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1996

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**AN ICHTHYOLOGICAL SURVEY OF THE FORKS  
OF THE PLATTE RIVER IN WESTERN NEBRASKA**

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**ABSTRACT**

An ichthyological survey (1989–1995) of 31 sites on the North Platte and South Platte rivers and immediately below the North Platte diversion dam (junction of the North Platte and South Platte rivers) resulted in the captures and distributional documentation of 46 species of fishes. Four other species, found in the drainage, were captured in tributary streams only. Preserved voucher records are based on 49 sampling visits (1989–1995) to the 32 localities (approximately 55,000 specimens). An additional 42,000 nonvouchered specimens were taken, identified, and released at 17 of the localities (1980–1995). Above Lake McConaughy, the North Platte River is dominated by five species (*Cyprinella lutrensis*, *Hybognathus hankinsoni*, *H. placitus*, *Hybopsis dorsalis*, and *Notropis ludibundus*), whereas below Lake McConaughy the fish fauna is dominated by only four species (*Catostomus commersoni*, *Cyprinella lutrensis*, *Hybopsis dorsalis*, and *Notropis ludibundus*). The South Platte fish fauna is dominated by six species (*Cyprinella lutrensis*, *Hybopsis dorsalis*, *Notropis ludibundus*, *Pimephales promelas*, *Semotilus atromaculatus*, and *Fundulus zebrinus*). The two units on the North Platte River are each divisible into eastern and western sections, based on the compositions of the fish faunas. The eastern and western divisions are attributed to effects of the impoundment of the North Platte River by Lake McConaughy. Recent (1995) work on the South Platte River also suggests the existence of eastern and western subdivisions, but those subdivisions were not evident 10–20 yr ago. Including nonvouchered records obtained by ichthyology classes, the twelve sites on the North Platte River above Lake McConaughy harbor 15–29 species of fishes (39 species taken in total), whereas the eight sites on the North Platte River below Lake McConaughy harbor 17–29 species (34 species taken in total) and the twelve sites on the South Platte River harbor 19–33 species (37 species taken in total).

† † †

Knowledge of the distributions of fish species in western Nebraska remains very general and very few published records exist. Furthermore, aside from col-

lections in the 1930s and 1940s (deposited in the University of Michigan's Museum of Zoology, Ann Arbor), very little in the way of vouchered collections exist. Nevertheless, popular publications, aimed at informing fishermen of the fish species, reported the distributions of most species in the western parts of the state (Morris et al., 1974). The most detailed inventory (Bliss and Schainost, 1973) focused on streams and includes few stations in the Platte River. Furthermore, nearly all preserved samples used by Bliss and Schainost were discarded in 1973, eliminating the possibility of revision of identifications. Public knowledge of the fishes of the upper parts of the Platte River in Nebraska remains based on the unpublished dissertation of Johnson (1942) and L. Morris' (1960) unpublished Masters' thesis. Johnson (1942) reported records of 26 species from the region we surveyed. He reported between one and eight species from six sites on the upper North Platte River (Henry, Morrill, Mitchell, Scottsbluff, Bayard, and Oshkosh), 14 species from one locality on the lower North Platte River (3 mi N Sutherland), and three to 12 species from three localities on the South Platte River (SW Big Springs, Brule, and Ogallala). Many of those records are mentioned by Jones (1963). The dearth of ichthyological information about the fishes of the Platte River in Nebraska is partially mitigated by the availability of some survey data for Colorado (Woodling, 1985) and Wyoming (Baxter and Simon, 1970). The Wyoming data set also includes more recent surveys of some major tributaries (Patton and Hubert, 1993; Rahel and Hubert, 1991).

In the 1840s to 1870s, this region was known to biologists and explorers as the "forks of the Platte." Although current usage reports these as "rivers," to early observers, having the benefit of knowledge of eastern drainages, these were minor streams but the forks were a clear sign of the nearby Rocky Mountains.

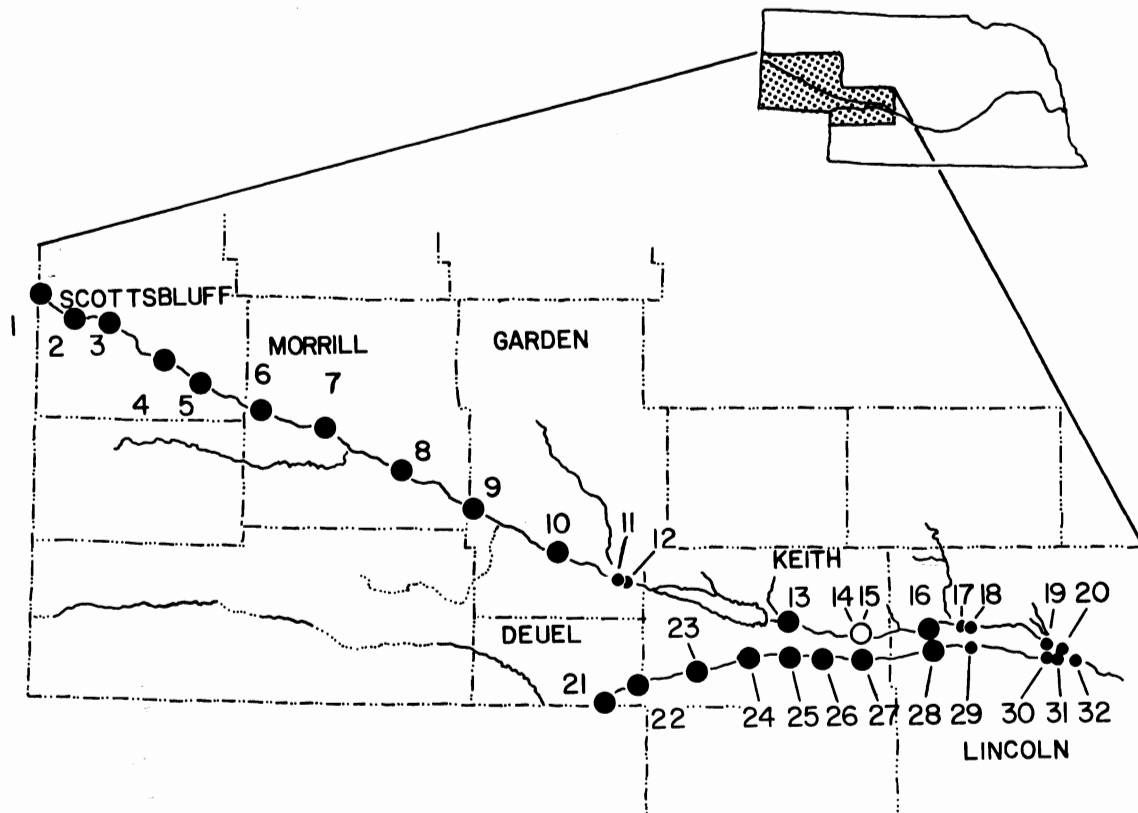


Figure 1. Map of the region discussed in this paper. Localities are numbered and county names are provided for those counties including portions of the North and South Platte rivers.

The forks extended eastward to the vicinity of modern-day North Platte, Nebraska. Because we have produced the first comprehensive documentation of the ichthyofauna, we elect to use this seemingly anachronistic terminology in our title for these prairie streams.

The University of Nebraska–Lincoln established the Cedar Point Biological Station in Keith County, Nebraska, in 1975, and beginning that year and more or less continually offered a class in field ichthyology there. In 1989, the first author (JDL) began to accumulate voucher collections for the Platte River during one class activity in ichthyology class. No schedule was maintained and the dataset was viewed as inadequate by early 1995, when the authors decided to complete a detailed survey of the North and South Platte rivers in 1995. Including the samples made 1989–1992, we visited 32 sites along these two rivers and made voucher collections (Fig. 1). Most of the collecting effort was done in four trips in 1995 (March, April, September, and October) with spot collecting in June. The detailed survey (providing vouchers for records), when joined with nearly 20 years of data from class activities, represents a reasonably complete account of the fishes of the Platte rivers in western Nebraska. These data are of some importance in public policy debates as well as of interest in documenting part of Nebraska's biota.

The fish fauna of the North and South Platte rivers is made up of 51 species (excepting aliens restricted to Lake McConaughy and associated waters). However, only eight species, seven minnows (*Cyprinella lutrensis*, *Hybognathus hankinsoni*, *H. placitus*, *Hybopsis dorsalis*, *Notropis ludibundus*, *Pimephales promelas*, and *Semotilus atromaculatus*) and one topminnow (*Fundulus zebrinus*) account for 92.6% of all fishes found in these streams (Table 1).

## MATERIALS AND METHODS

Limited acquisition of museum vouchers began when JDL initiated his surveys of the introduced Western Mosquitofish, *Gambusia affinis*, (Lynch, 1988) and continued during his surveys to document changes in the distribution of the Plains Topminnow, *Fundulus sciadicus*. Lynch's sampling methods for *Fundulus sciadicus* and *Gambusia affinis* involved primarily sampling with aquatic dipnets. However, beginning in 1989, JDL devoted limited time to the documentation of distributions of all fish species in the North and South Platte rivers. Two stations were sampled in 1989, three in 1990, one in 1991, one in 1993, and 27 in 1995. Fifteen stations were sampled twice in 1995. In 1995, we undertook to complete that inventory by sampling every accessible station along those two rivers

Table 1. Twelve most abundant species from North and South Platte Rivers.

Rank	Name	Upper NP	Lower NP	South P	Incidence	Percent
1.	<i>Notropis ludibundus</i>	3627	4090	8733	32	30.8
2.	<i>Hybopsis dorsalis</i>	2445	3649	9175	32	28.6
3.	<i>Hybognathus hankinsoni</i>	3669	181	3203	21	13.2
4.	<i>Hybognathus placitus</i>	4118	0	5	8	7.7
5.	<i>Pimephales promelas</i>	1030	193	1328	30	4.8
6.	<i>Cyprinella lutrensis</i>	529	592	549	25	3.1
7.	<i>Semotilus atromaculatus</i>	129	219	965	30	2.4
8.	<i>Fundulus zebrinus</i>	183	46	842	27	2.0
9.	<i>Campostoma anomalum</i>	1	61	597	20	1.2
10.	<i>Catostomus commersoni</i>	198	221	135	28	1.1
11.	<i>Gambusia affinis</i>	251	116	171	27	1.0
12.	<i>Carpionodes cyprinus</i>	256	36	133	23	0.8

from the points where they enter Nebraska to the diversion dam east of the city of North Platte, Lincoln County. The limited early work by Johnson used seines rather than fish toxins or electrofishing and, in order to make comparisons with those collections made more than 50 years ago, we too used seining as our means of collecting. Each station was sampled using nets of 6–12 m (¼ inch [5 mm] mesh) to sample backwaters, ponds, and channels and using 2-m wide nets (mesh ⅓ to ¼ inch [2–5 mm]) to sample bank and obstruction microhabitats. Heavy duty aquatic dipnets were used to sample waters choked with algae, debris, and submerged vegetation. Sampling continued until we failed to add species to the sample or until we had collected all species expected (based on previous sampling efforts). Some of the stations were also sampled by Bazata (1991) using electroshocking. In addition to these samples, we used the unvouchered records obtained during some 20 yrs of class activities by JDL's ichthyology classes wherein fishes were captured, identified, counted, and released. The vouchers documenting these distributional data are deposited at primarily three institutions. Much of the documentation of distributional data for *Gambusia affinis* is deposited at the University of Kansas Natural History Museum, Lawrence, and the University of Michigan's Museum of Zoology, Ann Arbor, while the vouchers (639 lots) for the ichthyofauna in general (39 major collections from 32 localities) are deposited at the University of Nebraska State Museum, Lincoln (ZM 5984–6176, 6990–7135, 7156–7245, 7406–7510, 7902–7997).

Some of the taxonomy employed here might be unfamiliar to some biologists. The classification followed here is the same as was used in Mayden (1992). The most obvious differences from traditional usages concern native minnows, where the contents of the traditional genera *Hybopsis* and *Notropis* are revised substantially following Mayden (1989).

## SAMPLING STATIONS

The species represented by vouchers are indicated using a species number that corresponds to the list of species given in the Accounts of Species. Our vouchers are not indicated by museum number or field number if they are deposited in the University of Nebraska State Museum (UNSM, ZM series). Those records not vouchered by us are not included in the numbered lists but are identified in the text. The habitat descriptions apply to the collections made by us between 1989 and 1995. Some of the localities, especially those in Keith County, Nebraska, have been visited repeatedly by JDL's ichthyology classes. In those cases, frequency-of-collection data are provided as well as the listing of species.

### North Platte River

1. Stateline Island, 0.6 mi S Henry, Scottsbluff Co. T23N R58W Section 4, SE¼ se¼. Main channel, backwaters, isolated pool; depths to 0.6 m. Johnson (1942) reported eight species from this locality. A collection of 17 species reported (Rahel and Hubert, 1991) as being from the North Platte River at the mouth of Horse Creek is actually this locality (W. A. Hubert, pers. comm.). This locality was sampled twice (June 1988 and June 1990, 9 and 12 species, respectively) by employees of the Nebraska Department of Environmental Control (DEC) (Bazata, 1991). [2 September 1995, 18 species]. We did not encounter *Campostoma anomalum* at this site (found by Johnson, 1942, and each DEC sampling) or did we find *Phenacobius mirabilis* (found by Johnson, 1942). Johnson (1942) also took *Ameiurus melas* at this site but no one else has taken the species there. Rahel and Hubert (1991) reported *Luxilus cornutus*, *Lepomis cyanellus*, and *Micropterus salmoides*, species not taken by others when sampling this locality. A total of 24 species is known from this locality and all are vouchered (UMMZ, USNM, and UW). The only species unique to this site is *Etheostoma nigrum*. Species: 7, 8, 9, 11, 13, 14, 15, 17, 19, 20, 23, 24, 25, 26, 29, 34, 35, 47.

