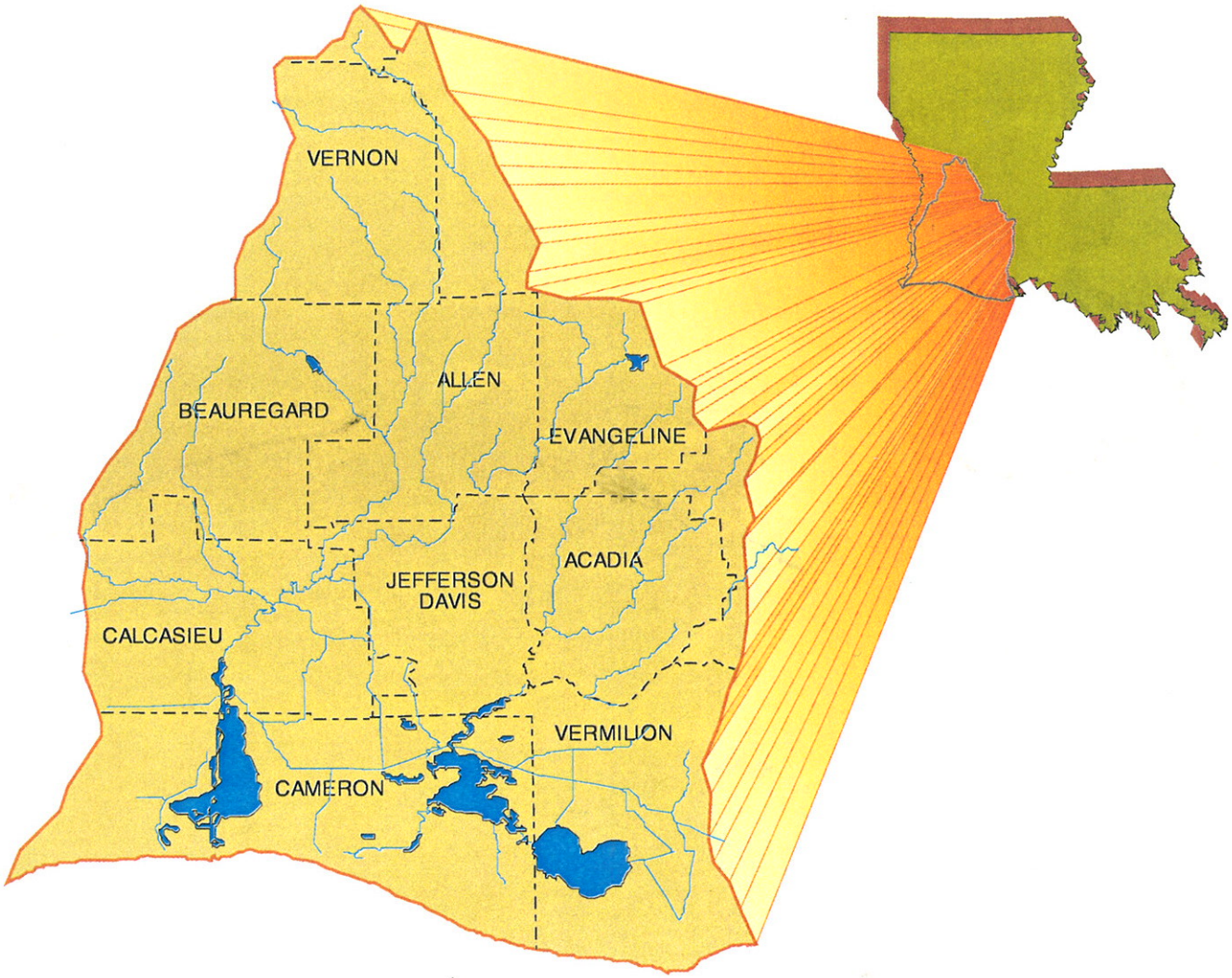
Statistical Summary of Surface-Water Quality in Louisiana--Calcasieu-Mermentau River Basin, 1943-95

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
Water Resources Technical Report No. 55E



STATE OF LOUISIANA
DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT
PUBLIC WORKS AND FLOOD CONTROL DIRECTORATE
WATER RESOURCES SECTION
in cooperation with the
U.S. GEOLOGICAL SURVEY

1997

STATE OF LOUISIANA

DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

PUBLIC WORKS AND FLOOD CONTROL DIRECTORATE

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WATER RESOURCES

TECHNICAL REPORT NO. 55E

Statistical Summary of Surface-Water Quality in Louisiana--Calcasieu-Mermentau River Basin, 1943-95

By

Charles R. Garrison

U.S. GEOLOGICAL SURVEY

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Multiply	By	To obtain
inch (in.)	25.4	millimeter
foot (ft)	0.3048	meter
mile (mi)	1.609	kilometer
acre	0.4047	hectare
cubic foot per second (ft^3/s)	0.0283	cubic meter per second
million gallons per day (Mgal/d)	0.04381	cubic meter per second

Temperature in degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) as follows: $°F = 1.8(°C) + 32$.

Sea level: In this report, "sea level" refers to the National Geodetic Vertical Datum of 1929--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "Sea Level Datum of 1929."

Abbreviated water-quality units:

cells per milliliter (cells/mL)
colonies per 100 milliliters (cols/100 mL)
microsiemens per centimeter at 25 degrees Celsius (µS/cm)
micrograms per liter (µg/L)
milligrams per liter (mg/L)
nanograms per liter (ng/L)

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By Charles R. Garrison

ABSTRACT

A statistical summary of surface-water quality in the Calcasieu-Mermentau River basin was completed using available data from the U.S. Geological Survey Water-Data Storage and Retrieval System (WATSTORE), a computerized data base. Data for 33 water-quality properties and constituents for 21 sites in the Calcasieu-Mermentau River basin within Louisiana were statistically analyzed for the water years 1943-95. Results are reported as boxplots, linear-regression plots, and tabulated data.

The data were summarized into seven categories: (1) physical properties--specific conductance, pH, water temperature, dissolved oxygen, and dissolved solids; (2) major inorganic cations--dissolved calcium, magnesium, sodium, and potassium; (3) major inorganic anions--total alkalinity as calcium carbonate, dissolved sulfate, and dissolved chloride; (4) trace metals--dissolved copper, iron, lead, and zinc; (5) nutrients--nitrogen and phosphorus constituents; (6) organic compounds--pesticides and PCB's; and (7) biological constituents--fecal coliform and fecal streptococcus bacteria and phytoplankton.

The physical properties varied for surface waters in the Calcasieu-Mermentau River basin. The median values for specific conductance ranged from 46 to 25,200 microsiemens per centimeter at 25 degrees Celsius. Values for pH in water from the basin were occasionally less than 6.5, the lower limit of the U.S. Environmental Protection Agency's recommended range for freshwater aquatic life. Median values for water temperatures ranged from 15.0 to 25.0 degrees Celsius.

The dissolved oxygen concentrations were greater than the State's minimum water-quality criterion of 5.0 mg/L (milligrams per liter) in more than 75 percent of the samples analyzed at most sites. However, the statistical data indicated that between 50 and 75 percent of the samples collected at Mermentau River at Mermentau, Louisiana had dissolved oxygen concentrations of less than or equal to 5.0 mg/L.

An analysis of the data for major inorganic cations and anions indicated that concentrations of major ions were less than recommended levels for drinking water, where such levels have been established. However, there were high concentrations of sodium and chloride at the coastal sites.

An analysis of the available data for trace metals indicated that dissolved copper, lead, and zinc concentrations were less than the maximum contaminant levels of the U.S. Environmental Protection Agency's primary and secondary drinking water regulations. The iron concentrations in water from the basin occasionally exceeded the U.S. Environmental Protection Agency's Secondary Maximum Contaminant Level of 300 µg/L (micrograms per liter) for domestic water supplies at most of the sites, but did not exceed the recommended maximum level of 1,000 µg/L for freshwater aquatic life.

An analysis of the nutrient data indicated that the median concentrations of ammonia plus organic nitrogen as nitrogen at the sites ranged from 0.7 to 1.2 mg/L. However, the median concentrations were generally greater at Mermentau River at Mermentau, Louisiana, and Houston River near Buhler, Louisiana, than at the other sites.

An analysis of the available organic-chemical data indicated that diazinon and 2,4-D were detected at more sites and with greater frequency than any of the other organic compounds that were analyzed.

The median ratios of fecal coliform to fecal streptococcus bacteria were less than 0.7 for most of the sites within the Calcasieu-Mermentau River basin, indicating that sources of fecal coliform bacteria were probably predominantly livestock or poultry wastes. Additional study is needed to confirm these results. Phytoplankton concentrations ranged from 0 to 45,000 cells per milliliter due to seasonal influence.

ACKNOWLEDGMENTS

The author extends his appreciation to Zahir "Bo" Bolourchi, Chief, Water Resources Section, of the Louisiana Department of Transportation and Development, for guidance and assistance provided during the study and his substantial contribution to the completion of this report. The Report Preparation Section of the Louisiana District was especially helpful in the completion of this report at early stages of preparation and different stages of review. The final preparation and layout of the report was a team effort. The team members were Sebastian R. Brazelton, Dorothy L. Collier, Cheryl A. Johnson, William C. Martin, and Darlene M. Smothers.

1.0 INTRODUCTION

THIS REPORT IS ORGANIZED INTO THREE PARTS AND PRESENTED IN "STOP" FORMAT[1]

A single topic is presented in text and pictures on facing pages.

This report, **"Statistical Summary of Surface-Water Quality in Louisiana--Calcasieu-Mermentau River Basin, 1943-95,"** is one of a series of reports in which surface-water-quality data for the major river basins in Louisiana will be statistically summarized. This report is organized into three parts (excluding the "Abstract"): the "Introduction," the "Calcasieu-Mermentau River basin in Louisiana," and "Selected References."

The "Introduction" provides background information about the study, describes the hydrologic setting and land use in Louisiana, and presents a brief description of selected water-quality properties and constituents.

The section titled "Calcasieu-Mermentau River basin in Louisiana," presents statistical analyses of the surface-water-quality data at selected representative sites in the basin. This basin summary section contains the following:

- Maps and text giving an overview of the basin, including location, areal extent, drainage area, major drainage and surface-water bodies, land use, and water use.
- Boxplots and text describing statistical summaries of selected physical properties of surface waters at representative sampling sites.
- Graphs and text describing the relation between specific conductance and dissolved solids and specific conductance and dissolved chloride, at representative sampling sites.
- Boxplots, tables, and text describing statistical summaries of major inorganic chemical constituents; selected trace metals, nutrients, and organic chemicals concentrations; and selected biological constituents, usually bacteria.
- Summary and conclusions, which pertain only to the basin summary.

The "Selected References" lists all references that pertain to the water quality in the basin.

[1]This report is presented in "STOP" (Sequential Thematic Organization of Publications) format (Hobba, Jr., 1981, p. 1). In this format, topics are presented using text and illustrations on two facing pages. Generally, topics are presented on two facing pages in this report, but in a few places the information is continued on additional pages.

1.1 Background

SURFACE-WATER QUALITY OF THE MAJOR DRAINAGE BASINS IN LOUISIANA

A large amount of water-quality data is available for streams, rivers, and lakes in Louisiana.

Water-quality samples from streams, rivers, and lakes in Louisiana have been collected and analyzed by the U.S. Geological Survey (USGS) since 1905, and the USGS, in cooperation with local, State, and other Federal agencies, systematically has operated water-quality sites on streams, rivers, and lakes in the State since 1943. Results of the analyses are stored in the USGS computerized water-quality files and often are used to answer data requests and provide a large source of information for the managers of Louisiana's surface-water resources. Even though these data have been published in the USGS series of annual reports entitled Water Resources Data for Louisiana (Dantin and others, 1994) and in many other reports that describe surface-water quality, descriptive statistics for these data are needed to make the data more useful for water managers, to allow more complete answers to be given for information requests from the public, to indicate the need for additional water-quality data at existing or new sites, and to indicate problem areas where interpretive studies are needed.

In response to the above needs, the USGS, in cooperation with the Louisiana Department of Transportation and Development, began a study in October 1987 to statistically analyze and summarize water-quality data from about 300 surface-water-quality sites in Louisiana and to present the data in such a manner that trends, overall quality, and basin-wide changes in water quality could be evaluated. The study focused on the surface-water quality of the Mississippi River mainstem and the major drainage basins in Louisiana: the Lake Pontchartrain-Lake Maurepas basin; the Mississippi River Delta basin; the Atchafalaya-Teche-Vermilion basin; and the Calcasieu-Mermentau, Ouachita, Pearl, Red, Sabine, and Tensas River basins (fig. 1.1-1).

