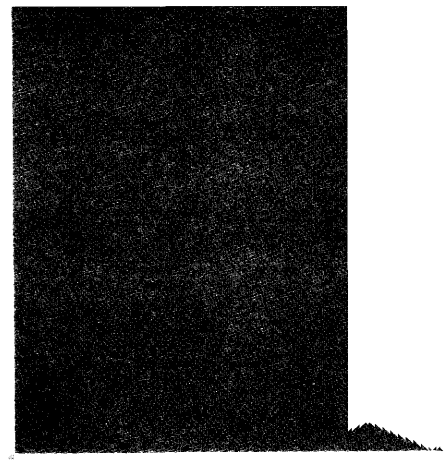
A Statistical Analysis of the Quality of Surface Water in Nebraska



United States Geological Survey Water-Supply Paper 2179

Prepared in cooperation with the Nebraska Natural Resources Commission

A Statistical Analysis of the Quality of Surface Water in Nebraska

By RICHARD A. ENGBERG

Prepared in cooperation with the
Nebraska Natural Resources Commission

U.S. GEOLOGICAL SURVEY WATER-SUPPLY PAPER 2179

UNITED STATES DEPARTMENT OF THE INTERIOR
JAMES G. WATT, Secretary

GEOLOGICAL SURVEY
Dallas L. Peck, Director

UNITED STATES GOVERNMENT PRINTING OFFICE: 1983

For sale by Distribution Branch
Text Products Section
U.S. Geological Survey
604 South Pickett Street
Alexandria, Virginia 22304

Library of Congress Cataloging in Publication Data

Engberg, R. A.

A statistical analysis of the quality of surface water in Nebraska.

(Geological Survey water-supply paper ; 2179)
Bibliography: p.
Supt. of Docs. no.: I 19.13:2179
1. Water quality—Nebraska—Statistics. I. Nebraska Natural Resources Commission. II. Title. III. Series.
TD224.N18E5 553.7'9'09782 81-2161
AACR2

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A Statistical Analysis of the Quality of Surface Water in Nebraska

By Richard A. Engberg

Abstract

This report provides descriptive statistics for 29 chemical or biological constituents for 109 stream sites in Nebraska sampled by the U.S. Geological Survey beginning in 1946. Also provided for each site are regression equations relating specific conductance to each of 12 chemical constituents and a regression equation relating specific conductance to stream discharge.

The descriptive statistics are presented by river basins. Water leaving these basins that has the lowest mean specific conductance (266 umho/cm) is from the Niobrara River at Verdel, and water that has the highest (1,890 umho/cm) is from the South Platte River at Roscoe. Statewide, the principal cations in streamflow are calcium and sodium, and the principal anions are bicarbonate and sulfate. Calcium and bicarbonate usually predominate where mean specific conductance is less than 1,000 umho/cm, and sodium and sulfate predominate where the mean exceeds 1,000 umho/cm.

On the basis of regression equations, dissolved solids, hardness, calcium, magnesium, and bicarboante, with some exceptions, correlate well with specific conductance of all stream sites.

Illustrations of how regression equations may be used to estimate water quality of streamflow are given and are compared with values from actual analyses.

INTRODUCTION

Systematic collection of water-quality data by the U.S. Geological Survey for streams in Nebraska began in 1946 when the Geological Survey office and laboratory were established in Lincoln. These data, together with a few scattered data collected prior to 1946, constitute a rich source of information on the quality of streamflow in Nebraska and can be important for a wide range of potential uses if they are reduced to a manageable and useful form.

PURPOSE AND SCOPE

Section 208 of Public Law 92-500 is directed toward the investigation of and planning measures for the control of nonpoint-source pollution in streams. The Nebraska Natural Resources Commission—the agency having overall responsibility for Section 208 planning in Nebraska—recognized the need in the planning process to know that can be learned from existing records and approved a proposal to summarize and reduce the Survey's existing records and approved a proposal to summarize and reduce the Survey's existing records to a manageable and useful form. The purpose of this report is to present Nebraska surface-water-quality data in such a form. Although information in this report is of particular importance to those involved in Section 208 planning, it also should prove useful to planners at many levels, including natural resources district managers, officials of State and Federal agencies, and private individuals.

Data for 109 stream-sampling sites in Nebraska are summarized by river basin in this report. Maximums, minimums, means, medians, standard deviations, and percentiles have been determined for 29 different physical, chemical, and microbiological constituents. Such descriptive statistics provide a means for comparing constituent values within an analysis and for comparing individual constituents between analyses and between stations.

Functional relationships betwen specific conductance and each of 12 different constituents, as well as the functional relationship between specific conductance and water discharge, have been determined by the use of regression equations. These relationships allow users to estimate constituent concentrations when only specific conductance is known or to estimate specific conductance when only water discharge is known.

Trend analyses or analyses of variance of data between stations have not been included in this report. These and other relationships might form the basis for future reports.

NATURAL HYDROLOGIC FACTORS THAT INFLUENCE WATER QUALITY

The quality of streamflow is influenced by many hydrologic factors of which several are discussed below. Climate affects stream-water quality through variations in temperature and precipitation. Topography and drain-

age affect stream quality by influencing the magnitude and rate of overland runoff. Various sources of streamflow affect stream quality differently; for example, a high fraction of ground-water inflow tends to make streamflow constant in quality, whereas a high fraction of overland runoff tends to make it highly variable.

Climate

Nebraska's climate is characterized by extremes. Hot summers and cold winters are normal, with wide and frequent temperature variations common at all times of the year. Statewide, January was the coldest month for the period of 1941–1970, according to Lawson, Dewey, and Nield (1977), with mean monthly average temperatures of 25°F (−4°C) or less for more than two-thirds of the State. July was the hottest month for the same period, with mean monthly average temperatures exceeding 75°F (24°C) for more than half of the State.

Precipitation varies greatly across Nebraska. For the period 1941–1970, the mean annual precipitation ranged from 36 inches in extreme southeast Nebraska to 15 inches in western Nebraska (Lawson, Dewey, and Nield, 1977). Precipitation is unevenly distributed during the year, averaging five times more in June, the wettest month, than in January, the driest month.

Topography and Drainage

Land-surface elevations increase from east to west in Nebraska. The greatest relief is observed along the upper reaches of stream valleys, especially along the North Platte River in western Nebraska.

Topography in eastern Nebraska is related to glaciation during the Pleistocene Epoch. The eastern one-fourth of Nebraska was covered at least once by advancing glaciers during this period. Much of this area is composed of rolling hills made up of clayey till deposited by the glacier and covered by loess of aeolian origin. Southwest of the rolling hills are loess plains underlain by sands and gravels, some of which originate from the glaciers. Some of the plains in central and southwest Nebraska have been modified greatly by water and wind erosion to moderate to steeply sloping hills.

About one-fourth of Nebraska is covered by sandhills. These deposits are mostly stabilized by vegetation and are characterized by dunes, the axes of which lie generally in a northwesterly to southeasterly direction. The sandhills are geologically young. Keech and Bentall (1971) believe that they were formed during the last period of continental glaciation in late Pleistocene time.

Much of western Nebraska is high plains, characterized by bedrock covered in some areas by thin mantle rock. In southwest Nebraska, the bedrock is covered by loess. Topographic surfaces range from flatlands to rolling hills in the bedrock areas.

Drainage follows the regional topography in an eastward or southeastward direction with the principal exception of the Platte River in the central part of the State. Here the channel describes a broad arc flowing to the northeast for approximately 100 mi before returning to a southeasterly course. Increases of land-surface elevation as a result of deposition from glaciation in southeast Nebraska probably caused the river to change to its present course.

Sources of Streamflow

An annual average of approximately 1 million acre-ft of streamflow enters Nebraska from Colorado, Wyoming, Kansas, and South Dakota. However, approximately 7.1 million acre-ft leaves Nebraska each year (Nebraska Soil and Water Conservation Commission (NSWCC), 1971). The increase is derived from two sources within Nebraska—discharge from the ground-water reservoir and overland runoff. Of these two sources, the ground-water reservoir provides approximately 3.3 million acre-ft, and overland runoff provides the remainder (Bentall and Shaffer, 1979).

Ground water is not evenly distributed throughout the State. Of the approximately 2 billion acre-ft of ground water estimated to be in storage in Nebraska, nearly half is in the sandhills area, where saturated thicknesses of 50–1,000 ft of water-bearing material are common (University of Nebraska, 1966). In contrast, at many places in the extreme northwest corner of the State, in the Republican River drainage, and in the glaciated part of eastern Nebraska there is less than 20 ft of water-bearing material, and in some places, there is none at all.

In areas where ground water is abundant and soils are sandy, such as in the sandhills, streamflow is maintained mostly by ground-water discharge. Such streams as the Niobrara, Middle Loup, and North Loup rivers are characterized by relatively small ranges of water discharge owing to the constancy in amount of ground-water inflow and to the fact that only small fractions of their drainage areas contribute to overland runoff. For example, the range in daily discharge for the Middle Loup River at Dunning from 1945 to 1978 was only 100–1,020 ft^3/s. The 33-year average discharge for this stream site was 398 ft^3/s. The drainage area for this station is 1,850 mi^2, of which only 80 mi^2 contributes directly to surface runoff. Probably more than 75 percent of the flow at this station is derived from ground water.

On the other hand, in areas where ground water is not abundant and soils are clayey, streamflow is maintained mostly from overland runoff. This is true particularly for streams in the glaciated area of eastern

Nebraska, such as the Big Blue River and the Big and Little Nemaha rivers. The range in discharge for the Big Nemaha River at Falls City for the period from 1944 to present, for example, was 3.0–71,600 ft^3/s; the 32-year average discharge was 562 ft^3/s. The drainage area of this station is 1,340 mi^2, all of which contributes directly to surface runoff. Probably 90 percent of the streamflow at this station is derived from overland runoff.

DATA AVAILABLE

The earliest sample for chemical analysis for a Nebraska stream in Geological Survey files was collected in 1912 from the Elkhorn River at Waterloo. Since then, samples have been collected at least once from approximately 425 surface-water sites in Nebraska. Analyses from scattered locations exist in the files through the early 1940's. Most were collected by Geological Survey headquarters personnel as part of specific projects or for general information as part of nationwide surveys. Sampling on a regular basis at specific stations did not begin until 1946, with the advent in Nebraska of the Missouri River basin (MRB) program.

In recent years, the need for data on the quality of surface water in Nebraska has broadened considerably. Prior to the 1960's, most sampling in the State was conducted to obtain information for project planning and development, particularly in relation to irrigation. In the mid-1960's attention began to focus on the need for data to be used in the control and abatement of pollution, and this need now has become the most important one. Even in regard to pollution, emphasis on data needs is changing from point sources to nonpoint sources.

One reason for the broadening of water-quality data is an increasing awareness of the importance of water quality as both a management and predictive tool. This is coupled with recent developments in analytical methodology that now make possible the measurement of many constituents that could not be measured routinely only a few years ago.

As a result of these broadened data needs, there is now a much wider variety of data available than there was even 10 years ago. In 1978, water-quality data were collected on a monthly basis at 53 sites in Nebraska in comparison with 22 sites in 1968, and during the same period the number of constituents analyzed increased from an average of about 12 per sample to nearly 30. Prior to 1968, the constituents determined commonly included only major cations and anions such as calcium, sodium, sulfate, chloride, and nitrate. Since then, although measurements of the foregoing constituents continue, considerable emphasis has been placed on measurements of trace constituents such as cadmium, arsenic, and selenium, on nutrients including phosphorus, ammonia, and organic nitrogen, on organic substances such as total organic carbon, lindane, and methoxychlor, and on biological or microbiological organisms including phytoplankton, periphyton, coliform bacteria, and fecal streptococcal bacteria. Also during the last 10 years, the importance of on-site data collection has been recognized. Specific conductance, pH, water temperature, dissolved oxygen, and sometimes bicarbonate are now measured routinely at most sampling sites.

Sampling techniques and analytical methodologies have improved considerably over the period during which the samples discussed in this report have been collected. As a greater understanding of the hydrology of streamflow and of sediment movement developed, improved methods for securing truly representative water-quality samples followed. Also more precise and accurate instrumental analytical methods for determining constituent concentrations have been developed over the years.

Samples collected from 1946 to 1971 were analyzed in the district water-quality laboratory at Lincoln. Samples collected after 1971 were analyzed in the U.S. Geological Survey Central Laboratory system, which presently has laboratories in Arvada, Colo., and in Doraville, Ga.

Programs Through Which Data Were Obtained

Studies funded through the MRB program provided the bulk of the data for nearly two decades and continue to be important. However, studies from other programs now also contribute substantially to the available data. The principal programs under which the U.S. Geological Survey has obtained or is now obtaining water-quality data for Nebraska are summarized in table 1.

Constituents Selected for Statistical Analysis

Of the nearly 425 sites at which samples were collected in Nebraska, data sufficient for statistical analyses are available for only 109. The criterion used to make this determination was that if 15 or more concurrent water-discharge and specific-conductance measurements were available for a specific site, data for that site were considered to be sufficient for statistical analyses.

Descriptive statistics for as many as 29 chemical and microbiological constituents are presented on the first page of data for each station. These constituents were selected mostly on the basis of the availability of data. Included in the 29 constituents are specific conductance, pH, dissolved oxygen, fecal coliform, and fecal streptococcal bacteria, all of which are now measured streamside. Several nutrients, including five forms of nitrogen and two forms of phosphorus, were selected

Table 1. Summary of principal Federal and cooperative surface-water quality programs in Nebraska, 1946 to present

[Cooperating agencies: EPA, U.S. Environmental Protection Agency; LPSNRD, Lower Platte South Natural Resources District; NDWR, Nebraska Department of Water Resources; NNRC, Nebraska Natural Resources Commission; SVWD, Salt Valley Watershed District]

Program	Type	Cooperating agencies	Year begun	Year ended	Purpose and type of data
Missouri River	Federal[1]	----------	1946	---------	General assessment of quality of water for project planning, principally irrigation projects; monitoring; chemical constituents
Irrigation net	Federal	----------	1952	1972	Quality of water for irrigation and the effects of irrigation development on the quality of streamflow; chemical constituents
Benchmark	Federal	----------	1967	---------	Analysis of pristine streams—common and trace chemical constituents; microbiological constituents
Low-flow quality and quantity	Cooperative	NDWR	1967	1970	Assessment of water quality at low flow in tributary streams in Elkhorn and Blue River basins; common constituents
Salt Creek basin study	Cooperative	SVWD LPSNRD	1968	1975	Assessment of water quality in Salt Creek basin—common constituents, nutrients, microbiology
Dual-station water pollution assessment	Federal	EPA	1969	---------	Assessment of water quality in streams above and below major cities—nutrients, common constituents
Statewide monitoring program	Cooperative	NNRC	1971	---------	Long-term monitoring of water quality with emphasis on point- and nonpoint-source pollution—common and trace constituents, nutrients, microbiology, sediment
NASQAN[2]	Federal	----------	1974	---------	Assessment of quality of water leaving nationwide accounting units—common and trace constituents, nutrients, biology and microbiology, sediment

[1]Work under this program requested by the U.S. Bureau of Reclamation and the U.S. Fish and Wildlife Service.

[2]National Stream Quality Accounting Network.

because of their importance in eutrophication, their significance as indicators of possible contamination, or their potential effects on public health. Color and biochemical oxygen demand were selected because they are indicators of organic material in streamflow. The remainder of the constituents selected are those that occur most commonly in natural water and that have been measured most frequently in the past. Iron and manganese, generally considered trace constituents, have been measured routinely for many more years than have most other trace constituents.

Trace constituents such as arsenic, lead, selenium, and cadmium are important because of their toxicity in small quantities to humans and animals. However, they are not included in the report because they have been measured on only a few samples from less than half the sites.

Results of regression analyses relating concentrations of each of 12 constituents to specific conductance and results of a regression analysis relating specific conductance to water discharge are presented on the second page of data for each station. These 12 constituents were chosen after first examining regression relationships between specific conductance and all 29 constituents for 7 stations that are representative of a variety of hydrologic settings in Nebraska. These stations are Salt Creek at Lincoln, Weeping Water Creek near Union, Big Nemaha River at Falls City, Spring Creek at Lexington, Republican River at Guide Rock, North Loup River at Taylor, and North Platte River at Lisco. If specific conductance failed to explain 50 percent of the variance for any constituent at any of the 7 representative stations, that constituent was not included in the subsequent regression analyses for all 109 stations. Whereas the 50 percent figure was somewhat arbitrary, the author concluded that if factors other than specific conductance explained more than 50 percent of the variance for a constituent for the 7 representative stations, a regression relationship for specific conductance and that constituent was not likely to be significant for any of the stations.

Discussions of the properties and significance of each of the 29 constituents described in this report may be found in Hem (1970) and in McKee and Wolf (1963).

STATISTICS

Several available USGS Statpac computer programs and SAS (Statistical Analysis System) programs (Barr and others, 1976) were used in data reduction and table preparation.

Statistical terms used in this report are defined as follows:

Mean is the sum of the values of individual observations divided by the total number of observations in the group.

Median is the value of the middle observation of an uneven number of ordered observations or the mean of the two middle observations when there are an even number of observations.

Maximum is the observation of largest value in a group of observations.

Minimum is the observation of smallest value in a group of observations.

Standard deviation is the square root of the sum of the squares of deviations from the mean of all observations in a group divided by the number of all observations. It is expressed mathematically as

$$s = \sqrt{\frac{\Sigma (x_i - \bar{x})^2}{n - 1}}$$

where s is the standard deviation, x_i is the ith value of x, $\bar{x}$ is the mean value of x, and n is the total number of observations.

Ninetieth percentile is that value in a group of observations below which 90 percent of the total number of observations occur.

Tenth percentile is that value in a group of observations below which 10 percent of the total number of observations occur.

Regression equation is an equation defining the relationship between a dependent and an independent variable. For a linear relationship, the equation takes the following form:

$$Y = bX + a$$

where X and Y are values of the independent and dependent variables, respectively. The coefficient b is the slope of the line, and the constant a is the Y-axis intercept. For a logarithmic relationship, the equation takes the following form:

$$Y = aX^b$$

Standard error of estimate, as it is used in this report, is a measurement of the variation around the line of regression. It is in actuality the standard deviation about the regression line.

Correlation coefficient is a term relating the standard error of estimate and the standard deviation of the values of the dependent variable. It takes the form of

$$r = \frac{bs_x}{s_y}$$

where r is the correlation coefficient, b is the slope of the regression line, s_x is the standard deviation of the independent variable, and s_y is the standard deviation of the dependent variable. A perfect relationship has a

value of ± 1. A completely imperfect relationship has a value of zero.

Percent explained variance is the coefficient of determination expressed as a percent. The coefficient of determination is the square of the correlation coefficient and is the proportion of variance in the dependent variable that is explained by variation in the independent variable.

Explanation for Blanks in the Data Tables

None of the tables of descriptive statistics (first page for each station) are complete. There are several reasons for this. If there is no value for the number of measurements, then that particular constituent has never been measured at that station. When the number of measurements for a particular constituent is less than 10, neither the median nor the percentile values are shown because they have limited significance. Samples for some stations consisted of composites of discharge-weighted increments of daily samples covering as many as 31 days each. These samples were not used in computing percentiles.

Blanks also occur in the regression tables because of insufficient data. If less than 15 measurements for any of the 12 constituents or specific conductance were available, the regression equation for the relationship of that constituent to specific conductance was not determined.

Means and standard deviations are not shown for fecal coliform and fecal streptococcal bacteria enumerations. To explain why, the following paragraphs discuss continuous and discrete data and normal distribution.

With the exception of fecal coliform and fecal streptococcal bacteria, all constituent data in this report are continuous. This means that an infinite number of positive values for the constituent theoretically is possible between zero and its maximum concentration. Of course, this is limited in actuality by the sensitivity of the method by which the constituent is measured. Continuous data will often, but not always, tend to be distributed normally; that is, observed values of the constituent measured cluster around the mean and, if plotted, approximate a bell-shaped curve.

Fecal coliform and fecal streptococcal bacteria data represent counts of individual colonies and can assume only positive integer values. Therefore, these data are not continuous but are limited only to certain discrete values. These data tend not to be distributed normally because they represent the association of organisms with each other and with their environment, and this is indeed the case with the fecal coliform and fecal streptococcal bacteria data in this report. Usually, discrete data are highly skewed; that is, individual values do not cluster around the mean. As a result, measurements such as the mean and standard deviation are of limited use in analyzing fecal coliform and fecal streptococcal bacteria data. Frequency distributions represented by percentiles are much more useful tools than the mean and standard deviation for interpreting these fecal coliform and fecal streptococcal bacteria data.

Analogous Constituents

Statistical data are reported for certain constituents in more than one form. This is true for dissolved-solids residue and sum and for nitrate as N, nitrate as NO_3, and nitrite plus nitrate as N.

Both dissolved-solids residue and dissolved-solids sum are shown in the tables because in recent years the residue often was not measured if a sufficient number of constituents were measured so that a sum could be computed. Conversely, the residue often was measured if a sufficient number of constituents were not measured. Although residue and sum represent nearly the same thing, they may represent different aspects of the same hydrologic condition; therefore, descriptive statistics for both are included in this report.

The three nitrogen constituents represent three different ways of reporting essentially the same data. Prior to the 1971 water year, USGS laboratories reported all values of nitrate as NO_3. In 1971, the reporting convention was changed to report all values of nitrate as N. Nitrate as N differs by a factor of 4.43 from nitrate as NO_3. In 1972, the USGS Central Laboratory adopted an automated method for nitrate in which both nitrite and nitrate are measured together. Because nitrite is unstable and occurs generally in very small concentrations, this measurement of nitrite plus nitrate as N is considered, for most conditions, to be equivalent to a measurement of nitrate only. Because of differences in laboratory methods over the years and because the different measurements are not precisely equivalent, these three constituents are included separately in this report to make the nitrogen data more manageable and useful.

STATISTICAL DATA BY BASIN

For ease of examination, the statistical data presented herein are grouped by river basin (fig. 1). These are the same basin designations used by the Nebraska Natural Resources Commission, previously called the Nebraska Soil and Water Conservation Commission, in preparation of the Framework Study for the State Water Plan (NSWCC, 1971). Some of the basins are complete drainage units, some are parts of drainage units, and others are groupings of small drainage units which are hydrologically similar.

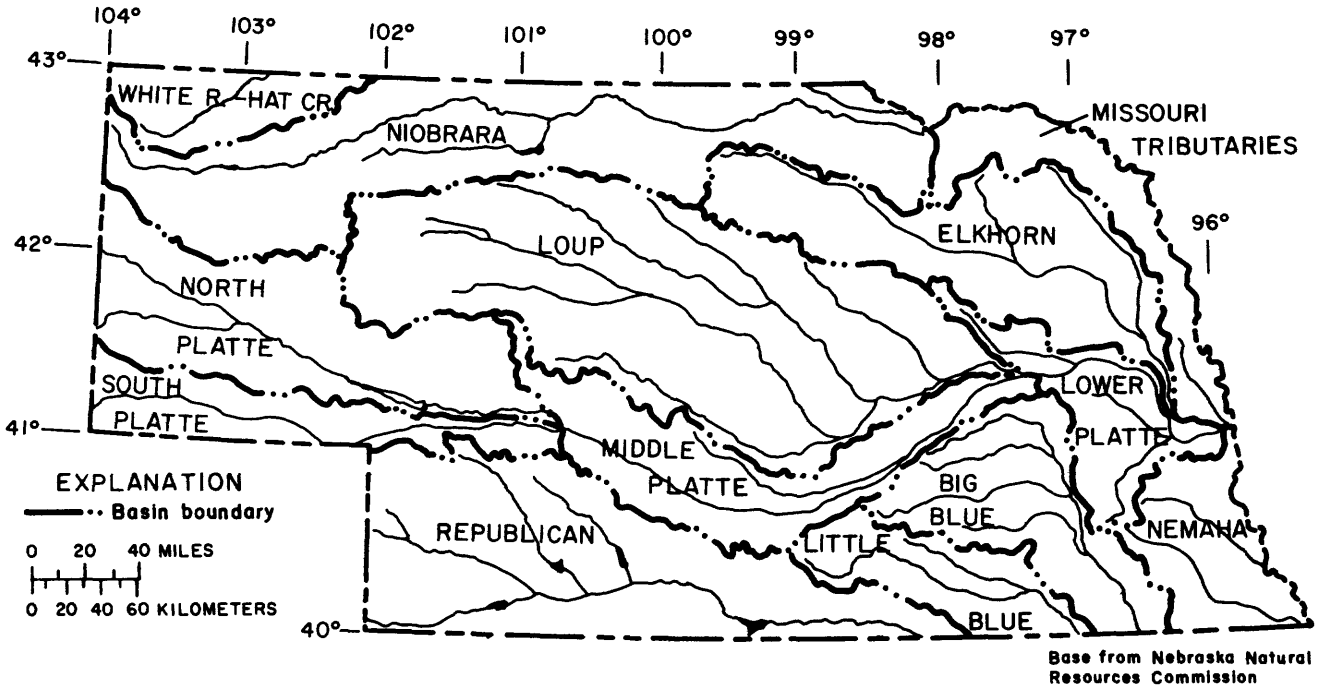

Figure 1. River basins of Nebraska.

Data are identified in the following sections both by station number and station name. Station numbers are official Geological Survey eight-digit downstream-order numbers. The first two digits are "06" for all stations, indicating that all stations in Nebraska are in the Missouri River basin. The other six digits indicate the downstream location within the basin.

In this report, μ, indicating micro, is shown as lowercase "u".

White River–Hat Creek Basin

The White River–Hat Creek basin is the smallest of the 13 basins in Nebraska. It is also one of the roughest areas of the State topographically, one of the areas least suited for cultivation, and one of the areas of lowest ground-water availability.

Sufficient data for statistical analyses are available for only one surface-water sampling site in the basin. That site, the White River near Whitney, is located in the central part of the basin (fig. 2) and was operated from 1969 to 1972. The White River is fed mostly by overland runoff. Part of its drainage basin is composed of fine surficial clays, some of which are carried into the stream. Much of the time the river is extremely turbid and has a whitish appearance, which probably accounts for its name. Base flow is maintained by small amounts of ground water discharged into tributaries flowing from Pine Ridge which forms the southern boundary of part of the basin.

The mean specific conductance of the White River is 1,320 umho/cm, which makes this one of the more highly mineralized streams in Nebraska. Sodium is the predominant cation (positively charged ion) with a mean concentration of 157 mg/L. Sulfate is the predominate anion (negatively charged ion) with a mean concentration of 416 mg/L.

Regression equations were developed for the relationships between specific conductance and seven constituents. Correlation coefficients were 0.91 or greater for each of these relationships.

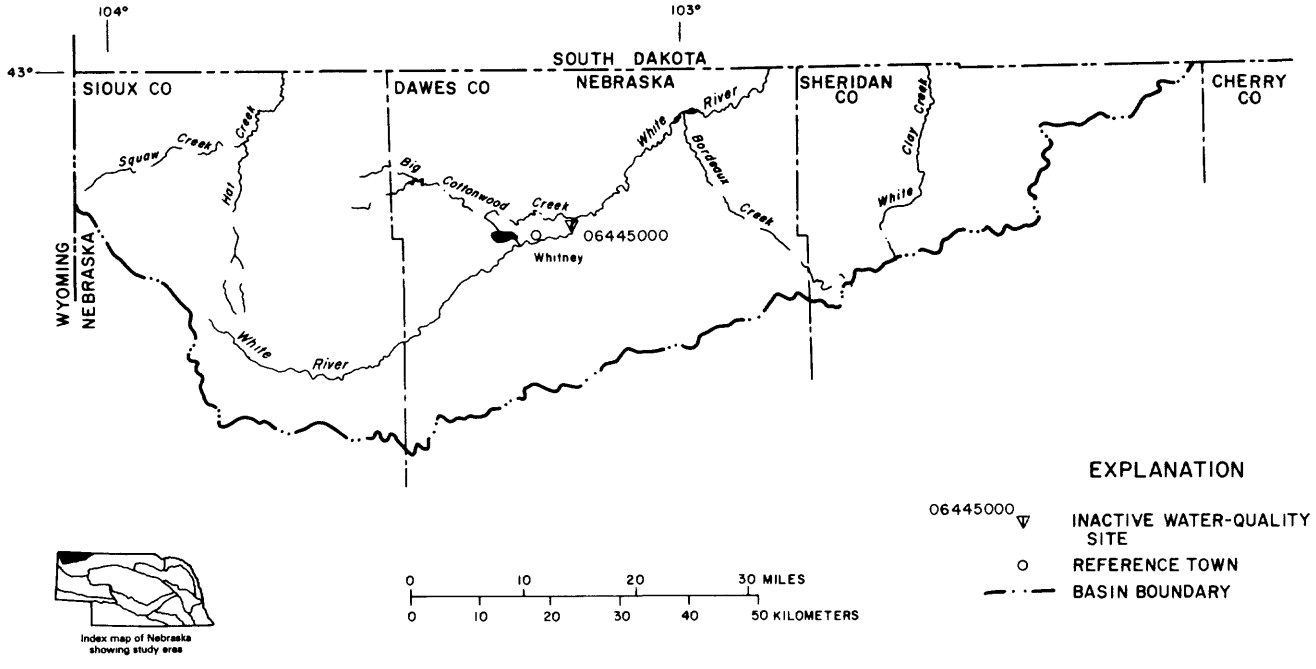

Figure 2. Location of water-quality sampling sites, White River–Hat Creek basin.

WHITE RIVER - HAT CREEK BASIN

06445000 White River near Whitney, Nebr.

Location.--Lat 42°48'42", long 103°09'59", in SE¼NE¼NE¼ sec. 26, T.33 N., R.50 W., Dawes County, at county road bridge 1.7 mi north and 4.5 mi east of Whitney.

Drainage area.--676 mi^2.

Period of record.--August 1969 to June 1972.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	73	3,500	495	1,320	1,190	616	2,200	680
Dissolved solids, residue	mg/L	36	2,290	298	961	813	466	1,700	470
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L	36	736	170	329	288	132	550	212
Calcium, dissolved	mg/L	24	140	53	83	83	20	110	62
Magnesium, dissolved	mg/L	24	52	9.5	23	22	11	39	11
Sodium, dissolved	mg/L	23	424	52	157	140	96	250	60
Potassium, dissolved	mg/L	5	20	12	16		3.6		
Bicarbonate ion	mg/L	12	502	198	313	300	92	450	206
Sulfate, dissolved	mg/L	36	1,300	67	416	332	296	850	104
Chloride, dissolved	mg/L	26	28	7.4	14	14	5.1	22	7.9
Fluoride, dissolved	mg/L	23	2.5	0.5	0.8	0.7	0.4	0.9	0.6
Silica, dissolved	mg/L								
Boron, dissolved	mg/L	23	740	60	253	207	165	420	87
Iron, dissolved	ug/L	5	49	6	28		21		
Manganese, dissolved	ug/L	21	420	0	121	54	140	360	0
Nitrite + nitrate as N dissolved	mg/L	12	1.5	0.03	0.59	0.58	0.49	1.1	0.06
Nitrate as N, dissolved	mg/L	23	2.0	0.00	0.63	0.58	0.53	1.1	0.12
Nitrate as NO_3, dissolved	mg/L								
Ammonia N, total	mg/L								
Organic N, total	mg/L								
Phosphorus, total	mg/L	36	1.1	0.04	0.27	0.20	0.22	0.55	0.10
Phosphorus, dissolved	mg/L	12	0.32	0.00	0.09	0.09	0.08	0.12	0.01
Fecal coliform	col/100 ml	21	2,800	0	------	100	-------	1,220	4
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L	37	13.4	6.1	10.3	10.2	1.8	12.6	7.8
Biochemical oxygen demand (5 day)	mg/L	36	6.7	0.6	2.5	2.2	1.4	5.2	1.2
pH	pH units	52	9.3	7.3	8.1	8.2	0.3	8.4	7.9
Color	Co - Pt units	6	32	5	14		12		

06445000 White River near Whitney, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	36	RDS = 0.838(SpC) − 127.060	0.99	98	61
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	36	TH = 0.224(SpC) + 38.351	.93	87	49
Calcium (Ca)	24	Ca = 0.042(SpC) + 35.143	.91	83	8.6
Magnesium (Mg)	24	Mg = 0.023(SpC) − 4.003	.96	92	3.0
Sodium (Na)	23	Na = 0.165(SpC) − 44.779	.99	99	11
Potassium (K)	----------	----------	----------	----------	----------
Bicarbonate (HCO_3)	----------	----------	----------	----------	----------
Sulfate (SO_4)	36	SO_4 = 0.529(SpC) − 271.345	.98	97	52
Chloride (Cl)	26	Cl = 0.010(SpC) + 2.895	.92	84	2.1
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
73	45	1.9	$SpC = 2356Q^{-0.36264}$	-0.70	49	0.136	32

Niobrara River Basin

The Niobrara River basin in Nebraska is long and narrow and lies mostly along the northern border of the State. The entire basin includes parts of Wyoming and South Dakota. In Nebraska, it extends for about 300 mi from the Wyoming border to the confluence of the Niobrara and Missouri Rivers. For convenience, the small Ponca Creek basin is included in this discussion with the Niobrara, but water quality of Ponca Creek is not related to that of the Niobrara River and its tributaries.

Sufficient data for statistical analysis are available for eight surface-water sampling sites in the Niobrara River basin and for two on Ponca Creek. These sites are shown on figure 3.

During most of its passage across Nebraska, the Niobrara River flows through sandhills. Because the contributing drainage area is small in comparison with the total drainage, relatively small amounts of overland runoff reach the stream. For the 83 times that the Niobrara River at Norden was sampled for water quality, the maximum discharge was only 5.7 times the minimum, indicating relatively small overall fluctuations of stream discharge. This means that flow of the stream is derived mostly from ground-water seepage. On the other hand, the maximum water discharge of Ponca creek at Anoka for the 22 times that it was sampled for water quality was more than 17,000 times the minimum discharge. Flow in Ponca Creek carries very little ground-water seepage, being maintained mostly by overland runoff.

Mean specific conductance averaged about 400 umho/cm for the four uppermost stations in the Niobrara River basin. By contrast, the mean near the mouth of the Niobrara River at Verdel was only 266 umho/cm. The improvement in overall quality of water in a downstream direction is attributed to tributary inflow of water of excellent quality combined with seepage of ground water into the Niobrara during its passage through the sandhills. The principal cation throughout the entire reach of the Niobrara River is calcium, and the principal anion is bicarbonate.

The water quality of Long Pine Creek is probably representative of that of most tributaries of the Niobrara River having their origin in the sandhills, because geology and hydrology of most tributaries are very similar. Mean specific conductance for Long Pine Creek at Riverview is 179 umho/cm.

Concentrations of chloride, nitrate, BOD, fecal coliform, and fecal streptococcal bacteria are low in the Niobrara River and its tributaries, indicating that the stream is relatively unpolluted.

Regression equations were developed for the relationships between specific conductance and those constituents for which sufficient data have been collected. Correlation coefficients were low for several of the relationships and correlations were not significant at the 95 percent confidence level for several relationships. The only constituents for which the percent explained variance exceeded 50 for all Niobrara River and tributary stations, except those for which there was insufficient data, were dissolved-solids residue and bicarbonate.

Correlations are relatively poor for most constituents because concentrations are low and may vary over narrow ranges. Also, because concentration ranges are low for most constituents, small natural variations in ion ratios between these constituents and variations resulting from analytical methodology in the laboratory tend to reduce correlation. According to Irwin and Lemons (1975), temporal variations, often seasonal, may be responsible for differences in chemical composition of water, causing correlation coefficients to be affected.

Mean specific conductance for samples from Ponca Creek at Anoka is 820 umho/cm and for samples from Ponca Creek at Verdel is 1,125 umho/cm. Calcium is the predominate cation, and bicarbonate and sulfate are the predominate anions in samples from Ponca Creek.

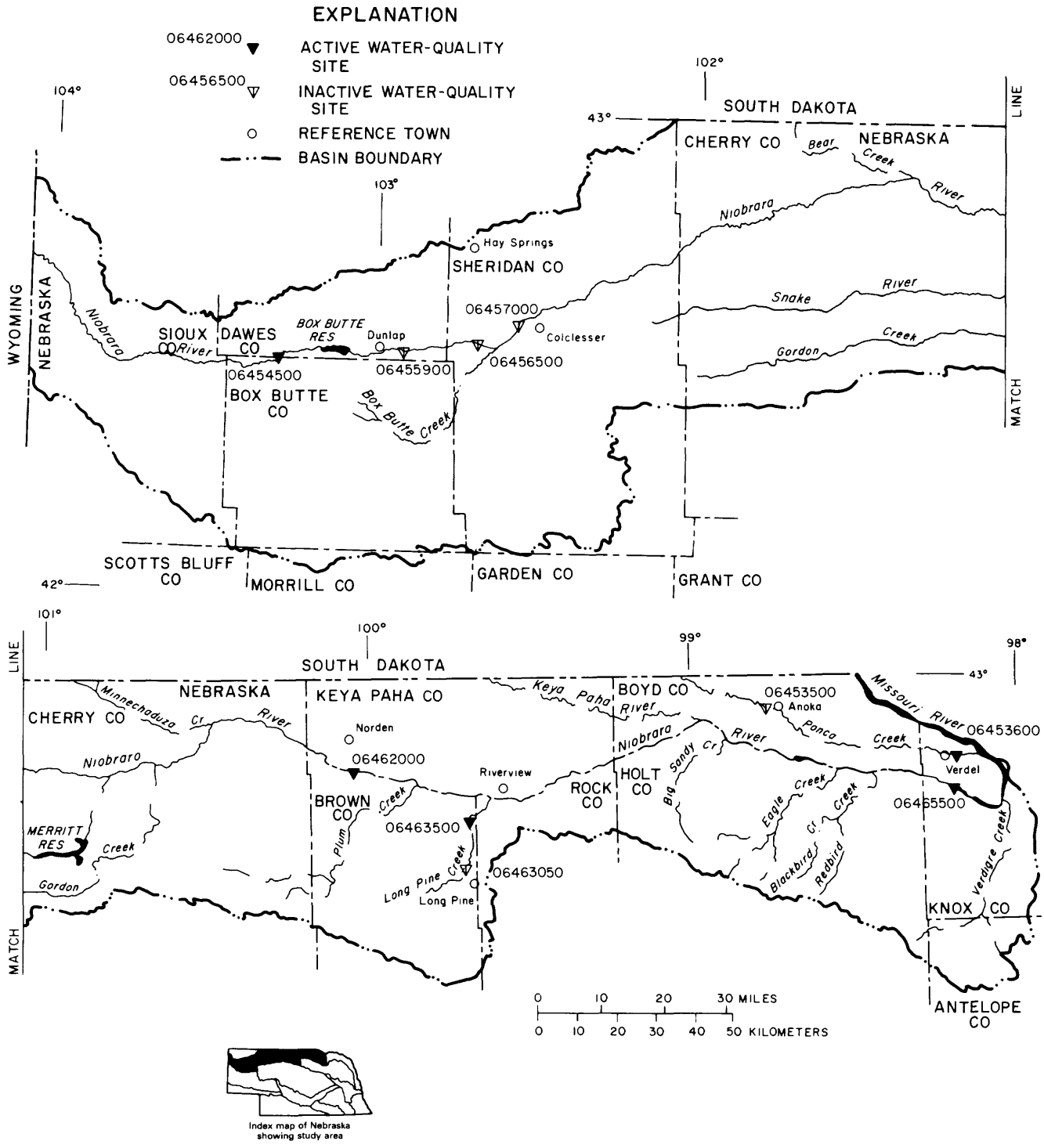

Figure 3. Location of water-quality sampling sites, Niobrara River basin.

06453500 Ponca Creek at Anoka, Nebr.

Location.--Lat 42°45'25", long 98°50'30", in NE¼ sec. 9, T.34 N., R.13 W., Boyd County, Hydrologic Unit 10150001, on downstream side of left pier of bridge on State Highway 11, 0.5 mi southwest of Anoka and 0.5 mi upstream from Dry Creek.

Drainage area.--505 mi^2.

Period of record.--December 1963 to September 1964, October 1966 to September 1967.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	22	1,130	439	820	840	174	1,000	590
Dissolved solids, residue	mg/L	22	825	282	579	583	142	740	390
Dissolved solids, sum	mg/L	----------							
Hardness as $CaCO_3$	mg/L	22	554	210	386	390	96	520	260
Calcium, dissolved	mg/L	22	160	66	106	101	26	140	74
Magnesium, dissolved	mg/L	22	42	11	29	31	8.2	38	18
Sodium, dissolved	mg/L	22	37	6.3	28	30	6.2	33	24
Potassium, dissolved	mg/L	22	15	7.4	11	9.5	2.4	14	8.0
Bicarbonate ion	mg/L	22	360	177	253	250	49	305	200
Sulfate, dissolved	mg/L	22	383	51	223	225	88	320	110
Chloride, dissolved	mg/L	22	11	1.2	8.1	8.4	1.9	9.6	6.7
Fluoride, dissolved	mg/L	22	0.6	0.1	0.3	0.3	0.1	0.4	0.1
Silica, dissolved	mg/L	22	20	12	17	17	2.2	19	14
Boron, dissolved	mg/L	22	170	10	105	120	44	160	48
Iron, dissolved	ug/L	22	240	10	34	33	48	50	10
Manganese, dissolved	ug/L	17	260	0	70	39	86	230	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	22	3.1	0	0.80	--------	0.96	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	21	8.2	7.2	7.8	7.9	0.3	8.1	7.4
Color	Co - Pt units	8	20	3	10	--------	8	----------	

06453500 Ponca Creek at Anoka, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	22	RDS = 0.814(SpC) − 89.369	1.0	99	13
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	22	TH = 0.544(SpC) − 60.696	.98	97	17
Calcium (Ca)	22	Ca = 0.144(SpC) − 11.876	.97	93	6.8
Magnesium (Mg)	22	Mg = 0.044(SpC) -- 7.260	.94	89	2.8
Sodium (Na)	22	Na = 0.027(SpC) + 5.824	.76	58	4.1
Potassium (K)	22	K = 0.005(SpC) + 6.733	*.34	12	2.3
Bicarbonate (HCO_3)	22	HCO_3 = 0.124(SpC)+151.537	.44	20	45
Sulfate (SO_4)	22	SO_4 = 0.473(SpC) − 165.121	.93	87	33
Chloride (Cl)	22	Cl = 0.006(SpC) + 3.361	.51	26	1.7
Silica (Si)	22	Si - 0.003(SpC) + 14.083	*.26	6.8	2.2
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
22	1,740	0.10	$SpC = 943\ Q^{-0.08756}$	-0.82	67	0.059	14

* Not significant at 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06453600 Ponca Creek at Verdel, Nebr.

Location.--Lat 42°48'40", long 98°10'35", in NE¼NE¼ sec. 30, T.33 N., R.7 W., Knox County, Hydrologic Unit 10150001, near left bank at left downstream end of bridge on State Highway 12, 0.6 mi east of Verdel and 3.1 mi upstream from mouth.

Drainage area.--812 mi^2.

Period of record.--July 1975 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	21	1,660	540	1,125	1,120	305	1,533	755
Dissolved solids, residue	mg/L	13	1,880	391	978	--------	414	----------	----------
Dissolved solids, sum	mg/L	6	1,020	561	761	--------	180	----------	----------
Hardness as $CaCO_3$	mg/L	8	720	380	546	--------	131	----------	----------
Calcium, dissolved	mg/L	7	190	110	148	--------	33	----------	----------
Magnesium, dissolved	mg/L	7	49	21	36	--------	9.8	----------	----------
Sodium, dissolved	mg/L	8	51	26	40	--------	9.0	----------	----------
Potassium, dissolved	mg/L	7	14	12	13	--------	0.9	----------	----------
Bicarbonate ion	mg/L	8	320	124	219	--------	58	----------	----------
Sulfate, dissolved	mg/L	8	590	250	430	--------	126	----------	----------
Chloride, dissolved	mg/L	20	23	5.6	16	16	4.6	22	11
Fluoride, dissolved	mg/L	6	0.4	0.3	0.4	--------	0.05	----------	----------
Silica, dissolved	mg/L	7	17	9.7	14	--------	2.6	----------	----------
Boron, dissolved	mg/L	7	340	130	187	--------	69	----------	----------
Iron, dissolved	ug/L	7	60	10	24	--------	24	----------	----------
Manganese, dissolved	ug/L	7	350	0	163	--------	132	----------	----------
Nitrite + nitrate as N, dissolved	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Nitrate as N, dissolved	mg/L	2	0.60	0.00	0.30	----------	----------	----------	----------
Nitrate as NO_3, dissolved	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Ammonia N, total	mg/L	19	0.41	0.00	0.07	0.05	0.09	0.13	0.00
Organic N, total	mg/L	19	1.6	0.12	0.55	0.44	0.38	1.4	0.15
Phosphorus, total	mg/L	19	0.52	0.01	0.10	0.06	0.12	0.26	0.02
Phosphorus, dissolved	mg/L	13	0.11	0.00	0.03	0.02	0.03	0.06	0.01
Fecal coliform	col/100 ml	10	5,100	13	--------	140	--------	880	63
Fecal streptococci	col/100 ml	15	10,000	68	--------	1,400	--------	7,100	140
Oxygen, dissolved	mg/L	19	13.3	6.7	9.7	9.4	2.0	12.5	7.2
Biochemical oxygen demand (5-day)	mg/L	17	9.0	1.4	3.6	2.6	2.2	7.6	1.7
pH	pH units	20	8.4	7.0	7.7	7.7	0.4	8.3	7.1
Color	Co - Pt units	6	35	2	12	-------	13	----------	----------

06453600 Ponca Creek at Verdel, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	----------				
Dissolved solids, sum (SDS)	----------				
Hardness as $CaCO_3$ (TH)	----------				
Calcium (Ca)	----------				
Magnesium (Mg)	----------				
Sodium (Na)	----------				
Potassium (K)	----------				
Bicarbonate (HCO_3)	----------				
Sulfate (SO_4)	----------				
Chloride (Cl)	20	Cl = 0.014(SpC) + 0.443	0.90	81	2.1
Silica (Si)	----------				
Nitrite + Nitrate as N (NO_2-NO_3)	----------				

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
20	170	0.08	$SpC = 1228\ Q^{-0.07273}$	-0.52	27	0.113	26

06454500 Niobrara River above Box Butte Reservoir, Nebr.

Location.--Lat 42°27'35", long 103°10'15", in NE¼ sec. 27, T.29 N., R.50 W., Dawes County, Hydrologic Unit 10150002, on right bank 1 mi upstream from high-water line of Box Butte Reservoir and 6 mi east of Marsland.

Drainage area.--1,400 mi^2, approximately.

Period of record.--July 1975 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	27	472	358	413	414	28	450	370
Dissolved solids, residue	mg/L	17	325	263	286	282	17	310	270
Dissolved solids, sum	mg/L	9	300	266	281	--------	13	----------	
Hardness as $CaCO_3$	mg/L	8	180	150	160	--------	12	----------	
Calcium, dissolved	mg/L	8	54	45	49	--------	3.8	----------	
Magnesium, dissolved	mg/L	8	10	8.1	9.3	--------	0.7	----------	
Sodium, dissolved	mg/L	8	37	22	26	--------	4.6	----------	
Potassium, dissolved	mg/L	8	8.7	6.3	7.4	--------	1.0	----------	
Bicarbonate ion	mg/L	8	270	210	243	--------	21	----------	
Sulfate, dissolved	mg/L	8	33	11	16	--------	7.1	----------	
Chloride, dissolved	mg/L	25	8.3	3.5	5.3	4.9	1.2	7.1	3.9
Fluoride, dissolved	mg/L	9	0.8	0.6	0.7	--------	0.07	----------	
Silica, dissolved	mg/L	8	52	39	47	--------	4.2	----------	
Boron, dissolved	mg/L	8	160	40	68	--------	38	----------	
Iron, dissolved	ug/L	8	180	0	46	--------	58	----------	
Manganese, dissolved	ug/L	8	200	5.0	46	--------	64	----------	
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	28	0.07	0.00	0.02	0.02	0.02	0.05	0.00
Organic N, total	mg/L	28	0.81	0.15	0.43	0.38	0.19	0.71	0.21
Phosphorus, total	mg/L	28	0.12	0.00	0.04	0.04	0.03	0.09	0.01
Phosphorus, dissolved	mg/L	20	0.08	0.00	0.02	0.02	0.02	0.05	0.00
Fecal coliform	col/100 ml	15	1,800	1	-------	66	----------	465	0
Fecal streptococci	col/100 ml	23	4,200	9	-------	56	----------	660	16
Oxygen, dissolved	mg/L	28	16.5	8.2	-------	10.0	----------	13.0	8.5
Biochemical oxygen demand (5-day)	mg/L	26	9.4	0.6	2.9	2.5	1.9	5.2	1.1
pH	pH units	28	7.8	7.1	7.4	7.4	0.2	7.7	7.2
Color	Co - Pt units	9	25	3	14	--------	8	----------	

06454500 Niobrara River above Box Butte Reservoir, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	17	RDS = 0.110(SpC)+ 240.947	*0.17	3.0	17
Dissolved solids, sum (SDS)	----	----	----	----	----
Hardness as $CaCO_3$ (TH)	----	----	----	----	----
Calcium (Ca)	----	----	----	----	----
Magnesium (Mg)	----	----	----	----	----
Sodium (Na)	----	----	----	----	----
Potassium (K)	----	----	----	----	----
Bicarbonate (HCO_3)	----	----	----	----	----
Sulfate (SO_4)	----	----	----	----	----
Chloride (Cl)	25	Cl = 0.003(SpC)+ 4.187	* .06	0.42	1.2
Silica (Si)	----	----	----	----	----
Nitrite + Nitrate as N (NO_2-NO_3)	----	----	----	----	----

* Not significant at 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
27	86	6.6	$SpC = 406Q^{0.00508}$	*0.04	0.20	0.031	7.1

*Not significant at 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06455900 Niobrara River near Dunlap, Nebr.

Location.--Lat 42°27'48", long 102°55'47", in SE¼NW¼ sec. 26, T.29 N., R.48 W., Dawes County, 0.5 mi upstream from gaging station, at county road bridge 0.7 mi upstream from Cottonwood Creek, and 2.0 mi east of Dunlap.

Drainage area.--1,580 mi^2, approximately (at gaging station).

Period of record.--August 1969 to September 1973.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	79	510	290	382	389	46	433	316
Dissolved solids, residue	mg/L	2	279	221	250	--------	41	----------	----------
Dissolved solids, sum	mg/L	7	284	212	247	--------	30	----------	----------
Hardness as $CaCO_3$	mg/L	7	150	99	124	--------	21	----------	----------
Calcium, dissolved	mg/L	7	46	25	35	--------	8.8	----------	----------
Magnesium, dissolved	mg/L	7	9.9	8.3	9.2	--------	0.5	----------	----------
Sodium, dissolved	mg/L	7	28	23	27	--------	1.9	----------	----------
Potassium, dissolved	mg/L	7	9.2	6.4	7.9	--------	0.9	----------	----------
Bicarbonate ion	mg/L	7	237	179	210	--------	24	----------	----------
Sulfate, dissolved	mg/L	7	18	11	15	--------	2.3	----------	----------
Chloride, dissolved	mg/L	7	6.3	2.0	4.4	--------	1.4	----------	----------
Fluoride, dissolved	mg/L	7	0.9	0.7	0.7	--------	0.1	----------	----------
Silica, dissolved	mg/L	7	51	31	42	--------	8.9	----------	----------
Boron, dissolved	mg/L	7	60	20	44	--------	15	----------	----------
Iron, dissolved	ug/L	----------							
Manganese, dissolved	ug/L	----------							
Nitrite + nitrate as N, dissolved	mg/L	5	1.1	0.05	0.56	--------	0.50	----------	----------
Nitrate as N, dissolved	mg/L	2	0.86	0.03	0.45	----------			
Nitrate as NO_3, dissolved	mg/L	2	3.8	0.20	2.0	----------			
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	2	0.57	0.20	0.39	----------			
Phosphorus, total	mg/L	2	0.21	0.18	0.20	----------			
Phosphorus, dissolved	mg/L	7	0.04	0.02	0.03	--------	0.01	----------	----------
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	75	13.8	5.3	9.7	9.6	2.0	12.0	6.7
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	82	8.6	7.2	8.1	8.2	0.2	8.4	7.8
Color	Co - Pt units	7	18	0	5	--------	6	----------	----------

06456500 Niobrara River near Hay Springs, Nebr.

Location.--Lat 42°28'30", long 102°41'50", in NE¼ sec. 22, T.29 N., R.46 W., on right bank about 500 ft upstream from bridge on State Highway 87, 14 mi south of Hay Springs, in Sheridan County, and about 4 mi upstream from Box Butte Creek.

Period of record.--October 1963 to September 1964.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	25	450	342	416	416	23	440	400
Dissolved solids, residue	mg/L	25	308	233	284	284	16	302	260
Dissolved solids, sum	mg/L	----------							
Hardness as $CaCO_3$	mg/L	25	174	121	156	158	11	168	140
Calcium, dissolved	mg/L	24	57	34	48	48	8.7	54	44
Magnesium, dissolved	mg/L	23	15	4.4	9.0	8.7	4.7	11	7.4
Sodium, dissolved	mg/L	24	29	21	25	26	1.9	28	23
Potassium, dissolved	mg/L	24	11	7.1	9.0	9.4	1.4	10	7.4
Bicarbonate ion	mg/L	25	250	189	235	237	13	248	220
Sulfate, dissolved	mg/L	24	34	16	19	19	3.5	22	0.0
Chloride, dissolved	mg/L	24	4.7	2.5	3.3	3.2	0.6	4.1	2.7
Fluoride, dissolved	mg/L	24	0.8	0.6	0.7	--------	0.1	----------	
Silica, dissolved	mg/L	24	58	44	49	50	3.1	53	46
Boron, dissolved	mg/L	24	120	10	54	49	24	90	38
Iron, dissolved	ug/L	24	180	0	52	33	51	160	12
Manganese, dissolved	ug/L	16	150	0	18	0	40	70	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	24	2.7	0.20	1.3	--------	0.63	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	25	8.3	7.4	7.7	7.7	0.2	8.0	7.5
Color	Co - Pt units	7	7	3	4	--------	2	----------	

06456500 Niobrara River near Hay Springs, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	25	RDS = 0.659(SpC) + 9.565	0.94	89	5.4
Dissolved solids, sum (SDS)	---	---	---	---	---
Hardness as $CaCO_3$ (TH)	25	TH = 0.448(SpC) − 30.677	.89	79	5.3
Calcium (Ca)	24	Ca = 0.135(SpC) − 8.214	.66	44	3.6
Magnesium (Mg)	23	Mg = 0.022(SpC) − 0.215	*.25	6.4	1.9
Sodium (Na)	24	Na = 0.030(SpC) + 12.819	*.34	11	1.8
Potassium (K)	24	K = 0.016(SpC) + 2.350	*.26	6.5	1.3
Bicarbonate (HCO_3)	25	HCO_3 = 0.517(SpC)+ 20.026	.90	82	5.6
Sulfate (SO_4)	24	SO_4 = 0.075(SpC) − 11.915	.46	22	3.2
Chloride (Cl)	24	Cl = 0.006(SpC) + 0.597	*.23	5.3	0.6
Silica (Si)	24	Si = 0.011(SpC) + 44.764	*.08	0.60	3.2
Nitrite + Nitrate as N (NO_2-NO_3)	---	---	---	---	---

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
25	87	10	$SpC = 423Q^{-0.00580}$	*0.04	0.17	0.026	6.0

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06457000 Niobrara River near Colclesser, Nebr.

Location.--Lat 42°32'38", long 102°29'58", in NW¼SE¼SE¼ sec. 29, T.30 N., R.44 W., Sheridan County, at wooden bridge 1 mi west of Colclesser Mill School, about 2 mi upstream from Pine Creek, and 2.2 mi southwest of State Highway 250 bridge crossing.

Drainage area.--2,220 mi^2, approximately.

Period of record.-- August 1969 to September 1973.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	82	500	170	394	399	50	442	340
Dissolved solids, residue	mg/L	2	289	288	288	----------	----------	----------	----------
Dissolved solids, sum	mg/L	7	298	254	272	--------	16	----------	----------
Hardness as $CaCO_3$	mg/L	7	170	139	150	--------	12	----------	----------
Calcium, dissolved	mg/L	7	52	41	46	--------	4.3	----------	----------
Magnesium, dissolved	mg/L	7	9.0	7.5	8.5	--------	0.6	----------	----------
Sodium, dissolved	mg/L	7	29	18	23	--------	3.8	----------	----------
Potassium, dissolved	mg/L	7	14	7.7	10	--------	2.1	----------	----------
Bicarbonate ion	mg/L	7	245	206	220	--------	14	----------	----------
Sulfate, dissolved	mg/L	7	29	17	23	--------	4.6	----------	----------
Chloride, dissolved	mg/L	7	7.3	2.2	4.0	--------	1.6	----------	----------
Fluoride, dissolved	mg/L	7	0.8	0.5	0.6	--------	0.1	----------	----------
Silica, dissolved	mg/L	7	52	42	46	--------	3.5	----------	----------
Boron, dissolved	mg/L	7	71	35	51	--------	14	----------	----------
Iron, dissolved	ug/L	2	38	0	19	----------	----------	----------	----------
Manganese, dissolved	ug/L	2	28	7	18	----------	----------	----------	----------
Nitrite + nitrate as N, dissolved	mg/L	5	0.96	0.05	0.43	--------	0.38	----------	----------
Nitrate as N, dissolved	mg/L	2	0.97	0.13	0.55	----------	----------	----------	----------
Nitrate as NO_3, dissolved	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Ammonia N, total	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Organic N, total	mg/L	2	0.38	0.30	0.34	----------	----------	----------	----------
Phosphorus, total	mg/L	1	----------	----------	0.09	----------	----------	----------	----------
Phosphorus, dissolved	mg/L	7	0.08	0.02	0.05	--------	0.02	----------	----------
Fecal coliform	col/100 ml	----------	----------	----------	----------	----------	----------	----------	----------
Fecal streptococci	col/100 ml	----------	----------	----------	----------	----------	----------	----------	----------
Oxygen, dissolved	mg/L	76	12.4	5.3	9.5	9.4	1.7	11.8	7.2
Biochemical oxygen demand (5-day)	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
pH	pH units	83	8.7	7.2	8.2	8.2	0.25	8.5	7.9
Color	Co - Pt units	7	20	3	9	--------	6.6	----------	----------

06457000 Niobrara River near Colclesser, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	----------	----------	----------	----------	----------
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	----------	----------	----------	----------	----------
Calcium (Ca)	----------	----------	----------	----------	----------
Magnesium (Mg)	----------	----------	----------	----------	----------
Sodium (Na)	----------	----------	----------	----------	----------
Potassium (K)	----------	----------	----------	----------	----------
Bicarbonate (HCO_3)	----------	----------	----------	----------	----------
Sulfate (SO_4)	----------	----------	----------	----------	----------
Chloride (Cl)	----------	----------	----------	----------	----------
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
82	75	16	$SpC = 263Q^{0.10724}$	0.26	6.9	0.062	14

06462000 Niobrara River near Norden, Nebr.

Location.--Lat 42°47'13", long 100°02'06", in N½SW¼ sec. 33, T.33 N., R.23 W., Keya Paha County, Hydrologic Unit 10150004, on left bank 60 ft downstream from county road bridge, 1.5 mi downstream from Fairfield Creek, and 6 mi south of Norden.

Drainage area.--8,390 mi^2, approximately.

Period of record.--Water years 1963-66, 1974 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	83	261	201	233	233	14	251	212
Dissolved solids, residue	mg/L	46	205	172	188	184	7.8	199	178
Dissolved solids, sum	mg/L	37	218	165	183	183	9.4	196	170
Hardness as $CaCO_3$	mg/L	83	120	81	97	97	6.9	101	89
Calcium, dissolved	mg/L	83	39	27	32	32	2.4	35	30
Magnesium, dissolved	mg/L	83	5.4	0.9	4.1	4.3	0.7	4.8	3.2
Sodium, dissolved	mg/L	83	12	7.3	9.2	9.2	0.7	10	8.5
Potassium, dissolved	mg/L	83	8.4	3.9	6.4	6.5	0.8	7.4	5.5
Bicarbonate ion	mg/L	83	162	119	138	137	8.0	150	128
Sulfate, dissolved	mg/L	83	12	2.4	7.2	7.2	1.4	8.8	6.0
Chloride, dissolved	mg/L	83	3.2	0.0	1.3	1.4	0.6	2.0	0.2
Fluoride, dissolved	mg/L	84	0.6	0.2	0.4	0.4	0.6	0.4	0.4
Silica, dissolved	mg/L	83	66	37	53	53	7.4	59	47
Boron, dissolved	mg/L	83	100	0	29	0	15	0	0
Iron, dissolved	ug/L	83	270	0	39	31	43	69	14
Manganese, dissolved	ug/L	71	130	0	14	0	26	40	0
Nitrite + nitrate as N, dissolved	mg/L	37	1.1	0.01	0.29	0.19	0.26	0.60	0.00
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	38	0.12	0.01	0.07	0.08	0.03	0.11	0.03
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	84	8.8	7.1	7.6	7.7	0.3	8.0	7.3
Color	Co - Pt units	55	45	1	9	6	8.2	18	4

06462000 Niobrara River near Norden, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	46	RDS = 0.441(SpC) + 83.587	0.72	51	5.5
Dissolved solids, sum (SDS)	36	SDS = 0.345(SpC) + 103.812	.46	21	9.5
Hardness as $CaCO_3$ (TH)	82	TH = 0.326(SpC) + 20.657	.67	44	5.2
Calcium (Ca)	82	Ca = 0.117(SpC) + 4.857	.68	46	1.8
Magnesium (Mg)	82	Mg = 0.006(SpC) + 2.549	*.12	1.5	.7
Sodium (Na)	82	Na = 0.022(SpC) + 4.152	.43	18	.6
Potassium (K)	82	K = 0.018(SpC) + 2.112	.31	9.4	.8
Bicarbonate (HCO_3)	82	HCO_3 = 0.432(SpC)+ 37.230	.76	57	5.3
Sulfate (SO_4)	82	SO_4 = 0.040(SpC) – 2.038	.39	15	1.4
Chloride (Cl)	82	Cl - 0.011(SpC) – 1.377	.26	7.0	.6
Silica (Si)	83	Si = 0.005(SpC) + 52.071	*.01	0.02	5.2
Nitrite + Nitrate as N (NO_2-NO_3)	36	NO_2-NO_3 = 0.002(SpC)-0.107	*.09	0.85	0.27

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Water discharge (ft^3/s) Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate: Log units	Standard error of estimate: Percent
83	2,230	390	SpC - 226 $Q^{0.00407}$	*0.02	0.05	0.026	6.0

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

NIOBRARA RIVER BASIN

06463050 Long Pine Creek at Long Pine, Nebr.

Location.--Lat 42°32'59", long 99°42'23", in NE¼NW¼ sec. 30, T.30 N., R.20 W., Brown County, at timber bridge 0.1 mi downstream from U.S. Highway 20 bridge and about 0.9 mi northwest of Long Pine.

Period of record.--October 1973 to June 1975.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	21	160	114	131	131	7.6	132	129
Dissolved solids, residue	mg/L	13	135	117	124	120	5.1	130	119
Dissolved solids, sum	mg/L	7	130	122	125	---	2.4	---	---
Hardness as $CaCO_3$	mg/L	7	52	46	49	---	2.0	---	---
Calcium, dissolved	mg/L	7	17	15	16	---	.6	---	---
Magnesium, dissolved	mg/L	7	2.4	1.8	2.1	---	.2	---	---
Sodium, dissolved	mg/L	7	5.9	5.0	5.5	---	.4	---	---
Potassium, dissolved	mg/L	7	4.5	3.2	4.0	---	.4	---	---
Bicarbonate ion	mg/L	7	72	68	70	---	1.3	---	---
Sulfate, dissolved	mg/L	7	6.8	3.2	4.0	---	1.3	---	---
Chloride, dissolved	mg/L	21	2.5	.3	1.2	1.1	.5	1.8	0.7
Fluoride, dissolved	mg/L	7	.3	.1	.2	---	.1	---	---
Silica, dissolved	mg/L	7	56	50	54	---	2.3	---	---
Boron, dissolved	mg/L	7	60	0	20	---	20	---	---
Iron, dissolved	ug/L	7	50	10	27	---	12	---	---
Manganese, dissolved	ug/L	7	10	0	2	---	3.9	---	---
Nitrite + nitrate as N, dissolved	mg/L	21	1.3	0.86	1.0	1.0	0.13	1.2	0.83
Nitrate as N, dissolved	mg/L	---	---	---	---	---	---	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	21	0.13	0.00	0.03	0.02	0.03	0.05	0.01
Organic N, total	mg/L	21	0.57	0.00	0.20	0.19	0.13	0.33	0.05
Phosphorus, total	mg/L	21	0.31	0.13	0.22	0.23	0.03	0.27	0.20
Phosphorus, dissolved	mg/L	21	0.24	0.12	0.19	0.20	0.03	0.22	0.16
Fecal coliform	col/100 ml	21	1,100	2	---	36	---	220	6
Fecal streptococci	col/100 ml	21	600	15	---	73	---	300	25
Oxygen, dissolved	mg/L	20	12.1	8.4	10.2	10.0	1.0	11.6	9.0
Biochemical oxygen demand (5-day)	mg/L	20	6.2	0.2	1.6	1.2	1.4	3.7	0.6
pH	pH units	21	7.8	7.1	7.4	7.5	0.2	7.7	7.2
Color	Co - Pt units	7	10	0	5	---	3	---	---

06463050 Long Pine Creek at Long Pine, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	----------	----------	----------	----------	----------
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	----------	----------	----------	----------	----------
Calcium (Ca)	----------	----------	----------	----------	----------
Magnesium (Mg)	----------	----------	----------	----------	----------
Sodium (Na)	----------	----------	----------	----------	----------
Potassium (K)	----------	----------	----------	----------	----------
Bicarbonate (HCO_3)	----------	----------	----------	----------	----------
Sulfate (SO_4)	----------	----------	----------	----------	----------
Chloride (Cl)	21	Cl = 0.006(SpC) + 0.436	*0.08	0.73	0.5
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	21	NO_2-NO_3= -0.004(SpC)+1.512	*-.23	5.2	0.13

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Water discharge (ft^3/s) Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate: Log units	Standard error of estimate: Percent
21	58	50	$SpC = 146\ Q^{-0.02806}$	*- 0.03	0.08	0.025	5.8

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06463500 Long Pine Creek near Riverview, Nebr.