2. 2 mi S Morrill, Scottsbluff Co. T23N R57W Section 27 NW¼ sw¼. Main and side channels, limited access to backwater habitats; depth to 0.8 m. Johnson (1942) took seven species here, including *Pomoxis annularis*. This locality was sampled by Morris (1960) and is his station 23 where he took 15 species, including *Hybognathus placitus*, *Platygobio gracilis*, and *Salmo trutta*, during his five sampling visits in 1959. [22 July 1989, 14 species]. Eighteen species are known from this site but three are not vouchered. We do not think that this locality has been sampled adequately. Species: 7, 8, 9, 11, 13, 14, 15, 17, 20, 23, 25, 26, 34, 38.

3. 1.2 mi S Mitchell, Scottsbluff Co. T23N R56W Section 34 NW¼ nw¼. Main channel with very little backwater habitat; depth to 1.0 m. Johnson (1942) reported seven species, including *Etheostoma spectabile* (actually from drainage ditches entering the river rather than the river proper). DEC sampled the site in June 1990 and took 13 species including *Oncorhynchus mykiss*, *Platygobio gracilis*, *Noturus flavus*, and *Lepomis cyanellus*. [2 September 1995, 12 species]. Only 17 species are known from this inadequately sampled locality and only 13 are represented by vouchers. Species: 8, 9, 11, 13, 14, 15, 17, 20, 23, 25, 26, 35.

4. Terrytown, Scottsbluff Co. T22N R55W Section 26 SE¼. Our collections were made just W of US Hwy 71 bridge in main and side channels; one small backwater, 1.2 m deep. Johnson (1942) reported four species from the immediate vicinity of Scottsbluff including *Fundulus zebrinus*, a species not vouchered in our collecting. [22 July 1990, 17 species]. In addition to the voucher collection, classes visited this locality in July 1991 and August 1993. On these nonvoucher dates, we took 21 and 19 species, respectively. Nonvouchered species are *Oncorhynchus mykiss* (1991), *Dorosoma cepedianum* (1991 only), *Fundulus zebrinus*, *Lepomis macrochirus* (1991), *Pomoxis annularis* (1991), *Etheostoma spectabile* (1991), and *Perca flavescens* (1993). Twenty-four species have been taken at this site, 19 of which are vouchered in museum collections. Species: 7, 8, 9, 11, 13, 14, 17, 18, 20, 23, 24, 25, 26, 31, 35 (UMMZ 220419), 38, 42.

5. 0.3 mi N Melbeta, Scottsbluff Co. T21N R53W Section 18 SW¼ sw¼. Side channel habitats only; depth to 0.6 m. This locality was sampled by Morris (1960) and is his station 22. Morris (1960) sampled the locality five times in 1959 and obtained 11 species including *Hybognathus hankinsoni* (not taken by us). JDL took *Gambusia affinis* at this site in 1990. [2 September 1995, 13 species]. Only 15 species are known from this site (14 as vouchers). It is undersampled. Species: 7, 8, 9, 11, 13, 14, 16, 17, 20, 23, 24, 25, 29, 35 (UMMZ 220422).

6. 1.8 mi S Bayard, Morrill Co. T20N R52W Section 4, SW¼. Johnson (1942) took *Fundulus sciadicus* at this locality. [22 July 1990, 15 species]. Classes visited this locality in July 1991 and took 15 species including five not taken in 1990 and not vouchered (*Ictalurus punctatus*, *Noturus flavus*, *Lepomis cyanellus*, *Micropterus salmoides*, and *Etheostoma spectabile*). This locality has been undersampled, but 16 species are represented by vouchers and five others are not vouchered. Species: 3, 7, 8, 9, 11, 13, 14, 15, 17, 20, 23, 25, 26, 34, 43.

7. 1 mi NNE Bridgeport, Morrill Co. T20N R50W Section 28 SW¼ nw¼. Main channel, side channel, small backwaters. Morris (1960) sampled at the Bridgeport Recreation Area, a few hundred meters upstream of our station. [28 October 1995, 13 species]. An ichthyology class sampled this site in

July 1990 and took 13 species (all vouchered) including *Dorosoma cepedianum*, *Moxostoma macrolepidotum*, *Fundulus sciadicus*, and *Noturus flavus*, species not taken in October 1995. Morris (1960) took 14 species at his station 21 (five samples during 1959) including *Platygobio gracilis*, a species we did not encounter here. Including Morris' (1960) records, only 18 species are known from this site (17 as vouchers). Species: 2, 7, 8, 9, 11, 13, 14, 15, 16, 17, 20, 23, 26, 30, 33, 34, 35.

8. 1 mi SW Broadwater, Morrill Co. T19N R48W Section 28 SE¼ sw¼. Main channel and small backwaters. Additionally, a small seepage stream heavily choked with aquatic vegetation on the north side of the river was sampled. [21 July 1991, 15 species]. JDL sampled the seepage stream 23 July 1990 and took five species (*Campostoma anomalum*, *Cyprinus carpio*, *Pimephales promelas*, *Fundulus sciadicus*, and *Etheostoma spectabile*) vouchered as JDL 90.53. The locality was also visited by an ichthyology class in August 1993, when we took 17 species, including *Rhinichthys cataractae* (not vouchered) and *Gambusia affinis* (vouchered as JDL 93.10). Eighteen species are known from this site (17 as vouchers). Species: 7, 9, 11, 12, 13, 14, 16, 17, 20, 23, 27, 29, 33, 34, 35, 42, 48.

9. 0.7 mi SW Lisco, Garden Co. T18N R46W Section 32 NE¼ sw¼. [22 July 1989, 12 species (main channel and backwaters); 28 October 1995, 17 species (backwater)]. This locality was sampled by Morris (1960) and is his station 20. Morris took 12 species (three sampling visits) including *Dorosoma cepedianum* and *Catostomus catostomus*, species not taken by us. Twenty species are known (18 as vouchers) from this locality. Species: 7, 9, 11, 12, 13, 14, 15, 16, 17, 20, 23, 24, 26, 29, 33, 34, 35, 45, 48.

10. 1.5 mi S Oshkosh, Garden Co. T16N R44W Section 10 NE¼ nw¼. Side and main channels (depth to 0.5 m); small backwater habitats on islands. [3 June 1995, 11 species; 2 September 1995, 16 species]. Johnson (1942) sampled at this locality in 1940 and took eight species, including two centrarchids (*Lepomis cyanellus* and *Micropterus salmoides*) not taken by us in either of our 1995 samples. An ichthyology class sampled here in July 1990 and took 13 species (only *Noturus flavus* was vouchered, FMNH 103557); *Dorosoma cepedianum*, *Lepomis cyanellus*, *L. macrochirus*, *Micropterus salmoides*, and *Morone chrysops* were not vouchered. Twenty-six species have been collected at this locality but only 21 are represented by vouchers. Species: 1, 7, 8, 9, 11, 13, 14, 15, 16, 17, 19, 20, 23, 26, 29, 30 (FMNH 103557), 33, 34, 35.

11. 1 mi SSW Lewellen, Garden Co. T16N R42W Section 33 SW¼ ne¼. [2 September 1995, 17 species]. The habitat consists of broad shallow channels with modest depth along each shore (to 0.5–1.0 m). Backwaters occur on shallow islands. A large *Typha* marsh on the north bank provides cool lentic waters (the marsh was not sampled in September 1995). Ichthyology classes have sampled this site previously (June 1980, August 1988, and July 1993, 12, 17, and 16 species, respectively). In 1980, we also took *Morone chrysops* and *Stizostedion vitreum* at this site, and in 1988 we took those species and *Etheostoma spectabile*. The 1993 sampling included *Culaea inconstans*, *Lepomis macrochirus*, *Etheostoma spectabile*, and *Stizostedion vitreum*, species not vouchered in 1995. *Culaea inconstans* is vouchered for the locality (JDL 93.1), as is *Etheostoma spectabile* (JDL 90.44). Twenty-two species are known by us from this site (19 are vouchered). Species: 2, 7, 9, 11, 13, 14, 15, 16, 17, 20, 23, 24, 26, 29, 33, 34,

35, 37, 48.

12. 1.5 mi SE Lewellen, US Highway 26 bridge, Garden Co. T16N R42W Section 34 NE $\frac{1}{4}$  se $\frac{1}{4}$ . The habitat consists of a main channel (to about 1 m deep) and side channels (less than 0.5 m). Some backwater habitat occurs on the large islands just west of the bridge. On one island is a *Typha*-ringed pond, rarely in contact with the river. On the north-west side of the bridge is a large borrow pit up to 2 m deep (not sampled in 1995). [2 September 1995, 15 species]. Ichthyology class records for six other visits (June 1980, July 1981, August 1981, June 1982, July 1987, and July 1993) are available but not vouchered. *Micropterus salmoides* was vouchered for this locality on 28 October 1995 (ZM 7902). Those data are summarized as follows (the number in parentheses following the species number [see list in Accounts of Species] reports the number of visits in which the species was taken at this site [of 7 visits])—vouchered: 2(5), 7(5), 11(7), 13(7), 14(7), 15(2), 16(5), 17(3), 20(6), 23(3), 26(3), 29(6), 34(7), 35(1), 50(5); nonvouchered: 9(5), 27(6), 30(1), 33(3), 38(6), 39(5), 40(3), 42(4), 43(1), 44(1), 45(5), 48(1), 49(2). *Esox lucius* was taken at this station once in the early 1980s but was not vouchered. Twenty-nine species have been found at this locality but only 15 are vouchered in museum collections.

13. 0.7 mi SW Keystone, Keith Co. T14N R37W Section 5 SW $\frac{1}{4}$  sw $\frac{1}{4}$ . [15 April 1995, 11 species; 7 June 1995, 12 of 16 species vouchered]. Morris (1960) sampled this locality (his station 17) twice in 1959 and found 14 species (*Catostomus commersoni*, *Cyprinella lutrensis*, *Hybognathus hankinsoni*, *Fundulus zebrinus*, and *Etheostoma spectabile* only taken once in the two visits). Frank B. Cross collected at this site on 11 September 1959 and found 16 species (*Cyprinella lutrensis*, *Cyprinus carpio*, *Lepomis cyanellus*, and *Micropterus salmoides* not vouchered); Cross' collection is preserved at the University of Kansas (4843-53; species: 7, 8, 9, 12, 14, 17, 20, 23, 25, 26, 33, 34). DEC sampled this site in September 1988 and obtained species 3, 6, 7, 8, 9, 14, 20, 26, 45, and 50. JDL's ichthyology classes sampled it in June 1978, June 1980, August 1981, July 1983, July 1992, August 1993, June 1995, and July 1995. The species list is based on eight visits by JDL's ichthyology classes and our collection of 15 April 1995 (number in parentheses records frequency of capture, of nine visits). Species (vouchered): 8(9), 9(9), 12(8), 15(4), 17(8), 20(9), 22(1), 23(6), 25(9), 26(9), 37(1), 38(4), 48(1), 49(2); (nonvouchered): 3(1), 7(2), 13(1), 14(6), 29(1), 34(3), 41(1), 45(2), 50(2). *Esox lucius* was taken in 1975 but neither specimen was deposited as a museum voucher. Twenty-seven species are known from this locality but only 17 have been vouchered (including three species vouchered on the basis of Cross' 1959 collection (7 [KU 4843], 33 [KU 4850], 34 [KU 4849])).

14. 4 mi N, 0.5 mi W Paxton, Keith Co. T14N R35W Section 18 SE $\frac{1}{4}$  se $\frac{1}{4}$ . Main channel (to 1.0 m), sheltered pond on island, attached borrow pit on north side of river, heavily vegetated side channel along north shore. [15 April 1995, 14 species; 28 June 1995, 10 of 14 species vouchered]. Ichthyology classes also sampled the locality eight other times since 1980 (June 1980, August 1981, June 1986, July 1987, August 1990, July 1992, July 1993, and August 1993), securing 19, 18, 16, 15, 11, 14, 18, and 19 species, respectively. Species (vouchered): 9(10), 12(8), 15(7), 17(10), 20(8), 22(1), 23(9), 26(10), 33(10), 34(9), 35(4, since 1990), 37(3), 38(9), 40(9), 42(10), 48(6); (nonvouchered): 2(2), 5(4), 7(3), 8(1), 13(4), 14(7), 25(1), 27(4), 41(1), 43(3), 44(2), 49(3), 50(1). Twenty-nine

species have been found at this locality and 16 are vouchered.

