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BIOLOGICAL AND MEDICAL SCIENCES

FISH POPULATIONS OF THE MIDDLE LOUP RIVER, NEBRASKA

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ABSTRACT: From September 5, 1970 to August 10, 1971, 27 species and 12,499 fish were collected from the Middle Loup River by seine. The red shiner, *Notropis lutrensis*, and the sand shiner, *Notropis stramineus*, composed 72 per cent of the total fish taken. The minnow family, Cyprinidae, composed 88 per cent of the total fish collected. Species diversity and number of species increased with the increase in the size of the river.

INTRODUCTION

Very little research has been done with fish distribution in the rivers of Nebraska. As time goes by, conditions change and so do the fish populations. Thus, it is important that we know what the fish distribution and species composition are today so that we can best manage this resource for future generations.

The Middle Loup River begins in Hooker County northwest of Mullen. It flows mainly in a southeasterly direction. The Middle Loup and South Loup Rivers combine near Boelus and then angle northeasterly until they flow into the North Loup River forming the Loup River.

METHODS AND MATERIALS

All collections were made with a seine. The collections during the fall of 1970 were made with a 20-foot by 4-foot nylon ¼-inch mesh seine. The collections made during the spring and summer of 1971 were made with a 20-foot by 5-foot nylon ¼-inch mesh bag seine.

As the fish were collected, they were immediately placed in a 6 per cent formalin solution. A few of the fish captured were identified and released.

Fourteen collection stations (Fig. 1) and (Table 1) were selected along the river mainly because of their accessibility. Three different habitats were sampled at most sites. These habitats included the channel water with swift flowing water, side channel with shallow moderate flowing water, and back water formed by the river backing up into pools of various depths. Some of the collection stations toward the headwaters of the river consisted of just one habitat, the channel, because of the narrow width of the river.

Seine hauls made at each station were kept at similar lengths as much as possible. These hauls usually averaged 10 yards. The number of seine hauls made for each habitat at each station did vary. Seine hauls were made until it was felt that a representative sample had been taken. This was determined when no new species were taken in a seine haul.

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The keys used in the identification of the fish collected were Eddy (1969) and Cross (1967).

RESULTS

Seining may not be the best method for collecting, but for my situation it seemed to be the most practical method. The Middle Loup River is generally not too deep or too swift for a seine.

According to Morris (1960), rotenone was more effective than a seine for fish in swift water. He reported at times seining obtained better results than the poison, depending on the species and swiftness of the water.

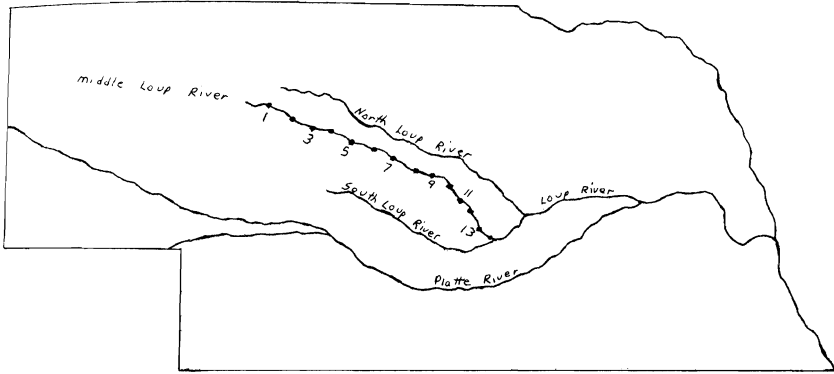


Figure 1. Collection stations on the Middle Loup River.

Table 1: The approximate locations of all collection stations in relation to the nearest towns. Legend for Figure 1.

