwest quarter of Sec. 33, 3 July 76. Water quite turbid; depth to 0.6 m; width 24.4 m; current 0.4 m/sec; bottom mostly small gravel, some sand and rock; few rushes; water temperature 21 C; time 1130. Species: 1, 4, 5, 6, 8, 10, 11, 12, 13, 17.
- 19B. Thirty meters downstream from 19A, 3 July 76. Water quite turbid; depth to 0.5 m; width 21.3 m; current 1.5 m/sec; bottom mostly small gravel, some sand and rock; few rushes; water temperature 21 C; time 1330. Species: 1, 5, 6, 8, 10, 12, 13.
- 20A. T21N, R2E, northeast quarter of Sec. 28, 6 July 76. Water quite turbid; depth to 0.6 m; width 21.3 m; current 0.3 to 0.6 m/sec; bottom mostly sand, some rock; no vegetation; water temperature 21 C; time 0830. Species: 1, 5, 6, 8, 10, 13, 17.

- 20B. Fifteen meters upstream from 20A, 6 July 76. Water quite turbid; depth to 0.3 m; width 21.3 m; current 1.3 m/sec; bottom mostly rock, some medium gravel and sand; few rushes; water temperature 24 C; time 1030. Species: 6, 8, 10, 12, 13.
- 20C. East across island from 20A, 6 July 76. Water not turbid to very turbid; depth to 0.6 m; width 6.1 m; no current; bottom silty-clay; few rushes and arrowhead, dense coontail; water temperature 25 C; time 1200. Species: 3, 4, 10, 11, 12, 13, 14, 16, 19, 21.
- 21A. T22N, R2E, northwest quarter of Sec. 33, 7 July 76. Water somewhat turbid; depth to 0.3 m; width 6.1 m; current 1.2 m/sec; bottom mostly large gravel, some small gravel and sand; no vegetation; water temperature 24 C; time 1100. Species: 5, 6, 8, 10, 11, 12.
- 21B. Just downstream from 21A, 7 July 76. Water somewhat turbid; depth to 1.1 m; width 9.1 m; current 0.6 m/sec; bottom mostly sand, some rock; no vegetation; water temperature 25 C; time 1300. Species: 4, 5, 6, 7, 8, 10, 11, 13, 17, 19.
- 22A. T22N, R2E, southwest quarter of Sec. 28, 8 July 76. Water very turbid; depth to 0.9 m; width 24.4 m; current 0.9 m/sec; bottom rock and sand; few rushes; water temperature 23 C; time 0900; just downstream from vehicle crossing. Species: 4, 6, 7, 8, 10, 12, 13, 17.
- 22B. Thirty meters downstream from 22A, 8 July 76. Water very turbid; depth to 0.6 m; width 36.6 m; current 1.2 m/sec; bottom mostly rock, some medium gravel, little silty-clay; few rushes; water temperature 24 C; time 1100. Species: 4, 6, 7, 8, 10, 12, 14, 17.
23. T22N, R2E, northwest quarter of Sec. 8, 9 July 76. Water very turbid; depth to 1.1 m; width 15.2 m; current 1.2 m/sec; bottom mostly medium gravel and rock, some sand; few rushes; water temperature 24 C; time 0930. Species: 5, 6, 7, 8, 10, 12, 13, 14, 15, 18, 22.
24. T22N, R2E, northwest quarter of Sec. 8, 200 meters downstream from 23, mouth of small stream entering Little Missouri River, 9 July 76. Water very turbid; depth to 0.6 m; width 3.7 m; no current; bottom silty-clay; few rushes; water temperature 23 C; time 1200. Species: 5, 6, 8, 10, 11, 13, 16, 19.
- 25A. T21N, R2E, northwest quarter of Sec. 21, southeast side of Harding County Highway #988 crossing, 15 July 76. Water very turbid; depth to 3.1 m; width 45.7 m; current over 0.9 m/sec; bottom mostly small gravel, some large gravel; few rushes; water temperature 20 C; time 1230. Species: 1, 4, 5, 6, 7, 8, 10, 12, 15, 16, 17, 22.

- 25B. T21N, R2E, northwest quarter of Sec. 21, northwest side of Harding County Highway #988 crossing, 15 July 76. Water very turbid; depth to 1.8 m; width 30.5 m; current 0.2 m/sec; bottom silty-clay and sand; no vegetation; water temperature 21 C; time 1300. Species: 1, 5, 6, 13, 17, 19.