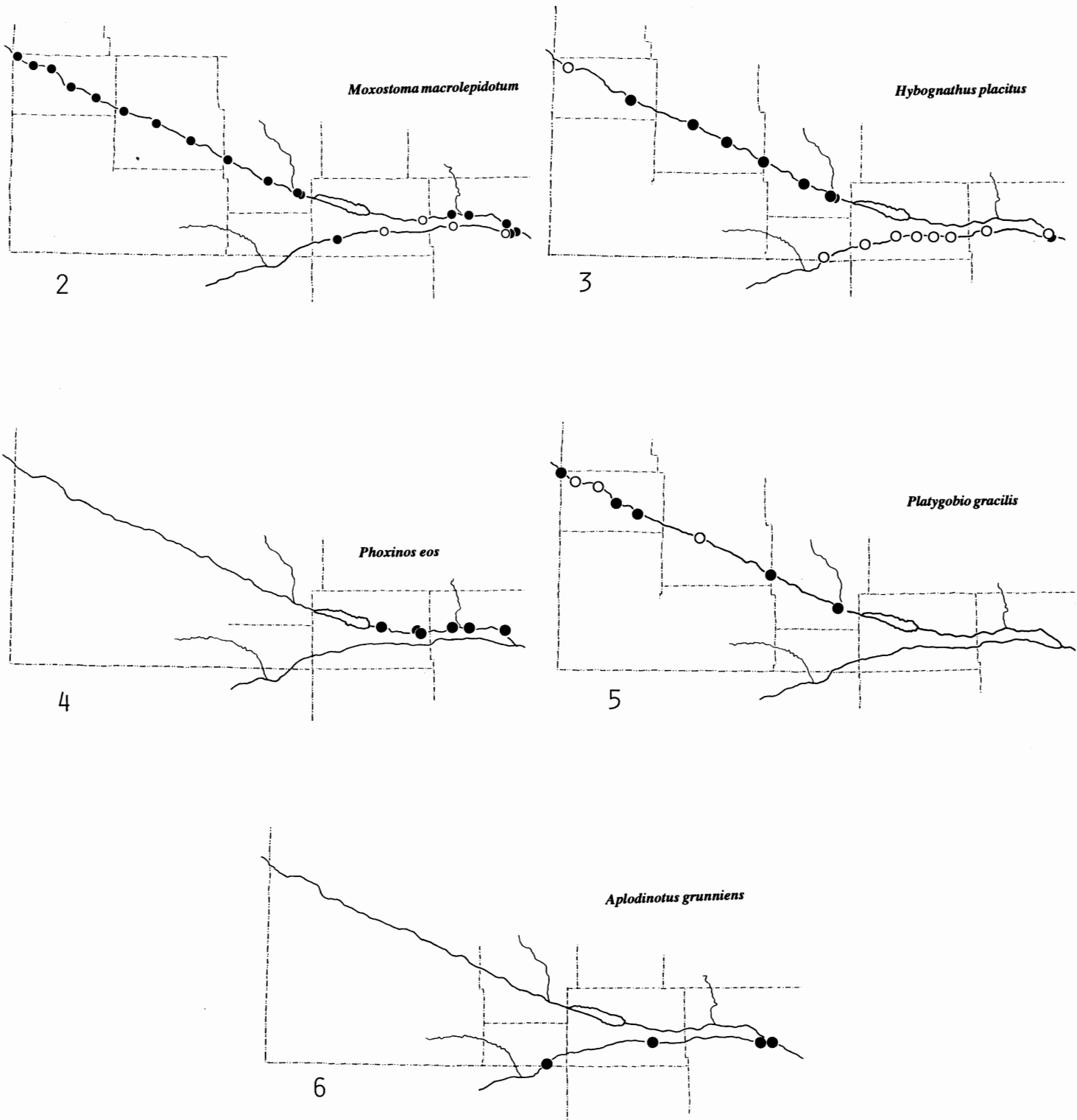
15. 0.5 mi N Sarben, Keith Co. T14N R35W Section 22 NE $\frac{1}{4}$  se $\frac{1}{4}$ . In addition to the main channel and a side channel on the north bank, collectors routinely visited a large pond occupying most of the large island immediately west of the bridge. In April 1995, we collected along a side channel, heavily clogged with algae, on the south bank. [15 April 1995, 12 species; June 1995, 13 species]. Additionally, ichthyology classes sampled this site in August 1989, August 1990, August 1991, and July 1992, taking 13, 14, 16, and 10 species, respectively. Species (vouchered): 9(5) 12(4), 15(3), 17(6), 20(5), 23(5), 23(5), 26(4), 33(6), 34(6), 35(5), 37(3), 38(4), 40(4), 42(5), 48(4); (nonvouchered): 7(2), 8(1), 11(1), 14(4). Only 20 species (16 as vouchers) are known from this locality (no more than three kilometers below station 14, where 29 species are known), which does not have as much lentic waters.

16. 3.5 mi N Sutherland, Lincoln Co. T14N R33W Section 4 SW $\frac{1}{4}$  sw $\frac{1}{4}$ . This is probably the same station sampled by Johnson (1942), "3 mi N Sutherland", and by Morris (1960), "3 mi N, 1 mi W Sutherland". The habitat consists of main and side channels as well as pools associated with bridge supports. Just west of the bridge, along the northern bank, is a sluggish, cold stream. [24 March 1995, 10 species; 17 June 1995, 18 species]. In addition, an ichthyology class collected here in August 1988 and took 20 species. Species (vouchered): 9, 11, 12, 13, 15, 17, 20, 22, 23, 26, 33, 34, 35, 38, 40, 41; (nonvouchered): 7, 8, 14, 29, 37, 43, 48. Twenty-three species are known from this site.

17. 4 mi N, 2 mi W Hershey, Suburban Canal diversion, Lincoln Co. T14N R32W Section 7 SW $\frac{1}{4}$  nw $\frac{1}{4}$ . [6 June 1995, 9 species; 24 June 1995, 20 species]. A deep swift pool lies immediately below the diversion dam. A small seepage stream, heavily choked with vegetation, enters the river on the north shore just below the diversion dam. The impoundment above the diversion was also sampled (24 June 1995) but with only limited success. This locality was sampled by Morris (1960) four times in 1959 (his station 15). Morris (1960) found 13 species, ten of which we obtained as well. He reported *Fundulus sciadicus* (which we have seen but failed to capture at the site) and *Pomoxis annularis*, records we think correct, and *Notropis blennioides*, a record we doubt. Species: 2, 7, 8, 9, 11, 12, 13, 14, 15, 17, 20, 22, 23, 26, 27, 34, 35, 36, 38, 40, 42. Hybrid sunfish (38 × 40) were found here as well. Twenty-three species have been taken at this site, based on relatively few visits.

18. 3 mi N Hershey, Lincoln Co. T14N R32W Section 9 SW $\frac{1}{4}$  nw $\frac{1}{4}$ . Main channel and a side channel. These are connected by a smaller channel crossing an island and forming relatively deep (to 1 m) backwaters. [14 June 1992, 10 species; 23 March 1995, 7 species; 28 June 1995, 13 species]. DEC collected here (electrofishing) in July 1988 and took species 8, 9, 11, 13, 14, 17, 20, 26, 29, 38, 40. Twenty-one species are known (18 as vouchers). Species: 7, 8, 9, 11, 12, 13, 14, 15, 17, 20, 21, 22, 23, 26, 34, 35, 37, 42. Hybrids (12 × 25) were also taken here but no *Rhinichthys cataractae* have been found by us at this site.

19. 1 mi N North Platte, US Highway 83 bridge, Lincoln Co. T14N R30W Section 28 SE $\frac{1}{4}$  nw $\frac{1}{4}$ . There is a single channel here but along the north shore there are smaller side channels braiding over the large sand bar. Backwaters are abundant on the sand bar, up to 1.5 m deep. Most collecting was concentrated along the north bank and in the deeper backwaters. [15 April 1995, 16 species; 29 October 1995, 9



Figures 2-6. Distribution of fish species in the forks of the Platte River, Nebraska. Open symbols are unvouchered records.

species]. Species: 7, 9, 11, 12, 13, 15, 17, 20, 23, 26, 33, 34, 35, 36, 38, 40, 42. Only 17 species are known from this site, which is inadequately sampled.

20. 2.5 mi E North Platte, US Highway 30 bridge, Lincoln Co. T13N R30W Section 1 NE¼ nw¼. Main and side channels (mostly shallow but occasionally to 1 m) as well as a lentic borrow pit connected to the river. [15 April 1995, 12 species; 10 June 1995, 12 species, four as vouchers]. Ichthyology classes have visited this site frequently (July 1982, August 1987, July 1988, July 1991) and DEC sampled here in September 1988. Those five visits obtained 11, 14, 20, 12, and 9 species respectively. Vouchered species for the locality are: 1, 7, 8, 13, 17, 20, 26, 34, 35, 36, 38, 39, 40, 42, 44, 49. All records (frequencies in parenthesis, N = 7) are as follows: 1(1), 2(3), 7(5), 8(2), 9(2), 11(3), 12(1), 13(7), 14(2), 16(1), 17(6), 20(6), 23(1), 26(2), 27(1), 29(3), 34(4), 35(5), 36(4, since 1987), 37(1), 38(3), 39(2), 40(7), 41(2), 42(7), 44(4), 49(4), 50(1). Twenty-eight species are known for this site but only 16 have been vouchered.

### South Platte River

21. 6.5 mi SW Big Springs, Western Canal gate, Deuel Co. T12N R43W Section 13 NW¼ nw¼. This site was completely dry in late March 1995 but was scoured in the flooding of June 1995. When we visited it 3 September 1995, the site consisted of a pool (more than 2 m deep) below the gates to the Western Diversion Canal and a small stream (2–4 m wide, 0.5 m deep) leading to the South Platte River. [3 September 1995, 18 species]. This may be a site visited by Johnson (1942) and described as "2 mi NE of Colorado line" where he took three species also taken by us. Species: 2, 7, 9, 13, 14, 17, 20, 23, 26, 27, 29, 34, 35, 38, 39, 40, 42, 44. Classes have visited this site during the early 1990s and vouchers exist for two other species (37 and 51). Nonvoucher records are also available for species 12, 16, 21, and 49. Twenty-four species have been taken at this locality.

22. 0.6 mi S Big Springs, Deuel Co. T13N R41W Section 31 NW¼ sw¼. The habitat consisted of a small main channel (to about 0.6 m) with sand and gravel substrate, a backwater about 1 m in depth, and a small backwater on a sandbar (source for *Fundulus sciadicus* and *Gambusia affinis*). [22 March 1995, 5 species; 3 September 1995, 11 species]. Species: 9, 12, 14, 17, 20, 23, 26, 29, 33, 34, 35. Previous sampling at this locality had not yielded species 33 or 35. A class visited the site in August 1983 and took 18 species (nine of the above plus species 2, 7, 13, 15, 21, 25, 27, 38, 39). DEC sampled the site in July 1987 and found six species (12, 13, 14, 17, 20, 23). Only 20 species have been taken at the locality and only eleven are vouchered.

23. 0.5 mi S Brule, Keith Co. T13N R40W Section 22 NE¼ sw¼. Following the scouring floods of June 1995, the habitat at this site consisted of shallow main channels (to 0.5 m), large shallow backwaters, and isolated pools (0.3–1.0 m deep). Johnson (1942) sampled this station and found seven species (9, 12, 17, 18, 20, 26, 34). [3 September 1995, 17 species]. Species: 7, 9, 11, 12, 13, 14, 17, 20, 23, 26, 29, 34, 35, 38, 40, 42, 44. The only other voucher we have for this locality is for *Rhinichthys cataractae* (ZM 2427, collected 9 July 1986). Ichthyology classes visited this site nine times between June 1978 and August 1988. The frequency distribution for the pooled species list for those nine visits is: 2(1), 7(3), 9(9), 12(9), 13(9), 14(9), 15(8), 16(5), 17(9), 20(9), 21(6), 23(9), 25(2), 26(8), 27(4), 34(9), 37(2), 38(3), 39(5), 40(1), 42(1). In the face

of these data, it appears certain that *Luxilus cornutus* is extirpated at this locality. This is a well-collected locality with 25 species known (18 as vouchers).

24. 0.5 mi S Ogallala, Keith Co. T13N R39W Section 7 NE¼. The habitat consists of a shallow main channel (ca 0.5 m) and a few side channels. In addition, backwaters occur on some of the larger sandbars and along the banks, associated with wingdikes. Johnson (1942) sampled this station and obtained 12 species (9, 12, 15, 16, 17, 18, 20, 23, 26, 34, 40, 48). [3 September 1995, 12 species]. Species: 7, 12, 14, 17, 20, 21, 23, 26, 29, 34, 42, 44. Species 35 was vouchered (UMMZ 220440) for this locality in 1991. Ichthyology class activities sampled this locality seven times between June 1978 and August 1983 and secured the following (frequency in parentheses): 2(1), 6(1), 7(4), 9(6), 12(7), 13(7), 14(5), 15(5), 16(3), 17(7), 20(7), 21(4), 23(7), 26(5), 27(1), 29(1), 34(7), 39(4), 42(1), 49(1). Miscellaneous collecting at the locality (1975–1986) also resulted in nonvouchered records for species 25, 37, and 43. The absence of *Luxilus cornutus* (reported by Johnson, 1942) suggests extirpation of that species for the South Platte River. Johnson (1942) also reported *Etheostoma exile* from this locality and we have not encountered it. In 1990, students from a vertebrate-zoology course reported to JDL that they had taken *E. nigrum* at this locality. The specimens were discarded before JDL could examine them. On the basis of JDL having observed the identification skills of those students, it is probable that the darters were either *E. exile* or *E. nigrum*. This is a well-collected locality with 26 species (not counting the *Etheostoma*), 17 of which are vouchered.