STATION	LOCATION
1	2 miles north of Mullen
2	½ mile east of Seneca
3	7 miles east of Seneca
4	1 mile west of Thedford
5	½ mile west of Halsey
6	Dunning
7	Milburn Daly Park
8	9 miles west of Sargent
9	½ mile south of Sargent
10	Comstock
11	Arcadia
12	1 mile west of Loup City
13	1 mile south of Rockville
14	1 mile south of Boelus

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Some large species, such as carp and carpsuckers, were observed outswimming the seine. At one collection site, largemouth bass jumped over the seine.

The following list contains the species collected from fall of 1970 through summer of 1971. The scientific name and common name for each species was taken from the American Fisheries Society (1960).

Cyprinidae (minnow family)

- Notropis lutrensis* (Baird and Girard) (red shiner)
- Notropis stramineus* (Cope) (sand shiner)
- Hybognathus hankinsoni* Hubbs (brassy minnow)
- Pimephales promelas* Rafinesque (fathead minnow)
- Notropis dorsalis* (Agassiz) (bigmouth shiner)
- Cyprinus carpio* Linnaeus (carp)
- Hybopsis gracilis* (Richardson) (flathead chub)
- Hybognathus placita* Girard (northern plains minnow)
- Notropis blennioides* (Girard) (river shiner)
- Semotilus atromaculatus* (Mitchill) (creek chub)
- Rhinichthys cataractae* (Valenciennes) (longnose dace)
- Hybopsis aestivalis* (Girard) (speckled chub)

Catostomidae (sucker family)

- Carpiodes carpio* (Rafinesque) (river carpsucker)
- Carpiodes forbesi* Hubbs (plains carpsucker)
- Catostomus commersoni* (Lacepede) (white sucker)
- Moxostoma macrolepidotum* (LeSueur) (northern redhorse)

Cyprinodontidae (killifish family)

- Fundulus sciadicus* Cope (plains topminnow)
- Fundulus kansae* Garman (plains killifish)

Centrarchidae (sunfish family)

- Lepomis macrochirus* Rafinesque (bluegill)
- Micropterus salmoides* (Lacepede) (largemouth bass)
- Lepomis cyanellus* Rafinesque (green sunfish)
- Pomoxis annularis* Rafinesque (white crappie)
- Pomoxis nigromaculatus* (LeSueur) (black crappie)

Ictaluridae (catfish family)

- Ictalurus melas* (Rafinesque) (black bullhead)
- Ictalurus punctatus* (Rafinesque) (channel catfish)
- Noturus gyrinus* (Mitchill) (tadpole madtom)

Percidae (perch family)

- Etheostoma exile* (Girard) (Iowa darter)

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Distribution and number of fish taken are summarized for each station (Table 2). Red shiners and sand shiners were the most abundant composing 72 per cent of the total number of fish taken. The red shiner was collected at every station. With additional seining, red shiners probably would be found at Mullen.

Only one species, the longnose dace, was limited to the headwaters of the river. It was collected at only the first 3 stations.

Table 2: Total number of fish of each species taken from the Middle Loup River at each station.