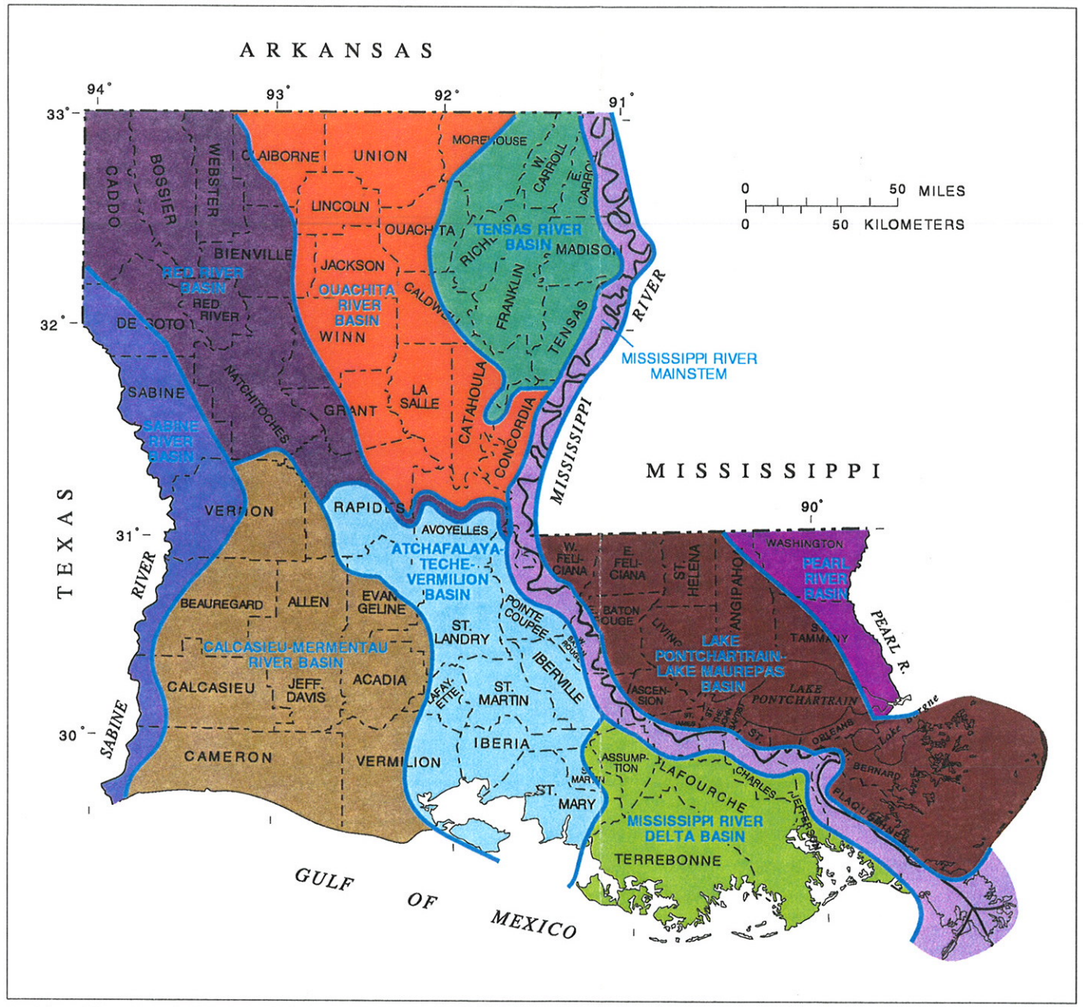

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Figure 1.1-1. Major surface-water basins in Louisiana.

1.2 Purpose and Scope

ANALYZE AND SUMMARIZE SURFACE-WATER-QUALITY DATA

Statistical analyses with illustrations describe water quality of the major drainage basins in Louisiana.

Statistical analyses of water-quality data and corresponding illustrations are presented for each major drainage basin in Louisiana. Nine of the 10 basins described in this study are those delineated by the Louisiana Department of Transportation and Development (1984). The mainstem of the Mississippi River is discussed separately from the Mississippi River Delta basin to preserve continuity of data for the Mississippi River.

Data for about 300 sites in Louisiana for water years 1905-95 were included in these statistical analyses. The number of water-quality sites varied from basin to basin, and the number and type of samples varied from site to site within a given basin. Pesticides, and occasionally, trace metals and nutrients are presented in tables when there are more than 10 samples, and most, or all, of the concentrations are below the largest detection level for the analytical methods used. Daily sediment data were collected at Bayou Grand Cane near Stanley, Bayou Castor near Logansport, and Bayou San Patricio near Benson in the Sabine River basin, and Pearl River near Bogalusa in the Pearl River basin. This information is presented in tables in the Sabine River basin and the Pearl River basin reports. All water-quality data and streamflow data used for the statistical analyses are stored in the USGS Water-Data Storage and Retrieval System (WATSTORE), a computerized data base (fig. 1.2-1). Only WATSTORE data were used for the study.

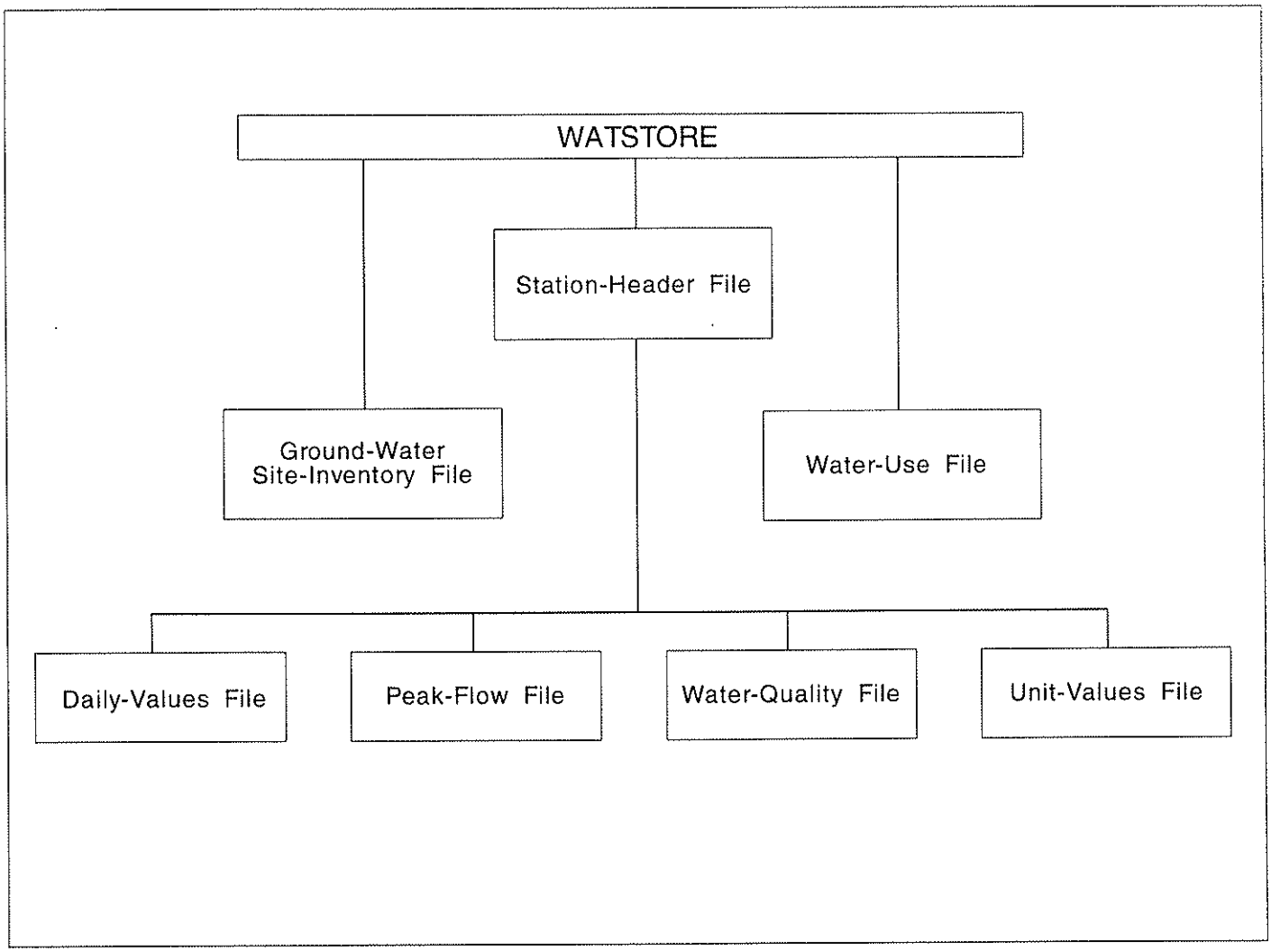

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Figure 1.2-1. Files in the U.S. Geological Survey Water-Data Storage and Retrieval System (WATSTORE).

1.3 Methods of Study

BOXPLOTS AND GRAPHS ILLUSTRATE WATER QUALITY AT SIX REPRESENTATIVE SITES IN A BASIN

Tables list statistical information for selected water-quality properties and constituents.

Data from six representative sites within a basin are presented graphically. Data from all sites within a basin that were sampled 10 or more times are summarized in tables for each basin. These tables list the following information and summary statistics for selected properties and constituents for each site: number of analyses; detection level; maximum, minimum, and mean values or concentrations; and values or concentrations representing the 5th, 25th, 50th, 75th, and 95th percentiles of the total sample population. The data for selected sites were used to generate boxplots and linear regression equations and graphs for selected properties and constituents.

Boxplots illustrate a statistical summary of water-quality data at a site (D.R. Helsel, U.S. Geological Survey, written commun., 1989) (fig. 1.3-1). Boxplots of specific conductance, pH, water temperature, dissolved oxygen, major inorganic cations, major inorganic anions, trace metals, nutrients, bacteria, and phytoplankton (where data were available), were developed for selected sites in each basin.

A boxplot summarizes a data set by displaying the values or concentrations representing the 5th, 25th, 50th, 75th, and 95th percentiles of the data. This format allows comparison among streams in the basin. The term percentile as used in this report refers to a distribution of values in the total data set. For example, the 25th percentile is the data value below which 25 percent of the data values occur (Sokal and Rohlf, 1969, p. 45). The 50th percentile is also the median of the data. The interquartile range is between the 25th and 75th percentiles. Fifty percent of the data are within this range.

A boxplot is constructed so the top and bottom of the box are drawn at the 75th and 25th percentiles. A line across the box indicates the median. The 95th and 5th percentiles are indicated by a vertical line from the top of the box to the 95th percentile and from the bottom of the box to the 5th percentile.

A horizontal dashed line indicates the analytical detection level. Because of changes in analytical procedures the reporting level may have changed over time. When multiple reporting levels were used for some constituents, a dashed line was drawn across the boxplot at the largest reporting level used.

Another method used to evaluate water-quality data in this series of reports is linear regression (fig. 1.3 -2). Linear regression equations were calculated in the form of $Y = aX + b$, where a is the slope of the regression line, b is the Y intercept, and Y and X are the dependent and independent variables (Sokal and Rohlf, 1969, p. 408). The number of data pairs, N, and the correlation coefficient, r, also are presented. The correlation coefficient indicates the degree of association between two variables. The closer the r value is to ± 1, the better the association. Linear regression equations and graphs are presented for specific conductance and dissolved solids and for specific conductance and dissolved chloride. However, extrapolation of the equations beyond the data used to define the equation could result in incorrect values because the relation may not be linear in that range.

Water-quality samples were collected and analyzed using techniques and methods prescribed by the USGS. Collection procedures for chemical constituents are determined by the Office of Water Quality within the USGS. Methods for chemical analyses are presented in "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments" (Fishman and Friedman, 1989). Collection procedures and analytical methods for biological constituents are presented in "Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples" (Britton and Greeson, 1988). Collection procedures and analytical methods for organic constituents are presented in "Methods for the Determination of Organic Substances in Water and Fluvial Sediments" (Wershaw and others, 1983).