Location.--Lat 42°41'20", long 99°41'20", in SE¼NE¼ sec. 5, T.31 N., R.20 W., Brown County, at gaging station at county road bridge, 1 mi downstream from Bone Creek, and 5.5 mi southwest of Riverview.

Drainage area.--390 mi^2, approximately.

Period of record.--Chemical analyses: October 1969 to July 1970, April 1973 to September 1973, October 1976 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	49	297	151	179	172	28	210	153
Dissolved solids, residue	mg/L	16	267	143	165	152	32	195	146
Dissolved solids, sum	mg/L	24	229	120	152	150	19	159	137
Hardness as $CaCO_3$	mg/L	23	102	57	72	71	10	80	62
Calcium, dissolved	mg/L	23	34	20	24	23	3.4	28	21
Magnesium, dissolved	mg/L	23	5.5	0.5	3.0	3.1	1.0	3.8	1.9
Sodium, dissolved	mg/L	13	29	4.6	8.7	7.2	6.2	8.5	6.5
Potassium, dissolved	mg/L	13	17	4.6	6.5	5.6	3.2	7.5	0.0
Bicarbonate ion	mg/L	23	146	86	101	97	15	120	90
Sulfate, dissolved	mg/L	23	16	0.4	6.2	5.8	3.7	11	1.6
Chloride, dissolved	mg/L	27	21	0.0	2.5	1.9	3.8	3.2	1.0
Fluoride, dissolved	mg/L	24	0.6	0.2	0.3	0.3	0.1	0.5	0.2
Silica, dissolved	mg/L	22	58	27	50	53	9.5	58	42
Boron, dissolved	mg/L	20	60	0	27	21	17	53	10
Iron, dissolved	ug/L	24	130	0	38	32	25	60	20
Manganese, dissolved	ug/L	13	20	0	4.7	0	6	10	0
Nitrite + nitrate as N, dissolved	mg/L	15	1.4	0.47	1.0	1.1	0.28	1.3	0.50
Nitrate as N, dissolved	mg/L	2	0.62	0.31	0.47	----------			
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	6	0.14	0.03	0.06	---------	0.04	----------	
Organic N, total	mg/L	8	3.5	0.16	0.83	---------	1.1	----------	
Phosphorus, total	mg/L	8	1.8	0.21	0.46	---------	0.55	----------	
Phosphorus, dissolved	mg/L	18	0.97	0.12	0.25	0.20	0.19	0.33	0.15
Fecal coliform	col/100 ml	6	150	30	----------				
Fecal streptococci	col/100 ml	6	200	96	----------				
Oxygen, dissolved	mg/L	27	12.2	8.4	10.2	9.8	1.4	12.0	8.5
Biochemical oxygen demand (5-day)	mg/L	6	3.3	0.6	1.3	---------	1.0	----------	
pH	pH units	53	8.4	7.0	7.8	8.0	0.3	8.2	7.4
Color	Co - Pt units	14	60	3	18	12	16	35	4

06463500 Long Pine Creek near Riverview, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	16	RDS = 0.752(SpC)+ 25.424	0.94	88	11
Dissolved solids, sum (SDS)	23	SDS = 0.470(SpC)+ 64.843	.81	65	12
Hardness as $CaCO_3$ (TH)	23	TH = 0.163(SpC)+ 42.492	.51	26	9.2
Calcium (Ca)	23	Ca = 0.057(SpC)+ 13.520	.55	31	2.9
Magnesium (Mg)	23	Mg = 0.005(SpC)+ 2.110	*.15	2.2	1.1
Sodium (Na)	---	---	---	---	---
Potassium (K)	---	---	---	---	---
Bicarbonate (HCO_3)	23	HCO_3 = 0.380(SpC)+ 30.863	.84	71	8.2
Sulfate (SO_4)	23	SO_4 = 0.031(SpC) + 0.468	*.28	7.7	3.6
Chloride (Cl)	27	Cl = 0.092(SpC) − 14.285	.74	55	2.6
Silica (Si)	22	Si = − 0.134(SpC)+ 74.598	-.47	22	8.6
Nitrite + Nitrate as N (NO_2-NO_3)	15	NO_2+NO_3= -0.002(SpC)+1.283	*-.04	0.18	0.30

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
49	762	89	$SpC = 54\ Q^{0.24302}$	0.58	34	0.049	11

06465500 Niobrara River near Verdel, Nebr.

Location.--Lat 42°44'25", long 98°12'45", near center of N½ sec. 23, T.32 N., R.8 W., Knox County, Hydrologic Unit 10150007, on left bank 4 ft downstream from Pishelville Bridge, 6 mi south of Verdel, and 7 mi upstream from Verdigre Creek.

Drainage area.--12,600 mi^2, approximately.

Period of record.--Water years 1958-65, 1967 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	54	339	216	266	262	28	312	234
Dissolved solids, residue	mg/L	46	262	165	200	197	21	230	180
Dissolved solids, sum	mg/L	35	231	162	194	193	15	210	174
Hardness as $CaCO_3$	mg/L	35	140	93	110	113	12	130	96
Calcium, dissolved	mg/L	35	44	31	36	36	3.5	42	38
Magnesium, dissolved	mg/L	35	6.4	3.7	4.8	4.8	0.7	5.9	3.9
Sodium, dissolved	mg/L	35	13	7.1	9.9	9.8	1.3	12	8.6
Potassium, dissolved	mg/L	35	9.0	4.9	6.6	6.4	1.1	8.1	5.1
Bicarbonate ion	mg/L	35	164	109	142	144	12	162	122
Sulfate, dissolved	mg/L	35	34	9.2	16	15	5.8	26	11
Chloride, dissolved	mg/L	51	3.9	0.7	1.9	1.8	0.6	2.6	1.4
Fluoride, dissolved	mg/L	37	0.6	0.0	0.4	0.4	0.1	0.4	0.3
Silica, dissolved	mg/L	35	59	27	47	47	5.9	55	42
Boron, dissolved	mg/L	35	60	0	33	30	12	50	20
Iron, dissolved	ug/L	35	150	0	40	29	34	89	12
Manganese, dissolved	ug/L	35	210	0	22	10	44	40	0
Nitrite + nitrate as N, dissolved	mg/L	33	0.96	0.00	0.40	0.32	0.33	0.77	0.01
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	53	0.64	0.00	0.07	0.04	0.11	0.15	0.00
Organic N, total	mg/L	51	4.7	0.11	0.82	0.65	0.77	1.5	0.19
Phosphorus, total	mg/L	53	1.4	0.05	0.27	0.23	0.22	0.44	0.13
Phosphorus, dissolved	mg/L	53	0.29	0.01	0.08	0.08	0.05	0.14	0.03
Fecal coliform	col/100 ml	38	900	5	-------	32	---------	395	12
Fecal streptococci	col/100 ml	46	2,600	12	-------	118	---------	510	40
Oxygen, dissolved	mg/L	51	13.4	7.0	9.8	9.4	1.6	12.2	7.9
Biochemical oxygen demand (5-day)	mg/L	45	9.4	0.4	3.2	2.7	2.0	5.8	0.8
pH	pH units	55	8.6	6.5	7.7	7.7	0.4	8.2	7.4
Color	Co - Pt units	35	130	2	21	10	24	45	5

06465500 Niobrara River near Verdel, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	44	RDS = 0.670(SpC)+ 22.362	0.91	84	8.7
Dissolved solids, sum (SDS)	33	SDS = 0.510(SpC)+ 61.097	.89	79	7.2
Hardness as $CaCO_3$ (TH)	33	TH = 0.368(SpC) + 13.852	.82	68	6.9
Calcium (Ca)	33	Ca = 0.108(SpC) + 7.662	.83	70	2.0
Magnesium (Mg)	33	Mg = 0.020(SpC) − 0.244	.72	52	.5
Sodium (Na)	33	Na = 0.042(SpC) − 1.027	.85	73	.7
Potassium (K)	33	K = 0.023(SpC) + 0.497	.56	31	1.0
Bicarbonate (HCO_3)	33	HCO_3 = 0.366(SpC)+ 46.842	.82	67	7.1
Sulfate (SO_4)	33	SO_4 = 0.114(SpC) − 13.187	.53	28	5.0
Chloride (Cl)	49	Cl = 0.008(SpC) − 0.332	.40	16	.6
Silica (Si)	33	Si + 0.004(SpC) + 46.275	*.02	0.03	6.0
Nitrite + Nitrate as N (NO_2-NO_3)	32	NO_2-NO_3=0.002(SpC)− 0.267	*.21	4.4	0.33

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Water discharge (ft^3/s) Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate Log units	Standard error of estimate Percent
52	4,240	508	$SpC = 132\ Q^{0.09718}$	0.39	15	0.042	9.7

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Missouri River Tributaries Basin and Missouri River Main Stem

The series of basins collectively referred to as the Missouri River tributaries basin consists of all direct drainage from Nebraska into the Missouri River between its confluence with the Niobrara River and its confluence with the Platte River. Data from sites in the Missouri River tributaries basin were not sufficient for statistical analysis.

For convenience, stations on the Missouri River main stem are included in this part of the report. Data included for the Missouri River are limited to those obtained by the Nebraska District of the U.S. Geological Survey.

Data for five sites on the Missouri River main stem are sufficient for some statistical representation. Three of these sites are shown on figure 4, and the other two are shown on figure 11. Means for specific conductance at the five stations ranged from 676 to 723 umho/cm. Predominate cations at all stations are calcium and sodium, and predominant anions are bicarbonate and sulfate.

Effluent from sewage plants of the major cities, Sioux City, Iowa, and Omaha, Nebr., is carried by the Missouri River. The median fecal coliform concentration at Decatur, which is about 35 river miles downstream from Sioux City, was 3,020 colonies per 100 ml. Near the Mormon Bridge at Omaha, which is at the northeast edge of the city and upstream from the Omaha sewage-treatment plant, the concentration was 1,400 colonies per 100 ml. This more than twofold improvement is related to several factors including bacterial die-off, tributary dilution, and settling of bacteria to the streambed. At Bellevue, just downstream from Omaha, the median fecal coliform concentration was 24,000 colonies per 100 ml. This improved to 17,000 colonies per 100 ml at Plattsmouth. Some of this improvement may be the result of a dilution of 10–20 percent because of inflow of water from the Platte River.

Most nutrients increased in concentration as the water passed Omaha. Mean concentration of ammonia-N was 0.11 mg/L near the Mormon Bridge but increased to 0.22 at Plattsmouth. Mean total phosphorus was 0.23 mg/L at the Mormon Bridge and 0.39 mg/L at Plattsmouth.

Regression equations were developed for constituents at three stations. Data for the Missouri River at Nebraska City indicates reasonably good correlation with most constituents and specific conductance. Regulation of flows in the upper reaches of the Missouri River coupled with unregulated tributary inflow in the area of study may combine to decrease the percent explained variances for all constituents.

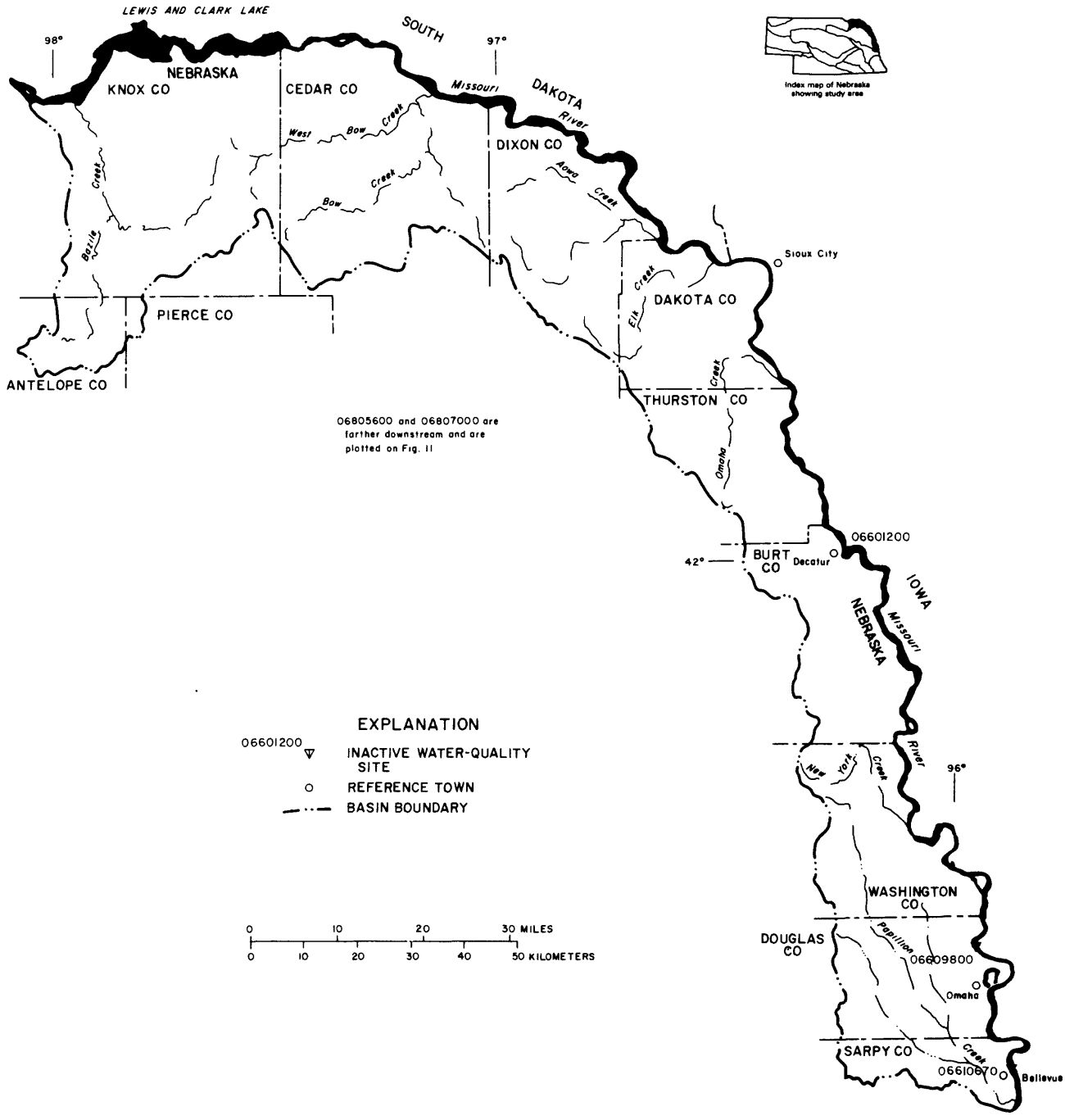

Figure 4. Location of water-quality sampling sites, Missouri River tributaries basin and Missouri River main stem.

MISSOURI RIVER MAIN STEM

06601200 Missouri River at Decatur, Nebr.

Location.--Lat 42°00'26", long 96°14'29", in NE¼SW¼ sec. 36, T.24 N., R.10 E., Burt County, at bridge at Decatur.

Drainage area.--316,160 mi^2.

Period of record.-- July 1969 to June 1970, August 1971 to September 1973.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	138	920	412	723	726	69	790	660
Dissolved solids, residue	mg/L	59	589	390	487	486	29	522	450
Dissolved solids, sum	mg/L	4	517	360	460	----------	69	----------	----------
Hardness as $CaCO_3$	mg/L	36	285	210	242	246	55	262	220
Calcium, dissolved	mg/L	26	68	53	61	61	3.6	66	57
Magnesium, dissolved	mg/L	26	24	18	22	22	1.6	24	20
Sodium, dissolved	mg/L	7	72	33	62	----------	14	----------	----------
Potassium, dissolved	mg/L	4	8.1	5.3	6.1	----------	1.4	----------	----------
Bicarbonate ion	mg/L	79	238	150	190	193	21	208	170
Sulfate, dissolved	mg/L	63	236	140	201	206	17	225	187
Chloride, dissolved	mg/L	52	22	8.5	11	11	1.9	13	9.6
Fluoride, dissolved	mg/L	7	0.6	0.3	0.5	----------	0.1	----------	----------
Silica, dissolved	mg/L	4	12	7.4	8.8	----------	2.1	----------	----------
Boron, dissolved	mg/L	7	140	80	121	----------	21	----------	----------
Iron, dissolved	ug/L	----------	----------	----------	----------	----------	----------	----------	----------
Manganese, dissolved	ug/L	7	140	10	48	----------	56	----------	----------
Nitrite + nitrate as N, dissolved	mg/L	26	1.0	0.04	0.25	0.23	0.19	0.39	0.07
Nitrate as N, dissolved	mg/L	12	1.0	0.10	0.40	0.36	0.26	0.62	0.13
Nitrate as NO_3, dissolved	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Ammonia N, total	mg/L	37	1.1	0.00	0.10	0.06	0.19	0.23	0.00
Organic N, total	mg/L	31	1.9	0.13	0.39	0.34	0.30	0.44	0.23
Phosphorus, total	mg/L	65	1.3	0.04	0.15	0.11	0.18	0.25	0.06
Phosphorus, dissolved	mg/L	28	0.14	0.00	0.05	0.05	0.04	0.10	0.01
Fecal coliform	col/100 ml	76	16,000	360	-------	3,020	--------	10,300	1,300
Fecal streptococci	col/100 ml	----------	----------	----------	----------	----------	----------	----------	----------
Oxygen, dissolved	mg/L	100	17.4	6.6	10.4	10.0	2.2	13.5	7.8
Biochemical oxygen demand (5-day)	mg/L	38	9.2	0.5	2.2	1.8	1.7	4.1	1.0
pH	pH units	118	8.8	7.0	7.9	8.0	0.3	8.3	7.4
Color	Co - Pt units	5	50	2	13	----------	20	----------	----------

06601200 Missouri River at Decatur, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	58	RDS = 0.473(SpC) + 143.051	0.63	40	23
Dissolved solids, sum (SDS)	---	---	---	---	---
Hardness as $CaCO_3$ (TH)	36	TH = 0.240(SpC) + 66.993	.77	59	9.8
Calcium (Ca)	26	Ca = 0.056(SpC) + 19.746	.72	52	2.5
Magnesium (Mg)	26	Mg = 0.028(SpC) + 0.685	.82	68	.9
Sodium (Na)	---	---	---	---	---
Potassium (K)	---	---	---	---	---
Bicarbonate (HCO_3)	79	HCO_3 = 0.088(SpC) + 125.754	.26	6.6	16
Sulfate (SO_4)	62	SO_4 = 0.302(SpC) − 18.131	.76	57	11
Chloride (Cl)	52	Cl = 0.010(SpC) + 3.749	*.21	4.6	1.9
Silica (Si)	---	---	---	---	---
Nitrite + Nitrate as N (NO_2-NO_3)	26	NO_2+NO_3 = − 0.003(SpC)+2.478	-.73	54	0.13

* Not significant at 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Water discharge (ft^3/s) Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate: Log units	Standard error of estimate: Percent
137	62,300	10,000	$SpC = 403Q^{0.05578}$	0.18	3.2	0.048	11

MISSOURI RIVER MAIN STEM

06609800 Missouri River near Mormon Bridge at Omaha, Nebr.

Location.--Lat 41°20'37", long 95°57'26", in SE¼NW¼ sec. 21, T.16 N., R.13 E., Douglas County, at raw-water intake of Omaha Metropolitan Utilities District, Florence Station, 10.3 mi upstream from gaging station, 0.2 mi downstream from Mormon Bridge, at river mile 626.2.

Period of record.-- February 1974 to June 1975.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	12	775	615	709	720	43	750	673
Dissolved solids, residue	mg/L								
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L								
Calcium, dissolved	mg/L								
Magnesium, dissolved	mg/L								
Sodium, dissolved	mg/L								
Potassium, dissolved	mg/L								
Bicarbonate ion	mg/L	35	236	182	210	209	16	228	190
Sulfate, dissolved	mg/L								
Chloride, dissolved	mg/L								
Fluoride, dissolved	mg/L								
Silica, dissolved	mg/L								
Boron, dissolved	mg/L								
Iron, dissolved	ug/L								
Manganese, dissolved	ug/L								
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L								
Ammonia N, total	mg/L	32	0.35	0.03	0.11	0.08	0.09	0.23	0.05
Organic N, total	mg/L	27	2.6	0.05	0.60	0.37	0.61	1.4	0.15
Phosphorus, total	mg/L	32	1.2	0.05	0.23	0.15	0.24	0.37	0.08
Phosphorus, dissolved	mg/L								
Fecal coliform	col/100 ml	35	27,000	40	-------	1,400	--------	12,400	230
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L	36	14.7	5.9	10.2	9.6	2.4	13.5	7.2
Biochemical oxygen demand (5-day)	mg/L								
pH	pH units	36	8.3	7.2	7.8	7.8	0.2	8.1	7.4
Color	Co - Pt units								

MISSOURI RIVER MAIN STEM

06610670 Missouri River at Bellevue, Nebr.

Location: Lat 41°08'35", long 95°53'00", in SE¼NW¼ sec. 31, T.14 N., R.14 E., Sarpy County, at inlet to Kramer Power Plant in Bellevue.

Period of record.--July 1969 to June 1970, August 1971 to September 1973.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	76	830	360	713	739	91	800	590
Dissolved solids, residue	mg/L	34	569	376	494	496	48	530	465
Dissolved solids, sum	mg/L	5	526	368	464	---	60	---	---
Hardness as $CaCO_3$	mg/L	38	282	190	246	248	18	275	230
Calcium, dissolved	mg/L	27	71	50	62	62	4.5	69	58
Magnesium, dissolved	mg/L	27	25	16	22	22	1.6	24	21
Sodium, dissolved	mg/L	8	75	30	63	---	15	---	---
Potassium, dissolved	mg/L	5	8.1	5.4	6.0	---	1.2	---	---
Bicarbonate ion	mg/L	17	239	172	206	202	21	230	176
Sulfate, dissolved	mg/L	39	230	120	196	204	26	225	170
Chloride, dissolved	mg/L	27	30	10	14	12	5.2	24	11
Fluoride, dissolved	mg/L	8	0.6	0.3	0.5	---	0.1	---	---
Silica, dissolved	mg/L	5	12	7.3	8.8	---	1.9	---	---
Boron, dissolved	mg/L	8	140	30	108	---	37	---	---
Iron, dissolved	ug/L	5	840	0	178	---	370	---	---
Manganese, dissolved	ug/L	8	60	10	30	---	16	---	---
Nitrite + nitrate as N, dissolved	mg/L	26	1.5	0.05	0.51	0.36	0.39	1.0	0.14
Nitrate as N, dissolved	mg/L	13	1.6	0.20	0.54	0.49	0.36	0.76	0.25
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	10	1.1	0.07	0.31	0.17	0.31	0.54	0.10
Organic N, total	mg/L	4	1.8	0.29	0.76	---	0.70	---	---
Phosphorus, total	mg/L	38	0.82	0.10	0.26	0.20	0.17	0.58	0.12
Phosphorus, dissolved	mg/L	27	0.16	0.00	0.07	0.07	0.04	0.15	0.02
Fecal coliform	col/100 ml	26	200,000	1,600	---	24,000	---	98,500	14,000
Fecal streptococci	col/100 ml	---	---	---	---	---	---	---	---
Oxygen, dissolved	mg/L	38	13.0	6.3	9.5	9.0	2.1	12.5	6.9
Biochemical oxygen demand (5-day)	mg/L	38	9.9	1.0	2.9	2.3	1.8	5.3	1.3
pH	pH units	54	8.2	7.1	7.7	7.8	0.3	8.0	7.2
Color	Co - Pt units	6	50	3	13	---	18	---	---

06610670 Missouri River at Bellevue, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	33	RDS = 0.688(SpC) − 11.676	0.94	89	13
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	37	TH = 0.226(SpC) + 80.187	.70	49	13
Calcium (Ca)	27	Ca = 0.057(SpC) + 19.715	.66	43	3.5
Magnesium (Mg)	27	Mg = 0.019(SpC) + 8.002	.60	35	1.3
Sodium (Na)	----------	----------	----------	----------	----------
Potassium (K)	----------	----------	----------	----------	----------
Bicarbonate (HCO_3)	16	HCO_3 = 0.200(SpC) + 61.838	.67	46	16
Sulfate (SO_4)	38	SO_4 = 0.411(SpC) − 105.020	.90	80	12
Chloride (Cl)	27	Cl = − 0.004(SpC) + 16.850	*−.04	.13	5.3
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	26	NO_2-NO_3= −0.004(SpC) + 3.527	−.54	29	0.34

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
76	57,000	16,000	$SpC = 254Q^{0.09718}$	*0.22	5.0	0.064	15

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06805600 Missouri River at Plattsmouth, Nebr.

Location.--Lat 41°00'04", long 95°51'59", in NE¼NW¼ sec. 20, T.12 N., R.14 E., Cass County, at toll bridge on U.S. Highway 34, 1.0 mi southeast of Plattsmouth.

Period of record.-- February 1974 to June 1975.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	12	776	516	683	710	79	765	581
Dissolved solids, residue	mg/L	----------							
Dissolved solids, sum	mg/L	----------							
Hardness as $CaCO_3$	mg/L	----------							
Calcium, dissolved	mg/L	----------							
Magnesium, dissolved	mg/L	----------							
Sodium, dissolved	mg/L	----------							
Potassium, dissolved	mg/L	----------							
Bicarbonate ion	mg/L	35	256	174	215	215	15	232	200
Sulfate, dissolved	mg/L	35	248	72	172	173	36	220	110
Chloride, dissolved	mg/L	35	47	7.0	20	17	10	34	12
Fluoride, dissolved	mg/L	----------							
Silica, dissolved	mg/L	----------							
Boron, dissolved	mg/L	----------							
Iron, dissolved	ug/L	----------							
Manganese, dissolved	ug/L	----------							
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	34	0.56	0.05	0.22	0.19	0.14	0.39	0.06
Organic N, total	mg/L	34	3.7	0.00	0.76	0.58	0.68	1.2	0.22
Phosphorus, total	mg/L	34	1.9	0.10	0.39	0.27	0.36	0.79	0.13
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	36	98,000	465	------	17,000	--------	48,800	2,200
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	36	14.0	5.7	9.8	9.7	2.4	13.2	6.7
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	36	8.1	7.2	7.7	7.8	0.2	8.0	7.4
Color	Co - Pt units	----------							

06807000 Missouri River at Nebraska City, Nebr.

Location.--Lat 40°40'55", long 95°50'48", in NW¼NE¼ sec. 9, T.8 N., R.14 E., Otoe County, at gaging station at Waubonsie Highway Bridge at Nebraska City, at mile 562.6.

Drainage area.--414,400 mi^2, approximately.

Period of record.-- January 1951 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	564	945	332	676	--------	109	----------	----------
Dissolved solids, residue	mg/L	517	643	217	441	--------	76	----------	----------
Dissolved solids, sum	mg/L	169	620	194	441	--------	67	----------	----------
Hardness as $CaCO_3$	mg/L	530	344	111	225	--------	32	----------	----------
Calcium, dissolved	mg/L	237	93	30	61	--------	7.9	----------	----------
Magnesium, dissolved	mg/L	237	35	8.1	19	--------	3.8	----------	----------
Sodium, dissolved	mg/L	528	92	13	54	--------	15	----------	----------
Potassium, dissolved	mg/L	184	10	4.3	6.2	--------	1.0	----------	----------
Bicarbonate ion	mg/L	563	328	110	197	--------	26	----------	----------
Sulfate, dissolved	mg/L	272	267	46	164	--------	40	----------	----------
Chloride, dissolved	mg/L	238	38	5.4	17	--------	5.2	----------	----------
Fluoride, dissolved	mg/L	189	0.8	0.1	0.5	--------	0.1	----------	----------
Silica, dissolved	mg/L	187	52	5.5	14	--------	4.8	----------	----------
Boron, dissolved	mg/L	196	320	40	108	--------	35	----------	----------
Iron, dissolved	ug/L	158	530	0	34	--------	62	----------	----------
Manganese, dissolved	ug/L	55	500	0	39	--------	80	----------	----------
Nitrite + nitrate as N, dissolved	mg/L	40	1.8	0.00	0.68	--------	0.50	----------	----------
Nitrate as N, dissolved	mg/L	164	2.9	0.00	0.78	--------	0.45	----------	----------
Nitrate as NO_3, dissolved	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Ammonia N, total	mg/L	2	0.05	0.03	0.04	----------	----------	----------	----------
Organic N, total	mg/L	21	3.7	0.00	0.86	--------	0.88	----------	----------
Phosphorus, total	mg/L	40	1.3	0.09	0.24	--------	0.21	----------	----------
Phosphorus, dissolved	mg/L	75	0.75	0.03	0.16	--------	0.12	----------	----------
Fecal coliform	col/100 ml	24	550,000	5,000	----------	----------	----------	----------	----------
Fecal streptococci	col/100 ml	24	11,000	430	----------	----------	----------	----------	----------
Oxygen, dissolved	mg/L	30	12.6	0.0	9.2	--------	2.5	----------	----------
Biochemical oxygen demand (5-day)	mg/L	1	----------	----------	3.1	----------	----------	----------	----------
pH	pH units	562	9.0	6.7	7.6	--------	0.3	----------	----------
Color	Co - Pt units	124	80	2	10	--------	11	----------	----------

06807000 Missouri River at Nebraska City, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	514	RDS = 0.675(SpC) − 11.458	0.98	96	----------
Dissolved solids, sum (SDS)	167	SDS = 0.634(SpC) + 4.833	.96	93	----------
Hardness as $CaCO_3$ (TH)	527	TH = 0.270(SpC) + 43.302	.91	83	----------
Calcium (Ca)	236	Ca = 0.058(SpC) + 21.592	.77	59	----------
Magnesium (Mg)	236	Mg = 0.031(SpC) − 2.450	.86	73	----------
Sodium (Na)	527	Na = 0.125(SpC) − 29.724	.93	87	----------
Potassium (K)	183	K = − 0.002(SpC) + 7.835	−.26	6.5	----------
Bicarbonate (HCO_3)	562	HCO_3= 0.176(SpC) + 78.683	.74	55	----------
Sulfate (SO_4)	271	SO_4 = 0.344(SpC) − 71.379	.91	83	----------
Chloride (Cl)	236	Cl = 0.029(SpC) − 3.525	.60	36	----------
Silica (Si)	186	Si = − 0.008(SpC)+ 18.819	−.17	3.0	----------
Nitrite + Nitrate as N (NO_2-NO_3)	39	NO_2-NO_3= − 0.002(SpC)+ 2.367	*−.28	7.6	----------

* Not significant at the 95 percent confidence interval; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
562	327,000	3,700	$SpC = 2865Q^{-0.13994}$	− 0.48	23	----------	----------

North Platte River Basin

The North Platte River basin in Nebraska lies mostly in western Nebraska, extending from the Wyoming border to the confluence of the North and South Platte Rivers in Lincoln County. Included in the basin is Lake McConaughy, the largest lake in Nebraska.

The North Platte River valley from the Wyoming border to Lake McConaughy is irrigated extensively with diverted surface water. Streamflow is maintained by controlled release of water from several reservoirs in Wyoming. Water is diverted both in Wyoming and in Nebraska into an extensive canal system which provides irrigation water for more than 170,000 acres in the North Platte Valley above Lake McConaughy (NSWCC, 1971). Between Lake McConaughy and the North Platte–South Platte River confluence, approximately 50,000 acres of the basin are irrigated by diversion of surface water. Irrigation water returns to the North Platte River in the form of ground-water seepage and direct runoff. Many drains, which prior to the development of the irrigation project were only intermittent streams, now flow the year around.

Data sufficient for statistical analysis are available for 15 sampling sites in the North Platte River basin (fig. 5). Of these sites, five are on the main stem, and the rest are on tributaries.

The mean specific conductance for the North Platte River at the Wyoming-Nebraska State line was 802 umho/cm, and for 118 samples downstream at Bridgeport it was 931 umho/cm. This 15 percent increase probably results mostly from irrigation return flow. Calcium and sodium are the principal cations, and bicarbonate and sulfate are the principal anions in North Platte River water. An examination of data collected on a monthly basis indicates that sodium usually is higher in concentration near the end of the irrigation season than at other times.

Pumpkin Creek, a major tributary, joins the North Platte River below Bridgeport. Some Pumpkin Creek water and some ground water is used for irrigation in Pumpkin Creek basin. Calcium is the principal cation and bicarbonate is the principal anion in water from Pumpkin Creek near Bridgeport; the mean specific conductance is 592 umho/cm.

The North Platte River near Keystone is just downstream from the outlet of Lake McConaughy. Specific conductance at this station averaged 741 umho/cm. This is 26 percent less than the mean for the North Platte River at Bridgeport. Inflow of less highly mineralized water from tributaries draining sandhill areas and from seepage directly into the lake and storage of relatively dilute storm runoff are most likely the cause of this decrease. Large lakes often serve as "sinks" for some constituents, especially nutrients. Lake McConaughy seems to be a sink for nitrogen, because the mean value for nitrite plus nitrate as N is 1.7 mg/L at Lisco but only 0.41 mg/L at Keystone.

Results of regression analyses for the North Platte River at the Wyoming-Nebraska State line indicate that the percent explained variance for most constituents as related to specific conductance exceeds 50, and all relationships are significant at the 95 percent confidence level. In contrast, none of the percent explained variances for the North Platte River near Keystone exceed 50, and most relationships are not significant at the 95 percent confidence level. This dramatically illustrates the effects that return flow from irrigation and impoundment have on regression relationships. Correlations for the Keystone station are poor; ion ratios of the constituents probably vary more considerably than does conductance.

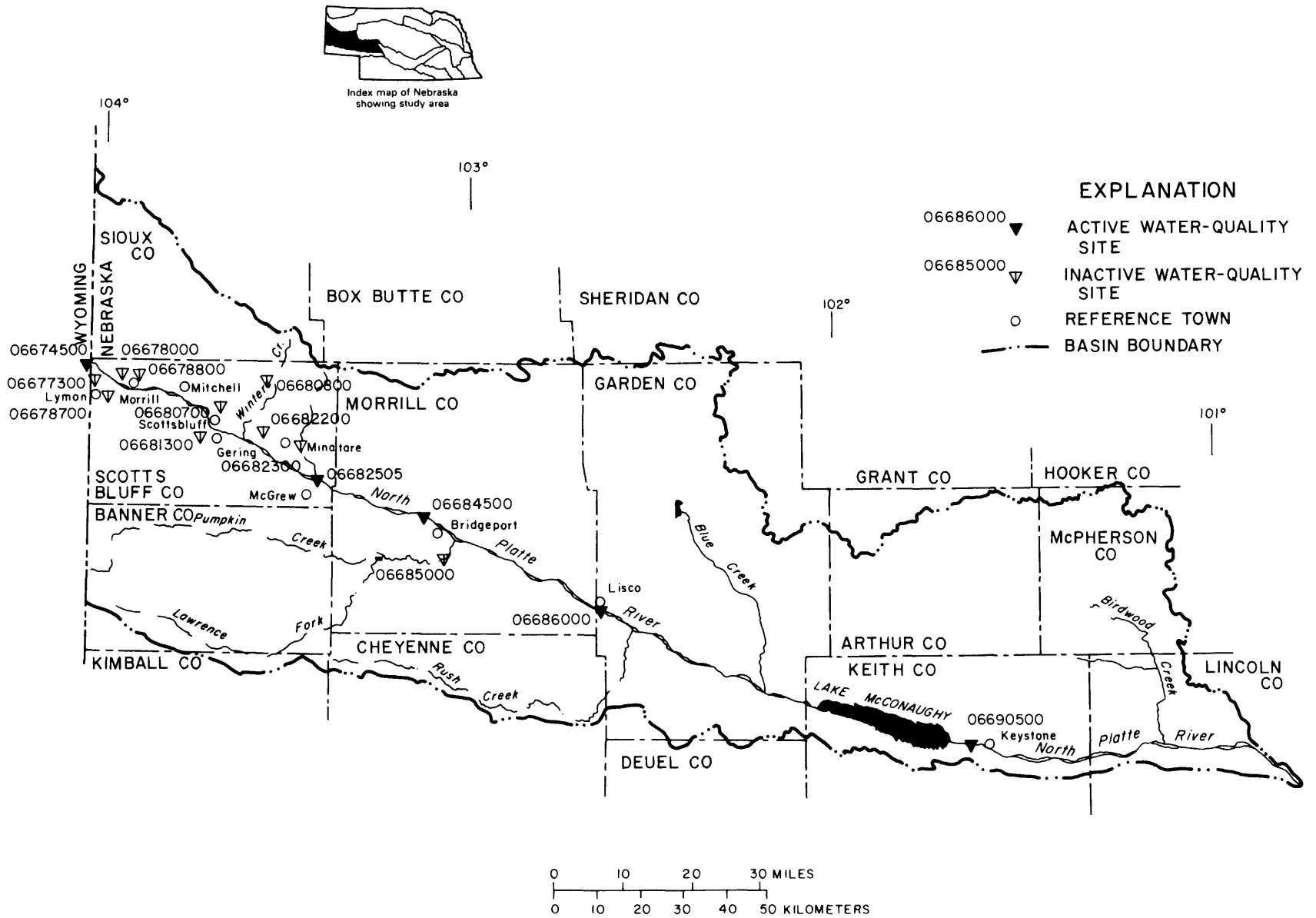

Figure 5. Location of water-quality sampling sites, North Platte River basin.

06674500 North Platte River at Wyoming-Nebraska State Line

Location.--Lat 41°59'25", long 104°02'57", in SW¼NE¼SE¼ sec. 4, T.23 N., R.58 W., Scotts Bluff County, Nebr., Hydrologic Unit 10180009, on right bank 650 ft upstream from bridge on Nebraska State Highway 86, 700 ft downstream from Wyoming-Nebraska State line, and 0.5 mi south of Henry, Nebr.

Drainage area (revised).--22,218 mi^2, of which 1,929 mi^2 is probably noncontributing. The 3,959 mi^2 in Great Divide basin is not included.

Period of record.--Water year 1966 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	224	1,080	102	802	---	123	---	
Dissolved solids, residue	mg/L	147	684	344	537	---	76	---	
Dissolved solids, sum	mg/L	142	695	344	530	---	80	---	
Hardness as $CaCO_3$	mg/L	187	340	171	263	---	31	---	
Calcium, dissolved	mg/L	193	99	34	71	---	13	---	
Magnesium, dissolved	mg/L	188	43	2.7	21	---	5.2	---	
Sodium, dissolved	mg/L	204	121	37	73	---	16	---	
Potassium, dissolved	mg/L	189	8.6	3.0	5.8	---	1.1	---	
Bicarbonate ion	mg/L	189	336	157	241	---	45	---	
Sulfate, dissolved	mg/L	193	250	110	197	---	23	---	
Chloride, dissolved	mg/L	193	34	9.0	18	---	4.0	---	
Fluoride, dissolved	mg/L	204	1.0	0.0	0.6	---	0.1	---	
Silica, dissolved	mg/L	190	35	4.3	21	---	6.6	---	
Boron, dissolved	mg/L	141	590	0	108	---	54	---	
Iron, dissolved	ug/L	25	230	0	46	---	52	---	
Manganese, dissolved	ug/L	1	---		40	---		---	
Nitrite + nitrate as N, dissolved	mg/L	16	1.9	0.27	0.85	---	0.58	---	
Nitrate as N, dissolved	mg/L	61	2.3	0.14	0.90	---	0.58	---	
Nitrate as NO_3, dissolved	mg/L	---							
Ammonia N, total	mg/L	---							
Organic N, total	mg/L	---							
Phosphorus, total	mg/L	79	0.47	0.00	0.07	---	0.08	---	
Phosphorus, dissolved	mg/L	9	0.14	0.00	0.04	---	0.05	---	
Fecal coliform	col/100 ml	73	21,000	0	---				
Fecal streptococci	col/100 ml	---							
Oxygen, dissolved	mg/L	100	11.9	7.1	9.4	---	1.2	---	
Biochemical oxygen demand (5-day)	mg/L	39	5.0	0.1	2.0	---	1.1	---	
pH	pH units	165	8.5	7.2	8.0	---	0.2	---	
Color	Co - Pt units	---							

06674500 North Platte River at Wyoming-Nebraska State Line--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	146	RDS = 0.723(SpC) − 36.970	0.98	96	---
Dissolved solids, sum (SDS)	131	SDS = 0.664(SpC) − 7.347	.95	91	---
Hardness as $CaCO_3$ (TH)	176	TH = 0.232(SpC) + 74.861	.79	63	---
Calcium (Ca)	182	Ca = 0.078(SpC) + 8.244	.65	42	---
Magnesium (Mg)	177	Mg = 0.010(SpC) + 12.362	.21	4.4	---
Sodium (Na)	185	Na = 0.129(SpC) − 30.991	.86	75	---
Potassium (K)	178	K = 0.007(SpC) − 0.166	.73	53	---
Bicarbonate (HCO_3)	178	HCO_3 = 0.371(SpC) − 58.898	.88	78	---
Sulfate (SO_4)	182	SO_4 = 0.182(SpC) + 50.333	.83	70	---
Chloride (Cl)	182	Cl = 0.024(SpC) − 1.221	.63	40	---
Silica (Si)	179	Si = 0.041(SpC) − 12.362	.66	44	---
Nitrite + Nitrate as N (NO_2-NO_3)	15	NO_2-NO_3 = 0.003(SpC) − 1.648	.79	62	---

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
223	3,760	33	$SpC = 1{,}740\ Q^{-0.12226}$	-0.53	28	---	---

06677300 Kiowa Creek near Lyman, Nebr.

Location.--Lat 41°55', long 104°00' in NW¼ sec. 36, T.23 N., R.58 W., on right bank 65 ft upstream from Union Pacific Railroad bridge, 0.8 mi upstream from mouth, and 2.2 mi northeast of Lyman, Scotts Bluff County.

Period of record.-- September 1961 to September 1965.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	43	1,560	751	1,280	1,380	229	1,500	860
Dissolved solids, residue	mg/L	43	1,060	503	874	940	153	998	568
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L	43	240	99	142	127	36	190	178
Calcium, dissolved	mg/L	43	63	20	38	35	10	52	28
Magnesium, dissolved	mg/L	43	20	7.3	11	9.8	3.3	17	8.6
Sodium, dissolved	mg/L	43	318	82	242	280	72	316	110
Potassium, dissolved	mg/L	43	15	5.8	11	12	2.0	14	9.3
Bicarbonate ion	mg/L	43	582	204	462	490	111	564	280
Sulfate, dissolved	mg/L	43	283	168	241	244	26	270	205
Chloride, dissolved	mg/L	43	39	15	28	30	5.5	34	18
Fluoride, dissolved	mg/L	43	1.0	0.4	0.8	0.8	0.1	0.9	0.6
Silica, dissolved	mg/L	43	63	14	48	53	13	61	29
Boron, dissolved	mg/L	43	370	10	269	305	84	357	140
Iron, dissolved	ug/L	25	120	10	47	40	34	100	0
Manganese, dissolved	ug/L	1			0				
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L	43	14	0.70	6.8		3.4		
Ammonia N, total	mg/L								
Organic N, total	mg/L								
Phosphorus, total	mg/L								
Phosphorus, dissolved	mg/L								
Fecal coliform	col/100 ml								
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L								
Biochemical oxygen demand (5-day)	mg/L								
pH	pH units	43	8.7	7.2	7.9	8.0	0.3	8.4	7.6
Color	Co - Pt units	7	20	7	11		4.6		

06677300 Kiowa Creek near Lyman, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	43	RDS = 0.662(SpC) + 26.927	0.99	98	23
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	43	TD = -0.137(SpC) + 317.344	-.87	76	18
Calcium (Ca)	43	Ca = -0.036(SpC) + 83.813	-.80	64	6.2
Magnesium (Mg)	43	Mg = -0.011(SpC) + 26.024	-.79	63	2.0
Sodium (Na)	43	Na = 0.309(SpC) − 153.763	.99	98	11
Potassium (K)	43	K = 0.005(SpC) + 5.097	.55	30	1.6
Bicarbonate (HCO_3)	43	HCO_3 = 0.470(SpC)-140.012	.97	94	28
Sulfate (SO_4)	43	SO_4 = 0.093(SpC) + 121.911	.83	69	14
Chloride (Cl)	43	Cl = 0.023(SpC)-1.067	.94	88	2.0
Silica (Si)	43	Si = 0.052(SpC)-18.958	.90	81	5.8
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
43	188	2.7	$SpC = 2{,}178\ Q^{-0.17352}$	0.80	64	0.053	12

06678000 Sheep Creek near Morrill, Nebr.

Location.--Lat 41°57'50", long 103°56'20", in NW¼SW¼ sec. 16, T.23 N., R.57 W., Scotts Bluff County, at gaging station at Burlington Northern Railroad bridge, 50 ft downstream from bridge on U.S. Highway 26, 1 mi west of Morrill, and 1.5 mi upstream from mouth.

Drainage area.--362 mi^2, of which about 25 mi^2 is noncontributing.

Period of record.--July 1970 to September 1973.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	114	1,150	575	830	817	115	990	687
Dissolved solids, residue	mg/L	2	591	557	574	----------	----------	----------	----------
Dissolved solids, sum	mg/L	6	594	534	560	--------	20	----------	----------
Hardness as $CaCO_3$	mg/L	7	280	268	277	--------	5.4	----------	----------
Calcium, dissolved	mg/L	7	80	76	78	--------	1.3	----------	----------
Magnesium, dissolved	mg/L	7	21	18	19	--------	1.0	----------	----------
Sodium, dissolved	mg/L	7	77	56	64	--------	6.8	----------	----------
Potassium, dissolved	mg/L	7	12	10	11	--------	0.8	----------	----------
Bicarbonate ion	mg/L	7	277	250	262	--------	8.4	----------	----------
Sulfate, dissolved	mg/L	7	190	168	180	--------	8.6	----------	----------
Chloride, dissolved	mg/L	7	16	14	15	--------	0.9	----------	----------
Fluoride, dissolved	mg/L	7	1.0	0.6	0.7	--------	0.2	----------	----------
Silica, dissolved	mg/L	7	56	15	49	--------	15	----------	----------
Boron, dissolved	mg/L	7	120	90	97	--------	11	----------	----------
Iron, dissolved	ug/L	----------	----------	----------	----------	----------	----------	----------	----------
Manganese, dissolved	ug/L	----------	----------	----------	----------	----------	----------	----------	----------
Nitrite + nitrate as N, dissolved	mg/L	5	3.0	2.3	2.5	--------	0.30	----------	----------
Nitrate as N, dissolved	mg/L	1	----------	----------	2.6	----------	----------	----------	----------
Nitrate as NO_3, dissolved	mg/L	2	12	7.2	9.6	----------	----------	----------	----------
Ammonia N, total	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Organic N, total	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Phosphorus, total	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Phosphorus, dissolved	mg/L	6	0.14	0.02	0.06	--------	0.04	----------	----------
Fecal coliform	col/100 ml	----------	----------	----------	----------	----------	----------	----------	----------
Fecal streptococci	col/100 ml	----------	----------	----------	----------	----------	----------	----------	----------
Oxygen, dissolved	mg/L	108	13.0	7.7	10.2	10.0	1.4	12.0	8.3
Biochemical oxygen demand (5-day)	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
pH	pH units	113	8.6	7.0	7.7	7.7	0.3	8.1	7.4
Color	Co - Pt units	6	10	0	4	--------	3.6	----------	----------

06678000 Sheep Creek near Morrill, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)					
Hardness as $CaCO_3$ (TH)					
Calcium (Ca)					
Magnesium (Mg)					
Sodium (Na)					
Potassium (K)					
Bicarbonate (HCO_3)					
Sulfate (SO_4)					
Chloride (Cl)					
Silica (Si)					
Nitrite + Nitrate as N (NO_2-NO_3)					

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
114	154	2.6	$SpC = 771\ Q^{0.01905}$	*0.18	3.4	0.060	14

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06678700 Brown Canyon Drain near Mitchell, Nebr.

Location.--At Mitchell-Gering Canal, 13 ft upstream from culvert and 2.7 miles southwest of Mitchell, Scotts Bluff County.

Period of record.--September 1961 to September 1965.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	43	1,220	743	1,040	1,120	166	1,200	794
Dissolved solids, residue	mg/L	43	868	504	730	793	123	845	535
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L	43	237	110	179	175	35	225	132
Calcium, dissolved	mg/L	43	74	22	50	51	11	65	35
Magnesium, dissolved	mg/L	43	18	8.5	13	13	2.7	17	11
Sodium, dissolved	mg/I	43	215	81	161	192	52	209	86
Potassium, dissolved	mg/L	43	15	6.1	12	13	2.1	14	9.2
Bicarbonate ion	mg/L	43	414	214	330	350	67	402	230
Sulfate, dissolved	mg/L	43	276	168	220	223	23	247	181
Chloride, dissolved	mg/L	43	29	15	22	23	3.8	26	16
Fluoride, dissolved	mg/L	43	0.7	0.3	0.6	0.6	0.1	0.6	0.4
Silica, dissolved	mg/L	42	68	18	50	61	18	66	26
Boron, dissolved	mg/L	43	470	110	240	282	90	324	110
Iron, dissolved	ug/L	25	220	0	48	30	51	110	10
Manganese, dissolved	ug/L	1			0				
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L	43	25	1.6	14		7.8		
Ammonia N, total	mg/L								
Organic N, total	mg/L								
Phosphorus, total	mg/L								
Phosphorus, dissolved	mg/L								
Fecal coliform	col/100 ml								
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L								
Biochemical oxygen demand (5-day)	mg/L								
pH	pH units	43	8.5	7.1	7.8	7.8	0.3	8.3	7.4
Color	Co - Pt units	7	25	5	11		8.3		

06678700 Brown Canyon Drain near Mitchell, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	43	RDS = 0.741(SpC) − 41.460	1.0	99	12
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	43	TH = − 0.158(SpC)+343.146	− .75	57	23
Calcium (Ca)	43	Ca = − 0.042(SpC) + 94.296	− .63	40	8.8
Magnesium (Mg)	43	Mg = − 0.014(SpC) + 27.157	− .84	70	1.5
Sodium (Na)	43	Na = 0.308(SpC) − 159.374	.98	97	9.3
Potassium (K)	43	K = 0.008(SpC) + 3.377	.66	43	1.6
Bicarbonate (HCO_3)	43	HCO_3= 0.383(SpC) − 69.235	.95	90	22
Sulfate (SO_4)	43	SO_4 = 0.119(SpC) + 95.664	.86	74	12
Chloride (Cl)	43	Cl = 0.020(SpC) + 0.544	.88	78	1.8
Silica (Si)	42	Si = 0.102(SpC) − 55.630	.95	91	5.4
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
43	21	0.90	$SpC = 1234\ Q^{-0.16573}$	− 0.94	89	0.024	5.5

06678800 Dutch Flats Drain near Mitchell, Nebr.

Location.--At gaging station at county road bridge, 0.2 mi upstream from mouth and 2.5 miles northwest of Mitchell, Scotts Bluff County.

Period of record.-- September 1961 to September 1965.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	43	906	703	831	857	59	887	735
Dissolved solids, residue	mg/L	43	642	479	587	605	46	630	513
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L	43	358	255	314	323	31	347	265
Calcium, dissolved	mg/L	43	108	70	90	93	12	101	75
Magnesium, dissolved	mg/L	43	38	17	21	22	3.2	24	19
Sodium, dissolved	mg/L	43	63	48	56	57	3.0	60	52
Potassium, dissolved	mg/L	43	17	7.6	13	14	2.5	16	9.1
Bicarbonate ion	mg/L	43	323	208	278	300	39	318	218
Sulfate, dissolved	mg/L	43	215	156	184	184	11	196	165
Chloride, dissolved	mg/L	43	20	12	14	15	1.6	17	12
Fluoride, dissolved	mg/L	43	0.6	0.1	0.4	0.4	0.1	0.5	0.4
Silica, dissolved	mg/L	43	54	20	42	49	11	53	24
Boron, dissolved	mg/L	43	160	70	111	112	22	144	89
Iron, dissolved	ug/L	25	140	0	46	30	39	104	13
Manganese, dissolved	ug/L	1			20				
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L	43	11	0.20	7.5		3.0		
Ammonia N, total	mg/L								
Organic N, total	mg/L								
Phosphorus, total	mg/L								
Phosphorus, dissolved	mg/L								
Fecal coliform	col/100 ml								
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L								
Biochemical oxygen demand (5-day)	mg/L								
pH	pH units	43	8.2	6.9	7.7	7.7	0.3	8.1	7.4
Color	Co - Pt units	7	20	4	8		5.8		

06678800 Dutch Flats Drain near Mitchell, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	43	RDS = 0.748(SpC) − 34.368	0.96	92	14
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	43	TH = 0.494(SpC) − 96.666	.95	90	9.7
Calcium (Ca)	43	Ca = 0.175(SpC) − 54.922	.87	75	6.0
Magnesium (Mg)	43	Mg = 0.014(SpC) + 9.823	*.26	6.7	3.1
Sodium (Na)	43	Na = 0.028(SpC) + 32.277	.56	31	2.5
Potassium (K)	43	K = 0.034(SpC) − 15.460	.79	63	1.6
Bicarbonate (HCO_3)	43	HCO_3= 0.610(SpC) − 229.171	.91	83	17
Sulfate (SO_4)	43	SO_4 = 0.037(SpC) + 152.948	*.20	3.8	11
Chloride (Cl)	43	Cl = 0.008(SpC) + 8.024	*.28	7.6	1.6
Silica (Si)	43	Si = 0.161(SpC) − 91.765	.85	72	6.0
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
43	28	4.5	$SpC = 1036\ Q^{-0.09965}$	-0.73	53	0.022	5.1

06680700 Winter Creek at Tri-State Canal near Scottsbluff, Nebr.

Location.--At gaging station, 15 ft upstream from culvert under Tri-State canal and 5 mi northeast of Scottsbluff, Scotts Bluff County.

Period of record.--July 1961 to September 1965.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	48	785	629	734	740	31	760	685
Dissolved solids, residue	mg/L	48	570	453	538	544	22	559	504
Dissolved solids, sum	mg/L	----------							
Hardness as $CaCO_3$	mg/L	48	273	172	252	256	21	274	220
Calcium, dissolved	mg/L	48	85	43	74	77	8.2	82	63
Magnesium, dissolved	mg/L	48	21	11	16	17	1.7	19	15
Sodium, dissolved	mg/L	48	62	55	59	59	1.5	61	57
Potassium, dissolved	mg/L	48	16	6.0	7.3	7.0	1.5	7.9	6.6
Bicarbonate ion	mg/L	48	252	144	233	241	22	248	200
Sulfate, dissolved	mg/L	48	170	141	158	160	7.4	168	145
Chloride, dissolved	mg/L	48	24	11	16	16	1.6	17	15
Fluoride, dissolved	mg/L	48	0.8	0.4	0.5	0.5	0.1	0.6	0.4
Silica, dissolved	mg/L	48	76	53	62	63	3.9	66	56
Boron, dissolved	mg/L	48	180	80	138	144	19	167	122
Iron, dissolved	ug/L	29	100	0	26	21	23	62	0
Manganese, dissolved	ug/L	2	20	0	10	----------			
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	48	9.7	5.6	7.4	--------	0.98	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	48	8.2	6.8	7.8	7.8	0.3	8.1	7.5
Color	Co - Pt units	12	5	0	3	3	1.8	4	0

06680700 Winter Creek at Tri-State Canal near Scottsbluff, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	48	RDS = 0.642(SpC) + 66.953	0.90	82	9.5
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	48	TH = 0.618(SpC) − 201.923	.91	83	8.7
Calcium (Ca)	48	Ca = 0.236(SpC) − 98.991	.89	80	3.7
Magnesium (Mg)	48	Mg = 0.005(SpC) + 12.292	*.10	0.95	1.7
Sodium (Na)	48	Na - 0.004(SpC) + 56.072	*.07	0.55	1.5
Potassium (K)	48	K = 0.011(SpC) − 0.854	*.22	5.1	1.5
Bicarbonate (HCO_3)	48	HCO_3 = 0.652(SpC)-246.146	.91	83	9.2
Sulfate (SO_4)	48	SO_4 = 0.080(SpC) + 99.203	.33	11	7.0
Chloride (Cl)	48	Cl = 0.020(SpC) + 0.567	.40	16	1.5
Silica (Si)	48	Si = 0.005(SpC) + 58.531	*.04	0.17	3.9
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
48	52	14.5	$SpC = 635\ Q^{0.04291}$	0.35	12	0.018	4.1

06680800 Hale Drain near Scottsbluff, Nebr.

Location.--At Tri-State canal, 135 ft downstream from culvert and 3 mi northeast of Scottsbluff, Scotts Bluff County.

Period of record.--September 1961 to September 1965.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	43	934	660	794	802	49	842	733
Dissolved solids, residue	mg/L	43	612	476	566	570	31	602	523
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L	43	252	142	222	226	24	246	185
Calcium, dissolved	mg/L	43	75	33	62	66	9.1	72	50
Magnesium, dissolved	mg/L	43	22	13	16	16	1.8	19	14
Sodium, dissolved	mg/L	43	94	62	84	87	7.2	91	74
Potassium, dissolved	mg/L	43	12	6.9	8.8	8.7	1.0	10	7.8
Bicarbonate ion	mg/L	43	288	172	255	262	27	284	220
Sulfate, dissolved	mg/L	43	184	143	167	164	10	180	156
Chloride, dissolved	mg/L	43	19	13	17	18	1.3	19	16
Fluoride, dissolved	mg/L	43	0.6	0.1	0.4	0.4	0.1	0.5	0.3
Silica, dissolved	mg/L	43	74	32	58	62	9.2	66	44
Boron, dissolved	mg/L	43	320	100	175	183	34	200	140
Iron, dissolved	ug/L	25	160	0	42	28	41	88	12
Manganese, dissolved	ug/L	1			20				
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L	43	19	4.1	7.9		2.3		
Ammonia N, total	mg/L								
Organic N, total	mg/L								
Phosphorus, total	mg/L								
Phosphorus, dissolved	mg/L								
Fecal coliform	col/100 ml								
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L								
Biochemical oxygen demand $pH^{(5\text{-day})}$	mg/L								
	pH units	43	8.3	7.3	7.8	7.8	0.3	8.1	7.4
Color	Co - Pt units	7	10	4	7		2.6		

06680800 Hale Drain near Scottsbluff, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	43	RDS = 0.584(SpC) + 101.700	0.93	86	12
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	43	TH = 0.351(SpC) − 56.239	.70	50	18
Calcium (Ca)	43	Ca = 0.130(SpC) − 40.355	.69	48	6.6
Magnesium (Mg)	43	Mg = 0.009(SpC) + 8.818	*.24	6.0	1.8
Sodium (Na)	43	Na = 0.083(SpC) + 18.417	.56	32	6.0
Potassium (K)	43	K = -0.0002(SpC) + 8.984	*-.01	.02	1.0
Bicarbonate (HCO_3)	43	HCO_3 = 0.495(SpC)-137.492	.91	82	11
Sulfate (SO_4)	43	SO_4 = 0.067(SpC) + 113.896	.33	11	9.5
Chloride (Cl)	43	Cl = 0.010(SpC) + 8.746	.40	16	1.2
Silica (Si)	43	Si = 0.064(SpC) + 7.077	.34	12	8.8
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
43	20.3	1.4	$SpC = 752\ Q^{0.03626}$	0.44	20	0.024	5.5

06681300 Gering Drain at Mitchell-Gering Canal near Gering, Nebr.

Location.--At Mitchell-Gering canal, 2.8 mi southwest of Gering, Scotts Bluff County.

Period of record.--July 1961 to September 1965.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	47	1,180	455	1,040	1,110	149	1,180	860
Dissolved solids, residue	mg/L	47	823	314	725	780	108	823	580
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L	47	242	70	166	162	40	215	100
Calcium, dissolved	mg/L	47	69	11	47	49	13	62	25
Magnesium, dissolved	mg/L	47	19	6.9	12	11	3.4	17	8.5
Sodium, dissolved	mg/L	47	231	34	169	190	47	215	97
Potassium, dissolved	mg/L	47	17	7.3	11	11	1.5	13	9.5
Bicarbonate ion	mg/L	47	432	226	364	400	65	429	265
Sulfate, dissolved	mg/L	47	224	37	194	198	26	209	180
Chloride, dissolved	mg/L	43	32	5.4	24	26	4.6	29	19
Fluoride, dissolved	mg/L	45	0.8	0.3	0.6	0.6	0.1	0.7	0.5
Silica, dissolved	mg/L	45	70	25	52	60	13	64	34
Boron, dissolved	mg/L	45	500	20	343	405	113	429	175
Iron, dissolved	ug/L	27	100	10	41	31	30	92	10
Manganese, dissolved	ug/L								
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L	45	18	1.2	12		4.8		
Ammonia N, total	mg/L								
Organic N, total	mg/L								
Phosphorus, total	mg/L								
Phosphorus, dissolved	mg/L								
Fecal coliform	col/100 ml								
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L								
Biochemical oxygen demand (5-day)	mg/L								
pH	pH units	47	8.5	7.1	7.8	7.9	0.3	8.2	7.5
Color	Co - Pt units	10	35	3	10	8	9.3	16	5

06681300 Gering Drain at Mitchell-Gering Canal near Gering, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	47	RDS = 0.722(SpC) -- 26.197	0.99	99	12
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	47	TH = -0.129(SpC)+300.665	-.48	23	36
Calcium (Ca)	47	Ca = -0.026(SpC)+73.625	*-.28	8.0	13
Magnesium (Mg)	47	Mg = -0.016(SpC)+28.070	-.69	47	2.5
Sodium (Na)	47	Na - 0.301(SpC) – 144.068	.95	90	15
Potassium (K)	47	K = 0.003(SpC) + 8.100	*.27	7.4	1.5
Bicarbonate (HCO_3)	47	HCO_3 = 0.403(SpC)– 55.917	.92	84	26
Sulfate (SO_4)	47	SO_4 = 0.121(SpC) + 67.822	.69	48	19
Chloride (Cl)	47	Cl = 0.029(SpC) – 6.308	.93	86	1.7
Silica (Si)	45	Si = 0.067(SpC) – 17.679	.78	61	8.3
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
47	170	5.2	$SpC = 2032\ Q^{-0.23724}$	-0.88	78	0.035	8.1

06682200 Alliance Drain near Minatare, Nebr.

Location.--At gaging station, 50 ft north of county road, 0.1 mi downstream from Tri-State canal and 4.5 mi north of Minatare, Scotts Bluff County.

Period of record.--July 1961 to September 1965.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	47	959	740	794	790	32	830	767
Dissolved solids, residue	mg/L	47	672	525	573	572	22	588	550
Dissolved solids, sum	mg/L	----------							
Hardness as $CaCO_3$	mg/L	47	300	249	276	278	10	289	261
Calcium, dissolved	mg/L	47	93	68	82	84	4.7	88	77
Magnesium, dissolved	mg/L	47	28	14	17	18	2.5	20	14
Sodium, dissolved	mg/L	47	67	50	61	62	2.4	64	59
Potassium, dissolved	mg/L	47	55	8.7	11	10	6.6	12	9.1
Bicarbonate ion	mg/L	47	252	193	230	232	10	244	220
Sulfate, dissolved	mg/L	47	216	169	194	195	10	208	180
Chloride, dissolved	mg/L	47	58	6.2	18	18	6.3	20	16
Fluoride, dissolved	mg/L	47	0.7	0.4	0.6	0.6	0.1	0.6	0.4
Silica, dissolved	mg/L	47	57	39	48	48	5.2	56	42
Boron, dissolved	mg/L	47	240	20	114	115	32	140	89
Iron, dissolved	ug/L	29	110	0	31	21	25	71	12
Manganese, dissolved	ug/L	1	----------		20	----------			
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	47	5.3	0.30	1.8	---------	1.1	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	47	8.1	7.1	7.6	7.6	0.3	8.0	7.3
Color	Co - Pt units	10	25	4	8	7	6.7	16	0

06682200 Alliance Drain near Minatare, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	47	RDS = 0.616(SpC) + 84.392	0.90	82	9.4
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	47	TH = 0.181(SpC) + 132.855	.56	32	8.5
Calcium (Ca)	47	Ca = 0.055(SpC) + 38.673	.37	14	4.4
Magnesium (Mg)	47	Mg = 0.012(SpC) + 7.594	*.15	2.4	2.5
Sodium (Na)	47	Na = 0.019(Sp) + 45.709	*.25	6.4	2.4
Potassium (K)	47	K = 0.170(SpC)– 123.623	.82	66	3.9
Bicarbonate (HCO_3)	47	HCO_3=0.105(SpC)+ 147.208	.33	11	9.5
Sulfate (SO_4)	47	SO_4 = 0.109(SpC)+ 108.031	.34	12	9.6
Chloride (Cl)	47	Cl = 0.158(SpC)– 107.036	.80	64	3.8
Silica (Si)	47	Si = -0.020(SpC)+ 64.384	*-.12	1.5	5.2
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
47	38	1.7	$SpC = 774\ Q^{0.01023}$	*0.19	3.7	0.016	3.7

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06682300 Ninemile Drain near Minatare, Nebr.

Location.--At gaging station at county highway bridge, 0.5 mi downstream from Tri-State canal and 6.5 mi northeast of Minatare, Scotts Bluff County.