Station	1			2			3			4			5		
	Fall '70	Spring '71	Summer '71	Fall '70	Spring '71	Summer '71	Fall '70	Spring '71	Summer '71	Fall '70	Spring '71	Summer '71	Fall '70	Spring '71	Summer '71
Species															
Red Shiner	--	--	--	--	--	12	--	1	1	2	--	16	40	53	81
Sand shiner	4	3	22	--	9	20	--	17	52	17	7	20	26	329	48
Brassy minnow	--	1	--	--	--	--	--	--	--	--	--	--	--	--	--
River carpsucker	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fathead minnow	--	--	1	--	--	--	--	--	--	--	--	9	--	3	3
Bigmouth shiner	--	2	6	--	--	--	--	--	--	--	4	8	45	48	5
Plains carpsucker	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2
Plains topminnow	1	--	--	--	--	--	--	--	1	--	--	3	--	--	--
White sucker	--	--	--	--	1	--	--	2	1	--	5	14	7	24	7
Carp	--	--	--	--	2	--	--	--	--	--	--	--	1	--	--
Fathead chub	--	--	--	--	--	--	--	--	--	--	--	2	1	--	--
Blackbullhead	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Bluegill	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern Plains Minnow	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Largemouth bass	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
River shiner	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Northern redbhorse	--	--	--	--	--	--	--	--	--	--	2	--	--	1	--
Green sunfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Creek chub	--	--	--	--	--	--	--	1	--	--	--	3	--	8	4
Longnose dace	3	1	--	2	1	--	--	5	1	--	--	--	--	--	--
Channel catfish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Plains killifish	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
White crappie	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Speckled chub	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Iowa darter	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Ladpole madtom	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Black crappie	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Station	6			7			8			9			10		
Red shiner	7	15	59	258	80	85	89	161	63	148	72	64	89	40	39
Sand shiner	267	106	5	110	444	26	106	48	12	85	123	55	70	13	32
Brassy minnow	18	3	4	22	60	31	157	122	7	59	128	13	14	1	14
River carpsucker	--	--	--	--	--	5	9	--	1	23	110	4	3	--	232
Fathead minnow	39	1	2	33	184	13	73	14	--	20	77	15	7	--	--
Bigmouth shiner	76	9	13	--	9	3	63	1	--	64	2	4	--	--	--
Plains carpsucker	--	--	12	2	13	8	2	2	--	--	199	4	5	--	41
Plains topminnow	--	--	--	--	--	--	--	20	45	--	--	24	--	--	--
White sucker	1	--	1	--	5	2	--	7	--	--	3	--	--	--	--
Carp	--	--	--	--	1	--	4	4	9	1	7	7	1	--	30
Fathead chub	--	2	--	2	--	7	4	--	--	--	1	2	2	2	--

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(TABLE 2 CONTINUED)

Date	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	Fall	Spring	Summer	
	'70	'71	'71	'70	'71	'71	'70	'71	'71	'70	'71	'71	'70	'71	'71	
Species																
Black bullhead	-	-	-	-	-	-	-	7	-	-	1	-	-	-	-	-
Bluegill	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-
Northern plains minnow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Largemouth bass	-	-	-	-	-	-	1	-	1	6	-	1	-	-	-	-
River shiner	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Northern redhorse	-	-	-	-	-	3	-	7	-	-	6	-	-	-	-	4
Green sunfish	-	-	-	-	-	-	1	5	1	3	4	2	-	-	-	-
Creek chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Longnose dace	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Channel catfish	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1
Plains killifish	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
White crappie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Speckled chub	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iowa darter	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Tadpole madtom	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Black crappie	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-

Station	11			12			13			14			Total
Red Shiner	943	156	56	468	231	302	325	153	4	446	151	164	4874
Sand Shiner	768	65	233	408	25	109	27	2	-	366	38	11	4128
Brassy minnow	9	-	7	5	4	5	17	10	-	66	1	5	783
River carpsucker	32	-	92	37	1	70	21	2	21	9	-	11	683
Flathead minnow	20	-	-	5	-	-	-	2	-	13	2	-	536
Bigmouth shiner	48	-	-	2	1	4	1	-	-	33	16	-	467
Plains carpsucker	17	1	2	9	-	37	9	2	-	25	20	8	420
Plains topminnow	28	13	6	-	-	-	-	-	-	-	-	-	141
White sucker	-	-	-	-	-	-	-	-	-	-	-	-	80
Carp	-	1	2	-	1	-	1	1	-	3	1	1	78
Flathead chub	8	-	-	2	-	-	-	-	-	2	5	-	42
Black bullhead	-	-	-	-	-	-	-	21	12	-	-	-	41
Bluegill	-	-	-	-	-	-	12	1	-	15	2	2	37
Northern Plains minnow	-	-	-	-	-	-	1	-	-	27	7	2	35
Largemouth bass	-	-	1	1	3	7	3	1	1	4	-	2	32
River shiner	2	1	-	12	-	1	-	-	-	9	-	3	30
Northern redhorse	1	-	2	-	-	4	-	-	-	-	-	-	30
Green sunfish	-	1	-	-	2	-	-	-	-	1	-	-	20
Creek chub	-	-	-	-	-	-	-	-	-	-	-	-	16
Longnose dace	-	-	-	-	-	-	-	-	-	-	-	-	13
Channel catfish	-	-	-	-	-	-	1	-	-	1	-	-	4
Plains killifish	2	-	-	-	1	-	-	-	-	-	-	-	3
White crappie	-	-	-	-	-	-	-	-	2	-	-	-	2
Speckled chub	1	-	-	-	-	-	-	-	-	-	-	-	1
Iowa darter	-	-	-	-	-	-	-	-	-	-	-	-	1
Tadpole madtom	-	-	-	-	-	-	-	-	-	-	-	-	1
Black crappie	-	-	-	-	-	-	-	-	-	-	-	-	1
													<u>12499</u>

