

Fish Communities in the Plains Region of the South Platte River, August 1993 and 1994

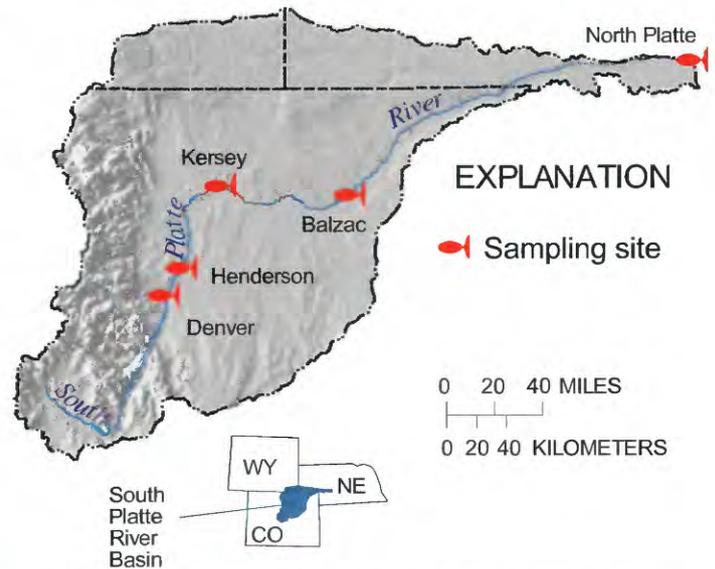
NAWQA FACT SHEET

U.S. Department of the Interior
U.S. Geological Survey

As part of the U.S. Geological Survey National Water-Quality Assessment (NAWQA) program, fish communities were sampled at five sites in the South Platte River from Denver, Colorado, to North Platte, Nebraska. The number and composition of fish species changed from upstream to downstream in the South Platte River. The total number of fish collected at each site varied among sites and from year to year.

The NAWQA program uses an integrated approach (physical, chemical, and biological) to assess water quality on a basin-wide scale. Multiple lines of evidence are used in assessing water-quality conditions at a site. A goal of the South Platte NAWQA study is to provide a basin-wide assessment of the status and variability of stream biological communities to assist in the assessment of water quality in the basin. A first step in understanding how fish communities are related to water quality is to examine the changes in fish occurrence and distribution in the basin.

A fish community is a group of fish species that inhabit the same area and interact with each other. The structure of a fish community is determined by the species present; their relative abundances, life stages, and size distribution; and their distribution in space and time.

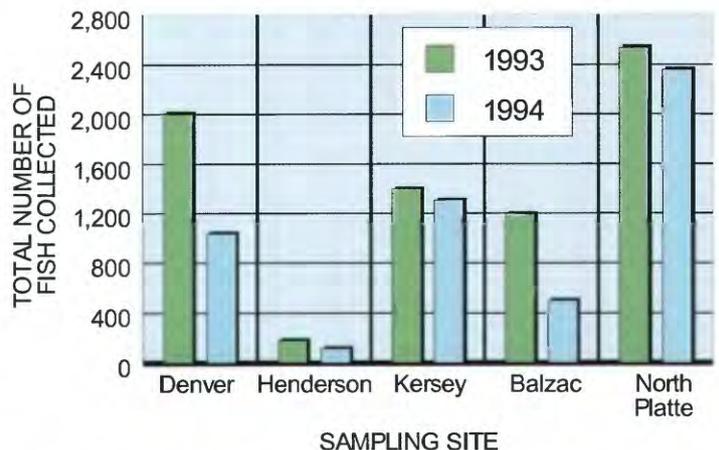


Location of sampling sites along the South Platte River.

A greater number of fish were collected at each site in 1993 than in 1994. Catching fish at any one site is not an exact procedure. Numbers of fish and the types of fish species collected can vary from month to month because of many factors, including the amount of streamflow, the visibility of fish in water at the time of collection, and the mobility of the fish. Although the number of fish at a site varied between 1993 and 1994, the pattern among sites was similar among the two sampling periods. The Henderson, Colorado, site had the lowest number of fish, and the North Platte, Nebraska, site had the highest number of fish.