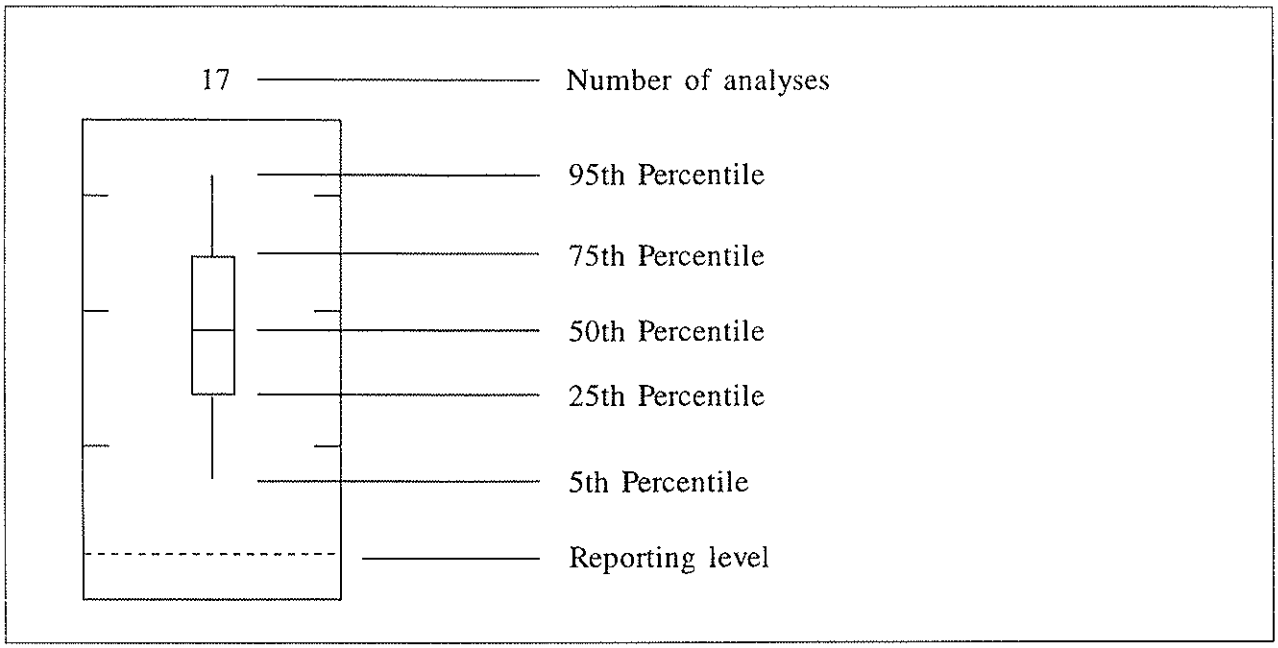

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Figure 1.3-1. Example and definition of boxplot.

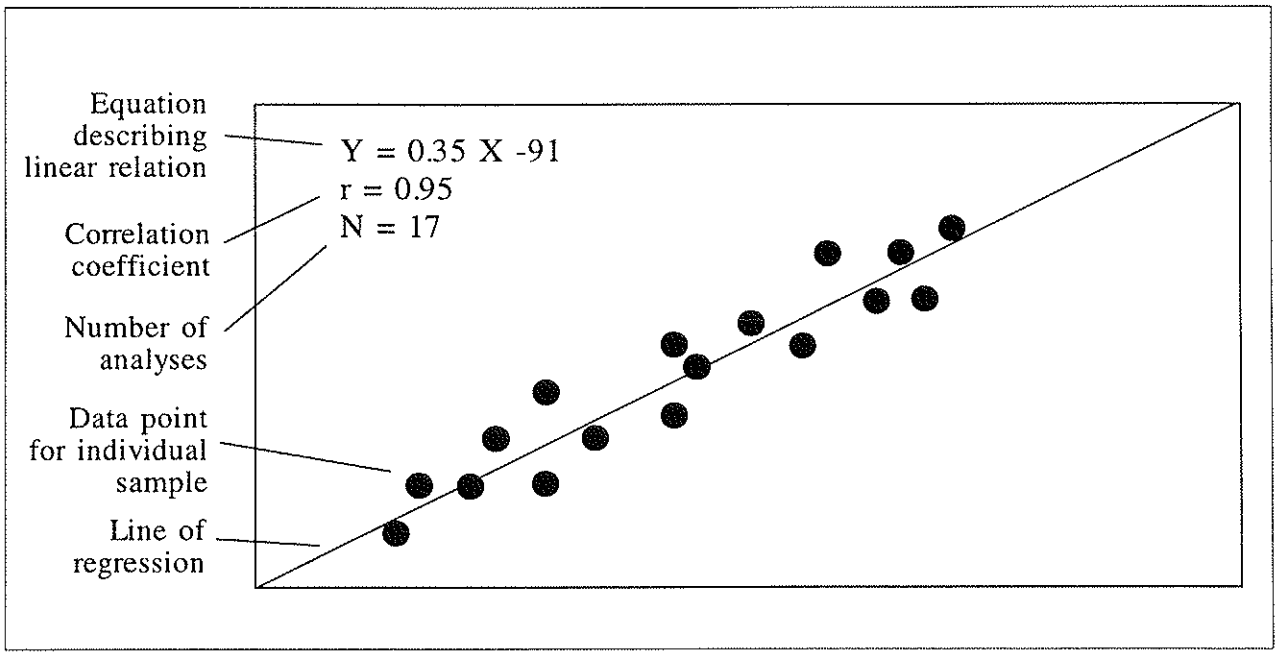

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Figure 1.3-2. Example and definition of linear regression.

1.4 Hydrologic Setting and Land Use in Louisiana

CLIMATE AND PHYSIOGRAPHY INDIRECTLY AFFECT WATER QUALITY

Climate and physiography are the primary factors that affect land use in Louisiana, and "the quality of Louisiana's streams, rivers, and lakes depends in large part on the uses of the land they drain" (U.S. Geological Survey, 1993, p. 293).

1.4.1 Climate

HUMID, SUBTROPICAL CLIMATE PREVAILS IN LOUISIANA

The mean annual precipitation ranges from about 48 inches in the northwestern part of the State to 64 inches in the southeastern part.

The relatively high annual rainfall and the year-round moderate air temperatures account for the humid, subtropical climate in Louisiana (Lee, 1985b, p. 2). Annual rainfall ranges from about 48 in. in the northwestern part of the State to about 64 in. in the southeastern part (fig. 1.4.1-1) (McWreath and Lowe, 1986; Muller and others, 1984). The most intense rainfall occurs during localized thunderstorms that produce large amounts of rainfall but move rapidly through an area.

Other sources of heavy rainfall are tropical storms and hurricanes. These storms intensify over the warm waters of the Gulf of Mexico and move slowly inland. During this inland movement, extremely heavy rainfall can occur over most of the State in a short period of time and can cause major flooding.

Mean annual air temperatures range from 19.0 °C in the northern part of the State to 20.5 °C in the southern part. The lowest temperatures usually occur during January and February and the highest temperatures occur during July and August (Lee, 1985b, p. 2).

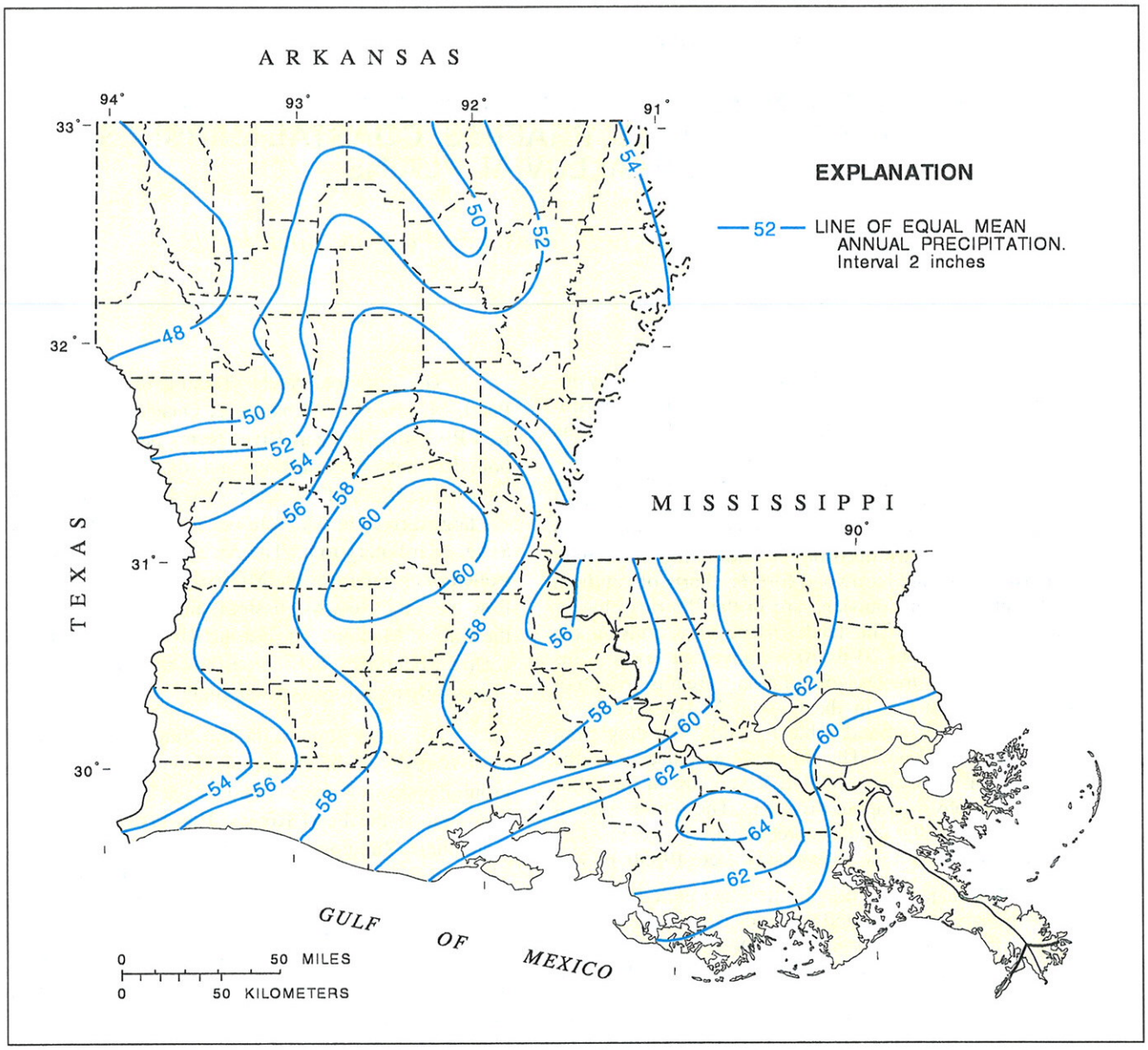

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Figure 1.4.1-1. Mean annual precipitation in Louisiana, 1951-80. (Source: Muller and others, 1984)

1.4.2 Physiography

LOUISIANA INCLUDES PARTS OF FOUR PHYSIOGRAPHIC DIVISIONS--PINE HILLS, PRAIRIES, COASTAL MARSHES, AND ALLUVIAL PLAINS

Major land uses include forests and agricultural lands.

Louisiana lies within the Coastal Plain Physiographic Province, and includes parts of four physiographic divisions--the Pine Hills, the Prairies, the Coastal Marshes, and the Alluvial Plains (Fenneman, 1938). These physiographic divisions are shown in figure 1.4.2-1. Parts of north-central, western, and southeastern Louisiana are in the Pine Hills division. The topography of this division is undulating hills with extensive pine and hardwood forests. Parts of southern and southwestern Louisiana are in the Prairies physiographic division. The land surface elevations in the Prairies range from 20 to 30 ft above sea level. This area generally is treeless except along streams. Much of coastal Louisiana is in the Coastal Marshes division. These areas are flat and subject to tidal flooding from the Gulf of Mexico. The flood plains adjacent to the Mississippi, Ouachita, and Red Rivers are in the Alluvial Plains physiographic division. The topography of these areas is flat with interconnecting streams that allow flow between the river basins (Lee, 1985b, p. 3).

The major land uses in the State include forests, cropland, grazing land, and wetlands (Louisiana Department of Transportation and Development, 1984, p. 24-28). Even though most land is well suited to agriculture, some areas support industry, oil and gas production, and aquaculture (U.S. Geological Survey, 1993, p. 293).

The principal rivers draining the State are the Pearl, Mississippi, Atchafalaya, Ouachita, Sabine, and Red Rivers. The Pearl River forms part of the eastern boundary between Louisiana and Mississippi and drains only a small part of the State. The Mississippi River is the largest river in the State but few streams within the State are tributary to it. The Atchafalaya River is a controlled distributary of the Mississippi River, and carries flow from the Red, Mississippi, and Ouachita Rivers to the Gulf of Mexico. The Sabine River forms part of the western boundary between Louisiana and Texas and drains only a small part of the State.

All other streams in the State are tributary to these rivers with the exception of two groups. The first group consists of streams east of the Mississippi River and west of the Pearl River. This group includes the Tchefuncte, Tangipahoa, Natalbany, and Amite Rivers. These rivers eventually flow into the Gulf of Mexico by way of Lake Pontchartrain and Lake Maurepas. The second group includes rivers west of the Mississippi River and east of the Sabine River. Major streams in this group are Bayou Teche and the Vermilion, Mermentau, and Calcasieu Rivers. These rivers flow into the Gulf of Mexico.