25. 0.5 mi SE Roscoe, Keith Co. T13N R37W Section 5 SE¼ ne¼. The habitat sampled in March 1995 was a side channel and its associated backwaters in and around wingdikes. [22 March 1995, 6 species]. Species: 12, 17, 20, 23, 26, 34. In addition, *Gambusia affinis* is vouchered for this locality (UMMZ 220437). Ichthyology classes visited this locality six times between June 1982 and August 1991 and obtained the following species (frequencies in parentheses): 2(1), 7(3), 9(6), 11(1), 12(6), 13(6), 14(4), 15(4), 16(2), 17(6), 20(6), 21(3), 23(6), 25(1), 26(6), 34(6), 35(2, since 1988), 37(1), 38(3), 39(1), 40(1), 42(1), 44(1), 49(2). Twenty-four species are known from the locality although only seven are documented by vouchers.

26. 5.5 mi E, 1 mi S Roscoe, Korty diversion dam, Keith Co. T13N R36W Section 8 NW¼ se¼. The habitats below the diversion dam vary with recent flow patterns. Normally, there are one or two relatively deep (ca 2 m) pools below gate(s) and a braided main channel flowing east. When we sampled in March 1995, workers had created two channels along opposite sides of the river with a massive sand deposit between them. Following the June floods, a large pool formed all the way across the river below the dam (depth in excess of 2 m) and was drained by two or three shallow channels. [22 March 1995, 8 species; 3 September 1995, 11 species]. Species: 7, 9, 12, 13, 17, 20, 25, 26, 34, 35, 39, 42, 49. *Aplodinotus grunniens* is vouchered (ZM 3920) from this locality based on a small adult taken in July 1988. In addition to these 14 species, miscellaneous collecting at this site 1987–1993 provides nonvouchered records for nine others (species 2, 8, 14, 15, 16, 21, 27, 29, 38).

27. 0.6 mi S Paxton, Keith Co. T13N R35W Section 8 NW¼ se¼. When we sampled the site in March 1995, the available habitat consisted of side channels to about 0.3 m and an isolated pool (0.5–0.8 m deep) under the bridge. [23



March 1995, 9 species]. Species: 9, 12, 13, 15, 17, 20, 23, 26, 34. In addition, vouchers are available for *Gambusia affinis* (ZM 1738, July 1986) and *Culaea inconstans* (ZM 1739, August 1990). Ichthyology classes visited the site seven times between July 1983 and July 1993 [July of 1983 and 1986, August of 1988, 1989, 1990, and 1991, and July of 1993] taking 16, 19, 17, 6, 12, 15, and 6 species, respectively. DEC sampled the site twice (July 1987 and June 1990) taking 9 and 10 species, respectively (but see below). Species (with frequencies in parentheses) taken in these nine samples are: 2(1), 7(4), 9(4), 12 (6), 13(8), 14(7), 15(3), 16(3), 17(8), 20(8), 21(2), 23(9), 25(2), 26(9), 27(2), 33(1), 34(9), 35(6, since 1986), 37(5), 38(4), 39(3), 42(1), 49(3). Not included in these data are two other DEC records for this locality (*Hybognathus argyritis* in 1987 and *Ameiurus natalis* in 1990). We have not been able to locate vouchers for the record of *H. argyritis*, of which we are suspicious because it would be the only record from the South Platte River. Ken Bazata (*in litt.*, 17 May 1996) informed us that the *Ameiurus* record is a mistranscribed record for *Perca flavescens*. Aside from the two disputed DEC records, 23 species are known for the site (only eleven as vouchers).

28. 1.2 mi S Sutherland, Lincoln Co. T14N R33W Section 32 S½. In March 1995, we sampled the main channel and two small side channels as well as isolated and semi-isolated pools against the south bank. On other occasions, sampling at this locality has included a large borrow pit on the north shore just east of the bridge. The 1987 collection was made from isolated pools along the south bank and from the main channel. [29 July 1987, 8 species; 23 March 1995, 12 species]. Species: 8, 9, 12, 13, 17, 20, 23, 25, 26, 27, 33, 34, 35, 37, 42. Ichthyology classes visited this site, working both the riverine habitats and the borrow pit, seven times (June 1978, July 1980, July 1981, June 1982, July 1983, July 1987, and July 1993) taking 17, 22, 21, 18, 21, 19, and 14 species, respectively (29 species in total). This was the first site in Nebraska where JDL detected feral populations of mosquitofish, *Gambusia affinis* (23 July 1981), and the site has been occupied continuously by them for the past 15 yr. The frequency distributions of these 30 species are as follows: 2(5), 6(1), 7(6), 8(3), 9(7), 11(3), 12(4), 13(6), 14(6), 15(1), 16(1), 17(7), 20(7), 21(3), 23(7), 25(7), 26(6), 27(6), 29(2), 33(1), 34(7), 35(5), 37(3), 38(5), 39(6), 40(2), 42(5), 43(4), 44(2), 49(4). This is a well-collected site with 30 species known (only 15 of which are known as vouchers).

29. 1.3 mi S Hershey, Lincoln Co. T14N R32W Section 32 SE¼ se¼. In March, we sampled from a large backwater along the south levee (to 0.5 m) and in the South Channel. In October, we sampled the main channel and backwaters (1.0–1.5 m deep) along the south levee. [23 March 1995, 12 species; 28 October 1995, 12 species]. Species: 7, 9, 12, 15, 17, 20, 21, 23, 25, 26, 33, 34, 37, 40, 42, 44, 49, 50. *Gambusia affinis* is also known from this locality (Lynch, 1988), which is poorly known (only 19 species) but well-vouchered.

30. 1.5 mi S North Platte, US Highway 83 bridge, Lincoln Co. T13N R30W Section 9 NE¼ nw¼ and NW¼ ne¼. The March sample was taken from isolated pools, a small stream entering on the north bank, and around debris in a side channel. The October sample was taken from an isolated pool beneath the bridge, a side channel, and the main channel. [23 March 1995, 14 species; 29 October 1995, 16 species]. Species: 7, 9, 12, 13, 14, 15, 17, 19, 20, 23, 26, 29, 33, 34, 35, 37, 38, 40, 42, 51. This locality was sampled by ichthyology

classes in July 1982, when 12 species were taken including two suckers not listed above (*Carpionodes carpio* and *Moxostoma macrolepidotum*, nonvoucher records) and July 1988, when 14 species were taken including three (*Dorosoma cepedianum*, *Labidesthes sicculus*, and *Micropterus dolomieu*) not listed above and not vouchered. This site is not well-collected, although we have records of 25 species (20 as vouchers).

31. 2.7 mi SE North Platte, Newberry Exit, Lincoln Co. T13N R30W Section 11 SW¼ ne¼ and SE¼ nw¼. The collection for vouchers was made in the main channel (to about 1.3 m), a side channel (0.5 m deep), and a long backwater along the north bank (to about 0.5 m). [3 September 1995, 21 species]. Species: 2, 7, 9, 10, 11, 12, 13, 14, 15, 17, 19, 20, 27, 29, 35, 36, 40, 41, 42, 49, 50, 51. *Culaea inconstans* is also vouchered from this locality based on a specimen captured in 1993 (JDL 93.08). This locality was also visited by ichthyology classes on six occasions (August 1987, July 1988, August 1989, and July of 1990, 1991, and 1993) where 16, 15, 18, 21, 23, and 25 species, respectively, were taken. DEC sampled here in July 1987 and August 1992, obtaining 17 (or 18) and 15 species, respectively. We suspect that DEC biologists erroneously divided their sample of *Notropis ludibundus* into two species (they also reported obtaining *N. blennioides* here) in 1987. The DEC record of *Morone americana* (1992) is actually a mistranscription of data and was based on *Perca flavescens* (K, Bazata, *in litt.*, 17 May 1996). With these two caveats, the frequencies of occurrence of the other 31 species in these eight samples are as follows: 2(7), 6(1), 7(6), 8(3), 9(6), 10(1), 11(7), 12(4), 13(8), 14(8), 15(1), 17(8), 20(8), 21(1), 23(8), 26(7), 29(5), 34(6), 35(7), 36(7), 37(1), 38(5), 39(3), 40(6), 41(8), 42(3), 43(1), 44(2), 49(6), 50(3), 51(2). Thirty-three species have been taken at this well-collected locality (23 species are vouchered). *Ictiobus cyprinellus* is known only from this site.

### Platte River

32. 4.5 mi E, 2 mi S North Platte, North Platte diversion dam, Lincoln Co. T13N R29W Section 8 NW¼ sw¼. Our collection was made in the pools and channels immediately below the diversion dam. We sampled pools to 1.5 m, including those behind closed gates. A gravel-bottomed 'stream' flowed along the concrete apron of the diversion dam and it was sampled as a distinctive microhabitat (yielding many of our specimens of species 12, 21, and 25). [29 October 1995, 28 species]. Species: 2, 6, 7, 9, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 23, 25, 26, 29, 32, 34, 36, 40, 41, 42, 45, 49, 50, 51. Although we made a very fine collection here in October 1995, we do not think this locality is well-sampled. *Pylodictis olivaris* is known only from this site. For computational purposes, we treat this site as being on the South Platte River even though it is the junction of the North Platte and South Platte rivers and the beginning of the Middle Platte River.

## THE ICHTHYOFAUNA

Four species (*Salmo trutta*, *Ameiurus natalis*, *Noturus gyrinus*, and *Etheostoma exile*) were not taken from the Platte River but were found in tributary streams. Our failure to take them in the river is attributed to habitat preferences by these species. The two catfishes are found only in Whitehorse Creek, just north of the city of North Platte, at the eastern extreme

of the study area. We did not take *Esox lucius* during the surveys but have collected it on several occasions in the North Platte River.

Thirty-one native species and 15 alien (introduced) species were found. Three species (*Scaphirhynchus platyrhynchus*, *Nocomis biguttatus*, and *Macrhybopsis gelida*), for which historical records exist, were not encountered in our surveys and are presumed extirpated from western Nebraska. We do not include in the ichthyofauna the following species: *Ambloplites rupestris* (introduced in Lake Ogallala and common in a few sandpits just below the Keystone diversion dam), *Morone saxatilis* (introduced into Lake McConaughy), *Notemigonus crysoleucas* (collected sporadically in Lake McConaughy and Lake Ogallala, probably bait releases), *Notropis hudsonius* (introduced into Lake McConaughy but extirpated by 1983), *Oncorhynchus clarkii* (taken in gillnets in Lake Ogallala), *Osmerus mordax* (introduced into Lake McConaughy but apparently extirpated), *Salvelinus fontinalis* (taken on rod and reel in Lake Ogallala in the late 1970s but not since), and *Scardinius erythrophthalmus* (introduced into Lake McConaughy ca 1989 but apparently extirpated by 1994). Ignoring these eight species associated with Lake McConaughy and the three extirpated natives, we suggest that the ichthyofauna of the Nebraska sections of the North and South Platte rivers and their attendant tributaries consists of 51 species of actinopterygians (these species are numbered 1 through 51 in the species accounts).

In the North Platte River above Lake McConaughy (stations 1–12), we found 34 species in 1989–95. In addition, five other species were taken at one to four localities in 1976–88 but not vouchered. In the North Platte River below Lake McConaughy (stations 13–20), 31 species were found in 1992–95. Two other species (*Ictalurus punctatus* and *Stizostedion vitreum*) were collected in 1995 but were not preserved as vouchers because the specimens were too large (over 60 cm SL). *Esox lucius* has been collected at various times but no vouchers were saved. Thirty-seven species were taken in the South Platte River (stations 21–32). Between the Colorado border and US Highway 83 at North Platte (stations 21–30), the South Platte River is a low volume stream with about 30–31 species of fishes. However, between stations 30 and 31, the South Platte River receives substantial inflow from reservoir discharge and the ichthyofauna changes substantially (records of *Carpionodes carpio*, *Ictiobus cyprinellus*, *Notropis atherinoides*, *Pylodictis olivaris*, *Labidesthes sicculus*, *Micropterus dolomieu*, *Morone chrysops*). In addition to these species, *Lepisosteus osseus* reaches its western limit below the North Platte diversion dam (station 32).

## ACCOUNTS OF SPECIES

Species are listed in the family sequence adopted by most ichthyologists, but within families, species are ordered alphabetically by scientific name.

### CLUPEIDAE (Herrings)

1. *Alosa pseudoharengus* (Alewife). This Atlantic coast species was introduced into Lake McConaughy in the late 1980s as a forage base for certain gamefish. We first detected it in 1989 in Lake Ogallala as young-of-the-year. In the early 1990s, *Alosa* was extremely abundant in the system of irrigation lakes. We have collected it only twice in the rivers: once in 1992 (station 20) and once in 1995 (station 10).
2. *Dorosoma cepedianum* (Gizzard Shad). The native herring occurs throughout the system but is encountered only sporadically. We obtained vouchers at seven sites (7, 8, 11, 12, 17, 21, 31, 32) but have found it at about two-thirds of the 32 sites in the past 20 yr. Adults are taken commonly in impoundments and below diversion dams, but most of our records are based on young-of-the-year fish.