Period of record.--July 1961 to September 1965.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	50	802	621	707	711	32	738	660
Dissolved solids, residue	mg/L	50	551	466	520	523	19	542	500
Dissolved solids, sum	mg/L	----------							
Hardness as $CaCO_3$	mg/L	50	284	206	257	262	17	276	240
Calcium, dissolved	mg/L	50	88	51	76	79	7.3	83	68
Magnesium, dissolved	mg/L	50	33	11	16	16	3.4	20	13
Sodium, dissolved	mg/L	50	66	43	50	49	4.1	54	47
Potassium, dissolved	mg/L	50	13	4.0	7.8	7.8	1.1	8.7	7.0
Bicarbonate ion	mg/L	50	256	153	220	223	18	236	200
Sulfate, dissolved	mg/L	50	182	127	156	156	10	169	141
Chloride, dissolved	mg/L	50	20	13	16	16	1.2	18	14
Fluoride, dissolved	mg/L	48	0.7	0.4	0.6	0.6	0.1	0.6	0.5
Silica, dissolved	mg/L	48	78	31	61	63	8.4	66	47
Boron, dissolved	mg/L	48	200	70	118	123	23	145	100
Iron, dissolved	ug/L	29	150	0	32	21	32	74	11
Manganese, dissolved	ug/L	1	----------		0	----------			
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	48	8.5	3.0	6.5	---------	1.3	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	50	8.2	6.9	7.8	7.9	0.3	8.1	7.4
Color	Co - Pt units	10	6	2	5	5	1.2	5	4

06682300 Ninemile Drain near Minatare, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	50	RDS = 0.512(SpC)+ 157.814	0.85	73	10
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	50	TH = 0.432(SpC)– 47.890	.84	70	9.3
Calcium (Ca)	50	Ca = 0.130(SpC)– 15.676	.58	34	6.0
Magnesium (Mg)	50	Mg = 0.024(SpC)– 0.798	*.23	5.3	3.3
Sodium (Na)	50	Na = 0.088(SpC)– 12.433	.70	48	3.0
Potassium (K)	50	K = 0.008(SpC) + 2.384	*.23	5.3	1.0
Bicarbonate (HCO_3)	50	HCO_3= 0.512(SpC)– 142.725	.90	81	8.2
Sulfate (SO_4)	50	SO_4 = 0.190(SpC)+ 21.444	.62	38	7.9
Chloride (Cl)	50	Cl = 0.014(SpC) + 5.979	.37	14	1.1
Silica (Si)	48	Si = -0.063(SpC)+ 105.364	*-.25	6.2	8.2
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
50	140	11.5	$SpC = 620\ Q^{0.03992}$	0.57	33	0.016	3.7

06682505 North Platte River at McGrew, Nebr.

Location.--Lat 41°45'42", long 103°25'02", in SW¼ sec. 25, T.21 N., R.53 W., Scotts Bluff County, Hydrologic Unit 10180009, at bridge on county road 1.2 mi north of State Highway 92, 0.3 mi downstream from Ninemile Creek and 0.9 mi north of McGrew.

Period of record.--June 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	51	1,090	705	922	950	93	1,000	790
Dissolved solids, residue	mg/L	32	715	482	624	640	56	677	545
Dissolved solids, sum	mg/L	18	660	458	615	637	52	655	528
Hardness as $CaCO_3$	mg/L	18	310	230	286	294	19	306	260
Calcium, dissolved	mg/L	18	91	64	80	82	6.6	88	70
Magnesium, dissolved	mg/L	18	23	18	21	22	1.2	23	19
Sodium, dissolved	mg/L	18	100	57	92	96	11	100	70
Potassium, dissolved	mg/L	18	12	5.6	9.6	10	1.5	12	7.6
Bicarbonate ion	mg/L	18	325	221	295	310	32	325	232
Sulfate, dissolved	mg/L	18	250	160	208	212	19	230	190
Chloride, dissolved	mg/L	50	28	14	21	22	3.0	25	17
Fluoride, dissolved	mg/L	18	0.7	0.4	0.5	0.5	0.1	0.6	0.4
Silica, dissolved	mg/L	18	42	15	33	37	7.9	41	22
Boron, dissolved	mg/L	18	210	110	156	160	22	183	130
Iron, dissolved	ug/L	18	70	0	27	21	19	60	0
Manganese, dissolved	ug/L	18	360	0	89	46	114	330	0
Nitrite + nitrate as N, dissolved	mg/L	24	3.6	0.64	1.9	1.9	0.86	2.9	0.76
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	51	0.41	0.00	0.11	0.09	0.10	0.25	0.02
Organic N, total	mg/L	51	3.0	0.09	0.90	0.86	0.46	1.2	0.50
Phosphorus, total	mg/L	51	4.4	0.08	0.39	0.16	0.75	0.43	0.12
Phosphorus, dissolved	mg/L	43	1.0	0.02	0.09	0.06	0.15	0.11	0.05
Fecal coliform	col/100 ml	39	6,000	17	-------	363	--------	2,800	99
Fecal streptococci	col/100 ml	48	6,300	16	-------	560	--------	2,300	120
Oxygen, dissolved	mg/L	52	12.8	5.8	9.5	9.8	1.5	11.6	7.4
Biochemical oxygen demand (5-day)	mg/L	52	11.0	0.7	3.0	2.5	1.8	5.1	1.4
pH	pH units	53	--------	6.9	-------	7.6	--------	7.9	7.3
Color	Co - Pt units	18	25	1	10	7	7.7	21	2

06682505 North Platte River at McGrew, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	31	RDS = 0.478(SpC)+ 183.040	0.84	72	30
Dissolved solids, sum (SDS)	18	SDS = 0.558(SpC)+ 99.439	.91	83	22
Hardness as $CaCO_3$ (TH)	18	TH = 0.178(SpC) + 121.235	.78	61	12
Calcium (Ca)	18	Ca = 0.057(SpC) + 27.108	.73	53	4.6
Magnesium (Mg)	18	Mg = 0.006(SpC) + 15.182	*.42	18	1.2
Sodium (Na)	18	Na = 0.120(SpC) − 18.808	.90	81	5.0
Potassium (K)	18	K = 0.011(SpC) − 0.651	.61	38	1.2
Bicarbonate (HCO_3)	18	HCO_3= 0.293(SpC)+ 24.081	.76	58	22
Sulfate (SO_4)	18	SO_4 = 0.146(SpC)+ 72.755	.65	42	15
Chloride (Cl)	49	Cl = 0.026(SpC) − 3.261	.81	66	1.8
Silica (Si)	18	Si = 0.052(SpC) − 14.639	.55	30	6.8
Nitrite + Nitrate as N (NO_2-NO_3)	24	HO_2-NO_3=0.008(SpC)− 5.367	.88	77	0.42

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
51	5,530	331	SpC = 2,206 $Q^{-0.12476}$	-0.76	58	0.030	6.9

06684500 North Platte River at Bridgeport, Nebr.

Location.--Main channel gage: Lat 41°40'39", long 103°05'45", in NW¼SW¼ sec. 28, T.20 N., R.50 W., Morrill County, Hydrologic Unit 10180009, on downstream side of pier near center of bridge on U.S. Highway 26, 0.5 mi north of Bridgeport. Browns Creek channel gage: Lat 41°40'55", long 103°05'53", in NW¼NW¼ sec. 28, T.20 N., R.50 W., Morrill County, on left bank 0.2 mi upstream from culvert on U.S. Highway 26 and 0.8 mi north of Bridgeport.

Drainage area (revised).--25,300 mi^2, approximately, of which about 23,300 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide basin is not included.

Period of record.--Water year 1971 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	118	1,450	645	931	947	131	1,110	732
Dissolved solids, residue	mg/L	1	----------		647	----------			
Dissolved solids, sum	mg/L	----------							
Hardness as $CaCO_3$	mg/L	1	----------		287	----------			
Calcium, dissolved	mg/L	1	----------		84	----------			
Magnesium, dissolved	mg/L	1	----------		19	----------			
Sodium, dissolved	mg/L	1	----------		86	----------			
Potassium, dissolved	mg/L	1	----------		11	----------			
Bicarbonate ion	mg/L	1	----------		298	----------			
Sulfate, dissolved	mg/L	1	----------		204	----------			
Chloride, dissolved	mg/L	1	----------		22	----------			
Fluoride, dissolved	mg/L	1	----------		0.5	----------			
Silica, dissolved	mg/L	1	----------		47	----------			
Boron, dissolved	mg/L	1	----------		150	----------			
Iron, dissolved	ug/L	1	----------		0	----------			
Manganese, dissolved	ug/L	1	----------		50	----------			
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	118	14.4	6.8	9.8	9.4	1.8	12.4	7.6
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	120	8.6	7.1	7.7	7.7	0.3	8.1	7.4
Color	Co - Pt units	----------							

06684500 North Platte River at Bridgeport, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	----------	----------	----------	----------	----------
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	----------	----------	----------	----------	----------
Calcium (Ca)	----------	----------	----------	----------	----------
Magnesium (Mg)	----------	----------	----------	----------	----------
Sodium (Na)	----------	----------	----------	----------	----------
Potassium (K)	----------	----------	----------	----------	----------
Bicarbonate (HCO_3)	----------	----------	----------	----------	----------
Sulfate (SO_4)	----------	----------	----------	----------	----------
Chloride (Cl)	----------	----------	----------	----------	----------
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
118	10,500	169	$SpC = 1,472\ Q^{-0.06453}$	-0.30	8.9	0.060	14

06685000 Pumpkin Creek near Bridgeport, Nebr.

Location.--Lat 41°37'38", long 103°02'10", in SW¼ sec. 12, T.19 N., R.50 W., Morrill County, at gaging station at bridge on U.S. Highway 385 and State Highway 92, 0.5 mi upstream from mouth and 4 mi southeast of Bridgeport.

Drainage area.--1,020 mi^2, approximately.

Period of record.--July 1970 to September 1973.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	114	1,170	450	592	565	104	735	501
Dissolved solids, residue	mg/L	1	----------		377	----------			
Dissolved solids, sum	mg/L	5	500	358	412	----------	71	----------	
Hardness as $CaCO_3$	mg/L	5	230	180	204	----------	24	----------	
Calcium, dissolved	mg/L	5	66	53	59	----------	5.4	----------	
Magnesium, dissolved	mg/L	5	17	11	14	----------	2.7	----------	
Sodium, dissolved	mg/L	5	70	40	53	----------	13	----------	
Potassium, dissolved	mg/L	5	10	8.6	9.3	----------	0.5	----------	
Bicarbonate ion	mg/L	5	297	275	288	----------	10	----------	
Sulfate, dissolved	mg/L	5	140	25	69	----------	52	----------	
Chloride, dissolved	mg/L	5	19	9.2	13	----------	4.2	----------	
Fluoride, dissolved	mg/L	5	0.8	0.6	0.7	----------	0.1	----------	
Silica, dissolved	mg/L	5	53	39	44	----------	5.4	----------	
Boron, dissolved	mg/L	5	130	50	104	----------	37	----------	
Iron, dissolved	ug/L	----------							
Manganese, dissolved	ug/L	----------							
Nitrite + nitrate as N, dissolved	mg/L	4	2.2	1.8	2.0	----------	0.18	----------	
Nitrate as N, dissolved	mg/L	1	----------		2.2	----------			
Nitrate as NO_3, dissolved	mg/L	1	----------		9.6	----------			
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	5	0.08	0.02	0.05	----------	0.03	----------	
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	108	15.2	6.0	10.7	10.0	2.0	13.9	8.4
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	109	8.9	7.2	7.8	7.9	0.4	8.4	7.5
Color	Co - Pt units	5	20	0	11	----------	9.2	----------	

06685000 Pumpkin Creek near Bridgeport, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)					
Hardness as $CaCO_3$ (TH)					
Calcium (Ca)					
Magnesium (Mg)					
Sodium (Na)					
Potassium (K)					
Bicarbonate (HCO_3)					
Sulfate (SO_4)					
Chloride (Cl)					
Silica (Si)					
Nitrite + Nitrate as N (NO_2-NO_3)					

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
113	77	0.48	$SpC = 455\ Q^{0.09713}$	0.58	34	0.056	13

06686000 North Platte River at Lisco, Nebr.

Location.--Lat 41°29'18", long 102°37'25", in NW¼SE¼ sec. 33, T.18 N., R.46 W., Garden County, Hydrologic Unit 10180009, near right bank on downstream side of pier of highway bridge, 0.5 mi south of Lisco.

Drainage area (revised).--26,700 mi^2, approximately, of which about 24,700 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide basin is not included.

Period of record.--Water year 1970 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	263	1,230	640	887	898	90	994	758
Dissolved solids, residue	mg/L	25	670	482	601	610	50	663	516
Dissolved solids, sum	mg/L	65	658	458	584	590	48	638	520
Hardness as $CaCO_3$	mg/L	91	310	206	272	280	20	299	243
Calcium, dissolved	mg/L	90	90	53	77	78	7.2	85	65
Magnesium, dissolved	mg/L	90	23	14	20	20	1.3	22	18
Sodium, dissolved	mg/L	90	100	53	83	86	9.6	93	68
Potassium, dissolved	mg/L	90	20	6.0	9.9	10	1.8	12	7.6
Bicarbonate ion	mg/L	91	338	220	284	290	29	318	240
Sulfate, dissolved	mg/L	91	220	134	189	193	15	214	173
Chloride, dissolved	mg/L	91	29	12	20	21	2.6	23	17
Fluoride, dissolved	mg/L	38	0.7	0.3	0.5	0.5	0.1	0.6	0.5
Silica, dissolved	mg/L	67	42	13	35	37	7.1	42	24
Boron, dissolved	mg/L	37	190	90	138	140	26	175	101
Iron, dissolved	ug/L	27	140	0	37	28	39	82	0
Manganese, dissolved	ug/L	27	220	0	33	20	48	66	0
Nitrite + nitrate as N, dissolved	mg/L	74	3.0	0.01	1.7	1.7	0.76	2.6	0.68
Nitrate as N, dissolved	mg/L	74	3.0	0.00	1.7	1.8	0.78	2.7	0.59
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	54	0.25	0.00	0.07	0.06	0.06	0.14	0.00
Organic N, total	mg/L	86	6.0	0.06	0.85	0.74	0.66	1.3	0.38
Phosphorus, total	mg/L	53	1.7	0.03	0.25	0.21	0.25	0.36	0.10
Phosphorus, dissolved	mg/L	83	0.14	0.00	0.06	0.06	0.03	0.10	0.02
Fecal coliform	col/100 ml	42	1,600	1	--------	38	----------	350	2
Fecal streptococci	col/100 ml	50	2,200	4	--------	125	----------	723	41
Oxygen, dissolved	mg/L	222	15.2	6.8	9.9	9.6	1.8	12.5	7.7
Biochemical oxygen demand (5-day)	mg/L	90	10.0	0.5	2.5	2.3	1.6	4.3	1.1
pH	pH units	263	9.0	7.1	7.8	7.8	0.4	8.3	7.4
Color	Co - Pt units	85	120	0	14	8	16	29	3

06686000 North Platte River at Lisco, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	24	RDS = 0.626(SpC) + 64.033	0.83	68	30
Dissolved solids, sum (SDS)	66	SDS = 0.612(SpC) + 53.755	.87	75	24
Hardness as $CaCO_3$ (TH)	91	TH = 0.194(SpC) + 104.648	.69	47	15
Calcium (Ca)	90	Ca = 0.071(SpC) + 15.445	.72	51	5.1
Magnesium (Mg)	90	Mg = 0.005(SpC) + 15.118	.29	8.3	1.2
Sodium (Na)	90	Na = 0.109(SpC) − 11.094	.82	68	5.4
Potassium (K)	90	K = 0.010(SpC) + 0.953	.42	17	1.6
Bicarbonate (HCO_3)	91	HCO_3= 0.281(SpC)+ 40.225	.70	49	21
Sulfate (SO_4)	91	SO_4 = 0.149(SpC)+ 60.144	.70	49	11
Chloride (Cl)	91	Cl = 0.025(SpC) − 1.528	.70	49	1.9
Silica (Si)	67	Si = 0.072(SpC) − 27.738	.70	49	5.1
Nitrite + Nitrate as N (NO_2-NO_3)	74	NO_2-NO_3=0.007(SpC) − 4.361	.65	42	0.58

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
262	9,600	263	SpC = 1,326 $Q^{-0.05577}$	-0.29	8.7	0.047	11

06690500 North Platte River near Keystone, Nebr.

Location.--Lat 41°12'30", long 101°37'50", in SW¼ sec. 1, T.14 N., R.38 W., Keith County, Hydrologic Unit 10180014, on right bank 0.2 mi downstream from diversion dam of Sutherland Reservoir supply canal and 2.5 mi southwest of Keystone.

Drainage area (revised).--29,300 mi^2, approximately, of which about 25,800 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide basin is not included.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	157	848	395	741	750	57	779	704
Dissolved solids, residue	mg/L	----------							
Dissolved solids, sum	mg/L	19	529	477	499	494	15	520	481
Hardness as $CaCO_3$	mg/L	19	250	190	220	224	14	243	210
Calcium, dissolved	mg/L	19	67	51	58	58	4.3	63	52
Magnesium, dissolved	mg/L	19	22	15	19	19	1.5	20	16
Sodium, dissolved	mg/L	19	89	71	79	78	4.6	86	74
Potassium, dissolved	mg/L	19	11	8.4	9.6	9.4	0.9	10	8.5
Bicarbonate ion	mg/L	19	257	178	222	221	19	240	178
Sulfate, dissolved	mg/L	19	200	150	177	181	11	195	170
Chloride, dissolved	mg/L	19	22	16	19	19	1.7	21	17
Fluoride, dissolved	mg/L	19	0.8	0.4	0.5	0.5	0.1	0.6	0.4
Silica, dissolved	mg/L	19	28	18	23	23	3.1	27	19
Boron, dissolved	mg/L	19	150	90	133	138	15	148	110
Iron, dissolved	ug/L	18	70	0	22	20	19	60	9
Manganese, dissolved	ug/L	19	500	0	102	39	148	440	0
Nitrite + nitrate as N, dissolved	mg/L	19	1.1	0.05	0.41	0.30	0.29	0.77	0.07
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	19	0.13	0.00	0.04	0.03	0.03	0.08	0.01
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand $pH^{(5\text{-day})}$	mg/L	----------							
	pH units	13	8.5	7.3	7.8	7.6	0.5	8.5	7.3
Color	Co - Pt units	19	10	0	5	5	2.5	9	2

06690500 North Platte River near Keystone, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)	19	SDS = 0.233(SpC)+ 318.663	0.47	22	14
Hardness as $CaCO_3$ (TH)	19	TH = 0.009(SpC) + 213.253	*.02	0.04	14
Calcium (Ca)	19	Ca = -0.013(SpC)+ 67.988	*-.10	.92	4.4
Magnesium (Mg)	19	Mg = 0.004(SpC) + 15.365	*.08	.73	1.5
Sodium (Na)	19	Na = 0.066(SpC) + 27.957	*.43	18	4.3
Potassium (K)	19	K = 0.007(SpC) + 4.014	*.24	5.8	0.9
Bicarbonate (HCO_3)	19	HCO_3= -0.174(SpC)+357.735	*-.28	7.7	19
Sulfate (SO_4)	19	SO_4 = 0.193(SpC) + 27.840	.53	28	9.5
Chloride (Cl)	19	Cl = 0.020(SpC) + 3.009	*.35	12	1.7
Silica (Si)	19	Si = 0.069(SpC) − 30.985	.67	45	2.4
Nitrite + Nitrate as N (NO_2-NO_3)	19	NO_2-NO_3= 0.002(SpC)-1.374	*.24	5.9	0.29

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate Log units	Percent
135	3,760	2.00	SpC = 756 $Q^{-0.00440}$	*-0.11	1.1	0.045	10

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

South Platte River Basin

The South Platte River basin in Nebraska lies mostly in western Nebraska, extending from the Wyoming and Colorado borders to the confluence of the North and South Platte Rivers in Lincoln County. Over half the basin in Nebraska is comprised of Lodgepole Creek drainage.

About 34,000 acres in the South Platte River and Lodgepole Creek valleys are irrigated by surface water diverted from both Lodgepole Creek and the South Platte River.

Descriptive statistics are available for four stations in the South Platte River basin (fig. 6).

Specific conductance averaged 1,730 umho/cm at the South Platte River at Julesburg, Colo., between 1945 and 1969. At the South Platte River at Roscoe during the period from 1975 to the present, the mean specific conductance was 1,890 umho/cm. Sodium and calcium are the principal cations, and sulfate is the principal anion at both South Platte River stations. At Lodgepole Creek at Kimball, the mean specific conductance is 644 umho/cm. Calcium is the principal cation, and bicarbonate is the principal anion.

Water in the South Platte River is the most highly mineralized water moving across any border of Nebraska. It is heavily used and reused for irrigation along its entire course across northeastern Colorado. Some dissolved chemical constituents greatly increase in concentration during the reuse. This is particularly true of sulfate, sodium, and chloride, which are highly conservative constituents that tend to remain in solution once they are dissolved. On the other hand, calcium and bicarbonate are limited by solubility controls so that they do not increase in concentration very much.

Mean specific conductance is 9 percent higher at Roscoe than at Julesburg. Different periods of record may account for the increase. The use and recycling of river water for irrigation increased steadily in Colorado and Nebraska during 1949–1969, the period of record for the South Platte River at Julesburg. Increased water use since 1969 may have been accompanied by increased mineralization in the stream and may account for the 9 percent increase between Julesburg and Roscoe.

Streamflow in Lodgepole Creek is mostly overland runoff. Low rainfall combined with diversion for irrigation causes much of Lodgepole Creek to be dry during summer months. Data for the station at Kimball probably are not completely representative of water quality in Lodgepole Creek because of the proximity of the station to the sewage outfall from Kimball. At times during the summer, the only flow at the station may be effluent. Higher than normal concentrations of chloride, nitrite plus nitrate, phosphorus, and BOD are detected then. Also higher concentrations of fecal coliform and fecal streptococcal bacteria are detected at these times.

Regression equations were developed between specific conductance and all 12 variables for the 2 Julesburg stations and the Lodgepole Creek station. Correlation coefficients are above 0.80 for most of the principal constituents. Data are sufficient only for regression equations between dissoved-solids residue and specific conductance and between chloride and specific conductance for the Roscoe station.

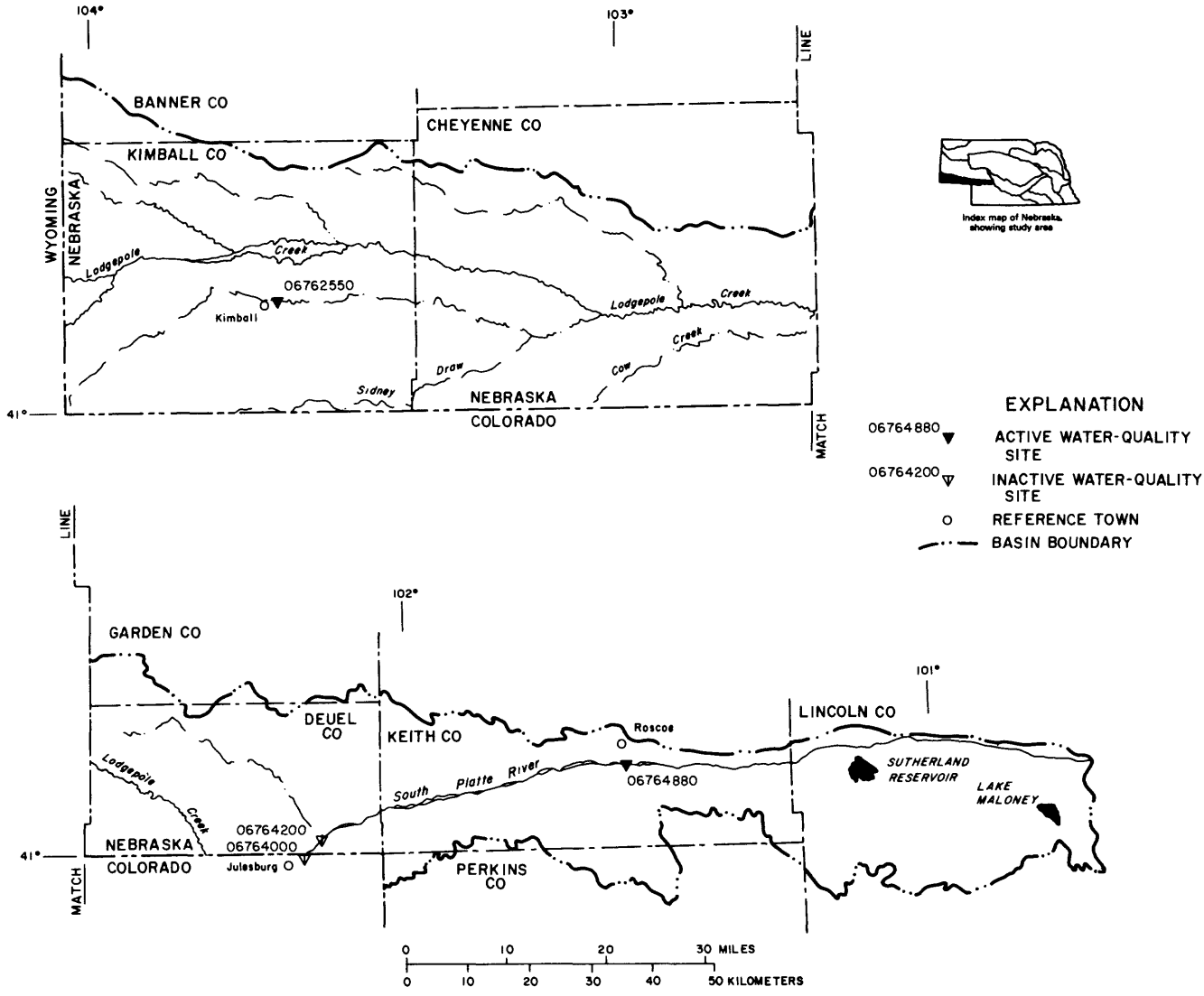

Figure 6. Location of water-quality sampling sites, South Platte River basin.

06762550 Lodgepole Creek at Kimball, Nebr.

Location.--Lat 41°14'50", long 103°38'32", in NW¼SW¼NW¼ sec. 28, T.15 N., R.55 W., Kimball County, Hydrologic Unit 10190016, at bridge on county road 0.8 mi north of U.S. Highway 30 at east edge of Kimball.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	55	1,060	480	644	597	136	880	520
Dissolved solids, residue	mg/L	33	604	320	402	385	71	490	338
Dissolved solids, sum	mg/L	19	538	313	388	--------	64	----------	
Hardness as $CaCO_3$	mg/L	18	310	190	220	220	26	240	200
Calcium, dissolved	mg/L	18	87	53	62	63	7.9	70	55
Magnesium, dissolved	mg/L	18	23	13	16	16	2.2	18	15
Sodium, dissolved	mg/L	18	72	26	38	37	10	49	29
Potassium, dissolved	mg/L	18	15	7.0	9.5	8.9	2.3	14	7.3
Bicarbonate ion	mg/L	18	299	234	264	270	22	290	238
Sulfate, dissolved	mg/L	18	140	30	46	41	25	69	31
Chloride, dissolved	mg/L	51	140	19	35	28	21	48	22
Fluoride, dissolved	mg/L	17	1.0	0.7	0.8	1.1	0.1	0.9	0.0
Silica, dissolved	mg/L	18	48	32	41	42	4.6	47	35
Boron, dissolved	mg/L	18	360	80	151	145	68	270	90
Iron, dissolved	ug/L	18	370	0	66	40	86	160	10
Manganese, dissolved	ug/L	18	60	0	'22	20	17	50	0
Nitrite + nitrate as N, dissolved	mg/L	27	4.7	1.1	2.2	2.2	0.82	2.9	1.3
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	50	9.8	0.02	1.7	0.82	2.2	3.9	0.22
Organic N, total	mg/L	50	11	0.00	1.7	1.2	2.0	2.2	0.58
Phosphorus, total	mg/L	50	16	0.36	2.0	0.81	2.6	4.4	0.42
Phosphorus, dissolved	mg/L	44	6.6	0.24	1.2	0.64	1.5	3.7	0.33
Fecal coliform	col/100 ml	43	180,000	170	--------	8,400	---------	58,000	920
Fecal streptococci	col/100 ml	47	140,000	120	--------	4,200	---------	15,000	260
Oxygen, dissolved	mg/L	51	16.4	2.6	10.5	10.1	2.7	13.5	6.8
Biochemical oxygen demand (5-day)	mg/L	48	49	2.0	11	8.1	9.4	22	3.2
pH	pH units	53	8.5	7.0	7.7	7.8	0.3	8.2	7.3
Color	Co - Pt units	17	40	5	20	20	9.9	35	0

06762550 Lodgepole Creek at Kimball, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	34	RDS = 0.464(SpC) + 107.629	0.95	90	22
Dissolved solids, sum (SDS)	19	SDS = 0.500(SpC) + 75.966	.95	90	21
Hardness as $CaCO_3$ (TH)	19	TH = 0.107(SpC) + 152.560	.49	24	23
Calcium (Ca)	19	Ca = 0.030(SpC) + 43.209	.46	21	7.2
Magnesium (Mg)	19	Mg = 0.008(SpC) + 10.915	.46	21	2.0
Sodium (Na)	19	Na = 0.121(SpC) − 34.131	.87	75	8.6
Potassium (K)	19	K = 0.22(SpC) − 3.997	.90	82	1.3
Bicarbonate (HCO_3)	19	HCO_3 = 0.109(SpC) + 197.104	.57	33	19
Sulfate (SO_4)	19	SO_4 = 0.154(SpC) − 49.709	.76	58	16
Chloride (Cl)	53	Cl = 0.144(SpC) − 55.919	.88	78	11
Silica (Si)	19	Si = 0.017(SpC) + 30.359	*.44	20	4.3
Nitrite + Nitrate as N (NO_2-NO_3)	27	NO_2-NO_3 = 0.003(SpC) + 0.317	*.25	6.1	0.81

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
55	15	0.31	$SpC = 730\ Q^{-0.11628}$	-0.67	45	0.062	14

06764000 South Platte River at Julesburg, Colo.

Location.--Lat 40°58'46", long 102°15'15", in NW¼NE¼ and SE¼NE¼ (two channels) sec. 33, T. 12 N., R.44 W., Sedgwick County, at gaging station at bridge on U.S. Highway 385, 0.9 mi southeast of Julesburg, 3 mi upstream from Colorado-Nebraska State line, and 8 mi downstream from Lodgepole Creek.

Drainage area.--23,138 sq mi.

Period of record.--October 1945 to September 1969.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	396	2500	291	1730	------	319	----------	
Dissolved solids, residue	mg/L	379	1860	429	1350	------	268	----------	
Dissolved solids, sum	mg/L	109	1660	469	1380	------	187	----------	
Hardness as $CaCO_3$	mg/L	394	860	150	640	------	127	----------	
Calcium, dissolved	mg/L	148	249	36	177	------	36	----------	
Magnesium, dissolved	mg/L	148	151	13	53	------	14	----------	
Sodium, dissolved	mg/L	385	279	5.4	161	------	35	----------	
Potassium, dissolved	mg/L	146	26	0.9	15	------	3.8	----------	
Bicarbonate ion	mg/L	334	440	142	276	------	51	----------	
Sulfate, dissolved	mg/L	169	930	9.5	672	------	145	----------	
Chloride, dissolved	mg/L	168	110	0.4	66	------	17	----------	
Fluoride, dissolved	mg/L	153	1.1	0.30	0.71	------	0.14	----------	
Silica, dissolved	mg/L	146	49	9.8	26	------	7.3	----------	
Boron, dissolved	mg/L	87	560	100	250	------	63	----------	
Iron, dissolved	ug/L	51	640	0	52	------	108	----------	
Manganese, dissolved	ug/L	19	410	0	66	------	110	----------	
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	25	1.9	0.00	0.62	------	0.50	----------	
Nitrate as NO_3, dissolved	mg/L	72	10	0.5	3.4	------	1.7	----------	
Ammonia N, total	mg/L	1	----------		0.01	----------			
Organic N, total	mg/L	1	----------		0.16	----------			
Phosphorus, total	mg/L	56	1.2	0.00	0.30	------	0.31	----------	
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	43	720	4.0	128	------	187	----------	
Fecal streptococci	col/100 ml	48	12,000	20	592	------	1760	----------	
Oxygen, dissolved	mg/L	149	13.0	6.5	8.5	------	1.7	----------	
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	336	8.8	6.6	7.7	------	0.3	----------	
Color	Co - Pt units	45	18	2	7	------	4.2	----------	

06764000 South Platte River at Julesburg, Colo.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	379	RDS =0.837(SpC) - 105.550	0.98	95	--------
Dissolved solids, sum (SDS)	110	SDS =0.707(SpC) + 76.068	.91	83	--------
Hardness as $CaCO_3$ (TH)	390	TH =0.389(SpC) - 34.578	.97	94	--------
Calcium (Ca)	148	Ca =0.097(SpC) + 4.242	.88	78	--------
Magnesium (Mg)	148	Mg =0.032(SpC) - 3.856	.75	56	--------
Sodium (Na)	381	Na =0.105(SpC) - 20.875	.96	93	--------
Potassium (K)	146	K =0.007(SpC) + 3.529	.57	32	--------
Bicarbonate (HCO_3)	334	HCO_3 =0.115(SpC) + 76.412	.74	54	--------
Sulfate (SO_4)	169	SO_4 =0.425(SpC) - 77.642	.95	91	--------
Chloride (Cl)	168	Cl =0.045(SpC) - 12.774	.85	72	--------
Silica (Si)	146	Si =0.005(SpC) + 16.478	.21	4.6	--------
Nitrite + Nitrate as N (NO_2-NO_3)	24	NO_2-NO_3 =0.00005(SpC)+0.528	*.04	.16	--------

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
395	18,500	9.7	$SpC = 2316Q^{-.05775}$	-0.36	13	----------	----------

06764200 South Platte River near Julesburg, Colo.

Location.--Lat 41°00'59", long 102°10'34", in SE¼NW¼ sec. 13, T.12 N., R.43 W., Deuel County, Nebr. at diversion to Western Canal about 1.7 mi downstream from Colorado-Nebraska State line, 4.7 mi downstream from gaging station at Julesburg, and about 6 mi northeast of Julesburg.

Drainage area.--23,200 mi^2, approximately.

Period of record.--July 1969 to June 1973.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	48	2160	897	1760	1830	274	2020	1300
Dissolved solids, residue	mg/L	35	1670	672	1380	1420	229	1600	1100
Dissolved solids, sum	mg/L	20	1550	1050	1360	1370	142	1560	1120
Hardness as $CaCO_3$	mg/L	40	770	340	652	680	102	740	510
Calcium, dissolved	mg/L	37	210	100	173	188	28	205	130
Magnesium, dissolved	mg/L	37	68	31	54	56	7.0	61	47
Sodium, dissolved	mg/L	21	208	140	176	180	20	200	152
Potassium, dissolved	mg/L	22	24	9.4	16	16	3.2	20	12
Bicarbonate ion	mg/L	32	358	181	279	278	48	327	200
Sulfate, dissolved	mg/L	40	810	283	657	678	118	782	530
Chloride, dissolved	mg/L	40	88	30	71	72	12	84	61
Fluoride, dissolved	mg/L	22	2.0	0.6	1.0	0.9	0.3	1.4	0.7
Silica, dissolved	mg/L	21	46	13	24	23	7.0	30	17
Boron, dissolved	mg/L	21	450	220	280	267	48	320	240
Iron, dissolved	ug/L	21	340	10	84	37	88	150	15
Manganese, dissolved	ug/L	18	600	10	98	60	133	180	20
Nitrite + nitrate as N, dissolved	mg/L	25	4.7	0.01	1.8	1.6	1.2	3.4	0.60
Nitrate as N, dissolved	mg/L	23	5.1	0.06	2.1	2.1	1.3	3.8	0.61
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	36	5.0	0.05	0.58	0.36	0.82	1.0	0.12
Phosphorus, dissolved	mg/L	33	0.63	0.02	0.23	0.15	0.19	0.52	0.05
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	1	----------		2.3	----------			
pH	pH units	32	8.4	7.3	8.0	8.1	0.3	8.3	7.7
Color	Co - Pt units	24	40	4	14	9	10	23	5.0

06764200 South Platte River near Julesburg, Colo.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	35	RDS =0.859(SpC) - 111.105	0.96	91	68
Dissolved solids, sum (SDS)	20	SDS =0.773(SpC) - 52.295	.95	91	44
Hardness as $CaCO_3$ (TH)	40	TH =0.372(SpC) - 1.684	.91	84	42
Calcium (Ca)	37	Ca =0.109(SpC) - 20.124	.86	74	14
Magnesium (Mg)	37	Mg =0.021(SpC) + 17.082	.66	43	5.4
Sodium (Na)	21	Na =0.078(SpC) + 32.946	.66	44	15
Potassium (K)	22	K =0.011(SpC) - 4.923	.58	34	2.7
Bicarbonate (HCO_3)	32	HCO_3 =0.104(SpC) + 93.771	.61	37	3.8
Sulfate (SO_4)	40	SO_4 =0.444(SpC) - 123.473	.94	88	41
Chloride (Cl)	40	Cl =0.042(SpC) - 3.179	.85	73	6.5
Silica (Si)	21	Si =0.021(SpC) - 14.312	.51	26	6.2
Nitrite + Nitrate as N (NO_2-NO_3)	25	NO_2-NO_3 =0.0009(SpC) +0.141	*.22	5.0	1.2

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
48	7120	20	$SpC = 2645Q^{-.07210}$	-0.56	31	0.068	16

06764880 South Platte River at Roscoe, Nebr.

Location.--Lat 41°07'33", long 101°34'35", in NW¼SW¼ sec. 4, T.13 N., R.37 W., Keith County, Hydrologic Unit 10190018, at bridge on access road between U.S. Highway 30 and Interstate 80, about 0.5 mi southeast of Roscoe.

Period of record.--July 1975 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	27	2600	1540	1890	1900	245	2100	1570
Dissolved solids, residue	mg/L	18	1800	1170	1440	1440	170	1700	1200
Dissolved solids, sum	mg/L	8	1520	1150	1370	------	134	----------	
Hardness as $CaCO_3$	mg/L	8	770	570	675	------	75	----------	
Calcium, dissolved	mg/L	8	200	140	175	------	22	----------	
Magnesium, dissolved	mg/L	8	65	50	57	------	5.0	----------	
Sodium, dissolved	mg/L	9	200	140	176	------	21	----------	
Potassium, dissolved	mg/L	8	18	15	16	------	0.9	----------	
Bicarbonate ion	mg/L	9	306	230	259	------	28	----------	
Sulfate, dissolved	mg/L	9	800	560	696	------	92	----------	
Chloride, dissolved	mg/L	27	99	60	81	82	8.1	90	69
Fluoride, dissolved	mg/L	9	0.8	0.4	0.7	------	0.1	----------	
Silica, dissolved	mg/L	9	2.3	8.2	18	------	4.5	----------	
Boron, dissolved	mg/L	9	300	220	271	------	25	----------	
Iron, dissolved	ug/L	9	20	0	16	------	7	----------	
Manganese, dissolved	ug/L	9	440	20	110	------	128	----------	
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	28	0.39	0.00	0.08	0.06	0.08	0.17	0.00
Organic N, total	mg/L	28	4.2	0.20	1.0	0.86	0.79	1.8	0.45
Phosphorus, total	mg/L	28	0.45	0.07	0.21	0.21	0.09	0.34	0.11
Phosphorus, dissolved	mg/L	20	0.28	0.00	0.16	0.17	0.07	0.26	0.07
Fecal coliform	col/100 ml	15	5500	41	719	140	1430	1800	55
Fecal streptococci	col/100 ml	23	4500	52	515	200	940	1100	105
Oxygen, dissolved	mg/L	28	14.8	8.4	11.2	11.5	1.6	13.0	8.7
Biochemical oxygen demand (5-day)	mg/L	27	5.4	1.0	3.0	3.2	1.2	5.0	1.1
pH	pH units	28	8.2	7.1	7.6	7.7	0.3	8.0	7.3
Color	Co - Pt units	9	14	4	6	------	3.1	----------	

06764880 South Platte River at Roscoe, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	17	RDS =0.486(SpC) + 534.053	0.76	58	114
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	----------	----------	----------	----------	----------
Calcium (Ca)	----------	----------	----------	----------	----------
Magnesium (Mg)	----------	----------	----------	----------	----------
Sodium (Na)	----------	----------	----------	----------	----------
Potassium (K)	----------	----------	----------	----------	----------
Bicarbonate (HCO_3)	----------	----------	----------	----------	----------
Sulfate (SO_4)	----------	----------	----------	----------	----------
Chloride (Cl)	26	Cl =0.019(SpC) + 44.852	0.57	33	6.8
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
27	900	0.12	$SpC = 1658Q^{.02976}$	0.45	20	0.050	12

Middle Platte River Basin

The Middle Platte River basin is in central Nebraska. It extends from the confluence of the North and South Platte Rivers in Lincoln County to the confluence of the Platte and Loup rivers in Platte County and includes the Platte River and several tributaries.

Of the approximately 2,765,000 acres of land in the basin, about 1 million acres, or 36 percent, are irrigated farmland. This is the greatest amount of irrigated land in any of the 13 basins. About 230,000 acres are irrigated by diverted surface water, more than half of which are in the Tri-county area of Gosper, Phelps, and Kearney counties (NSWCC, 1971). Water, during peak demand periods, is diverted from the Platte River into the Tri-county Supply Canal near North Platte.

Seventeen sampling sites in the basin have sufficient data for statistical analysis (fig. 7). Of these, nine are on the Platte River, six on tributaries, and two on canals or reservoirs. Of the sites on the Platte River, data for four represent the entire flow, while data for five represent flow of individual channels. For the Platte River at Brady, data are available separately for channel 1 and channel 4 and for the combined flow of all channels. Likewise, for the Platte River near Overton, data are available for the north channel, the south channel, and combined flow. For the Platte River near Kearney, data are available for the north channel only.

Mean specific conductance of the Platte River increased from 727 umho/cm at Brady to 847 umho/cm at Grand Island and decreased to 828 umho/cm at Duncan. Generally, means of specific conductance for the tributaries are slightly higher. Tributaries like Spring Creek near Lexington carry irrigation return flow most of the year, which may account for their higher means. Principal cations at Platte River stations and at the Spring Creek, North Dry Creek, Tri-county Supply Canal, and Johnson Reservoir stations are calcium and sodium; principal anions are bicarbonate and sulfate.

The Wood River is the principal tributary entering the Platte River from the north in the Middle Platte River basin. Throughout the upper half of the Wood River basin, flow is maintained strictly by overland runoff. The mean specific conductance is 990 umho/cm at Wood River near Grand Island but is lower both upstream near Alda and downstream near Chapman. From Grand Island downstream, sodium and calcium are the principal cations, whereas upstream from Grand Island, calcium is the principal cation. Bicarbonate is the principal anion throughout.

The quality of water in the Wood River near Grand Island and near Chapman, in the North Channel of the Platte River near Kearney, and for part of its period of record in Spring Creek near Lexington is affected by sewage effluent. Mean concentrations of chloride, nitrite plus nitrate, dissolved phosphorus, and BOD are noticeably higher at these stations than at stations not affected by effluent. The effect of the effluent can clearly be seen by comparing concentrations for Spring Creek at Lexington with those for a site not affected significantly by effluent. (See table 2.)

Table 2. Comparison of concentrations of selected constituents to show the effect of sewage effluent on Spring Creek near Lexington

Constituent	Platte River near Overton (north channel)	Spring Creek near Lexington
Mean NO_2 + NO_3 (mg/L)	0.59	2.3
Mean chloride (mg/L)	25	74
Mean dissolved phosphorus (mg/L)	.08	1.6
Mean biochemical oxygen demand (mg/L)	2.7	12.3

A similar comparison may be made to show the effects of sewage effluent on the Wood River near Grand Island. (See table 3). The Wood River near Alda station is upstream from the Grand Island sewage-treatment plant, whereas the Wood River near Grand Island station is downsteam.

Table 3. Comparison of concentrations of selected constituents to show the effect of sewage effluent on Wood River near Grand Island

Constituent	Wood River near Alda	Wood River near Grand Island
Mean chloride (mg/L)	53	103
Mean dissolved phosphorus (mg/L)	1.2	3.0
Median fecal coliform (col/100 ml)	3,150	22,400

Even with the larger amounts of nitrite plus nitrate in water in the tributaries and with the massive irrigation development and its attendant use of fertilizers, there is no significant increase in nitrite plus nitrate in Platte River water as it passes through the Middle Platte River basin.

Results of regression analyses indicate that correlation coefficients generally exceed 0.8 for most constituents for Platte River stations in the basin. The exceptions are potassium, silica, nitrite plus nitrate, and

sometimes bicarbonate. There is no significant relationship between water discharge and specific conductance for most of these stations. This is because specific conductance, as for most of the constituents, varies over a much narrower range than does water discharge or because the range of conductance may be controlled by factors other than water discharge.

Correlations coefficients for dissolved solids, sodium, and chloride generally exceed 0.9 at the downstream sites on Wood River, which means that changes in concentrations of these constituents are closely related to changes in specific conductance.

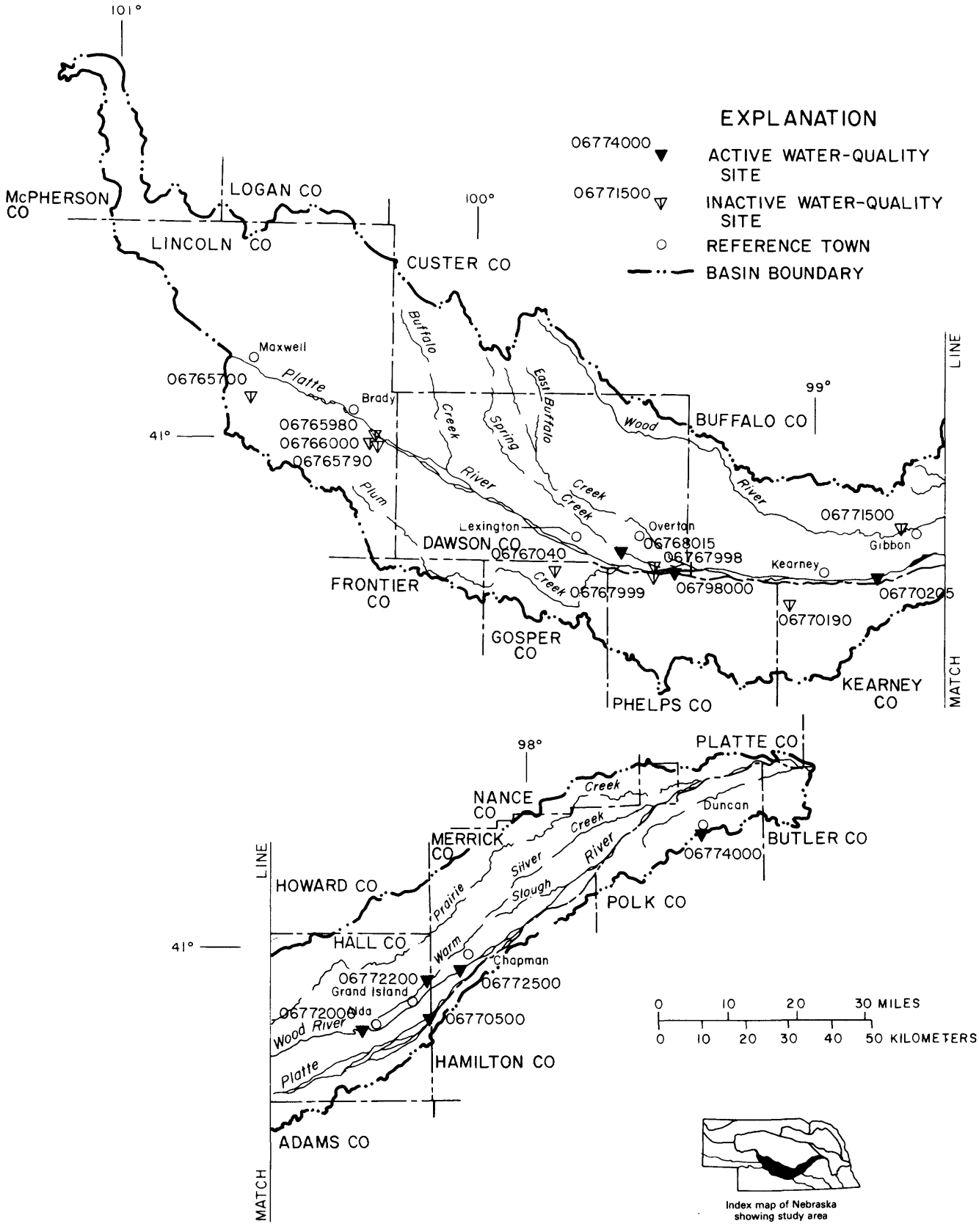

Figure 7. Location of water-quality sampling sites, Middle Platte River basin.

06765700 Supply Canal (Tri-County Diversion) near Maxwell, Nebr.

Location.--Lat 41°03'50", long 100°38'50", in sec. 28, T.13 N., R.29 W., Lincoln County, at gaging station at Parshall flume near Maxwell.

Period of record.--March 1951 to September 1972.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	222	1430	594	867	------	161	----------	----------
Dissolved solids, residue	mg/L	194	1070	394	591	------	127	----------	----------
Dissolved solids, sum	mg/L	40	910	452	593	------	100	----------	----------
Hardness as $CaCO_3$	mg/L	200	530	186	270	------	68	----------	----------
Calcium, dissolved	mg/L	78	126	50	72	------	18	----------	----------
Magnesium, dissolved	mg/L	78	38	13	22	------	6.1	----------	----------
Sodium, dissolved	mg/L	200	128	48	80	------	15	----------	----------
Potassium, dissolved	mg/L	78	26	7.4	11	------	2.0	----------	----------
Bicarbonate ion	mg/L	222	279	172	223	------	18	----------	----------
Sulfate, dissolved	mg/L	81	422	143	229	------	70	----------	----------
Chloride, dissolved	mg/L	78	44	13	25	------	6.6	----------	----------
Fluoride, dissolved	mg/L	78	0.9	0.3	0.6	------	0.1	----------	----------
Silica, dissolved	mg/L	78	35	6.4	24	------	5.7	----------	----------
Boron, dissolved	mg/L	76	220	40	137	------	30	----------	----------
Iron, dissolved	ug/L	52	390	0	39	------	70	----------	----------
Manganese, dissolved	ug/L	15	120	0	26	------	34	----------	----------
Nitrite + nitrate as N, dissolved	mg/L	17	1.2	0.00	0.37	------	0.29	----------	----------
Nitrate as N, dissolved	mg/L	31	1.6	0.00	0.57	------	0.42	----------	----------
Nitrate as NO_3, dissolved	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Ammonia N, total	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Organic N, total	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Phosphorus, total	mg/L	1	----------	----------	0.23	----------	----------	----------	----------
Phosphorus, dissolved	mg/L	33	0.18	0.01	.07	------	0.05	----------	----------
Fecal coliform	col/100 ml	----------	----------	----------	----------	----------	----------	----------	----------
Fecal streptococci	col/100 ml	----------	----------	----------	----------	----------	----------	----------	----------
Oxygen, dissolved	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
Biochemical oxygen demand (5-day)	mg/L	----------	----------	----------	----------	----------	----------	----------	----------
pH	pH units	222	8.4	6.7	7.7	------	0.4	----------	----------
Color	Co - Pt units	42	20	0	6	------	4.7	----------	----------

06765700 Supply Canal (Tri-County Diversion) near Maxwell, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	193	RDS =0.804(SpC) - 98.691	0.99	99	--------
Dissolved solids, sum (SDS)	39	SDS =0.796(SpC) - 109.253	.98	97	--------
Hardness as $CaCO_3$ (TH)	199	TH =0.442(SpC) - 93.068	.97	94	--------
Calcium (Ca)	77	Ca =0.104(SpC) - 17.723	.89	79	--------
Magnesium (Mg)	77	Mg =0.039(SpC) - 11.768	.96	92	--------
Sodium (Na)	199	Na =0.084(SpC) + 7.479	.88	77	--------
Potassium (K)	77	K =0.004(SpC) + 8.033	.26	6.9	--------
Bicarbonate (HCO_3)	221	HCO_3 =0.056(SpC) + 175.065	.50	24	--------
Sulfate (SO_4)	80	SO_4 =0.463(SpC) - 171.775	.98	96	--------
Chloride (Cl)	77	Cl =0.040(SpC) - 9.984	.92	84	--------
Silica (Si)	77	Si = -0.008(SpC)+ 31.313	*-.21	4.3	--------
Nitrite + Nitrate as N (NO_2-NO_3)	16	NO_2-NO_3 =0.002(SpC) - 1.201	.82	66	--------

*Not significant at the 95 percent conficence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
221	2240	606	$SpC = 308Q^{.13987}$	0.22	4.7	--------	-------

06765980 Platte River at Brady, Nebr. (Channel 1)

Location.--Lat 41°01'10", long 100°22'16" (channel 1); lat 40°59'22", long 100°22'39" (channel 4), in secs. 11 and 23, T.12 N., R.27 W., Lincoln County, at gaging station at highway bridges 0.5 mi and 2.5 mi, respectively, south of Brady, and 18 mi downstream from confluence of North Platte and South Platte Rivers.

Drainage area.--60,200 mi^2, approximately.

Period of record.--November 1950 to September 1972.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	67	991	408	627	613	126	770	480
Dissolved solids, residue	mg/L	38	637	284	392	385	69	480	316
Dissolved solids, sum	mg/L	43	594	304	394	390	67	490	313
Hardness as $CaCO_3$	mg/L	45	294	137	191	188	29	230	160
Calcium, dissolved	mg/L	45	79	40	55	54	7.4	66	48
Magnesium, dissolved	mg/L	44	24	9.0	13	13	3.2	18	10
Sodium, dissolved	mg/L	45	76	29	49	48	13	67	32
Potassium, dissolved	mg/L	44	24	7.3	9.6	9.3	2.5	11	7.8
Bicarbonate ion	mg/L	67	254	168	213	212	18	238	191
Sulfate, dissolved	mg/L	46	241	60	115	113	38	173	72
Chloride, dissolved	mg/L	45	20	7.4	13	12	3.9	19	8.3
Fluoride, dissolved	mg/L	44	0.9	0.3	0.5	0.5	0.1	0.7	0.5
Silica, dissolved	mg/L	44	41	21	34	36	4.5	40	28
Boron, dissolved	mg/L	44	290	20	88	82	47	135	47
Iron, dissolved	ug/L	29	110	0	31	18	30	63	0
Manganese, dissolved	ug/L	17	210	0	27	0	52	58	0
Nitrite + nitrate as N, dissolved	mg/L	17	0.99	0.00	0.25	0.14	0.27	0.55	0.00
Nitrate as N, dissolved	mg/L	32	0.85	0.00	0.34	0.25	0.29	0.80	0.00
Nitrate as NO_3, dissolved	mg/L	49	3.8	0	1.2	-------	1.2	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	21	1.4	0.02	0.41	0.44	0.29	0.67	0.16
Phosphorus, total	mg/L	3	0.39	0.12	0.22	----------			
Phosphorus, dissolved	mg/L	45	0.17	0.02	0.07	0.07	0.04	0.11	0.03
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	67	8.5	7.3	8.0	8.0	0.3	8.3	7.7
Color	Co - Pt units	35	25	2	6	4	5.4	12	3

06765980 Platte River at Brady, Nebr. (Channel 1)--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	38	RDS =0.670(SpC) + 9.488	0.96	92	20
Dissolved solids, sum (SDS)	43	SDS =0.657(SpC) + 4.714	.99	97	11
Hardness as $CaCO_3$ (TH)	45	TH =0.263(SpC) + 36.466	.92	85	11
Calcium (Ca)	45	Ca =0.059(SpC) + 20.064	.83	70	4.1
Magnesium (Mg)	44	Mg =0.030(SpC) - 4.632	.98	95	.7
Sodium (Na)	45	Na =0.125(SpC) - 25.182	.96	92	3.9
Potassium (K)	44	K =0.016(SpC) - .172	.68	46	1.9
Bicarbonate (HCO_3)	67	HCO_3 =0.102(SpC) + 148.652	.71	50	13
Sulfate (SO_4)	46	SO_4 =0.349(SpC) - 91.666	.98	96	7.8
Chloride (Cl)	45	Cl =0.036(SpC) - 8.425	.95	90	1.2
Silica (Si)	44	Si = -.026(SpC) + 49.428	-.59	35	3.7
Nitrite + Nitrate as N (NO_2-NO_3)	17	NO_2-NO_3 =0.0008(SpC) -0.307	*.24	5.8	.27

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
67	9550	57	$SpC = 339Q^{.11357}$	0.70	48	0.062	14

06765990 Platte River at Brady, Nebr. (Channel 4)

Location.--Lat 41°01'10", long 100°22'16" (channel 1), lat 40°59'22", long 100°22'39" (channel 4), in sec. 11 and 23, T.12 N., R.27 W., Lincoln County, at gaging station at highway bridges 0.5 mi and 2.5 mi, respectively, south of Brady and 18 mi downstream from confluence of North and South Platte Rivers.

Drainage area.--60,200 mi^2, approximately.

Period of record.--November 1950 to September 1972.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	64	880	581	759	762	47	807	712
Dissolved solids, residue	mg/L	36	564	443	513	509	26	545	480
Dissolved solids, sum	mg/L	37	586	424	509	504	34	553	464
Hardness as $CaCO_3$	mg/L	43	292	212	259	259	18	285	240
Calcium, dissolved	mg/L	42	85	53	73	74	6.2	80	64
Magnesium, dissolved	mg/L	42	23	15	19	20	1.5	22	18
Sodium, dissolved	mg/L	43	70	43	55	56	5.3	62	50
Potassium, dissolved	mg/L	42	20	12	14	14	1.6	16	13
Bicarbonate ion	mg/L	65	290	194	253	256	15	268	237
Sulfate, dissolved	mg/L	44	200	120	154	152	16	178	138
Chloride, dissolved	mg/L	43	28	15	20	20	2.3	24	18
Fluoride, dissolved	mg/L	42	0.9	0.4	0.6	0.6	0.1	0.6	0.5
Silica, dissolved	mg/L	41	50	30	42	43	3.6	46	39
Boron, dissolved	mg/L	40	190	10	102	110	32	137	61
Iron, dissolved	ug/L	27	120	0	21	10	24	50	0
Manganese, dissolved	ug/L	16	70	0	23	22	22	60	0
Nitrite + nitrate as N, dissolved	mg/L	17	1.7	0.00	0.84	0.83	0.48	1.4	0.10
Nitrate as N, dissolved	mg/L	27	1.7	0.40	1.1	1.0	0.38	1.6	0.58
Nitrate as NO_3, dissolved	mg/L	48	7.6	0.00	4.1	------	1.8	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	19	0.70	0.00	0.30	0.31	0.16	0.47	0.00
Phosphorus, total	mg/L	3	0.39	0.06	0.21	----------			
Phosphorus, dissolved	mg/L	45	0.25	0.01	0.06	0.06	0.04	0.11	0.03
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	65	8.3	7.3	8.0	8.0	0.3	8.3	7.6
Color	Co - Pt units	34	32	0	6	4	6	10	2

06765990 Platte River at Brady, Nebr. (Channel 4)--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	35	RDS =0.357(SpC) + 250.770	0.57	33	22
Dissolved solids, sum (SDS)	36	SDS =0.492(SpC) + 140.602	.80	65	20
Hardness as $CaCO_3$ (TH)	42	TH =0.239(SpC) + 81.377	.73	54	12
Calcium (Ca)	41	Ca =0.064(SpC) + 24.980	.62	38	4.4
Magnesium (Mg)	41	Mg =0.021(SpC) + 3.289	.73	53	1.0
Sodium (Na)	42	Na =0.074(SpC) - .572	.74	54	3.6
Potassium (K)	41	K =0.008(SpC) + 7.623	*.27	7.2	1.6
Bicarbonate (HCO_3)	64	HCO_3 =0.143(SpC) + 145.355	.50	25	12
Sulfate (SO_4)	43	SO_4 =0.220(SpC) - 10.354	.73	53	11
Chloride (Cl)	42	Cl =0.035(SpC) - 5.932	.79	62	1.5
Silica (Si)	40	Si =0.016(SpC) + 30.064	*.23	5.5	3.6
Nitrite + Nitrate as N (NO_2-NO_3)	17	NO_2-NO_3 =0.0008(SpC) +0.200	*.05	.28	.49

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
64	120	24	$SpC = 664Q^{.03298}$	*0.17	3.0	0.027	6.2

06766000 Platte River at Brady, Nebr.

Location.--Lat 41°01'10", long 100°22'16" (channel 1), lat 40°59'22", long 100°22'39" (channel 4), in sec. 11 and 23, T.12 N., R.27 W., Lincoln County, at gaging station at highway bridges 0.5 mi and 2.5 mi, respectively, south of Brady and 18 mi downstream from confluence of North Platte and South Platte Rivers.

Drainage area.--60,200 mi^2, approximately.

Period of record.--November 1950 to September 1972.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	169	1900	401	727	-----	256	----------	
Dissolved solids, residue	mg/L	167	1520	270	494	-----	192	----------	
Dissolved solids, sum	mg/L	15	1390	257	566	-----	336	----------	
Hardness as $CaCO_3$	mg/L	169	764	133	248	-----	111	----------	
Calcium, dissolved	mg/L	42	198	38	80	-----	40	----------	
Magnesium, dissolved	mg/L	42	84	9.2	23	-----	19	----------	
Sodium, dissolved	mg/L	169	172	25	58	-----	23	----------	
Potassium, dissolved	mg/L	38	12	4.5	9.9	-----	1.3	----------	
Bicarbonate ion	mg/L	169	358	144	226	-----	25	----------	
Sulfate, dissolved	mg/L	44	763	68	214	-----	197	----------	
Chloride, dissolved	mg/L	42	55	6.5	21	-----	13	----------	
Fluoride, dissolved	mg/L	38	0.8	0.3	0.5	-----	0.1	----------	
Silica, dissolved	mg/L	38	44	15	34	-----	7.2	----------	
Boron, dissolved	mg/L	38	640	30	122	-----	95	----------	
Iron, dissolved	ug/L	28	240	0	21	-----	45	----------	
Manganese, dissolved	ug/L	2	50	30	40	-----	14	----------	
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	13	0.59	0.14	0.38	-----	0.14	----------	
Nitrate as NO_3, dissolved	mg/L	35	3.2	0.10	1.6	-----	0.82	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	1	----------		0.11	----------			
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	169	8.4	6.7	7.6	-----	0.3	----------	
Color	Co - Pt units	20	43	1	8	-----	9.8	----------	

06766000 Platte River at Brady, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	165	RDS =0.844(SpC) - 108.238	1.0	100	-------
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	168	TH =0.429(SpC) - 63.521	.99	98	-------
Calcium (Ca)	41	Ca =0.098(SpC) - .879	.98	96	-------
Magnesium (Mg)	41	Mg =0.046(SpC) - 14.820	.98	96	-------
Sodium (Na)	167	Na =0.085(SpC) - 4.057	.96	91	-------
Potassium (K)	37	K = -.001(SpC) + 10.660	*-.24	5.6	-------
Bicarbonate (HCO_3)	167	HCO_3 =0.082(SpC) + 166.341	.84	70	-------
Sulfate (SO_4)	43	SO_4 =0.492(SpC) - 188.286	1.0	99	-------
Chloride (Cl)	41	Cl =0.032(SpC) - 5.334	.99	98	-------
Silica (Si)	37	Si = -.012(SpC) + 43.207	-.48	23	-------
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
167	10,000	3.7	$SpC = 940Q^{-.05216}$	0.21	4.2	----------	----------

06767040 Johnson Reservoir below powerplant No. 2 near Lexington, Nebr.

Location.--Lat 40°41'02", long 99°44'39", in NW¼NE¼ sec. 7, T.8 N., R.21 W., Gosper County, in tailrace below Johnson powerhouse No. 2, 6 mi south of Lexington.

Period of record.--March 1957 to June 1971.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	23	1120	634	852	835	121	1000	715
Dissolved solids, residue	mg/L	21	794	456	588	565	96	720	480
Dissolved solids, sum	mg/L	3	723	605	683	-----	68	----------	
Hardness as $CaCO_3$	mg/L	22	368	184	256	250	52	330	197
Calcium, dissolved	mg/L	21	91	41	67	65	15	88	48
Magnesium, dissolved	mg/L	21	34	16	22	22	4.8	28	17
Sodium, dissolved	mg/L	22	102	60	82	82	11	96	69
Potassium, dissolved	mg/L	21	13	10	11	11	1.1	13	10
Bicarbonate ion	mg/L	22	232	172	202	204	12	217	190
Sulfate, dissolved	mg/L	23	378	140	235	227	62	320	243
Chloride, dissolved	mg/L	22	41	18	26	25	6.1	35	21
Fluoride, dissolved	mg/L	22	0.8	0.4	0.6	0.6	0.1	0.7	0.6
Silica, dissolved	mg/L	22	32	7.1	19	18	5.8	26	11
Boron, dissolved	mg/L	21	180	26	137	147	36	172	100
Iron, dissolved	ug/L	19	110	0	34	21	33	93	10
Manganese, dissolved	ug/L	17	70	0	19	8	25	66	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	2	0.11	0.10	0.10	----------			
Nitrate as NO_3, dissolved	mg/L	21	1.8	0.00	0.35	-----	0.39	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	1	----------		0.04	----------			
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	22	8.4	7.2	7.6	7.6	0.3	8.0	7.3
Color	Co - Pt units	11	6	2	4	4	1.5	5	2

06767040 Johnson Reservoir below powerplant No. 2 near Lexington, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	21	RDS =0.822(SpC) - 122.713	1.0	99	9.5
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	22	TH =0.405(SpC) - 90.159	.96	92	15
Calcium (Ca)	21	Ca =0.116(SpC) - 33.069	.90	80	6.8
Magnesium (Mg)	21	Mg =0.036(SpC) - 8.330	.86	74	2.5
Sodium (Na)	22	Na =0.079(SpC) + 14.444	.91	82	4.6
Potassium (K)	21	K =0.004(SpC) + 7.804	*.42	18	1.0
Bicarbonate (HCO_3)	22	HCO_3 = -.029(SpC) + 227.339	*-.30	8.9	12
Sulfate (SO_4)	23	SO_4 =0.507(SpC) - 197.025	.98	97	11
Chloride (Cl)	22	Cl =0.046(SpC) - 13.884	.94	88	2.2
Silica (Si)	22	Si = -.018(SpC) + 33.664	*-.37	14	5.5
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Water discharge (ft^3/s) Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate: Log units	Standard error of estimate: Percent
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06767998 Platte River near Overton, Nebr. (North Channel)

Location.--Lat 40°40'57", long 99°32'19", in NW¼NE¼ sec. 12, T.8 N., R.20 W., Dawson County, Hydrologic Unit 10200101, on left bank 600 ft downstream from county highway bridge, 4 mi south of Overton, and 4 mi downstream from Plum Creek. Prior to June 2, 1976, (north channel) gage at site 600 ft upstream. South channel gage discontinued June 2, 1976.