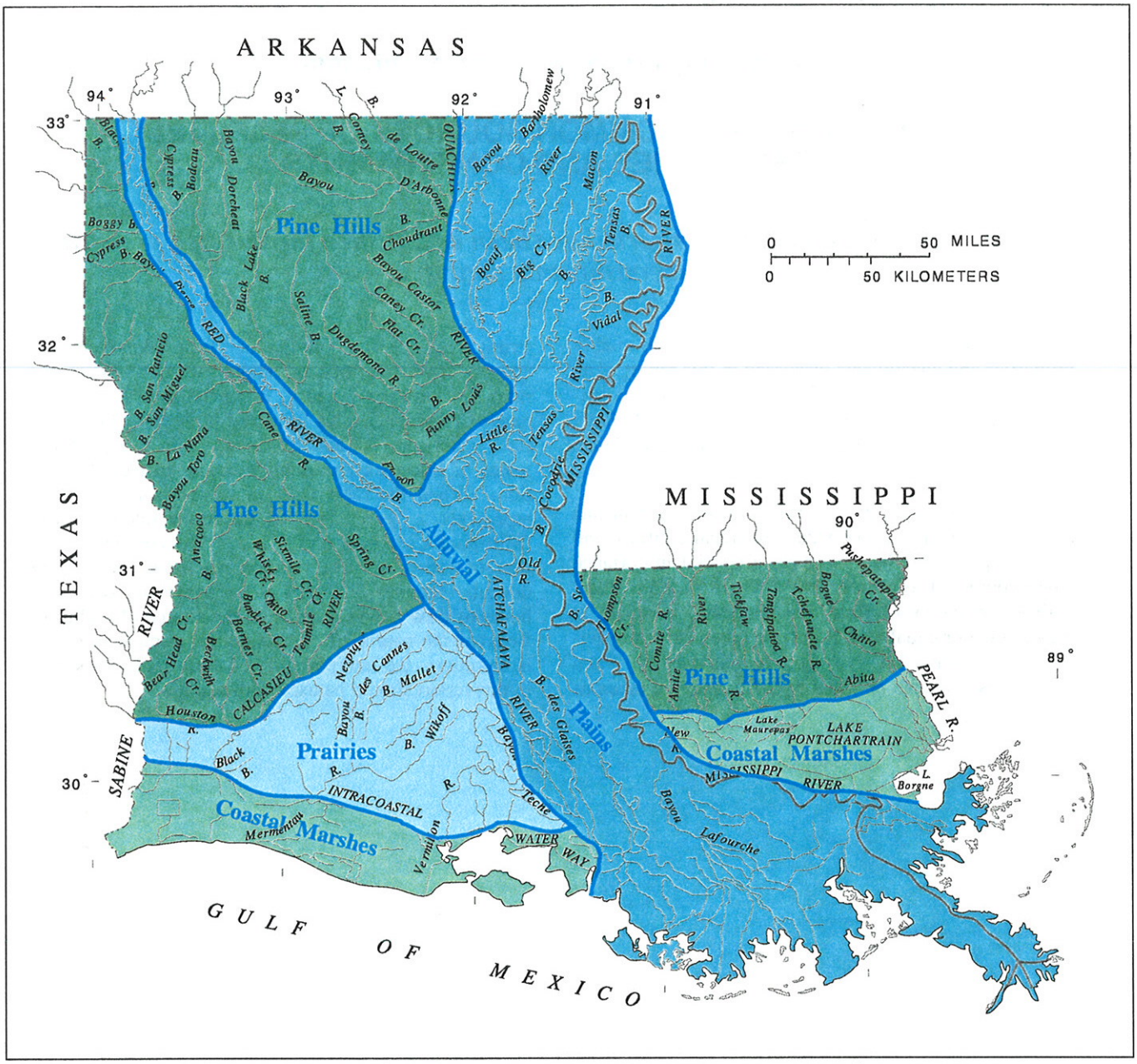

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Figure 1.4.2-1. Physiographic divisions and streams in Louisiana. (Source: Lee, 1985b, p. 4)

1.5 Surface-Water-Quality Properties and Constituents

TABLE INCLUDES COMMON SOURCES OF SELECTED PROPERTIES AND CONSTITUENTS

Federal regulations and State criteria have been established for selected properties and constituents analyzed.

Table 1.5-1 describes selected water-quality properties and constituents discussed in this report. The table lists common sources of the properties and constituents and their environmental significance, and where established, the Federal regulations and State criteria are presented.

In addition to the information presented in this table, it may be noted that values for fecal coliform and fecal streptococcus bacteria have a special importance when compared to each other. "When the ratio (fecal coliform bacteria to fecal streptococcus bacteria) is greater than or equal to 4, it may be taken as strong evidence that pollution derives from human wastes. When the ratio is less than or equal to 0.7, it may be taken as strong evidence that pollution derives predominantly or entirely from livestock or poultry wastes. When the ratio lies between 2 and 4, it can indicate a predominance of human wastes in mixed pollution. When the ratio is between 0.7 and 1.0, it can indicate a predominance of livestock and poultry wastes in mixed pollution. When the ratio falls on values from 1 to 2, it represents a 'grey area' of uncertain interpretation" (Millipore Corporation, 1972, p. 36). This interpretation of ratios is most reliable when the two counts describe samples collected at the same site within 24 hours of flow downstream from the source of pollution. Because the source of contamination in most instances is unknown, the interpretation of these ratios presented in this report should be used with caution.

Table 1.5-1. Common sources of properties and constituents, their environmental significance, and Federal regulations and State criteria

[Source: U.S.Environmental Protection Agency (USEPA), 1976; 1986; 1994; 1996; Louisiana Department of Environmental Quality (DEQ), 1984; Hem, 1985; Tobin and Youger, 1977.
NE, no established criteria; SMCL, secondary maximum contaminant level; °C, degrees Celsius; mg/L, milligrams per liter; µg/L, micrograms per liter;
MCL, maximum contaminant level; Proposed MCL, proposed maximum contaminant level; ng/L, nanograms per liter; cols/100 mL, colonies per 100 milliliters]

Property or constituent	Common source	Environmental significance	USEPA Federal water-quality regulations[1]	DEQ State water-quality criteria
Physical properties				
Specific conductance	Ions within the water.	Indicates the presence of precipitation, dilution, evaporation, and metabolic uptake and release of chemicals.	NE	NE
pH	Hydrogen-ion activity.	May indicate oxidation of some form of sulfur or iron.	SMCL is 6.5-8.5 and 6.5-9.0 is the recommended range for freshwater aquatic life.	6.0-9.0 and no effluent will cause pH to vary by more than 1.0.
Water temperature	Seasonal changes; daily variance outside discharges into waterbody.	Affects migration patterns and colonization characteristics; accelerates biodegradation; decreases maximum oxygen concentration.	See U.S. Environmental Protection Agency (1976, p. 218).	Freshwater: (1) Maximum of 2.8 °C rise above ambient for streams. (2) Maximum of 1.7 °C rise above ambient for lakes. (3) Maximum temperature of 32.2 °C except where otherwise listed. Estuarine and coastal waters: (1) Maximum of 2.2 °C rise above ambient October through May. (2) Maximum of 0.83 °C rise during June through September. (3) Maximum temperature of 35.0 °C except when natural conditions elevate temperature above this level.
Dissolved oxygen	Transferred from the atmosphere; photosynthesis by aquatic plants.	Inadequate dissolved oxygen can have adverse effect on aquatic life.	For freshwater aquatic life and coastal marine water, 5.0 mg/L.	For freshwater and coastal marine water, 5.0 mg/L.
Total dissolved solids.	Inorganic salts and some organic materials.	Excess can cause pipe corrosion or have detrimental effects on sensitive crops if used for irrigation.	SMCL is 500 mg/L. 250 mg/L for chlorides and sulfates in domestic water supplies (welfare).	State criteria vary from stream to stream.
Major inorganic cations				
Calcium, dissolved	Occurs in igneous-rock minerals, silicate minerals, and as carbonates in sedimentary rocks.	Important for animal and plant nutrition.	NE	NE
Magnesium, dissolved	Carbonate sedimentary rock forms such as limestone.	Important for animal and plant nutrition.	NE	NE
Sodium, dissolved	Occurs in igneous and sedimentary rocks, especially evaporites.	Excessive sodium in drinking or irrigation water can have detrimental effects on plants and consumers.	No water-quality contaminant level is recommended for home drinking water.	NE
Potassium, dissolved	More abundant in sedimentary rocks than igneous rocks.	Essential plant nutrient.	NE	NE
Major inorganic anions				
Alkalinity, as calcium carbonate	Caused by the presence of bicarbonates, carbonates, and hydroxides. Function of pH and temperature.	Buffers water against pH changes.	For freshwater aquatic life, 20 mg/L.	NE
Sulfate, dissolved	Can be dissolved from gypsum, sodium sulfate, and some types of shales. Mining activities, industrial waste, and organic matter.	Concentrations exceeding a natural, background level indicate contamination from human activity; in sufficient quantity, can cause water to be unsuitable for public supply; can harm aquatic organisms.	SMCL is 250 mg/L.	Maximum contaminant level is 250 mg/L.
Chloride, dissolved	Common in brine and a primary constituent in seawater; evaporite sediment.	Associated with sodium and, if present in excess, can be detrimental in water used for drinking or irrigation.	SMCL is 250 mg/L	For instream concentration, 250 mg/L.
Trace metals				
Copper, dissolved	Malachite and cuprite. Oxides and sulfates are used in algicides, pesticides, and fungicides.	Important for the synthesis of chlorophyll.	SMCL is 1,000 µg/L.	NE
Iron, dissolved	Present in igneous-rock minerals and in sedimentary rocks.	Important for plant and animal nutrition.	SMCL is 300 µg/L.	NE
Lead, dissolved	Often result from mining, smelting, and other industrial operations. May occur naturally as lead sulfide.	Toxic, bioaccumulative. Has no nutritional value.	MCL is 15 µg/L at the tap. For sensitive freshwater resident species, 0.01 times the 96-hour LC_{50} value, using the receiving or comparable water as the diluent and soluble lead measurements (using an 0.45 micron filter).	NE
Zinc, dissolved	Used in the metallurgy, paint, rubber, and photo-engraving industries.	Important for animal metabolism. However, small quantities can be toxic to aquatic plants, animals, and bacteria.	SMCL is 5,000 µg/L.	NE
Nutrients				
Ammonia plus organic nitrogen, total	Sewerage or industrial contamination.	Ammonia reactions with chlorine can result in the formation of chloramine compounds. Organic nitrogen can be an indicator of organic pollution.	NE	NE
Nitrite plus nitrate, nitrate, and nitrite as nitrogen, total.	Fertilizers and animal and human wastes.	Plant nutrient that can be an indication of wastes.	MCL for nitrite plus nitrate is 10 mg/L, nitrate is 10 mg/L, and nitrite 1.0 mg/L.	NE
Phosphorus, total	Results from leaching of rocks and soil, decomposition of plants and animals, from fertilizers, sewerage, and industrial waste.	Although it is not toxic to man, it is bioaccumulative and toxic to certain forms of aquatic life. High concentrations promote undesirable plant growth causing eutrophication of lakes.	NE	NE
Pesticides and other organics				
DDT, total	Insecticides.	Bioaccumulative and toxic.	For freshwater and marine aquatic life, 0.001 µg/L.	For freshwater, 1.1 µg/L. For public water supply, 0.24 ng/L.
PCB, total	Found in capacitors and transformers used in the electrical industry.	Bioaccumulative and toxic.	For freshwater aquatic life, 0.014 µg/L. Ingestion of contaminated water and aquatic organisms should be zero.	For freshwater, 2.0 µg/L. For public water supply, 0.79 ng/L.
Diazinon, total	Insecticides.	Bioaccumulative and toxic.	NE	NE
Lindane, total	Insecticides.	Bioaccumulative and toxic.	For domestic water supply, 0.2 µg/L. For freshwater aquatic life, 0.01 µg/L.	NE
Chlordane, total	Insecticides.	Bioaccumulative and toxic.	For freshwater aquatic life, 2.4 µg/L.	For freshwater, 2.4 µg/L. For public water supply, 4.6 ng/L.
Malathion, total	Insecticides.	Bioaccumulative and toxic.	For freshwater and marine aquatic life, 0.1 µg/L.	NE
Endrin, total	Insecticides.	Bioaccumulative and toxic.	For freshwater aquatic life, 0.18 µg/L. MCL is 2.0 µg/L.	For freshwater, 0.18 µg/L. For public water supply, 1.0 µg/L.
Parathion, total	Insecticides.	Bioaccumulative and toxic.	For freshwater and marine aquatic life, 0.04 µg/L.	NE
Endosulfan, total	Insecticides.	Bioaccumulative and toxic.	For freshwater aquatic life, 0.22 µg/L. To protect public health, 74 µg/L.	NE
2,4-D, total	Herbicides.	Bioaccumulative and toxic.	For domestic water supply, 70 µg/L.	For public water supply, 100 µg/L.
Biological constituents				
Fecal coliform	Human wastes.	Indicator of pathogens.	Based on minimum of 5 samples collected over a 30-day period, the level should not exceed a log mean of 200 cols/100 mL, nor should more than 10 percent of the total samples collected during any 30-day period exceed 400 cols/100 mL.	Based on a minimum of 5 samples collected over a 30-day period, the level should not exceed a log mean of 200 cols/100 mL, nor should more than 10 percent of the total samples collected during any 30-day period exceed 400 cols/100 mL.
Fecal streptococcus	Livestock and poultry wastes.	Indicator of pathogens.	NE	NE
Suspended sediment				
Suspended sediment	Sand, silt, clay, and organic material which enter a stream either from hillslope erosion or directly from the streambed.	Long periods of high concentrations of sediment can interfere with photosynthesis, bury benthic organisms, inhibit respiration of gilled organisms, and ultimately alter the aquatic ecosystem.	NE	NE

[1] *Primary Drinking-Water Regulations maximum contaminant level (February 1996):* Enforceable, health-based regulation that is to be set as close to the maximum contaminant level goal as is feasible. The definition of feasible means the use of best technology, treatment techniques, and other means that the Administrator of USEPA finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are generally available (taking cost into consideration).