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Only 4 channel catfish were collected. They were all under 1 foot in length. Since many channel catfish are taken out of the river by fishermen each year, this indicates the catfish evaded the seine. Rotenone or a shocker would probably have done better for this species.

Besides the channel catfish, the plains killifish, speckled chub, Iowa darter, tadpole madtom, black crappie, and white crappie were of very low population density. Only 3 plains killifish, 2 white crappie, and 1 each of Iowa darter, tadpole madtom, and black crappie were collected.

From station 1 to station 14, the total number of fish collected at each site increased (Fig. 2). The last 4 stations, 11 through 14, made up 51.2 per cent of the total fish collected. This may be accounted for by the fact that as you go downstream the size of the river increases and thus more types of habitat can be found.

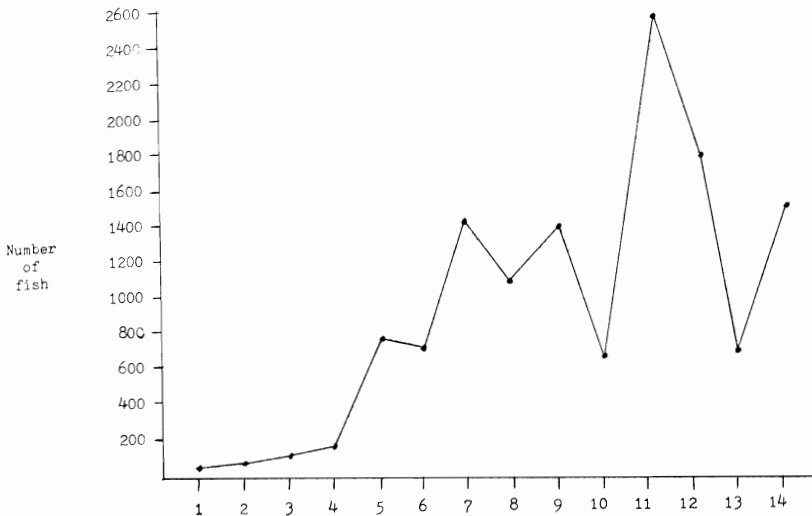


Figure 2. Total number of fish collected at each station.

By far, more fish were collected at station 11 than at any other site. This was influenced by the appearance of a large school of 2 species, the red shiner and the sand shiner. One short seine haul, taken in the backwater in the fall of 1970, produced 682 sand shiners and 302 red shiners. It was a cold day, the river water was cold, and these fish accumulated in the warmer backwater.

Stations 10 and 13 showed a great drop in total numbers compared to the surrounding stations. This was probably due to the lack of a favorable habitat. The river at these points did not have a substantial amount of

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backwater or small pools where most fish are found. There was mainly a narrow channel and very shallow sidewater.

From station 1 to station 14, the total number of species collected at each site increased (Fig. 3). Stations 6 and 10 did show a drop in the number of species. This was probably due to the lack of a variation of habitats. If the collection sites had been a mile or so on either side of these locations, there may not have been this drop.