Drainage area (revised).--57,700 mi^2, approximately.

Period of record.--October 1969 to September 1976.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	178	1200	464	832	833	107	960	737
Dissolved solids, residue	mg/L	57	752	405	583	566	73	700	510
Dissolved solids, sum	mg/L	113	776	478	564	556	54	650	505
Hardness as $CaCO_3$	mg/L	130	380	202	275	274	28	316	245
Calcium, dissolved	mg/L	130	100	58	74	73	7.5	84	66
Magnesium, dissolved	mg/L	130	32	14	22	22	2.9	26	19
Sodium, dissolved	mg/L	130	100	42	73	74	10	86	60
Potassium, dissolved	mg/L	120	17	6.1	12	13	1.9	15	10
Bicarbonate ion	mg/L	130	277	193	244	246	17	265	222
Sulfate, dissolved	mg/L	130	330	112	203	203	37	255	163
Chloride, dissolved	mg/L	130	40	14	25	25	4.7	31	20
Fluoride, dissolved	mg/L	121	1.5	0.2	0.6	0.6	0.2	0.8	0.5
Silica, dissolved	mg/L	120	44	7.2	29	30	6.2	36	22
Boron, dissolved	mg/L	121	209	70	127	131	26	160	91
Iron, dissolved	ug/L	114	250	0	31	16	40	64	0
Manganese, dissolved	ug/L	91	292	0	42	20	57	108	0
Nitrite + nitrate as N, dissolved	mg/L	66	1.7	0.00	0.59	0.54	0.40	1.2	0.12
Nitrate as N, dissolved	mg/L	54	1.4	0.00	0.52	0.52	0.37	1.0	0.01
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	1	----------		0.20	----------			
Phosphorus, total	mg/L	45	0.55	0.06	0.17	0.16	0.09	0.27	0.08
Phosphorus, dissolved	mg/L	109	0.22	0.00	0.08	0.07	0.04	0.13	0.03
Fecal coliform	col/100 ml	23	2400	3	-----	63	-----	240	14
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	45	14.3	6.4	10.7	11.4	2.2	13.0	7.4
Biochemical oxygen demand (5-day)	mg/L	46	6.0	1.0	2.7	2.6	1.1	4.3	1.6
pH	pH units	163	8.5	6.8	7.9	8.1	0.4	8.4	7.4
Color	Co - Pt units	80	50	0	9	6	9.8	20	2

06767998 Platte River near Overton, Nebr. (North Channel)--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	57	RDS =0.801(SpC) - 80.424	0.97	93	19
Dissolved solids, sum (SDS)	114	SDS =0.581(SpC) + 71.104	.86	74	28
Hardness as $CaCO_3$ (TH)	130	TH =0.280(SpC) + 38.785	.82	66	16
Calcium (Ca)	130	Ca =0.064(SpC) + 19.871	.70	49	5.4
Magnesium (Mg)	130	Mg =0.030(SpC) - 3.034	.84	71	1.6
Sodium (Na)	130	Na =0.095(SpC) - 6.975	.78	60	6.3
Potassium (K)	120	K =0.003(SpC) + 9.924	*.12	1.4	1.9
Bicarbonate (HCO_3)	130	HCO_3 =0.015(SpC) + 231.446	*.07	.49	17
Sulfate (SO_4)	130	SO_4 =0.378(SpC) - 115.842	.84	71	20
Chloride (Cl)	130	Cl =0.042(SpC) - 10.894	.74	55	3.1
Silica (Si)	120	Si = -.026(SpC) + 50.381	-.34	12	5.9
Nitrite + Nitrate as N (NO_2-NO_3)	66	NO_2-NO_3 =0.0007(SpC) -0.012	*.13	1.8	.40

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
176	14,000	69	$SpC = 767Q^{.01054}$	0.08	0.64	0.062	14

06767999 Platte River near Overton, Nebr. (South Channel)

Location.--Lat 40°40'57", long 99°32'19", in NW¼NE¼ sec. 12, T.8 N., R.20 W., Dawson County, Hydrologic Unit 10200101, on left bank 600 ft downstream from county highway bridge, 4 mi south of Overton and 4 mi downstream from Plum Creek. Prior to June 2, 1976, (north channel) gage at site 600 ft upstream. South channel gage discontinued June 2, 1976.

Drainage area (revised.--57,700 mi^2, approximately, of which about 52,900 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide basin is not included.

Period of record.--October 1969 to September 1976.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	176	1280	520	910	887	140	1110	761
Dissolved solids, residue	mg/L	60	918	418	641	608	109	807	518
Dissolved solids, sum	mg/L	114	881	478	614	587	89	745	507
Hardness as $CaCO_3$	mg/L	131	429	210	287	284	48	362	233
Calcium, dissolved	mg/L	131	110	52	75	74	12	95	59
Magnesium, dissolved	mg/L	131	38	16	24	24	4.6	32	20
Sodium, dissolved	mg/L	131	123	47	86	83	12	102	75
Potassium, dissolved	mg/L	122	24	3.0	12	12	2.5	14	10
Bicarbonate ion	mg/L	131	274	172	229	231	21	257	198
Sulfate, dissolved	mg/L	131	393	125	249	238	56	339	190
Chloride, dissolved	mg/L	131	44	15	28	27	6.8	39	21
Fluoride, dissolved	mg/L	122	1.0	0.1	0.6	0.6	0.1	0.8	0.5
Silica, dissolved	mg/L	121	35	3.0	23	24	5.7	29	15
Boron, dissolved	mg/L	121	396	50	148	147	40	187	118
Iron, dissolved	ug/L	115	474	0	38	15	70	71	0
Manganese, dissolved	ug/L	87	540	0	21	9	61	48	0
Nitrite + nitrate as N, dissolved	mg/L	63	1.7	0.00	0.57	0.52	0.35	1.0	0.13
Nitrate as N, dissolved	mg/L	57	1.3	0.00	0.49	0.47	0.31	0.91	.07
Nitrate as NO_3, dissolved	mg/L								
Ammonia N, total	mg/L								
Organic N, total	mg/L	1			0.28				
Phosphorus, total	mg/L	46	0.52	0.03	0.15	0.14	0.09	0.27	0.07
Phosphorus, dissolved	mg/L	109	0.42	0.00	0.06	0.05	0.06	0.12	0.01
Fecal coliform	col/100 ml	22	2500	1	-----	39	-----	440	1
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L	45	15.2	6.9	11.0	11.6	2.4	13.8	7.6
Biochemical oxygen demand (5-day)	mg/L	47	6.6	0.9	2.8	2.5	1.2	4.6	1.6
pH	pH units	164	8.6	6.9	8.0	8.2	0.4	8.4	7.5
Color	Co - Pt units	82	70	0	9	5	11	20	2

06767999 Platte River near Overton, Nebr. (South Channel)--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	60	RDS = 0.794(SpC) - 77.859	0.97	94	28
Dissolved solids, sum (SDS)	114	SDS = 0.691(SpC) - 20.546	.94	88	30
Hardness as $CaCO_3$ (TH)	131	TH = 0.361(SpC) - 43.961	.92	86	18
Calcium (Ca)	131	Ca = 0.088(SpC) - 6.271	.87	75	6.2
Magnesium (Mg)	131	Mg = 0.034(SpC) - 6.982	.92	85	1.8
Sodium (Na)	131	Na = 0.089(SpC) + 4.373	.87	76	6.1
Potassium (K)	122	K = 0.003(SpC) + 9.140	*.13	1.8	2.4
Bicarbonate (HCO_3)	131	HCO_3 = 0.037(SpC) + 194.880	.21	4.6	21
Sulfate (SO_4)	131	SO_4 = 0.432(SpC) - 147.248	.94	88	20
Chloride (Cl)	131	Cl = 0.049(SpC) - 16.401	.88	77	3.2
Silica (Si)	121	Si = -.007(SpC) + 28.847	*-.14	2.0	5.7
Nitrite + Nitrate as N (NO_2-NO_3)	63	NO_2-NO_3 = 0.002(SpC) - 1.518	.68	47	.26

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
174	5000	22.9	$Spc = 730Q^{.03345}$	0.19	3.6	0.071	16

06768000 Platte River near Overton, Nebr.

Location.--Lat 40°40'57", long 99°32'19", in NW¼NE¼ sec. 12, T.8 N., R.20 W., Dawson County, Hydrologic Unit 10200101, on left bank 600 ft downstream from county highway bridge, 4 mi south of Overton and 4 mi downstream from Plum Creek. Prior to June 2, 1976, (north channel) gage at site 600 ft upstream. South channel gage discontinued June 2, 1976.

Drainage area (revised).--57,700 mi^2, approximately, of which about 52,900 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide basin is not included.

Period of record.--Water years 1960 to 1968, October 1976 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	191	1190	421	824	-----	116	----------	
Dissolved solids, residue	mg/L	177	866	270	558	-----	89	----------	
Dissolved solids, sum	mg/L	15	610	487	555	548	36	600	498
Hardness as $CaCO_3$	mg/L	190	433	141	269	-----	47	----------	
Calcium, dissolved	mg/L	77	107	47	72	-----	12	----------	
Magnesium, dissolved	mg/L	77	36	6.7	21	-----	4.4	----------	
Sodium, dissolved	mg/L	190	100	23	70	-----	11	----------	
Potassium, dissolved	mg/L	77	24	10	12	-----	1.8	----------	
Bicarbonate ion	mg/L	190	280	104	230	-----	23	----------	
Sulfate, dissolved	mg/L	190	367	66	201	-----	47	----------	
Chloride, dissolved	mg/L	77	37	8.6	23	-----	4.4	----------	
Fluoride, dissolved	mg/L	76	0.8	0.3	0.5	-----	0.1	----------	
Silica, dissolved	mg/L	77	36	11	27	-----	5.6	----------	
Boron, dissolved	mg/L	77	440	50	131	-----	48	----------	
Iron, dissolved	ug/L	62	130	0	23	-----	29	----------	
Manganese, dissolved	ug/L	27	130	0	16	-----	26	----------	
Nitrite + nitrate as N, dissolved	mg/L	13	2.0	0.51	1.0	-----	0.41	----------	
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	13	0.23	0.02	0.07	0.06	0.05	0.09	0.03
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	190	8.4	6.9	7.6	-----	0.3	----------	
Color	Co - Pt units	30	90	1	9	-----	16	----------	

06768000 Platte River near Overton, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	177	RDS = 0.757(SpC) - 61.463	0.99	98	14
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	187	TH = 0.378(SpC) - 42.325	.94	88	16
Calcium (Ca)	74	Ca = 0.083(SpC) + 4.051	.79	62	7.6
Magnesium (Mg)	74	Mg = 0.032(SpC) - 5.604	.84	71	2.5
Sodium (Na)	187	Na = 0.080(SpC) + 3.764	.84	71	6.0
Potassium (K)	74	K = 0.00006(SOC) + 12.299	*.004	.002	1.8
Bicarbonate (HCO_3)	187	HCO_3 = 0.119(SpC) + 131.870	.60	36	18
Sulfate (SO_4)	187	SO_4 = 0.374(SpC) - 107.327	.92	85	18
Chloride (Cl)	74	Cl = 0.032(SpC) - 3.699	.85	73	2.3
Silica (Si)	74	Si = 0.014(SpC) + 15.595	.30	9.0	5.2
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
189	13,300	129	$SpC = 800Q^{.00272}$	*0.01	0.02	0.065	15

06768015 Spring Creek below Lexington, Nebr.

Location.--Lat 40°45'13", long 99°40'22", in NW¼SW¼NW¼ sec. 13, T.9 N., R.21 W., Dawson County, Hydrologic Unit 10200101, at bridge on county road 0.5 mi south of U.S. Highway 30, 0.1 mi downstream from Dawson County Drain No. 1, and 3.2 mi southeast of Lexington.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	54	2100	481	1260	1280	346	1720	840
Dissolved solids, residue	mg/L	33	1150	324	811	830	199	1010	580
Dissolved solids, sum	mg/L	17	1290	456	838	810	237	1150	536
Hardness as $CaCO_3$	mg/L	17	500	210	372	380	88	483	250
Calcium, dissolved	mg/L	17	130	60	103	100	24	127	69
Magnesium, dissolved	mg/L	17	42	14	28	29	7.2	38	20
Sodium, dissolved	mg/L	17	240	60	122	100	55	220	62
Potassium, dissolved	mg/L	17	39	12	27	28	6.9	35	18
Bicarbonate ion	mg/L	17	454	214	358	380	76	450	262
Sulfate, dissolved	mg/L	17	510	130	257	240	93	400	160
Chloride, dissolved	mg/L	50	290	16	74	57	57	170	26
Fluoride, dissolved	mg/L	17	1.0	0.3	0.6	0.6	0.2	0.8	0.4
Silica, dissolved	mg/L	17	68	22	39	39	10	51	29
Boron, dissolved	mg/L	17	360	130	210	185	69	330	160
Iron, dissolved	ug/L	17	250	20	82	50	61	160	30
Manganese, dissolved	ug/L	17	170	0	52	30	49	140	10
Nitrite + nitrate as N, dissolved	mg/L	24	5.5	0.12	2.3	2.2	1.4	3.9	0.6
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	51	17	.02	1.5	.49	2.9	4.2	.05
Organic N, total	mg/L	51	6.7	0.00	1.7	1.4	1.4	3.0	0.62
Phosphorus, total	mg/L	51	7.5	0.25	1.9	1.2	1.8	4.6	0.53
Phosphorus, dissolved	mg/L	41	6.7	0.05	1.6	0.94	1.8	4.6	0.24
Fecal coliform	col/100 ml	32	236000	260	-----	5950	------	65,500	833
Fecal streptococci	col/100 ml	43	60000	50	-----	2880	------	23,000	437
Oxygen, dissolved	mg/L	49	17.0	0.8	9.0	8.4	3.3	13.3	4.6
Biochemical oxygen demand (5-day)	mg/L	47	44.0	3.4	12.3	10	8.1	23.3	4.6
pH	pH units	53	8.3	7.3	7.8	7.8	0.3	8.2	7.5
Color	Co - Pt units	17	70	13	31	23	15	50	17

06768015 Spring Creek below Lexington, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	32	RDS =0.525(SpC) + 165.156	0.89	79	92
Dissolved solids, sum (SDS)	17	SDS =0.601(SpC) + 44.054	.93	87	90
Hardness as $CaCO_3$ (TH)	17	TH =0.176(SpC) + 140.257	.73	53	63
Calcium (Ca)	17	Ca =0.051(SpC) + 35.746	.77	60	16
Magnesium (Mg)	17	Mg =0.012(SpC) + 11.887	.62	39	5.8
Sodium (Na)	17	Na =0.129(SpC) - 48.537	.86	75	28
Potassium (K)	17	K =0.008(SpC) + 16.260	*.44	20	6.4
Bicarbonate (HCO_3)	17	HCO_3 =0.161(SpC) + 144.546	.78	60	49
Sulfate (SO_4)	17	SO_4 =0.149(SpC) + 59.902	.59	34	78
Chloride (Cl)	49	Cl =0.109(SpC) - 62.874	.66	44	43
Silica (Si)	17	Si =0.021(SpC) + 10.948	.78	61	6.5
Nitrite + Nitrate as N (NO_2-NO_3)	24	NO_2-NO_3 =0.003(SpC) - 1.096	.65	42	1.1

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
53	200	2	$SpC = 1868\bar{Q}^{0.17027}$	0.63	40	0.098	23

06770190 North Dry Creek near Kearney, Nebr.

Location.--Lat 40°36'00", long 99°08°30", in SE¼ sec. 5, T.7 N., R.16 W., Kearney County, at gaging station about 1,000 ft north of east-west county road, 5.3 mi upstream from mouth, 8 mi southwest of Kearney, and 8.2 mi north of Axtell.

Period of record.--February 1969 to September 1971.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	102	1260	490	894	927	156	1010	670
Dissolved solids, residue	mg/L	46	803	453	657	657	79	750	540
Dissolved solids, sum	mg/L	48	822	446	639	651	80	730	520
Hardness as $CaCO_3$	mg/L	55	500	282	393	391	48	460	333
Calcium, dissolved	mg/L	55	150	83	116	117	16	140	94
Magnesium, dissolved	mg/L	55	32	19	25	25	3.0	30	21
Sodium, dissolved	mg/L	55	89	26	49	43	16	76	33
Potassium, dissolved	mg/L	48	25	13	18	18	2.8	22	14
Bicarbonate ion	mg/L	55	384	247	315	314	30	353	275
Sulfate, dissolved	mg/L	55	305	100	213	214	46	268	145
Chloride, dissolved	mg/L	55	35	12	21	20	5.9	30	14
Fluoride, dissolved	mg/L	48	0.9	0.0	0.5	0.5	0.2	0.7	0.3
Silica, dissolved	mg/L	48	36	9.3	28	29	5.2	34	24
Boron, dissolved	mg/L	48	380	22	104	84	70	180	40
Iron, dissolved	ug/L	44	1230	0	93	25	238	109	0
Manganese, dissolved	ug/L	22	1560	150	800	660	433	1500	290
Nitrite + nitrate as N, dissolved	mg/L	5	4.0	1.5	3.0	-----	1.1	----------	
Nitrate as N, dissolved	mg/L	51	8.2	0.30	3.5	3.6	1.5	5.1	1.7
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	47	3.4	0.08	0.78	0.68	0.55	0.92	0.44
Phosphorus, dissolved	mg/L	50	0.84	0.07	0.48	0.46	0.15	0.70	0.32
Fecal coliform	col/100 ml	24	1400	2	-----	190	-----	1000	8
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	47	19.5	4.6	10.7	10.2	3.2	15.7	6.4
Biochemical oxygen demand (5-day)	mg/L	47	7.2	0.4	2.8	2.6	1.6	5.0	1.3
pH	pH units	102	8.5	7.2	8.0	8.0	0.2	8.3	7.6
Color	Co - Pt units	13	68	1	20	19	18	36	3

06770190 North Dry Creek near Kearney, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	46	RDS = 0.696(SpC) + 20.274	0.93	86	30
Dissolved solids, sum (SDS)	48	SDS = 0.676(SpC) + 14.986	.94	89	27
Hardness as $CaCO_3$ (TH)	55	TH = 0.273(SpC) + 141.160	.62	38	38
Calcium (Ca)	55	Ca = 0.068(SpC) + 53.221	.45	21	14
Magnesium (Mg)	55	Mg = 0.024(SpC) + 2.894	.84	71	1.7
Sodium (Na)	55	Na = 0.108(SpC) - 50.710	.72	52	11
Potassium (K)	48	K = 0.007(SpC) + 10.844	.30	8.9	2.7
Bicarbonate (HCO_3)	55	HCO_3 = 0.050(SpC) + 269.073	*.18	3.2	30
Sulfate (SO_4)	55	SO_4 = 0.395(SpC) - 151.108	.92	84	19
Chloride (Cl)	55	Cl = 0.044(SpC) - 19.552	.79	63	3.6
Silica (Si)	48	Si = -.007(SpC) + 34.042	*-.15	2.2	5.2
Nitrite + Nitrate as N (NO_2-NO_3)					

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate Log units	Percent
102	25	5	$SpC = 938Q^{-.02816}$	*-.05	23	0.086	20

06770205 Platte River (North Channel) near Kearney, Nebr.

Location.--Lat 40°40'30", long 99°00'24", in SW¼NW¼SW¼ sec. 10, T.8 N., R,15 W., Buffalo County, Hydrologic Unit 10200101, on county road, 0.2 mi north of Interstate Highway I-80 (no access) and about 4.5 mi southeast of Kearney.

Period of record.--Water year 1953 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	60	1320	500	959	920	194	1250	770
Dissolved solids, residue	mg/L	35	934	348	635	630	126	778	500
Dissolved solids, sum	mg/L	17	787	514	608	565	85	740	529
Hardness as $CaCO_3$	mg/L	18	370	220	280	280	43	360	230
Calcium, dissolved	mg/L	18	100	56	74	75	13	100	60
Magnesium, dissolved	mg/L	18	29	17	23	23	2.9	27	19
Sodium, dissolved	mg/L	18	140	53	86	82	19	110	73
Potassium, dissolved	mg/L	18	16	9.4	13	14	2.1	16	9.7
Bicarbonate ion	mg/L	18	307	182	246	243	33	295	206
Sulfate, dissolved	mg/L	17	270	180	219	217	26	263	190
Chloride, dissolved	mg/L	52	98	18	42	33	22	76	24
Fluoride, dissolved	mg/L	18	0.8	0.2	0.6	0.6	0.1	0.7	0.3
Silica, dissolved	mg/L	17	31	16	25	26	3.6	29	21
Boron, dissolved	mg/L	18	260	30	141	142	47	200	80
Iron, dissolved	ug/L	18	330	0	58	40	72	90	10
Manganese, dissolved	ug/L	18	360	0	87	20	116	310	10
Nitrite + nitrate as N, dissolved	mg/L	26	3.0	0.00	0.83	0.67	0.69	1.7	0.14
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	52	5.2	0.00	0.79	0.21	1.2	2.3	.03
Organic N, total	mg/L	52	4.2	0.00	1.1	0.90	0.79	1.8	0.27
Phosphorus, total	mg/L	53	2.7	0.08	0.82	0.54	1.4	1.6	0.25
Phosphorus, dissolved	mg/L	44	2.7	0.08	0.64	0.32	0.64	1.4	0.16
Fecal coliform	col/100 ml	38	182,000	12	------	12,500	-------	55,500	675
Fecal streptococci	col/100 ml	46	39,000	207	------	1,370	-------	3,700	380
Oxygen, dissolved	mg/L	53	13.1	6.2	9.0	8.8	1.6	11.0	7.3
Biochemical oxygen demand (5-day)	mg/L	53	39.0	1.8	9.8	7.4	7.5	15.8	3.2
pH	pH units	57	8.3	7.2	7.8	7.9	0.3	8.2	7.5
Color	Co - Pt units	18	49	4	16	15	11	31	0

06770205 Platte River (North Channel) near Kearney, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	34	RDS =0.543(SpC) + 110.910	0.91	82	54
Dissolved solids, sum (SDS)	18	SDS =0.482(SpC) + 161.632	.86	74	44
Hardness as $CaCO_3$ (TH)	18	TH =0.221(SpC) + 76.038	.74	56	29
Calcium (Ca)	18	Ca =0.065(SpC) + 14.150	.73	53	9.1
Magnesium (Mg)	18	Mg =0.014(SpC) + 9.348	.72	52	2.1
Sodium (Na)	18	Na =0.105(SpC) - 11.312	.82	67	11
Potassium (K)	18	K =0.006(SpC) + 7.262	*.44	20	1.9
Bicarbonate (HCO_3)	18	HCO_3 =0.153(SpC) + 103.415	.67	45	25
Sulfate (SO_4)	17	SO_4 =0.157(SpC) + 72.947	.87	75	13
Chloride (Cl)	51	Cl =0.090(SpC) - 44.585	.80	64	13
Silica (Si)	17	Si = -.006(SpC) + 31.161	*-.25	6.2	3.6
Nitrite + Nitrate as N (NO_2-NO_3)	26	NO_2-NO_3 =0.003(SpC) - 1.948	.62	39	.55

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
60	400	4.5	$SpC = 164Q^{-0.13567}$	-0.78	60	0.058	13

06770500 Platte River near Grand Island, Nebr.

Location.--Lat 40°52'28", long 98°16'54", in SW¼SW¼ sec. 31, T.11 N., R.8 W., Merrick County, Hydrologic Unit 10200101, on left bank 118 ft downstream from bridge on U.S. Highway 34, 2 mi upstream from Burlington Northern, Inc., bridge, and 5 mi southeast of Grand Island.

Drainage area (revised).--58,800 mi^2, approximately, of which about 54,000 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide basin is not included.

Period of record.--Water year 1972 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	64	1040	688	847	835	84	960	745
Dissolved solids, residue	mg/L	9	698	499	593	-----	71	----------	
Dissolved solids, sum	mg/L	55	699	435	575	567	52	640	520
Hardness as $CaCO_3$	mg/L	56	350	210	272	273	31	320	235
Calcium, dissolved	mg/L	56	95	55	72	72	9.3	87	62
Magnesium, dissolved	mg/L	56	28	17	22	22	2.7	27	20
Sodium, dissolved	mg/L	56	95	53	80	80	8.2	89	70
Potassium, dissolved	mg/L	56	17	5.0	12	12	1.8	14	9.8
Bicarbonate ion	mg/L	56	280	182	227	228	18	249	200
Sulfate, dissolved	mg/L	56	300	160	222	223	31	275	190
Chloride, dissolved	mg/L	62	36	19	27	28	3.7	32	23
Fluoride, dissolved	mg/L	58	0.8	0.4	0.6	0.5	0.1	0.7	0.5
Silica, dissolved	mg/L	56	30	12	23	24	4.0	28	18
Boron, dissolved	mg/L	56	250	100	137	140	24	164	120
Iron, dissolved	ug/L	56	100	0	25	21	21	51	9
Manganese, dissolved	ug/L	56	230	0	11	0	31	22	0
Nitrite + nitrate as N, dissolved	mg/L	34	1.3	0.00	0.43	0.38	0.37	0.85	.02
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	52	3.0	0.25	0.91	0.79	0.52	1.4	0.40
Phosphorus, total	mg/L	52	3.5	0.06	0.23	0.16	0.47	0.26	0.10
Phosphorus, dissolved	mg/L	62	0.26	0.00	0.07	0.07	0.05	0.14	0.03
Fecal coliform	col/100 ml	40	2060	3	-----	97	-----	870	11
Fecal streptococci	col/100 ml	49	3200	10	-----	110	-----	997	25
Oxygen, dissolved	mg/L	63	14.2	5.0	10.3	10.0	1.8	12.7	8.1
Biochemical oxygen demand (5-day)	mg/L	48	31.0	1.4	7.8	6.2	5.8	15.0	2.0
pH	pH units	78	8.7	7.2	8.0	8.2	0.3	8.4	7.5
Color	Co - Pt units	56	50	1	11	8	8.8	20	3

06770500 Platte River near Grand Island, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)	53	SDS =0.547(SpC) + 113.030	0.86	74	27
Hardness as $CaCO_3$ (TH)	56	TH =0.315(SpC) + 6.879	.83	69	18
Calcium (Ca)	56	Ca =0.082(SpC) + 2.923	.73	54	6.4
Magnesium (Mg)	56	Mg =0.026(SpC) + .504	.81	65	1.6
Sodium (Na)	56	Na =0.060(SpC) + 28.840	.61	38	6.5
Potassium (K)	56	K = -.002(SpC) + 13.315	*-.09	.80	1.8
Bicarbonate (HCO_3)	56	HCO_3 =0.123(SpC) + 123.730	.56	32	15
Sulfate (SO_4)	56	SO_4 =0.293(SpC) - 24.318	.79	62	19
Chloride (Cl)	62	Cl =0.026(SpC) + 5.451	.60	36	3.0
Silica (Si)	56	Si =0.002(SpC) + 21.155	*.04	.17	4.0
Nitrite + Nitrate as N (NO_2-NO_3)	34	NO_2-NO_3 =0.002(SpC) - 1.650	.49	24	.32

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
64	14,000	26	$SpC = 698Q^{.02662}$	0.33	11	0.040	9.2

06771500 Wood River near Gibbon, Nebr.

Location.--Lat 40°46'17", long 98°47'51", in NW¼NW¼ sec. 9, T.9 N., R.13 W., Buffalo County, Hydrologic Unit 10200102, Buffalo County, on left bank 10 ft downstream from bridge on county highway and 2.5 mi northeast of Gibbon.

Drainage area.--572 mi^2.

Period of record.--October 1974 to November 1976.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	26	2990	235	1810	2150	930	2820	270
Dissolved solids, residue	mg/L	1	----------		212	----------			
Dissolved solids, sum	mg/L	----------							
Hardness as $CaCO_3$	mg/L	1	----------		108	----------			
Calcium, dissolved	mg/L	1	----------		31	----------			
Magnesium, dissolved	mg/L	1	----------		7.4	----------			
Sodium, dissolved	mg/L	1	----------		3.7	----------			
Potassium, dissolved	mg/L	1	----------		16	----------			
Bicarbonate ion	mg/L	1	----------		134	----------			
Sulfate, dissolved	mg/L	1	----------		14	----------			
Chloride, dissolved	mg/L	1	----------		4.6	----------			
Fluoride, dissolved	mg/L	1	----------		0.4	----------			
Silica, dissolved	mg/L	1	----------		17	----------			
Boron, dissolved	mg/L	1	----------		60	----------			
Iron, dissolved	ug/L	1	----------		60	----------			
Manganese, dissolved	ug/L	1	----------		50	----------			
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	14	42	0.04	11	3.4	16	40	0.00
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	1	----------		7.5	----------			
Color	Co - Pt units	----------							

06772000 Wood River near Alda, Nebr.

Location.--Lat 40°51'10", long 98°28'20", in NE¼SE¼ sec. 7, T.10 N., R.10 W., Hall County, Hydrologic Unit 10200102, on right bank 1.2 mi south of Alda, 2.2 mi upstream from old north channel of the Platte River, and 19 mi upstream from present mouth.

Drainage area.--628 mi^2.

Period of record.--Water year 1974 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	15	1330	128	745	830	422	1200	129
Dissolved solids, residue	mg/L	13	962	117	552	630	288	840	166
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L	1			284				
Calcium, dissolved	mg/L	1			81				
Magnesium, dissolved	mg/L	1			20				
Sodium, dissolved	mg/L	1			19				
Potassium, dissolved	mg/L	1			29				
Bicarbonate ion	mg/L	23	400	22	244	260	127	375	66
Sulfate, dissolved	mg/L	21	260	7.8	123	150	85	230	27
Chloride, dissolved	mg/L	24	130	1.0	53	51	38	120	4.5
Fluoride, dissolved	mg/L	1			0.4				
Silica, dissolved	mg/L	1			25				
Boron, dissolved	mg/L	1			130				
Iron, dissolved	ug/L	1			40				
Manganese, dissolved	ug/L	1			80				
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L								
Ammonia N, total	mg/L	25	6.4	0.00	0.70	0.17	1.4	1.1	.02
Organic N, total	mg/L	23	8.6	0.81	2.7	2.1	2.0	5.5	0.90
Phosphorus, total	mg/L	23	4.5	0.69	1.8	1.6	.96	3.2	1.0
Phosphorus, dissolved	mg/L	7	1.9	0.24	1.2	-----	0.54	----------	
Fecal coliform	col/100 ml	18	96,000	255	-----	3150	-----	53,000	400
Fecal streptococci	col/100 ml	9	10,000	44					
Oxygen, dissolved	mg/L	16	17.6	5.2	9.0	8.9	3.1	13.0	5.9
Biochemical oxygen demand (5-day)	mg/L								
pH	pH units	20	8.7	6.5	7.7	8.0	0.7	8.6	6.7
Color	Co - Pt units								

06772000 Wood River near Alda, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	---	---	---	---	---
Dissolved solids, sum (SDS)	---	---	---	---	---
Hardness as $CaCO_3$ (TH)	---	---	---	---	---
Calcium (Ca)	---	---	---	---	---
Magnesium (Mg)	---	---	---	---	---
Sodium (Na)	---	---	---	---	---
Potassium (K)	---	---	---	---	---
Bicarbonate (HCO_3)	15	$HCO_3 = 0.212(SpC) + 84.512$	0.67	45	103
Sulfate (SO_4)	15	$SO_4 = 0.182(SpC) - 3.974$	.84	71	51
Chloride (Cl)	---	---	---	---	---
Silica (Si)	---	---	---	---	---
Nitrite + Nitrate as N (NO_2-NO_3)	---	---	---	---	---

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
15	472	1.3	$SpC = 1551Q^{-0.37092}$	-0.84	70	0.210	50

06772200 Wood River near Grand Island, Nebr.

Location.--Lat 40°56°05", long 98°16'56", in SW¼NW¼SW¼ sec. 7, T.11 N., R.8 W., Merrick County, Hydrologic Unit 10200102, at bridge on county road 1.0 mi south of U.S. Highway 30, 3.0 mi east of Grand Island.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	64	1780	224	990	937	298	1400	706
Dissolved solids, residue	mg/L	47	984	448	647	600	153	920	479
Dissolved solids, sum	mg/L	16	984	419	635	590	141	840	516
Hardness as $CaCO_3$	mg/L	21	340	220	268	270	30	305	230
Calcium, dissolved	mg/L	21	100	67	80	78	8.6	90	70
Magnesium, dissolved	mg/L	21	21	13	16	17	2.4	19	13
Sodium, dissolved	mg/L	21	210	43	90	76	45	160	47
Potassium, dissolved	mg/L	21	26	9.2	15	15	4.7	21	11
Bicarbonate ion	mg/L	62	368	89	254	262	50	320	195
Sulfate, dissolved	mg/L	61	240	32	151	157	42	200	93
Chloride, dissolved	mg/L	78	250	4.0	103	80	65	210	37
Fluoride, dissolved	mg/L	21	1.0	0.3	0.5	0.5	0.1	0.6	0.4
Silica, dissolved	mg/L	20	37	17	26	27	7.5	33	22
Boron, dissolved	mg/L	20	370	100	199	190	85	357	120
Iron, dissolved	ug/L	21	140	10	53	41	33	90	26
Manganese, dissolved	ug/L	21	180	0	68	50	54	150	19
Nitrite + nitrate as N, dissolved	mg/L	28	4.0	0.08	2.0	1.9	1.0	3.4	0.30
Nitrate as N, dissolved	mg/L	----							
Nitrate as NO_3, dissolved	mg/L	----							
Ammonia N, total	mg/L	76	29	0.01	7.6	5.4	6.9	18	0.35
Organic N, total	mg/L	74	9.0	0.00	1.8	1.1	2.1	4.1	0.00
Phosphorus, total	mg/L	76	22	0.43	3.4	2.2	3.9	5.9	1.0
Phosphorus, dissolved	mg/L	47	21	0.75	3.0	1.7	3.7	5.7	0.93
Fecal coliform	col/100 ml	56	2,000,000	300	-----	22,400	-----	280,000	2400
Fecal streptococci	col/100 ml	64	110,000	200	-----	2200	-----	15,000	370
Oxygen, dissolved	mg/L	70	17.2	2.9	7.2	6.8	2.7	10.0	4.7
Biochemical oxygen demand (5-day)	mg/L	48	40.0	2.5	15.0	12.7	8.9	29.0	6.0
pH	pH units	75	7.9	6.9	7.5	7.5	0.2	7.8	7.3
Color	Co - Pt units	19	110	3	17	10	24	35	4

06772200 Wood River near Grand Island, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	48	RDS =0.514(SpC) + 124.162	0.98	96	32
Dissolved solids, sum (SDS)	17	SDS =0.540(SpC) + 83.038	.97	94	37
Hardness as $CaCO_3$ (TH)	21	TH =0.020(SpC) + 249.133	*.16	2.7	31
Calcium (Ca)	21	Ca =0.002(SpC) + 77.817	*.07	.48	8.8
Magnesium (Mg)	21	Mg =0.003(SpC) + 13.748	*.29	8.2	2.4
Sodium (Na)	21	Na =0.174(SpC) - 77.292	.97	95	10
Potassium (K)	21	K =0.011(SpC) + 4.708	.60	36	3.8
Bicarbonate (HCO_3)	54	NCO_3 =0.129(SpC) + 131.891	.79	62	31
Sulfate (SO_4)	50	SO_4 =0.088(SpC) + 66.527	.63	40	33
Chloride (Cl)	64	Cl =0.203(SpC) - 100.321	.93	86	24
Silica (Si)	21	Si =0.005(SpC) + 21.540	*.26	7.0	4.8
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3 = -.001(SpC) + 3.277	*-.30	9.1	1.0

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
64	306	1.7	$SpC = 1899Q^{-0.24546}$	-0.72	52	0.099	23

06772500 Wood River near Chapman, Nebr.

Location.--Lat 40°57'56", long 98°12'22", in NE¼SE¼ sec. 34, T.12 N., R.8 W., Merrick County, Hydrologic Unit 10200102, at county road bridge 2.5 mi west and 4.0 mi south of center of Chapman.

Drainage area.--700 mi^2, approximately.

Period of record.--Water year 1968 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	181	1570	158	806	788	248	1100	543
Dissolved solids, residue	mg/L	118	891	102	475	483	127	599	315
Dissolved solids, sum	mg/L	117	970	103	532	532	128	687	380
Hardness as $CaCO_3$	mg/L	154	330	56	238	251	46	281	186
Calcium, dissolved	mg/L	153	95	17	72	75	14	85	59
Magnesium, dissolved	mg/L	153	22	2.1	14	14	3.0	17	11
Sodium, dissolved	mg/L	154	190	3.0	66	58	37	118	30
Potassium, dissolved	mg/L	153	82	6.0	14	13	8.0	19	9.7
Bicarbonate ion	mg/L	153	410	67	223	215	53	292	180
Sulfate, dissolved	mg/L	153	260	12	125	127	46	178	63
Chloride, dissolved	mg/L	172	210	0.1	55	36	45	108	18
Fluoride, dissolved	mg/L	153	1.9	0.1	0.6	0.5	0.2	0.7	0.4
Silica, dissolved	mg/L	152	35	10	25	26	4.4	30	20
Boron, dissolved	mg/L	153	640	40	181	177	86	300	101
Iron, dissolved	ug/L	135	960	0	82	42	129	167	14
Manganese, dissolved	ug/L	96	500	0	120	77	123	290	10
Nitrite + nitrate as N, dissolved	mg/L	48	14	0.00	2.5	2.1	2.4	3.9	0.40
Nitrate as N, dissolved	mg/L	36	20	0.10	4.1	3.4	3.6	7.1	0.90
Nitrate as NO_3, dissolved	mg/L								
Ammonia N, total	mg/L	54	22	0.00	5.2	2.4	6.4	16	0.04
Organic N, total	mg/L	54	21	0.00	2.2	1.0	3.7	5.0	0.00
Phosphorus, total	mg/L	64	14	0.33	3.0	2.2	2.5	6.4	1.0
Phosphorus, dissolved	mg/L	98	13	0.05	2.6	2.0	2.2	5.1	0.90
Fecal coliform	col/100 ml	43	2,700,000	70	-----	12,800	-----	124,000	1120
Fecal streptococci	col/100 ml	53	37,000	1	-----	1700	-----	16,000	200
Oxygen, dissolved	mg/L	128	11.6	1.8	7.4	7.6	1.6	9.5	5.2
Biochemical oxygen demand (5-day)	mg/L	72	47.0	0.30	13.1	10.6	9.4	25.2	4.5
pH	pH units								
Color	Co - Pt units	94	280	2	19	10	36	29	4

06772500 Wood River near Chapman, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	119	RDS =0.579(SpC) + 53.947	0.96	93	33
Dissolved solids, sum (SDS)	116	SDS =0.556(SpC) + 60.444	.98	95	28
Hardness as $CaCO_3$ (TH)	153	TH =0.143(SpC) + 125.798	.74	56	30
Calcium (Ca)	152	Ca =0.042(SpC) + 39.302	.72	52	9.5
Magnesium (Mg)	152	Mg =0.009(SpC) + 6.675	.74	55	2.1
Sodium (Na)	153	Na =0.148(SpC) - 50.844	.95	90	12
Potassium (K)	152	K =0.007(SpC) + 9.043	.20	4.0	7.9
Bicarbonate (HCO_3)	153	HCO_3 =0.148(SpC) + 105.976	.68	46	39
Sulfate (SO_4)	153	SO_4 =0.140(SpC) + 15.098	.73	53	31
Chloride (Cl)	171	Cl =0.159(SpC) - 72.520	.88	77	22
Silica (Si)	152	Si =0.008(SpC) + 19.372	.42	18	4.0
Nitrite + Nitrate as N (NO_2-NO_3)	48	NO_2-NO_3= -.0009(SpC)+3.304	*-.08	.60	2.4

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
181	1040	.70	$SpC = 1488Q^{-0.23176}$	-0.67	45	0.119	28

06774000 Platte River near Duncan, Nebr.

Location.--Lat 41°22'04", long 97°29'40", in SE¼SW¼ sec. 12, T.16 N., R.2 W., Platte County, Hydrologic Unit 10200103, on left bank 25 ft downstream from highway bridge, 1.5 mi south of Duncan, and 12 mi upstream from Loup River.

Drainage area (revised).--60,900 mi^2, approximately, of which about 56,100 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide Basin is not included.

Period of record.--Water year 1965 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	230	1560	236	828	836	146	1000	652
Dissolved solids, residue	mg/L	101	788	171	565	550	101	685	460
Dissolved solids, sum	mg/L	138	739	280	551	557	79	653	447
Hardness as $CaCO_3$	mg/L	182	392	80	263	264	43	317	222
Calcium, dissolved	mg/L	182	98	25	70	70	11	84	60
Magnesium, dissolved	mg/L	182	53	4.3	21	22	4.8	26	17
Sodium, dissolved	mg/L	182	103	13	73	77	14	91	55
Potassium, dissolved	mg/L	174	27	4.7	12	12	2.4	15	10
Bicarbonate ion	mg/L	181	284	104	223	224	27	254	192
Sulfate, dissolved	mg/L	182	311	25	208	208	46	270	156
Chloride, dissolved	mg/L	182	41	3.7	25	25	5.6	33	19
Fluoride, dissolved	mg/L	176	1.2	0.0	0.6	0.6	0.1	0.8	0.5
Silica, dissolved	mg/L	174	52	5.6	23	24	5.1	28	18
Boron, dissolved	mg/L	174	560	40	132	131	48	168	94
Iron, dissolved	ug/L	89	330	0	51	27	63	130	0
Manganese, dissolved	ug/L	63	457	0	44	27	71	87	0
Nitrite + nitrate as N, dissolved	mg/L	75	1.7	0.00	0.48	0.44	0.38	1.0	.02
Nitrate as N, dissolved	mg/L	57	1.3	0.00	0.41	0.41	0.34	0.82	0.00
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	1	----------		0.01	----------			
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	48	0.78	0.06	0.26	0.22	0.14	0.45	0.13
Phosphorus, dissolved	mg/L	124	0.46	0.00	0.12	0.10	.08	0.21	.04
Fecal coliform	col/100 ml	24	5500	1	-----	91	-----	210	5
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	47	14.2	5.2	10.6	10.1	2.4	13.5	7.3
Biochemical oxygen demand (5-day)	mg/L	47	7.8	0.9	3.2	2.9	1.9	6.1	1.2
pH	pH units	223	8.7	6.8	7.9	8.0	0.4	8.4	7.5
Color	Co - Pt units	107	80	0	14	7	16	31	3

06774000 Platte River near Duncan, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	101	RDS = 0.752(SpC) - 51.607	0.98	97	18
Dissolved solids, sum (SDS)	136	SDS = 0.671(SpC) - 5.446	.96	93	21
Hardness as $CaCO_3$ (TH)	182	TH = 0.315(SpC) + 3.761	.93	87	16
Calcium (Ca)	182	Ca = 0.073(SpC) + 9.596	.84	71	6.0
Magnesium (Mg)	182	Mg = 0.032(SpC) - 5.144	.85	72	2.5
Sodium (Na)	182	Na = 0.103(SpC) - 11.625	.92	84	5.7
Potassium (K)	174	K = 0.004(SpC) + 8.753	.21	4.4	2.3
Bicarbonate (HCO_3)	181	HCO_3 = 0.155(SpC) + 96.029	.72	52	19
Sulfate (SO_4)	182	SO_4 = 0.346(SpC) - 76.432	.95	90	14
Chloride (Cl)	182	Cl = 0.038(SpC) - 6.268	.87	76	2.8
Silica (Si)	174	Si = 0.004(SpC) + 20.342	*.09	.80	5.1
Nitrite + Nitrate as N (NO_2-NO_3)	75	NO_2-NO_3 = -.0001(SpC) +0.589	*-.04	.19	.38

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
229	15,000	3.0	$SpC = 790Q^{.00418}$	*0.03	0.07	0.088	20

Loup River Basin

The Loup River basin is the largest in surface area of all 13 basins in Nebraska. It is located exactly in the center of the State, and streamflow in it originates within the borders of the State. The basin ends at the confluence of the Loup and Platte Rivers.

Over half of the Loup River basin is comprised of sandhills. Underlying the sandhills are saturated deposits as thick as 1,000 ft. These deposits are the source of all streams originating in the basin. Only small amounts of overland runoff are carried by sandhills streams.

Downstream from the sandhills, Pleistocene sands and gravels are overlain by loess deposits, and topography is hilly. Through the loess-hills part of the basin, ground-water derived streamflow is supplemented by overland runoff.

Irrigation is not extensive in the Loup River basin at the present time because until the development of center-pivot irrigation systems, much of the land could not be irrigated by the systems then in existence because the land was too steeply sloping. Probably only about 450,000 acres or about 5 percent of the existing land area presently is irrigated. Of these acres, about 185,000 are irrigated by surface water diverted from the North Loup and Middle Loup Rivers.

Twelve sampling sites in the Loup River basin have sufficient data available for statistical analyses (fig. 8). Five of these sites are in the sandhills or near the edge of the sandhills. Seven are on the Loup River, including the Loup River Power Canal, or on the South, Middle, or North Loup Rivers. Cedar River and Beaver Creek are tributaries of the Loup River and drain approximately one-fifth of the basin. Water is diverted into the Loup River Power Canal near Genoa for electrical generation, and during most of the year nearly all the flow of the Loup River is diverted into this canal.

Mineralization of water in the Loup River basin, with the exception of Mud Creek, is low and varies over narrow ranges. Based on tenth and ninetieth percentile data, 80 percent of all specific conductance values can be expected to range between 160 and 350 umho/cm for stations in the Middle Loup drainage. Based on the same percentile data, specific conductances range typically between 130 and 260 umho/cm for stations in the North Loup drainage. Calcium is the principal cation, and bicarbonate is the principal anion at all sampling sites in the basin. Silica is an important constituent throughout the basin.

Mineralization increases in a downstream direction through the Middle Loup River system. After leaving the sandhills, concentrations of principal constituents increase about 35 percent from Comstock to St. Paul, accompanied by a 30 percent decrease in silica concentrations. This increase may be caused by several factors, including the addition of more highly mineralized water from the South Loup River, discharge of more highly mineralized ground water from the loess hills, and possibly enrichment by irrigation return flow.

Water in the Loup River Power Canal (Station 06792499) is similar in mineralization to water in the Middle Loup at St. Paul (Station 06785000), even though water of lower mineralization from the North Loup River enters the Loup River between the two stations. The effect of this water of better quality may be offset by the seepage of more highly mineralized ground water into the stream between the two stations.

Median concentrations of fecal coliform and fecal streptococcal bacteria are low at all but one of the stations at which they were measured. At Mud Creek near Broken Bow, located downstream from the city sewage outfall, the median fecal coliform bacteria concentration was 2,700 colonies per 100 ml, and the median fecal streptococcal bacteria concentration was 1,500 colonies per 100 ml. Also, mean concentrations of total and dissolved phosphorus are less than 1.0 mg/L for all stations except Mud Creek near Broken Bow.

Regression equations were developed between specific conductance and each of the 12 constituents for all stations except the South Loup River at St. Michael, for which there were an insufficient number of measurements of each constituent. Correlation coefficients generally are above 0.7 for sandhills stations. Many of these coefficients are not significant at the 95 percent confidence level, especially for stations in the sandhills. In water from sandhills streams, natural variations in ion ratios between principal chemical constituents, such as sodium and potassium, tend to reduce correlation between individual constituents and conductance. Correlation coefficients are closer to 1.0 at downstream sites such as the Middle Loup River at St. Paul and the Loup River Power Canal because of the increased contribution of overland runoff to the streamflow.

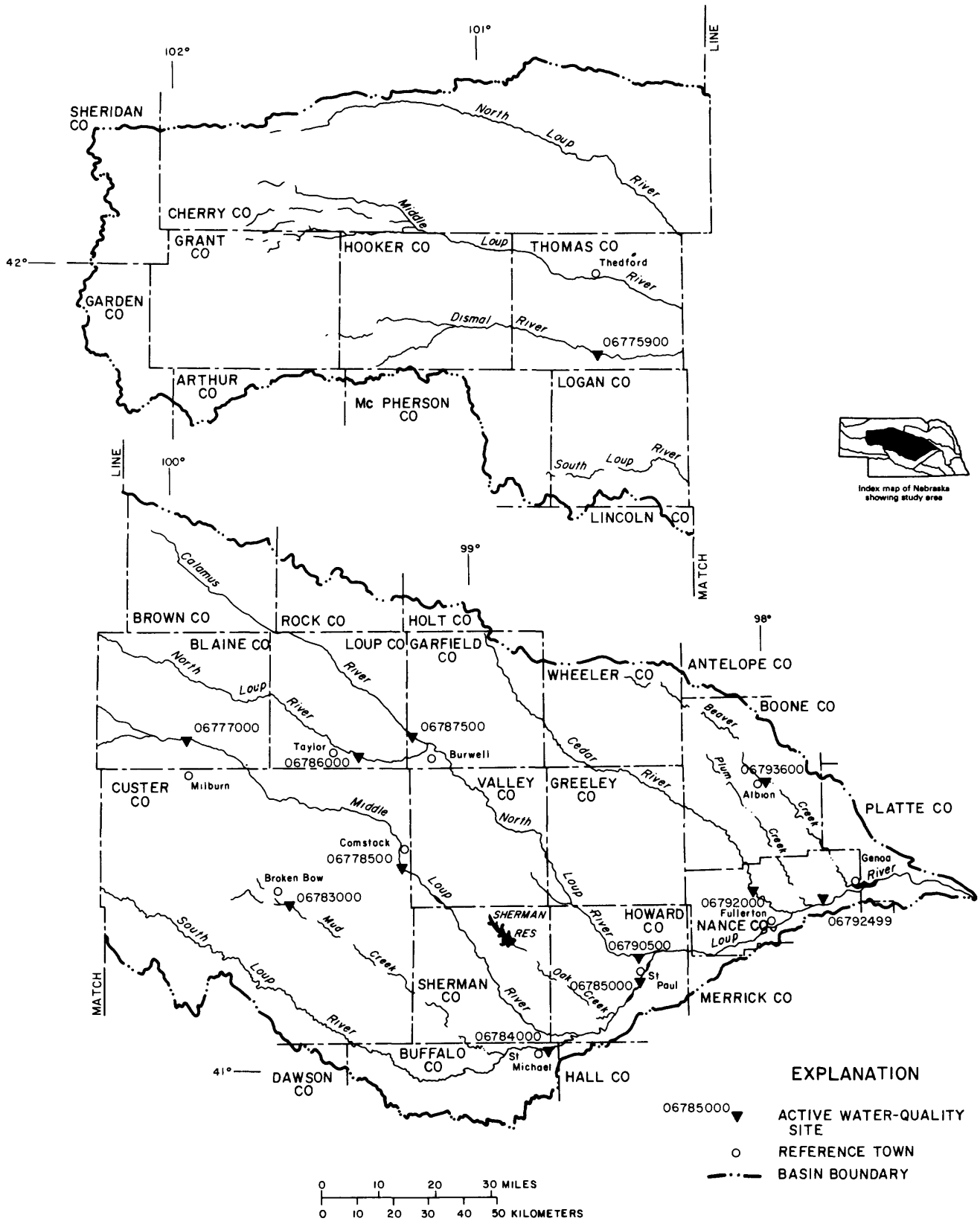

Figure 8. Location of water-quality sampling sites, Loup River basin.

06775900 Dismal River near Thedford, Nebr.

Location.--Lat 41°46'45", long 100°31'30", in NE¼NW¼ sec. 23, T.21 N., R.28 W., Thomas County, Hydrologic Unit 10210002, on right bank 25 ft upstream from bridge on State Highway 83, 2 mi upstream from boundary of Nebraska National Forest (Bessey Division), and 14 mi south of Thedford.

Drainage area.--960 mi^2, approximately, of which about 30 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1967 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	138	218	132	176	177	12	189	160
Dissolved solids, residue	mg/L	72	190	142	157	155	8.1	168	145
Dissolved solids, sum	mg/L	75	172	138	155	154	5.7	164	229
Hardness as $CaCO_3$	mg/L	81	85	64	71	72	4.1	77	67
Calcium, dissolved	mg/L	82	26	20	23	23	1.4	25	22
Magnesium, dissolved	mg/L	81	4.8	1.8	3.5	3.5	0.4	3.9	3.3
Sodium, dissolved	mg/L	77	11	5.9	7.1	7.0	0.7	8.0	6.6
Potassium, dissolved	mg/L	78	9.2	3.2	5.3	5.3	0.7	5.9	4.8
Bicarbonate ion	mg/L	81	118	91	102	100	4.6	101	98
Sulfate, dissolved	mg/L	77	12	1.2	7.0	7.0	1.4	8.4	5.5
Chloride, dissolved	mg/L	82	4.4	0.4	1.2	1.2	0.6	1.8	0.7
Fluoride, dissolved	mg/L	83	0.5	0.2	0.3	0.3	0.06	0.4	0.3
Silica, dissolved	mg/L	77	62	44	56	57	3.0	59	52
Boron, dissolved	mg/L	79	60	0	20	--------	11	----------	
Iron, dissolved	ug/L	68	490	0	60	28	94	122	4
Manganese, dissolved	ug/L	52	297	0	21	10	46	49	0
Nitrite + nitrate as N, dissolved	mg/L	32	0.66	0.18	0.40	0.44	0.12	0.53	0.24
Nitrate as N, dissolved	mg/L	26	0.70	0.00	0.40	0.48	0.21	0.61	0.00
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	20	0.41	0.16	0.23	0.23	0.05	0.28	0.19
Phosphorus, dissolved	mg/L	57	0.38	0.04	0.17	0.17	0.05	0.22	0.14
Fecal coliform	col/100 ml	18	500	23	-------	99	--------	207	33
Fecal streptococci	col/100 ml	22	840	4	-------	120	--------	325	12
Oxygen, dissolved	mg/L	80	12.3	6.2	9.4	9.3	1.4	11.0	7.7
Biochemical oxygen demand (5-day)	mg/L	74	8.4	0.3	1.4	1.0	1.4	2.5	0.6
pH	pH units	138	8.7	6.5	7.8	7.9	0.4	8.3	7.4
Color	Co - Pt units	70	35	0	7	5	6.5	14	2

06775900 Dismal River near Thedford, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	72	RDS = -0.043(SpC) + 164.486	*-0.04	0.21	8.1
Dissolved solids, sum (SDS)	74	SDS = 0.068(SpC) + 142.582	*.10	1.1	5.8
Hardness as $CaCO_3$ (TH)	81	TH = 0.074(SpC) + 58.159	*.16	2.6	4.1
Calcium (Ca)	82	Ca = 0.033(SpC) + 16.911	*.21	4.6	1.4
Magnesium (Mg)	81	Mg = -0.004(SpC) + 4.202	*-.09	0.85	0.4
Sodium (Na)	77	Na = 0.011(SpC) + 5.056	*.14	2.0	0.7
Potassium (K)	78	K = 0.016(SpC) + 2.402	*.20	4.0	0.7
Bicarbonate (HCO_3)	81	HCO_3 = 0.150(SpC) + 74.501	.30	8.9	4.4
Sulfate (SO_4)	77	SO_4 = -0.023(SpC) + 11.161	*-.15	2.2	1.4
Chloride (Cl)	82	Cl - 0.002(SpC) + 0.805	*.04	0.12	0.6
Silica (Si)	77	Si = -0.026(SpC) + 57.266	*-.02	0.07	3.0
Nitrite + Nitrate as N (NO_2-NO_3)	32	NO_2-NO_3= -0.0009(SpC)+0.566	*-.08	0.64	0.12

* Not significant at the 95 percent confidence level; the regression equation should not be used to preduct the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
125	233	176	$SpC = 250\ Q^{-0.06608}$	*-0.06	0.32	0.030	6.9

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06777000 Middle Loup River near Milburn, Nebr.

Location.--Lat 41°49'02", long 99°58'15", in NE¼SW¼ sec. 3, T.21 N., R.23 W., Blaine County, Hydrologic Unit 10210003, at Laughran bridge 9 mi upstream from Rifle Creek and 15 mi northwest of Milburn.

Drainage area.--3,690 mi^2, approximately, of which 135 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1970 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	213	978	130	178	174	56	187	162
Dissolved solids, residue	mg/L	3	160	153	157	--------	3.5	----------	
Dissolved solids, sum	mg/L	15	165	149	155	--------	4.1	160	151
Hardness as $CaCO_3$	mg/L	15	78	66	70	70	3.6	76	66
Calcium, dissolved	mg/L	15	25	21	22	23	1.3	24	21
Magnesium, dissolved	mg/L	15	3.9	3.1	3.4	3.3	0.2	3.7	3.1
Sodium, dissolved	mg/L	15	8.0	6.6	7.1	7.1	0.4	7.6	6.7
Potassium, dissolved	mg/L	15	6.6	5.2	5.7	5.7	0.4	6.0	5.4
Bicarbonate ion	mg/L	15	105	94	100	100	3.4	101	95
Sulfate, dissolved	mg/L	15	9.3	6.0	7.3	7.2	1.0	8.6	6.1
Chloride, dissolved	mg/L	15	2.2	0.0	1.1	1.1	0.5	1.7	0.6
Fluoride, dissolved	mg/L	15	0.5	0.2	0.3	0.4	0.1	0.4	0.3
Silica, dissolved	mg/L	15	60	52	56	57	2.2	59	53
Boron, dissolved	mg/L	15	140	0	33	31	31	41	8
Iron, dissolved	ug/L	3	129	47	79	--------	44	----------	
Manganese, dissolved	ug/L	2	39	0	20	----------			
Nitrite + nitrate as N, dissolved	mg/L	12	0.76	0.31	0.53	0.56	0.17	0.75	0.32
Nitrate as N, dissolved	mg/L	3	0.62	0.50	0.56	--------	0.06	----------	
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	3	0.71	0.19	0.46	--------	0.26	----------	
Phosphorus, total	mg/L	3	0.49	0.20	0.35	--------	0.14	----------	
Phosphorus, dissolved	mg/L	15	0.22	0.15	0.17	0.17	0.02	0.20	0.16
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	207	17.4	2.0	9.4	9.0	2.0	12.1	7.4
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	216	8.8	6.6	7.8	7.8	0.3	8.2	7.4
Color	Co - Pt units	15	40	5	14	10	10	30	0

06777000 Middle Loup River near Milburn, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)	15	SDS = 0.311(SpC) + 100.232	0.67	45	3.1
Hardness as $CaCO_3$ (TH)	15	TH = 0.205(SpC) + 33.538	*.51	26	3.2
Calcium (Ca)	15	Ca = 0.070(SpC) + 10.027	*.48	23	1.2
Magnesium (Mg)	15	Mg = 0.006(SpC) + 2.345	*.22	4.8	0.2
Sodium (Na)	15	Na = 0.027(SpC) + 2.339	.62	39	0.3
Potassium (K)	15	K = 0.024(SpC) + 1.483	.59	34	0.3
Bicarbonate (HCO_3)	15	HCO_3 = 0.268(SpC) + 51.872	.69	48	2.6
Sulfate (SO_4)	15	SO_4 = 0.004(SpC) + 6.613	*.04	0.13	1.0
Chloride (Cl)	15	Cl = -0.002(SpC) + 1.433	*-.03	0.10	0.5
Silica (Si)	15	Si = 0.050(SpC) + 47.566	*.20	3.9	2.3
Nitrite + Nitrate as N (NO_2-NO_3)					

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
213	1,030	331	$SpC = 154\ Q^{0.01796}$	*0.03	0.08	0.032	7.4

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06778500 Middle Loup River near Comstock, Nebr.

Location;--Lat 41°28'49", long 99°12'43", in NE¼NE¼NE¼ sec. 1, T.17 N., R.17 W., Custer County, Hydrologic Unit 10210003, at bridge on Custer-Valley County line 0.3 mi downstream from diversions for canals 3 and 4, 1.3 mi south of Burlington Northern, Inc., crossing, and 5.5 mi southeast of Comstock.

Drainage area.--4,650 mi^2, approximately, of which 430 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1969 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	229	309	172	200	197	--------	223	180
Dissolved solids, residue	mg/L	3	169	161	166	---------	4.4	----------	
Dissolved solids, sum	mg/L	15	205	139	173	170	17	195	157
Hardness as $CaCO_3$	mg/L	15	110	71	89	90	12	100	72
Calcium, dissolved	mg/L	15	37	23	29	29	4.3	35	22
Magnesium, dissolved	mg/L	15	5.7	3.3	4.2	4.2	0.6	5.0	3.5
Sodium, dissolved	mg/L	15	9.6	6.0	7.6	7.6	0.8	8.6	6.6
Potassium, dissolved	mg/L	15	7.6	5.1	6.2	6.3	0.7	7.0	5.4
Bicarbonate ion	mg/L	15	156	95	121	112	16	140	107
Sulfate, dissolved	mg/L	15	11	6.0	7.9	7.6	1.5	10	6.1
Chloride, dissolved	mg/L	15	4.6	1.0	1.8	1.7	0.9	3.0	1.3
Fluoride, dissolved	mg/L	15	0.5	0.2	0.3	0.4	0.1	0.4	0.3
Silica, dissolved	mg/L	15	60	45	55	57	4.4	60	50
Boron, dissolved	mg/L	15	50	0	30	30	12	41	20
Iron, dissolved	ug/L	2	11	10	10	----------			
Manganese, dissolved	ug/L	2	202	0	101	----------			
Nitrite + nitrate as N, dissolved	mg/L	12	0.72	0.00	0.30	0.30	0.26	0.62	0.01
Nitrate as N, dissolved	mg/L	3	0.56	0.38	0.48	---------	0.09	----------	
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	3	0.52	0.35	0.43	----------	0.09	----------	
Phosphorus, total	mg/L	3	0.41	0.24	0.32	----------	0.09	----------	
Phosphorus, dissolved	mg/L	15	0.21	0.09	0.15	0.15	0.03	0.20	0.11
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	224	13.6	7.1	9.7	9.4	1.6	12.0	7.8
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	232	8.9	6.6	7.9	7.9	0.4	8.4	7.4
Color	Co - Pt units	15	50	4	20	20	12	32	5

06778500 Middle Loup River near Comstock, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	----------	----------	----------	----------	----------
Dissolved solids, sum (SDS)	15	SDS = 0.594(SpC) + 48.519	0.95	91	5.4
Hardness as $CaCO_3$ (TH)	15	TH = 0.378(SpC) + 9.992	.89	80	5.4
Calcium (Ca)	15	Ca = 0.137(SpC) + 0.104	.89	79	2.0
Magnesium (Mg)	15	Mg = 0.011(SpC) + 1.915	*.50	26	0.5
Sodium (Na)	15	Na - 0.016(SpC) + 4.124	.53	28	0.8
Potassium (K)	15	K = 0.020(SpC) + 2.026	.84	70	0.4
Bicarbonate (HCO_3)	15	HCO_3 0.576(SpC) + 0.160	.98	95	3.7
Sulfate (SO_4)	15	SO_4 = 0.024(SpC) + 2.990	*.44	20	1.4
Chloride (Cl)	15	Cl = 0.003(SpC) + 1.225	*.09	0.76	1.0
Silica (Si)	15	Si = 0.115(SpC) + 30.561	.72	53	3.1
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
227	1,980	6	$SpC = 252\ Q^{-0.04054}$	-0.50	25	0.039	9.0

06783000 Mud Creek near Broken Bow, Nebr.

Location.--Lat 41°22'30", long 99°35'10", in NW¼SW¼NW¼ sec. 11, T.16 N., R.20 W., Custer County, Hydrologic Unit 10210005, at bridge on State Highway 2, about 3 mi southeast of Broken Bow.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	52	886	205	668	682	143	837	500
Dissolved solids, residue	mg/L	35	539	127	422	443	88	512	320
Dissolved solids, sum	mg/L	17	507	197	420	420	80	500	332
Hardness as $CaCO_3$	mg/L	17	320	98	226	230	51	300	180
Calcium, dissolved	mg/L	17	99	32	71	71	16	95	54
Magnesium, dissolved	mg/L	17	17	4.4	12	12	2.9	15	9.3
Sodium, dissolved	mg/L	17	86	14	47	47	19	76	22
Potassium, dissolved	mg/L	17	31	11	17	17	4.4	20	12
Bicarbonate ion	mg/L	17	396	120	304	310	67	390	240
Sulfate, dissolved	mg/L	17	45	14	31	30	8.3	42	19
Chloride, dissolved	mg/L	51	120	9.8	48	47	21	75	26
Fluoride, dissolved	mg/L	17	0.6	0.1	0.3	0.3	0.1	0.5	0.2
Silica, dissolved	mg/L	17	58	8.9	45	48	11	52	38
Boron, dissolved	mg/L	17	360	60	188	175	77	280	110
Iron, dissolved	ug/L	17	370	0	71	46	87	150	10
Manganese, dissolved	ug/L	17	460	20	178	125	132	430	50
Nitrite + nitrate as N, dissolved	mg/L	25	1.6	0.1	0.6	0.4	0.44	1.4	0.2
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	52	12	0.02	2.5	1.7	2.6	6.6	0.09
Organic N, total	mg/L	52	20	0.00	3.1	2.6	3.2	4.8	0.66
Phosphorus, total	mg/L	52	12	0.31	2.6	2.4	2.0	4.1	0.96
Phosphorus, dissolved	mg/L	45	7.5	0.27	2.1	2.0	1.3	3.4	0.81
Fecal coliform	col/100 ml	41	200,000	33	-------	2,700	---------	25,500	180
Fecal streptococci	col/100 ml	51	120,000	16	-------	1,500	---------	8,300	360
Oxygen, dissolved	mg/L	54	12.2	2.5	7.0	6.9	1.9	9.7	4.4
Biochemical oxygen demand (5-day)	mg/L	48	43.0	2.8	16.8	13.5	11.0	35.0	5.3
pH	pH units	56	8.4	6.5	7.6	7.6	0.4	8.2	7.3
Color	Co - Pt units	17	140	10	42	30	32	90	18

06783000 Mud Creek near Broken Bow, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	34	RDS = 0.565(SpC) + 44.915	0.95	90	28
Dissolved solids, sum (SDS)	17	SDS = 0.553(SpC) + 47.061	.98	96	15
Hardness as $CaCO_3$ (TH)	17	TH = 0.245(SpC) + 61.321	.68	47	38
Calcium (Ca)	17	Ca = 0.077(SpC) + 18.763	.71	50	11
Magnesium (Mg)	17	Mg = 0.014(SpC) + 2.694	.66	44	2.2
Sodium (Na)	17	Na = 0.103(SpC) - 21.813	.78	62	12
Potassium (K)	17	K = -0.008(SpC) + 22.402	*-.27	7.3	4.3
Bicarbonate (HCO_3)	17	HCO_3 = 0.412(SpC) + 26.614	.88	77	33
Sulfate (SO_4)	17	SO_4 = 0.036(SpC) + 6.366	.62	38	6.7
Chloride (Cl)	50	Cl = 0.096(SpC) - 16.119	.66	43	16
Silica (Si)	17	Si = 0.048(SpC) + 12.529	.64	41	8.4
Nitrite + Nitrate as N (NO_2-NO_3)	25	NO_2-NO_3= -0.0007(SpC)+1.054	*-.23	5.3	0.43

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
52	30	0.16	$SpC = 703\ Q^{-0.14579}$	-0.48	23	0.101	23

06784000 South Loup River at St. Michael, Nebr.

Location.--Lat 41°01'53", long 98°44'25", in NE¼NE¼ sec. 11, T.12 N., R.13 W., Buffalo County, Hydrologic Unit 10210004, 15 ft upstream and 65 ft right from right upstream corner of county highway bridge, 0.6 mi northeast of St. Michael, and 3.4 mi upstream from Sweet Creek.