Proposed maximum contaminant level: Not enforceable.

Secondary Drinking-Water Regulations secondary maximum contaminant level: Contaminants that affect the aesthetic quality of drinking water. At high concentrations or values, health implications as well as aesthetic degradation may also exist. SMCLs are not federally enforced, but are intended as guidelines for the states.

2.0 CALCASIEU-MERMENTAU RIVER BASIN IN LOUISIANA

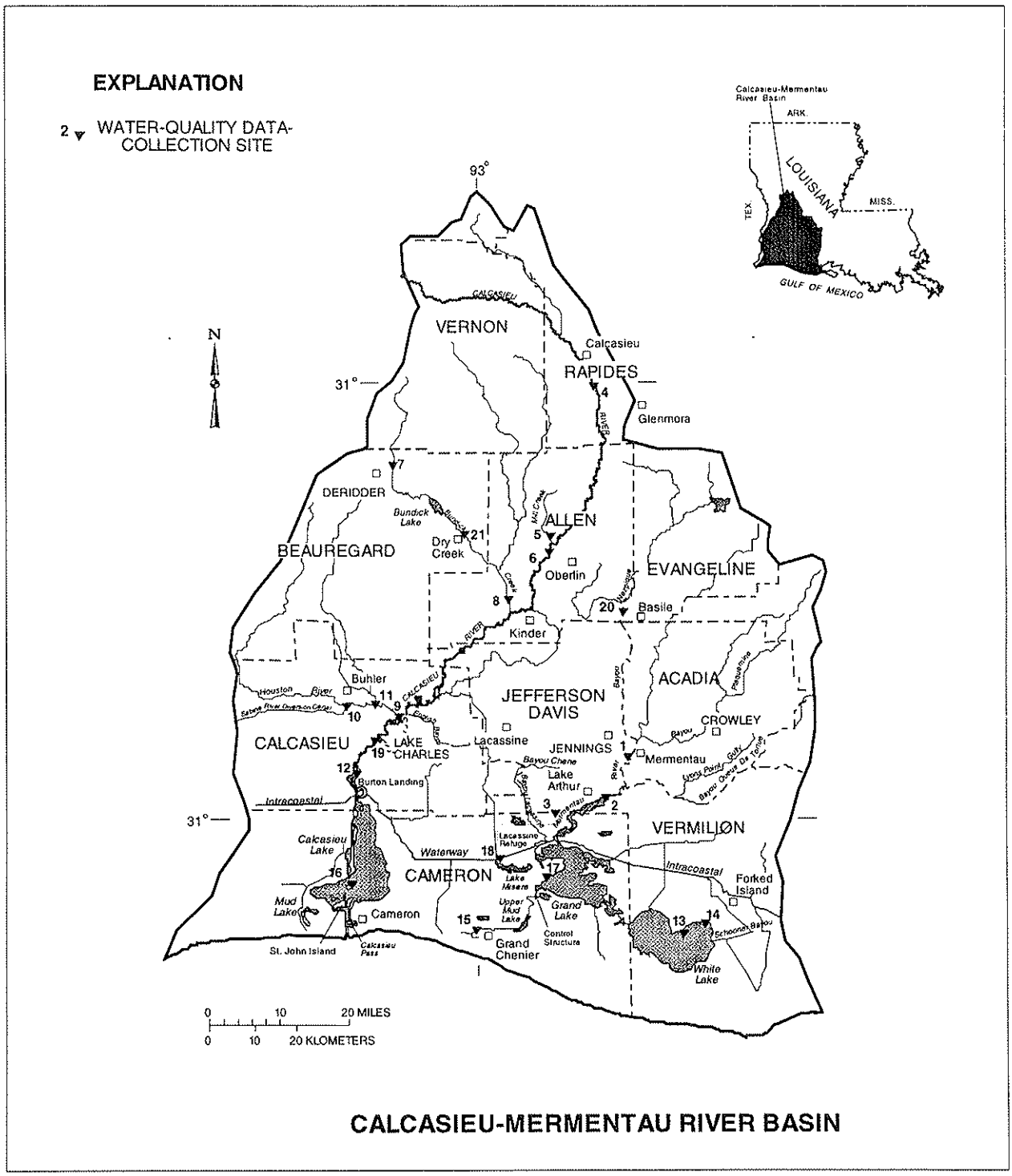
STATISTICAL SUMMARY OF SURFACE-WATER QUALITY IN THE CALCASIEU-MERMENTAU RIVER BASIN

Data from 21 sites are presented.

Statistical analyses of surface-water-quality data for the Calcasieu-Mermentau River basin are presented in this part of the report. Text, maps, boxplots, graphs, and tables are used to describe the surface-water quality. Data are presented for 33 water-quality properties and constituents from analyses of water stored in the USGS WATSTORE files. The data were collected from 21 sites (table 2.0-1 and fig. 2.0-1) in the basin during water years 1943-95. This information is useful to Federal, State, and local planners; hydrologists; engineers; scientists; and others who have water-resources management responsibilities for the Calcasieu-Mermentau River basin.

Table 2.0-1. Surface-water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, 1943-95

Map no. (fig. 2.0-1)	Site name and location	Map no. (fig. 2.0-1)	Site name and location
1	Mermentau River at Mermentau	14	White Lake (northeast corner) near Forked Island
2	Mermentau River at Lake Arthur	15	Mermentau River at Upper Mud Lake near Grand Chenier
3	Mermentau River at Lacassine Refuge	16	Calcasieu Pass at St. John Island near Cameron
4	Calcasieu River near Glenmora	17	Grand Lake northeast of Control Structure near Grand Chenier
5	Mill Creek near Oberlin	18	Gulf Intracoastal Waterway at Lake Misere
6	Calcasieu River near Oberlin	19	Calcasieu River at mile 40.0 at Lake Charles
7	Bundick Creek near DeRidder	20	Bayou Nezpique near Basile
8	Calcasieu River near Kinder	21	Bundick Creek near Dry Creek
9	Calcasieu River near Lake Charles		
10	Houston River near Buhler		
11	Houston River east of Buhler		
12	Calcasieu River at Burton Landing near Lake Charles		
13	White Lake (east side) 4.8 miles west of Schooner Bayou		



Louisiana Department of Transportation and Development-U.S. Geological Survey Water Resources Cooperative Program

Figure 2.0-1. Surface-water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, 1943-95.

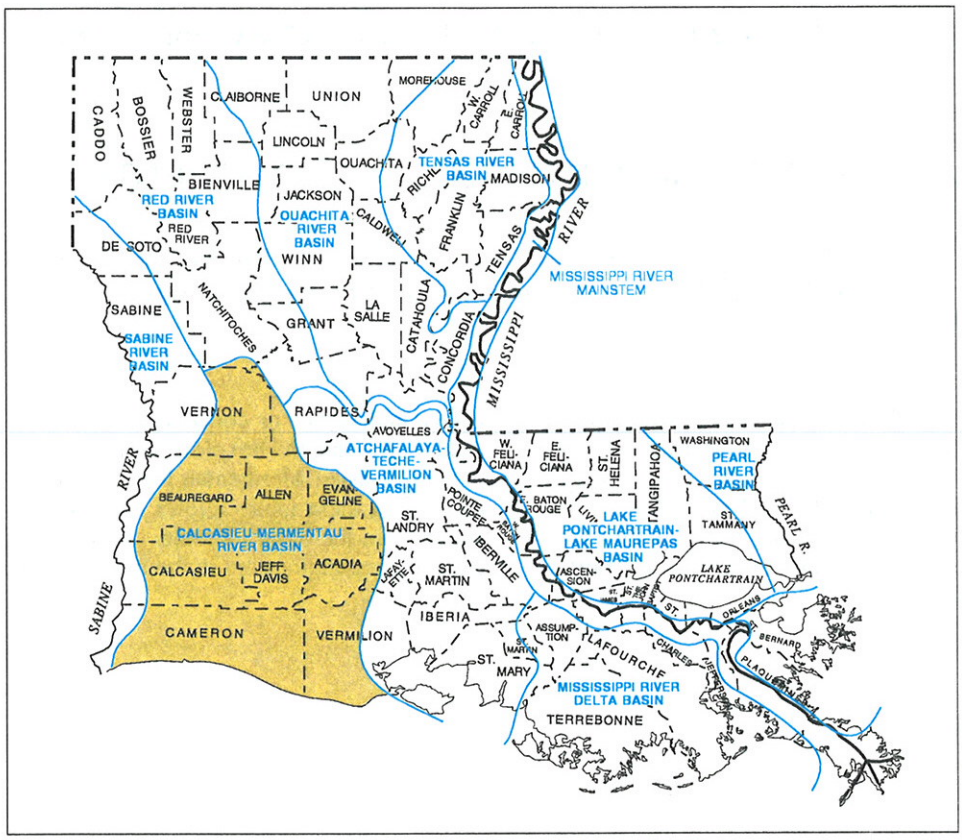
2.1 Overview

CALCASIEU RIVER AND MERMENTAU RIVER ARE PRINCIPAL SOURCES OF SURFACE WATER

Surface water within the Calcasieu-Mermentau River basin is used mainly for agriculture and industry.

The Calcasieu-Mermentau River basin in Louisiana (fig. 2.0-1) is about 130 mi long and 95 mi wide at its widest point. The Calcasieu and Mermentau Rivers are the primary sources of surface water in the basin, and most of the water is used for rice irrigation and industry (fig. 2.1-1) (Lovelace and Johnson, 1996, p. 104).

The principal sources of fresh surface water in the basin are Bayou Nezpique, Calcasieu River, Mermentau River, Intracoastal Waterway, Grand Lake, and White Lake. The minimum average discharge for sites where data was available within the basin is 159 ft^3/s at Bundick Creek near DeRidder for the period, 1956-69 (U.S. Geological Survey, 1971); and the maximum average discharge is 2,670 ft^3/s at Calcasieu River near Kinder for the period, 1923-94 (Garrison and others, 1995). The lakes have surface areas of 32,000 acres at Grand Lake and 51,840 acres at White Lake (Louisiana Department of Transportation and Development, 1984). Other bodies of fresh surface water in the basin include Bundick Creek, Calcasieu Pass, Houston River, and Mill Creek.



Louisiana Department of Transportation and Development-U.S. Geological Survey Water Resources Cooperative Program

Withdrawals by Category

Category	Amount (Mgal/d)
Public supply	0.00
Industry	172.32
Power generation	8.61
Rural domestic	.00
Livestock	1.03
Rice irrigation	182.42
General irrigation	.16
Aquaculture	70.44
TOTAL	434.99

Withdrawals by Parish

Parish	Amount (Mgal/d)
Acadia	8.88
Allen	1.70
Beauregard	.15
Calcasieu	197.89
Cameron	24.62
Evangeline	11.48
Jefferson Davis	43.99
Lafayette	.43
St. Landry	1.88
Vermilion	143.97

Withdrawals by Major Water Body

Water Body	Amount (Mgal/d)
Bayou Chene	12.22
Bayou Lacassine	10.86
Bayou Plaquemine	1.97
Bayou Queue de Tortue	73.59
Calcasieu River	144.01
English Bayou	1.39
Farmers Canal	1.48
Intracoastal Waterway	2.62
Lyons Point Gully	1.13
Mermentau River	17.07
Sabine River Diversion Canal	42.62

Figure 2.1-1. Surface-water withdrawals (in million gallons per day) from the Calcasieu-Mermentau River basin, Louisiana, 1995. (Source: Lovelace and Johnson, 1996, p. 104)

2.2 Surface-Water Quality

SELECTED PROPERTIES AND CONSTITUENTS

Physical, chemical, and biological data describe the surface-water quality of the Calcasieu-Mermentau River basin.