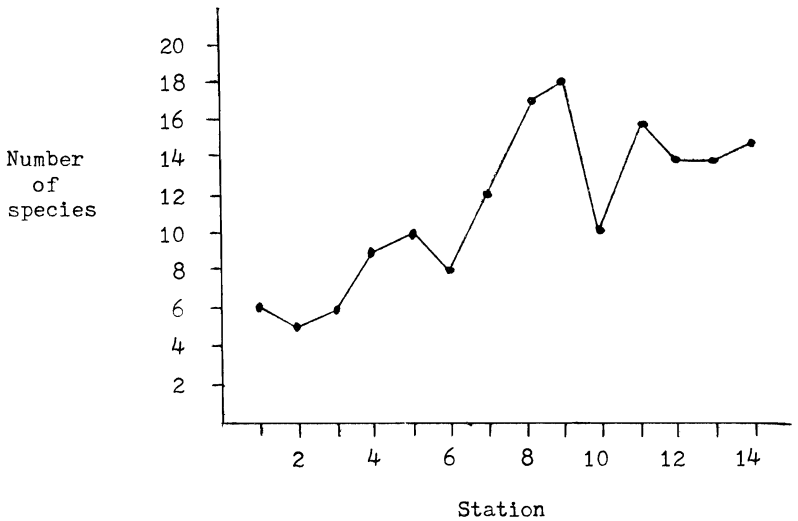


Figure 3. Number of species collected at each station.

Stations 12 to 14 showed a slight drop in the number of species. This may be due to the fluctuation of the water level as reported by Morris (1960). A large volume of water for irrigation is removed from the river at various points above station 12 at Loup City during the summer. This does lower the level of the river considerably and fills in a number of the deeper holes and causes the water to get quite warm.

Species diversity also increased from station 1 to station 14 (Fig. 4). This graph is almost parallel to that of Fig. 3. Stations 6 and 10 were rather low indicating lack of suitable habitat. Stations 8 and 9 were quite high. This indicates suitable habitat for a larger number of species. Stations 11 to 14 showed a drop from stations 8 and 9. This may be due to the fluctuation of the water level during the summer.

Cyprinidae, the minnow family, accounted for 88 per cent of the total fish taken (Table 3). Morris (1960) reported the minnow family accounted

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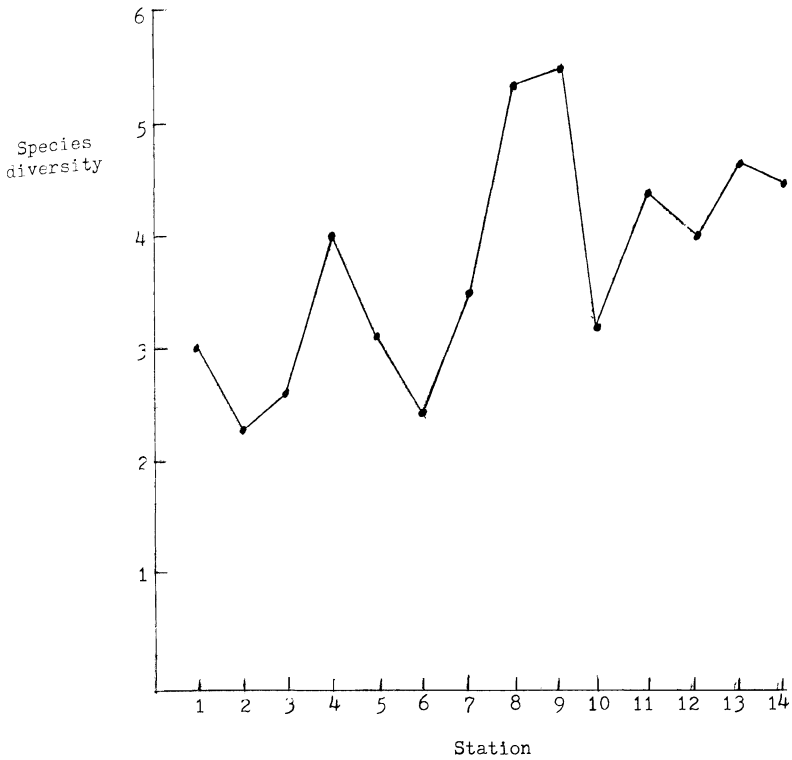