Drainage area.--2,350 mi^2, approximately, of which about 1,610 mi^2 contributes directly to surface runoff.

Period of record.--Water years 1946-53, 1974 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	94	544	206	368	370	52	420	312
Dissolved solids, residue	mg/L	---	---	---	---	---	---	---	---
Dissolved solids, sum	mg/L	7	293	232	258	--------	23	----------	
Hardness as $CaCO_3$	mg/L	7	190	150	167	--------	16	----------	
Calcium, dissolved	mg/L	7	61	47	53	--------	5.2	----------	
Magnesium, dissolved	mg/L	7	9.4	6.6	8.0	--------	1.1	----------	
Sodium, dissolved	mg/L	7	14	9.4	11	--------	1.4	----------	
Potassium, dissolved	mg/L	7	11	6.8	9.5	--------	1.5	----------	
Bicarbonate ion	mg/L	7	253	180	215	--------	24	----------	
Sulfate, dissolved	mg/L	7	21	14	17	--------	2.2	----------	
Chloride, dissolved	mg/L	7	4.8	3.1	4.0	--------	0.6	----------	
Fluoride, dissolved	mg/L	7	0.4	0.2	0.3	--------	0.1	----------	
Silica, dissolved	mg/L	7	56	39	46	--------	6.2	----------	
Boron, dissolved	mg/L	7	70	30	48	--------	15	----------	
Iron, dissolved	ug/L	---	---	---	---	---	---	---	---
Manganese, dissolved	ug/L	---	---	---	---	---	---	---	---
Nitrite + nitrate as N, dissolved	mg/L	7	2.1	0.00	0.67	--------	0.74	----------	
Nitrate as N, dissolved	mg/L	---	---	---	---	---	---	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	---	---	---	---	---	---	---	---
Organic N, total	mg/L	---	---	---	---	---	---	---	---
Phosphorus, total	mg/L	---	---	---	---	---	---	---	---
Phosphorus, dissolved	mg/L	7	0.42	0.12	0.22	--------	0.10	----------	
Fecal coliform	col/100 ml	---	---	---	---	---	---	---	---
Fecal streptococci	col/100 ml	---	---	---	---	---	---	---	---
Oxygen, dissolved	mg/L	95	14.4	5.4	10.1	10.0	1.8	12.5	7.8
Biochemical oxygen demand (5-day)	mg/L	---	---	---	---	---	---	---	---
pH	pH units	95	8.7	6.6	7.9	8.0	0.4	8.5	7.3
Color	Co - Pt units	7	60	5	24	--------	17	----------	

06784000 South Loup River at St. Michael, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	----------	----------	----------	----------	----------
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	----------	----------	----------	----------	----------
Calcium (Ca)	----------	----------	----------	----------	----------
Magnesium (Mg)	----------	----------	----------	----------	----------
Sodium (Na)	----------	----------	----------	----------	----------
Potassium (K)	----------	----------	----------	----------	----------
Bicarbonate (HCO_3)	----------	----------	----------	----------	----------
Sulfate (SO_4)	----------	----------	----------	----------	----------
Chloride (Cl)	----------	----------	----------	----------	----------
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
90	1,880	23	$SpC = 452\ Q^{-0.04485}$	*-0.18	3.4	0.065	15

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06785000 Middle Loup River at St. Paul, Nebr.

Location.--Lat 41°11'55", long 98°26'50", in NE¼SW¼NE¼ sec. 10, T.14 N., R.10 W., Howard County, Hydrologic Unit 10210003, on left bank at St. Paul, 450 ft upstream from bridge on U.S. Highway 281 and 6 mi upstream from confluence with North Loup River.

Drainage area.--8,090 mi^2, approximately, of which about 3,130 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1969 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	255	470	157	299	298	46	348	243
Dissolved solids, residue	mg/L	12	230	129	178	170	32	220	142
Dissolved solids, sum	mg/L	23	261	119	193	200	43	240	130
Hardness as $CaCO_3$	mg/L	26	170	63	121	130	30	160	99
Calcium, dissolved	mg/L	26	51	22	38	41	8.8	48	23
Magnesium, dissolved	mg/L	26	9.4	2.0	5.9	6.2	2.0	8.0	2.8
Sodium, dissolved	mg/L	17	13	6.8	10	10	1.7	13	8.5
Potassium, dissolved	mg/L	15	11	5.6	8.5	8.8	1.4	10	7.0
Bicarbonate ion	mg/L	25	212	92	157	155	36	200	100
Sulfate, dissolved	mg/L	26	17	3.2	11	12	4.5	16	4.7
Chloride, dissolved	mg/L	26	9.1	0.5	2.6	2.4	1.8	4.2	1.0
Fluoride, dissolved	mg/L	24	0.6	0.1	0.3	0.3	0.1	0.5	0.2
Silica, dissolved	mg/L	24	62	28	43	46	9.9	58	31
Boron, dissolved	mg/L	21	120	10	44	41	25	72	20
Iron, dissolved	ug/L	13	120	0	46	41	38	85	0
Manganese, dissolved	ug/L	4	167	0	57	----------			
Nitrite + nitrate as N, dissolved	mg/L	14	1.3	0.00	0.53	0.50	0.40	1.1	0.08
Nitrate as N, dissolved	mg/L	3	0.60	0.00	0.26	----------			
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	3	1.1	0.36	0.65	----------			
Phosphorus, total	mg/L	3	0.43	0.26	0.33	----------			
Phosphorus, dissolved	mg/L	15	0.32	0.09	0.19	0.20	0.06	0.26	0.10
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	235	17.5	6.7	9.8	9.6	1.8	12.6	7.7
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	256	8.8	6.4	8.0	8.1	0.4	8.5	7.4
Color	Co - Pt units	14	150	5	32	21	36	47	8

06785000 Middle Loup River at St. Paul, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	----------	----------	----------	----------	----------
Dissolved solids, sum (SDS)	23	SDS = 0.717(SpC) + 2.654	0.97	94	11
Hardness as $CaCO_3$ (TH)	26	TH = 0.430(SpC) + 1.375	.94	88	10
Calcium (Ca)	26	Ca - 0.124(SpC) + 3.948	.93	87	3.2
Magnesium (Mg)	26	Mg = 0.027(SpC) - 1.601	.90	81	0.9
Sodium (Na)	17	Na - 0.030(SpC) + 0.918	.89	80	0.8
Potassium (K)	15	K = 0.011(SpC) + 5.070	*.38	15	1.4
Bicarbonate (HCO_3)	25	HCO_3 = 0.556(SpC) + 5.004	.96	92	10
Sulfate (SO_4)	26	SO_4 = 0.054(SpC) - 4.039	.81	66	2.7
Chloride (Cl)	26	Cl = 0.019(SpC) - 2.562	.69	48	1.3
Silica (Si)	24	Si - 0.114(SpC) + 12.394	.75	56	6.7
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
250	7,940	111	$SpC = 703\ Q^{-0.13372}$	-0.67	44	0.053	12

06786000 North Loup River at Taylor, Nebr.

Location.--Lat 41°46'37", long 99°22'45", in NE¼SE¼ sec. 22, T.21 N., R.18 W., Loup County, Hydrologic Unit 10210006 on left bank 64 ft downstream from bridge on U.S. Highway 183 and 0.4 mi north of Taylor.

Drainage area.--2,280 mi^2, approximately, of which about 180 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1974 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	39	197	141	165	164	12	182	147
Dissolved solids, residue	mg/L	---	---	---	---	---	---	---	---
Dissolved solids, sum	mg/L	39	169	128	148	144	8.0	160	139
Hardness as $CaCO_3$	mg/L	37	83	56	68	67	6.2	78	59
Calcium, dissolved	mg/L	37	28	18	22	22	2.2	26	19
Magnesium, dissolved	mg/L	38	3.7	2.7	3.1	3.2	0.3	3.6	2.8
Sodium, dissolved	mg/L	38	13	5.5	6.6	6.4	1.2	7.2	5.8
Potassium, dissolved	mg/L	38	7.7	4.9	6.0	6.0	0.6	6.8	5.2
Bicarbonate ion	mg/L	38	118	81	96	97	7.9	101	86
Sulfate, dissolved	mg/L	38	12	2.9	5.5	5.0	1.8	6.5	3.8
Chloride, dissolved	mg/L	38	2.7	0.1	1.2	1.0	0.6	2.0	0.6
Fluoride, dissolved	mg/L	40	0.6	0.2	0.4	0.4	0.1	0.5	0.3
Silica, dissolved	mg/L	38	60	45	54	56	3.6	59	50
Boron, dissolved	mg/L	38	80	4	29	29	13	50	20
Iron, dissolved	ug/L	37	310	10	41	30	49	60	0
Manganese, dissolved	ug/L	38	1.1	0.00	0.42	0.42	0.30	0.79	0.02
Nitrite + nitrate as N, dissolved	mg/L	---	---	---	---	---	---	---	---
Nitrate as N, dissolved	mg/L	---	---	---	---	---	---	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	---	---	---	---	---	---	---	---
Organic N, total	mg/L	---	---	---	---	---	---	---	---
Phosphorus, total	mg/L	---	---	---	---	---	---	---	---
Phosphorus, dissolved	mg/L	40	0.24	0.05	0.13	0.14	0.04	0.18	0.08
Fecal coliform	col/100 ml	---	---	---	---	---	---	---	---
Fecal streptococci	col/100 ml	---	---	---	---	---	---	---	---
Oxygen, dissolved	mg/L	1	---	---	10.5	---	---	---	---
Biochemical oxygen demand (5-day)	mg/L	---	---	---	---	---	---	---	---
pH	pH units	40	8.5	6.4	7.6	7.7	0.4	8.1	7.3
Color	Co - Pt units	40	55	1	12	8	12	30	3

06786000 North Loup River at Taylor, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	----------	----------	----------	----------	----------
Dissolved solids, sum (SDS)	36	SDS = 0.438(SpC) + 76.102	0.63	40	6.6
Hardness as $CaCO_3$ (TH)	36	TH = 0.364(SpC) + 6.987	.71	50	4.5
Calcium (Ca)	36	Ca = 0.124(SpC) + 1.220	.70	48	1.6
Magnesium (Mg)	37	Mg = 0.013(SpC) + 0.956	.53	28	0.3
Sodium (Na)	37	Na = -0.002(SpC) + 6.923	*-.02	0.03	1.2
Potassium (K)	37	K = 0.023(SpC) + 2.165	.46	22	0.5
Bicarbonate (HCO_3)	37	HCO_3 = 0.540(SpC) + 6.635	.81	66	4.7
Sulfate (SO_4)	37	SO_4 = 0.017(SpC) + 2.757	*.11	1.2	1.8
Chloride (Cl)	37	Cl = -0.001(SpC) + 1.378	*-.03	.07	0.6
Silica (Si)	37	Si = 0.122(SpC) + 34.244	.41	17	3.3
Nitrite + Nitrate as N (NO_2-NO_3)	37	NO_2-NO_3= -0.017(SpC)+ 3.228	-.66	44	0.23

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
39	785	98	$SpC = 298\ Q^{-0.09939}$	-0.66	44	0.024	5.5

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06787500 Calamus River near Burwell, Nebr.

Location.--Lat 41°48'35", long 99°10'56", in NW¼NW¼ sec. 9, T.21 N., R.16 W., Garfield County, Hydrologic Unit 10210008, on left bank 130 ft downstream from highway bridge, 1.5 mi upstream from mouth, and 3 mi northwest of Burwell.

Drainage area.--1,060 mi^2, approximately, of which about 110 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1972 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	66	165	128	141	142	6.6	150	130
Dissolved solids, residue	mg/L	----------							
Dissolved solids, sum	mg/L	55	155	112	127	125	6.9	137	120
Hardness as $CaCO_3$	mg/L	54	68	49	56	56	3.3	60	52
Calcium, dissolved	mg/L	54	22	16	18	18	1.1	20	17
Magnesium, dissolved	mg/L	54	3.3	1.3	2.6	2.7	0.3	2.9	2.4
Sodium, dissolved	mg/L	54	9.5	4.7	5,9	5.9	0.6	6.3	5.4
Potassium, dissolved	mg/L	54	5.8	3.9	4.8	4.8	0.4	5.6	4.4
Bicarbonate ion	mg/L	54	93	69	81	82	0.4	87	77
Sulfate, dissolved	mg/L	54	11	0.8	4.6	4.5	1.5	6.2	3.2
Chloride, dissolved	mg/L	54	2.6	0.0	1.1	1.0	0.5	1.9	0.6
Fluoride, dissolved	mg/L	55	0.9	0.0	0.3	0.3	0.01	0.4	0.2
Silica, dissolved	mg/L	54	62	37	48	48	0.2	52	44
Boron, dissolved	mg/L	54	90	0	24	21	16	38	9.9
Iron, dissolved	ug/L	9	110	20	54	--------	33	----------	
Manganese, dissolved	ug/L	8	60	0	15	--------	20	----------	
Nitrite + nitrate as N, dissolved	mg/L	50	0.94	0.00	0.40	0.37	0.19	0.70	0.20
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	5	0.02	0.01	0.01	--------	0.004	----------	
Organic N, total	mg/L	5	1.3	0.40	0.71	--------	0.4	----------	
Phosphorus, total	mg/L	5	0.23	0.14	0.18	--------	0.03	----------	
Phosphorus, dissolved	mg/L	55	0.29	0.11	0.16	0.16	0.03	0.19	0.13
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	72	13.9	6.2	10.1	10.0	1.7	12.4	8.1
Biochemical oxygen demand (5-day)	mg/L	5	6.3	1.2	3.0	--------	2.3	----------	
pH	pH units	93	8.3	6.5	7.6	7.7	0.3	8.0	7.3
Color	Co - Pt units	55	40	2	13	9.8	9.7	29	5

06787500 Calamus River near Burwell, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)	54	SDS = 0.568(SpC) + 46.981	0.47	22	6.2
Hardness as $CaCO_3$ (TH)	54	TH = 0.298(SpC) + 13.462	.51	26	2.9
Calcium (Ca)	54	Ca = 0.103(SpC) + 3.366	.50	25	1.0
Magnesium (Mg)	54	Mg = 0.012(SpC) + 0.874	*.25	6.4	0.3
Sodium (Na)	54	Na = 0.047(SpC) - 0.785	.42	17	0.6
Potassium (K)	54	K = 0.024(SpC) - 1.499	.32	10	0.4
Bicarbonate (HCO_3)	54	HCO_3 0.395(SpC) + 25.560	.54	29	3.6
Sulfate (SO_4)	54	SO_4 = 0.063(SpC) - 4.300	*.24	5.7	1.5
Chloride (Cl)	54	Cl - 0.018(SpC) - 1.402	*.19	3.6	0.5
Silica (Si)	54	Si = 0.062(SpC) + 39.221	*.08	0.74	4.1
Nitrite + Nitrate as N (NO_2-NO_3)	50	NO_2-NO_3= -0.002(SpC) + 0.622	*-.04	0.21	0.19

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
66	451	182	SpC = 193 $Q^{-0.05523}$	*-0.19	3.6	0.020	4.6

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06790500 North Loup River near St. Paul, Nebr.

Location.--Lat 41°15'35", long 98°26'50", in NW¼NW¼NE¼ sec. 22, T.15 N., R.10 W., Howard County, Hydrologic Unit 10210007, on right bank 310 ft downstream from bridge on U.S. Highway 281, 3 mi north of St. Paul, and 4 mi upstream from confluence with Middle Loup River.

Drainage area.--4,290 mi^2, approximately, of which about 1,240 mi^2 contributes directly to surface runoff.

Period of record.--Water years 1946-53, 1974 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	40	269	171	223	220	23	260	192
Dissolved solids, residue	mg/L	----------							
Dissolved solids, sum	mg/L	40	211	139	177	175	14	197	160
Hardness as $CaCO_3$	mg/L	39	120	70	96	94	11	120	86
Calcium, dissolved	mg/L	39	40	22	30	30	3.6	37	28
Magnesium, dissolved	mg/L	39	6.8	3.7	5.0	4.8	0.7	6.0	4.1
Sodium, dissolved	mg/L	39	11	5.8	8.0	7.9	0.9	9.2	7.2
Potassium, dissolved	mg/L	39	9.7	5.2	6.9	6.8	1.0	8.6	5.6
Bicarbonate ion	mg/L	39	163	98	131	123	14	154	119
Sulfate, dissolved	mg/L	39	12	3.8	7.8	7.2	1.8	11	6.5
Chloride, dissolved	mg/L	39	4.8	1.1	1.9	1.7	0.7	2.6	1.1
Fluoride, dissolved	mg/L	40	0.5	0.2	0.3	0.4	0.05	0.4	0.3
Silica, dissolved	mg/L	39	64	36	50	51	5.2	56	44
Boron, dissolved	mg/L	39	80	0	32	31	17	62	15
Iron, dissolved	ug/L	39	110	10	40	40	25	87	10
Manganese, dissolved	ug/L	39	40	0	7	5	9	20	0
Nitrite + nitrate as N, dissolved	mg/L	39	1.2	0.00	0.46	0.48	0.34	0.88	0.01
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	40	0.58	0.03	0.15	0.14	0.10	0.21	0.06
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	41	8.3	6.9	7.7	7.7	0.4	8.2	7.2
Color	Co - Pt units	40	85	1	15	8	18	26	4

06790500 North Loup River near St. Paul, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)	42	SDS = 0.519(SpC) + 61.268	0.88	78	6.5
Hardness as $CaCO_3$ (TH)	42	TH = 0.405(SpC) + 5.912	.87	76	5.5
Calcium (Ca)	42	Ca = 0.127(SpC) + 1.963	.85	72	1.9
Magnesium (Mg)	42	Mg = 0.022(SpC) + 0.118	.72	52	0.5
Sodium (Na)	42	Na = 0.030(SpC) + 1.347	.81	66	0.5
Potassium (K)	42	K = 0.031(SpC) + 0.074	.68	46	0.8
Bicarbonate (HCO_3)	42	HCO_3 = 0.532(SpC) + 11.893	.91	83	5.8
Sulfate (SO_4)	42	SO_4 = 0.044(SpC) - 2.048	.59	35	1.4
Chloride (Cl)	42	Cl = 0.014(SpC) - 1.127	.45	20	0.6
Silica (Si)	42	Si = 0.020(SpC) + 45.913	*.09	0.82	5.2
Nitrite + Nitrate as N (NO_2-NO_3)	42	NO_2-NO_3= -0.007(SpC)+ 2.001	-.46	21	0.31

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
41	1,820	274	$SpC = 391\ Q^{-0.08551}$	-0.36	13	0.041	9.4

06792000 Cedar River near Fullerton, Nebr.

Location.--Lat 41°23'45", long 98°00'15", in NE¼NE¼ sec. 4, T.16 N., R.6 W., Nance County, Hydrologic Unit 10210010, near left bank on downstream side of pier of highway bridge, 3 mi northwest of Fullerton and 7.2 mi (revised) upstream from mouth.

Drainage area.--1,220 mi^2, approximately, of which about 480 mi^2 contributes directly to surface runoff.

Period of record.--Water years 1958-59, 1974 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	45	344	194	276	276	31	312	240
Dissolved solids, residue	mg/L	6	301	136	199	--------	56	----------	
Dissolved solids, sum	mg/L	39	249	128	192	191	20	216	170
Hardness as $CaCO_3$	mg/L	41	170	81	124	127	15	145	111
Calcium, dissolved	mg/L	38	50	26	39	39	4.7	45	34
Magnesium, dissolved	mg/L	38	11	3.9	6.5	6.6	1.1	7.4	5.3
Sodium, dissolved	mg/L	41	26	3.8	8.5	8.1	3.0	9.4	6.9
Potassium, dissolved	mg/L	38	10	5.2	7.2	7.2	0.9	8.1	6.4
Bicarbonate ion	mg/L	42	213	110	164	164	17	185	143
Sulfate, dissolved	mg/L	38	13	4.0	8.4	8.7	1.8	10	6.4
Chloride, dissolved	mg/L	39	25	0.1	2.4	1.7	3.8	3.0	1.2
Fluoride, dissolved	mg/L	41	0.4	0.2	0.3	0.3	0.06	0.3	0.2
Silica, dissolved	mg/L	38	53	17	38	38	6.4	46	32
Boron, dissolved	mg/L	39	70	2	35	30	13	52	25
Iron, dissolved	ug/L	39	1,100	0	70	40	172	87	0
Manganese, dissolved	ug/L	37	40	0	12	10	11	30	0
Nitrite + nitrate as N, dissolved	mg/L	37	0.69	0.00	0.22	0.17	0.21	0.53	0.01
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	40	0.53	0.12	0.21	0.21	0.07	0.29	0.15
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	2	9.3	8.3	8.8	----------			
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	44	8.9	6.5	7.6	7.6	0.5	8.3	7.0
Color	Co - Pt units	42	140	2	18	12	23	39	5

06792000 Cedar River near Fullerton, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)	36	SDS = 0.567(SpC) + 34.792	0.76	58	12
Hardness as $CaCO_3$ (TH)	41	TH = 0.470(SpC) - 6.938	.86	74	7.9
Calcium (Ca)	38	Ca = 0.140(SpC) - 0.365	.83	70	2.6
Magnesium (Mg)	38	Mg = 0.032(SpC) - 2.537	.81	66	.6
Sodium (Na)	41	Na = 0.020(SpC) + 2.790	*.19	3.6	3.0
Potassium (K)	38	K = -0.004(SpC) + 8.347	*-.13	1.6	.9
Bicarbonate (HCO_3)	42	HCO_3=0.572(SpC) + 5.433	.94	87	6.3
Sulfate (SO_4)	38	SO_4 = 0.013(SpC) + 4.704	*.20	4.1	1.8
Chloride (Cl)	39	Cl = 0.003(SpC) + 1.517	*.02	.06	3.8
Silica (Si)	38	Si = 0.136(SpC) - 0.408	.59	35	5.2
Nitrite + Nitrate as N (NO_2-NO_3)	37	NO_2-NO_3= 0.006(SpC) + 0.064	*.07	.47	.21

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
44	3,300	47	$SpC = 466\ Q^{-0.10168}$	-0.54	29	0.044	10

06792499 Loup River Power Canal at Diversion near Genoa, Nebr.

Location.--Lat 41°23'31", long 97°49'20", in NE¼NW¼ sec. 6, T.16 N., R.4 W., Nance County, Hydrologic Unit 10210009, at diversion structure, 2 mi upstream from gaging station, and 5.5 mi southwest of Genoa.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	59	346	240	278	273	22	312	251
Dissolved solids, residue	mg/L	32	247	149	201	199	18	220	181
Dissolved solids, sum	mg/L	57	246	155	200	198	17	220	175
Hardness as $CaCO_3$	mg/L	56	160	85	117	121	12	138	101
Calcium, dissolved	mg/L	55	49	28	37	37	3.9	42	33
Magnesium, dissolved	mg/L	55	8.7	3.5	6.0	6.1	0.9	7.0	5.0
Sodium, dissolved	mg/L	55	12	7.4	9.5	9.4	1.0	11	8.2
Potassium, dissolved	mg/L	55	9.8	1.0	7.7	7.8	1.3	9.3	6.6
Bicarbonate ion	mg/L	55	201	130	159	157	15	180	140
Sulfate, dissolved	mg/L	55	16	6.3	11	11	2.2	14	7.9
Chloride, dissolved	mg/L	55	4.8	1.4	2.6	2.5	0.8	3.9	1.6
Fluoride, dissolved	mg/L	57	1.3	0.1	0.4	0.3	0.1	0.4	0.3
Silica, dissolved	mg/L	56	66	20	46	48	8.2	55	37
Boron, dissolved	mg/L	24	730	20	73	50	141	70	25
Iron, dissolved	ug/L	36	160	0	48	39	31	90	20
Manganese, dissolved	ug/L	36	120	0	18	10	23	42	0
Nitrite + nitrate as N, dissolved	mg/L	23	1.1	0.00	0.43	0.50	0.38	0.89	0.00
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	2	0.04	0.02	0.03	----------			
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	34	0.89	0.18	0.31	0.28	0.14	0.44	0.18
Phosphorus, dissolved	mg/L	26	0.34	0.05	0.18	0.18	0.07	0.28	0.10
Fecal coliform	col/100 ml	22	15,300	3	--------	55	---------	1,700	13
Fecal streptococci	col/100 ml	31	10,000	12	--------	133	---------	935	31
Oxygen, dissolved	mg/L	4	10.6	8.0	9.5	--------	1.1	----------	
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	59	8.6	6.7	7.8	7.9	0.4	8.4	7.4
Color	Co - Pt units	24	100	5	25	20	24	58	8

06792499 Loup River Power Canal at Diversion near Genoa, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	32	RDS = 0.647(SpC) + 23.048	0.80	64	11
Dissolved solids, sum (SDS)	56	SDS = 0.553(SpC) + 45.652	.71	51	12
Hardness as $CaCO_3$ (TH)	56	TH = 0.482(SpC) - 16.972	.84	71	6.8
Calcium (Ca)	55	Ca = 0.150(SpC) - 4.750	.86	73	2.0
Magnesium (Mg)	55	Mg = 0.022 (SpC) - 0.266	.57	33	0.7
Sodium (Na)	55	Na = 0.027(SpC) + 1.920	.58	33	0.8
Potassium (K)	55	K = 0.008(SpC) + 5.310	*.14	2.0	1.3
Bicarbonate (HCO_3)	55	HO_3 = 0.575(SpC) - 1.406	.84	71	8.2
Sulfate (SO_4)	55	SO_4 = 0.047(SpC) - 2.168	.47	22	2.0
Chloride (Cl)	55	Cl - 0.012(SpC) - 0.771	.33	11	0.8
Silica (Si)	56	Si = 0.0005(SpC) + 45.940	*0.00	0.00	8.3
Nitrite + Nitrate as N (NO_2-NO_3)	23	NO_2-NO_3= -0.002(SpC)+0.985	*-.11	1.3	0.38

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
59	3,700	69	$SpC = 340\ Q^{-0.02830}$	-0.27	7.1	0.033	7.6

06793600 Beaver Creek near Albion, Nebr.

Location.--Lat 41°41'00", long 97°58'25", in NW¼NW¼NE¼ sec. 26, T.20 N., R.6 W., Boone County, Hydrologic Unit 10210009, at bridge on county road 0.8 mi east and 0.6 mi southeast of junction of highways 14, 39, and 91 at east edge of Albion.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	54	388	215	252	249	27	280	225
Dissolved solids, residue	mg/L	33	275	115	182	179	25	210	160
Dissolved solids, sum	mg/L	19	196	155	179	180	12	195	156
Hardness as $CaCO_3$	mg/L	18	130	94	113	118	8.6	127	98
Calcium, dissolved	mg/L	18	40	30	36	36	3.2	40	32
Magnesium, dissolved	mg/L	18	6.5	4.3	5.6	5.8	0.6	6.4	4.5
Sodium, dissolved	mg/L	18	10	6.9	8.3	8.6	1.0	9.3	7.1
Potassium, dissolved	mg/L	17	11	6.3	7.5	7.1	1.2	9.7	6.4
Bicarbonate ion	mg/L	18	174	123	149	150	14	170	129
Sulfate, dissolved	mg/L	18	29	4.3	8.6	6.9	5.7	14	4.7
Chloride, dissolved	mg/L	51	20	1.5	2.9	2.6	2.6	3.6	1.8
Fluoride, dissolved	mg/L	19	0.4	0.1	0.3	0.3	0.06	0.3	0.2
Silica, dissolved	mg/L	18	49	30	37	36	5.4	47	32
Boron, dissolved	mg/L	18	80	6	34	30	18	52	10
Iron, dissolved	ug/L	18	1,000	20	129	67	225	230	20
Manganese, dissolved	ug/L	18	120	0	28	19	33	100	10
Nitrite + nitrate as N, dissolved	mg/L	27	1.2	0.07	0.37	0.36	0.23	0.58	0.10
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	54	1.1	0.00	0.22	0.19	0.19	0.40	0.00
Organic N, total	mg/L	54	3.8	0.15	0.86	0.77	0.56	1.3	0.31
Phosphorus, total	mg/L	54	1.6	0.28	0.55	0.52	0.22	0.80	0.36
Phosphorus, dissolved	mg/L	46	1.4	0.03	0.41	0.35	0.20	0.57	0.28
Fecal coliform	col/100 ml	42	71,300	3	--------	530	---------	4,800	11
Fecal streptococci	col/100 ml	52	42,000	23	--------	430	---------	4,000	72
Oxygen, dissolved	mg/L	55	14.0	7.1	9.8	9.6	1.6	12.0	7.7
Biochemical oxygen demand (5-day)	mg/L	52	9.4	1.1	3.7	2.8	2.1	7.0	1.7
pH	pH units	59	8.5	6.8	7.6	7.7	0.3	8.0	7.2
Color	Co - Pt units	19	70	8	24	20	16	50	10

06793600 Beaver Creek near Albion, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	33	RDS = 0.696(SpC) + 7.473	0.83	70	14
Dissolved solids, sum (SDS)	18	SDS = 0.486(SpC) + 55.201	.77	59	8.0
Hardness as $CaCO_3$ (TH)	18	TH = 0.333(SpC) + 27.709	.74	55	5.9
Calcium (Ca)	18	Ca = 0.102(SpC) + 9.480	.62	38	2.6
Magnesium (Mg)	18	Mg = 0.028(SpC) - 1.641	.83	69	.4
Sodium (Na)	18	Na = 0.026(SpC) + 1.672	.48	23	.9
Potassium (K)	17	K = 0.014(SpC) + 3.813	*.23	5.4	1.2
Bicarbonate (HCO_3)	18	HCO_3 = 0.640(SpC) - 14.684	.86	74	7.5
Sulfate (SO_4)	18	SO_4 = 0.001(SpC) + 8.298	*.003	0.00	5.9
Chloride (Cl)	51	Cl = 0.073(SpC) - 15.448	.76	58	1.7
Silica (Si)	18	Si = -0.011(SpC) + 39.628	*-.04	0.14	5.6
Nitrite + Nitrate as N (NO_2-NO_3)	27	NO_2-NO_3=0.005(SpC) - 0.889	.64	42	0.18

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
52	155	7.50	$SpC = 338\ Q^{-0.07601}$	-0.40	16	0.040	9.2

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Elkhorn River Basin

The Elkhorn River basin is located in northeastern Nebraska. All streamflow in the basin originates within Nebraska. The basin ends at the confluence of the Elkhorn River and the Platte River west of Omaha. The western part of the basin, comprising about one-third of the total area, is sandhills. The rest of the basin generally lies within the glaciated part of Nebraska, which is characterized by deposits of glacial drift overlain by loess. In places, the drift is more than 200 ft thick. Topography of the area is rolling.

Irrigation is not extensive in the basin although development of pump irrigation is accelerating in the sandhills. By 1971, about 150,000 acres out of a total of about 4.5 million acres in the basin were under irrigation (NSWCC, 1971). Only small amounts of land are irrigated by surface water, and this land is irrigated by direct pumpage from the streams rather than by diversion.

Descriptive statistics were determined on data from seven sites in the Elkhorn River basin (fig. 9). Of these, two are on Logan Creek, the principal tributary of the Elkhorn River in the eastern part of the basin, and five are on the Elkhorn River and its branches. Mean specific conductance for the Elkhorn River at Ewing is 220 umho/cm and for the South Fork Elkhorn River at Ewing is 194 umho/cm. Most of the flow at Ewing is derived from ground water. From Ewing to Norfolk, mean specific conductance increases by 46 percent to 322 umho/cm. The increase is due to higher concentrations of calcium and bicarbonate carried by streams draining the area to the south.

Mean specific conductance for 154 measurements on the Elkhorn River at Waterloo, the downstream most station in the basin, is 496 umho/cm. This is an increase of 54 percent from Norfolk and is caused by the addition of more highly mineralized water from Logan Creek and other tributaries within the reach between Norfolk and Waterloo.

Mean specific conductance for 127 measurements of Logan Creek at Pender is 716 umho/cm. Logan Creek drains an area of loess and glacial drift. Ground water derived from this area is considerably more highly mineralized than that from the sandhills area. Glacial drift deposits and the loess and soil overlying them are rich in soluble chemical constituents including calcium and carbonate. This material is dissolved by percolating water that eventually discharges into the streams and causes the streams to be more highly mineralized.

Calcium is the principal cation and bicarbonate is the principal anion at all stations.

Fecal coliform and fecal streptococcal bacteria concentrations were measured only on Logan Creek at Pender and on Elkhorn River at Waterloo. Medians for the Pender station were 280 colonies per 100 ml for fecal coliform bacteria and 332 colonies per 100 ml for fecal streptococci. Medians for the Waterloo station were 9,600 and 3,130 colonies per 100 ml for fecal coliform and fecal streptococcal bacteria, respectively. This station is only a few miles downstream from the outfall of the Fremont sewage-treatment plant. Mean BOD was 8.8 mg/L at the Waterloo station, and the mean chloride was 13 mg/L, the highest for any of the sites in the basin.

Regression equations were developed between specific conductance and each of the constituents having significant numbers of measurements. Correlation coefficients exceed 0.8 for nearly every regression between conductance and dissolved solids, hardness, calcium, magnesium, sodium, and bicarbonate for all stations.

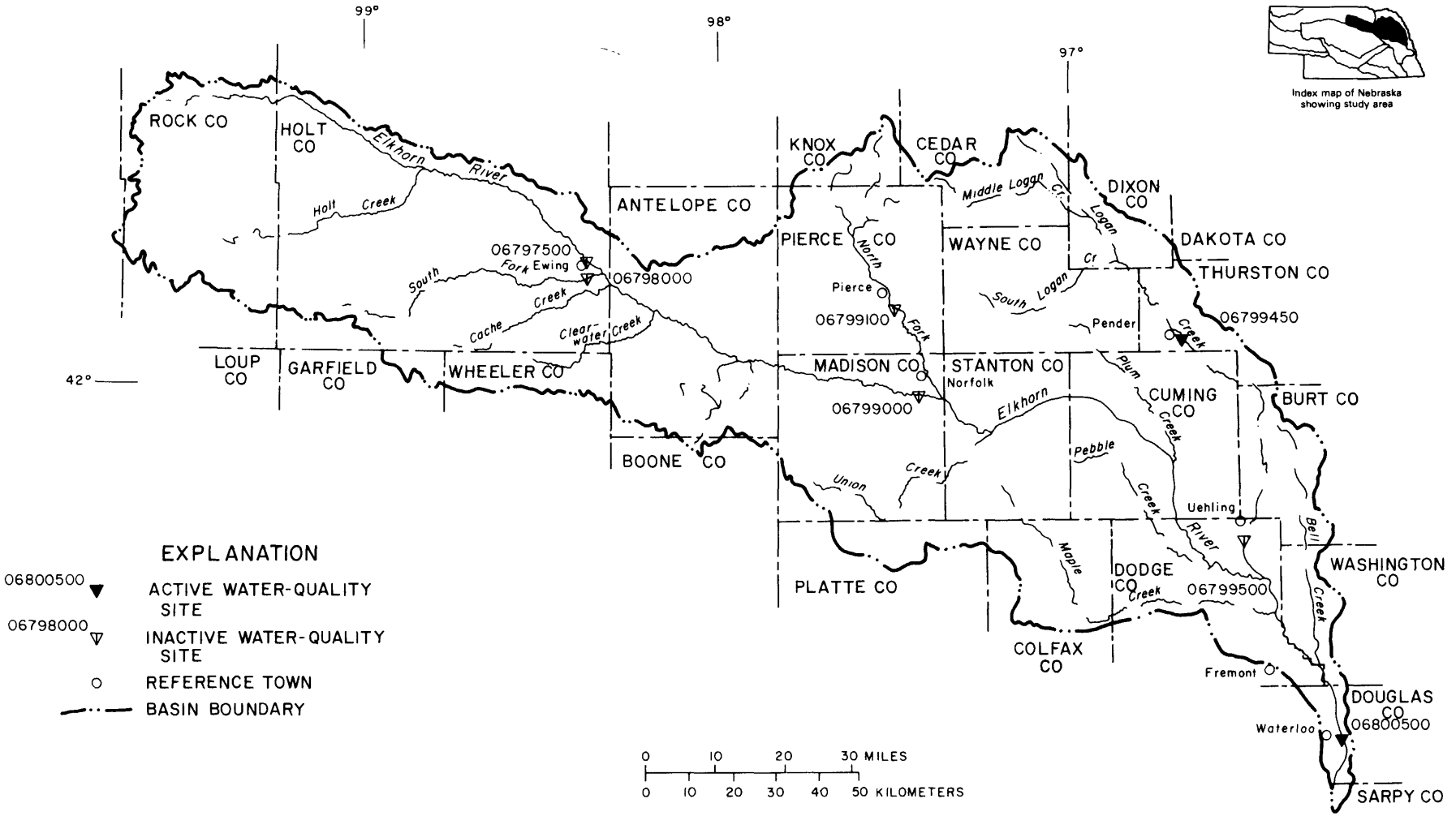

Figure 9. Location of water-quality sampling sites, Elkhorn River basin.

06797500 Elkhorn River at Ewing, Nebr.

Location (revised).--Lat 42°16'03", long 98°20'11", at gaging station at bridge on State Highway 420, 0.8 mi north of Ewing, Holt County, and 1.5 mi upstream from South Fork Elkhorn River.

Drainage area.--1,400 mi^2, approximately, of which about 740 mi^2 contributes directly to surface runoff.

Period of record.--September 1960 to September 1966.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	119	319	157	220	217	24	244	200
Dissolved solids, residue	mg/L	81	260	132	170	167	21	195	151
Dissolved solids, sum	mg/L	1	----------		159	----------			
Hardness as $CaCO_3$	mg/L	79	133	56	87	84	12	100	77
Calcium, dissolved	mg/L	79	42	19	29	29	3.7	34	26
Magnesium, dissolved	mg/L	79	6.8	1.1	3.5	3.4	1.0	4.8	2.2
Sodium, dissolved	mg/L	79	17	7.5	9.9	9.4	1.9	13	8.2
Potassium, dissolved	mg/L	79	7.7	3.1	5.8	5.8	0.8	7.0	4.8
Bicarbonate ion	mg/L	79	194	86	127	124	18	147	111
Sulfate, dissolved	mg/L	79	12	3.0	6.7	6.3	1.6	8.7	5.0
Chloride, dissolved	mg/L	79	3.8	0.0	1.7	1.9	1.1	2.9	0.0
Fluoride, dissolved	mg/L	79	0.7	0.1	0.4	0.4	0.09	0.5	0.3
Silica, dissolved	mg/L	79	57	13	40	40	7.5	50	32
Boron, dissolved	mg/L	79	170	0	37	29	25	64	19
Iron, dissolved	ug/L	78	330	0	72	64	50	107	31
Manganese, dissolved	ug/L	56	230	0	37	22	44	83	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	80	8.1	6.7	7.4	7.4	0.3	7.9	7.0
Color	Co - Pt units	24	75	1	11	8	15	22	2

06797500 Elkhorn River at Ewing, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	81	RDS = 0.769(SpC) + 0.156	0.95	90	7.0
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	79	TH = 0.430(SpC) - 8.236	.96	93	3.2
Calcium (Ca)	79	Ca = 0.129(SpC) + .587	.93	87	1.3
Magnesium (Mg)	79	Mg = 0.026(SpC) - 2.239	.66	43	0.8
Sodium (Na)	79	Na = 0.061(SpC) - 3.573	.86	74	1.0
Potassium (K)	79	K = 0.014(SpC) + 2.774	.45	21	0.7
Bicarbonate (HCO_3)	79	HCO_3=0.643(SpC) - 15.630	.97	95	4.1
Sulfate (SO_4)	79	SO_4 = 0.024(SpC) + 1.428	.40	16	1.4
Chloride (Cl)	79	Cl = -0.006(SpC) + 2.987	*-.14	1.9	1.1
Silica (Si)	79	Si = 0.013(SpC) + 36.957	*.05	0.22	7.5
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
105	3,130	4.8	$SpC = 191\ Q^{0.02983}$	0.27	7.5	0.044	10

ELKHORN RIVER BASIN

06798000 South Fork Elkhorn River at Ewing, Nebr.

Location.--Lat 42°15'04", long 98°20'18", at gaging station at bridge on U.S. Highway 275 at southeast limits of Ewing, Holt County, and 0.8 mi above mouth.

Drainage area.--320 mi^2, approximately, of which about 190 mi^2 contributes directly to surface runoff.

Period of record.--September 1960 to September 1966.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	84	285	166	194	188	22	218	171
Dissolved solids, residue	mg/L	81	243	127	156	153	19	176	140
Dissolved solids, sum	mg/L	1	----------		134	----------			
Hardness as $CaCO_3$	mg/L	79	116	66	79	76	9.0	89	70
Calcium, dissolved	mg/L	79	39	22	26	26	3.1	30	24
Magnesium, dissolved	mg/L	79	5.9	0.4	3.0	3.0	0.8	4.2	2.1
Sodium, dissolved	mg/L	79	15	6.1	7.6	7.0	1.5	9.6	6.5
Potassium, dissolved	mg/L	79	7.6	3.7	4.6	4.5	0.8	6.0	3.9
Bicarbonate ion	mg/L	79	167	96	113	110	13	127	100
Sulfate, dissolved	mg/L	79	11	1.3	5.1	4.9	1.7	7.4	3.2
Chloride, dissolved	mg/L	79	3.4	0.0	0.8	0.8	0.8	2.0	0.0
Fluoride, dissolved	mg/L	79	0.5	0.1	0.3	0.3	0.08	0.4	0.1
Silica, dissolved	mg/L	79	62	21	43	44	5.2	48	37
Boron, dissolved	mg/L	79	100	0	25	--------	19	----------	
Iron, dissolved	ug/L	78	280	0	64	54	48	90	28
Manganese, dissolved	ug/L	55	110	0	22	10	29	67	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	80	8.4	6.7	7.4	7.4	0.3	8.0	7.1
Color	Co - Pt units	24	35	1	8	8	7.2	13	2

06798000 South Fork Elkhorn River at Ewing, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	81	RDS = 0.816(SpC) - 2.531	0.94	89	6.3
Dissolved solids, sum (SDS)					
Hardness as $CaCO_3$ (TH)	79	TH = 0.395(SpC) + 1.956	.97	95	2.0
Calcium (Ca)	79	Ca = 0.128(SpC) + 1.667	.93	87	1.1
Magnesium (Mg)	79	Mg = 0.018(SpC) - 0.483	.47	22	0.8
Sodium (Na)	79	Na = 0.064(SpC) - 4.978	.93	86	0.6
Potassium (K)	79	K = 0.022(SpC) + 0.351	.60	36	0.7
Bicarbonate (HCO_3)	79	HCO_3=0.572(SpC) + 1.538	.96	93	3.5
Sulfate (SO_4)	79	SO_4 = 0.040(SpC) - 2.654	.53	28	1.4
Chloride (Cl)	79	Cl = 0.006(SpC) - 0.405	*.17	3.0	0.8
Silica (Si)	79	Si = -0.012(SpC)+44.952	*-.05	0.25	5.2
Nitrite + Nitrate as N (NO_2-NO_3)					

*Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate Log units	Percent
84	490	20	$SpC = 148\ Q^{0.06984}$	0.36	13	0.041	9.4

06799000 Elkhorn River near Norfolk, Nebr.

Location.--Lat 42°00'20", long 97°28'40", in SW¼ sec. 31, T.24 N., R.1 W., Madison County, at gaging station at county road bridge, 3.5 mi west-southwest of Norfolk, and 7 mi upstream from North Fork Elkhorn River.

Drainage area.--2,790 mi^2, approximately, of which about 1,790 mi^2 contributes directly to surface runoff.

Period of record.--September 1960 to September 1970.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	157	682	182	322	322	47	347	278
Dissolved solids, residue	mg/L	129	343	141	220	221	28	247	187
Dissolved solids, sum	mg/L	38	287	140	214	218	28	243	170
Hardness as $CaCO_3$	mg/L	128	201	92	140	142	18	159	117
Calcium, dissolved	mg/L	128	66	29	45	46	5.6	51	37
Magnesium, dissolved	mg/L	128	9.8	3.0	6.8	7.0	1.2	8.1	5.2
Sodium, dissolved	mg/L	128	16	2.2	9.3	9.3	2.0	12	7.3
Potassium, dissolved	mg/L	127	11	5.5	7.2	7.0	1.0	8.5	6.2
Bicarbonate ion	mg/L	128	266	114	190	193	24	212	158
Sulfate, dissolved	mg/L	128	17	3.8	8.6	8.4	1.8	11	6.9
Chloride, dissolved	mg/L	128	3.8	0.0	1.8	---	0.9	---	
Fluoride, dissolved	mg/L	128	0.6	0.1	0.4	0.3	0.8	0.4	0.1
Silica, dissolved	mg/L	128	56	1.1	38	39	8.2	45	27
Boron, dissolved	mg/L	128	130	0	38	32	21	58	20
Iron, dissolved	ug/L	114	870	0	65	46	93	125	19
Manganese, dissolved	ug/L	74	160	0	39	28	40	104	0
Nitrite + nitrate as N, dissolved	mg/L	---							
Nitrate as N, dissolved	mg/L	24	2.0	0.00	0.34	0.30	0.46	0.99	0.00
Nitrate as NO_3, dissolved	mg/L	129	8.9	0.13	1.4	1.5	---		
Ammonia N, total	mg/L	---							
Organic N, total	mg/L	---							
Phosphorus, total	mg/L	---							
Phosphorus, dissolved	mg/L	13	0.48	0.11	0.21	0.21	0.09	0.23	0.13
Fecal coliform	col/100 ml	---							
Fecal streptococci	col/100 ml	---							
Oxygen, dissolved	mg/L	---							
Biochemical oxygen demand (5-day)	mg/L	---							
pH	pH units	129	8.6	6.7	7.7	7.7	0.3	8.1	7.3
Color	Co - Pt units	47	45	1	9	5	8.9	24	2

06799000 Elkhorn River near Norfolk, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	129	RDS = 0.653(SpC) + 12.618	0.90	81	12
Dissolved solids, sum (SDS)	38	SDS = 0.526(SpC) + 42.865	.85	72	15
Hardness as $CaCO_3$ (TH)	128	TH = 0.422(SpC) + 6.257	.91	84	7.2
Calcium (Ca)	128	Ca = 0.131(SpC) + 3.407	.89	79	2.6
Magnesium (Mg)	128	Mg = 0.023(SpC) - 0.594	.77	60	0.7
Sodium (Na)	128	Na = 0.027(SpC) + 0.613	.52	27	1.7
Potassium (K)	127	K = -0.003(SpC) + 8.100	*-.10	1.1	0.9
Bicarbonate (HCO_3)	128	HCO_3=0.577(SpC) + 6.117	.92	85	9.4
Sulfate (SO_4)	128	SO_4 = 0.0008(SpC)+ 8.316	*.02	0.03	1.8
Chloride (Cl)	128	Cl = 0.004(SpC) + 0.477	*.18	3.2	0.9
Silica (Si)	128	Si = 0.140(SpC) - 7.067	.66	43	6.2
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s) Maximum	Water discharge (ft^3/s) Minimum	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate Log units	Standard error of estimate Percent
146	16,700	65	$SpC = 525\ Q^{-0.08521}$	-0.56	32	0.050	11

06799100 North Fork Elkhorn River near Pierce, Nebr.

Location.--At gaging station, on left downstream wingwall of county road bridge, 2.5 mi southeast of Pierce, Pierce County.

Drainage area.--520 mi^2, approximately.

Period of record.--September 1960 to September 1964.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	56	567	175	445	439	56	510	412
Dissolved solids, residue	mg/L	53	367	149	289	283	36	333	262
Dissolved solids, sum	mg/L	1	----------		268	----------			
Hardness as $CaCO_3$	mg/L	51	256	72	207	207	28	242	180
Calcium, dissolved	mg/L	51	77	23	63	63	8.5	73	56
Magnesium, dissolved	mg/L	51	18	3.6	12	12	2.5	16	9.7
Sodium, dissolved	mg/L	51	23	3.1	13	13	3.3	18	11
Potassium, dissolved	mg/L	51	11	3.0	6.1	5.6	1.6	7.9	4.4
Bicarbonate ion	mg/L	51	308	92	252	256	32	285	214
Sulfate, dissolved	mg/L	51	56	7.5	24	20	9.6	37	16
Chloride, dissolved	mg/L	51	5.3	0.0	2.8	2.6	0.9	3.8	2.1
Fluoride, dissolved	mg/L	51	0.5	0.2	0.4	0.3	0.08	0.4	0.3
Silica, dissolved	mg/L	51	44	11	32	33	5.6	37	25
Boron, dissolved	mg/L	51	110	10	40	38	19	59	26
Iron, dissolved	ug/L	50	110	10	36	30	25	76	21
Manganese, dissolved	ug/L	29	470	0	156	118	145	360	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	56	8.6	0.10	4.4	---------	1.8	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	52	8.3	7.0	7.6	7.6	0.3	8.0	7.2
Color	Co - Pt units	19	44	1	9	5	10	20	0

06799100 North Fork Elkhorn River near Pierce, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	53	RDS = 0.590(SpC) + 26.218	0.96	92	10
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	51	TH = 0.464(SpC) + 0.199	.97	94	6.7
Calcium (Ca)	51	Ca = 0.134(SpC) + 3.532	.92	86	3.3
Magnesium (Mg)	51	Mg = 0.031(SpC) - 1.833	.72	52	1.8
Sodium (Na)	51	Na = 0.048(SpC) - 8.096	.86	74	1.7
Potassium (K)	51	K = -0.004(SpC) + 7.951	*-.16	2.5	1.6
Bicarbonate (HCO_3)	51	HCO_3=0.509(SpC) + 25.576	.93	86	12
Sulfate (SO_4)	51	SO_4 = 0.112(SpC) - 26.041	.69	48	7.0
Chloride (Cl)	51	Cl = 0.005(SpC) + 0.442	.36	13	0.8
Silica (Si)	50	Si = 0.042(SpC) + 13.448	.43	19	5.1
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
56	1,170	21	$SpC = 660\ Q^{-0.10048}$	-0.45	20	0.061	14

ELKHORN RIVER BASIN

06799450 Logan Creek at Pender, Nebr.

Location.--Lat 42°06'40", long 96°42'00", in NW¼ sec. 26, T.25 N., R.6 E., Thurston County, Hydrologic Unit 10220004, on right bank 200 ft downstream from bridge on Nebraska State Highway 94 at Pender and 0.7 mi downstream from Rattlesnake Creek.

Drainage area.--731 mi^2, approximately.

Period of record.--Water years 1964-68, 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	127	870	287	716	730	102	803	600
Dissolved solids, residue	mg/L	111	595	204	474	483	60	525	408
Dissolved solids, sum	mg/L	29	535	173	433	467	97	502	190
Hardness as $CaCO_3$	mg/L	84	400	120	328	346	64	388	250
Calcium, dissolved	mg/L	85	120	34	92	96	19	113	66
Magnesium, dissolved	mg/L	85	40	7.6	24	25	6.0	29	17
Sodium, dissolved	mg/L	84	33	2.2	22	24	5.8	29	17
Potassium, dissolved	mg/L	84	13	4.8	7.6	6.9	2.0	12	5.6
Bicarbonate ion	mg/L	84	400	124	324	335	60	380	250
Sulfate, dissolved	mg/L	84	140	22	101	103	23	122	78
Chloride, dissolved	mg/L	126	23	1.4	7.2	6.0	3.4	12	4.2
Fluoride, dissolved	mg/L	85	0.8	0.1	0.3	0.3	0.1	0.5	0.2
Silica, dissolved	mg/L	84	28	3.2	20	21	4.8	25	13
Boron, dissolved	mg/L	85	170	10	76	78	24	102	51
Iron, dissolved	ug/L	68	310	0	32	21	50	59	0
Manganese, dissolved	ug/L	62	760	0	173	116	154	370	40
Nitrite + nitrate as N, dissolved	mg/L	28	2.9	0.18	1.4	1.4	0.65	2.4	0.62
Nitrate as N, dissolved	mg/L	1	----------		0.60	----------			
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	55	3.5	0.00	0.32	0.14	0.53	0.63	0.01
Organic N, total	mg/L	53	36	0.04	2.1	0.56	5.8	1.9	0.25
Phosphorus, total	mg/L	55	8.3	0.11	0.65	0.36	1.2	0.85	0.24
Phosphorus, dissolved	mg/L	48	0.54	0.08	0.23	0.24	0.10	0.33	0.12
Fecal coliform	col/100 ml	39	290,000	16	--------	280	---------	3,200	100
Fecal streptococci	col/100 ml	47	150,000	4	--------	332	---------	9,600	72
Oxygen, dissolved	mg/L	52	13.6	5.2	9.5	9.8	2.1	12.0	6.5
Biochemical oxygen demand (5-day)	mg/L	53	8.8	1.1	4.3	3.7	2.1	7.9	2.0
pH	pH units	129	8.6	6.5	7.8	7.8	0.3	8.2	7.5
Color	Co - Pt units	46	380	1	20	5	57	46	3

06799450 Logan Creek at Pender, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	111	RDS = 0.670(SpC) - 12.533	0.95	90	19
Dissolved solids, sum (SDS)	28	SDS = 0.680(SpC) - 28.396	.93	87	36
Hardness as $CaCO_3$ (TH)	84	TH = 0.540(SpC) - 44.356	.95	91	19
Calcium (Ca)	85	Ca = 0.147(SpC) - 9.363	.89	79	8.5
Magnesium (Mg)	85	Mg = 0.043(SpC) - 5.313	.81	66	3.5
Sodium (Na)	84	Na = 0.045(SpC) - 8.228	.86	75	3.0
Potassium (K)	84	K = -0.008(SpC) + 13.363	-.46	21	1.8
Bicarbonate (HCO_3)	84	HCO_3=0.501(SpC) - 21.004	.94	88	21
Sulfate (SO_4)	84	SO_4 = 0.182(SpC) - 24.402	.89	79	11
Chloride (Cl)	125	Cl = 0.009(SpC) + 0.801	.27	7.4	3.3
Silica (Si)	84	Si = 0.032(SpC) - 1.798	.74	56	3.2
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3= -0.0008(SpC)+2.049	*-.19	3.7	0.65

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
126	21,400	11.50	$SpC = 1{,}201Q^{-0.12082}$	-0.64	42	0.063	14

06799500 Logan Creek near Uehling, Nebr.

Location.--Lat 41°42'50", long 96°31'15", in SE¼SE¼ sec. 9, T.20 N., R.8 E., Dodge County, at gaging station at bridge on county road 2 mi southwest of Uehling and 8 mi upstream from mouth.

Drainage area.--1,030 mi^2, approximately.

Period of record.--October 1968 to September 1971.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	unho/cm	71	888	276	676	698	113	780	530
Dissolved solids, residue	mg/L	40	580	178	444	455	87	540	330
Dissolved solids, sum	mg/L	42	570	178	427	447	84	503	330
Hardness as $CaCO_3$	mg/L	42	430	120	309	323	66	368	210
Calcium, dissolved	mg/L	43	120	36	85	88	19	102	62
Magnesium, dissolved	mg/L	42	31	7.4	24	26	5.5	28	16
Sodium, dissolved	mg/L	42	50	3.6	26	27	7.9	32	16
Potassium, dissolved	mg/L	42	17	4.8	7.8	7.1	2.5	10	6.0
Bicarbonate ion	mg/L	43	449	117	327	340	70	388	220
Sulfate, dissolved	mg/L	42	157	22	92	97	24	110	59
Chloride, dissolved	mg/L	42	20	2.0	7.3	6.4	2.9	11	4.8
Fluoride, dissolved	mg/L	42	0.8	0.1	0.4	0.4	0.1	0.6	0.2
Silica, dissolved	mg/L	42	28	5.2	18	19	5.1	25	13
Boron, dissolved	mg/L	42	135	20	81	84	28	118	40
Iron, dissolved	ug/L	41	1,000	0	90	47	165	170	0
Manganese, dissolved	ug/L	15	590	0	89	21	187	500	0
Nitrite + nitrate as N, dissolved	mg/L	4	1.8	0.00	0.47	--------	0.89	----------	
Nitrate as N, dissolved	mg/L	36	5.7	0.00	1.2	0.77	1.4	2.6	0.00
Nitrate as NO_3, dissolved	mg/L	41	25	0.00	4.6	--------	5.9	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	27	0.66	0.06	0.22	0.15	0.16	0.41	0.09
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	43	8.3	7.3	7.9	8.0	0.2	8.2	7.8
Color	Co - Pt units	30	35	1	7	5	7.3	20	1

06799500 Logan Creek near Uehling, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	40	RDS = 0.698(SpC) - 25.146	0.96	92	25
Dissolved solids, sum (SDS)	42	SDS = 0.697(SpC) - 38.070	.98	96	16
Hardness as $CaCO_3$ (TH)	42	TH = 0.530(SpC) - 44.181	.96	92	19
Calcium (Ca)	43	Ca = 0.144(SpC) - 11.227	.90	80	8.4
Magnesium (Mg)	42	Mg = 0.041(SpC) - 3.713	.89	80	2.5
Sodium (Na)	42	Na = 0.052(SpC) - 8.828	.78	60	5.0
Potassium (K)	42	K = -0.006(SpC) + 11.998	*-.30	9.0	2.4
Bicarbonate (HCO_3)	43	HCO_3=0.559(SpC) - 45.892	.94	89	24
Sulfate (SO_4)	42	SO_4 = 0.171(SpC) - 21.708	.85	72	13
Chloride (Cl)	42	Cl = 0.011(SpC) - 0.289	.47	22	2.6
Silica (Si)	42	Si = 0.026(SpC) + 0.947	.60	36	4.2
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
62	4,480	6	$SpC = 1{,}144\ Q^{-0.12354}$	-0.56	32	0.077	18

06800500 Elkhorn River at Waterloo, Nebr.

Location.--Lat 41°17'25", long 96°17'05", in SW¼ sec. 3, T.15 N., R.10 E., Douglas County, Hydrologic Unit 10220003, on right bank 100 ft upstream from bridge at north edge of Waterloo and 3.5 mi downstream from Rawhide Creek.

Drainage area.--6,900 mi^2, approximately, of which about 5,870 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1966 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	154	733	192	496	510	103	598	323
Dissolved solids, residue	mg/L	73	493	136	318	338	65	380	210
Dissolved solids, sum	mg/L	129	486	121	317	326	65	383	210
Hardness as $CaCO_3$	mg/L	148	319	66	209	221	46	260	138
Calcium, dissolved	mg/L	148	94	22	61	63	13	76	41
Magnesium, dissolved	mg/L	148	21	2.5	14	15	3.2	18	7.8
Sodium, dissolved	mg/L	144	46	3.9	22	22	7.2	31	12
Potassium, dissolved	mg/L	144	18	6.1	8.6	8.3	1.7	10	7.2
Bicarbonate ion	mg/L	148	364	90	245	266	51	300	168
Sulfate, dissolved	mg/L	146	88	14	43	44	13	60	24
Chloride, dissolved	mg/L	147	41	0.1	13	11	6.9	21	5.7
Fluoride, dissolved	mg/L	147	0.7	0.0	0.4	0.4	0.1	0.5	0.3
Silica, dissolved	mg/L	148	40	6.3	25	26	6.8	34	15
Boron, dissolved	mg/L	145	1,400	0	80	64	28	103	40
Iron, dissolved	ug/L	128	480	0	56	41	66	110	12
Manganese, dissolved	ug/L	98	780	0	62	33	98	150	0
Nitrite + nitrate as N, dissolved	mg/L	52	3.0	0.00	1.2	1.2	0.77	2.0	0.09
Nitrate as N, dissolved	mg/L	36	6.6	0.00	1.6	1.2	1.5	3.9	0.32
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	59	1.7	0.00	0.47	0.41	0.39	0.98	0.04
Organic N, total	mg/L	61	29	0.00	3.6	1.6	6.2	5.0	0.66
Phosphorus, total	mg/L	61	8.5	0.42	1.1	0.72	1.3	1.7	0.51
Phosphorus, dissolved	mg/L	102	1.1	0.04	0.43	0.41	0.18	0.68	0.25
Fecal coliform	col/100 ml	41	666,000	500	--------	9,600	--------	270,000	960
Fecal streptococci	col/100 ml	51	290,000	80	--------	3,130	--------	44,300	197
Oxygen, dissolved	mg/L	57	14.0	4.5	9.3	9.4	2.4	12.6	5.8
Biochemical oxygen demand (5-day)	mg/L	57	34.0	0.3	8.8	7.6	6.1	16.2	2.4
pH	pH units	160	8.8	6.9	7.8	7.8	0.4	8.3	7.3
Color	Co - Pt units	120	330	1	27	11	45	49	5

06800500 Elkhorn River at Waterloo, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	73	RDS = 0.629(SpC) + 11.816	0.98	96	13
Dissolved solids, sum (SDS)	125	SDS = 0.631(SpC) - 1.227	.98	96	12
Hardness as $CaCO_3$ (TH)	146	TH = 0.428(SpC) - 3.516	.95	91	14
Calcium (Ca)	146	Ca = 0.122(SpC) + 0.701	.93	86	5.0
Magnesium (Mg)	146	Mg = 0.030(SpC) - 1.361	.95	90	1.0
Sodium (Na)	142	Na = 0.064(SpC) - 10.096	.87	76	3.5
Potassium (K)	142	K = -0.005(SpC) + 11.140	-.29	8.6	1.6
Bicarbonate (HCO_3)	146	HCO_3=0.464(SpC) + 15.200	.93	86	19
Sulfate (SO_4)	144	SO_4 = 0.111(SpC) - 11.850	.88	78	6.0
Chloride (Cl)	145	Cl = 0.046(SpC) - 10.042	.68	46	5.1
Silica (Si)	146	Si = 0.051(SpC) - 0.262	.75	56	4.5
Nitrite + Nitrate as N (NO_2-NO_3)	50	NO_2-NO_3= -0.001(SpC)+1.872	*-.19	3.5	0.77

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
153	38,700	97	$SpC = 1{,}765\ Q^{-0.19256}$	-0.81	66	0.064	15

Lower Platte River Basin

The Lower Platte River basin includes all Platte River drainage from the confluence of the Loup and Platte Rivers to the mouth of the Platte, with the exception of the Elkhorn River basin. Included is Salt Creek which drains about half the Lower Platte River basin.

Much of the area drained by the Lower Platte River basin has been glaciated. Most of the glacial drift is overlain by loess; however, in some of the rest of the non-valley areas, soils have developed directly on the drift.

Total acres irrigated in the basin are slightly over 100,000, and most irrigation in the basin is by pumpage of ground water. Irrigation with surface water is limited to a few individuals who pump directly from the streams. With few exceptions, irrigated acreage is found only in the Platte River Valley and in Todd Valley, a loess-covered ancestral channel of the Platte River in Saunders County.