FISHES COLLECTED

Hiodonotidae

1. *Hiodon alosoides* (Rafinesque) — goldeye

The goldeye was an uncommon species found in 25 collections. Over 500 goldeye were captured at collecting station 25. Station 25 was located below the downstream side of a cement road crossing where the river was deep and wide. This species was generally more common in areas with gravel or sand bottoms. The goldeye has been reported throughout the Little Missouri River drainage. Collection records: 2C, 3B, 4B, 5C, 5D, 6A, 7A, 8, 9, 10B, 10C, 10D, 11A, 12A, 12B, 13, 14, 15, 16, 18, 19A, 19B, 20A, 25A, 25B (See Collection Sites).

Esocidae

2. *Esox lucius* Linnaeus — northern pike

The northern pike was reported for the first time from the Little Missouri River. Only one specimen was captured. The confluence of Stick Creek and the Little Missouri River yielded this specimen. Collection record: 14.

Cyprinidae

3. *Couesius plumbeus* (Agassiz) — lake chub

The lake chub was a rare species; only one specimen was collected at one station. The lake chub has been reported in all parts of the Little Missouri River except Montana. Collection record: 20C.

4. *Cyprinus carpio* Linnaeus — carp

The carp was a rare species found in 12 collections. It was most common in slow to moderate currents with bottoms free of rock. The carp was previously reported in the South Dakota, Wyoming and North Dakota sections of the Little Missouri River. Collection records: 3A, 4B, 9, 10C, 11B, 13, 19A, 20C, 21B, 22A, 22B, 25A.

5. *Hybognathus nuchalis* Agassiz — silvery minnow

The silvery minnow was an abundant species found in large to small numbers in 30 collections. No clearcut habitat preferences could be observed. The silvery minnow has been found in all parts of the Little Missouri River in previous studies. Collection records:

1B, 2A, 2B, 3A, 3B, 4B, 5D, 6A, 8, 9, 10B, 10D, 11A, 11B, 11C, 13, 14, 15, 16, 17A, 17B, 19A, 19B, 20A, 21A, 21B, 23, 24, 25A, 25B.

6. *Hybognathus placitus* Girard — plains minnow

The plains minnow was present in 38 of the 48 collections and was an abundant species. It represented 10.2% of all fish captured. It was found in varying numbers in different types of habitat. Although it was usually found with the silvery minnow, the plains minnow was generally present in higher numbers than this closely related species. This fish has been found in all sections of the Little Missouri River. Collection records: 1B, 2A, 2B, 2C, 3A, 3B, 4B, 5B, 5C, 5D, 7B, 8, 9, 10A, 10B, 10D, 11A, 11B, 11C, 12A, 12B, 13, 15, 16, 17B, 18, 19A, 19B, 20A, 20B, 21A, 21B, 22B, 23, 24, 25A, 25B.

7. *Hybopsis gelida* (Girard) — sturgeon chub

The sturgeon chub has been reported from the Little Missouri River in North Dakota (Hankinson 1929). This North Dakota collection yielded only four individuals. In the present study it was a rare fish found in small to moderate numbers in five collections. It was collected in fast water over rock or gravel bottoms. Collection records: 21B, 22A, 22B, 23, 25A.

8. *Hybopsis gracilis* (Richardson) — flathead chub

The flathead chub was an abundant species found in 43 of the 48 collections. It represented 16.4% of all fish captured. It exhibited no observable habitat preference within the river. The flathead chub has previously been reported from all sections of the Little Missouri River. Collection records: 1A, 1B, 2A, 2B, 2C, 3A, 3B, 4A, 4B, 5A, 5C, 5D, 6A, 6B, 7A, 8, 9, 10A, 10B, 10C, 10D, 11A, 11B, 11C, 12A, 12B, 13, 15, 16, 17A, 18, 19A, 19B, 20A, 20B, 21A, 21B, 22A, 22B, 23, 24, 25A.

9. *Notemigonus crysoleucas* (Mitchill) — golden shiner

The golden shiner has not previously been reported from the Little Missouri River. In this survey it was a rare species found in moderate numbers in one collection. This site, a pond-like area on the Stick Creek tributary of the Little Missouri River, was formed by an earthen dam. This species could have been stocked into this pond-like area, or it may have immigrated into the area during flooding. Collection record: 13.

10. *Notropis stramineus* (Cope) — sand shiner

The sand shiner was present in 47 of the 48 collections and was an abundant species. It represented 46.7% of all fish captured. It was the most abundant species in this study. The sand shiner has previously been reported in all sections of the Little Missouri River. Collection records: 1A, 1B, 2A, 2B, 2C, 3A, 3B, 4A, 4B, 5A,

5B, 5C, 5D, 6A, 6B, 7A, 7B, 8, 9, 10A, 10B, 10C, 10D, 11A, 11B, 11C, 12A, 12B, 13, 14, 15, 16, 17A, 17B, 18, 19A, 19B, 20A, 20B, 20C, 21A, 21B, 22A, 22B, 23, 24, 25A.