Figure 4. Species diversity at each station.

$$\text{Species diversity} = \frac{\text{number of species}}{\log_e N} \quad \text{where } N = \text{number of individuals}$$

for 76 per cent of all fish collected in the Platte River. He also collected a total of 11 families from the Platte River. During my research, only 5 families were collected from the Middle Loup River. The next most common family was the sucker family, Catostomidae, which composed only 9.7 per cent of the total.

Table 3: Relative numerical abundance of members of the families of fish in the Middle Loup River.

FAMILY	PER CENT OF TOTAL
Cyprinidae (minnow family)	88.03%
Catostomidae (sucker family)	9.70%
Cyprinodontidae (killifish family)	1.15%
Centrarchidae (sunfish family)	.74%
Ictaluridae (catfish family)	.37%
Percidae (perch family)	.01%

DISCUSSION

From September 5, 1970 to August 10, 1971, 27 species of fish were taken from the Middle Loup River by seine. Johnson (1942) reported 46 species being residents of the Loup Rivers. He reported that the number of species present in the Loup Rivers was not great.

The Loup Rivers, in Johnson's study, included the South Loup, Middle Loup, North Loup, and the Loup River, formed by the union of the 3 rivers. The Loup River empties into the Platte River. This system covers a large area across Nebraska forming many different habitats suitable for many different species of fish. This most likely resulted in more species being collected in his research. It is also possible that some of the species he and others collected in the Middle Loup River have since disappeared.

To my knowledge, the plains killifish and the tadpole madtom have not been reported being collected in the Middle Loup River. Only 3 plains killifish and 1 tadpole madtom were collected during my research. The speckled chub and the Iowa darter are considered quite rare in the Middle Loup River. Only 1 fish of each species was collected.

In the course of the Middle Loup River's history, a number of diversion dams have been put in by man. Diversion dams are located at Milburn, Sargent, Comstock, and Boelus. The dam at Boelus diverts the water to a power plant. The Comstock Dam diverts the water to Sherman Reservoir for recreation and irrigation. The other dams divert the water for irrigation.

From Arcadia, station 11, on downstream the river becomes quite shallow during the summer because of all the water taken out of it. Most of the deeper holes in the river become filled up with sand eliminating a place where both small and large, game and nongame fish can find food and shelter. With the large amount of shallow water present, the water becomes quite warm. This affects the amount of oxygen and food available to the fish in the shallow water. The remaining holes in the river become overcrowded with fish which eventually leads to a reduction of both large and small fish in both species and numbers.

The main game fish taken from the river by fishermen are the largemouth bass and the channel catfish. Most of the fishing for these fish occurs in the lower half of the river. The upper half of the Middle Loup River lacks in the quantity the suitable habitat for these game species.

Continued work on the Middle Loup River will reveal whether the fish are decreasing, increasing, or remaining the same in regard to number of species and total population. Hopefully, with this added knowledge, the river could be managed to its maximum potential.

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REFERENCES CITED

- American Fisheries Society, 1960. A list of common and scientific names of the better known fishes of the U.S. and Canada. 2nd ed. Pub. no. 1. 102 p.
- Cross, Frank B., 1967. Handbook of fishes of Kansas. Robert R. Sanders, State Printer. Topeka, Kansas. 357 p.
- Eddy, Samuel, 1969. The freshwater fishes. 2nd ed. Wm. C. Brown Company Publishers. Dubuque, Iowa. 286 p.
- Johnson, R. E., 1942. The distribution of Nebraska fishes. Thesis, Univ. of Michigan Library. Univ. of Michigan. 152 p.
- Morris, Larry A., 1960. The distribution of fish in the Platte River, Nebraska. M. A. Thesis, Univ. of Missouri. 73 p.