### SALMONIDAE (Salmon and Trout)

3. *Oncorhynchus mykiss* (Rainbow Trout). A single voucher was taken at station 6 and specimens were found at station 4 in 1991 and station 13 in 1993. This species is relatively common in several streams entering the North Platte River.
4. *Salmo trutta* (Brown Trout). Brown trout are rarely encountered in the region. We took one in Horse Creek near Lyman (1989), and the species has been found three times in Whitetail Creek by students doing class projects (all specimens are young-of-the-year).

### ESOCIDAE (Pikes)

5. *Esox lucius* (Northern Pike). Although we did not encounter this species during our surveys, we have taken it nine times during ichthyology classes over the past 20 yr (never vouchered) along the North Platte River. Northern Pike have been seined at stations 12 and 13, station 14 (four times), and from Whitehorse Creek (three occasions). Individuals captured varied from 10–70 cm SL.

### CATOSTOMATIDAE (Suckers)

6. *Carpionodes carpio* (River Carpsucker). The River Carpsucker has been found only rarely in the region. It has been taken in an oxbow at station 28 twice in 20 yr and was found to be relatively common at station 32 in 1995.
7. *Carpionodes cyprinus* (Quillback Carpsucker). This Carpsucker occurs throughout the region. Adults are taken rarely except at stations 10–12 (immediately above Lake McConaughy). Vouchers were obtained at 23 stations. Animals greater than 20 cm SL are found in the North Platte River immediately above Lake McConaughy

and immediately below the Keystone diversion. Specimens this large are also common below the North Platte diversion (station 32). Nearly all other specimens taken are young-of-the-year or those from the previous year.

8. *Catostomus catostomus* (Longnose Sucker). The Longnose Sucker is abundant only in the western Panhandle (stations 1–7) and immediately below Lake McConaughy (station 13). Nevertheless, it can be found regularly at station 28 (Sutherland, South Platte River) and at Hershey (North Platte River, stations 17, 18). It is also common in tributary streams entering the North Platte River.
9. *Catostomus commersoni* (White Sucker). We found this species at 28 stations during the survey. It has been taken at all 32 stations during the past 20 years and is often locally abundant (station 13). In our survey, it was the tenth most abundant species (1.1%).
10. *Ictiobus cyprinellus* (Bigmouth Buffalo). The Buffalo was found only at station 31, immediately below the discharge from Lake Maloney. Young-of-the-year were found in two different years at this site.
11. *Moxostoma macrolepidotum* (River Redhorse). This is a common species in the North Platte River above Lake McConaughy (found at every station) whereas it is less common elsewhere in the forks of the Platte (Fig. 2). It is absent just below Lake McConaughy (present at stations 16–19) and is rare in most of the South Platte River (taken at stations 23, 31, 32) in 1995. The occurrence at station 23 (three juveniles) in 1995 is thought to reflect dispersal during the high water pulse of the summer. The species had not been found in the western portion of the South Platte River in 20 years of sampling (except once at Roscoe).

### CYPRINIDAE (Minnows)

The abundant shiners were formerly all included in the genus *Notropis* but the Platte species are now partitioned into four genera following Mayden (1989): *Cyprinella* ("*Notropis*" *lutrensis*), *Hybopsis* ("*Notropis*" *dorsalis*), *Luxilus* ("*Notropis*" *cornutus*), and *Notropis*.

12. *Campostoma anomalum* (Stoneroller). This species is abundant in the South Platte River (stations 22–32) but rare in the North Platte River. We found it at seven of eight stations on the North Platte River below Lake McConaughy (13–19) but it was common at only one (station 15). Above Lake McConaughy, the species was found only twice. Single specimens were taken at the Lisco site (station 9) in October 1995 and the Broadwater site (station 8) in July 1991. Johnson (1942) and DEC found the species at Henry (station 1) three times but we failed to detect it during our single visit. Overall, *Campostoma anomalum* is the ninth most abundant species in the survey (1.2%).
13. *Cyprinella lutrensis* (Red Shiner). Red Shiners are not distributed throughout the system but are the sixth most abundant species (3.1%). They are found at every station above Lake McConaughy, where they make up 3.1% of fishes taken, and are regularly found in the Lake. On the lower North Platte, below Lake McConaughy, they make up 6.2% of all samples but are absent at stations 13–15, rare at station 16, and common at stations 17–20. At stations 17–20, they make up 2.3–18.6% of the sample. In the South Platte River, Red Shiners are common only at stations 30–32, making up 2.0–9.7% of the sample. Although we found them at stations 21, 23, and 26–28 in 1995, they were rare (one or two specimens per sample (less than 0.3%), having been markedly more common before 1990.
14. *Cyprinus carpio* (European Carp). Although adults were seen at stations in March and April, none was collected; furthermore, few specimens were taken in June. Our collections in September and October consistently yielded young-of-the-year *Cyprinus carpio*. The species was introduced into Nebraska in the 1880s and has been seen or collected at each of the 32 sites on the North and South Platte rivers.
15. *Hybognathus hankinsoni* (Brassy Minnow). The Brassy Minnow is the third most abundant species (13.2%) encountered in our survey, but its abundance is partially accounted for by being very common at two sites (stations 1 and 32, 2,324 and 3,090 specimens respectively). It was found at 16 of 20 sites on the North Platte River (stations 1–3, 6, 7, 9–19) and was often very abundant (stations 1, 3, 9–12 9.3–54.7%) above Lake McConaughy. On the Lower North Platte River, below Lake McConaughy, the species was found at all but one station but was never abundant (most common at station 15: 5.5%). In the South Platte River, it was found only at five eastern stations (27, 29–32) and was abundant only at station 32 (20.9%).
16. *Hybognathus placitus* (Plains Minnow). The Plains Minnow is abundant only above Lake McConaughy. Nevertheless, it is the fourth most abundant species in our samples (7.7%). We found it at only eight stations (seven above Lake McConaughy—4, 7–12, and the easternmost locality, station 32). At stations 7 and 9–12, it was common (15.4–66.1%). Although we found it only at station 32 on the South Platte River in 1995, we found it west to the Colorado border in previous years but never as an abundant minnow (Fig. 3).
17. *Hybopsis dorsalis* (Bigmouth Shiner). This is the second most abundant species in the system (28.6%) and was found at all 32 stations during our sampling efforts. In addition, it was found at nearly every station visited between 1975 and 1995 (but occasionally absent at station 12). In the South Platte River, it is slightly more abundant than the Sand Shiner (34.2 vs. 32.6%); at eight stations (23–29, 31) it is more common than the Sand Shiner. Above Lake McConaughy, the abundance of *Hybognathus* reduces the ranks of Bigmouth and Sand shiners and Bigmouth Shiners are less abundant than Sand Shiners (14.3 vs. 21.2%); Bigmouth Shiners are more common than Sand Shiners at only three stations: 1, 2, 6). Below Lake McConaughy on the North Platte River, Bigmouth Shiners are less abundant than Sand Shiners (38.1 vs. 42.7%) but are more abundant than Sand Shiners at six of the eight stations (13–16, 18, 20).
18. *Luxilus cornutus* (Common Shiner). We took this species only at station 4 (1990) from the North or South Platte rivers, although it can be found regularly in tributary streams of the North Platte River in Scottsbluff County. Historically, it occurred in Lodgepole Creek (tributary to the South Platte River), but the populations

- were apparently poisoned by the Nebraska Game and Parks Commission during their stream renovation projects in the late 1960s into the early 1980s. Johnson (1942) reported it from western Keith County (South Platte River) but those populations are also extirpated (none detected 1975–1995).
19. *Notropis atherinoides* (Emerald Shiner). This species was introduced into Lake McConaughy using Wyoming stocks in 1990 and was found by us only in Lake McConaughy until 1995. We took Emerald Shiners at stations 1 and 10 (twice) and at stations 30–32 in 1995. This peculiar pattern of distribution suggests movement west from Lake McConaughy and east by means of the Sutherland Canal, which returns to the South Platte River between stations 30 and 31. At station 31, *N. atherinoides* was very abundant (16.1%), especially in the main channel.
20. *Notropis ludibundus* (Sand Shiner). This is the most abundant fish species in the system (30.8%) but its abundance shows parallel geographic variation to that of the Bigmouth Shiner. Sand Shiners were found at all 32 stations during the survey and have been found at nearly every sampling event on the system in 20 years of sampling (occasionally absent at stations 13 and 14). Older (1950–1988) literature uses the name *Notropis stramineus* for this species. Immediately below Lake McConaughy (stations 13–15), *N. ludibundus* is uncommon (only about 10% as abundant as *Hybopsis dorsalis*). However, overall, the Sand Shiner is more common in the forks of the Platte River than is the Bigmouth Shiner. Immediately above Lake McConaughy (stations 11, 12), Sand Shiners occur nearly to the exclusion of Bigmouth Shiners. Occasional records of the River Shiner (*Notropis blennioides*) are stated or implied. Our investigation of materials suggests that only minnows with 0,4/4,0 pharyngeal teeth occur in the region of the forks of the Platte, and that the color pattern features mentioned by Eddy and Underhill (1978) allow misidentification of *N. ludibundus* as *N. blennioides*.
21. *Phenacobius mirabilis* (Suckermouth Minnow). *Phenacobius mirabilis* is rarely abundant in the system and during our surveys was found at only stations 18 (Hershey), 24 (Ogallala), 29 (Hershey), and 32 (North Platte Diversion). One to six individuals were found at each locality. The species is found in Horse Creek, a tributary to the North Platte River (our records and Rahel and Hubert, 1991). At various occasions over the past 20 years, JDL's ichthyology classes have found the species common at stations 21, 24, and 26. In only a few years in the past 20 yr was *P. mirabilis* not found by ichthyology classes.
22. *Phoxinotus eos* (Northern Redbelly Dace). *Phoxinotus eos* reaches its southwestern range terminus in the region and was long known to occur in a few feeder streams in northwestern Keith County (Bliss and Schainost, 1973). Recently, it was found as well in Whitehorse Creek in Lincoln County (Haynes and Weekly, 1992). During our surveys, we found *P. eos* at five stations (13, 15–18) on the North Platte River below Lake McConaughy (Fig. 4). At stations 13, 16, and 18, single individuals were seined from the river, whereas at stations 15 and 17, five and six individuals were found in small seepage streams entering the North Platte River. On two occasions in 1978, *P. eos* was taken from the North Platte River at stations 13 and 14 (no vouchers were preserved).
23. *Pimephales promelas* (Fathead Minnow). *Pimephales promelas* was found at 30 of 32 stations and is the fifth most abundant species taken (4.8%). Although it was not found at stations 20 or 31 during the survey, the species has been found at each of those sites in other years. Fathead minnows are common when backwaters and isolated pools are available, but we found the species abundant at some localities on the South Platte River (5.0%) and North Platte River above Lake McConaughy (6.0%), even where backwaters were few. The species is markedly less common on the North Platte River below Lake McConaughy (2.0%).
24. *Platygobio gracilis* (Flathead Chub). In 20 years of fieldwork in the region, we found this species only above Lake McConaughy, where it is sporadic (Fig. 5). During our surveys, we found it at only five stations (1, 4, 5, 9, 11) and never in abundance. Adults as well as young-of-the-year were found in 1995.
25. *Rhinichthys cataractae* (Longnose Dace). Longnose Dace are common in the North Platte above Lake McConaughy (stations 1–5) and then become rare or absent (found at stations 6 and 8). In spite of extensive fieldwork over the past 20 years, we have never found them in the Garden County part of the North Platte River. Below Lake McConaughy, Longnose Dace are very common at Keystone (station 13) but seldom encountered to the east. In 1995, we did collect two hybrids of *Campostoma anomalum* and *R. cataractae* at station 18 (N of Hershey), providing evidence of some eastward dispersal. *Rhinichthys cataractae* is usually absent from collections on the South Platte River with the exception of station 28 (where *Catostomus catostomus* also makes its anomalous appearance). In 1995, we took *R. cataractae* at stations 26, 28, 29, and 32 on the South Platte River.
26. *Semotilus atromaculatus* (Creek Chub). The Creek Chub is the seventh most abundant species in the system (2.4%) and was found at 30 stations. Below Lake McConaughy (North Platte River) and on the South Platte River, *S. atromaculatus* was the fifth most abundant species in those 20 samples. Above Lake McConaughy on the North Platte River, this species ranked twelfth.

#### ICTALURIDAE (Catfishes)

27. *Ameiurus melas* (Black Bullhead). This is an introduced species, not at home in swiftly flowing streams such as the Platte River, and was found during our survey only five times (stations 8, 17, 21, 28, 31). We also have routinely found it at station 12 but did not collect it there in 1995. It is most frequently found in small streams flowing into the Platte River or in isolated pools.
28. *Ameiurus natalis* (Yellow Bullhead). This species reaches what is thought to be its western range limit in Nebraska in Whitehorse Creek, where it is abundant (Haynes and Weekly, 1992). We are aware of no records from the North Platte or Platte rivers.
29. *Ictalurus punctatus* (Channel Catfish). This species occurs throughout the region and was found at 15 of 32 sites. Its absence is attributed to the effect of season (no *Ictalurus* were found in March and April and few were encountered in June, whereas young-of-the-year were

abundant in September).

