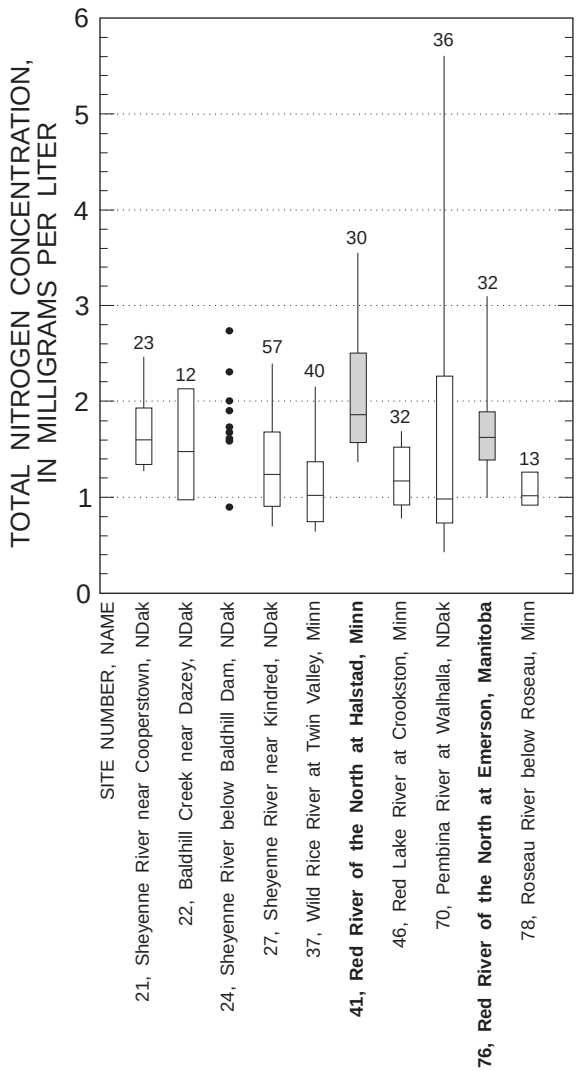

EXPLANATION

Sites with more than 15 data values:

23 Number of observations

90th Percentile

75th Percentile

50th Percentile (Median)

25th Percentile

10th Percentile

Sites with 10-15 data values have no whiskers shown.

Sites with less than 10 data values have individual data values shown.

Shaded boxes indicate a site on the Red River of the North.

Figure 7.--Distribution of total nitrogen concentrations for selected U.S. Geological Survey stream sites in the Red River of the North Basin.

Pembina River (as high as 0.81 mg/L). Nitrate concentrations also were high in the Red River at Halstad, Minn. and Emerson, Manitoba.

The largest ranges in nitrate concentration were found at the three Pembina River sites (fig. 8A). This river drains some of the steepest agricultural land in the basin. This probably contributes to more rapid runoff of nutrients. This would cause frequent, high, and short-term runoff that results in a large range in nitrate concentrations.

Median ammonia concentrations shown on the box plots in figure 8B were above 0.2 mg/L at two sites on the Sheyenne River and two sites on the Red River. The Red River below Fargo, N. Dak. had the highest median ammonia concentration of more than 0.4 mg/L, and also had the largest range in values. This could be attributed to wastewater discharges from the Moorhead sewage treatment plant and other discharges from the Fargo-Moorhead area. The Fargo sewage treatment plant on the Sheyenne River probably contributed to the relatively high concentrations of ammonia detected downstream at the Harwood, N. Dak. site.

The high ammonia concentrations at the Red River at Halstad, Minn. and the Sheyenne River below Baldhill Dam are more difficult to interpret. At Halstad, it is possible that increased ammonia from the Fargo-Moorhead area is still present in the Red River, particularly during the winter months when re-aeration would be minimal. Also during the winter, elevated ammonia below Baldhill Dam on the Sheyenne River probably is caused by anoxic conditions in Lake Ashtabula. High ammonia concentrations near lake sediments may be present throughout the year, but the entire lake may build up high ammonia concentrations under ice cover (Wetzel, 1975). To verify this seasonality, ammonia concentrations from sites having high median concentrations (site 24 on the Sheyenne River and sites 16 and 41 on the Red River) were compared by month. Median ammonia concentrations during November through March were about or well above 0.5 mg/L, but during April through October ammonia concentrations were about 0.2 mg/L or less.

Analyses were available for ammonia plus organic nitrogen as total (TKN), dissolved (DKN), or both (TKN and DKN). More data were available for total ammonia plus organic nitrogen than for dissolved. Because the distribution of TKN and DKN concentrations are about the same, only TKN will be discussed in this report. Likewise, the organic nitrogen component of TKN can be determined only when ammonia concentrations are available. Because both values often are not available, TKN will be discussed.

About two thirds of the nitrogen in the rivers of the Red River Basin is TKN. Figure 8C shows that the distribution of TKN at each site and between sites is similar to the