Descriptive statistics are available for 16 stations in the Lower Platte River basin (fig. 10). Twelve of these are in the Salt Creek basin which, because of its proximity to the city of Lincoln and its unusual hydrologic conditions, has been studied extensively. With the exception of that from the tributaries Stevens Creek, Wahoo Creek, and Silver Creek, streamflow in the Salt Creek basin is highly mineralized. The mean specific conductance of Salt Creek above Beal Slough was 1,190 umho/cm, of Salt Creek at Lincoln it was 4,850

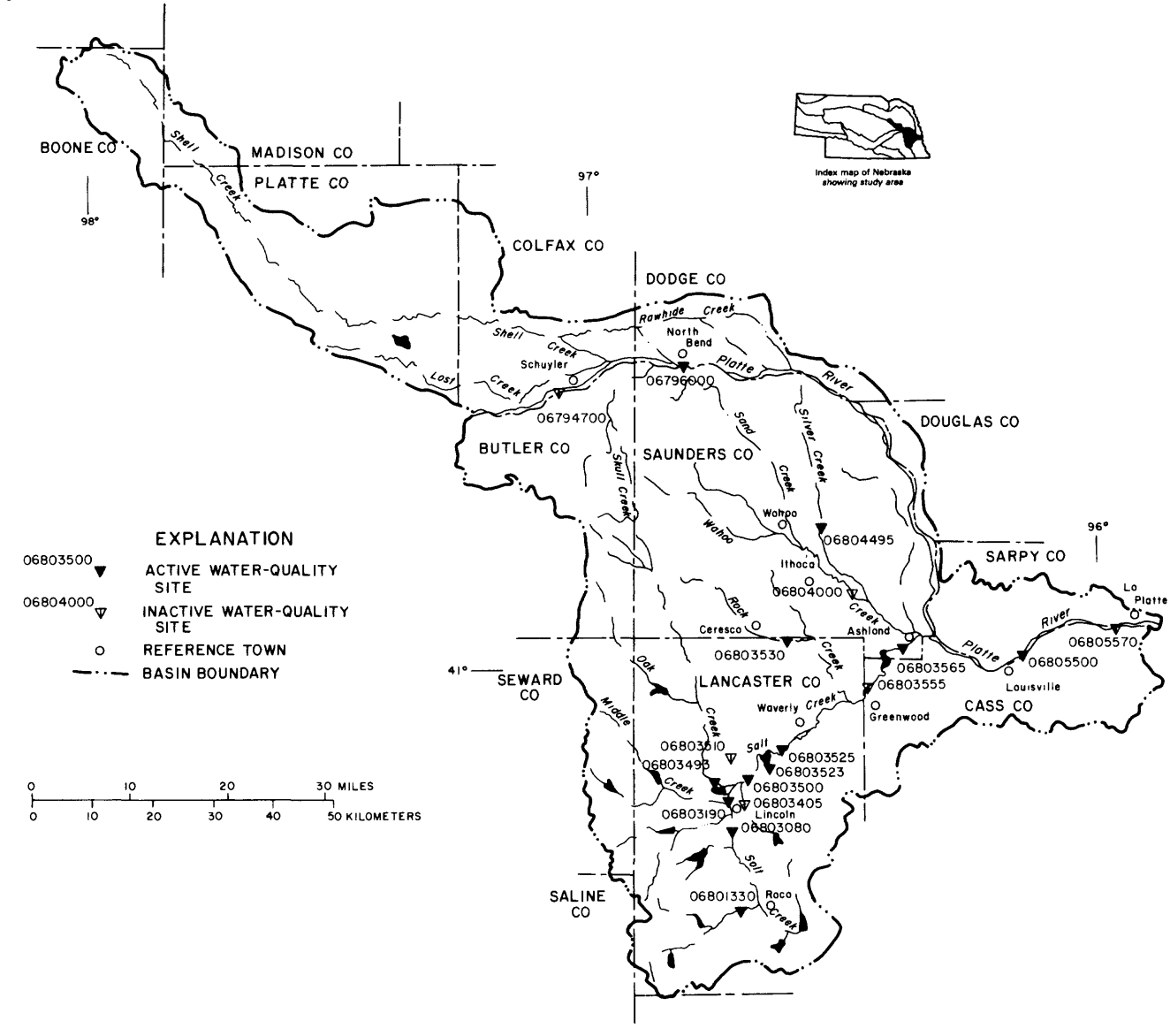

Figure 10. Location of water-quality sampling sites, Lower Platte River basin.

umho/cm, and of Salt Creek above Ashland it was 5,030 umho/cm.

Seepage from saline deposits in the Dakota Formation of the Cretaceous age is the cause of the highly mineralized water in Salt Creek. These deposits occur to the north and west of Lincoln at shallow depth. Water seeps directly into the streams from these deposits or moves into overlying Pleistocene deposits and from them seeps into the streams. Water in the lower reaches of Oak Creek and Little Salt Creek, which drains the area to the northwest of Lincoln and which enters Salt Creek in the Lincoln area, is the most highly mineralized of any stream reach in Nebraska.

As expected, sodium is the principal cation, and chloride is the principal anion in water from all these reaches as well as from all reaches of Salt Creek downstream from Lincoln. Saline deposits in the Dakota formation occur at greater depth south than north and west of Lincoln, and less of the highly saline seepage from them reaches the stream. At Roca and above Beal Slough, sodium is the principal cation, and bicarbonate and chloride are the principal anions. This is also true for Rock Creek near Ceresco. Calcium is the principal cation and bicarbonate the principal anion in Stevens, Wahoo, and Silver Creeks.

The effect of effluent from the Lincoln sewage-treatment plant on Salt Creek prior to 1977 can be seen in table 4. Medians for fecal coliform and fecal streptococcal bacteria increased dramatically at the first station (Salt Creek at Lincoln) downstream from the sewage-treatment plant. Thereafter, the medians decreased downstream. In 1977, treatment facilities were improved. Concentrations of the magnitudes shown in table 4 no longer apply. Increases in means of dissolved and total phosphorus and of BOD follow the same pattern as the medians for the bacteria.

Table 4. Median fecal coliform and fecal streptococcal bacteria concentrations for stations on Salt Creek

Station	Fecal coliform (col/100 ml)	Fecal streptococcal bacteria (col/100 ml)
At Roca ----------	317	1,070
Above Beal Slough----------	474	560
At 14th Street, Lincoln-----	568	910
At Lincoln----------	175,000	42,000
Below Stevens Creek-------	105,000	23,500
At Greenwood----------	7,000	1,000
Above Ashland----------	5,200	948

Salt Creek enters the Platte River about 10 mi above Louisville. Although the discharge contributed by Salt Creek averages only about 3.5 percent of the total flow of the Platte River at Louisville, during low flow in the Platte River the highly mineralized water from Salt Creek causes the quality of water in the Platte River to deteriorate considerably.

Some descriptive statistics are available for four stations on the Platte River near Schuyler, at North Bend, at Louisville, and at LaPlatte. Mean specific conductance for the Platte River at North Bend is 461 umho/cm; whereas for the Platte River at Louisville it is 713 umho/cm, an increase of approximately 55 percent.

The influence of Salt Creek on the quality of water in the Platte River at Louisville also is reflected in mean chloride concentrations. At North Bend, it was 11 mg/L, and at Louisville, it was 79 mg/L. At North Bend, the principal cation is calcium, and the principal anion is bicarbonate. At Louisville, bicarbonate also is the principal anion, but sodium and calcium are the principal cations.

Correlation coefficients between specific conductance and principal constituents are greater than 0.8 for the Platte River both near Schuyler and at North Bend. At Louisville, correlation coefficients between conductance and chloride and sodium are 0.92 and 0.98, respectively; but those between conductance and other principal constituents are less than 0.7.

A high degree of negative correlation between specific conductance and water discharge is observed for all main stem Salt Creek stations and most Salt Creek tributaries. This occurs because as overland runoff increases water discharge in the streams, it dilutes the highly mineralized base flow accordingly.

06794700 Platte River near Schuyler, Nebr.

Location.--Lat 41°24'50", long 97°03'35", in NE¼SE¼ sec. 27, T.17 N., R.3 E., Colfax County, at bridge on State Highway 15, 2.6 mi south of intersection of U.S. Highway 30 and State Highway 15 at Schuyler, and 6.0 mi upstream from Shell Creek.

Period of record.--October 1966 to September 1968.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	27	709	250	383	367	107	520	272
Dissolved solids, residue	mg/L	27	484	184	267	252	70	350	282
Dissolved solids, sum	mg/L	13	329	180	243	240	46	290	183
Hardness as $CaCO_3$	mg/L	27	244	96	141	134	32	180	100
Calcium, dissolved	mg/L	27	68	30	42	40	8.6	51	32
Magnesium, dissolved	mg/L	27	18	5.1	8.8	8.0	3.1	14	5.4
Sodium, dissolved	mg/L	27	61	8.1	22	19	12	35	13
Potassium, dissolved	mg/L	27	11	6.0	8.3	8.2	1.2	9.8	6.4
Bicarbonate ion	mg/L	27	215	131	168	168	22	195	176
Sulfate, dissolved	mg/L	27	166	12	49	40	36	98	15
Chloride, dissolved	mg/L	27	18	1.6	6.4	5.4	4.1	12	3.0
Fluoride, dissolved	mg/L	27	0.5	0.1	0.4	0.4	0.09	0.4	0.3
Silica, dissolved	mg/L	27	56	21	40	42	7.0	48	32
Boron, dissolved	mg/L	27	100	0	46	41	24	100	30
Iron, dissolved	ug/L	14	90	20	32	30	19	50	23
Manganese, dissolved	ug/L	14	90	0	23	0	34	80	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	27	3.0	0.00	0.70	----------	0.74	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	27	8.2	7.2	7.7	7.7	0.2	8.1	7.4
Color	Co - Pt units	13	15	2	6	5	4	11	2

06794700 Platte River near Schuyler, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	27	RDS = 0.646(SpC) + 19.564	0.99	98	9.6
Dissolved solids, sum (SDS)	----------				
Hardness as $CaCO_3$ (TH)	27	TH = 0.296(SpC) + 27.425	.98	96	6.2
Calcium (Ca)	27	Ca = 0.076(SpC) + 12.902	.95	90	2.8
Magnesium (Mg)	27	Mg = 0.026(SpC) - 1.123	.89	80	1.4
Sodium (Na)	27	Na = 0.110(SpC) - 20.273	.98	96	2.4
Potassium (K)	27	K = 0.006(SpC) + 5.917	.54	29	1.0
Bicarbonate (HCO_3)	27	HCO_3= 0.177(SpC)+99.996	.86	74	11
Sulfate (SO_4)	27	SO_4 = 0.328(SpC) - 76.430	.98	96	6.8
Chloride (Cl)	27	Cl = 0.037(SpC) - 7.958	.97	94	1.0
Silica (Si)	27	Si = -0.030(SpC)+51.649	-.45	21	6.3
Nitrite + Nitrate as N (NO_2-NO_3)	----------				

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
27	14,600	770	$SpC = 467\ Q^{-0.02971}$	*0.08	0.61	0.113	26

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06796000 Platte River at North Bend, Nebr.

Location.--Lat 41°27'10", long 96°45'50", in SE¼ sec. 7, T.17 N., R.6 E., Dodge County, Hydrologic Unit 10200201, on left bank 80 ft upstream from bridge (new bridge in use during 1976) on State Highway 79, 1 mi south of North Bend, and 5 mi downstream from Shell Creek.

Drainage area (revised).--77,100 mi^2, approximately, of which about 63,300 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide Basin is not included.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	75	833	192	461	453	136	586	300
Dissolved solids, residue	mg/L	31	390	136	275	295	74	350	141
Dissolved solids, sum	mg/L	62	556	194	325	320	70	420	245
Hardness as $CaCO_3$	mg/L	70	280	80	167	169	40	222	123
Calcium, dissolved	mg/L	70	78	25	48	48	11	62	36
Magnesium, dissolved	mg/L	70	20	4.3	11	12	3.3	16	7.2
Sodium, dissolved	mg/L	70	66	3.1	30	31	13	44	12
Potassium, dissolved	mg/L	70	17	5.2	9.0	9.0	1.5	10	7.6
Bicarbonate ion	mg/L	69	264	92	181	184	33	218	140
Sulfate, dissolved	mg/L	70	220	8.5	73	71	39	120	19
Chloride, dissolved	mg/L	70	24	1.6	11	10	5.0	18	4.0
Fluoride, dissolved	mg/L	70	0.9	0.3	0.4	0.4	0.1	0.5	0.4
Silica, dissolved	mg/L	70	53	7.5	34	35	8.3	44	24
Boron, dissolved	mg/L	68	160	0	69	70	27	94	42
Iron, dissolved	ug/L	64	760	0	69	36	115	125	12
Manganese, dissolved	ug/L	64	120	0	16	10	22	48	0
Nitrite + nitrate as N, dissolved	mg/L	42	1.2	0.00	0.43	0.40	0.36	0.90	0.00
Nitrate as N, dissolved	mg/L	1	----------		0.80	----------			
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	52	0.39	0.00	0.08	0.06	0.08	0.17	0.00
Organic N, total	mg/L	53	4.7	0.32	1.1	1.0	0.74	2.0	0.45
Phosphorus, total	mg/L	56	0.73	0.14	0.32	0.28	0.13	0.49	0.19
Phosphorus, dissolved	mg/L	62	0.30	0.06	0.16	0.16	0.06	0.24	0.09
Fecal coliform	col/100 ml	42	113,000	3	--------	215	---------	680	27
Fecal streptococci	col/100 ml	50	13,600	20	--------	188	----------	1,100	45
Oxygen, dissolved	mg/L	52	15.0	6.8	10.4	10.1	1.9	12.6	8.0
Biochemical oxygen demand (5-day)	mg/L	54	10.0	0.8	4.4	4.1	2.1	6.8	1.8
pH	pH units	80	8.5	7.0	7.7	7.8	0.4	8.3	7.2
Color	Co - Pt units	63	90	3	23	20	18	49	8

06796000 Platte River at North Bend, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	33	RDS = 0.662(SpC) + 8.194	0.98	97	13
Dissolved solids, sum (SDS)	63	SDS = 0.575(SpC) + 43.080	.98	96	14
Hardness as $CaCO_3$ (TH)	71	TH = 0.283(SpC) + 35.358	.97	93	10
Calcium (Ca)	71	Ca = 0.074(SpC) + 13.721	.95	90	3.4
Magnesium (Mg)	71	Mg = 0.024(SpC) + 0.209	.96	92	0.9
Sodium (Na)	71	Na = 0.093(SpC) - 13.597	.97	94	3.2
Potassium (K)	71	K = 0.003(SpC) + 7.607	27	7.4	1.5
Bicarbonate (HCO_3)	71	HCO_3= 0.203(SpC) + 86.951	.84	70	18
Sulfate (SO_4)	72	SO_4 = 0.273(SpC) - 54.453	.95	90	13
Chloride (Cl)	73	Cl = 0.033(SpC) - 4.304	.89	79	2.3
Silica (Si)	72	Si = 0.008(SpC) + 31.212	*.13	1.7	8.4
Nitrite + Nitrate as N (NO_2-NO_3)	42	NO_2-NO_3= 0.0005(SpC)+0.156	*.18	3.3	0.36

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
76	73,600	180	$SpC = 898\ Q^{-0.08550}$	-0.30	9.4	0.129	30

06801330 Salt Creek near Roca, Nebr.

Location.--Lat 40°38'41", long 96°41'11", in NW¼SW¼ sec. 19, T.8 N., R.7 E., Lancaster County, at bridge on county road 1.0 mi south and 1.3 mi east of Roca.

Period of record.--August 1971 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	25	2,100	414	1,370	1,370	489	1,950	480
Dissolved solids, residue	mg/L	25	1,270	255	845	840	306	1,200	320
Dissolved solids, sum	mg/L	12	1,290	236	835	830	335	1,200	265
Hardness as $CaCO_3$	mg/L	16	410	150	317	335	84	393	160
Calcium, dissolved	mg/L	16	120	40	92	100	26	116	44
Magnesium, dissolved	mg/L	16	27	11	21	23	5.6	26	-------
Sodium, dissolved	mg/L	16	310	25	173	170	90	300	27
Potassium, dissolved	mg/L	16	13	5.7	8.1	7.7	2.0	12	6.2
Bicarbonate ion	mg/L	16	311	139	252	270	57	303	156
Sulfate, dissolved	mg/L	16	230	45	137	140	55	200	49
Chloride, dissolved	mg/L	25	450	21	232	220	130	410	36
Fluoride, dissolved	mg/L	16	0.6	0.1	0.4	0.5	0.1	0.5	0.3
Silica, dissolved	mg/L	12	25	9.2	17	18	5.0	22	12
Boron, dissolved	mg/L	12	660	20	224	150	209	540	40
Iron, dissolved	ug/L	4	60	0	20	---------	27	----------	
Manganese, dissolved	ug/L	4	770	40	375	---------	302	----------	
Nitrite + nitrate as N, dissolved	mg/L	16	4.3	0.00	1.1	0.76	1.1	2.0	0.06
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	20	0.90	0.00	0.18	0.11	0.20	0.49	0.01
Organic N, total	mg/L	25	1.9	0.18	0.84	0.79	0.48	1.5	0.30
Phosphorus, total	mg/L	25	0.97	0.09	0.39	0.37	0.18	0.57	0.19
Phosphorus, dissolved	mg/L	22	0.45	0.14	0.25	0.24	0.08	0.38	0.17
Fecal coliform	col/100 ml	21	38,000	16	--------	317	---------	965	120
Fecal streptococci	col/100 ml	24	410,000	100	--------	1,070	---------	4,100	270
Oxygen, dissolved	mg/L	25	15.3	5.8	9.6	9.5	2.8	13.0	6.4
Biochemical oxygen demand (5-day)	mg/L	24	9.0	1.0	3.3	2.7	2.0	5.1	1.4
pH	pH units	32	8.2	6.5	7.6	7.7	0.4	8.0	7.3
Color	Co - Pt units	16	200	5	37	11	64	51	0

06801330 Salt Creek near Roca, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	25	RDS = 0.621(SpC) - 4.586	0.99	99	35
Dissolved solids, sum (SDS)					
Hardness as $CaCO_3$ (TH)	16	TH = 0.146(SpC) + 113.965	.94	89	29
Calcium (Ca)	16	Ca = 0.044(SpC) + 30.966	.94	88	9.2
Magnesium (Mg)	16	Mg = 0.010(SpC) + 7.373	.95	90	1.8
Sodium (Na)	16	Na = 0.163(SpC) - 54.745	.99	98	14
Potassium (K)	16	K = 0.0005(SpC)+ 7.496	*.12	1.6	2.1
Bicarbonate (HCO_3)	16	HCO_3=0.063(SpC)+163.313	.61	37	46
Sulfate (SO_4)	16	SO_4 = 0.097(SpC) + 2.166	.96	92	16
Chloride (Cl)	25	Cl = 0.261(SpC) - 124.435	.98	95	28
Silica (Si)	12	Si = 0.006(SpC) + 9.033	.66	44	3.9
Nitrite + Nitrate as N (NO_2-NO_3)	16	NO_2-NO_3=0.00004(SpC)+1.005	*.02	0.04	1.1

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
25	225	2	$SpC = 2{,}817\ Q^{-0.34398}$	-0.83	69	0.114	26

06803080 Salt Creek above Beal Slough, at Lincoln, Nebr.

Location.--Lat 40°46'13", long 96°43'05", in SW¼SW¼ sec. 2, T.9 N., R.6 E., Lancaster County, Hydrologic Unit 10200203, at county road bridge 0.9 mi west of U.S. Highway 77 and northeast corner of State Penitentiary at Lincoln.

Drainage area.--221 mi^2.

Period of record.--Water year 1971 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	89	2,500	347	1,190	1,190	491	1,780	477
Dissolved solids, residue	mg/L	77	1,420	216	736	760	281	1,100	320
Dissolved solids, sum	mg/L	32	1,380	207	686	703	286	1,000	300
Hardness as $CaCO_3$	mg/L	47	440	110	290	308	81	380	160
Calcium, dissolved	mg/L	47	130	25	83	91	24	113	46
Magnesium, dissolved	mg/L	47	29	8	20	21	5.2	26	12
Sodium, dissolved	mg/L	47	320	20	135	147	75	230	38
Potassium, dissolved	mg/L	47	14	5.2	8.0	7.8	1.7	10	6.0
Bicarbonate ion	mg/L	93	348	130	281	294	53	328	185
Sulfate, dissolved	mg/L	93	260	32	125	120	48	185	63
Chloride, dissolved	mg/L	106	480	14	160	150	109	308	32
Fluoride, dissolved	mg/L	44	0.9	0.0	0.4	0.4	0.1	0.5	0.3
Silica, dissolved	mg/L	33	29	4.8	16	16	5.5	22	8.2
Boron, dissolved	mg/L	21	730	10	166	110	172	350	55
Iron, dissolved	ug/L	28	160	0	31	20	33	66	10
Manganese, dissolved	ug/L	29	1,300	10	398	320	310	905	20
Nitrite + nitrate as N, dissolved	mg/L	45	2.3	0.00	0.79	0.70	0.72	1.8	0.02
Nitrate as N, dissolved	mg/L	7	2.1	0.10	0.72	---	0.76	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	69	1.1	0.00	0.17	0.11	0.18	0.41	0.02
Organic N, total	mg/L	103	7.0	0.00	0.88	0.58	0.93	1.9	0.21
Phosphorus, total	mg/L	103	2.4	0.09	0.46	0.37	0.35	0.66	0.23
Phosphorus, dissolved	mg/L	82	0.78	0.02	0.27	0.25	0.12	0.40	0.16
Fecal coliform	col/100 ml	96	48,000	4	---	474	---	7,450	27
Fecal streptococci	col/100 ml	81	240,000	8	---	560	---	5,200	67
Oxygen, dissolved	mg/L	108	15.0	5.4	9.6	9.3	2.6	13.4	6.7
Biochemical oxygen demand (5-day)	mg/L	92	16.6	1.2	4.0	3.5	2.4	6.5	1.8
pH	pH units	139	9.2	6.6	7.6	7.7	0.4	8.0	7.2
Color	Co - Pt units	43	200	3	29	21	37	69	7

06803080 Salt Creek above Beal Slough, at Lincoln, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	79	RDS = 0.551(SpC) + 68.104	0.97	95	66
Dissolved solids, sum (SDS)	33	SDS = 0.558(SpC) + 29.392	.96	92	82
Hardness as $CaCO_3$ (TH)	46	TH = 0.151(SpC) + 106.896	.92	85	32
Calcium (Ca)	46	Ca = 0.045(SpC) + 29.411	.91	83	10
Magnesium (Mg)	46	Mg = 0.010(SpC) + 8.481	.91	83	2.2
Sodium (Na)	46	Na = 0.146(SpC) - 40.622	.96	93	20
Potassium (K)	46	K = -0.001(SpC) + 9.208	*-.29	8.3	1.6
Bicarbonate (HCO_3)	71	HCO_3= 0.061(SpC)+196.876	.54	30	48
Sulfate (SO_4)	73	SO_4 = 0.098(SpC) + 6.722	.93	86	20
Chloride (Cl)	87	Cl = 0.208(SpC) - 76.424	.91	83	48
Silica (Si)	33	Si = 0.004(SpC) + 11.642	*.33	11	5.3
Nitrite + Nitrate as N (NO_2-NO_3)	45	NO_2-NO_3= -0.001(SpC) + 2.037	-.71	50	0.51

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
89	491	3	$SpC = 3{,}037\ Q^{-0.35480}$	-0.85	72	0.109	25

06803190 Salt Creek at 14th Street at Lincoln, Nebr.

Location.--Lat 40°50'03", long 96°42'03", in NE¼SE¼ sec. 14, T.10 N., R.6 E., Lancaster County, at bridge at 14th Street, 2.1 mi downstream from Middle Creek and 0.3 mi upstream from confluence with Oak Creek.

Period of record.--March 1971 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	35	13,600	825	6,360	6,200	3,730	10,300	1,400
Dissolved solids, residue	mg/L	36	7,820	501	3,900	4,100	2,180	6,760	880
Dissolved solids, sum	mg/L	13	7,160	517	3,950	4,000	2,310	6,700	697
Hardness as $CaCO_3$	mg/L	26	560	140	347	380	113	470	255
Calcium, dissolved	mg/L	23	140	39	93	100	24	120	62
Magnesium, dissolved	mg/L	23	51	11	33	34	11	46	15
Sodium, dissolved	mg/L	24	2,800	100	1,430	1,620	797	2,430	290
Potassium, dissolved	mg/L	24	17	8.2	12	13	2.5	16	8.6
Bicarbonate ion	mg/L	26	396	161	310	340	75	390	200
Sulfate, dissolved	mg/L	26	620	65	292	315	153	465	112
Chloride, dissolved	mg/L	35	4,100	120	1,890	2,100	1,180	3,440	330
Fluoride, dissolved	mg/L	25	0.9	0.2	0.6	0.6	0.2	0.7	0.4
Silica, dissolved	mg/L	12	22	8.8	15	16	3.8	21	12
Boron, dissolved	mg/L	12	810	90	478	480	251	770	130
Iron, dissolved	ug/L	12	200	10	38	21	52	50	15
Manganese, dissolved	ug/L	12	810	80	384	440	237	640	110
Nitrite + nitrate as N, dissolved	mg/L	24	1.6	0.00	0.80	0.80	0.46	1.6	0.19
Nitrate as N, dissolved	mg/L	3	1.9	0.10	1.0	--------	0.90	----------	
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	20	0.60	0.03	0.36	0.42	0.16	0.57	0.17
Organic N, total	mg/L	36	5.2	0.11	1.0	0.65	1.1	1.7	0.26
Phosphorus, total	mg/L	36	1.6	0.20	0.47	0.40	0.31	0.66	0.20
Phosphorus, dissolved	mg/L	34	0.48	0.02	0.25	0.25	0.10	0.38	0.14
Fecal coliform	col/100 ml	30	120,000	10	--------	568	----------	5,900	150
Fecal streptococci	col/100 ml	32	140,000	24	--------	910	----------	19,000	150
Oxygen, dissolved	mg/L	37	18.4	5.0	10.8	10.2	2.7	14.3	7.2
Biochemical oxygen demand (5-day)	mg/L	36	9.6	1.2	3.6	3.1	2.0	6.1	1.5
pH	pH units	54	8.9	6.7	7.7	7.8	0.4	8.1	7.3
Color	Co - Pt units	27	100	3	25	12	25	56	5

06803190 Salt Creek at 14th Street at Lincoln, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	35	RDS = 0.583(SpC) + 68.678	0.99	98	287
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	26	TH = 0.028(SpC) + 162.801	.93	87	42
Calcium (Ca)	23	Ca = 0.006(SpC) + 49.893	.85	72	13
Magnesium (Mg)	23	Mg = 0.003(SpC) + 10.861	.96	92	3.2
Sodium (Na)	24	Na = 0.217(SpC) - 112.281	.99	99	80
Potassium (K)	24	K = 0.0004(SpC) + 10.123	.52	27	2.2
Bicarbonate (HCO_3)	26	HCO_3= 0.017(SpC) + 198.589	.84	70	42
Sulfate (SO_4)	26	SO_4 = 0.039(SpC) + 30.092	.99	98	20
Chloride (Cl)	35	Cl = 0.321(SpC) - 208.640	1.0	99	88
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	23	NO_2-NO_3= -0.0001(SpC)+1.459	-.76	58	0.31

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
35	593	8.1	$SpC = 98{,}500\ Q^{-0.75825}$	-0.96	92	0.096	22

06803405 Antelope Creek at Court Street at Lincoln, Nebr.

Location.--Lat 40°49'44", long 96°41'58", in SW¼SW¼ sec. 13, T.10 N., R.6 E., Lancaster County, at bridge on Court Street about 0.1 mi upstream from confluence with Salt Creek.

Period of record.--March 1971 to September 1977.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	37	8,140	204	5,100	5,400	2,210	7,620	1,200
Dissolved solids, residue	mg/L	36	5,160	138	3,030	3,300	1,310	4,390	680
Dissolved solids, sum	mg/L	13	4,170	510	3,080	3,300	1,070	3,880	1,680
Hardness as $CaCO_3$	mg/L	27	510	51	361	410	137	490	110
Calcium, dissolved	mg/L	24	160	16	98	115	39	140	33
Magnesium, dissolved	mg/L	24	38	2.6	26	30	11	36	6.8
Sodium, dissolved	mg/L	25	1,600	8.4	913	920	488	1,470	130
Potassium, dissolved	mg/L	25	18	3.9	12	13	3.8	17	5.5
Bicarbonate ion	mg/L	27	286	72	228	246	63	280	100
Sulfate, dissolved	mg/L	27	500	18	248	274	119	370	47
Chloride, dissolved	mg/L	36	2,400	9.4	1,440	1,470	664	2,170	270
Fluoride, dissolved	mg/L	26	1.3	0.2	0.7	0.6	0.3	1.2	0.3
Silica, dissolved	mg/L	13	41	6.7	26	30	10	40	13
Boron, dissolved	mg/L	13	330	30	232	260	89	310	50
Iron, dissolved	ug/L	13	90	10	33	21	22	60	15
Manganese, dissolved	ug/L	12	640	40	159	130	158	190	70
Nitrite + nitrate as N, dissolved	mg/L	23	4.6	0.00	2.6	2.4	1.2	4.0	0.96
Nitrate as N, dissolved	mg/L	3	3.9	3.3	3.5	--------	0.35	----------	
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	20	2.5	0.01	0.29	0.12	0.56	0.80	0.03
Organic N, total	mg/L	36	3.5	0.00	0.70	0.44	0.70	1.4	0.13
Phosphorus, total	mg/L	36	3.8	0.26	0.80	0.52	0.74	1.9	0.33
Phosphorus, dissolved	mg/L	34	3.8	0.01	0.72	0.49	0.78	2.0	0.26
Fecal coliform	col/100 ml	31	7,200	3	------	190	----------	2,700	17
Fecal streptococci	col/100 ml	32	49,000	20	------	1,000	----------	9,300	53
Oxygen, dissolved	mg/L	36	20.4	8.5	12.9	13.2	3.1	17.0	9.0
Biochemical oxygen demand (5-day)	mg/L	36	12.8	1.4	4.0	3.5	2.8	8.5	1.5
pH	pH units	56	8.9	6.9	7.9	8.0	0.4	8.4	7.3
Color	Co - Pt units	26	100	0	20	8	28	66	1

06803405 Antelope Creek at Court Street at Lincoln, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	36	RDS = 0.584(Sp) + 32.780	0.99	98	208
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	28	TH = 0.050(SpC) + 110.593	.89	80	63
Calcium (Ca)	25	Ca = 0.013(SpC) + 34.888	.85	72	21
Magnesium (Mg)	25	Mg = 0.004(SpC) + 5.653	.94	88	4.0
Sodium (Na)	26	Na = 0.195(SpC) - 48.263	1.0	99	42
Potassium (K)	26	K = 0.001(SpC) + 6.543	.71	50	2.7
Bicarbonate (HCO_3)	28	HCO_3= 0.023(SpC) + 114.054	.88	78	30
Sulfate (SO_4)	28	SO_4 = 0.042(SpC) + 35.450	.87	76	59
Chloride (Cl)	36	Cl = 0.297(SpC) - 84.830	.99	98	90
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	22	NO_2-NO_3=0.0004(SpC)+0.682	.69	48	0.91

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
37	67	1	$SpC = 9,599\ Q^{-0.90032}$	-0.95	91	0.114	26

06803493 Oak Creek at 14th Street at Lincoln, Nebr.

Location.--Lat 40°50'10", long 96°42'03", in SE¼NE¼ sec. 14, T.10 N., R.6 E., Lancaster County, at bridge at 14th Street, 0.2 mi upstream from confluence with Salt Creek.

Period of record.--March 1971 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	36	14,200	823	6,090	5,970	3,370	11,000	1,800
Dissolved solids, residue	mg/L	36	8,380	468	3,600	3,450	2,040	6,700	1,000
Dissolved solids, sum	mg/L	13	6,890	700	3,030	2,800	1,740	4,400	812
Hardness as $CaCO_3$	mg/L	27	530	140	345	373	100	460	160
Calcium, dissolved	mg/L	24	140	39	96	100	22	120	66
Magnesium, dissolved	mg/L	24	45	10	29	30	8.5	41	18
Sodium, dissolved	mg/L	25	3,000	200	1,260	1,300	739	2,300	330
Potassium, dissolved	mg/L	25	20	8.3	14	14	3.1	19	10
Bicarbonate ion	mg/L	27	528	148	368	393	106	455	235
Sulfate, dissolved	mg/L	27	550	36	229	230	123	410	77
Chloride, dissolved	mg/L	36	4,500	81	1,730	1,700	1,130	3,400	320
Fluoride, dissolved	mg/L	25	0.7	0.2	0.5	0.5	0.1	0.6	0.3
Silica, dissolved	mg/L	13	23	6.3	15	16	4.7	22	9.0
Boron, dissolved	mg/L	13	800	110	378	380	193	540	120
Iron, dissolved	ug/L	12	60	10	27	33	16	50	10
Manganese, dissolved	ug/L	12	1,600	150	952	1,100	464	1,500	450
Nitrite + nitrate as N, dissolved	mg/L	24	2.4	0.00	0.59	0.46	0.59	1.1	0.06
Nitrate as N, dissolved	mg/L	3	1.2	0.00	0.73	---	0.64	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	20	0.83	0.10	0.40	0.39	0.18	0.73	0.23
Organic N, total	mg/L	36	10	0.00	1.0	0.71	1.7	1.6	0.08
Phosphorus, total	mg/L	36	3.5	0.04	0.39	0.32	0.55	0.47	0.17
Phosphorus, dissolved	mg/L	34	0.57	0.00	0.19	0.16	0.12	0.32	0.05
Fecal coliform	col/100 ml	30	100,000	3	---	338	---	6,000	26
Fecal streptococci	col/100 ml	32	100,000	16	---	356	---	3,100	53
Oxygen, dissolved	mg/L	36	20.4	1.9	11.0	10.4	4.5	18.4	6.5
Biochemical oxygen demand	mg/L	35	8.2	1.5	3.7	3.2	1.9	7.5	1.9
pH (5-day)	pH units	54	8.9	6.9	7.8	7.8	0.3	8.1	7.4
Color	Co - Pt units	29	70	3	21	19	17	50	5

06803493 Oak Creek at 14th Street at Lincoln, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	36	RDS = 0.599(SpC) - 54.144	0.99	98	267
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	27	TH = 0.025(SpC) + 189.699	.85	72	54
Calcium (Ca)	24	Ca = 0.005(SpC) + 61.377	.75	57	15
Magnesium (Mg)	24	Mg = 0.002(SpC) + 13.709	.90	81	3.8
Sodium (Na)	25	Na = 0.215(SpC) - 129.099	.99	98	96
Potassium (K)	25	K = 0.0005(SpC) + 10.253	.58	34	2.6
Bicarbonate (HCO_3)	27	HCO_3= 0.024(SpC) + 218.336	.78	61	68
Sulfate (SO_4)	27	SO_4 = 0.033(SpC) + 24.995	.91	84	51
Chloride (Cl)	36	Cl = 0.331(SpC) - 282.043	.99	98	159
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	24	NO_2-NO_3= -0.0001(SpC)+1.276	-.67	45	0.45

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
36	176	7	$SpC = 42{,}100\ Q^{-0.68848}$	-0.87	76	0.147	34

06803500 Salt Creek at Lincoln, Nebr.

Location.--Lat 40°50'49", long 96°40'54", in NW¼SW¼ sec. 7, T.10 N., R.7 E., Lancaster County, Hydrologic Unit 10200203, near center of channel on downstream side of pier of bridge on North 27th Street at north edge of Lincoln, 1 mi downstream from Oak Creek.

Drainage area.--684 mi^2.

Period of record.--Water years 1951-54, 1968 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	132	9,630	155	4,850	4,740	2,310	7,620	1,400
Dissolved solids, residue	mg/L	117	5,990	114	2,870	2,810	1,430	4,570	750
Dissolved solids, sum	mg/L	62	5,980	112	2,920	2,800	1,490	4,750	920
Hardness as $CaCO_3$	mg/L	75	483	37	311	338	103	416	125
Calcium, dissolved	mg/L	74	128	11	83	91	27	110	36
Magnesium, dissolved	mg/L	74	40	2.3	25	26	9.3	36	8.5
Sodium, dissolved	mg/L	71	2,130	36	993	947	531	1,760	260
Potassium, dissolved	mg/L	71	34	4.4	15	16	4.7	21	8.9
Bicarbonate ion	mg/L	74	474	47	316	348	94	406	160
Sulfate, dissolved	mg/L	72	450	17	236	246	106	358	55
Chloride, dissolved	mg/L	113	3,050	11	1,270	1,210	733	2,380	220
Fluoride, dissolved	mg/L	73	1.4	0.1	0.8	0.8	0.3	1.2	0.4
Silica, dissolved	mg/L	61	31	8.2	23	25	5.7	29	14
Boron, dissolved	mg/L	71	866	40	407	444	185	615	103
Iron, dissolved	ug/L	58	800	0	97	63	146	147	27
Manganese, dissolved	ug/L	43	1,430	74	486	370	313	853	150
Nitrite + nitrate as N, dissolved	mg/L	52	8.3	0.00	1.6	1.2	1.8	2.0	0.53
Nitrate as N, dissolved	mg/L	42	7.4	0.00	1.1	0.83	1.3	1.7	0.26
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	60	15	0.01	5.9	5.4	3.7	11.0	1.2
Organic N, total	mg/L	111	17	0.00	2.6	1.9	2.9	6.2	0.22
Phosphorus, total	mg/L	96	11	0.30	3.9	3.4	2.2	6.8	1.2
Phosphorus, dissolved	mg/L	99	14	0.01	3.2	2.9	2.4	6.0	0.26
Fecal coliform	col/100 ml	76	2,800,000	3	-------175,000		--------895,000		13
Fecal streptococci	col/100 ml	72	770,000	1	------- 42,000		--------238,000		11
Oxygen, dissolved	mg/L	93	17.0	0.60	8.5	8.6	2.6	11.8	4.9
Biochemical oxygen demand (5-day)	mg/L	102	---------	5.1	-------	17.5	--------	43.2	7.3
pH	pH units	153	8.3	6.7	7.5	7.5	0.3	7.9	7.1
Color	Co - Pt units	70	200	3	27	20	33	42	8

06803500 Salt Creek at Lincoln, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	119	RDS = 0.605(SpC) - 70.027	0.99	99	161
Dissolved solids, sum (SDS)	62	SDS = 0.613(SpC)- 128.190	.99	99	178
Hardness as $CaCO_3$ (TH)	76	TH = 0.037(SpC) + 126.508	.90	80	46
Calcium (Ca)	75	Ca = 0.009(SpC) + 37.528	.86	74	14
Magnesium (Mg)	75	Mg = 0.003(SpC) + 7.733	.94	88	3.3
Sodium (Na)	72	Na = 0.218(SpC) - 116.225	.99	98	75
Potassium (K)	72	K = 0.001(SpC) + 9.283	.62	39	3.7
Bicarbonate (HCO_3)	75	HCO_3= 0.030(SpC) + 169.177	.78	60	60
Sulfate (SO_4)	73	SO_4 = 0.042(SpC) + 24.677	.94	89	35
Chloride (Cl)	116	Cl= 0.317(SpC) - 212.855	.97	95	167
Silica (Si)	62	Si = 0.001(SpC) + 16.114	.57	33	4.7
Nitrite + Nitrate as N (NO_2-NO_3)	52	NO_2-NO_3= -0.00003(SpC)+1.698	*.03	0.09	1.8

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
133	26,500	26	SpC = 103,600 $Q^{-0.66794}$	-0.95	91	0.107	25

06803510 Little Salt Creek near Lincoln, Nebr.

Location.--Lat 40°53'36", long 96°40'52", in NW¼SW¼ sec. 30, T.11 N., R.7 E., Lancaster County, at gaging station at bridge on county road 1.6 mi north of intersection of Interstate 80 and North 14th Street, north of Lincoln.

Period of record.--April 1971 to September 1976.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	24	28,800	201	9,960	9,100	8,340	20,000	886
Dissolved solids, residue	mg/L	22	18,200	140	6,170	6,200	5,170	12,000	510
Dissolved solids, sum	mg/L	11	10,600	119	2,040	830	3,070	3,700	331
Hardness as $CaCO_3$	mg/L	22	850	25	379	450	232	605	110
Calcium, dissolved	mg/L	22	210	7.4	96	110	58	160	28
Magnesium, dissolved	mg/L	22	80	1.6	34	40	23	60	7.3
Sodium, dissolved	mg/L	22	6,500	28	2,130	2,100	1,860	4,300	150
Potassium, dissolved	mg/L	22	35	6.8	19	20	7.4	27	10
Bicarbonate ion	mg/L	22	578	49	315	330	169	513	120
Sulfate, dissolved	mg/L	22	1,600	14	656	620	526	1,300	58
Chloride, dissolved	mg/L	22	9,200	27	2,930	2,400	2,610	5,900	160
Fluoride, dissolved	mg/L	23	1.6	0.3	0.7	0.7	0.3	1.1	0.5
Silica, dissolved	mg/L	10	22	6.1	10	10	4.5	12	6.9
Boron, dissolved	mg/L	10	2,710	110	619	310	784	1,030	180
Iron, dissolved	ug/L	13	193	10	46	30	47	70	20
Manganese, dissolved	ug/L	13	1,350	50	643	580	469	1,300	60
Nitrite + nitrate as N, dissolved	mg/L	18	1.4	0.05	0.60	0.48	0.42	1.2	0.06
Nitrate as N, dissolved	mg/L	1	----------		1.6	----------			
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	9	5.1	0.18	1.2	---------	1.5	----------	
Organic N, total	mg/L	22	16.0	0.00	2.5	1.1	3.9	7.2	0.03
Phosphorus, total	mg/L	22	4.3	0.13	0.89	0.57	0.98	1.7	0.16
Phosphorus, dissolved	mg/L	23	0.50	0.07	0.26	0.23	0.13	0.42	0.11
Fecal coliform	col/100 ml	17	81,000	1	-------	170	--------	39,500	8
Fecal streptococci	col/100 ml	17	222,000	420	-------	2,000	--------	68,000	-------
Oxygen, dissolved	mg/L	18	21.6	4.4	13.1	12.5	5.3	19.5	7.0
Biochemical oxygen demand (5-day)	mg/L	21	11.0	1.3	5.1	4.9	2.9	7.8	1.7
pH	pH units	39	8.6	7.0	7.8	7.8	0.4	8.3	7.1
Color	Co - Pt units	22	700	3	151	38	203	420	6

06803510 Little Salt Creek near Lincoln, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	22	RDS = 0.612(SpC) - 40.324	0.99	99	550
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	22	TH = 0.026(SpC) + 119.906	.92	85	92
Calcium (Ca)	22	Ca = 0.006(SpC) + 36.097	.85	73	31
Magnesium (Mg)	22	Mg = 0.003(SpC) + 6.850	.98	96	4.8
Sodium (Na)	22	Na = 0.221(SpC) - 107.903	1.0	99	143
Potassium (K)	22	K = 0.0007(SpC) + 12.067	.82	67	4.4
Bicarbonate (HCO_3)	22	HCO_3=0.016(SpC) + 152.407	.81	66	100
Sulfate (SO_4)	22	SO_4 = 0.062(SpC) + 26.415	.99	98	73
Chloride (Cl)	22	Cl - 0.309(SpC) - 205.824	1.0	99	236
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	18	NO_2-NO_3= -0.00004(SpC)+0.972	-.74	55	0.29

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
24	1,260	0.94	$SpC = 31,530\ Q^{-0.66371}$	-0.99	98	0.084	19

06803523 Stevens Creek at Hwy. 6 near Lincoln, Nebr.

Location.--Lat 40°52'35", long 96°36'16", in NW¼SW¼ sec. 35, T.11 N., R.7 E., Lancaster County, at bridge at U.S. Highway 6 about 2.6 mi northeast of intersection with U.S. Highway 77, and about 1.2 mi upstream from confluence with Salt Creek.

Period of record.--March 1971 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	36	892	89	672	678	131	780	540
Dissolved solids, residue	mg/L	36	616	80	438	443	85	510	360
Dissolved solids, sum	mg/L	21	563	61	416	430	104	490	320
Hardness as $CaCO_3$	mg/L	36	360	30	268	276	54	320	240
Calcium, dissolved	mg/L	33	100	8.3	75	77	16	90	62
Magnesium, dissolved	mg/L	33	28	2.2	20	20	4.3	24	17
Sodium, dissolved	mg/L	33	61	5.1	47	47	11	58	37
Potassium, dissolved	mg/L	33	11	4.2	6.7	6.5	1.6	8.6	4.9
Bicarbonate ion	mg/L	36	477	39	338	344	70	395	290
Sulfate, dissolved	mg/L	36	94	7.3	66	66	14	78	55
Chloride, dissolved	mg/L	36	43	1.1	20	19	8.9	35	12
Fluoride, dissolved	mg/L	33	0.8	0.0	0.4	0.4	0.2	0.5	0.2
Silica, dissolved	mg/L	21	29	5.9	19	20	6.4	26	13
Boron, dissolved	mg/L	21	320	40	134	113	75	250	70
Iron, dissolved	ug/L	12	50	10	19	20	12	30	12
Manganese, dissolved	ug/L	12	950	280	608	573	202	880	370
Nitrite + nitrate as N, dissolved	mg/L	24	3.1	0.00	1.4	1.3	1.0	2.8	0.09
Nitrate as N, dissolved	mg/L	3	1.8	0.00	1.1	---	0.99	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	20	1.3	0.10	0.39	0.28	0.32	0.99	0.14
Organic N, total	mg/L	36	4.0	0.17	0.83	0.63	0.73	1.4	0.27
Phosphorus, total	mg/L	36	0.85	0.21	0.44	0.41	0.14	0.67	0.29
Phosphorus, dissolved	mg/L	36	0.85	0.15	0.34	0.33	0.14	0.47	0.19
Fecal coliform	col/100 ml	32	49,000	40	---	1,740	---	3,750	550
Fecal streptococci	col/100 ml	32	124,000	180	---	1,040	---	5,900	390
Oxygen, dissolved	mg/L	36	14.5	3.8	9.6	8.9	2.6	14.0	7.2
Biochemical oxygen demand (5-day)	mg/L	35	13.0	1.0	3.3	2.7	2.1	5.1	1.5
pH	pH units	56	8.3	5.8	7.7	7.8	0.4	8.2	7.3
Color	Co - Pt units	36	400	2	30	20	64	39	5

06803523 Stevens Creek at Hwy. 6 near Lincoln, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	36	RDS = 0.609(SpC) + 28.205	0.94	88	30
Dissolved solids, sum (SDS)	21	SDS = 0.628(SpC) + 6.844	.98	96	21
Hardness as $CaCO_3$ (TH)	36	TH = 0.394(SpC) + 2.396	.96	92	15
Calcium (Ca)	33	Ca = 0.112(SpC) + 0.242	.96	91	4.8
Magnesium (Mg)	33	Mg = 0.030(SpC) - 0.853	.96	92	1.2
Sodium (Na)	34	Na = 0.069(SpC) + 0.857	.86	74	5.8
Potassium (K)	33	K = -0.001(SpC) + 7.384	*-.09	0.80	1.6
Bicarbonate (HCO_3)	36	HCO_3= 0.516(SpC) – 8.102	.96	92	20
Sulfate (SO_4)	36	SO_4 = 0.091(SpC) + 4.633	.82	67	8.5
Chloride (Cl)	36	Cl = 0.031(SpC) – 0.589	.46	21	8.0
Silica (Si)	21	Si = 0.028(SpC) + 1.038	.70	49	4.6
Nitrite + Nitrate as N (NO_2-NO_3)	24	NO_2-NO_3=0.002(SpC) + 0.007	*.27	7.5	1.0

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
36	2,390	0.24	$SpC = 759\ Q^{-0.14169}$	-0.63	40	0.123	29

06803525 Salt Creek below Stevens Creek, near Waverly, Nebr.

Location.--Lat 40°54'18", long 96°35'09", in NW¼SW¼ sec. 24, T.11 N., R.7 E., Lancaster County, Hydrologic Unit 10200203, at bridge 0.5 mi north of Interstate Highway 80 and 3 mi southwest of Waverly.

Drainage area.--815 mi^2.

Period of record.--Water year 1971 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	89	8,500	859	5,420	5,890	2,130	7,850	1,850
Dissolved solids, residue	mg/L	76	5,220	553	3,390	3,790	1,230	4,680	1,200
Dissolved solids, sum	mg/L	32	4,970	479	3,200	3,400	1,200	4,300	1,000
Hardness as $CaCO_3$	mg/L	46	410	160	334	348	57	390	250
Calcium, dissolved	mg/L	46	110	43	89	94	14	101	66
Magnesium, dissolved	mg/L	46	35	12	27	29	5.5	33	18
Sodium, dissolved	mg/L	47	1,700	100	1,130	1,180	417	1,630	440
Potassium, dissolved	mg/L	46	22	6.1	16	17	3.3	19	11
Bicarbonate ion	mg/L	95	446	168	355	378	60	406	270
Sulfate, dissolved	mg/L	95	470	63	294	325	94	396	167
Chloride, dissolved	mg/L	109	2,500	38	1,430	1,630	648	2,250	405
Fluoride, dissolved	mg/L	44	1.8	0.2	0.8	0.8	0.3	1.2	0.4
Silica, dissolved	mg/L	33	30	9.8	22	23	5.2	28	12
Boron, dissolved	mg/L	21	800	110	498	510	208	735	180
Iron, dissolved	ug/L	28	200	0	58	42	43	99	18
Manganese, dissolved	ug/L	28	1,100	16	372	310	271	735	90
Nitrite + nitrate as N, dissolved	mg/L	45	4.2	0.00	0.95	0.83	0.71	1.7	0.21
Nitrate as N, dissolved	mg/L	8	4.1	0.30	1.3	---	1.2	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	76	11	0.01	4.0	4.0	2.7	7.7	0.78
Organic N, total	mg/L	106	10	0.00	1.7	---	1.8	---	---
Phosphorus, total	mg/L	109	10	0.79	3.7	3.3	2.1	6.4	1.2
Phosphorus, dissolved	mg/L	84	10	0.15	3.3	3.1	2.0	5.9	0.54
Fecal coliform	col/100 ml	99	2,900,000	10	---	105,000	---	767,000	201
Fecal streptococci	col/100 ml	85	270,000	1	---	23,500	---	87,100	162
Oxygen, dissolved	mg/L	114	12.5	0.0	7.0	7.1	2.5	10.1	3.6
Biochemical oxygen demand (5-day)	mg/L	98	43.0	0.8	11.6	10.1	7.0	20.0	4.8
pH	pH units	145	8.5	6.5	7.5	7.6	0.3	7.9	7.2
Color	Co - Pt units	44	100	7	27	20	18	47	12

06803525 Salt Creek below Stevens Creek, near Waverly, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	76	RDS = 0.584(SpC) + 61.472	0.98	97	224
Dissolved solids, sum (SDS)	32	SDS = 0.576(SpC) + 2.435	.99	99	128
Hardness as $CaCO_3$ (TH)	45	TH = 0.026(SpC) + 185.047	.88	78	28
Calcium (Ca)	45	Ca = 0.006(SpC) + 53.227	.83	69	8.2
Magnesium (Mg)	45	Mg = 0.002(SpC) + 12.499	.91	83	2.3
Sodium (Na)	45	Na - 0.209(SpC) − 93.216	.99	98	68
Potassium (K)	45	K = 0.001(SpC) + 8.854	.71	51	2.4
Bicarbonate (HCO_3)	73	HCO_3= 0.025(SpC) + 204.329	.81	65	38
Sulfate (SO_4)	76	SO_4 = 0.045(SpC) + 41.671	.93	87	36
Chloride (Cl)	90	Cl - 0.301(SpC) − 166.136	.97	94	168
Silica (Si)	33	Si = 0.002(SpC) + 9.718	.86	73	2.7
Nitrite + Nitrate as N (NO_2-NO_3)	44	NO_2-NO_3= -0.0001(SpC)+1.656	.43	19	0.65

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
89	1,300	48	$SpC = 127{,}300\ Q^{-0.68251}$	-0.96	93	0.066	15

06803530 Rock Creek near Ceresco, Nebr.

Location.--Lat 41°00'56", long 96°32'39", in NE¼NE¼ sec. 17, T.12 N., R.8 E., Lancaster County, Hydrologic Unit 10200203, on right bank 10 ft downstream from bridge on east-west county road and 5.7 mi southeast of Ceresco.

Drainage area.--119 mi^2.

Period of record.--April 1970 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	62	2,830	145	1,340	1,310	383	1,730	1,100
Dissolved solids, residue	mg/L	46	1,950	197	859	813	258	1,120	685
Dissolved solids, sum	mg/L	40	1,120	72	770	766	200	970	600
Hardness as $CaCO_3$	mg/L	51	390	68	266	272	58	309	212
Calcium, dissolved	mg/L	51	120	19	75	75	17	91	60
Magnesium, dissolved	mg/L	51	31	4.9	19	20	4.5	25	15
Sodium, dissolved	mg/L	51	470	35	193	184	63	260	152
Potassium, dissolved	mg/L	51	13	6.6	8.7	8.4	1.6	11	7.0
Bicarbonate ion	mg/L	63	399	60	312	317	63	364	220
Sulfate, dissolved	mg/L	50	290	31	128	125	41	183	97
Chloride, dissolved	mg/L	51	580	56	216	200	84	310	165
Fluoride, dissolved	mg/L	52	0.9	0.1	0.5	0.5	0.1	0.6	0.3
Silica, dissolved	mg/L	40	35	9.8	24	24	6.1	33	17
Boron, dissolved	mg/L	39	450	80	237	240	56	290	170
Iron, dissolved	ug/L	19	80	0	23	20	16	40	10
Manganese, dissolved	ug/L	19	1,900	60	653	650	534	1,600	120
Nitrite + nitrate as N, dissolved	mg/L	37	4.1	0.00	1.4	1.3	1.2	3.1	0.06
Nitrate as N, dissolved	mg/L	19	3.6	0.00	0.89	0.72	0.98	3.1	0.00
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	31	3.8	0.04	0.38	0.22	0.66	0.55	0.07
Organic N, total	mg/L	55	12.0	0.00	1.3	0.70	2.2	2.5	0.19
Phosphorus, total	mg/L	39	2.3	0.21	0.50	0.43	0.35	0.83	0.24
Phosphorus, dissolved	mg/L	64	1.9	0.01	0.33	0.30	0.23	0.48	0.19
Fecal coliform	col/100 ml	28	19,000	25	-------	527	--------	3,300	45
Fecal streptococci	col/100 ml	28	26,000	60	-------	962	--------	5,400	330
Oxygen, dissolved	mg/L	34	15.0	4.0	10.1	10.0	2.7	13.5	7.0
Biochemical oxygen demand (5-day)	mg/L	32	9.6	0.8	3.3	2.6	2.1	6.8	1.7
pH	pH units	85	8.7	6.6	7.8	7.9	.0.4	8.4	7.3
Color	Co - Pt units	52	500	3	40	22	86	41	6

06803530 Rock Creek near Ceresco, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	44	RDS = 0.670(SpC) − 83.347	0.98	97	48
Dissolved solids, sum (SDS)	37	SDS = 0.565(SpC) + 40.562	.98	97	30
Hardness as $CaCO_3$ (TH)	49	TH = 0.120(SpC) + 100.929	.77	59	37
Calcium (Ca)	49	Ca = 0.032(SpC) + 30.694	.71	51	12
Magnesium (Mg)	49	Mg = 0.010(SpC) + 6.122	.79	63	2.8
Sodium (Na)	49	Na = 0.164(SpC) − 34.646	.98	95	14
Potassium (K)	49	K = -0.0005(SpC) + 9.447	*-.12	1.4	1.7
Bicarbonate (HCO_3)	61	HCO_3= 0.095(SpC) + 182.640	.53	28	54
Sulfate (SO_4)	48	SO_4 = 0.106(SpC) − 19.662	.97	93	11
Chloride (Cl)	49	Cl - 0.216(SpC) − 84.086	.96	93	22
Silica (Si)	38	Si = 0.005(SpC) + 16.995	*.25	6.1	6.0
Nitrite + Nitrate as N (NO_2-NO_3)	37	NO_2-NO_3= -0.001(SpC)+2.768	*-.30	9.3	1.2

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
62	1,230	2.1	SpC = 2,292 $Q^{-0.24353}$	-0.63	39	0.134	31

06803555 Salt Creek at Greenwood, Nebr.

Location.--Lat 40°57'56", long 96°27'01", at center of sec. 31, T.12 N., R.9 E., Cass County, at gaging station at county road bridge 0.5 mi west of Greenwood.

Drainage area.--1,051 mi^2.

Period of record.--July 1971 to September 1972.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	12	9,130	2,160	6,230	6,200	1,980	8,650	4,650
Dissolved solids, residue	mg/L	12	5,180	1,320	3,750	3,850	1,060	4,930	2,800
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L	12	440	260	360	360	52	420	310
Calcium, dissolved	mg/L	12	120	70	96	94	14	115	84
Magnesium, dissolved	mg/L	12	35	20	29	29	4.5	34	25
Sodium, dissolved	mg/L	12	1,800	340	1,190	1,250	420	1,730	830
Potassium, dissolved	mg/L	12	20	14	16	16	1.9	18	14
Bicarbonate ion	mg/L	12	426	286	360	363	41	410	290
Sulfate, dissolved	mg/L	12	520	140	312	330	107	420	-------
Chloride, dissolved	mg/L	12	2,700	470	1,710	1,800	624	2,500	1,200
Fluoride, dissolved	mg/L	12	1.1	0.4	0.8	0.8	0.2	1.0	0.6
Silica, dissolved	mg/L								
Boron, dissolved	mg/L								
Iron, dissolved	ug/L	12	40	20	27	34	6	51	20
Manganese, dissolved	ug/L	12	1,100	60	441	380	350	657	90
Nitrite + nitrate as N, dissolved	mg/L	12	7.1	0.57	1.8	1.2	1.9	4.3	0.60
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L								
Ammonia N, total	mg/L								
Organic N, total	mg/L	12	1.6	0.00	0.64	0.60	0.55	1.3	0.10
Phosphorus, total	mg/L	12	4.3	1.4	3.3	3.4	0.79	4.0	2.3
Phosphorus, dissolved	mg/L	12	4.0	1.0	3.0	3.2	0.82	3.9	2.0
Fecal coliform	col/100 ml	11	60,000	330	-------	7,000	---------	48,000	700
Fecal streptococci	col/100 ml	11	21,000	170	-------	1,000	---------	17,500	210
Oxygen, dissolved	mg/L	12	10.2	4.6	7.2	7.5	2.0	9.7	4.7
Biochemical oxygen demand (5-day)	mg/L	13	9.3	1.6	5.7	5.6	2.3	8.8	2.2
pH	pH units	23	7.9	6.7	7.5	7.6	0.3	7.9	7.1
Color	Co - Pt units	12	60	10	22	30	13	30	0

06803565 Salt Creek above Ashland, Nebr.

Location.--Lat 41°01'34", long 96°24'22", in NW¼NW¼ sec. 10, T.12 N., R.9 E., Saunders County, Hydrologic Unit 10200203, at county road bridge 2 mi southwest of Ashland.

Drainage area.--1,118 mi^2.

Period of record.--Water year 1971 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	93	8,230	723	5,030	5,620	1,950	7,180	2,200
Dissolved solids, residue	mg/L	91	5,140	446	2,970	3,270	1,140	4,200	1,330
Dissolved solids, sum	mg/L	40	4,360	413	2,710	2,930	1,060	3,920	1,300
Hardness as $CaCO_3$	mg/L	51	420	160	332	351	59	380	250
Calcium, dissolved	mg/L	51	110	46	89	93	15	103	67
Magnesium, dissolved	mg/L	51	35	12	26	28	5.6	32	17
Sodium, dissolved	mg/L	51	1,600	81	970	1,030	394	1,380	415
Potassium, dissolved	mg/L	51	20	6.5	14	14	3.0	18	9.7
Bicarbonate ion	mg/L	51	451	186	336	352	63	386	230
Sulfate, dissolved	mg/L	51	470	44	256	282	91	351	135
Chloride, dissolved	mg/L	91	2,500	77	1,320	1,480	588	1,890	500
Fluoride, dissolved	mg/L	52	1.2	0.3	0.7	0.7	0.2	0.9	0.5
Silica, dissolved	mg/L	38	30	11	21	21	4.7	27	13
Boron, dissolved	mg/L	28	660	90	412	440	168	620	140
Iron, dissolved	ug/L	18	90	0	36	32	24	80	10
Manganese, dissolved	ug/L	18	990	4	312	290	273	880	12
Nitrite + nitrate as N, dissolved	mg/L	59	3.4	0.00	1.6	1.6	0.58	2.2	0.86
Nitrate as N, dissolved	mg/L	7	2.5	0.60	1.4	---	0.72	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	60	9.0	0.00	2.2	1.6	1.9	4.5	0.37
Organic N, total	mg/L	94	11.0	0.00	1.5	1.2	1.6	2.9	0.17
Phosphorus, total	mg/L	94	9.5	0.85	2.9	2.4	1.9	5.2	1.1
Phosphorus, dissolved	mg/L	85	5.6	0.23	2.3	2.1	1.4	4.2	0.70
Fecal coliform	col/100 ml	81	190,000	3	---	5,200	---	57,400	90
Fecal streptococci	col/100 ml	83	200,000	20	---	948	---	31,000	110
Oxygen, dissolved	mg/L	93	16.8	3.5	8.0	7.5	2.2	10.3	5.5
Biochemical oxygen demand (5-day)	mg/L	90	36.0	1.7	10.4	8.0	7.1	21.5	3.8
pH	pH units	130	8.8	6.5	7.6	7.6	0.4	8.0	7.2
Color	Co - Pt units	52	100	5	25	20	20	58	9

06803565 Salt Creek above Ashland, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	92	RDS = 0.580(SpC) + 47.881	0.98	97	208
Dissolved solids, sum (SDS)	40	SDS = 0.566(SpC) + 4.454	.99	99	111
Hardness as $CaCO_3$ (TH)	52	TH = 0.027(SpC) + 192.517	.86	74	30
Calcium (Ca)	52	Ca = 0.006(SpC) + 55.662	.81	65	9.1
Magnesium (Mg)	52	Mg = 0.003(SpC) + 12.598	.90	80	2.5
Sodium (Na)	52	Na - 0.206(SpC) - 89.356	.99	98	48
Potassium (K)	52	K = 0.0009(SpC) + 9.353	.56	32	2.5
Bicarbonate (HCO_3)	52	HCO_3 = 0.025(SpC) + 203.822	.76	58	41
Sulfate (SO_4)	52	SO_4 = 0.039(SpC) + 57.603	.81	65	54
Chloride (Cl)	92	Cl - 0.300(SpC) − 164.521	.98	97	100
Silica (Si)	39	Si = 0.002(SpC) + 13.167	.58	34	3.9
Nitrite + Nitrate as N (NO_2-NO_3)	59	NO_2-NO_3= -0.00009(SpC)+2.025	-.31	9.8	0.55

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
93	1,650	46	$SpC = 162{,}000\ Q^{-0.70218}$	-0.92	86	0.090	21

06804000 Wahoo Creek at Ithaca, Nebr.

Location.--Lat 41°08'40", long 96°32'10", in NE¼NE¼ sec. 33, T.14 N., R.8 E., Saunders County, at gaging station at bridge on State Highway 63, 0.5 mi south of Ithaca.

Drainage area.--272 mi^2, approximately.

Period of record.--October 1966 to September 1968.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	25	938	112	764	833	214	910	360
Dissolved solids, residue	mg/L	25	666	97	489	528	137	580	230
Dissolved solids, sum	mg/L	12	601	452	533	535	40	580	486
Hardness as $CaCO_3$	mg/L	25	339	43	260	288	72	298	120
Calcium, dissolved	mg/L	25	100	12	75	83	21	89	36
Magnesium, dissolved	mg/L	25	22	3.2	18	20	4.8	22	8.7
Sodium, dissolved	mg/L	25	79	2.1	62	68	21	77	25
Potassium, dissolved	mg/L	25	13	6.0	9.1	9.0	1.4	11	7.8
Bicarbonate ion	mg/L	25	365	50	288	307	78	336	140
Sulfate, dissolved	mg/L	25	126	9.0	96	104	30	120	40
Chloride, dissolved	mg/L	25	62	1.3	45	48	16	58	15
Fluoride, dissolved	mg/L	25	0.8	0.3	0.5	0.5	0.1	0.6	0.4
Silica, dissolved	mg/L	25	31	11	24	26	5.4	29	13
Boron, dissolved	mg/L	25	210	40	146	161	43	200	76
Iron, dissolved	ug/L	12	120	10	47	29	42	114	12
Manganese, dissolved	ug/L	12	730	0	402	420	243	660	70
Nitrite + nitrate as N, dissolved	mg/L	---	---	---	---	---	---	---	---
Nitrate as N, dissolved	mg/L	25	7.5	0.00	4.0	---	2.0	---	---
Nitrate as NO_3, dissolved	mg/L	---	---	---	---	---	---	---	---
Ammonia N, total	mg/L	---	---	---	---	---	---	---	---
Organic N, total	mg/L	---	---	---	---	---	---	---	---
Phosphorus, total	mg/L	---	---	---	---	---	---	---	---
Phosphorus, dissolved	mg/L	---	---	---	---	---	---	---	---
Fecal coliform	col/100 ml	---	---	---	---	---	---	---	---
Fecal streptococci	col/100 ml	---	---	---	---	---	---	---	---
Oxygen, dissolved	mg/L	---	---	---	---	---	---	---	---
Biochemical oxygen demand (5-day)	mg/L	---	---	---	---	---	---	---	---
pH	pH units	25	8.4	6.7	7.7	7.8	0.4	8.1	7.0
Color	Co - Pt units	14	10	1	4	4	2.2	6	2

06804000 Wahoo Creek at Ithaca, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	25	RDS = 0.637(SpC) + 2.365	0.99	98	18
Dissolved solids, sum (SDS)	---	---	---	---	---
Hardness as $CaCO_3$ (TH)	25	TH = 0.331(SpC) + 7.770	.98	97	12
Calcium (Ca)	25	Ca = 0.097(SpC) + 0.971	.98	96	4.6
Magnesium (Mg)	25	Mg = 0.022(SpC) + 1.236	.96	93	1.3
Sodium (Na)	25	Na = 0.095(SpC) - 11.004	.98	96	4.0
Potassium (K)	25	K = 0.003(SpC) + 6.837	.46	21	1.3
Bicarbonate (HCO_3)	25	HCO_3 = 0.351(SpC) + 20.002	.97	94	20
Sulfate (SO_4)	25	SO_4 = 0.141(SpC) - 11.400	.99	98	4.2
Chloride (Cl)	25	Cl = 0.073(SpC) - 10.938	.97	94	4.1
Silica (Si)	25	Si = 0.023(SpC) + 6.361	.92	86	2.1
Nitrite + Nitrate as N (NO_2-NO_3)	---	---	---	---	---

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
25	11,400	19.4	$SpC = 2,584\ Q^{-0.32999}$	-0.97	94	0.052	12

06804495 Silver Creek near Wahoo, Nebr.

Location.--Lat 41°12'22", long 96°32'37", in NE¼NE¼NE¼ sec. 8, T.14 N., R.8 E., Saunders County, Hydrologic Unit 10200203, at bridge on county road 3.9 mi east of intersection of First Street and U.S. Highway 77 in Wahoo.