30. *Noturus flavus* (Stonecat). *Noturus flavus* is abundant in small streams entering the Platte River but is uncommon in the river. We found it at stations 4, 7, and 10 on the North Platte River above Lake McConaughy and have previously found it (not vouchered) at stations 6 and 12. We suspect that the flow rate of the North Platte River is too great for the species to be found there regularly. If that supposition is correct, we are at a loss to explain its absence from the South Platte River, which is normally a small stream.
31. *Noturus gyrinus* (Tadpole Madtom). This is the smallest catfish found in the system and, although Morris et al. (1974) reported it as distributed through the North Platte River to Wyoming, we are unaware of any basis for such a report. This species can be found abundantly in heavily vegetated portions of Whitehorse Creek, just north of the city of North Platte, Nebraska, its western distributional limit (Haynes and Weekly, 1992).
32. *Pylodictis olivaris* (Flathead Catfish). A single individual 44 cm SL was found dead on a sandbar at station 32. This is the westernmost locality for the species known to us in Nebraska. Employees of Central Nebraska Public Power told us (29 October 1995) that local fishermen took several individuals at this locality following the high summer flows of 1995. We have seen photographs of locally-caught *P. olivaris* in taverns along the Platte River in eastern Lincoln County, where the species is apparently common but seldom taken.

#### FUNDULIDAE (Topminnows)

33. *Fundulus sciadicus* (Plains Topminnow). *Fundulus sciadicus* is widely distributed but rare in this system. We found it at 13 stations, but it is nowhere common. The species is abundant in many of the streams entering the North and South Platte rivers but occurs in lentic water microhabitats along these rivers as well. Historically (before 1972), it appears to have been much more abundant than it is today and we attribute its decline to competition with the introduced Mosquitofish, *Gambusia affinis*.
34. *Fundulus zebrinus* (Plains Killifish). The Plains Killifish is widely distributed (27 of 32 stations) and relatively abundant in the system (2.0%, eighth most abundant species). However, it is rare in the North Platte River (0.8%) and much more abundant in the South Platte River (3.1%), where it is the sixth most abundant species.

#### POECILIIDAE (Live Bearers)

35. *Gambusia affinis* (Western Mosquitofish). Following its introduction in 1972, *G. affinis* has dispersed and been dispersed by humans over most of the Platte River system (Lynch, 1988). It is the eleventh most abundant species in our survey and was found at 27 stations. Lynch (1988) recorded it as dispersing up the South Platte River to Ogallala by 1987. We found the species at stations 21, 22, and 23 to the west of Ogallala. The species is also loose in Colorado (Woodling, 1985) and there is no way to be sure that the populations in western

Keith and Deuel counties originated from the introduction at North Platte and Brady in the early 1970s. At any rate, each source (Colorado and Nebraska) was derived from feral populations in Utah, which themselves were generated from a wild stock taken near Memphis, Tennessee, in 1931 (Rees, 1934, 1945). Lynch (1988) reported few feral populations along the North Platte above Lake McConaughy but that situation changed dramatically during the early 1990s and the species now appears to be distributed along the length of the North Platte River.

#### ATHERINIDAE (Siversides)

36. *Labidesthes sicculus* (Brook Silversides). This species was introduced accidentally with a stocking of *Dorosoma petense* into the cooling pond at the Sutherland Powerplant in 1979. The attempted introduction of *D. petense* failed, as might have been expected (Cross, 1967), but *Labidesthes sicculus* rapidly became very common (M. Madsen, pers. comm.). Subsequently, it has spread down the Platte River. We detected it in the mid-1980s in eastern Lincoln County. *Labidesthes sicculus* is not a species at home with the currents of the Platte River and invades backwaters where it can quickly become abundant. We found it only at the five easternmost stations (19, 20, 30–32). Hubbs (1921) noted that the species is very nearly an annual fish (young overwinter, reproduce, and die before next winter); the introduced populations in Nebraska follow that phenology as well. This species practices internal fertilization, but embryos are released after limited internal development (Grier et al., 1990).

#### GASTEROSTEIDAE (Sticklebacks)

37. *Culaea inconstans* (Brook Stickleback). This species was found at eleven stations, ten on the South Platte River or on the North Platte River below Lake McConaughy. Although not documented with vouchers, we have found the species at every locality in Deuel, Keith, and Lincoln counties except station 32. The sole record above Lake McConaughy is from a marsh beside the North Platte River just south of Lewellen (station 11).

#### CENTRARCHIDAE (Black Basses and Sunfishes)

38. *Lepomis cyanellus* (Green Sunfish). In our sampling, Green Sunfish were common at no site but are found throughout the system (taken at 13 stations). The best representation of vouchers is along the North Platte River below Lake McConaughy (7 of 8 stations). Putative hybrids with Bluegill were taken at station 17 (as were both putative parent species). In our experience, *L. cyanellus* is most easily caught using six-foot seines along the banks or in riprap. At many localities, we did not sample riprap so as to avoid tearing of the seines.
39. *Lepomis humilis* (Orangespotted Sunfish). We have found this species throughout the study area over the past 20 years but obtained vouchers from only three locations (stations 20, 21, and 26). Like *L. cyanellus*, *L. humilis* can often be caught by working the bank using

six-foot seines. During summer months most years, the species can be found in large numbers in lentic habitats along the river course, especially along the South Platte and station 12.

40. *Lepomis macrochirus* (Bluegill). This introduced sunfish species was taken at 12 stations (six along the North Platte below Lake McConaughy and six along the South Platte). Occasional individuals are taken from riprap and backwaters, but most of the specimens obtained came from borrow-pits attached to the North Platte River at stations 14 and 20.
41. *Micropterus dolomieu* (Smallmouth Bass). Smallmouth Bass were taken at only four locations in Lincoln County (stations 16, 20 [not saved], 31, 32). These fishes are especially abundant at station 31 in the outflows from Lake Maloney; elsewhere, the Smallmouth makes up an insignificant portion of the ichthyofauna.
42. *Micropterus salmoides* (Largemouth Bass). Largemouth Bass occur throughout the system (17 stations) and have been taken at every station at some time during the past 20 years. This introduced species is uncommon at stations unless there is some deep, relatively quiet water available. The species is very abundant at station 31 below the outflow of Lake Maloney.
43. *Pomoxis annularis* (White Crappie). Although we have taken *P. annularis* occasionally throughout the system, it is vouchered at only two stations during our survey (stations 6 and 8). In our experience, it is never abundant in this stream system.
44. *Pomoxis nigromaculatus* (Black Crappie). *Pomoxis nigromaculatus* was taken at five stations during our survey work (stations 21, 23, 24, and 29 on the South Platte River and station 20 on the North Platte River). All specimens were taken from backwaters and borrow-pits. We have taken the species on the North Platte River above Lake McConaughy in most years (station 12) but did not encounter it in 1995.

#### PERICHTHYIDAE (Sea Basses)

45. *Morone chrysops* (White Bass). In our surveys, we took White Bass on only three occasions (twice at station 8 and once at station 32). *Morone chrysops* is taken regularly during ichthyology class activities at stations 10–12 on the upper North Platte River, the only section of the stream system in which we view *M. chrysops* as an expected species.

#### PERCIDAE (Perches)

46. *Etheostoma exile* (Iowa Darter). In our surveys, we found this species once in Cedar Creek (just north of locality 14) and never in the rivers. Johnson (1942) found it in Lodgepole Creek as well as in the South Platte River at Ogallala. Recent collecting in Lodgepole Creek reveals the presence of only *E. spectabile* there. The ichthyofaunal changes in Lodgepole Creek resulted from stream renovation projects by the Nebraska Game and Parks Commission in the 1960s, 1970s, and early 1980s and re(?)introduction of *E. spectabile* by ichthyologists from Wyoming (W. Hubert, pers. comm., told me that darters were taken from Lodgepole Creek prior to the

first poisoning, held in captivity until the rotenone had dispersed, and then reintroduced into the western portions of Lodgepole Creek, where *E. spectabile* remains relatively common).

47. *Etheostoma nigrum* (Johnny Darter). The Johnny Darter was taken only at station 1; three individuals were seined in a backwater on a small island. This is the only station in the Nebraska panhandle where the species persists (taken at this same locality by DEC in 1990). It once occurred in Rush Creek (Cheyenne County) but that stream no longer has year-round flows. The historical reports for Lodgepole Creek (Johnson, 1942) reflect an ichthyofauna prior to stream renovation by the Nebraska Game and Parks Commission. The only evidence that we have that the species might persist in the South Platte drainage is the claim by vertebrate-zoology students in 1990 that they had caught two individuals while seining at Ogallala; unfortunately, the specimens were discarded before they could be examined.
48. *Etheostoma spectabile* (Orangethroated Darter). Orangethroated Darters are uncommon fish along the North Platte River both above and below Lake McConaughy. We took it at stations 8, 9, and 11 during our surveys but have found the species (not vouchered) at stations 4, 6, and 12 in various years. Below Lake McConaughy, *E. spectabile* occurs in several small streams flowing into the North Platte River and was taken by us at stations 14 and 15. In addition, we took one juvenile in the mouth of Whitetail Creek (essentially equal to station 13).
49. *Perca flavescens* (Yellow Perch). Yellow Perch were found at stations 13, 20, 26, 29, 31, and 32; this species occurs throughout the system as a product of introductions. Yellow Perch are not river and stream fishes but occur in more or less lentic waters associated with the rivers. As such, their distribution is spotty.
50. *Stizostedion vitreum* (Walleye). We took *S. vitreum* at stations 12, 13 (not preserved), 29, 31, and 32. These fishes are most abundant below the inflow of Lake Maloney. Walleye always constitute a minor part of the ichthyofauna, especially when seining is done in lotic habitats. In our experience, the species is most often encountered in pools below diversion dams and in backwaters.

#### SCIAENIDAE (Drums)

51. *Aplodinotus grunniens* (Freshwater Drum). Drum are found along the South Platte River (stations 21, 26, and 30–32) but are nowhere common (Fig. 6). Specimens captured at stations 21, 30, and 31 are young-of-the-year fish. Adults have been found in the pools below Korty and North Platte diversion dams.

#### COMPARISONS AND CONTRASTS AMONG ICHTHYOFAUNAE

The Upper Platte River (North and South Platte rivers) differs conspicuously from the Middle Platte River in species composition and relative abundances (Table 2). Chadwick and Associates (1995) found 41 species of fishes in the Middle Platte (between Elm

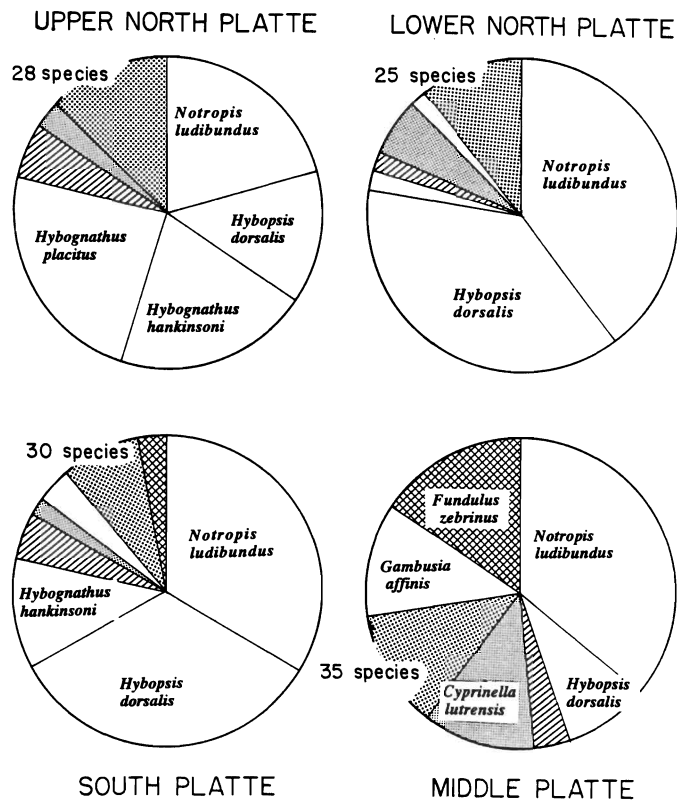


Figure 7. Fish communities (as pie diagrams) of the North Platte River (above and below Lake McConaughy), the South Platte River, and the Middle Platte River. Genera of abundant species are *Hybognathus* (*hankinsoni* and *placitus*), *Hybopsis* (*dorsalis*), and *Notropis* (*ludibundus*). Fine stipple defines *Cyprinella lutrensis* and hatching defines *Pimephales promelas* in all four diagrams. *Fundulus zebrinus* (cross hatching) is an important species in two communities. Coarse stipple defines the aggregates of rare and uncommon species in each community.

Creek and Phillips) based on eleven sampling periods at each of three sites (1990–1994). Only six species were found with relative abundances greater than 1%

(*Cyprinella lutrensis*, *Hybopsis dorsalis*, *Notropis ludibundus*, *Pimephales promelas*, *Fundulus zebrinus*, and *Gambusia affinis*). The Middle Platte is ichthyologically more like the South Platte and the Lower North Platte, but their data describe yet another ichthyofauna, distinct from those of the forks of the Platte although sharing most of the same dominant species (Fig. 7). Aside from the obvious increase in importance of *Gambusia affinis* and the decline of *Hybopsis dorsalis*, the Middle Platte has lost *Hybognathus hankinsoni*, *H. placitus*, and *Semotilus atromaculatus* as dominants (Fig. 7).