11. *Pimephales promelas* Rafinesque — fathead minnow

The fathead minnow was present in eight collections and was an abundant species. Two collection sites yielded the majority of this species. These two relatively large populations were located in medium to deep water areas with silty-clay bottoms and slow currents. Previous records of this minnow indicate that it is present in all parts of the Little Missouri River. Collection records: 13, 14, 17A, 19A, 20C, 21A, 21B, 24.

12. *Rhinichthys cataractae* (Valenciennes) — longnose dace

The longnose dace, a common species, appeared in 34 collections in this study but was seldom found in large numbers. The largest populations were found in shallow areas with a fast current over rock or gravel bottoms. The longnose dace has previously been reported from all sections of the Little Missouri River. Collection records: 1A, 1B, 2A, 2B, 2C, 4A, 5A, 5B, 5C, 6A, 6B, 7B, 8, 9, 10A, 10B, 11B, 11C, 12A, 13, 14, 15, 16, 17A, 18, 19A, 19B, 20B, 20C, 21A, 22A, 22B, 23, 25A.

Catostomidae

13. *Carpiodes carpio* (Rafinesque) — river carpsucker

The river carpsucker was a common species and was present in 27 collections. It was found in small to moderate numbers in most types of habitats sampled. This fish has been reported in all portions of the Little Missouri River in previous studies. Collection records: 1B, 2A, 2B, 3A, 3B, 4B, 5D, 6A, 8, 9, 10B, 11A, 11B, 12A, 14, 17A, 17B, 19A, 19B, 20A, 20B, 20C, 21B, 22A, 23, 24, 25B.

14. *Catostomus commersoni* (Lacépède) — white sucker

The white sucker has been reported from all sections of the Little Missouri River except in Montana. In this survey it was an uncommon species which was present in seven collections. It was usually captured as an individual specimen. No habitat preferences were noted. Collection records: 2A, 3A, 13, 17B, 20C, 22B, 23.

15. *Moxostoma macrolepidotum* (Lesueur) — shorthead redhorse

The shorthead redhorse, an uncommon species, was found in small numbers in nine collections. No habitat preferences were observed. It has been reported in the South Dakota and Montana portions of the Little Missouri River. Collection records: 1B, 2B, 2C, 7A, 11A, 11B, 14, 23, 25A.

*Ictaluridae*16. *Ictalurus melas* (Rafinesque) — black bullhead

The black bullhead, a rare species, was found in small numbers in five collections. The largest populations were in moderate depth areas with slow currents over silty-clay bottoms. It has been reported from all parts of the Little Missouri River. Collection records: 13, 14, 20C, 24, 25A.

17. *Ictalurus punctatus* (Rafinesque) — channel catfish

The channel catfish, a rare species, was found in small numbers in 16 collections. It was most common in areas with sand or small gravel bottoms and also along bank edges in deeper water. The channel catfish has previously been found in all parts of the Little Missouri River. Collection records: 1B, 4B, 5C, 5D, 8, 10C, 10D, 11A, 11B, 19A, 20A, 21B, 22A, 22B, 25A, 25B.

18. *Noturus flavus* Rafinesque — stonecat

The stonecat has previously been found in the South Dakota portion of the river. Simon (1946) reported it from the Little Missouri in Wyoming, but Baxter and Simon (1970) did not list it in that state. In this study, it was an uncommon species found in small numbers in four collections. Shallow areas with slow currents over gravel or rock bottoms were the most common habitats for this species. Collection records: 2B, 10A, 11A, 23.

*Centrarchidae*19. *Lepomis cyanellus* Rafinesque — green sunfish

The green sunfish was present in small to moderate numbers in 11 collections. It was captured only after flooding occurred. No habitat preferences were observed. This fish has been reported only in the Wyoming portion of the Little Missouri River. Collection records: 1B, 10D, 11B, 13, 14, 15, 17A, 20C, 21B, 24, 25B.

20. *Micropterus salmoides* (Lacépède) — largemouth bass

The largemouth bass has not previously been reported from the Little Missouri River. Personious and Eddy (1955), however, stated that the largemouth bass was introduced into the Beaver Creek and Coyote Creek tributaries of the Little Missouri River in North Dakota. It is also a commonly stocked pond fish. In this study this species was rare and was collected at only one station. This area was a pond-like body of water, formed by an earthen dam, on the Stick Creek tributary of the Little Missouri River. Water depth was moderate and the bottom was silty-clay. Collection record: 13.