Fish communities were sampled at five sites along the South Platte River from Denver to North Platte during August 1993 and 1994. Fish communities were collected with the assistance of individuals from the U.S. Fish and Wildlife Service, the National Biological Service, and the Colorado Division of Wildlife. Fish were collected from a section of stream about 250 to 325 yards in length using electrofishing techniques. During electrofishing, a probe emitting a localized electrical current (generally extending no greater than 4 feet around the probe) is placed in the water. Fish are attracted to the electrical current and become momentarily stunned and are netted. The total number of each fish species was counted, and the length and weight of as many as 30 fish of each species were measured. After counting and weighing, the fish were released back into the river.



Number of fish collected at sites in the South Platte River.

Relative Abundances of Predominant Fish Species in Plains Sites in the South Platte River

| Fish Species | Denver | Henderson | Kersey | Balzac | North Platte |
|--------------------|--------|-----------|--------|--------|--------------|
| Longnose dace | A | R | U | | |
| Longnose sucker | A | | C | | |
| Largemouth bass | A | C | R | | |
| Yellow perch | C | U | R | | U |
| White sucker | A | C | A | A | A |
| Common carp | C | C | C | C | C |
| Fathead minnow | A | C | A | A | R |
| Creek chub | C | U | U | C | A |
| Brook stickleback | | R | U | U | R |
| Sand shiner | | | A | C | C |
| Red shiner | | | C | C | C |
| Plains killifish | | | R | U | C |
| Plains minnow | | | | R | C |
| River carpsucker | | | | R | C |
| Bigmouth shiner | | | | U | A |
| Shorthead redhorse | | | | | C |
| Smallmouth bass | | | | | C |
| Stoneroller | | | | | C |

A-Abundant = greater than 100 C-Common = 20-100 U-Uncommon = 5-20 R-Rare = less than 5



Native fish species



Introduced fish species

There is a transition from cold-water to warm-water fish species in the South Platte River. White sucker, common carp, fathead minnow, and creek chub were present at all five sites. Cold-water species, such as longnose sucker and longnose dace, were present at sites nearer the mountains (Denver, Henderson, and Kersey, Colorado). Species associated with warm water, such as sand shiner, red shiner, plains killifish, plains minnow, river carpsucker, bigmouth shiner, shorthead redhorse, and stoneroller, begin to appear at the downstream sites (Kersey and Balzac, Colorado, and North Platte). The North Platte site had the most species of fish.

Differences in fish communities at upstream and downstream sites also might be related to differences in water quality or in the types of habitat available. The wide distribution of white sucker, common carp, fathead minnow, and creek chub is not surprising. These fish are considered to be tolerant species; that is, these fish are adaptable to degraded water quality, habitat alterations, siltation, organic pollution, channelization, or flow fluctuation. Sites located in or near the urban areas (Denver and Henderson) had fewer species of fish, and a greater proportion of the fish community consisted of introduced species (three introduced out of a total of eight species). Introduced species, such as largemouth bass, yellow perch, common carp, and smallmouth bass, are fish species that have been stocked for sports fishing or were accidentally released (such as bait fish or through reservoir releases) into the stream. The number of native fish species increases at sites farther downstream.

Knowing the relative abundance of fish species is important but does not give the complete story about the struc-

ture of the fish community at a site. Understanding the structure of the fish community also includes an evaluation of the distribution of fish among different size classes. For example, the average length of the 30 individual smallmouth bass measured at the North Platte site was 6 inches; 4 of the smallmouth bass measured 11 to 12 inches in length. In contrast, largemouth bass were abundant or common at the upstream sites (Denver and Henderson). However, the average length of the 30 largemouth bass measured at each site was less than 3 inches, and the largest largemouth bass was about 4 inches in length possibly indicating an imbalance in the largemouth bass population. The imbalance in largemouth bass might be due to a recent introduction of this fish species.

The information gathered in this study on fish communities represents one piece of information to be combined with other pieces of physical, chemical, and biological information to develop a picture of water quality across the basin.

Information on technical reports and hydrologic data related to NAWQA can be obtained from:

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