In the accounts provided above and Tables 1 and 2, reference is made to differences and similarities among the fish faunas of three river units, the North Platte River above Lake McConaughy, the North Platte River below Lake McConaughy, and the South Platte River. Among the twelve most abundant species in the system, the distinctions among river units are most obvious in terms of *Carpionodes cyprinus*, *Campostoma anomalum*, *Fundulus zebrinus*, and *Hybognathus placitus*. Using these and other less common species, we find that the Upper North Platte is distinctive in the presence of *Platygobio gracilis* (absent in the other two units), the near absence of *Culaea inconstans*, the rarity of *Campostoma anomalum* and *Fundulus zebrinus*, and the abundance of *Hybognathus placitus*; the Lower North Platte is distinctive in the absence of *Hybognathus placitus*, the rarity of *Dorosoma cepedianum* and *Fundulus zebrinus*, and the presence of *Phoxinos eos*. Each unit of the North Platte holds populations of *Etheostoma spectabile* but the species is always uncommon; and the South Platte is distinctive in the abundance of *Pimephales promelas*, *Semotilus atromaculatus*, and *Fundulus zebrinus*, the presence of *Aplodinotus grunniens*, and the near absence of *Moxostoma macrolepidotum* (except in the extreme eastern part). Trivially, the three units can be distinguished on the

Table 2. Relative abundances of nine species of fishes in the Middle (MP) and Upper Platte rivers (UNP = Upper North Platte, LNP = Lower North Platte, SP = South Platte) of Nebraska. (+ = less than 1%; - = absent). Percent abundances are calculated within river units.

	UNP	LNP	SP	MP <sup>1</sup>
20. <i>Notropis ludibundus</i>	21	43	33	36
17. <i>Hybopsis dorsalis</i>	14	38	34	9
15. <i>Hybognathus hankinsoni</i>	21	2	12	+
16. <i>Hybognathus placitus</i>	24	-	+	+
23. <i>Pimephales promelas</i>	6	2	5	4
13. <i>Cyprinella lutrensis</i>	3	6	2	12
26. <i>Semotilus atromaculatus</i>	+	2	4	+
34. <i>Fundulus zebrinus</i>	1	+	3	16
35. <i>Gambusia affinis</i>	1	1	+	12

<sup>1</sup>Chadwick and Associates (1995).

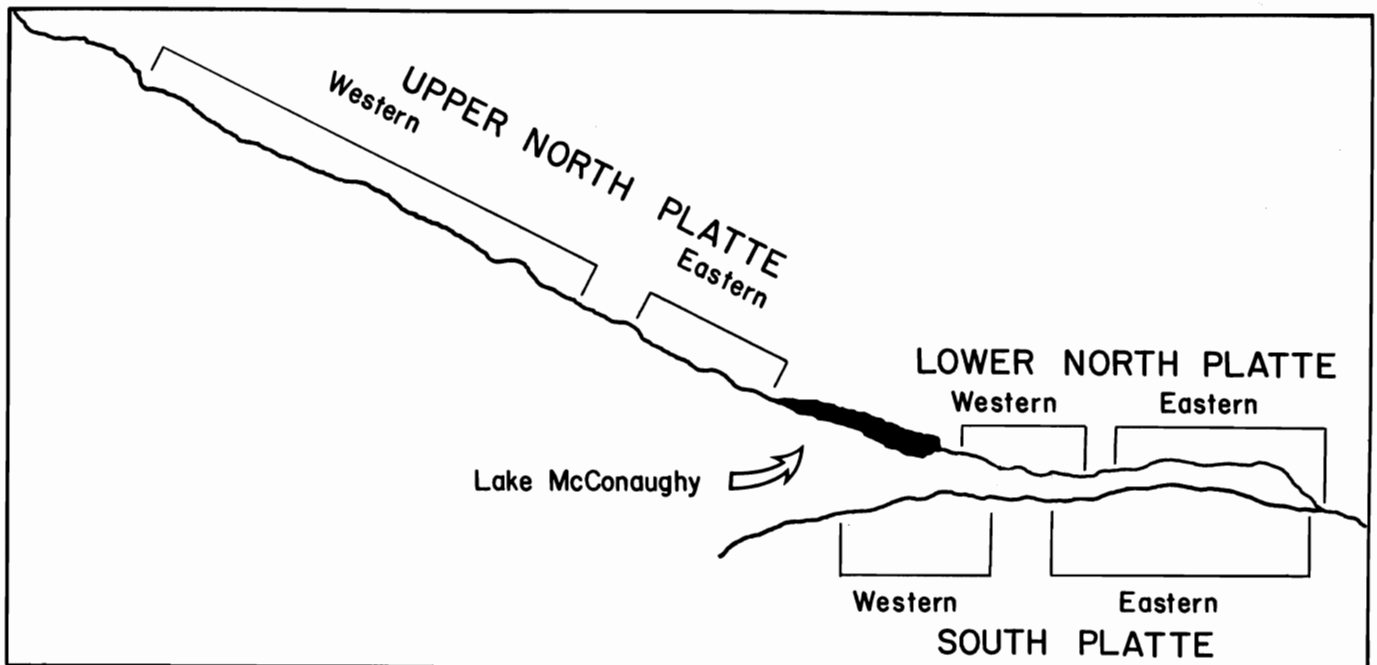


Figure 8. Map of forks of the Platte River in western Nebraska summarizing terminology applied to sections of the streams.

basis of a few species found either at the western end of the system (*Luxilus cornutus* and *Etheostoma nigrum*) or the eastern end of the system (*Carpionodes carpio*, *Ictiobus cyprinellus*, and *Labidesthes sicculus*).

We see nearly as much heterogeneity within units (eastern part vs western part) as among units (Fig. 8). Several of the voucher collections were made with the intent of capturing relative abundance data so as to make comparisons among the relative abundance data acquired as ichthyology class activities at stations primarily in eastern Garden County, Keith County, and Lincoln County. Using the relative abundance data (Table 3), we conclude that the Upper North Platte River contains an ichthyofauna dominated by six species (*Carpionodes cyprinus*, *Cyprinella lutrensis*, *Hybognathus hankinsoni*, *H. placitus*, *Hybopsis dorsalis*, and *Notropis ludibundus*) accounting for 78–85% of a sample, whereas the ichthyofauna of the Lower North Platte is dominated by four species (*Catostomus commersoni*, *Cyprinella lutrensis*, *Hybopsis dorsalis*, and *Notropis ludibundus*) accounting for 70–90% of a sample and the South Platte is dominated by five species (*Cyprinella lutrensis*, *Hybopsis dorsalis*, *Notropis ludibundus*, *Pimephales promelas*, and *Fundulus zebrinus*) accounting for 82–92% of a sample (Fig. 7).

That said, the eastern and western sections of each stream unit are markedly different. The western Upper North Platte contains a fish fauna made up primarily of four species (*Cyprinella lutrensis*, *Hybognathus placitus*, *Hybopsis dorsalis*, and *Notropis ludibundus*), whereas the eastern Upper North Platte contains a fish fauna made up primarily of six species (*Carpionodes cyprinus*, *Cyprinella lutrensis*, *Hybognathus hankinsoni*, *H. placitus*, *Notropis ludibundus*, and *Pimephales promelas*). The eastern section has a lower gradient, contains warmer water in the summer months, and is closely associated with Lake McConaughy. Although downstream effects of large impoundments are often cited (e.g., Patton and Hubert, 1993), we think that an upstream effect occurs as well and is represented for the Upper North Platte by the eastern abundance of *Carpionodes cyprinus* (Fig. 9), a species which is very abundant as adults in Lake McConaughy.

The western section of the Lower North Platte contains a fish fauna made up primarily of four species (*Catostomus commersoni*, *Hybopsis dorsalis*, *Notropis ludibundus*, and *Semotilus atromaculatus*). In sharp contrast, the eastern Lower North Platte contains a fish fauna made up primarily of only three species (*Cyprinella lutrensis*, *Hybopsis dorsalis*, and *Notropis*



Table 3. Relative abundance data (as tenths of a percent) for 19 fish species from six sections of the North and South Platte rivers<sup>1</sup>. Species numbers refer to those in the accounts of species. All species making up one percent or more of a faunule are included. Section identifications are: W UNP (Scottsbluff-Lisco), E UNP (Oshkosh-Lewellen), W LNP (Keystone-Sarben), E LNP (Sutherland-Highway 30), W SP (Brule-Roscoe), E SP (Paxton-Highway 83). A value of 0.0 means that abundance is less than 0.1%; absence of a species is indicated by a dash (-).

	W UNP	E UNP	W LNP	E LNP	W SP	E SP
17. <i>Hybopsis dorsalis</i>	10.8	4.1	56.5	28.8	39.1	27.2
20. <i>Notropis ludibundus</i>	31.0	11.4	6.3	45.1	29.7	30.2
13. <i>Cyprinella lutrensis</i>	16.1	9.7	0.0	13.4	7.0	7.7
15. <i>Hybognathus hankinsoni</i>	2.0	10.1	2.8	0.3	0.9	0.8
16. <i>Hybognathus placitus</i>	24.2	28.3	-	-	0.2	0.0
34. <i>Fundulus zebrinus</i>	4.2	2.2	1.9	1.2	10.3	10.3
26. <i>Semotilus atromaculatus</i>	0.8	0.3	5.5	1.7	1.7	4.9
23. <i>Pimephales promelas</i>	1.7	9.5	2.0	1.9	5.5	6.2
9. <i>Catostomus commersoni</i>	1.8	0.1	7.4	2.6	3.6	4.6
12. <i>Campostoma anomalum</i>	0.0	-	1.8	0.0	1.0	0.9
7. <i>Carpionodes cyprinus</i>	0.8	13.9	0.0	0.6	0.3	0.6
14. <i>Cyprinus carpio</i>	0.2	1.5	0.3	0.9	0.4	1.4
35. <i>Gambusia affinis</i>	0.5	1.9	1.0	0.6	0.0 <sup>2</sup>	1.1
40. <i>Lepomis macrochirus</i>	0.0	0.0	3.9	1.0	0.0	0.0
8. <i>Catostomus catostomus</i>	2.2	0.0	1.8	0.0	-	0.0
2. <i>Dorosoma cepedianum</i>	0.5	3.5	0.0	0.0	0.0	0.0
29. <i>Ictalurus punctatus</i>	0.4	2.3	0.0	0.0	0.0	0.1
25. <i>Rhinichthys cataractae</i>	1.2	-	0.6	-	0.0	0.
44. <i>Poxomis nigromaculatus</i>	0.0	0.0	1.1	0.0	0.0	0.0

<sup>1</sup>W UNP (= western Upper North Platte), six samples, 1989–1995, of 294–5640 specimens (mean 1653), two each at Broadwater and Lisco, one each from Bridgeport and Scottsbluff; E UNP (= eastern Upper North Platte), five samples, 1988–1995, of 512–2051 specimens (mean 1096), two each from the two sites (11–12) near Lewellen and one from Oshkosh; W LNP (= western Lower North Platte), seven samples, 1981–1995, of 547–1700 specimens (mean 1157) one from Keystone, four from Paxton, and two from Sarben; E LNP (= eastern Lower North Platte), seven samples, 1982–1995, of 705–2961 specimens (mean 1385), one each from Hershey, Highway 30, and Sutherland, and two each from Highway 83 and the Suburban Diversion (station 17); W SP (= western South Platte), 13 samples, 1980–1988, of 449–3361 specimens (mean 1674), six from Brule, four from Ogallala, and three from Roscoe; E SP (= eastern South Platte), nine samples, 1982–1995, of 455–2730 specimens (mean 1217), one from Sutherland, two from Hershey, and three each from Paxton and Highway 83.

<sup>2</sup>Data taken 1980–1988, *Gambusia affinis* was not possible for ten of the twelve collections because it had not dispersed that far west (Lynch, 1988).

*ludibundus*). The differences between the eastern and western sections of the Lower North Platte (Fig. 10) are very evident contrasting the rarity (6%) of *N. ludibundus* in the western section and its abundance (45%) in the eastern section. The eastern and western sections of the Lower North Platte are presumably caused by the influence of Lake McConaughy. Large impoundments on prairie streams have obvious downstream effects of reducing turbidity (Patton and Hubert, 1993), reducing habitat heterogeneity by channel incision and dewatering of backwaters (Williams and Wolman, 1984), and perhaps, in the case of Lake McConaughy, of maintaining lower water temperatures into the summer months. We suspect the latter cause explains the rarity of *Cyprinella lutrensis* in the western Lower North Platte.