*percidae*21. *Etheostoma exile* (Girard) — Iowa darter

The Iowa darter had not been reported from the Little Missouri River previous to this study. It was a rare fish found in two collections in small numbers during this study. Both of these sites had slow currents over silty-clay bottoms. Collection records: 13, 20C.

22. *Stizostedion canadense* (Smith) — sauger

The sauger, an uncommon species, was found in moderate numbers in four collections and was generally collected in moderate depth areas. It has previously been reported only from the Wyoming portion of the Little Missouri River. Collection records: 2A, 6A, 23, 25A.

DISCUSSION

Four of the species collected have not previously been reported from the Little Missouri River drainage (Table 1). These fishes included the northern pike, golden shiner, largemouth bass and Iowa darter. In addition to those four species, three others had not been reported from the South Dakota portion of the river. The sturgeon chub, green sunfish and sauger are new records for the river in this state. Two species, the brassy minnow and the sicklefin chub, have been reported from the river but were not collected during the present study.

During the study period, heavy rains occurred and caused the Little Missouri River to more than double in size. When waters receded several sites were resampled and numerous changes were observed. Many places that previously had had silty-clay or sand bottoms now had bottoms of rock or gravel. Secchi disc visibility decreased from an average of 109 mm before the rains to 74 mm after flooding. Average current velocity increased from 0.4 m/sec before the rains to 0.8 m/sec after the rains. Chemical changes in the river after flooding included decreases in carbon dioxide and hardness and an increase in dissolved oxygen. Most aquatic and shoreline terrestrial vegetation was covered or destroyed by flood waters.

The fish population of the river also appeared to be affected by flooding. Several sites were resampled to compare fish populations before and after flooding. The green sunfish was not collected before flooding, but was found at three resampled sites after flooding. This species has only been reported from the Wyoming portion of the river and was possibly displaced downstream by flood waters. It also may have immigrated from local ponds. There were numerous other instances where sites revisited after flooding yielded fishes not collected at those sites before flooding.

TABLE 1

List of Fish Species Reported From the Little Missouri River

Species	Present study	Hankinson (1929)	Personius and Eddy (1955)	Bailey and Allum (1962)	Baxter and Simon (1970)	Brown (1971)
<i>Hiodon alosoides</i>	X	X		X	X	X
<i>Esox lucius</i>	X					
<i>Couesius plumbeus</i>	X		X	X	X	X
<i>Cyprinus carpio</i>	X	X	X	X		
<i>Hybognathus hankinsoni</i>				X		
<i>H. nuchalis</i>	X	X		X	X	X
<i>H. placitus</i>	X	X	X	X	X	X
<i>Hybopsis gelida</i>	X	X				
<i>H. gracilis</i>	X	X	X	X	X	X
<i>H. meeki</i>			X			
<i>Notemigonus crysoleucas</i>	X					
<i>Notropis stramineus</i>	X	X	X	X	X	
<i>Pimephales promelas</i>	X	X	X	X	X	X
<i>Rhinichthys cataractae</i>	X	X	X	X	X	X
<i>Carpionodes carpio</i>	X	X	X	X	X	X
<i>Catostomus commersoni</i>	X	X	X	X	X	X
<i>Moxostoma macrolepidotum</i>	X			X		X
<i>Ictalurus melas</i>	X	X	X	X	X	X
<i>I. punctatus</i>	X	X	X	X	X	X
<i>Noturus flavus</i>	X	X		X		
<i>Lepomis cyanellus</i>	X				X	
<i>Micropterus salmoides</i>	X					
<i>Etheostoma exile</i>	X					
<i>Stizostedion canadense</i>	X		X			

The sturgeon chub, although not captured at resampled sites, was not collected until after flooding. Either this fish was a resident only in the northernmost section of the river in South Dakota or it immigrated into the area during flooding. It has been reported from North Dakota.

The largemouth bass, golden shiner, northern pike and Iowa darter also were only collected in the river after flooding. These fishes were either residents of the river or immigrants from local ponds or other portions of the river.

The sauger, a species not previously reported from the river in South Dakota, was collected both before and after flooding. Either this fish was missed by previous collectors or it has moved into the river since their collections were made.

The total number of fish species collected in the Little Missouri River is now 24. Twenty-three of these have been collected in the South Dakota portion of the river.

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