Period of record.--Water year 1974 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	48	713	75	539	546	99	620	432
Dissolved solids, residue	mg/L	31	408	220	337	338	39	390	300
Dissolved solids, sum	mg/L	16	439	36	328	343	87	390	271
Hardness as $CaCO_3$	mg/L	16	250	17	210	228	53	240	190
Calcium, dissolved	mg/L	16	71	5.3	60	64	15	67	56
Magnesium, dissolved	mg/L	16	18	1.0	15	16	3.8	17	13
Sodium, dissolved	mg/L	16	57	2.4	28	28	12	43	20
Potassium, dissolved	mg/L	16	11	5.4	9.0	9.5	1.2	9.9	7.9
Bicarbonate ion	mg/L	16	296	18	260	280	66	293	245
Sulfate, dissolved	mg/L	16	43	7.7	34	38	9.6	42	21
Chloride, dissolved	mg/L	46	66	1.3	19	16	14	38	4.8
Fluoride, dissolved	mg/L	16	0.6	0.2	0.4	0.6	0.08	0.5	0.4
Silica, dissolved	mg/L	16	37	3.6	30	34	7.9	36	26
Boron, dissolved	mg/L	16	90	40	61	60	12	71	40
Iron, dissolved	ug/L	15	1,200	0	146	46	304	330	10
Manganese, dissolved	ug/L	15	430	10	237	220	133	423	50
Nitrite + nitrate as N, dissolved	mg/L	21	4.9	1.1	1.7	1.5	0.81	2.1	1.2
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	49	4.1	0.00	1.0	0.18	1.3	3.3	0.02
Organic N, total	mg/L	48	8.1	0.00	1.0	0.67	1.2	2.0	0.21
Phosphorus, total	mg/L	49	2.7	0.24	0.49	0.41	0.36	0.62	0.28
Phosphorus, dissolved	mg/L	40	0.57	0.01	0.31	0.31	0.11	0.47	0.20
Fecal coliform	col/100 ml	35	6,610	30	--------	380	--------	1,650	79
Fecal streptococci	col/100 ml	45	7,670	68	--------	765	--------	2,200	230
Oxygen, dissolved	mg/L	46	22.5	3.7	10.4	10.1	3.0	12.8	7.2
Biochemical oxygen demand (5-day)	mg/L	48	12.0	0.5	5.0	4.6	2.7	8.8	2.1
pH	pH units	50	8.8	6.8	7.7	7.6	0.4	8.4	7.3
Color	Co - Pt units	16	400	0	31	5	99	17	2

06804495 Silver Creek near Wahoo, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	31	RDS = 0.401(SpC) + 114.084	0.80	64	24
Dissolved solids, sum (SDS)	16	SDS = 0.633(SpC) - 4.011	.97	94	22
Hardness as $CaCO_3$ (TH)	16	TH = 0.375(SpC) + 13.212	.93	87	20
Calcium (Ca)	16	Ca = 0.104(SpC) + 5.387	.92	85	6.0
Magnesium (Mg)	16	Mg = 0.027(SpC) + 0.604	.93	86	1.5
Sodium (Na)	16	Na - 0.072(SpC) - 9.578	.81	65	7.2
Potassium (K)	16	K = 0.008(SpC) + 4.872	.87	76	0.6
Bicarbonate (HCO_3)	16	HCO_3=0.470(SpC) + 13.490	.94	89	23
Sulfate (SO_4)	16	SO_4 = 0.058(SpC)+ 3.609	.81	65	5.8
Chloride (Cl)	47	Cl = 0.072(SpC) - 20.049	.52	27	12
Silica (Si)	16	Si = 0.052(SpC) + 3.248	.87	76	4.0
Nitrite + Nitrate as N (NO_2-NO_3)	21	NO_2-NO_3= -0.003(SpC)+3.558	*-.19	3.5	0.81

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
48	498	1.5	$SpC = 741\ Q^{-0.20836}$	-0.59	35	0.112	26

06805500 Platte River at Louisville, Nebr.

Location.--Lat 41°00'55", long 96°09'28", in NW¼NW¼ sec. 14, T.12 N., R.11 E., Sarpy County, Hydrologic Unit 10200202, on left bank at upstream side of bridge on Nebraska Highway 50, 1 mi north of Louisville.

Drainage area (revised).--85,800 mi^2, approximately, of which about 71,000 mi^2 contributes directly to surface runoff. Approximately 4,000 mi^2 in Great Divide Basin is not included.

Period of record.--Water year 1972 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	36	1,660	475	713	625	262	970	717
Dissolved solids, residue	mg/L	34	978	296	460	423	153	610	320
Dissolved solids, sum	mg/L	34	1,040	297	450	400	158	580	310
Hardness as $CaCO_3$	mg/L	34	240	150	190	192	23	227	-------
Calcium, dissolved	mg/L	34	70	45	55	55	6.4	64	48
Magnesium, dissolved	mg/L	34	18	8.3	13	13	1.9	15	11
Sodium, dissolved	mg/L	34	290	28	77	58	56	127	32
Potassium, dissolved	mg/L	34	13	7.3	9.6	9.6	1.4	12	7.5
Bicarbonate ion	mg/L	34	260	169	207	205	23	237	-------
Sulfate, dissolved	mg/L	34	140	37	81	80	20	100	57
Chloride, dissolved	mg/L	34	370	12	79	49	78	147	17
Fluoride, dissolved	mg/L	34	0.8	0.2	0.4	0.4	0.1	0.5	0.3
Silica, dissolved	mg/L	34	46	24	33	33	5.9	43	27
Boron, dissolved	mg/L	----------							
Iron, dissolved	ug/L	11	100	10	35	30	31	90	10
Manganese, dissolved	ug/L	12	50	0	15	11	16	40	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	33	1.0	0.24	0.50	0.42	0.21	0.85	0.30
Phosphorus, dissolved	mg/L	1	----------		0.35	----------			
Fecal coliform	col/100 ml	23	4,800	12	--------	110	----------	2,200	19
Fecal streptococci	col/100 ml	32	14,200	11	--------	180	----------	1,600	35
Oxygen, dissolved	mg/L	8	14.1	8.3	11.2	------	1.9	----------	
Biochemical oxygen demand (5-day)	mg/L	1	----------		11.0	----------			
pH	pH units	38	8.6	6.8	7.8	7.8	0.4	8.4	7.1
Color	Co - Pt units	----------							

06805500 Platte River at Louisville, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	34	RDS = 0.558(SpC) + 60.878	0.98	96	29
Dissolved solids, sum (SDS)	34	SDS = 0.579(SpC) + 36.242	.99	98	23
Hardness as $CaCO_3$ (TH)	34	TH = 0.047(SpC) + 156.638	.55	30	20
Calcium (Ca)	34	Ca = 0.014(SpC) + 45.426	.57	33	5.3
Magnesium (Mg)	34	Mg = 0.004(SpC) + 10.048	.52	27	1.6
Sodium (Na)	34	Na = 0.202(SpC) - 68.001	.98	96	11
Potassium (K)	34	K = 0.003(SpC) + 7.374	.57	33	1.2
Bicarbonate (HCO_3)	34	HCO_3 = 0.054(SpC)+168.241	.63	39	18
Sulfate (SO_4)	34	SO_4 = 0.049(SpC) + 45.300	.67	45	15
Chloride (Cl)	34	Cl = 0.281(SpC) - 121.556	.97	94	19
Silica (Si)	34	Si = -0.002(SpC)+ 34.563	*-.08	0.66	5.9
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
36	10,200	468	$SpC = 9{,}349\ Q^{-0.32216}$	-0.75	57	0.087	20

LOWER PLATTE RIVER BASIN

06805570 Platte River at La Platte, Nebr.

Location.--Lat 41°03'34", long 95°55'38", in NE¼NE¼ sec. 34, T.13 N., R.13 E., Sarpy County, at bridge on U.S. Highways 73 and 75, 2.7 mi upstream from mouth, and 1.0 mi south of La Platte.

Period of record.--February 1974 to June 1975.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	12	985	442	682	630	174	870	459
Dissolved solids, residue	mg/L								
Dissolved solids, sum	mg/L								
Hardness as $CaCO_3$	mg/L								
Calcium, dissolved	mg/L								
Magnesium, dissolved	mg/L								
Sodium, dissolved	mg/L								
Potassium, dissolved	mg/L								
Bicarbonate ion	mg/L	35	268	168	219	220	21	245	200
Sulfate, dissolved	mg/L								
Chloride, dissolved	mg/L								
Fluoride, dissolved	mg/L								
Silica, dissolved	mg/L								
Boron, dissolved	mg/L								
Iron, dissolved	ug/L								
Manganese, dissolved	ug/L								
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L								
Nitrate as NO_3, dissolved	mg/L								
Ammonia N, total	mg/L	33	0.47	0.01	0.16	0.12	0.12	0.37	0.05
Organic N, total	mg/L	32	4.2	0.06	0.99	0.79	0.90	1.5	0.33
Phosphorus, total	mg/L	34	2.1	0.17	0.60	0.43	0.47	1.3	0.27
Phosphorus, dissolved	mg/L								
Fecal coliform	col/100 ml	36	99,200	33	---	760	---	19,000	46
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L	36	14.2	7.0	10.5	10.1	2.0	13.0	8.0
Biochemical oxygen demand (5-day)	mg/L								
pH	pH units	36	8.7	7.2	7.8	7.9	0.3	8.1	7.4
Color	Co - Pt units								

Nemaha River Basin

The Nemaha River basin consists mostly of three separate small basins, the principal streams of which drain directly into the Missouri River. These include Weeping Water Creek in the north part of the basin, the Little Nemaha River in the middle part, and the Big Nemaha River in the south part. Part of the drainage basin of the Big Nemaha River is in northeast Kansas.

The entire Nemaha River basin lies within the glaciated part of the State. Part of the basin consists of loess-covered drift hills, while the rest of the basin, excluding valleys, consists of glacial drift with soils developed directly upon it. Streamflow is characterized by high percentages of overland runoff.

Thre sites, one on each of the principal streams, have sufficient water-quality data available for statistical analyses (fig. 11). These sites are all near the mouth of their respective streams, and therefore the quality of water at each site is representative of outflow from its respective drainage. The mean specific conductance for 30 analyses for Weeping Water Creek near Union is 504 umho/cm. Calcium is the principal cation, and bicarbonate the principal anion. A mean nitrite plus nitrate concentration of 4.8 mg/L, a mean total phosphorus concentration of 1.7 mg/L, and a median fecal coliform bacteria concentration of 1,700 col/100 ml may be due to sewage effluent and (or) feedlot runoff.

Fifty-six measurements of specific conductance at the Little Nemaha River at Auburn average 596 umho/cm. Like Weeping Water Creek, calcium and bicarbonate are the principal cation and anion, respectively, but the mean specific conductance is about 15 percent higher. Mean concentrations of nitrite plus nitrate and total phosphorus are 2.2 and 0.65 mg/L, respectively, and median concentrations for fecal coliform and fecal streptococcal bacteria are 2,970 and 1,380 col/100 ml, respectively. Sewage effluent from the city of Auburn enters the stream above the sampling site.

The average specific conductance of 56 measurements for the Big Nemaha River at Falls City is 657 umho/cm. For this station calcium and bicarbonate are the principal cation and anion, respectively. Total phosphorus and nitrite plus nitrate means and fecal coliform and fecal steptococcal bacteria medians are similar to those for the Little Nemaha River at Auburn. Sewage effluent from Falls City enters the river above the sampling site.

Correlation coefficients are 0.8 or greater for all constituents except potassium, chloride, silica, and nitrite plus nitrate for all three stations.

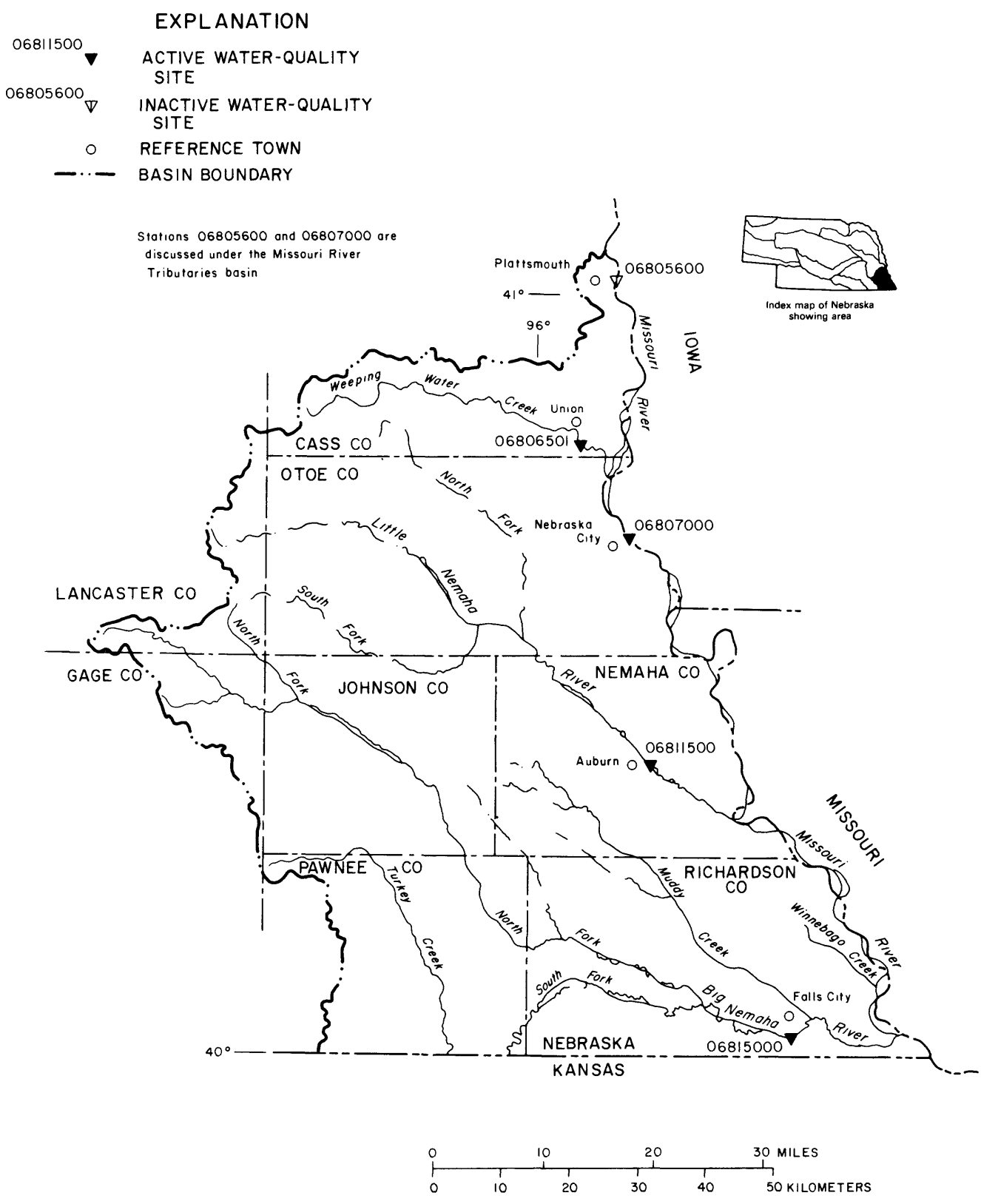

Figure 11. Location of water-quality sampling sites, Nemaha River basin.

06806501 Weeping Water Creek near Union, Nebr.

Location.--Lat 40°47'46", long 95°54'17", in NE¼NE¼NW¼ sec. 36, T.10 N., R.13 E., Cass County, Hydrologic Unit 10240001, at county road bridge 1.1 mi downstream from gaging station, 1.6 mi southeast of Union, and 3.9 mi downstream from South Branch Weeping Water Creek.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	30	615	110	504	553	123	595	420
Dissolved solids, residue	mg/L	3	316	77	169	--------	129	----------	
Dissolved solids, sum	mg/L	29	386	55	315	345	83	373	120
Hardness as $CaCO_3$	mg/L	29	280	28	223	248	62	275	80
Calcium, dissolved	mg/L	29	80	8.6	64	69	18	79	25
Magnesium, dissolved	mg/L	29	19	1.7	15	17	4.4	19	5.1
Sodium, dissolved	mg/L	29	34	3.0	20	22	6.8	28	5.3
Potassium, dissolved	mg/L	29	12	2.9	5.1	4.4	2.1	8.7	3.2
Bicarbonate ion	mg/L	29	342	47	257	274	70	307	99
Sulfate, dissolved	mg/L	29	49	4.7	36	40	9.9	44	20
Chloride, dissolved	mg/L	29	16	1.8	7.7	7.0	3.4	14	3.8
Fluoride, dissolved	mg/L	29	0.6	0.2	0.4	0.4	0.1	0.5	0.3
Silica, dissolved	mg/L	29	25	5.3	18	20	5.1	24	11
Boron, dissolved	mg/L	29	120	0	66	62	27	110	40
Iron, dissolved	ug/L	28	250	0	49	41	47	90	9
Manganese, dissolved	ug/L	28	630	40	223	200	129	380	90
Nitrite + nitrate as N, dissolved	mg/L	26	7.8	1.1	4.8	4.9	1.7	6.8	2.8
Nitrate as N, dissolved	mg/L	4	6.6	2.2	4.3	--------	2.0	----------	
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	7	0.94	0.06	0.61	--------	0.31	----------	
Organic N, total	mg/L	7	17	1.2	6.1	--------	6.4	----------	
Phosphorus, total	mg/L	7	4.4	0.26	1.7	--------	1.5	----------	
Phosphorus, dissolved	mg/L	29	0.42	0.07	0.20	0.18	0.08	0.36	0.11
Fecal coliform	col/100 ml	25	222,000	270	-------	1,700	--------	35,000	450
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	29	12.9	4.2	9.3	--------	2.2	12.2	8.0
Biochemical oxygen demand (5-day)	mg/L	29	10.0	1.0	3.7	3.0	2.1	6.4	1.9
pH	pH units	41	8.1	7.0	7.7	7.8	0.2	7.9	7.5
Color	Co - Pt units	29	480	4	61	19	113	190	5

06806501 Weeping Water Creek near Union, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)					
Dissolved solids, sum (SDS)	29	SDS = 0.657(SpC) - 15.927	0.99	99	9.1
Hardness as $CaCO_3$ (TH)	29	TH = 0.494(SpC) - 26.085	.99	99	6.7
Calcium (Ca)	29	Ca = 0.141(SpC) - 7.058	.99	98	2.2
Magnesium (Mg)	29	Mg = 0.035(SpC) - 2.088	.99	98	0.7
Sodium (Na)	29	Na = 0.047(SpC) - 3.321	.86	74	3.5
Potassium (K)	29	K = -0.007(SpC) + 8.693	-.43	18	1.9
Bicarbonate (HCO_3)	29	HCO_3=0.549(SpC) - 19.512	.98	96	15
Sulfate (SO_4)	29	SO_4 = 0.072(SpC) + 0.093	.91	83	4.1
Chloride (Cl)	29	Cl = 0.014(SpC) + 0.542	.52	27	3.0
Silica (Si)	29	Si = 0.036(SpC) + 0.176	.88	77	2.5
Nitrite + Nitrate as N (NO_2-NO_3)	26	NO_2-NO_3=0.010(SpC) - 0.514	.48	23	1.5

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
30	4,290	7.1	$SpC = 1{,}261\ Q^{-0.20944}$	-0.68	47	0.125	29

06811500 Little Nemaha River at Auburn, Nebr.

Location.--Lat 40°23'33", long 95°48'46", in NE¼NW¼ sec. 23, T.5 N., R.14 E., Nemaha County, Hydrologic Unit 10240006, on left bank at downstream side of bridge on U.S. Highway 136, 1 mi downstream from Longs Creek and Willow Creek and 1 mi east of Auburn.

Drainage area.--793 mi^2.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	56	850	190	596	610	123	710	460
Dissolved solids, residue	mg/L	37	506	159	378	380	89	450	320
Dissolved solids, sum	mg/L	19	462	105	338	355	88	420	176
Hardness as $CaCO_3$	mg/L	19	300	66	226	243	60	285	110
Calcium, dissolved	mg/L	19	85	20	64	66	17	82	30
Magnesium, dissolved	mg/L	19	22	3.8	16	18	4.7	21	8.2
Sodium, dissolved	mg/L	19	53	8.8	33	34	11	48	14
Potassium, dissolved	mg/L	19	7.7	3.7	5.1	4.8	1.1	6.9	3.8
Bicarbonate ion	mg/L	19	371	73	265	283	71	318	136
Sulfate, dissolved	mg/L	19	73	15	52	54	15	70	26
Chloride, dissolved	mg/L	54	68	4.7	17	16	9.6	27	8.6
Fluoride, dissolved	mg/L	19	0.6	0.2	0.4	0.4	0.1	0.5	0.2
Silica, dissolved	mg/L	19	21	8.6	16	18	3.2	20	10
Boron, dissolved	mg/L	19	100	0.0	63	70	22	91	40
Iron, dissolved	ug/L	19	100	10	46	38	29	92	20
Manganese, dissolved	ug/L	19	3,200	0	248	64	718	290	0
Nitrite + nitrate as N, dissolved	mg/L	28	4.4	0.16	2.2	2.2	1.1	3.8	0.62
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	57	3.4	0.00	0.31	0.20	0.48	0.48	0.04
Organic N, total	mg/L	57	5.8	0.18	1.2	0.76	1.1	2.7	0.40
Phosphorus, total	mg/L	57	5.5	0.01	0.65	0.41	0.83	1.2	0.28
Phosphorus, dissolved	mg/L	46	0.61	0.00	0.26	0.26	0.12	0.42	0.15
Fecal coliform	col/100 ml	41	21,700	200	-------	2,970	---------	10,600	590
Fecal streptococci	col/100 ml	51	145,000	156	-------	1,380	---------	8,830	260
Oxygen, dissolved	mg/L	53	16.0	6.0	10.5	10.1	2.1	13.3	7.3
Biochemical oxygen demand (5-day)	mg/L	55	15.0	1.0	4.5	3.6	2.7	8.2	1.9
pH	pH units	60	8.7	6.7	7.7	7.8	0.4	8.3	7.3
Color	Co - Pt units	18	340	3	36	12	78	60	4

06811500 Little Nemaha River at Auburn, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	37	RDS = 0.540(SpC) + 48.620	0.95	90	21
Dissolved solids, sum (SDS)	19	SDS = 0.653(SpC) - 24.810	.99	99	9.4
Hardness as $CaCO_3$ (TH)	19	TH = 0.446(SpC) - 21.862	.99	98	9.2
Calcium (Ca)	19	Ca = 0.127(SpC) - 6.106	.98	96	3.4
Magnesium (Mg)	19	Mg = 0.033(SpC) - 2.620	.96	92	1.4
Sodium (Na)	19	Na = 0.074(SpC) - 7.869	.88	78	5.3
Potassium (K)	19	K = -0.005(SpC) + 7.823	-.58	34	0.9
Bicarbonate (HCO_3)	19	HCO_3= 0.527(SpC) - 27.538	.99	98	11
Sulfate (SO_4)	19	SO_4 0.106(SpC) - 7.082	.94	88	5.2
Chloride (Cl)	54	Cl = 0.053(SpC) - 14.218	.64	42	7.5
Silica (Si)	19	Si = 0.020(SpC) + 5.633	.82	68	1.9
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3=0.0005(SpC)+1.896	*.05	0.21	1.2

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
56	1,030	1.2	SpC = 1,105 $Q^{-0.13952}$	-0.67	45	0.081	19

06815000 Big Nemaha River at Falls City, Nebr.

Location.--Lat 40°02'00", long 95°35'30", on line between secs. 22 and 23, T.1 N., R.16 E., Richardson County, Hydrologic Unit 10240008, near right bank on downstream side of pier of bridge on U.S. Highway 73, 1 mi south of Falls City, and 13 mi upstream from mouth.

Drainage area.--1,340 mi^2.

Period of record.--Water years 1951, 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	56	1,020	260	657	677	147	795	450
Dissolved solids, residue	mg/L	35	638	251	437	418	81	570	350
Dissolved solids, sum	mg/L	20	568	142	356	370	107	530	210
Hardness as $CaCO_3$	mg/L	20	390	98	249	263	65	340	140
Calcium, dissolved	mg/L	20	110	30	70	74	18	97	40
Magnesium, dissolved	mg/L	20	28	5.6	18	20	5.3	25	9.6
Sodium, dissolved	mg/L	20	64	9.5	30	26	14	50	18
Potassium, dissolved	mg/L	20	7.0	3.5	5.1	4.8	1.0	6.6	4.1
Bicarbonate ion	mg/L	20	378	110	249	265	62	343	140
Sulfate, dissolved	mg/L	20	140	21	72	67	29	120	39
Chloride, dissolved	mg/L	55	61	6.2	25	23	12	38	12
Fluoride, dissolved	mg/L	20	0.5	0.2	0.3	0.3	0.07	0.4	0.3
Silica, dissolved	mg/L	20	18	7.3	11	9.8	3.1	17	7.3
Boron, dissolved	mg/L	20	120	20	74	72	29	116	50
Iron, dissolved	ug/L	20	200	10	55	40	51	170	23
Manganese, dissolved	ug/L	20	180	0	54	38	52	106	4
Nitrite + nitrate as N, dissolved	mg/L	28	3.8	0.12	1.8	2.0	1.1	3.2	0.30
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	58	1.1	0.00	0.27	0.21	0.23	0.60	0.06
Organic N, total	mg/L	58	13	0.07	1.7	1.1	2.2	3.6	0.42
Phosphorus, total	mg/L	58	4.0	0.19	0.51	0.35	0.56	0.97	0.22
Phosphorus, dissolved	mg/L	48	0.50	0.04	0.19	0.19	0.08	0.29	0.09
Fecal coliform	col/100 ml	40	53,000	400	-------	4,160	---------	24,000	870
Fecal streptococci	col/100 ml	51	500,000	40	-------	1,190	---------	20,000	150
Oxygen, dissolved	mg/L	53	18.5	4.5	10.6	10.0	2.9	14.0	7.4
Biochemical oxygen demand (5-day)	mg/L	54	20.0	0.9	5.2	4.2	3.3	8.8	2.2
pH	pH units	60	8.6	6.9	7.8	7.8	0.4	8.4	7.4
Color	Co - Pt units	20	120	4	30	18	32	100	8

06815000 Big Nemaha River at Falls City, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	35	RDS = 0.631(SpC) - 3.472	0.95	91	24
Dissolved solids, sum (SDS)	19	SDS = 0.651(SpC) - 31.842	.99	98	15
Hardness as $CaCO_3$ (TH)	19	TH = 0.414(SpC) + 2.575	.94	88	23
Calcium (Ca)	19	Ca = 0.110(SpC) + 4.565	.91	83	7.6
Magnesium (Mg)	19	Mg = 0.033(SpC) - 1.771	.92	85	2.1
Sodium (Na)	19	Na = 0.084(SpC) - 20.386	.88	78	6.6
Potassium (K)	19	K = -0.003(SpC) + 6.709	*-.38	14	1.0
Bicarbonate (HCO_3)	19	HCO_3=0.368(SpC) + 30.062	.87	75	32
Sulfate (SO_4)	19	SO_4 = 0.173(SpC) - 31.320	.86	74	15
Chloride (Cl)	54	Cl = 0.058(SpC) - 13.658	.68	46	8.6
Silica (Si)	19	Si = 0.002(SpC) + 9.529	*.11	1.2	3.2
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3= -0.002(SpC)+2.870	*-.20	4.0	1.1

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
56	3,080	3.9	$SpC = 1,219\ Q^{-0.12262}$	-0.68	47	0.081	19

Republican River Basin

The Republican River basin is in the southwest corner of the State and extends from the Colorado border east to Thayer County. The Republican River flows into Kansas a few miles west of Superior, Nebr.

The basin is characterized topographically as plains or dissected plains. However, in some of the western part of the basin, sandhills exist. Otherwise, the basin is mantled mostly by loess overlying the Tertiary Ogallala Formation in its central part and by Pleistocene sands and gravels in its eastern part. Streams originating in the western part of the basin derive a considerably higher proportion of discharge from ground water than do streams originating elsewhere in the basin.

Water resources of the Republican River basin have been the most extensively developed of any basin in the State. Five major reservoirs for flood control and irrigation have been constructed in the basin. Nearly 100,000 acres of basin lands are irrigated by surface-water diversion.

Descriptive statistics were determined for water from six locations in the basin, all of which are on the mainstem of the Republican River (fig. 12). Mean specific conductance for the six stations varied from 500 to 569 umho/cm. The lowest mean of 500 umho/cm was for water from the Republican River above Medicine Creek at Cambridge during the period 1950–1956. With the exception of the Guide Rock station, the earliest sampling at the remaining stations was begun in 1968. The slight increase in mineralization since data collection was halted at Cambridge may result from the influence of return flow of diverted surface water used for irrigation. The influence of irrigation-return flow may be reduced somewhat by the influence of reservoirs acting as "sinks" for some constituents.

Calcium is the predominant cation, and bicarbonate the predominant anion at each location. Mean concentrations of fluoride exceed 1.0 mg/L at the two sites farthest upstream, indicating the effect of seepage of ground water derived from the Ogallala Formation in the western part of the basin, which is known to contain fluoride in these concentrations. Mean concentrations of nitrite plus nitrate and total phosphorus are low throughout the basin. This may be an indicator of the effectiveness of the reservoirs as nutrient sinks. Median concentrations of fecal coliform and fecal streptococcal bacteria concentrations are all well below 1,000 col/100 ml, indicating that the stream contains very little waste material from either urban or agricultural area.

Regression equations between specific conductance and those chemical constituents for which sufficient data are available were determined for all stations. Correlation coefficients for regression equations relating dissolved solids to specific conductance were greater than 0.85 for all stations, and for regression equations relating principal constituents to specific conductance they were generally greater than 0.7 for all stations, except for the Benkelman and Trenton stations. For the Cambridge station, correlation coefficients exceeded 0.8, except those for potassium and silica; several exceeded 0.9. Most measurements at Cambridge were made before the stream was regulated, and the inclusion of high-flow data tended to result in better correlations than would be observed if more recent data were available.

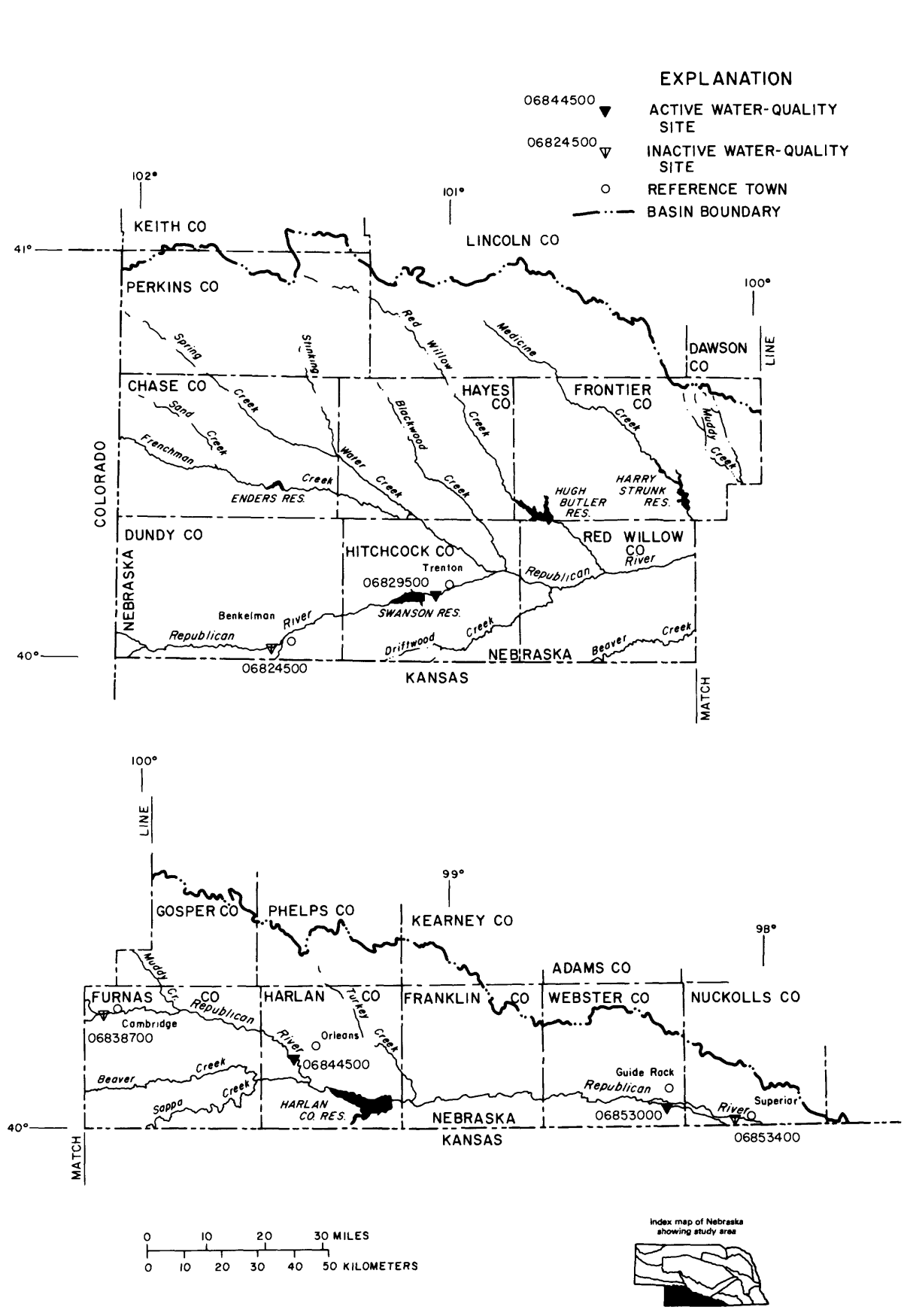

Figure 12. Location of water-quality sampling sites, Republican River basin.

06824500 Republican River at Benkelman, Nebr.

Location.--Lat 40°01'55", long 101°32'30", in SE¼SW¼ sec. 19, T.1 N., R.37 W., Dundy County, at gaging station at bridge on U.S. Highway 34, 0.6 mi south of Burlington Northern, Inc., track, 1 mi southwest of Benkelman, 2 mi upstream from South Fork Republican River, and 11 mi downstream from Rock Creek.

Drainage area.--4,830 mi^2, approximately, of which about 1,230 mi^2 contributes directly to surface runoff.

Period of record.-- July 1969 to June 1972.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	74	660	340	529	532	58	600	462
Dissolved solids, residue	mg/L	35	452	312	365	360	36	410	320
Dissolved solids, sum	mg/L	1	----------		358	----------			
Hardness as $CaCO_3$	mg/L	35	250	160	208	213	21	235	180
Calcium, dissolved	mg/L	25	67	39	53	54	7.0	61	42
Magnesium, dissolved	mg/L	25	21	14	17	17	1.9	20	15
Sodium, dissolved	mg/L	18	36	23	28	29	3.4	34	24
Potassium, dissolved	mg/L	7	16	10	13	-------	1.9	----------	
Bicarbonate ion	mg/L	16	278	196	242	240	20	260	216
Sulfate, dissolved	mg/L	37	117	19	72	71	21	100	50
Chloride, dissolved	mg/L	25	9.1	3.6	6.4	6.0	1.4	8.5	6.8
Fluoride, dissolved	mg/L	18	1.3	1.0	1.2	1.2	0.08	1.4	1.1
Silica, dissolved	mg/L	2	46	42	44	----------			
Boron, dissolved	mg/L	18	140	0	90	94	29	120	60
Iron, dissolved	ug/L	6	790	17	386	-------	333	----------	
Manganese, dissolved	ug/L	15	100	0	31	27	33	88	0
Nitrite + nitrate as N, dissolved	mg/L	14	1.2	0.01	0.56	0.44	0.41	1.2	0.02
Nitrate as N, dissolved	mg/L	23	1.4	0.00	0.59	0.43	0.48	1.2	0.04
Nitrate as NO_3, dissolved	mg/L	23	6.1	0.00	2.6	-------	2.1	----------	
Ammonia N, total	mg/L	1	----------		0.08	----------			
Organic N, total	mg/L	1	----------		0.82	----------			
Phosphorus, total	mg/L	37	0.49	0.03	0.15	0.13	0.10	0.30	0.05
Phosphorus, dissolved	mg/L	13	0.19	0.00	0.07	0.04	0.06	0.15	0.01
Fecal coliform	col/100 ml	23	1,500	0	-------	120	---------	740	14
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	37	12.7	6.2	9.9	10.0	1.9	12.3	7.6
Biochemical oxygen demand (5-day)	mg/L	37	5.2	0.7	1.9	1.8	1.0	2.7	1.3
pH	pH units	58	8.5	7.7	8.2	8.2	0.2	8.4	8.0
Color	Co - Pt units	7	26	3	10	--------	9	----------	

06824500 Republican River at Benkelman, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	35	RDS = 0.724(SpC) - 17.646	0.86	74	18
Dissolved solids, sum (SDS)	----------	----------	----------	----------	----------
Hardness as $CaCO_3$ (TH)	35	TH = 0.328(SpC) + 34.180	.66	43	16
Calcium (Ca)	25	Ca = 0.95(SpC) - 2.683	.60	36	5.7
Magnesium (Mg)	25	Mg = 0.038(SpC) - 2.716	.87	76	1.0
Sodium (Na)	18	Na = 0.018(SpC) + 19.019	*.18	3.3	3.5
Potassium (K)	----------	----------	----------	----------	----------
Bicarbonate (HCO_3)	16	HCO_3= -0.173(SpC)+334.600	*-.31	9.8	19
Sulfate (SO_4)	37	SO_4 = 0.373(SpC) - 125.910	.77	59	13
Chloride (Cl)	25	Cl = 0.017(SpC) - 2.779	.53	28	1.2
Silica (Si)	----------	----------	----------	----------	----------
Nitrite + Nitrate as N (NO_2-NO_3)	----------	----------	----------	----------	----------

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
74	220	0.78	$SpC = 518\ Q^{0.00368}$	*0.04	0.16	0.050	10

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

06829500 Republican River at Trenton, Nebr.

Location.--Lat 40°10'00", long 101°02'40", in SE¼ sec. 4, T.2 N., R.33 W., Hitchcock County, at gaging station 300 ft upstream from Elm Creek, 0.9 mi downstream from centerline of spillway of Trenton Dam, and 1.5 mi southwest of Trenton.

Drainage area.--8,620 mi^2, approximately, of which about 3,940 mi^2 contributes directly to surface runoff.

Period of record.-- Water years 1967 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	240	970	260	561	--------	99	----------	
Dissolved solids, residue	mg/L	141	504	232	378	--------	56	----------	
Dissolved solids, sum	mg/L	149	499	215	372	--------	61	----------	
Hardness as $CaCO_3$	mg/L	149	308	145	205	--------	31	----------	
Calcium, dissolved	mg/L	150	94	30	56	--------	9.7	----------	
Magnesium, dissolved	mg/L	149	27	9.0	16	--------	4.0	----------	
Sodium, dissolved	mg/L	77	69	11	36	--------	11	----------	
Potassium, dissolved	mg/L	74	23	3.6	11	--------	5.0	----------	
Bicarbonate ion	mg/L	159	360	158	248	--------	35	----------	
Sulfate, dissolved	mg/L	150	120	18	68	--------	22	----------	
Chloride, dissolved	mg/L	154	19	1.0	7.8	--------	3.2	----------	
Fluoride, dissolved	mg/L	140	1.8	0.4	1.1	--------	0.3	----------	
Silica, dissolved	mg/L	148	96	4.1	49	--------	17	----------	
Boron, dissolved	mg/L	50	830	90	214	--------	154	----------	
Iron, dissolved	ug/L	134	600	0	103	--------	122	----------	
Manganese, dissolved	ug/L	3	36	7	26	--------	16	----------	
Nitrite + nitrate as N, dissolved	mg/L	12	1.2	0.02	0.44	--------	0.38	----------	
Nitrate as N, dissolved	mg/L	3	0.17	0.02	0.08	--------	0.08	----------	
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	3	0.69	0.38	0.58	--------	0.18	----------	
Phosphorus, total	mg/L	3	0.28	0.06	0.15	--------	0.12	----------	
Phosphorus, dissolved	mg/L	15	0.28	0.00	0.04	--------	0.07	----------	
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	87	16.0	4.3	10.6	--------	2.8		
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	239	8.8	7.2	8.0	--------	0.4	----------	
Color	Co - Pt units	20	32	0	8	--------	7.4	----------	

06829500 Republican River at Trenton, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	140	RDS = 0.675(SpC) + 20.387	0.88	78	--------
Dissolved solids, sum (SDS)	148	SDS = 0.695(SpC) - 0.680	.91	82	--------
Hardness as $CaCO_3$ (TH)	148	TH = 0.290(SpC) + 49.614	.74	55	--------
Calcium (Ca)	149	Ca = 0.064(SpC) + 22.076	.53	28	--------
Magnesium (Mg)	148	Mg = 0.036(SpC) - 3.422	.71	51	--------
Sodium (Na)	76	Na = 0.094(SpC) - 16.703	.70	49	--------
Potassium (K)	73	K = 0.011(SpC) + 5.270	*.17	3.0	--------
Bicarbonate (HCO_3)	158	HCO_3=0.270(SpC) + 103.129	.61	37	--------
Sulfate (SO_4)	149	SO_4 = 0.244(SpC) - 63.092	.89	79	--------
Chloride (Cl)	153	Cl = 0.025(SpC)- 5.821	.62	39	--------
Silica (Si)	147	Si = 0.066(SpC) + 13.513	.31	9.6	--------
Nitrite + Nitrate as N (NO_2-NO_3)	----------				

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
239	3,150	0.68	$SpC = 635\ Q^{-0.03532}$	-0.47	22	----------	

06838700 Republican River above Medicine Creek, at Cambridge, Nebr.

Location (revised).--At bridge on State Highway 47, 2 mi upstream from gaging station at Cambridge, Furnas County, 1.5 mi upstream from Medicine Creek, and 3.3 mi upstream from Cambridge diversion dam.

Drainage area.--13,200 mi^2, approximately.

Period of record.-- December 1950 to September 1956.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	141	658	287	500	--------	86	----------	
Dissolved solids, residue	mg/L	141	444	190	337	--------	60	----------	
Dissolved solids, sum	mg/L	65	440	182	333	--------	59	----------	
Hardness as $CaCO_3$	mg/L	144	272	113	194	--------	35	----------	
Calcium, dissolved	mg/L	84	82	34	54	--------	8.7	----------	
Magnesium, dissolved	mg/L	84	22	6.8	15	--------	4.0	----------	
Sodium, dissolved	mg/L	144	45	7.0	27	--------	8.0	----------	
Potassium, dissolved	mg/L	65	18	8.4	14	--------	1.8	----------	
Bicarbonate ion	mg/L	141	355	158	255	--------	41	----------	
Sulfate, dissolved	mg/L	143	78	3.0	42	--------	16	----------	
Chloride, dissolved	mg/L	84	13	1.0	8.2	--------	2.8	----------	
Fluoride, dissolved	mg/L	65	1.2	0.4	0.8	--------	0.2	----------	
Silica, dissolved	mg/L	65	62	24	43	--------	9.2	----------	
Boron, dissolved	mg/L	81	220	0	99	--------	38	----------	
Iron, dissolved	ug/L	62	140	0	32	--------	34	----------	
Manganese, dissolved	ug/L	----------							
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	84	1.7	0.09	0.79	--------	0.36	----------	
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	141	8.5	7.1	7.8	--------	0.3	----------	
Color	Co - Pt units	38	20	3	9	--------	4.6	----------	

06838700 Republican River above Medicine Creek, at Cambridge, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	140	RDS = 0.696(SpC) - 11.052	0.98	97	---
Dissolved solids, sum (SDS)	64	SDS = 0.692(SpC) - 12.058	.99	98	---
Hardness as $CaCO_3$ (TH)	140	TH = 0.377(SpC) + 4.246	.94	89	---
Calcium (Ca)	80	Ca = 0.077(SpC) + 14.358	.82	67	---
Magnesium (Mg)	80	Mg = 0.043(SpC) - 6.634	.90	80	---
Sodium (Na)	140	Na = 0.082(SpC) - 13.781	.90	81	---
Potassium (K)	61	K = 0.006(SpC) + 11.174	.27	7.5	---
Bicarbonate (HCO_3)	140	HCO_3=0.451(SpC) + 29.852	.94	89	---
Sulfate (SO_4)	139	SO_4 = 0.147(SpC) - 32.309	.83	69	---
Chloride (Cl)	80	Cl = 0.029(SpC) - 6.452	.88	78	---
Silica (Si)	64	Si = 0.076(SpC) + 4.585	.70	49	---
Nitrite + Nitrate as N (NO_2-NO_3)	---	---	---	---	---

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
140	3,150	0.74	$SpC = 594\ Q^{-0.03808}$	-0.32	10	---	---

06844500 Republican River near Orleans, Nebr.

Location.--Lat 40°07'53", long 99°30'08", in NE¼NE¼ sec. 19, T.2 N., R.19 W., Harlan County Hydrologic Unit 10250009, on right bank 18 ft downstream from bridge on State Highway 89, 200 ft downstream from Burlington Northern, Inc., bridge, 2 mi west of Orleans, 2.8 mi upstream from Sappa Creek, and 23 mi upstream from Harlan County Dam.

Drainage area.--15,640 mi^2, approximately, of which about 8,910 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1969 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	243	900	130	569	584	132	719	383
Dissolved solids, residue	mg/L	61	497	168	380	391	78	456	255
Dissolved solids, sum	mg/L	49	552	192	366	374	84	475	230
Hardness as $CaCO_3$	mg/L	72	340	120	212	218	42	259	148
Calcium, dissolved	mg/L	51	91	32	59	59	12	72	43
Magnesium, dissolved	mg/L	51	27	4.6	17	18	5.1	22	8.8
Sodium, dissolved	mg/L	26	52	13	37	36	8.8	50	28
Potassium, dissolved	mg/L	26	20	13	16	17	2.1	19	13
Bicarbonate ion	mg/L	72	404	176	274	277	46	330	207
Sulfate, dissolved	mg/L	61	94	10	52	52	18	76	25
Chloride, dissolved	mg/L	95	28	1.1	14	15	6.3	23	6.5
Fluoride, dissolved	mg/L	49	1.0	0.3	0.8	0.8	0.2	1.0	0.5
Silica, dissolved	mg/L	48	50	18	37	38	7.3	46	26
Boron, dissolved	mg/L	47	300	30	148	140	67	250	77
Iron, dissolved	ug/L	43	1,800	10	98	39	276	140	23
Manganese, dissolved	ug/L	21	80	0	23	12	24	59	0
Nitrite + nitrate as N, dissolved	mg/L	30	2.3	0.00	1.1	1.1	0.79	2.2	0.01
Nitrate as N, dissolved	mg/L	3	1.1	0.01	0.38	----------			
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	56	1.8	0.00	0.16	0.11	0.25	0.29	0.02
Organic N, total	mg/L	59	8.9	0.00	1.3	0.97	1.6	2.0	0.33
Phosphorus, total	mg/L	58	2.7	0.19	0.45	0.32	0.46	0.60	0.22
Phosphorus, dissolved	mg/L	54	0.36	0.03	0.17	0.18	0.07	0.26	0.08
Fecal coliform	col/100 ml	42	200,000	25	-------	710	--------	11,000	84
Fecal streptococci	col/100 ml	50	55,400	69	-------	510	--------	5,200	144
Oxygen, dissolved	mg/L	183	14.3	4.6	9.8	9.8	2.0	12.6	7.2
Biochemical oxygen demand (5-day)	mg/L	54	25.0	0.3	6.6	5.0	5.8	15.0	1.7
pH	pH units	240	8.8	7.1	8.0	8.1	0.3	8.4	7.6
Color	Co - Pt units	25	65	3	18	20	13	30	6

06844500 Republican River near Orleans, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	61	RDS = 0.543(SpC) + 70.170	0.93	86	29
Dissolved solids, sum (SDS)	48	SDS = 0.562(SpC) + 52.322	.94	89	28
Hardness as $CaCO_3$ (TH)	72	TH = 0.327(SpC) + 35.075	.93	97	15
Calcium (Ca)	51	Ca = 0.073(SpC) + 18.649	.86	73	6.0
Magnesium (Mg)	51	Mg = 0.033(SpC) - 1.623	.87	76	2.5
Sodium (Na)	26	Na = 0.055(SpC) + 2.991	.85	72	4.8
Potassium (K)	26	K = 0.007(SpC) + 11.787	.46	21	1.9
Bicarbonate (HCO_3)	72	HCO_3= 0.361(SpC) + 77.512	.93	86	17
Sulfate (SO_4)	61	SO_4 = 0.127(SpC) - 17.834	.87	75	9.2
Chloride (Cl)	95	Cl = 0.038(SpC) - 7.950	.80	64	3.8
Silica (Si)	48	Si = 0.027(SpC) + 21.740	.51	26	6.3
Nitrite + Nitrate as N (NO_2-NO_3)	30	NO_2+NO_3=0.006(SpC)-2.778	.44	20	0.72

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
241	13,100	7.8	$SpC = 791\ Q^{-0.07212}$	-0.27	7.1	0.118	28

06853000 Republican River near Guide Rock, Nebr.

Location.--Lat 40°04'05", long 98°22'25", in SW¼NE¼ sec. 7, T.1 N., R.9 W., Webster County, Hydrologic Unit 10250016, on left bank 300 ft upstream from Willow Creek, 0.2 mi downstream from Courtland diversion dam, and 2 mi southwest of Guide Rock.

Drainage area.--22,040 mi^2, approximately, of which about 14,550 mi^2 contributes directly to surface runoff.

Period of record.--Water year 1962 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	233	840	228	565	567	99	665	462
Dissolved solids, residue	mg/L	206	554	172	359	360	63	428	277
Dissolved solids, sum	mg/L	116	548	163	370	373	63	433	293
Hardness as $CaCO_3$	mg/L	188	370	91	233	233	45	278	183
Calcium, dissolved	mg/L	188	110	28	70	70	15	87	50
Magnesium, dissolved	mg/L	188	20	4.6	14	15	3.0	19	11
Sodium, dissolved	mg/L	188	44	7.1	25	25	5.6	33	20
Potassium, dissolved	mg/L	187	18	7.5	12	13	2.3	16	9.3
Bicarbonate ion	mg/L	188	346	114	256	259	36	288	210
Sulfate, dissolved	mg/L	188	130	20	62	58	20	87	40
Chloride, dissolved	mg/L	225	27	6.8	16	17	4.1	22	11
Fluoride, dissolved	mg/L	189	0.7	0.2	0.4	0.4	0.1	0.6	0.3
Silica, dissolved	mg/L	188	39	2.7	20	21	7.8	31	11
Boron, dissolved	mg/L	183	300	0	123	120	53	190	55
Iron, dissolved	ug/L	64	440	0	86	61	96	162	11
Manganese, dissolved	ug/L	60	120	0	18	0	28	70	0
Nitrite + nitrate as N, dissolved	mg/L	27	1.4	0.23	0.78	0.69	0.37	1.3	0.33
Nitrate as N, dissolved	mg/L	47	4.1	0.05	0.68	0.57	0.58	1.1	0.21
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	55	0.49	0.00	0.10	0.08	0.10	0.19	0.01
Organic N, total	mg/L	55	6.3	0.22	0.84	0.57	0.98	1.2	0.33
Phosphorus, total	mg/L	102	1.3	0.09	0.24	0.21	0.16	0.31	0.15
Phosphorus, dissolved	mg/L	47	0.35	0.03	0.15	0.13	0.07	0.25	0.08
Fecal coliform	col/100 ml	38	180,000	3	-------	456	--------	11,400	9
Fecal streptococci	col/100 ml	46	29,000	16	-------	370	--------	2,700	43
Oxygen, dissolved	mg/L	52	14.5	7.0	10.2	9.8	2.2	13.0	7.6
Biochemical oxygen demand (5-day)	mg/L	52	46.0	0.8	4.2	3.0	6.4	5.1	1.1
pH	pH units	228	9.0	7.1	7.9	8.0	0.3	8.3	7.6
Color	Co - Pt units	19	70	0	15	8	16	35	2

06853000 Republican River near Guide Rock, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	207	RDS = 0.610(SpC) + 18.679	0.92	85	24
Dissolved solids, sum (SDS)	116	SDS = 0.593(SpC) + 24.760	.92	85	25
Hardness as $CaCO_3$ (TH)	189	TH = 0.422(SpC) - 0.044	.90	82	19
Calcium (Ca)	189	Ca = 0.131(SpC) - 2.751	.84	71	8.0
Magnesium (Mg)	189	Mg = 0.022(SpC) + 2.104	.72	51	2.1
Sodium (Na)	189	Na = 0.043(SpC) + 0.978	.74	54	3.8
Potassium (K)	188	K = -0.005(SpC) + 15.182	-.21	4.6	2.2
Bicarbonate (HCO_3)	189	HCO_3=0.321(SpC) + 78.410	.85	72	19
Sulfate (SO_4)	189	SO_4 = 0.183(SpC) - 39.697	.87	76	10
Chloride (Cl)	226	Cl = 0.031(SpC) - 1.301	.74	56	2.8
Silica (Si)	189	Si = 0.044(SpC) - 3.784	.54	29	6.6
Nitrite + Nitrate as N (NO_2-NO_3)	27	NO_2-NO_3=0.0001(SpC)+0.712	*.03	0.11	0.38

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
234	2,760	0.40	SpC = 700 $Q^{-0.04666}$	-0.31	9.8	0.082	19

REPUBLICAN RIVER BASIN

06853400 Republican River at Superior, Nebr.

Location.--Lat 40°01'01", long 98°05'15", in SE¼SE¼ sec. 27, T.1 N., R.7 W., Nuckolls County, at bridge on State Highway 14 about 1 mi west of Superior.

Drainage area.--22,300 mi^2.

Period of record.--July 1969 to September 1970.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	45	659	220	511	527	113	620	280
Dissolved solids, residue	mg/L	20	458	190	344	347	71	420	260
Dissolved solids, sum	mg/L	3	379	150	275	--------	116	----------	
Hardness as $CaCO_3$	mg/L	23	280	87	211	223	49	270	140
Calcium, dissolved	mg/L	10	86	25	66	76	19	85	46
Magnesium, dissolved	mg/L	10	18	5.9	14	16	3.4	17	11
Sodium, dissolved	mg/L	15	38	6.4	24	26	9.1	33	10
Potassium, dissolved	mg/L	8	17	8.2	13	---------	2.8	----------	
Bicarbonate ion	mg/L	17	300	114	233	240	54	283	131
Sulfate, dissolved	mg/L	23	82	9.2	57	60	20	78	23
Chloride, dissolved	mg/L	10	19	5.1	15	18	5.0	19	7.0
Fluoride, dissolved	mg/L	15	0.7	0.3	0.6	0.6	0.1	0.7	0.4
Silica, dissolved	mg/L	4	33	9.4	16	--------	11	----------	
Boron, dissolved	mg/L	15	200	40	87	80	42	130	43
Iron, dissolved	ug/L	6	285	19	96	--------	97	----------	
Manganese, dissolved	ug/L	13	372	10	64	40	98	140	15
Nitrite + nitrate as N, dissolved	mg/L	8	1.5	0.04	0.63	--------	0.56	----------	
Nitrate as N, dissolved	mg/L	14	1.3	0.00	0.63	0.73	0.37	1.0	0.10
Nitrate as NO_3, dissolved	mg/L	14	5.8	0.10	2.8	--------	1.7	----------	
Ammonia N, total	mg/L	2	0.21	0.20	0.20	--------	0.01	----------	
Organic N, total	mg/L	3	3.5	0.71	1.7	--------	1.5	----------	
Phosphorus, total	mg/L	23	2.2	0.17	0.49	0.33	0.48	1.2	0.15
Phosphorus, dissolved	mg/L	17	0.37	0.10	0.20	0.17	0.08	0.30	0.11
Fecal coliform	col/100 ml	10	9,300	100	------	470	---------	9,000	130
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	22	13.1	5.7	9.7	10.0	2.2	12.5	6.7
Biochemical oxygen demand (5-day)	mg/L	23	11.8	0.2	3.2	2.1	2.7	7.1	1.1
pH	pH units	39	8.4	7.5	8.0	8.0	0.3	8.4	7.6
Color	Co - Pt units	10	150	2	41	23	49	106	2

06853400 Republican River at Superior, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	20	RDS = 0.624(SpC) + 22.193	0.97	95	17
Dissolved solids, sum (SDS)	---	---	---	---	---
Hardness as $CaCO_3$ (TH)	23	TH = 0.377(SpC) + 19.713	.92	84	20
Calcium (Ca)	---	---	---	---	---
Magnesium (Mg)	---	---	---	---	---
Sodium (Na)	15	Na = 0.051(SpC) - 2.880	.79	62	5.8
Potassium (K)	---	---	---	---	---
Bicarbonate (HCO_3)	17	HCO_3=0.488(SpC) - 6.349	.94	89	18
Sulfate (SO_4)	23	SO_4 = 0.152(SpC)-20.485	.92	84	7.9
Chloride (Cl)	---	---	---	---	---
Silica (Si)	---	---	---	---	---
Nitrite + Nitrate as N (NO_2-NO_3)	---	---	---	---	---

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
45	1,650	25	$SpC = 1{,}169\ Q^{-0.15264}$	-0.59	35	0.097	22

Big Blue River Basin

The Big Blue River basin is in southeast Nebraska, and the Big Blue River flows out of the State south of Barneston.

The upper part of the basin lies in an area of loess plains overlying Pleistocene sands and gravels deposited as a result of glaciation. This part of the basin is very level. The glaciated lower part of the basin is more rolling. It is characterized by loess deposits overlying glacial drift or soils developed on glacial drift.

Irrigation with ground water is highly developed in that part of the basin underlain by Pleistocene sand and gravel. In the glaciated area, it is developed only where buried Pleistocene channels exist. There are no major diversions of surface water for irrigation in the basin, but there are some private diversions for irrigation of individual property.

Descriptive statistics were determined for the quality of water at nine surface sampling sites (fig. 13). Of these, five are on the main stem of the Big Blue River and two are on the West Fork Big Blue River. The other sites are on Lincoln Creek and Turkey Creek, major tributaries entering the Big Blue River from the west. Mean specific conductances in the Big Blue River basin range from 366 umho/cm at Surprise, in the upper end of the basin, to 622 umho/cm below Beatrice. Several of the sites including those below Seward, near Crete, below Beatrice on the Big Blue River, and below Hastings on the West Fork Big Blue River are located immediately below the sewage outfall of their respective communities. Calcium is the principal cation and bicarbonate the principal anion for each station.

The station at West Fork Big Blue River below Hastings is just below the Hastings sewage-plant outfall. During dry weather, effluent constitutes most of the flow. Mean concentrations of 6.3 mg/L for nitrite plus nitrate and of 5.5 mg/L for total phosphorus are the highest for those constituents at all stations included in this study. Mean concentrations of chloride and BOD also are high at this site as are the median concentrations of fecal coliform and fecal streptococcal bacteria.

The West Fork Big Blue River flows through a rural environment from Hastings to its mouth. A comparison of means or medians for several constituents (table 5) for West Fork Big Blue River at Hastings and near Dorchester, about 10 mi upstream from the mouth, indicates the effects of dilution from ground-water seepage and overland runoff on the quality of streamflow.

Fecal coliform and fecal streptococcal bacteria medians, and BOD, nitrite plus nitrate, organic nitrogen, and total phosphorus means for the stations below Seward, near Crete, and below Beatrice all reflect the proximity to the sewage outfalls of their respective communities.

Table 5. Comparison of mean and median concentrations of several constituents to show the effects of dilution from ground-water seepage and overland runoff on the quality of streamflow in the West Fork Big Blue River

Constituent	West Fork Big Blue River	
	Below Hastings	Near Dorchester
Mean specific conductance, umho/cm	592	439
Mean chloride, mg/L	41	16
Mean nitrite plus nitrate, mg/L	6.3	1.6
Mean total phosphorus, mg/L	5.5	.91
Mean biochemical oxygen demand, mg/L	14.6	4.8
Median fecal coliform, col/100 ml	75,700	610
Median fecal streptococci, col/100 ml	3,320	1,000

Turkey Creek near Wilber represents a special situation. Although calcium and bicarbonate are the predominate cation and anion, respectively, most of the time, an examination of the data indicates that sodium and chloride usually are the predominant cation and anion under low-flow conditions. During dry weather, flow is maintained in Turkey Creek by a small amount of ground-water discharge. Migration of ground water through highly saline deposits of the Cretaceous Dakota Formation upward into Pleistocene deposits and then into the stream accounts for the change in predominate ions in Turkey Creek under low-flow conditions.

Regression data for all nine stations show that correlation between specific conductance and principal cations, excluding potassium, and between specific conductance and bicarbonate is above 0.9 for all stations except West Fork Big Blue River below Hastings and Turkey Creek near Wilber. The large ratio of sewage-plant effluent to total streamflow affects ion ratios in such a way as to reduce correlation coefficients at the Hastings station. Seepage of saline water into Turkey Creek during periods of low discharge affects ion ratios with much the same result.

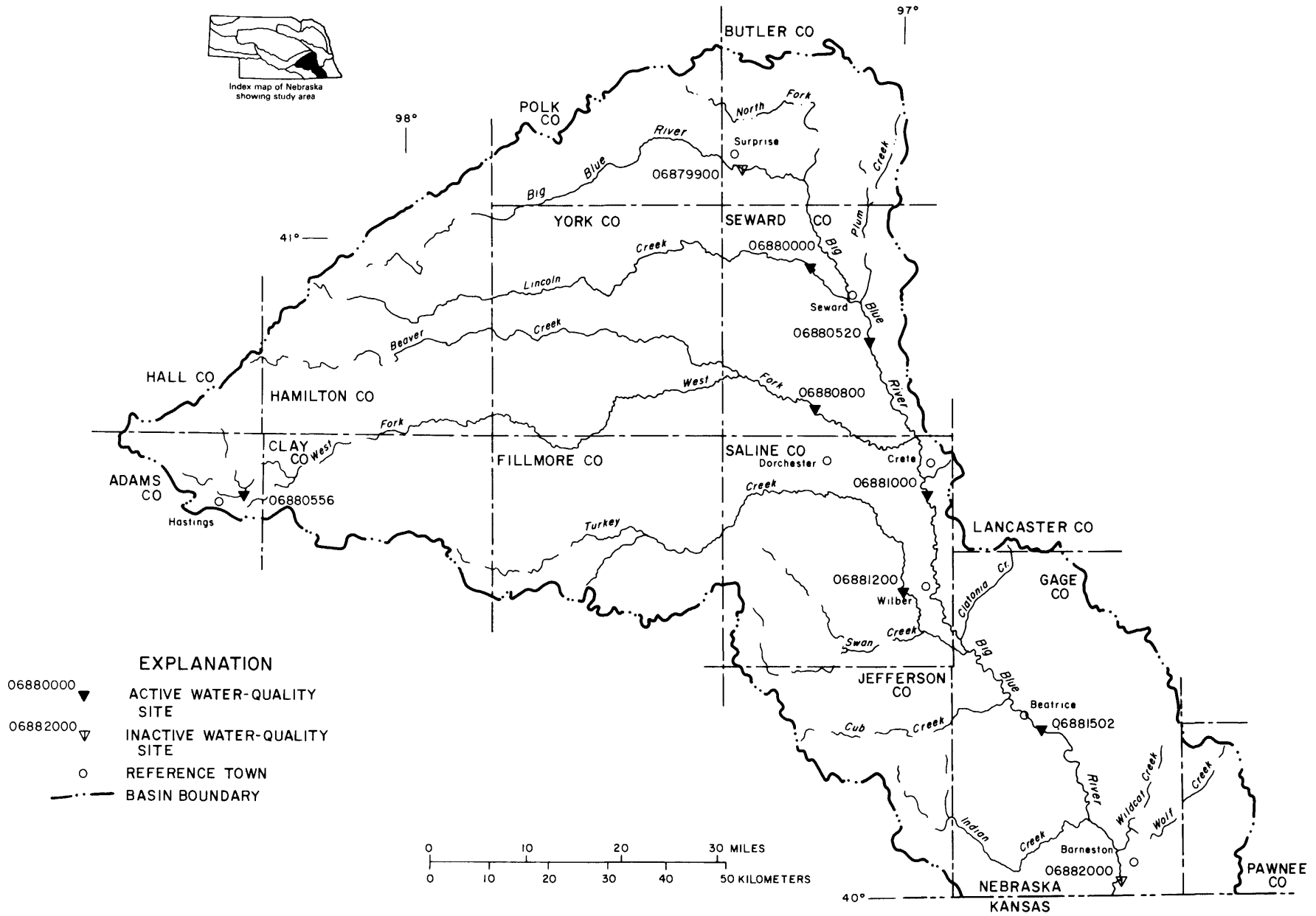

Figure 13. Location of water-quality sampling sites, Big Blue River basin.

06879900 Big Blue River at Surprise, Nebr.

Location.--Lat 41°06'05", long 97°18'35", in NW¼NW¼ sec. 15, T.13 N., R.1 E., Butler County, at gaging station 50 ft downstream from bridge on county road at south edge of Surprise.

Drainage area.--345 mi^2.