Figure 2.2-1 shows 1 of the 21 water-quality data-collection sites in the Calcasieu-Mermentau River basin. The data for this and other water-quality sites in the basin are presented in table 2.2-1 at the back of this report. The table includes selected water-quality properties and constituents, number of analyses, reporting levels, and values or concentrations for the percentiles used to generate the boxplots shown for 6 of the 21 sites in the Calcasieu-Mermentau River basin. The format of the data in these tables allows easy comparison among sites within the basin. Results of analyses used for statistical computations are in the files of the USGS.

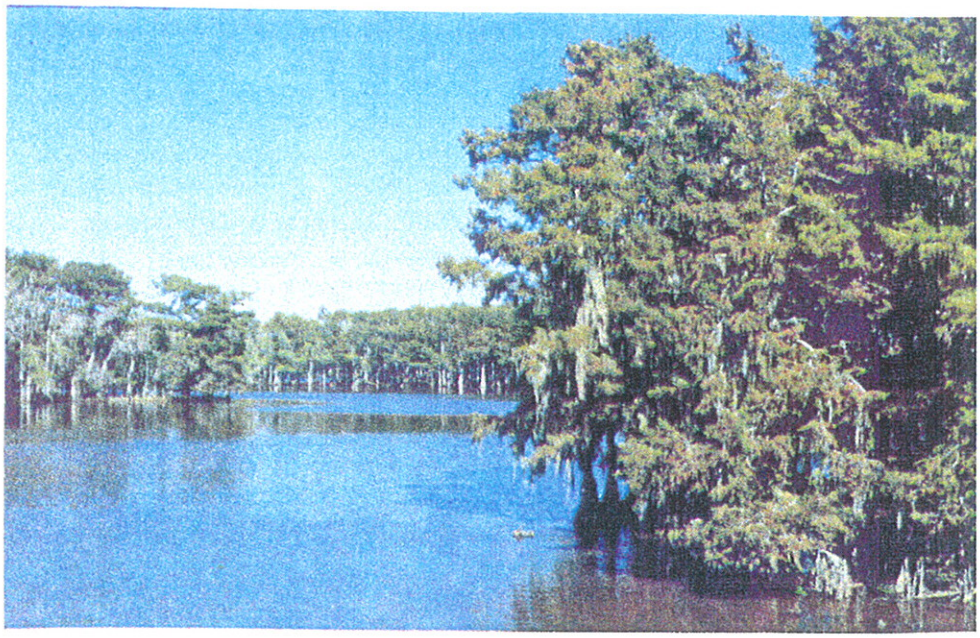


Figure 2.2-1. Water-quality site at Bayou Lacassine, a tributary of the Mermentau River, Louisiana. (Photograph by D.K. Demcheck, U.S. Geological Survey.)

2.2 Surface-Water Quality--continued

2.2.1 Physical Properties--Specific Conductance, pH, Water Temperature, and Dissolved Oxygen

VALUES FOR DISSOLVED OXYGEN AT MERMENTAU RIVER AT MERMENTAU WERE LESS THAN THE STATE'S MINIMUM WATER-QUALITY CRITERIA OF 5.0 MG/L

Between 50 and 75 percent of the dissolved oxygen concentrations measured at Mermentau River at Mermentau were less than 5.0 mg/L.

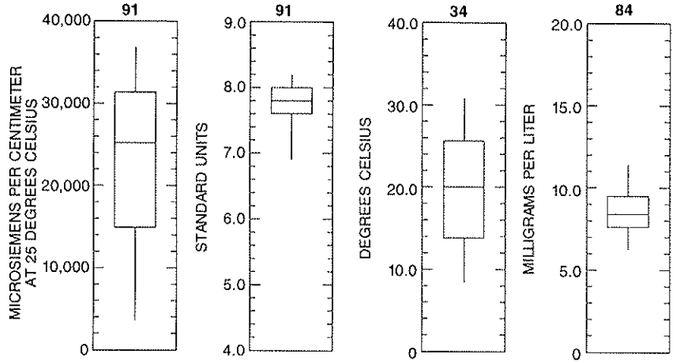
Statistical summaries of water-quality data at 21 sites in the basin are presented in table 2.2-1 in the back of the report and boxplots summarizing the specific conductance, pH, water temperature, and dissolved oxygen concentration data are presented in figure 2.2.1-1 for six of the sites. Specific conductance values for all sites in the Calcasieu-Mermentau River basin ranged from 21 µS/cm at Houston River east of Buhler to 40,200 µS/cm at Calcasieu Pass at St. John Island (table 2.2-1). The median values for specific conductance ranged from 46 to 25,200 µS/cm for all sites. Interquartile range for specific conductance at Calcasieu River near Kinder was low (40 to 69 µS/cm). However, the interquartile range for specific conductance at Mermentau River at Mermentau was slightly higher (90 to 185 µS/cm).

Values for pH in water from all sites in the basin ranged from 4.5 at Houston River near Buhler to 8.6 at White Lake (east side) 4.8 miles west of Schooner Bayou. Several sites within the basin occasionally exceeded the secondary maximum contaminant level (SMCL) range of 5.0 to 9.0 for domestic water supply (U.S. Environmental Protection Agency, 1976; 1986). Median pH values in the Calcasieu-Mermentau River basin ranged from 5.4 to 7.8. The boxplots indicate that pH was less than 6.5, the lower limit of the EPA recommended range for freshwater aquatic life (U.S. Environmental Protection Agency, 1976; 1986) in approximately 50 percent of the samples from Calcasieu River near Kinder and Mermentau River at Mermentau. However, the pH was less than 6.5 in fewer than 5 percent of the samples from the coastal sites.

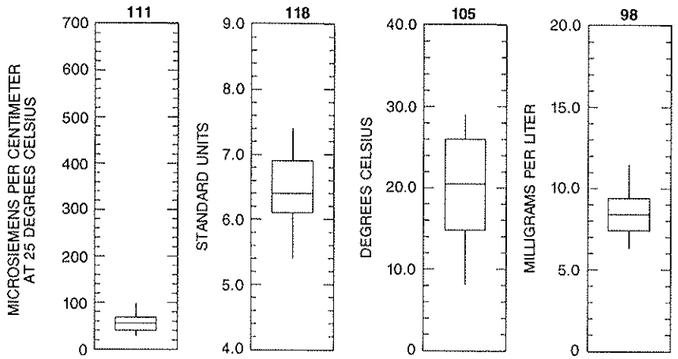
Values for water temperatures at all sites in the basin ranged from 4.0 °C at Mermentau River at Mermentau to 33.0 °C at Grand Lake northeast of the Control Structure near Grand Chenier, Calcasieu River near Lake Charles, and White Lake (northeast corner) near Forked Island. Median values ranged from 15.0 to 25.0 °C. Maximum water temperatures at several sites exceeded the State's criterion of 32.2 °C. These temperatures probably occurred during extreme low flow or on very hot days (Louisiana Department of Environmental Quality, 1984, p. 12). Interquartile ranges for water temperature were similar at the coastal sites. For example, the interquartile range was 16.0 to 27.5 °C at Grand Lake northeast of the Control Structure near Grand Chenier, and 16.0 to 26.8 °C at White Lake (northeast corner) near Forked Island.

Dissolved oxygen concentrations in water from the basin ranged from 0.4 mg/L at Houston River near Buhler to 14.0 mg/L at Calcasieu River near Glenmora. The median concentrations for dissolved oxygen ranged from 4.1 to 9.1 mg/L. Dissolved oxygen concentrations exceeded the State's minimum water-quality criteria of 5 mg/L in more than 75 percent of the samples analyzed at most sites. The U.S. Environmental Protection Agency's criterion for dissolved oxygen is 5.0 mg/L for freshwater aquatic life (U.S. Environmental Protection Agency, 1976; 1986). However, the boxplots for dissolved oxygen concentrations in figure 2.2.1-1 indicate that between 50 and 75 percent of the values measured at Mermentau River at Mermentau were less than 5.0 mg/L.

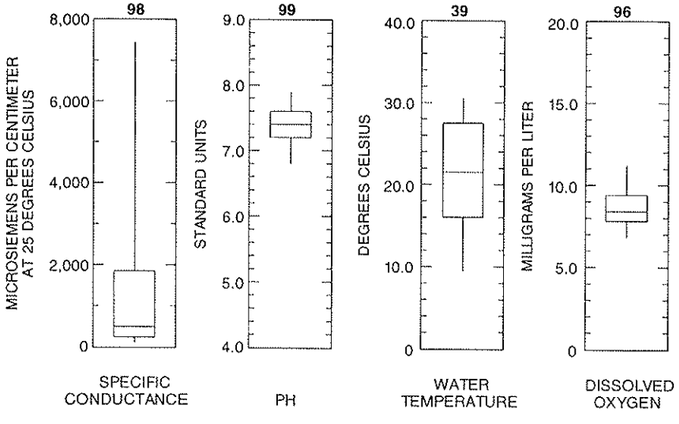
16 CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON

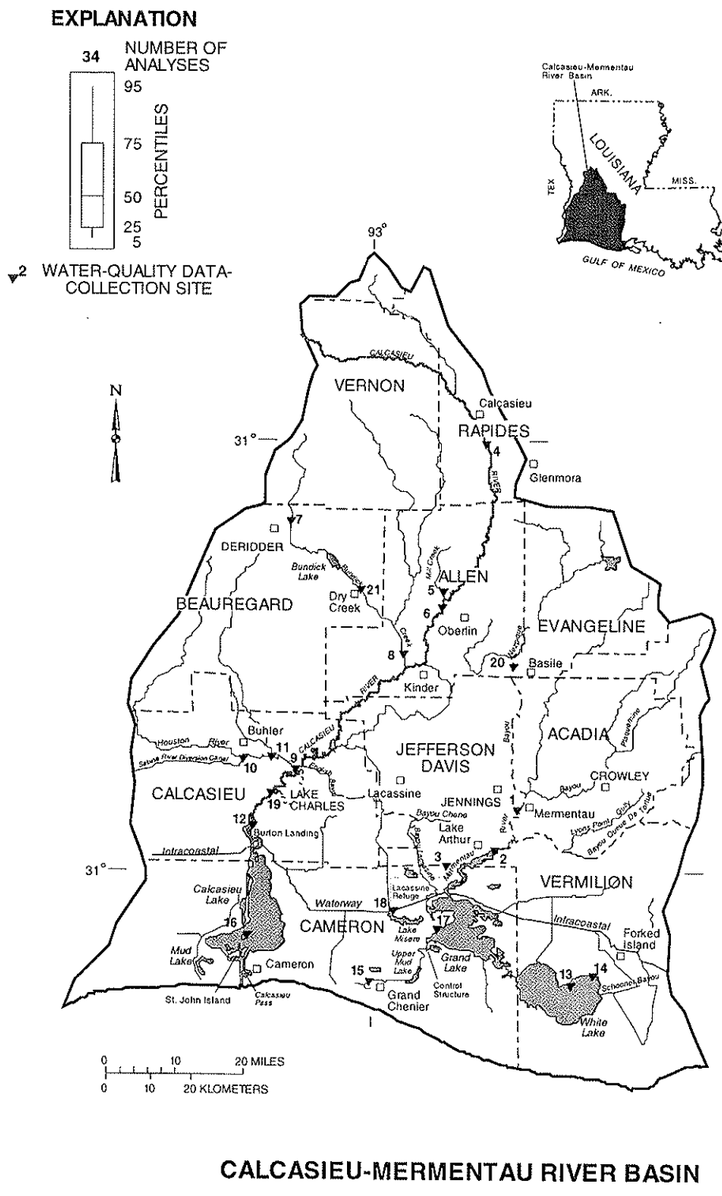


8 CALCASIEU RIVER NEAR KINDER



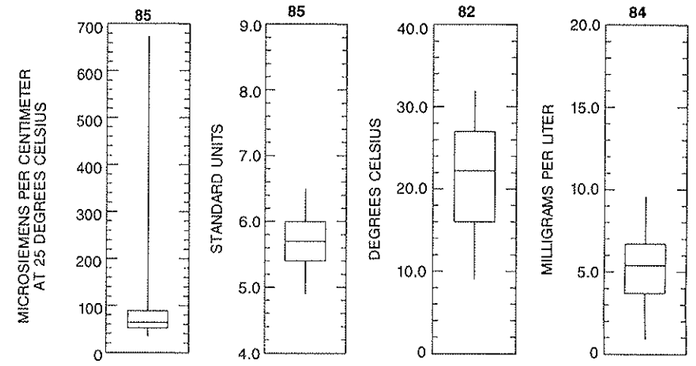
17 GRAND LAKE NORTHEAST OF CONTROL STRUCTURE NEAR GRAND CHENIER