The South Platte is not so markedly divided into eastern and western sections using the data from Table

3. However, the division is very apparent in recent collections where *Cyprinella lutrensis* is absent from the western section of the river and *Gambusia affinis* is abundant only in the eastern section. *Cyprinella lutrensis* was common at all stations along the South Platte River as late as 1988, but in field work from 1990 and later the species is absent or represented by fewer than a half dozen individuals at any station in Keith County (Fig. 11). Ichthyology classes made little use of the South Platte River after 1989 because flow rates were too low in Keith County and we failed to find enough diversity to justify class time on the western South Platte. Fieldwork was not possible during the flooding of June 1995, but when the river was sampled extensively in the fall of 1995, the absence of *Cyprinella lutrensis* was easily noted. The occasional class visits to the western South Platte in the 1990s were brief (and not documented) because we found too little diver-

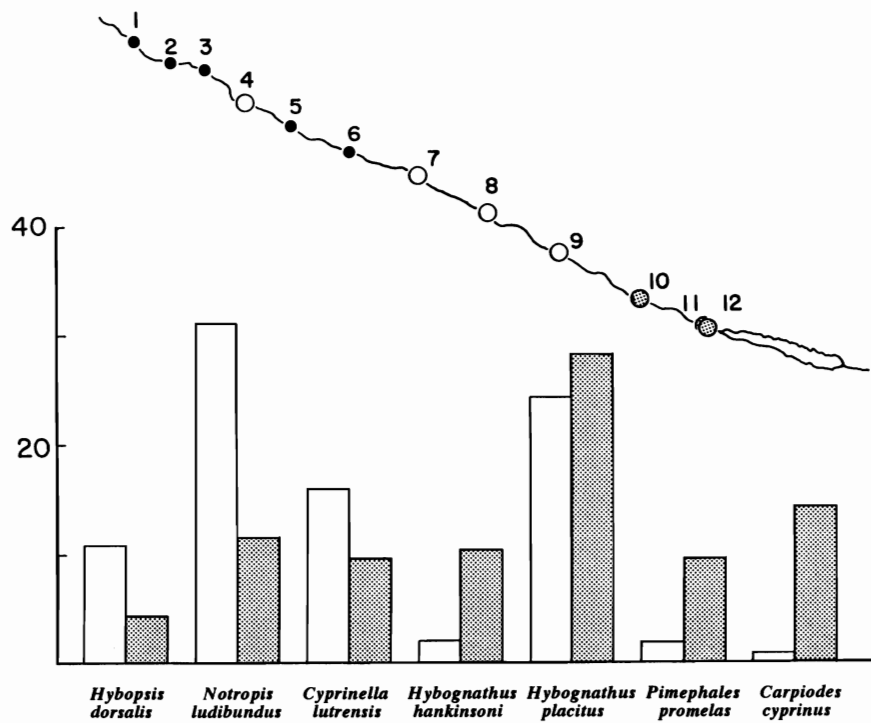


Figure 9. Differences in relative abundances of seven species found along the Upper North Platte River. Stippled bars represent each species from the eastern unit. The twelve stations sampled on this river unit are mapped and numbered 1-12. Open symbols represent the western stations and stippled symbols the eastern stations.

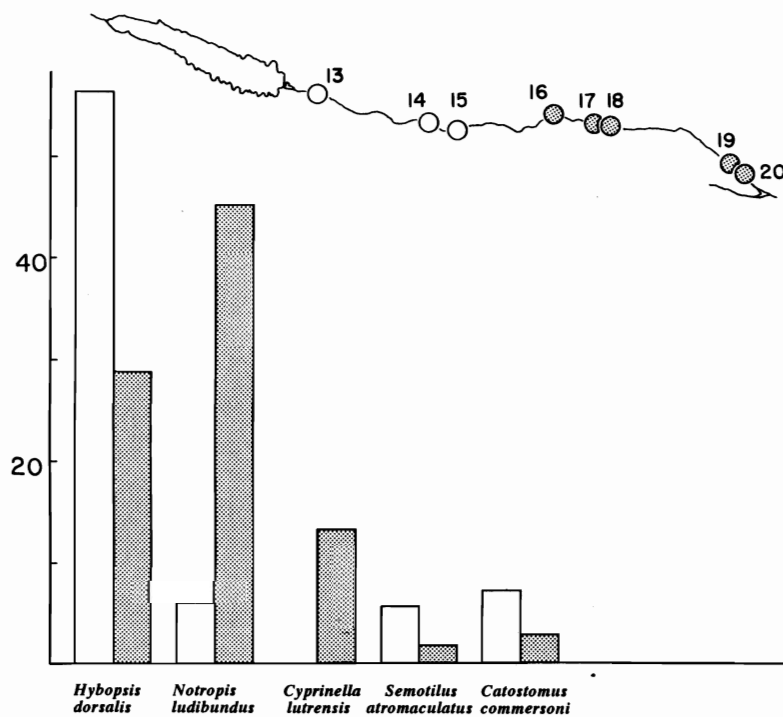


Figure 10. Differences in relative abundances of five species found along the Lower North Platte River. Stippled bars represent each species from the eastern unit. The eight stations sampled on this river unit are mapped and numbered 13-20. Open symbols represent the western stations and stippled symbols the eastern stations.

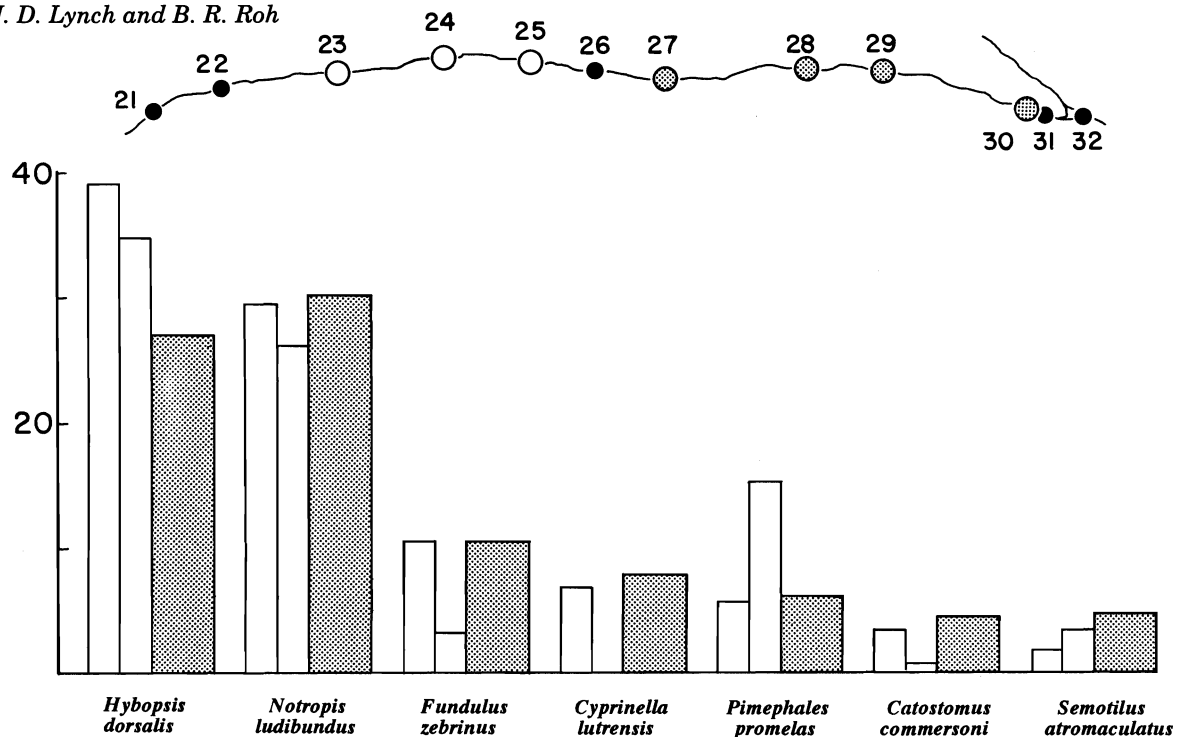


Figure 11. Differences in relative abundances of seven species found along the South Platte River. Broad, stippled, bars represent each species from the eastern unit. Species from the western section are represented by two narrow histogram bars, the left one reporting abundances before 1990 and the right one reporting abundances in the spring of 1995. The twelve stations sampled on this river unit are mapped and numbered 21–32. Open symbols represent the western stations and stippled symbols the eastern stations.

sity and/or the river was intermittent, prompting spot decisions to sample elsewhere during the field trip.

The changes in the ichthyofauna of the western South Platte can be appreciated by reference to some data that are not strictly comparable (Table 4). In June 1995, the South Platte River experienced severe flooding for the first time since 1983. That flooding interrupted our sampling plans and prevented the acquisition of summer samples in 1995. We were able to sample the western South Platte five times in the early spring (March/April) but those data reflect the vagaries of spring sampling (low diversity and absence of large fishes as well as those that show some migratory behaviors). The spring 1995 samples reveal the near absence of *Cyprinella lutrensis*, the rarity of *Catostomus commersoni*, and a high frequency for *Semotilus atromaculatus*. We were able to sample the western South Platte at four localities in September 1995 (following the flood) and those data parallel the summer (from the 1980s) numbers in part. We see the data for *Campostoma anomalum*, *Hybopsis dorsalis*, and *Notropis ludibundus* as comparable and argue that none of those species experienced any change in relative abundance between the 1980s and late 1995. We also think that the data for *Carpiodes cyprinus* and *Cyprinus carpio* are comparable except for the caveat that each is over-represented by young-of-the-year in

the September 1995 samples. For the other five species, we think that the late 1995 data differ appreciably from the data in the 1980s (Fig. 10). For *Fundulus zebrinus*, there appears to be a postflood decline in abundance, whereas *Pimephales promelas* has increased in relative abundance. Each of these putative changes is consistent across the four autumn sampling stations. *Catostomus commersoni*, *Cyprinella lutrensis*, and possibly *Hybognathus hankinsoni* are species whose declines in abundance occurred in the late 1980s and/or early 1990s, perhaps in response to the general decline in flows of the South Platte River. Twenty-one of the 26 species taken in the 1980s were found during our more limited surveys in September 1995. Our failure to take *Hybognathus placitus*, *Rhinichthys cataractae*, *Culaea inconstans*, and *Perca flavescens* in September 1995 probably reflects sampling effort because none of these species was ever abundant in the western South Platte. We did not take *Hybognathus hankinsoni* in September 1995 but frankly expected to do so, in spite of its earlier rarity (the four samples from September 1995 involve 364, 752, 834, and 974 specimens, samples that we think large enough to encounter a species with a relative abundance around 1%). In September 1995, we found *Fundulus sciadicus* young-of-the-year, a species that JDL failed to detect on the western South Platte in the interval from 1975 to 1993, even when searching explicitly for it (1986–1992). We attribute its arrival to

Table 4. Changes in relative abundances of eleven species of the fish fauna in the western section of the South Platte River between 1980 and 1995.

	1980s <sup>1</sup>	preflood <sup>2</sup>	postflood <sup>3</sup>
17. <i>Hybopsis dorsalis</i>	39.1	59.7	35.0
20. <i>Notropis ludibundus</i>	29.7	5.5	25.2
34. <i>Fundulus zebrinus</i>	10.3	14.2	3.3
13. <i>Cyprinella lutrensis</i>	7.0	+	+
23. <i>Pimephales promelas</i>	5.5	3.7	15.2
9. <i>Catostomus commersoni</i>	3.6	0.7	0.9
26. <i>Semotilus atromaculatus</i>	1.7	13.0	3.5
12. <i>Campostoma anomalum</i>	1.0	3.0	1.8
15. <i>Hybognathus hankinsoni</i>	0.9	+	
7. <i>Carpionodes cyprinus</i>	0.4		1.3
14. <i>Cyprinus carpio</i>	0.4		6.3
<b>Species taken</b>	<b>26</b>	<b>10</b>	<b>22</b>

<sup>1</sup>Samples in June, July, and August (1980-1988) from Brule (six), Ogallala (four), and Roscoe (three).

<sup>2</sup>Five samples in March and April 1995 (Big Springs, Brule, Korty, Paxton, and Roscoe).

<sup>3</sup>Four samples in September 1995 (Big Springs, Brule, Ogallala, and Western Canal).

flood-aided dispersal. Given the inappropriate flood-response behaviors of *Gambusia affinis* (Meffe, 1984), we had expected *G. affinis* to be absent from much of the western South Platte but instead found the species at Big Springs, Brule, and the Western Canal sites (stations 21-23). Previously, JDL observed a decline in *G. affinis* populations in the Middle Platte following sustained, court-ordered water releases (summer, 1990) from irrigation impoundments, and we noted comparable declines of *G. affinis* populations in our surveys of the South Platte in September and October 1995. However, sustained flows of two or three months, even in the form of flood events, appear incapable of eliminating *G. affinis*.

#### ACKNOWLEDGMENTS

In addition to approximately 300 students in Ichthyology (1975-1995), who gladly bent their backs and acquired sunburns in quest of little fishes in these rivers, JDL was aided by an outstanding group of graduate teaching assistants (Lisa Holy, Randy Morrison, Paul Ostermeier, Brian Roh, John Rowe, and Lyndon Ruhnke) in class management and collecting (1986-1993). Our collecting activities were aided materially by the participation on various occasions of Jody Haynes, Douglas Lynch, and, especially, J. Mathew Weekly. Access to restricted areas for collecting was facilitated through the good offices of Monte Madsen (Nebraska Game and Parks Commission, North Platte) and Mark Peyton (Central Nebraska Public Power, Gothenburg). The directors of Cedar Point Biological Station (Joan

Darling, John Janovy, Tony Joern, Brent Nickol, Bill Scharf, and Linda Vescio) and its manager (Ron Randall) extended numerous courtesies while providing logistic support for our activities. Scientific collecting permits were provided by Nebraska Game and Parks Commission. William Fink (University of Michigan), Patricia Freeman and Tom Labeledz (University of Nebraska-Lincoln), Wayne Hubert (University of Wyoming), and Ed Wiley (University of Kansas) accepted gifts of voucher specimens and/or provided information concerning specimens under their care. Ken Bazata provided corrections concerning DEC records.

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