Period of record.--December 1950 to September 1956.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	77	738	47	366	343	178	628	120
Dissolved solids, residue	mg/L	59	411	40	225	207	96	360	100
Dissolved solids, sum	mg/L	32	386	78	220	210	82	320	115
Hardness as $CaCO_3$	mg/L	59	284	12	122	113	71	220	25
Calcium, dissolved	mg/L	59	69	3.5	32	31	18	58	6.7
Magnesium, dissolved	mg/L	59	42	0.9	10	8.8	7.0	18	2.2
Sodium, dissolved	mg/L	59	50	0.6	16	14	11	33	1.8
Potassium, dissolved	mg/L	59	29	4.9	16	16	4.8	22	9.3
Bicarbonate ion	mg/L	59	358	14	162	147	97	310	37
Sulfate, dissolved	mg/L	59	59	5.0	18	16	9.9	30	6.9
Chloride, dissolved	mg/L	59	63	0.9	14	11	12	27	2.4
Fluoride, dissolved	mg/L	59	0.6	0.2	0.3	0.3	0.1	0.5	0.3
Silica, dissolved	mg/L	58	30	0.6	15	14	6.5	23	6.8
Boron, dissolved	mg/L	59	160	10	55	50	27	87	28
Iron, dissolved	ug/L	45	620	0	180	93	170	431	21
Manganese, dissolved	ug/L	29	1,600	20	412	330	366	840	75
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	22	6.0	0.20	1.7	1.2	1.4	3.6	0.52
Nitrate as NO_3, dissolved	mg/L	59	27	0.40	5.6	-------	5.1	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	14	1.3	0.04	0.36	0.23	0.34	0.80	0.08
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	59	8.4	6.3	7.5	7.7	0.5	8.2	6.7
Color	Co - Pt units	28	200	2	32	16	40	79	5

06879900 Big Blue River at Surprise, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	59	RDS = 0.531(SpC) + 45.790	0.97	94	23
Dissolved solids, sum (SDS)	32	SDS = 0.551(SpC) + 23.337	.99	99	9.4
Hardness as $CaCO_3$ (TH)	59	TH = 0.399(SpC) - 13.089	.98	95	16
Calcium (Ca)	59	Ca = 0.101(SpC) - 1.846	.96	92	5.3
Magnesium (Mg)	59	Mg = 0.036(SpC) - 2.083	.90	81	3.1
Sodium (Na)	59	Na = 0.061(SpC) - 4.656	.94	88	4.1
Potassium (K)	59	K = 0.009(SpC) + 13.154	.33	11	4.6
Bicarbonate (HCO_3)	59	HCO_3= 0.543(SpC) - 21.146	.98	95	21
Sulfate (SO_4)	59	SO_4 = 0.039(SpC) + 4.714	.69	48	7.2
Chloride (Cl)	59	Cl = 0.044(SpC) - 1.300	.68	46	8.5
Silica (Si)	58	Si = 0.003(SpC) + 13.549	*.08	0.71	6.6
Nitrite + Nitrate as N (NO_2-NO_3)					

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
75	3,390	0.02	$SpC = 354\ Q^{-0.18916}$	-0.79	62	0.173	41

BIG BLUE RIVER BASIN

06880000 Lincoln Creek near Seward, Nebr.

Location.--Lat 40°54'57", long 97°08'43", in NW¼NE¼ sec. 24, T.11 N., R.2 E., Seward County, Hydrologic Unit 10270201, on left bank 20 ft downstream from county road bridge, 2 mi west of Seward, and 2.5 mi upstream from mouth.

Drainage area.--446 mi^2.

Period of record.--Water years 1963-70, 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	159	646	51	432	505	159	562	125
Dissolved solids, residue	mg/L	136	425	52	278	320	94	361	102
Dissolved solids, sum	mg/L	55	386	73	287	309	81	354	135
Hardness as $CaCO_3$	mg/L	119	270	13	168	202	77	247	27
Calcium, dissolved	mg/L	119	80	3.9	50	61	24	73	7.6
Magnesium, dissolved	mg/L	119	22	0.6	10	12	4.7	15	1.9
Sodium, dissolved	mg/L	119	33	0.6	20	24	9.2	29	2.5
Potassium, dissolved	mg/L	119	17	4.3	9.8	9.3	2.8	14	6.6
Bicarbonate ion	mg/L	119	366	0	224	268	106	328	32
Sulfate, dissolved	mg/L	119	76	4.8	25	27	11	36	8.3
Chloride, dissolved	mg/L	154	17	1.2	6.2	6.0	2.8	9.2	3.1
Fluoride, dissolved	mg/L	120	2.0	0.1	0.4	0.3	0.2	0.5	0.2
Silica, dissolved	mg/L	119	40	5.3	25	28	8.7	35	12
Boron, dissolved	mg/L	119	150	10	48	41	22	70	30
Iron, dissolved	ug/L	97	630	0	90	44	112	244	14
Manganese, dissolved	ug/L	75	1,000	0	263	205	198	487	62
Nitrite + nitrate as N, dissolved	mg/L	28	2.9	0.03	1.3	1.3	0.61	2.2	0.60
Nitrate as N, dissolved	mg/L	25	6.5	0.00	1.6	1.3	1.6	2.9	0.01
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	55	1.6	0.00	0.21	0.10	0.34	0.73	0.02
Organic N, total	mg/L	55	5.6	0.10	1.3	0.87	1.0	2.4	0.37
Phosphorus, total	mg/L	56	1.9	0.20	0.60	0.56	0.32	0.99	0.26
Phosphorus, dissolved	mg/L	63	0.93	0.11	0.38	0.37	0.15	0.54	0.20
Fecal coliform	col/100 ml	43	26,000	3	-------	350	--------	2,500	20
Fecal streptococci	col/100 ml	52	50,000	6	-------	590	--------	3,000	26
Oxygen, dissolved	mg/L	55	17.4	4.6	9.9	9.2	3.3	15.0	6.3
Biochemical oxygen demand (5-day)	mg/L	53	26.0	1.0	4.8	3.6	4.1	8.9	1.8
pH	pH units	161	8.6	3.9	7.6	7.8	0.6	8.2	7.0
Color	Co - Pt units	65	900	1	45	10	120	130	2

06880000 Lincoln Creek near Seward, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	138	RDS = 0.557(SpC) + 46.120	0.97	94	23
Dissolved solids, sum (SDS)	54	SDS = 0.589(SpC) + 24.564	.98	96	16
Hardness as $CaCO_3$ (TH)	119	TH = 0.458(SpC) - 19.598	.99	98	10
Calcium (Ca)	119	Ca = 0.139(SpC) - 6.928	.99	98	3.7
Magnesium (Mg)	119	Mg = 0.027(SpC) - 0.570	.96	93	1.2
Sodium (Na)	119	Na = 0.053(SpC) - 2.052	.97	93	2.4
Potassium (K)	119	K = -0.008(SpC) + 12.913	-.46	21	2.5
Bicarbonate (HCO_3)	119	HCO_3=0.622(SpC) - 30.318	.99	97	17
Sulfate (SO_4)	119	SO_4 = 0.047(SpC) + 5.797	.73	53	7.5
Chloride (Cl)	156	Cl = 0.009(SpC) + 2.243	.52	27	2.4
Silica (Si)	119	Si = 0.040(SpC) + 9.151	.76	58	5.7
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3= -0.0007(SpC)+1.686	*-.13	1.7	0.62

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q).

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
159	4,510	1.3	$SpC = 1{,}136\ Q^{-0.36424}$	-0.92	84	0.106	25

06880520 Big Blue River below Seward, Nebr.

Location.--Lat 40°52'15", long 97°04'28", in NE¼NE¼NW¼ sec. 3, T.10 N., R.3 E., Seward County, Hydrologic Unit 10270202, at bridge on county road about 2.5 mi southeast of Seward.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	56	881	213	605	624	164	776	280
Dissolved solids, residue	mg/L	35	533	130	391	408	105	500	200
Dissolved solids, sum	mg/L	19	562	145	393	397	106	510	160
Hardness as $CaCO_3$	mg/L	18	360	82	248	248	74	350	86
Calcium, dissolved	mg/L	18	100	23	71	74	21	97	24
Magnesium, dissolved	mg/L	18	27	5.3	18	18	5.5	26	6.9
Sodium, dissolved	mg/L	18	55	11	37	39	11	49	16
Potassium, dissolved	mg/L	18	19	8.6	11	12	2.4	14	8.9
Bicarbonate ion	mg/L	18	401	97	293	310	85	390	108
Sulfate, dissolved	mg/L	18	110	22	70	66	25	93	31
Chloride, dissolved	mg/L	53	86	3.6	16	14	12	24	7.6
Fluoride, dissolved	mg/L	19	0.5	0.2	0.3	0.3	0.1	0.4	0.3
Silica, dissolved	mg/L	18	30	8.7	21	23	6.1	29	9.8
Boron, dissolved	mg/L	18	120	40	79	78	23	113	50
Iron, dissolved	ug/L	18	140	10	44	30	36	110	10
Manganese, dissolved	ug/L	18	700	0	282	260	205	650	80
Nitrite + nitrate as N, dissolved	mg/L	28	3.1	0.55	1.6	1.7	0.57	2.3	0.73
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	56	2.1	0.00	0.51	0.38	0.48	1.1	0.02
Organic N, total	mg/L	56	9.0	0.28	1.6	1.4	1.3	2.7	0.70
Phosphorus, total	mg/L	56	2.6	0.37	0.92	0.83	0.43	1.4	0.55
Phosphorus, dissolved	mg/L	47	1.0	0.27	0.60	0.53	0.20	0.90	0.36
Fecal coliform	col/100 ml	43	36,200	400	-------	2,800	---------	14,000	595
Fecal streptococci	col/100 ml	51	100,000	300	-------	1,370	---------	5,230	570
Oxygen, dissolved	mg/L	55	16.8	2.9	8.4	7.6	3.6	14.3	4.1
Biochemical oxygen demand (5-day)	mg/L	51	44.0	1.8	13.2	12.0	9.6	21.3	4.8
pH	pH units	60	8.7	6.6	7.6	7.6	0.4	8.0	7.2
Color	Co - Pt units	19	700	4	62	20	156	100	5

06880520 Big Blue River below Seward, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	35	RDS = 0.650(SpC) - 0.502	0.96	93	29
Dissolved solids, sum (SDS)	18	SDS = 0.635(SpC) - 8.043	.98	97	19
Hardness as $CaCO_3$ (TH)	18	TH = 0.435(SpC) - 27.448	.99	98	10
Calcium (Ca)	18	Ca = 0.124(SpC) - 7.609	.99	98	2.9
Magnesium (Mg)	18	Mg = 0.031(SpC) - 2.349	.97	94	1.4
Sodium (Na)	18	Na = 0.062(SpC) - 1.555	.96	92	3.2
Potassium (K)	18	K = -0.005(SpC) + 14.337	*-.34	11	2.4
Bicarbonate (HCO_3)	18	HCO_3=0.496(SpC) - 20.610	.99	98	13
Sulfate (SO_4)	18	SO_4 = 0.128(SpC) - 11.156	.88	77	12
Chloride (Cl)	53	Cl = 0.021(SpC) + 2.732	.29	83	12
Silica (Si)	18	Si = 0.022(SpC) + 7.356	.62	38	4.9
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3=0.0003(SpC)+1.437	*.08	0.60	0.58

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
56	650	5.9	SpC = 1,094 $Q^{-0.18452}$	-0.59	35	0.122	28

06880556 West Fork Big Blue River below Hastings, Nebr.

Location.--Lat 40°36'09", long 98°20'02", in NW¼NW¼SW¼ sec. 3, T.7 N. R.9 W., Adams County, Hydrologic Unit 10270203, at bridge on county road 1.4 mi north of U.S. Highway 6 and about 1.5 mi northeast of Hastings.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	60	980	105	592	613	188	810	333
Dissolved solids, residue	mg/L	35	510	140	375	393	100	478	210
Dissolved solids, sum	mg/L	17	493	72	349	330	109	460	171
Hardness as $CaCO_3$	mg/L	17	190	33	156	172	38	186	95
Calcium, dissolved	mg/L	17	59	10	49	54	12	59	28
Magnesium, dissolved	mg/L	17	10	2.0	8.3	8.8	2.0	9.9	6.0
Sodium, dissolved	mg/L	17	88	7.9	52	44	25	85	16
Potassium, dissolved	mg/L	17	14	7.5	11	11	2.1	14	9.1
Bicarbonate ion	mg/L	17	252	50	183	190	47	230	106
Sulfate, dissolved	mg/L	17	82	7.3	52	52	17	79	31
Chloride, dissolved	mg/L	52	77	3.6	41	41	20	68	15
Fluoride, dissolved	mg/L	17	1.6	0.3	0.6	0.5	0.3	1.1	0.3
Silica, dissolved	mg/L	17	35	7.9	26	28	6.4	32	18
Boron, dissolved	mg/L	17	530	50	212	145	149	450	60
Iron, dissolved	ug/L	17	400	20	96	58	95	230	30
Manganese, dissolved	ug/L	17	190	10	48	32	43	90	20
Nitrite + nitrate as N,	mg/L	26	15	0.04	6.3	6.0	4.1	12	1.5
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	53	8.3	0.01	2.5	2.1	2.0	4.5	0.20
Organic N, total	mg/L	51	19	0.00	2.1	1.4	2.8	3.2	0.18
Phosphorus, total	mg/L	53	11	0.90	5.5	5.8	3.0	9.1	1.8
Phosphorus, dissolved	mg/L	44	9.8	0.25	4.9	5.5	3.0	8.5	1.4
Fecal coliform	col/100 ml	39	860,000	3,300	-------75,700		--------	510,000	6,800
Fecal streptococci	col/100 ml	47	60,000	400	------- 3,320		--------	30,000	890
Oxygen, dissolved	mg/L	53	10.8	2.8	6.8	6.9	1.6	9.2	5.3
Biochemical oxygen demand	mg/L	54	48.0	3.6	14.6	12.4	9.0	27.5	7.3
pH	pH units	57	7.9	7.1	7.4	7.4	0.2	7.7	7.2
Color	Co - Pt units	17	300	7	45	24	71	130	10

06880556 West Fork Big Blue River below Hastings, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	36	RDS = 0.479(SpC) + 81.862	0.90	81	44
Dissolved solids, sum (SDS)	17	SDS = 0.536(SpC) + 33.902	.97	94	28
Hardness as $CaCO_3$ (TH)	17	TH = 0.156(SpC) + 64.921	.80	64	24
Calcium (Ca)	17	Ca = 0.050(SpC) + 20.233	.79	62	7.9
Magnesium (Mg)	17	Mg = 0.008(SpC) + 3.768	.76	58	1.3
Sodium (Na)	17	Na = 0.120(SpC) - 17.888	.94	88	9.2
Potassium (K)	17	K = 0.009(SpC) + 6.086	.83	68	1.2
Bicarbonate (HCO_3)	17	HCO_3=0.192(SpC) + 70.456	.80	65	29
Sulfate (SO_4)	17	SO_4 = 0.075(SpC) + 8.604	.85	72	9.5
Chloride (Cl)	53	Cl = 0.092(SpC) - 14.254	.86	74	10
Silica (Si)	17	Si = 0.030(SpC) + 9.060	.92	85	2.5
Nitrite + Nitrate as N (NO_2-NO_3)	26	NO_2-NO_3=0.017(SpC) - 3.052	.77	59	2.7

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
60	422	2.5	$SpC = 1{,}336\ Q^{-0.33887}$	-0.73	54	0.122	28

06880800 West Fork Big Blue River near Dorchester, Nebr.

Location.--Lat 40°43'52", long 97°10'38", in SW¼SW¼ sec. 23, T.9 N., R.2 E., Seward County, Hydrologic Unit 10270203, on right bank 60 ft downstream from bridge on county road, 6.2 mi northwest of Dorchester, and 19 mi upstream from mouth.

Drainage area.--1,206 mi².

Period of record.--Water years 1963-70, 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	166	701	78	439	504	156	583	137
Dissolved solids, residue	mg/L	146	415	71	286	327	87	365	140
Dissolved solids, sum	mg/L	62	407	78	275	320	91	356	98
Hardness as $CaCO_3$	mg/L	128	260	21	156	198	67	199	35
Calcium, dissolved	mg/L	128	79	6.1	47	57	21	66	10
Magnesium, dissolved	mg/L	128	15	1.5	9.3	11	3.6	13	2.8
Sodium, dissolved	mg/L	128	50	2.0	24	27	11	36	5.3
Potassium, dissolved	mg/L	127	16	4.5	9.2	8.9	2.2	13	6.9
Bicarbonate ion	mg/L	129	299	26	192	231	80	264	48
Sulfate, dissolved	mg/L	127	63	7.0	35	40	14	50	10
Chloride, dissolved	mg/L	163	43	2.0	16	16	7.3	24	4.9
Fluoride, dissolved	mg/L	128	0.6	0.1	0.4	0.4	0.1	0.5	0.3
Silica, dissolved	mg/L	127	36	4.7	24	26	6.9	32	14
Boron, dissolved	mg/L	127	320	10	61	55	33	85	31
Iron, dissolved	ug/L	98	660	0	68	36	99	143	8
Manganese, dissolved	ug/L	77	1,000	0	150	129	140	273	23
Nitrite + nitrate as N, dissolved	mg/L	28	2.9	0.28	1.6	1.8	0.65	2.3	0.44
Nitrate as N, dissolved	mg/L	24	3.7	0.00	1.6	1.4	1.1	3.2	0.07
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	57	1.6	0.00	0.31	0.20	0.34	0.64	0.04
Organic N, total	mg/L	57	7.3	0.09	1.4	1.2	1.2	2.2	0.33
Phosphorus, total	mg/L	57	3.8	0.52	0.91	0.83	0.45	1.2	0.62
Phosphorus, dissolved	mg/L	63	1.6	0.15	0.59	0.58	0.20	0.77	0.37
Fecal coliform	col/100 ml	44	125,000	5	--------	610	----------	5,800	45
Fecal streptococci	col/100 ml	52	143,000	25	--------1,000		----------	9,400	86
Oxygen, dissolved	mg/L	51	15.0	5.5	9.4	8.8	2.2	12.3	6.9
Biochemical oxygen demand (5-day)	mg/L	53	16.0	0.8	4.8	4.1	3.0	8.4	1.9
pH	pH units	170	8.5	6.5	7.6	7.6	0.4	8.1	7.0
Color	Co - Pt units	70	450	1	33	10	68	71	3

06880800 West Fork Big Blue River near Dorchester, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	146	RDS = 0.544(SpC) + 50.259	0.98	96	17
Dissolved solids, sum (SDS)	61	SDS = 0.599(spC) + 14.733	.99	98	12
Hardness as $CaCO_3$ (TH)	128	TH = 0.410(SpC) - 15.096	.99	97	11
Calcium (Ca)	128	Ca = 0.128(SpC) - 6.124	.98	96	3.9
Magnesium (Mg)	128	Mg = 0.022(SpC) + 0.122	.97	94	0.9
Sodium (Na)	128	Na = 0.065(SpC) - 3.454	.96	92	3.1
Potassium (K)	127	K = -0.007(SpC) + 12.085	-.51	26	1.9
Bicarbonate (HCO_3)	129	HCO_3 = 0.497(SpC) - 15.992	.99	97	13
Sulfate (SO_4)	127	SO_4 = 0.083(SpC) + 0.299	.95	91	4.2
Chloride (Cl)	163	Cl = 0.038(SpC) - 0.954	.80	64	4.4
Silica (Si)	127	Si = 0.032(SpC) + 10.800	.76	57	4.5
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3= -0.001(SpC)+2.255	*-.29	8.4	0.6

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
166	3,400	15	SpC = 3,570 $Q^{-0.46838}$	-0.93	87	0.084	19

06881000 Big Blue River near Crete, Nebr.

Location.--Lat 40°35'47", long 96°57'36", in SW¼SE¼ sec. 3, T.7 N., R.4 E., Saline County, Hydrologic Unit 10270202 on downstream side of right pier of highway bridge, 1.8 mi south of Missouri Pacific Railroad station in Crete, 3.3 mi downstream from Walnut Creek, and 3.6 mi upstream from Squaw Creek.

Drainage area.--2,716 mi^2.

Period of record.--Water years 1961-63, 1968 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	81	745	65	461	520	192	656	152
Dissolved solids, residue	mg/L	60	468	54	320	343	101	420	170
Dissolved solids, sum	mg/L	19	432	79	245	250	131	400	96
Hardness as $CaCO_3$	mg/L	39	280	17	139	140	84	252	33
Calcium, dissolved	mg/L	39	84	5.0	42	45	26	78	9.8
Magnesium, dissolved	mg/L	39	18	1.0	8.3	8.3	5.1	15	1.4
Sodium, dissolved	mg/L	39	45	2.2	20	17	12	36	4.0
Potassium, dissolved	mg/L	38	16	7.0	9.7	9.6	1.7	12	7.5
Bicarbonate ion	mg/L	39	326	28	165	170	99	295	43
Sulfate, dissolved	mg/L	39	74	1.0	34	34	19	60	11
Chloride, dissolved	mg/L	78	36	0.0	15	15	9.6	26	4.4
Fluoride, dissolved	mg/L	39	0.8	0.2	0.4	0.3	0.1	0.5	0.3
Silica, dissolved	mg/L	39	33	7.7	18	20	6.9	28	9.2
Boron, dissolved	mg/L	39	130	10	58	58	24	87	33
Iron, dissolved	ug/L	37	310	0	79	56	70	170	13
Manganese, dissolved	ug/L	33	460	0	102	30	128	250	0
Nitrite + nitrate as N, dissolved	mg/L	33	3.4	0.00	1.6	1.7	0.76	2.5	0.55
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	54	1.4	0.01	0.44	0.36	0.34	0.86	0.07
Organic N, total	mg/L	54	17	0.20	2.1	1.4	3.1	3.0	0.49
Phosphorus, total	mg/L	59	5.9	0.56	1.1	0.77	0.93	1.6	0.69
Phosphorus, dissolved	mg/L	50	0.91	0.21	0.50	0.52	0.13	0.64	0.34
Fecal coliform	col/100 ml	46	345,000	10	-------	6,800	--------	81,000	120
Fecal streptococci	col/100 ml	56	145,000	36	-------	2,900	--------	43,000	148
Oxygen, dissolved	mg/L	57	15.0	0.0	8.9	8.4	2.6	12.3	6.4
Biochemical oxygen demand (5-day)	mg/L	56	35.0	1.9	11.8	10.4	6.6	21.0	3.8
pH	pH units	81	8.4	6.2	7.5	7.6	0.4	8.0	6.9
Color	Co - Pt units	25	500	0	152	38	188	450	5

06881000 Big Blue River near Crete, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	60	RDS = 0.535(SpC) + 57.424	0.92	85	39
Dissolved solids, sum (SDS)	19	SDS = 0.588(SpC) + 14.242	.99	99	15
Hardness as $CaCO_3$ (TH)	39	TH = 0.422(SpC) - 16.319	.99	98	10
Calcium (Ca)	39	Ca = 0.129(SpC) - 5.411	.99	98	3.5
Magnesium (Mg)	39	Mg = 0.025(SpC) - 0.739	.96	92	1.4
Sodium (Na)	39	Na = 0.061(SpC) - 2.580	.98	95	2.7
Potassium (K)	38	K = -0.002(SpC) + 10.376	*-.21	4.6	1.7
Bicarbonate (HCO_3)	39	HCO_3=0.495(SpC) - 17.069	.99	97	16
Sulfate (SO_4)	39	SO_4 = 0.093(SpC) - 0.040	.96	92	5.6
Chloride (Cl)	78	Cl = 0.034(SpC) - 0.648	.81	65	4.7
Silica (Si)	39	Si = 0.030(SpC) + 7.432	.85	73	3.6
Nitrite + Nitrate as N (NO_2-NO_3)	32	NO_2-NO_3= -0.001(SpC)+2.321	-.37	13	0.72

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
81	19,900	11	$SpC = 2,975\ Q^{-0.36769}$	-0.87	75	0.130	30

06881200 Turkey Creek near Wilber, Nebr.

Location.--Lat 40°28'48", long 97°00'43", in NE¼NE¼ sec. 19, T.6 N., R.4 E., Saline County, Hydrologic Unit 10270204, on left bank near downstream side of bridge on State Highway 41, 2.8 mi west of Wilber.

Drainage area.--460 mi^2.

Period of record.--Water years 1966-70, 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	134	1,890	73	536	529	304	738	180
Dissolved solids, residue	mg/L	113	1,060	52	329	329	162	450	130
Dissolved solids, sum	mg/L	58	989	63	305	308	140	430	130
Hardness as $CaCO_3$	mg/L	93	280	21	165	187	68	229	47
Calcium, dissolved	mg/L	93	87	5.2	49	54	21	71	12
Magnesium, dissolved	mg/L	93	16	1.4	10	12	3.7	14	3.2
Sodium, dissolved	mg/L	94	300	2.1	36	32	36	46	6.1
Potassium, dissolved	mg/L	93	15	2.8	8.2	7.9	2.8	12	4.8
Bicarbonate ion	mg/L	94	326	24	196	218	81	273	48
Sulfate, dissolved	mg/L	94	70	6.8	41	44	15	56	15
Chloride, dissolved	mg/L	130	430	1.6	44	26	73	68	8.3
Fluoride, dissolved	mg/L	94	0.6	0.2	0.4	0.4	0.1	0.5	0.3
Silica, dissolved	mg/L	93	33	3.9	21	21	5.6	28	14
Boron, dissolved	mg/L	93	250	7	61	56	34	94	28
Iron, dissolved	ug/L	73	360	0	78	46	83	200	16
Manganese, dissolved	ug/L	57	440	0	114	78	98	235	16
Nitrite + nitrate as N, dissolved	mg/L	28	2.1	0.06	0.80	0.70	0.52	1.7	0.12
Nitrate as N, dissolved	mg/L	23	3.6	0.00	0.79	0.50	0.98	2.0	0.00
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	56	2.5	0.00	0.33	0.16	0.47	0.78	0.03
Organic N, total	mg/L	56	8.0	0.15	1.3	1.1	1.2	2.3	0.40
Phosphorus, total	mg/L	56	1.9	0.21	0.61	0.57	0.30	0.94	0.30
Phosphorus, dissolved	mg/L	63	1.2	0.00	0.38	0.37	0.16	0.50	0.23
Fecal coliform	col/100 ml	44	30,000	3	--------	488	--------	3,400	12
Fecal streptococci	col/100 ml	52	130,000	8	--------	1,140	--------	10,200	24
Oxygen, dissolved	mg/L	53	15.3	3.0	9.1	8.5	2.6	12.7	6.3
Biochemical oxygen demand (5-day)	mg/L	54	44.0	0.3	5.1	4.0	5.8	7.9	2.0
pH	pH units	136	8.5	6.4	7.6	7.7	0.4	8.2	7.0
Color	Co - Pt units	48	500	1	49	20	99	82	4

06881200 Turkey Creek near Wilber, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	111	RDS = 0.544(SpC) + 42.624	0.99	98	21
Dissolved solids, sum (SDS)	56	SDS = 0.535(SpC) + 37.458	.99	98	19
Hardness as $CaCO_3$ (TH)	93	TH = 0.198(SpC) + 67.857	.71	50	48
Calcium (Ca)	92	Ca = 0.059(SpC) + 20.247	.68	46	16
Magnesium (Mg)	92	Mg = 0.012(SpC) + 4.198	.78	61	2.3
Sodium (Na)	93	Na = 0.136(SpC) - 30.838	.91	83	15
Potassium (K)	92	K = -0.004(SpC) + 9.965	-.30	9.4	2.7
Bicarbonate (HCO_3)	94	HCO_3=0.246(SpC) + 75.734	.73	54	55
Sulfate (SO_4)	93	SO_4 = 0.050(SpC) + 16.639	.81	66	8.8
Chloride (Cl)	128	Cl = 0.215(SpC) - 72.270	.90	81	32
Silica (Si)	92	Si = 0.013(SpC) + 14.590	.55	30	4.7
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3= -0.001(SpC)+1.491	-.56	31	0.44

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
133	4,070	0.10	SpC = 1,080 $Q^{-0.30393}$	-0.88	77	0.125	29

06881502 Big Blue River below Beatrice, Nebr.

Location.--Lat 40°14'55", long 96°42'46", in SE¼SE¼ sec. 2, T.3 N., R.6 E., Gage County, Hydrologic Unit 10270202, at pipeline bridge about 2 mi downstream from bridge on U.S. Highway 77, 1.3 mi southeast of Beatrice.

Period of record.--Water year 1973 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	54	898	125	622	675	184	810	310
Dissolved solids, residue	mg/L	36	550	180	412	427	84	500	280
Dissolved solids, sum	mg/L	18	477	52	314	350	132	460	98
Hardness as $CaCO_3$	mg/L	18	260	25	170	200	75	257	43
Calcium, dissolved	mg/L	18	78	7.0	50	60	23	75	13
Magnesium, dissolved	mg/L	18	17	1.8	11	12	4.6	16	2.6
Sodium, dissolved	mg/L	18	69	4.4	40	38	20	66	9.1
Potassium, dissolved	mg/L	18	12	5.7	8.9	9.1	1.7	11	6.3
Bicarbonate ion	mg/L	18	291	30	191	215	86	267	51
Sulfate, dissolved	mg/L	18	76	5.6	52	57	21	75	14
Chloride, dissolved	mg/L	53	85	3.7	44	44	19	67	15
Fluoride, dissolved	mg/L	18	0.7	0.2	0.4	0.4	0.1	0.5	0.2
Silica, dissolved	mg/L	18	29	8.0	19	20	5.8	25	9.8
Boron, dissolved	mg/L	18	140	30	77	72	29	130	50
Iron, dissolved	ug/L	17	150	0	56	45	42	120	10
Manganese, dissolved	ug/L	17	320	0	106	45	112	300	0
Nitrite + nitrate as N, dissolved	mg/L	28	2.8	0.03	1.6	1.8	0.79	2.3	0.15
Nitrate as N, dissolved	mg/L	----------							
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	55	4.1	0.00	0.50	0.30	0.63	1.1	0.07
Organic N, total	mg/L	55	6.9	0.00	1.6	1.3	1.3	2.7	0.50
Phosphorus, total	mg/L	56	1.7	0.44	0.82	0.78	0.25	1.2	0.55
Phosphorus, dissolved	mg/L	46	1.1	0.02	0.48	0.46	0.18	0.65	0.29
Fecal coliform	col/100 ml	40	60,700	150	-------	2,600	---------	18,000	490
Fecal streptococci	col/100 ml	50	178,000	144	-------	1,000	---------	25,000	266
Oxygen, dissolved	mg/L	53	17.4	5.4	10.1	10.1	2.6	13.0	6.6
Biochemical oxygen demand (5-day)	mg/L	54	42.0	0.4	11.2	8.6	9.8	25.0	2.1
pH	pH units	60	8.9	6.7	7.7	7.7	0.4	8.3	7.2
Color	Co - Pt units	18	420	5	81	35	115	300	0

06881502 Big Blue River below Beatrice, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	35	RDS = 0.545(SpC) + 51.018	0.99	98	13
Dissolved solids, sum (SDS)	18	SDS = 0.611(SpC) - 4.538	1.0	99	11
Hardness as $CaCO_3$ (TH)	18	TH = 0.344(SpC) - 9.769	.99	98	12
Calcium (Ca)	18	Ca = 0.103(SpC) - 3.557	.99	97	3.8
Magnesium (Mg)	18	Mg = 0.020(SpC) - 0.032	.97	94	1.2
Sodium (Na)	18	Na = 0.092(SpC) - 8.123	.98	96	4.2
Potassium (K)	18	K = 0.001(SpC) + 8.382	*.13	1.6	1.7
Bicarbonate (HCO_3)	18	HCO_3= 0.390(SpC) - 12.291	.98	96	16
Sulfate (SO_4)	18	SO_4 0.095(SpC) + 1.830	.96	92	6.1
Chloride (Cl)	52	Cl = 0.090(SpC) - 12.493	.84	71	10
Silica (Si)	18	Si = 0.023(SpC) + 6.553	.87	76	3.0
Nitrite + Nitrate as N (NO_2-NO_3)	28	NO_2-NO_3=0.0001(SpC)+1.544	*.02	0.05	0.81

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
54	7,260	25.7	SpC = 3,214 $Q^{-0.31326}$	-0.82	67	0.105	24

06882000 Big Blue River at Barneston, Nebr.

Location.--Lat 40°03', long 96°35', in NE¼SW¼ sec. 13, T.1 N., R.7 E., Gage County, at gaging station in tailrace of powerplant, 0.8 mi northwest of Barneston, 2 mi upstream from Plum Creek, and 5 mi upstream from Nebraska-Kansas State line.

Drainage area.--4,444 mi^2.

Period of record.--October 1966 to September 1968.

Statistical data for selected chemical constituents

Constituent	Units	No. of measurements	Maximum	Minimum	Mean	Median	Standard deviation	Ninetieth percentile	Tenth percentile
Specific conductance	umho/cm	44	737	89	538	595	173	690	210
Dissolved solids, residue	mg/L	41	468	69	338	370	103	432	150
Dissolved solids, sum	mg/L	16	441	100	325	370	103	410	126
Hardness as $CaCO_3$	mg/L	41	254	28	182	196	61	238	74
Calcium, dissolved	mg/L	41	78	7.0	54	58	19	72	22
Magnesium, dissolved	mg/L	41	17	2.4	12	13	3.8	15	4.7
Sodium, dissolved	mg/L	41	57	1.6	40	46	16	56	13
Potassium, dissolved	mg/L	41	18	6.2	8.7	8.0	2.6	11	8.5
Bicarbonate ion	mg/L	41	292	32	212	240	73	277	76
Sulfate, dissolved	mg/L	41	68	5.2	48	53	16	64	21
Chloride, dissolved	mg/L	41	53	1.2	34	37	14	49	7.9
Fluoride, dissolved	mg/L	41	0.5	0.2	0.4	0.4	0.1	0.4	0.3
Silica, dissolved	mg/L	41	29	4.7	19	20	5.9	26	11
Boron, dissolved	mg/L	41	170	20	69	69	26	93	40
Iron, dissolved	ug/L	14	510	0	81	19	150	320	0
Manganese, dissolved	ug/L	14	490	0	122	110	128	197	0
Nitrite + nitrate as N, dissolved	mg/L								
Nitrate as N, dissolved	mg/L	3	1.7	0.50	0.93		0.66		
Nitrate as NO_3, dissolved	mg/L	41	26	0.10	8.3		5.4		
Ammonia N, total	mg/L								
Organic N, total	mg/L								
Phosphorus, total	mg/L								
Phosphorus, dissolved	mg/L	1			0.40				
Fecal coliform	col/100 ml								
Fecal streptococci	col/100 ml								
Oxygen, dissolved	mg/L	4	4.0	2.6	3.2		0.6		
Biochemical oxygen demand (5-day)	mg/L								
pH	pH units	44	8.4	6.1	7.6	7.7	0.4	8.1	7.0
Color	Co - Pt units	26	70	1	12	7.5	15	37	4.5

6882000 Big Blue River at Barneston, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measure-ments	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	41	RDS = 0.580(SpC) + 22.540	1.0	99	10
Dissolved solids, sum (SDS)	16	SDS = 0.587(SpC) + 12.886	.99	99	11
Hardness as $CaCO_3$ (TH)	41	TH = 0.344(SpC) - 4.757	.99	98	8.6
Calcium (Ca)	41	Ca = 0.104(SpC) - 2.727	.98	97	3.3
Magnesium (Mg)	41	Mg = 0.020(SpC) + 0.473	.96	92	1.1
Sodium (Na)	41	Na = 0.089(SpC) - 7.708	.98	97	2.7
Potassium (K)	41	K = -0.007(SpC) + 12.471	-.48	23	2.3
Bicarbonate (HCO_3)	41	HCO_3= 0.406(SpC) - 8.050	.99	98	11
Sulfate (SO_4)	41	SO_4 0.089(SpC) + 0.312	.98	96	3.4
Chloride (Cl)	41	Cl = 0.075(SpC) - 7.244	.95	90	4.6
Silica (Si)	41	Si = 0.015(SpC) + 10.955	.46	21	5.3
Nitrite + Nitrate as N (NO_2-NO_3)					

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measure-ments	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
44	26,000	31	SpC = 1,971 $Q^{-0.27778}$	-0.86	74	0.112	26

Little Blue River Basin

The Little Blue River basin is in south-central Nebraska between the Big Blue and Republican River basins. The Little Blue River leaves Nebraska just south of Steele City in Jefferson County.

Most of the basin is composed of flatlands underlain by loess-covered Pleistocene sand and gravel deposits. Topography becomes somewhat rolling in the eastern glaciated part of the basin where loess mantles glacial drift. In places in the eastern part of the basin, bedrock of Cretaceous age outcrops along valley sides. Streamflow is maintained mostly by the discharge of ground water supplemented by overland runoff in the upstream part of the basin. Overland runoff comprises most of the streamflow in the eastern part of the basin.

Descriptive statistics were determined for two locations on the Little Blue River. One is at Deweese in the upper part of the basin and the other is at Hollenberg, Kans., just downstream from the Nebraska-Kansas border (fig. 14). At Deweese, the mean specific conductance is 358 umho/cm. At Hollenberg, the mean conductance is 465 umho/cm, an increase of 30 percent over the mean for Deweese. The mean concentration of sodium increased 92 percent, and the mean for chloride increased 350 percent from Deweese to Hollenberg. Seepage of small amounts of more highly mineralized water from bedrock in the lower part of the basin probably accounts for these increased concentrations. Calcium is the principal cation and bicarbonate the principal anion at both stations.

Concentrations of most constituents associated with water pollution are not high at the Hollenberg station. Medians for fecal coliform and fecal streptococcal bacteria are 600 and 290 col/100 ml, respectively. However, the mean BOD concentration of 10.8 mg/L indicates some effect of effluent from the Fairbury sewage plant approximately 15 mi upstream.

Results of regression analyses indicate that with the exception of potassium and nitrite plus nitrate, correlation coefficients are all above 0.87 for all constituents at both stations.

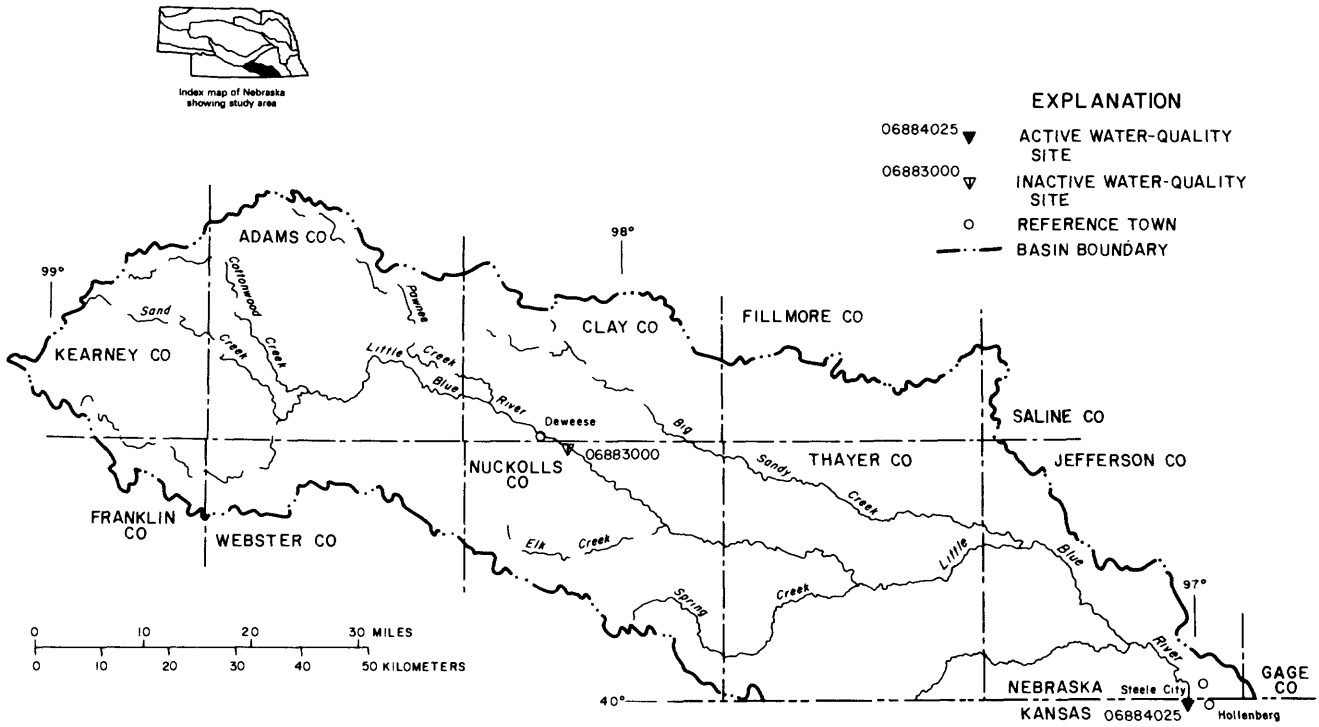

Figure 14. Location of water-quality sampling sites, Little Blue River basin.

06883000 Little Blue River near Deweese, Nebr.

Location (revised).--Lat 40°19'58", long 98°04'20", in SW¼NE¼ sec. 11, T.4 N., R.7 W., Nuckolls County, at gaging station about 1,500 ft above bridge on State Highway 14, 1 mi upstream from Walnut Creek, 3.2 mi southeast of Deweese, and 6 mi northwest of Angus.

Drainage area.--979 mi^2.

Period of record.--August 1956 to September 1958, October 1959 to June 1960, November 1960 to September 1968.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	203	758	63	358	-------	124	----------	
Dissolved solids, residue	mg/L	171	312	61	233	-------	69	----------	
Dissolved solids, sum	mg/L	38	294	66	219	-------	77	----------	
Hardness as $CaCO_3$	mg/L	175	197	21	148	-------	57	----------	
Calcium, dissolved	mg/L	171	70	6.5	47	-------	19	----------	
Magnesium, dissolved	mg/L	171	13	1.0	7.5	-------	2.7	----------	
Sodium, dissolved	mg/L	175	19	1.1	12	-------	5.1	----------	
Potassium, dissolved	mg/L	171	13	4.3	7.6	-------	1.6	----------	
Bicarbonate ion	mg/L	175	235	27	176	-------	67	----------	
Sulfate, dissolved	mg/L	170	36	3.3	27	-------	8.8	----------	
Chloride, dissolved	mg/L	170	11	0.0	6.9	-------	2.9	----------	
Fluoride, dissolved	mg/L	171	0.6	0.0	0.3	-------	0.1	----------	
Silica, dissolved	mg/L	171	39	9.9	28	-------	6.1	----------	
Boron, dissolved	mg/L	171	130	0	38	-------	19	----------	
Iron, dissolved	ug/L	147	630	0	62	-------	99	----------	
Manganese, dissolved	ug/L	70	520	0	63	41	82	160	0
Nitrite + nitrate as N, dissolved	mg/L	----------							
Nitrate as N, dissolved	mg/L	22	1.3	0.0	0.39	-------	0.37	----------	
Nitrate as NO_3, dissolved	mg/L	171	6.3	0.0	1.3	-------	1.3	----------	
Ammonia N, total	mg/L	----------							
Organic N, total	mg/L	----------							
Phosphorus, total	mg/L	----------							
Phosphorus, dissolved	mg/L	----------							
Fecal coliform	col/100 ml	----------							
Fecal streptococci	col/100 ml	----------							
Oxygen, dissolved	mg/L	----------							
Biochemical oxygen demand (5-day)	mg/L	----------							
pH	pH units	175	8.3	6.3	7.5	-------	0.4	----------	
Color	Co - Pt units	44	40	0	7	-------	6.8	----------	

06883000 Little Blue River near Deweese, Nebr.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	170	RDS = 0.562(SpC) + 35.140	0.99	98	--------
Dissolved solids, sum (SDS)	37	SDS = 0.602(SpC) + 14.579	1.0	99	--------
Hardness as $CaCO_3$ (TH)	174	TH = 0.462(SpC) - 13.727	1.0	99	--------
Calcium (Ca)	170	Ca = 0.152(SpC) - 6.188	.99	98	--------
Magnesium (Mg)	170	Mg = 0.020(SpC) + 0.341	.92	85	--------
Sodium (Na)	174	Na = 0.041(SpC) - 1.954	.98	97	--------
Potassium (K)	170	K = -0.007(SpC) + 10.182	-.55	30	--------
Bicarbonate (HCO_3)	174	HCO_3= 0.538(SpC) - 11.970	1.0	99	--------
Sulfate (SO_4)	169	SO_4 = 0.071(SpC) + 1.648	.97	94	--------
Chloride (Cl)	170	Cl = 0.022(SpC) - 0.808	.94	88	--------
Silica (Si)	170	Si = 0.044(SpC) + 12.168	.88	77	--------
Nitrite + Nitrate as N (NO_2-NO_3)	----------				

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
191	9,860	26	SpC = 2,179 $Q^{-0.40140}$	-0.91	85	----------	

LITTLE BLUE RIVER BASIN

06884025 Little Blue River at Hollenberg, Kans.

Location.--Lat 39°58'48", long 97°00'16", NE¼SW¼ sec. 8, T.1 S., R.4 E., Washington County, Hydrologic Unit 10270207 on right bank, 2 ft downstream from bridge on county road, 0.6 mi west of Hollenberg, Kans., and 1.75 mi downstream from Nebraska-Kansas State line.

Drainage area.--2,752 mi^2.

Period of record.--Water year 1972 to current year.

Statistical data for selected chemical constituents

Constituent	Units	No. of measure-ments	Max-imum	Min-imum	Mean	Median	Standard devi-ation	Ninetieth percent-ile	Tenth percent-ile
Specific conductance	umho/cm	68	693	110	465	521	180	658	145
Dissolved solids, residue	mg/L	42	439	78	320	352	87	402	190
Dissolved solids, sum	mg/L	21	410	93	247	275	116	370	100
Hardness as $CaCO_3$	mg/L	27	270	45	137	150	69	220	53
Calcium, dissolved	mg/L	27	87	14	43	41	22	71	17
Magnesium, dissolved	mg/L	27	13	1.9	7.1	7.4	3.5	12	2.6
Sodium, dissolved	mg/L	27	49	3.8	23	26	15	40	7.3
Potassium, dissolved	mg/L	27	12	4.8	8.2	8.4	1.5	9.6	6.4
Bicarbonate ion	mg/L	21	274	50	165	190	83	250	80
Sulfate, dissolved	mg/L	27	72	9.7	31	30	17	48	11
Chloride, dissolved	mg/L	62	73	3.8	31	36	16	46	6.3
Fluoride, dissolved	mg/L	27	1.1	0.2	0.4	0.4	0.2	0.6	0.2
Silica, dissolved	mg/L	21	28	8.2	18	19	7.3	27	14
Boron, dissolved	mg/L	21	100	30	60	59	18	90	53
Iron, dissolved	ug/L	20	240	0	55	40	53	120	24
Manganese, dissolved	ug/L	20	130	0	36	22	37	72	0
Nitrite + nitrate as N, dissolved	mg/L	38	6.9	0.02	1.4	1.3	1.1	2.4	0.27
Nitrate as N, dissolved	mg/L	6	6.8	0.02	2.0	--------	2.4	----------	
Nitrate as NO_3, dissolved	mg/L	----------							
Ammonia N, total	mg/L	61	4.7	0.00	0.38	0.19	0.68	0.66	0.05
Organic N, total	mg/L	57	9.6	0.04	1.7	0.89	2.0	4.0	0.36
Phosphorus, total	mg/L	58	5.5	0.17	0.68	0.47	0.85	1.2	0.29
Phosphorus, dissolved	mg/L	49	0.79	0.15	0.28	0.29	0.10	0.37	0.22
Fecal coliform	col/100 ml	48	83,000	0	-------	600	--------	18,500	32
Fecal streptococci	col/100 ml	59	280,000	36	-------	290	--------	20,000	67
Oxygen, dissolved	mg/L	63	17.8	4.3	9.7	9.6	2.6	12.9	6.7
Biochemical oxygen demand (5-day)	mg/L	61	42.0	0.6	10.8	6.6	10.7	26.0	2.1
pH	pH units	70	8.6	6.6	7.6	7.7	0.4	8.2	7.1
Color	Co - Pt units	20	900	4	144	28	229	520	6

06884025 Little Blue River at Hollenberg, Kans.--Continued

Results of regression analyses relating concentrations of selected chemical constituents to specific conductance (SpC)

Dissolved constituents (mg/L)	No. of measurements	Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate (mg/L)
Dissolved solids, residue (RDS)	42	RDS = 0.579(SpC) + 21.719	0.98	96	16
Dissolved solids, sum (SDS)	21	SDS = 0.584(SpC) + 7.628	1.0	99	9.6
Hardness as $CaCO_3$ (TH)	27	TH = 0.341(SpC) + 2.926	.96	92	19
Calcium (Ca)	27	Ca = 0.107(SpC) + 0.870	.94	89	7.4
Magnesium (Mg)	27	Mg = 0.018(SpC) + 0.202	.96	93	0.9
Sodium (Na)	27	Na = 0.076(SpC) - 6.909	.97	93	4.0
Potassium (K)	27	K = -0.003(SpC) + 9.322	*-.38	15	1.4
Bicarbonate (HCO_3)	21	HCO_3= 0.417(SpC) - 5.995	.99	99	9.4
Sulfate (SO_4)	27	SO_4 = 0.082(SpC) - 1.699	.94	88	6.1
Chloride (Cl)	62	Cl = 0.082(SpC) - 7.994	.89	79	7.3
Silica (Si)	21	Si = 0.032(SpC) + 5.079	.87	76	3.7
Nitrite + Nitrate as N (NO_2-NO_3)	38	NO_2-NO_3= -0.002(SpC)+2.492	-.40	16	1.0

* Not significant at the 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

Results of regression analyses relating specific conductance to water discharge (Q)

No. of measurements	Water discharge (ft^3/s)		Regression equation	Correlation coefficient	Percent explained variance	Standard error of estimate	
	Maximum	Minimum				Log units	Percent
60	9,390	23.9	$SpC = 3,229\ Q^{-0.34196}$	-0.88	78	0.106	25

DISCUSSION

The quality of water at the 109 sampling sites for which statistical data have been presented depends on several factors. One of these is the quality of ground-water seepage, which itself depends on the availability of soluble constituents and the texture of the soils and subsoils in the recharge area of the aquifer from which the water is derived. Water from sites in the upper part of the Loup River basin and the middle part of the Niobrara River basin is derived almost completely from the discharge of ground water from areas where small amounts of soluble constituents occur and soils are sandy. As a result, the least mineralized streamflow in Nebraska occurs in these areas.

The quality of ground-water seepage also is important in other parts of the State. Even though overland runoff may account for nearly all the discharge in many streams in eastern Nebraska, if the stream flows the year-around, base flow usually is maintained by ground-water seepage. In some of these streams, such as several in the Salt Creek basin, this seepage is derived from highly saline aquifers so that at low and medium flows these streams may be highly mineralized.

The second factor on which water quality at the sampling sites depends is the quality of overland runoff. Overland runoff accounts for most of the streamflow in eastern Nebraska. Following storm events, overland runoff usually contains smaller amounts of dissolved-chemical constituents. With the exception of sandhills streams, whose contributing drainage areas are but a small fraction of their total drainage areas, an inverse relationship between specific conductance and water discharge usually exists for all sampling sites; that is, specific conductance decreases as water discharge increases. This relationship may be poorly defined in locations where a high degree of regulation exists in the stream basin (such as the Republican River basin).

A third factor, quality of irrigation return flow, affects water quality in streams. For example, quality of water in the North Platte River basin is affected by return flow of surface water diverted upstream for irrigation use. Increases in dissolved solids, sodium, and sulfate concentrations are evident as a result of concentration by evapotranspiration, leaching of soils, or other processes.

Lastly, effluent from sewage-treatment plants or runoff from large feedlots may affect the quality of streamflow significantly, especially if the amount of effluent is large in proportion to the amount of streamflow. Usually, the quality of water at sampling sites below effluent discharges is characterized by increases in BOD, chloride, bacteria, and nutrient constituents. Several stations in the Big Blue River basin and on the mainstem of the Missouri River located below effluent discharges are characterized by high values of these constituents.

Application of Descriptive Statistics

The tables of descriptive statistics for each station can be used to compare the quality of water at stations within basins, to compare the quality of water outflowing from various basins, and to compare the quality of water at any station or stations with criteria for water use.

Intra-basin Water Quality

Comparison of water quality based on descriptive statistics can show similarities and differences in quality between stations within a basin. Generally, in basins such as the Loup, Elkhorn, Little Blue, and Big Blue, for which the source of water is entirely within the State, water is more highly mineralized at downstream sampling sites than at upstream sites as a result of seepage of more highly mineralized ground water in the lower part of each basin. For some basins where water originates partly outside the State, water flowing into the State is more highly mineralized than is water which originates in Nebraska. For example, as a result of the inflow of ground water low in dissolved chemical constituents, the mean specific conductance for the Niobrara River is less near the mouth at Verdel than at the most upstream sampling site above Box Butte Reservoir. In still other basins, such as the Middle Platte or the Republican, there is little, if any, overall difference in water quality between upstream ad downstream sites.

In general, with two principal exceptions, more than one area of mantle rock and geomorphology characterize each basin in the State. For example, the upper part of the Elkhorn River basin is in the sandhills, but the lower part is in loess-covered glacial drift hills. The differences in mantle rock, geomorphology, and proportions of overland runoff to ground-water inflow cause the quality of streamflow to differ by area within a basin. This can be illustrated by comparing the quality of water in the Elkhorn River at Ewing with the quality of water in Logan Creek at Pender. Mean conductance is 220 umho/cm at Ewing, where runoff is largely from the sandhills, and is 716 umho/cm at Pender, where runoff is largely from the glacial drift area even though calcium and bicarbonate are the principal ions in both streams.

The Missouri tributaries basin and the Nemaha River basin are both located in loess-covered glacial drift hills. Insufficient data exist for these basins to compare data from upstream and downstream locations on the same stream. However, water quality is very

similar both in type and degree of mineralization in the three major streams comprising the Nemaha River basin.

Inter-basin Water Quality

Comparison of water quality between basins is difficult because of water-quality differences within basins. However, comparison of outflow from the various basins is simple and highly instructive. Tables 6 and 7 contain data for the most downstream site in each of the basins or for the most representative station where downstream order may not be meaningful.

According to table 6, calcium is the principal cation and bicarbonate the principal anion in outflow from seven and eight of the basins in the State, respectively. Sodium is the principal cation in the White River–Hat Creek basin, and sulfate is the principal anion in the White River–Hat Creek basin and in the South Platte River basin. Sodium and calcium occur almost equally in water leaving the Missouri Tributaries, North Platte, South Platte, Middle Platte, and Lower Platte basins. Sulfate and bicarbonate occur almost equally in water leaving the Missouri tributaries, North Platte, and Middle Platte basins. Based on specific conductance, water leaving the South Platte River basin is the most mineralized, and water leaving the Niobrara River basin is the least mineralized.

Table 7 contains data for the comparison of constituents often associated with water pollution for each basin where information is available. Those stations having the highest means and medians are below outfalls of sewage-treatment plants.

Water-quality Criteria

Descriptive statistics for the individual stations can be used to estimate the suitablity of water for many uses. Criteria have been established for most major uses of water including public drinking-water supply, irrigation, industry, and recreation and are discussed by the EPA (1976). By comparing the descriptive statistics for a station in question with the criteria for a particular use, the suitablity of water for that use can be determined.

Probably the most useful of the descriptive statistics for comparison to water-quality criteria are those which measure frequency—the percentiles, including the median, and the range. The maximum and minimum which determine the range represent only unusual conditions. For many uses, the tenth and ninetieth percentiles may be more representative of the actual range of occurrence of most constituents and therefore a better indication of what the quality of water at a station truly is like.

The process of using descriptive statistics to determine the suitability of water for a particular use is complicated in that for most uses a variety of constituents or properties and their relation to each other must be considered simultaneously. In determining suitability for irrigation, for example, total dissolved solids, boron concentrations, the ratio of sodium concentrations to those of calcium and magnesium, and the relation of bicarbonate concentrations to calcium and magnesium must all be considered.

For an example of how the tables for each station can be used, table 8 compares irrigation criteria for dissolved solids and boron with frequency statistics for those constituents from representative outflow stations in each basin. Both total dissolved solids maximum and ninetieth percentile concentrations exceed the criteria for seven of the basins. However, minimum and tenth percentile concentrations exceed the criteria for only one of the basins. It should be pointed out that even though total dissolved solids concentrations exceed the criteria, use of the water for irrigation is not precluded because many other factors are involved (U.S. Salinity Laboratory, 1954).

Maximum concentrations for boron are less than the criteria for outflow from all 13 basins.

Application of Regression Equations

In general, but with numerous exceptions, for all sampling sites where sufficient data are available, dissolved-solids sum and residue, hardness, calcium, magnesium, and bicarbonate concentrations correlate well with specific conductance. Exceptions and reasons for exceptions have been noted in the sections concerning each basin. Sodium, chloride, and sulfate concentrations sometimes correlate well with specific conductance. Nitrite plus nitrate, silica, and potassium concentrations correlate poorly with specific conductance in most cases. Specific conductance correlates well with water discharge for some sites.

The regression equations in this report can be used in several ways. If specific conductance is known for a given time for a given sampling site, concentrations of other constituents can be estimated by substituting the known conductance into the appropriate equations. Assuming the known conductance into the appropriate equations. Assuming conditions are similar to those occurring during the period of record for each station, the reliability of the computed concentrations compared to the actual ones is related to the correlation coefficient, the standard error of estimate, and the level of significance. For sampling sites having water low in mineralization, differences between computed and actual concentrations may be within the range of the measurement error of the analytical method.

Table 6. Comparison of mean concentrations of chemical constituents in outflow from each of 13 river basins in Nebraska

River	Station	Specific conductance (umho/cm)	Ca (mg/L)	Mg (mg/L)	Na (mg/L)	HCO_3 (mg/L)	SO_4 (mg/L)	Cl (mg/L)
White-Hat	White River near Whitney	1,320	83	23	157	313	416	14
Niobrara	Niobrara River near Verdel	266	36	4.8	9.9	142	16	1.9
Missouri tributaries	Missouri River at Nebraska City	676	61	19	54	197	164	17
North Platte	North Platte River near Keystone	741	58	19	79	222	177	19
South Platte	South Platte River at Roscoe	1,890	175	57	176	259	696	81
Middle Platte	Platte River near Duncan	828	70	21	73	223	208	25
Loup	Loup River Power Canal at diversion near Genoa	278	37	6.1	9.4	157	11	2.5
Elkhorn	Elkhorn River at Waterloo	476	61	14	22	245	43	13
Lower Platte	Platte River at Louisville	713	55	13	77	207	81	79
Nemaha	Big Nemaha River at Falls City	657	70	18	30	249	72	25
Republican	Republican River at Superior	511	66	14	24	233	57	15
Big Blue	Big Blue River at Barneston	538	54	12	40	212	48	34
Little Blue	Little Blue River at Hollenberg, Kans.	405	43	7.1	23	165	31	31

Table 7. Comparison of nitrite plus nitrate, total phosphorus, BOD, fecal coliform, and fecal streptococci in outflow from 13 river basins in Nebraska

Basin	Station	Mean concentrations (mg/L)			Median concentrations (Col/100 ml)	
		$NO_2 + NO_3$	Total P	BOD	Fecal coliform	Fecal streptococci
White-Hat	White River near Whitney	0.59	0.27	2.5	100	-----
Niobrara	Niobrara River near Verdel	.40	.27	3.2	32	118
Missouri tributaries	Missouri River at Nebraska City	.68	.24	-----	-----	-----
North Platte	North Platte River near Keystone	.41	-----	-----	-----	-----
South Platte	South Platte River at Roscoe	-----	.21	3.0	140	200
Middle Platte	Platte River near Duncan	.48	.26	3.2	91	-----
Loup	Loup River Power Canal at diversion near Genoa.	.43	.31	-----	55	133
Elkhorn	Elkhorn River at Waterloo	1.2	1.1	8.8	9,600	3,130
Lower Platte	Platte River at Louisville	-----	.50	-----	110	180
Nemaha	Big Nemaha River at Falls City	1.8	.51	5.2	4,160	1,190
Republican	Republican River at Superior	.63	.49	3.2	470	-----
Big Blue	Big Blue River at Barneston	-----	-----	-----	-----	-----
Little Blue	Little Blue River at Hollenberg, Kans.	1.4	.68	10.8	600	290

Table 8. Examples showing comparison of frequency statistics with irrigation criteria for two constituents

River basin	Station	Total dissolved solids (mg/L)						Boron, dissolved (ug/L)					
		Criteria	Maximum	Ninetieth percentile	Median	Tenth percentile	Minimum	Criteria	Maximum	Ninetieth percentile	Median	Tenth percentile	Minimum
White-Hat	White River near Whitney	500	2,290	1,700	813	470	298	750	740	420	207	87	60
Niobrara	Niobrara River near Verdel	500	262	230	197	180	165	750	60	50	30	20	0
Missouri tributaries.	Missouri River at Nebraska City.	500	643	-----	-----	-----	217	750	320	-----	-----	-----	40
North Platte	North Platte River near Keystone.	500	529	520	494	481	477	750	150	148	138	110	90
South Platte	South Platte River at Roscoe.	500	1,800	1,700	1,440	1,200	1,170	750	300	-----	-----	-----	220
Middle Platte	Platte River near Duncan	500	788	685	550	460	171	750	560	164	131	94	40
Loup	Loup River Power Canal at diversion near Genoa.	500	247	220	199	181	149	750	730	70	50	25	20
Elkhorn	Elkhorn River at Waterloo	500	493	380	338	210	136	750	480	110	64	12	0
Lower Platte	Platte River at Louisville	500	978	610	423	320	296	750	-----	-----	-----	-----	-----
Nemaha	Big Nemaha River at Falls City.	500	638	570	418	350	251	750	120	116	72	50	20
Republican	Republican River at Superior.	500	458	420	347	260	190	750	200	130	80	43	40
Big Blue	Big Blue River at Barneston.	500	468	432	370	150	69	750	170	93	69	40	20
Little Blue	Little Blue River at Hollenberg, Kans.	500	439	402	352	190	78	750	100	90	59	53	30

In table 9, three examples are given in which concentrations computed from the regression equations are compared to concentrations obtained by laboratory measurement. The three stations for which the examples are shown are distributed across the State in three different topographic and geologic settings. Streamflow in Little Nemaha River at Auburn is maintained mostly by overland runoff. That in the Calamus River near Burwell is maintained almost completely by discharge of ground water into the stream, and that in the North Platte River at Lisco is maintained by controlled releases of water upstream and by irrigation return flow from both overland runoff and subsurface drainage.

Correlation coefficients for the first example, Little Nemaha River at Auburn, generally are high for the relationships between conductance and the selected constituents. The maximum difference between computed and actual concentrations is 6.2 percent for magnesium. This difference of 1 mg/L probably is not much greater than the measurement errors in the analytical method for magnesium.

Correlation coefficients for the second example, Calamus River near Burwell, generally are poor, but differences between the laboratory measurement and the computed values, with the exception of sulfate, are very small. This indicates that when concentrations of constituents are consistently very low, the accuracy and precision of the analytical methods used to determine these concentrations may explain more of the variation in concentrations than does specific conductance.

For the third example, North Platte River at Lisco, the greatest percent difference between actual and computed concentrations for the constituents examined is 6.8 percent. Correlation coefficients are not

Table 9. Comparison between concentrations of chemical constituents determined by chemical analyses with those concentrations computed from regression equations

Constituent	Actual analysis (A)	Computed value (B)	Correlation coefficient	Percent difference, $\frac{\lvert A-B \rvert}{A} \times 100$
Little Nemaha River at Auburn—March 1, 1977				
Specific conductance, umho/cm	598	-----	-----	-----
Dissolved solids sum, mg/L	351	365	0.99	4.0
Calcium, mg/L	69	70	.98	1.4
Magnesium, mg/L	16	17	.96	6.2
Sodium, mg/L	34	36	.88	5.9
Bicarbonate, mg/L	284	287	.99	1.1
Sulfate, mg/L	55	56	.94	1.8
Chloride, mg/L	17	18	.64	5.9
Calamus River near Burwell—September 9, 1977				
Specific conductance, umho/cm	135	-----	-----	-----
Dissolved solids sum, mg/L	127	124	.47	2.4
Calcium, mg/L	19	17	.50	10
Magnesium, mg/L	2.4	2.5	.25[1]	4.2
Sodium, mg/L	5.6	5.5	.42	1.8
Bicarbonate, mg/L	80	79	.54	1.2
Sulfate, mg/L	2.7	4.2	.24[1]	56
Chloride, mg/L	1.1	1.0	.19[1]	9.1
North Plate River at Lisco—May 17, 1977				
Specific conductance, umho/cm	922	-----	-----	-----
Dissolved solids sum, mg/L	606	618	.87	2.0
Calcium, mg/L	80	80	.72	0
Magnesium, mg/L	21	20	.29	4.8
Sodium, mg/L	87	89	.82	2.3
Bicarbonate, mg/L	280	299	.70	6.8
Sulfate, mg/L	210	197	.70	6.2
Chloride, mg/L	22	22	.70	0

[1]Not significant at 95 percent confidence level; the regression equation should not be used to predict the concentration of the dependent variable.

as good as those for the Auburn station; however, because the water is more highly mineralized, the percent differences between actual and computed concentrations for some constituents are actually very low.

Another way that regression equations may be used is to reduce the frequency of measurement for some constituents for individual stations, provided that basin characteristics have not changed from the period of time that the data on which the regression equation is based was collected. Also, if daily specific conductance measurements are available for a station, mean daily constituent concentrations can be simulated. Furthermore, if the standard errors of estimate of the regression relationships are satisfactory and if both daily specific conductance and mean daily water discharge data are available, mean daily constituent loads can be simulated.

If regression data are verified periodically by laboratory measurements at regular intervals, changes in regression coefficients with time may be useful in detecting effects of changes in the environment caused by major human activities. Such changes in regression coefficients are more likely to be observed in small streams than in large streams.

One the basis of the available data for the 109 stations covered by this report, it appears that with only a few exceptions, the use of regression equations generated for an individual station is appropriate only for that station. Small intra-basin differences in water quality preclude the use for one station of regression data generated for another. Therefore, any simulation of water-quality data using the regression equations generated for a particular station should be considered appropriate only for that location on the stream or for a short distance upstream or downstream from that location.

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METRIC CONVERSION FACTORS

The International System of units (SI) is used in this report. For readers who prefer the inch-pound system of units, the conversion factors for the terms in this report are listed below:

Multiply SI unit	By	To obtain inch-pound unit
square kilometer (km^2)	0.0040	acre
cubic meter (m^3)	1,233	acre-foot (acre-ft)
meter (m)	0.3048	foot (ft)
liter per second (L/s)	28.3162	cubic foot per second (ft^3/s)
millimeter (mm)	25.4	inch
kilometer (km)	1.609	mile (mi)
square kilometer (km^2)	2.590	square mile (mi^2)
degree Celsius (°C)	5/9 (°F-32)	degree Fahrenheit (°F)

INDEX OF STATION NAMES

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