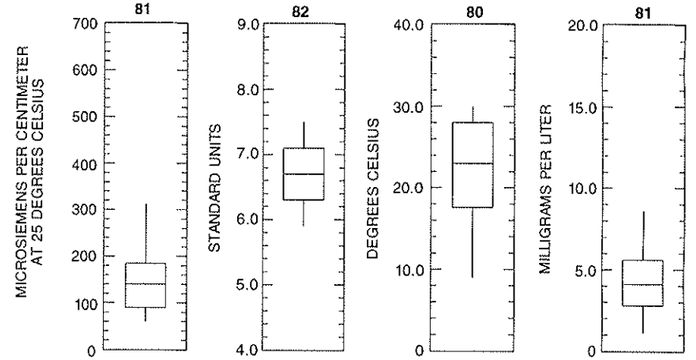


CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER



1 MERMENTAU RIVER AT MERMENTAU



14 WHITE LAKE (NORTHEAST CORNER) NEAR FORKED ISLAND

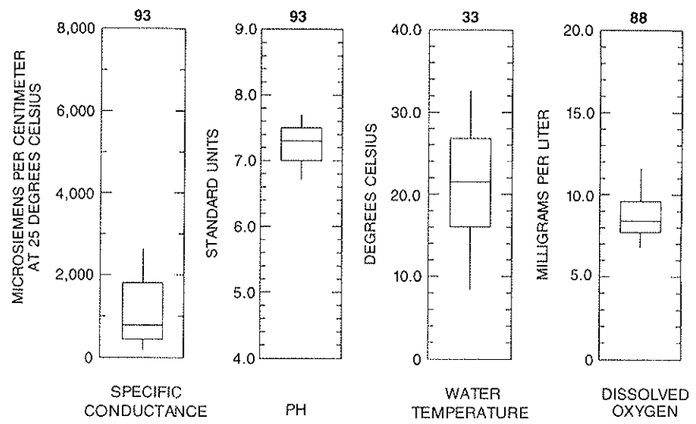


Figure 2.2.1-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and boxplots summarizing specific conductance, pH, water temperature, and dissolved-oxygen data for selected sites.

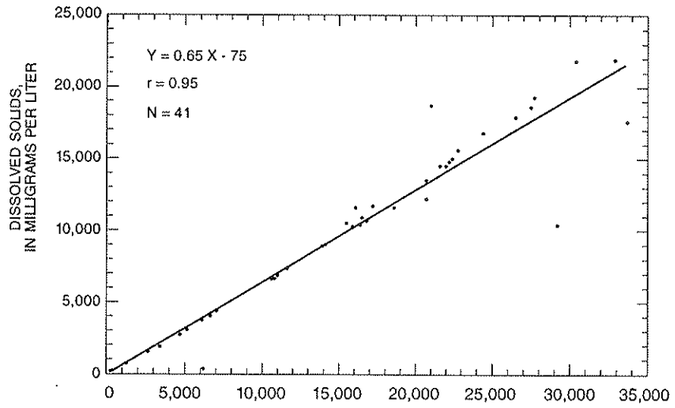
DISSOLVED SOLIDS CONCENTRATIONS CAN BE ESTIMATED FROM SPECIFIC CONDUCTANCE VALUES

Dissolved solids concentrations in water from the Calcasieu-Mermentau River basin met the U.S. Environmental Protection Agency's secondary drinking water regulations for dissolved solids in irrigation water.

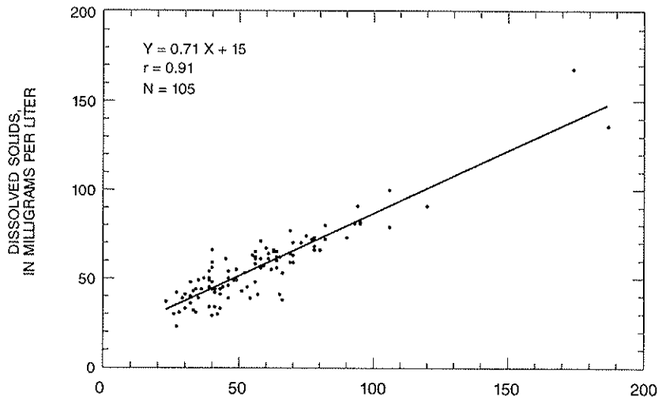
Linear regression equations relating dissolved solids concentrations to specific conductance were calculated for six sites in the Calcasieu-Mermentau River basin (fig. 2.2.2-1). The correlation coefficient values, r, ranged from 0.85 at Mermentau River at Lake Arthur to 1.00 at Houston River near Buhler. The relatively strong correlation between specific conductance and dissolved solids concentrations indicates that dissolved solids concentrations can be estimated from specific conductance values with a reasonable degree of accuracy.

The regression equation for Mermentau River at Mermentau, which was based on 81 chemical analyses, indicates that dissolved solids concentrations at that site can exceed 500 mg/L when specific conductance values exceed 948 µS/cm. The boxplot for specific conductance for Mermentau River at Mermentau (fig. 2.2.1-1) indicates that 948 µS/cm was exceeded in less than 5 percent of the samples analyzed. Although no State criteria for irrigation water quality are established for these streams or for the other streams for which regression equations were developed, the regression equations indicated that the inland streams in the basin generally met the U.S. Environmental Protection Agency's (1976) criterion for dissolved solids in irrigation water (500 mg/L).

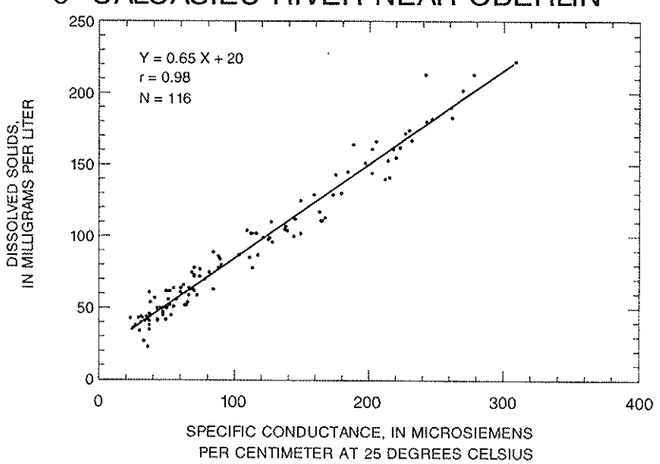
12 CALCASIEU RIVER AT BURTON LANDING NEAR LAKE CHARLES



8 CALCASIEU RIVER NEAR KINDER

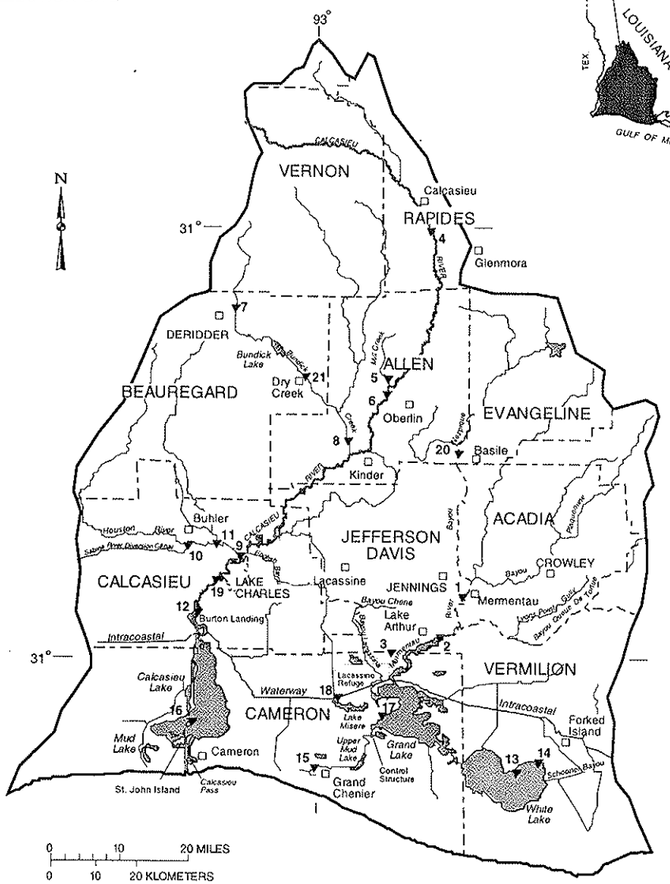


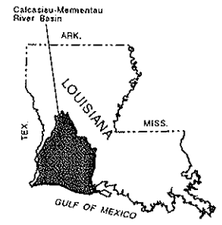
6 CALCASIEU RIVER NEAR OBERLIN



EXPLANATION

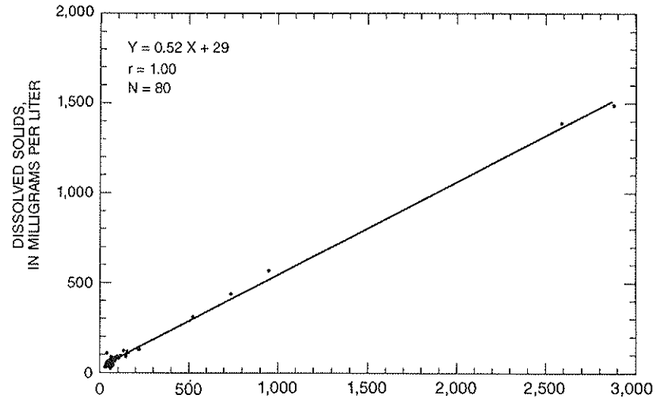
2 ▼ WATER-QUALITY DATA-COLLECTION SITE



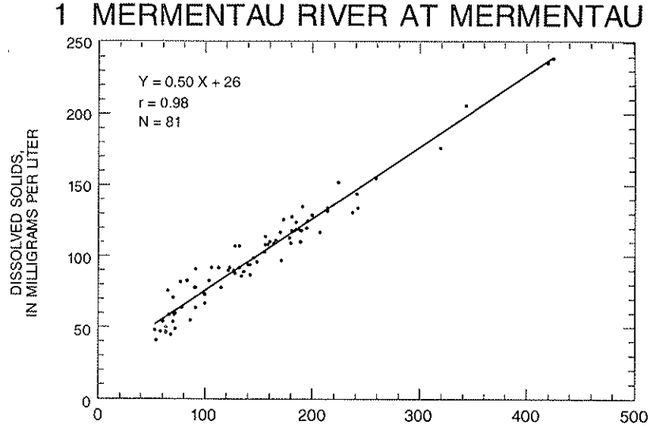


CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER



1 MERMENTAU RIVER AT MERMENTAU



2 MERMENTAU RIVER AT LAKE ARTHUR

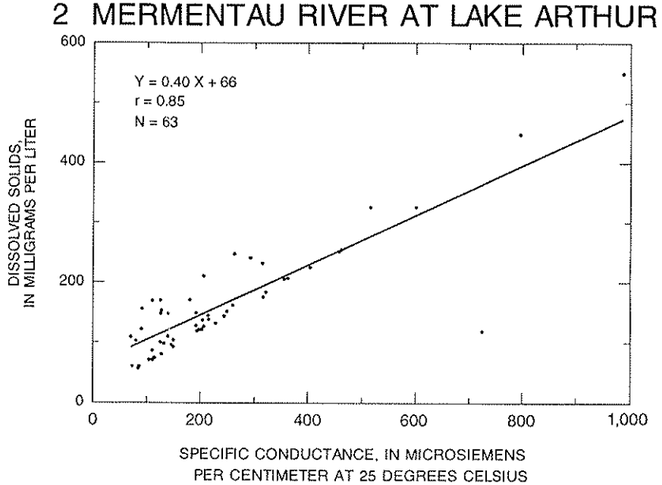


Figure 2.2.2-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and graphs showing relation between specific conductance and dissolved solids in water from selected sites.

2.2.3 Major Inorganic Cations--Dissolved Calcium, Magnesium, Sodium, and Potassium

HIGHEST CONCENTRATIONS OF DISSOLVED CALCIUM, SODIUM, MAGNESIUM, AND POTASSIUM IN THE BASIN OCCURRED AT CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON

Sodium concentration of 7,900 mg/L occurred at Calcasieu Pass at St. John Island near Cameron.

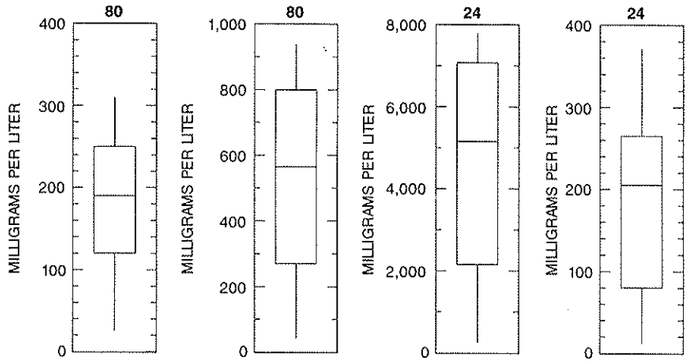
The data for major inorganic cations in water from the basin indicated that concentrations of major ions were below recommended levels for drinking water, where such levels have been established. Calcium concentrations at all sites in the Calcasieu-Mermentau River basin ranged from 1.0 mg/L at Calcasieu River near Oberlin to 340 mg/L at Calcasieu Pass at St. John Island near Cameron. Boxplots for six representative sites in the basin (fig. 2.2.3-1) show that the median value for calcium at Calcasieu Pass at St. John Island near Cameron was significantly higher than at other sites. The median value for calcium at Calcasieu Pass at St. John Island near Cameron was 190 mg/L. However, the median value at Calcasieu River near Kinder was 2.8 mg/L.

Magnesium concentrations in the basin ranged from less than 0.01 mg/L at Calcasieu River near Oberlin to 1,100 mg/L at Calcasieu Pass at St. John Island near Cameron. Boxplots from six representative sites (fig. 2.2.3-1) show wide variance of the magnesium values in the samples collected at these sites. The median values for magnesium ranged from 0.60 to 560 mg/L for all sites.

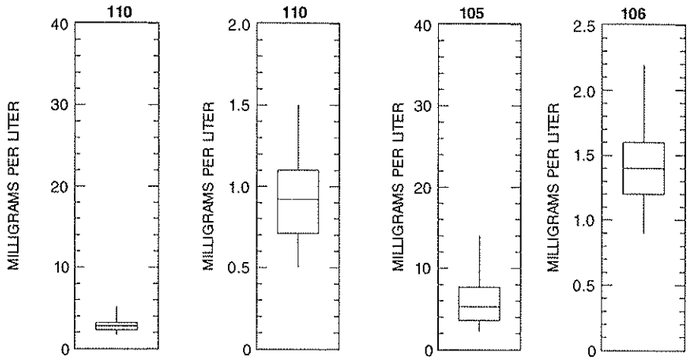
The highest sodium concentration in water from the basin was at Calcasieu Pass at St. John Island near Cameron (7,900 mg/L). The minimum sodium concentration (1.5 mg/L) occurred at Calcasieu River near Glenmora. Boxplots for six representative sites shown in fig. 2.2.3-1 show that at least 75 percent of the samples collected at Calcasieu River near Kinder and Mermentau River at Mermentau had sodium concentrations less than 25 mg/L. The median concentrations at the coastal sites ranged from 100 to 600 mg/L.

Concentrations of potassium in water from the basin ranged from 0.10 mg/L at Calcasieu River near Glenmora to 380 mg/L at Calcasieu Pass at St. John Island near Cameron. The maximum median concentration (200 mg/L) also occurred at Calcasieu Pass at St. John Island near Cameron. Boxplots for six representative sites (fig. 2.2.3-1) show a significant difference between the values for potassium at the coastal sites and the values at the other sites.

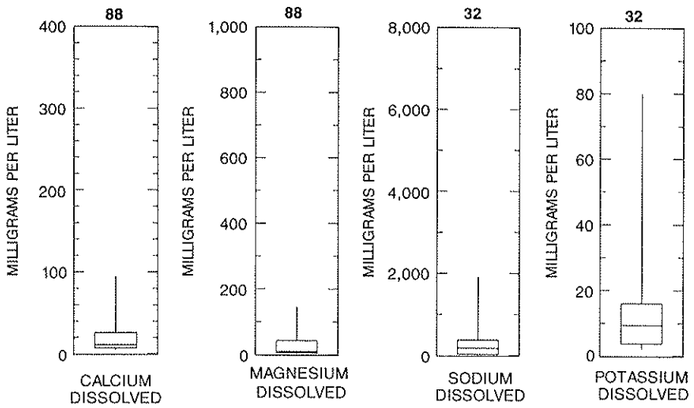
16 CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON



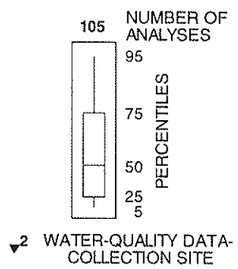
8 CALCASIEU RIVER NEAR KINDER

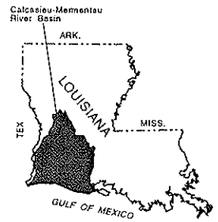


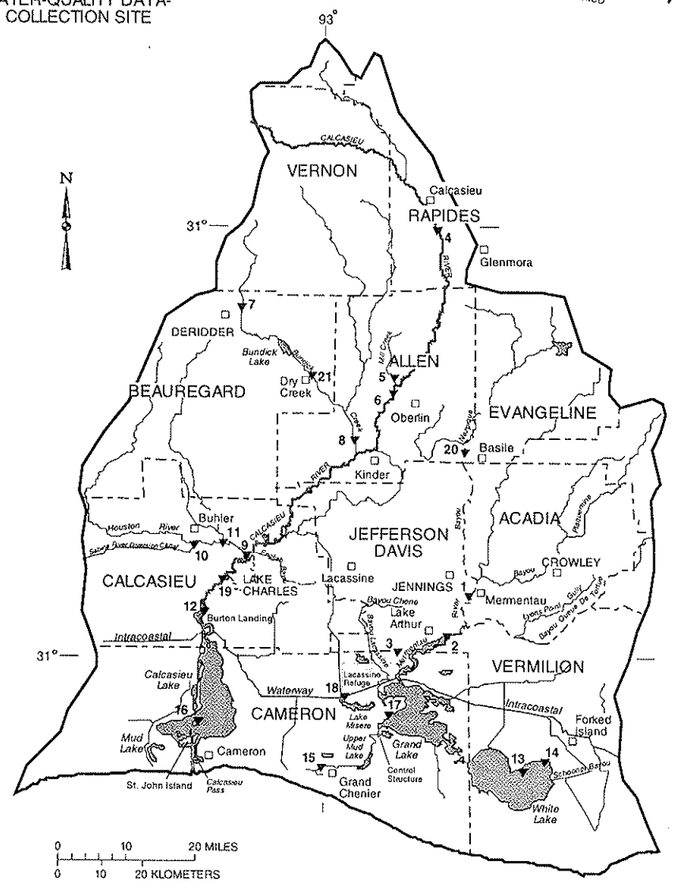
17 GRAND LAKE NORTHEAST OF CONTROL STRUCTURE NEAR GRAND CHENIER



EXPLANATION

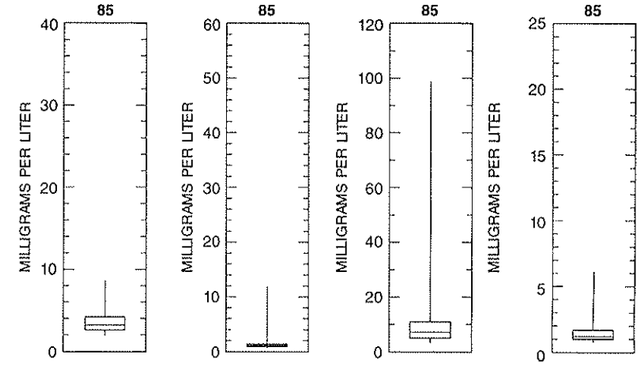




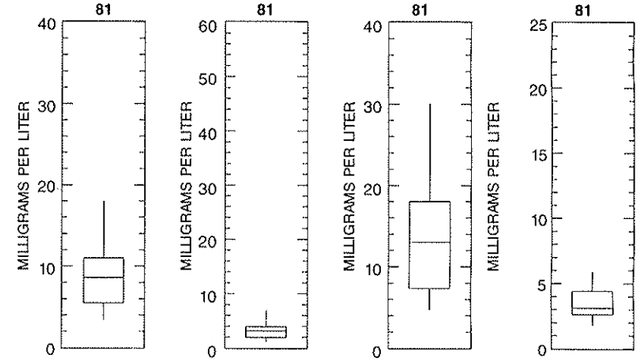


CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER



1 MERMENTAU RIVER AT MERMENTAU



14 WHITE LAKE (NORTHEAST CORNER) NEAR FORKED ISLAND

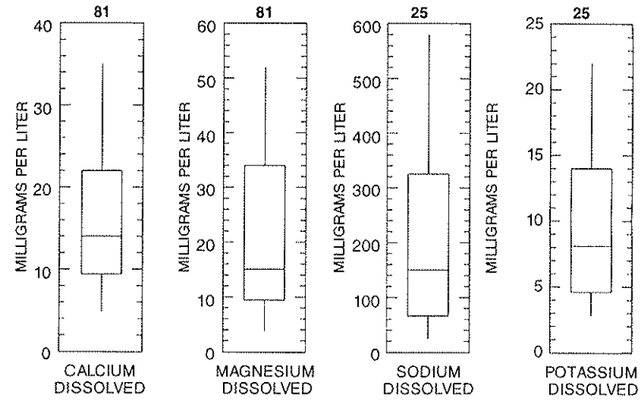


Figure 2.2.3-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and boxplots summarizing data for dissolved calcium, magnesium, sodium, and potassium concentrations in water from selected sites.

2.2.4 Major Inorganic Anions--Total Alkalinity as Calcium Carbonate, Dissolved Sulfate, and Dissolved Chloride

TOTAL ALKALINITY IS LOW AT CALCASIEU RIVER NEAR KINDER

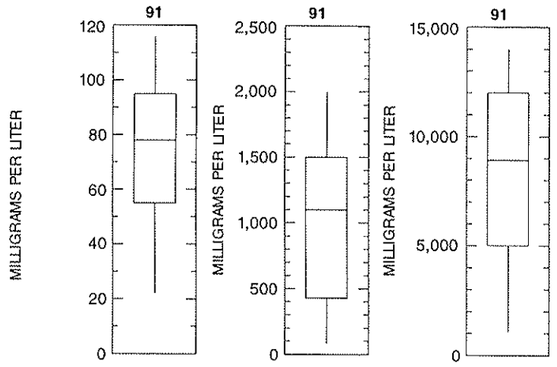
More than 75 percent of the samples at Calcasieu River near Kinder and Houston River near Buhler are less than the U.S. Environmental Protection Agency's minimum criterion for freshwater aquatic life.

The data for major inorganic anions in water from the basin indicated that concentrations of major ions were below recommended levels for drinking water, where such levels have been established. Alkalinity as calcium carbonate in water from the Calcasieu-Mermentau River basin ranged from 1 mg/L at Houston River near Buhler to 539 mg/L at Mill Creek near Oberlin. The lowest median concentration (7 mg/L) occurred at Houston River near Buhler. The maximum median alkalinity in the basin was 314 mg/L, which occurred at Mill Creek near Oberlin. The boxplots for six representative sites (fig. 2.2.4-1) show that alkalinity values in 75 percent of the samples analyzed were generally 20 mg/L or greater, with the exception of Calcasieu River near Kinder and Houston River near Buhler. The U.S. Environmental Protection Agency's minimum alkalinity criterion for freshwater aquatic life is 20 mg/L except where alkalinities for natural waters commonly are less (U.S. Environmental Protection Agency, 1976).

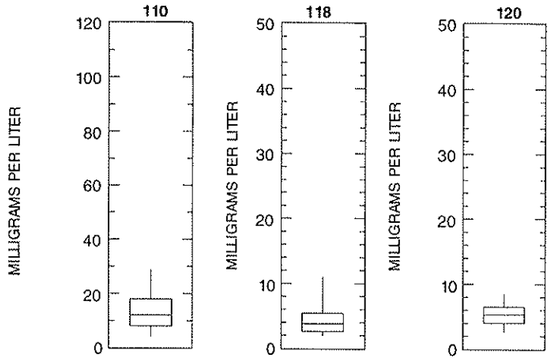
Concentrations of sulfate in water from the basin ranged from less than 0.1 mg/L at Bayou Nezpique near Basile to 3,600 mg/L at Calcasieu Pass at St. John Island near Cameron. The SMCL for drinking water is 250 mg/L (U.S. Environmental Protection Agency, 1986; Louisiana Department of Environmental Quality, 1984). The boxplots for six representative sites (fig. 2.2.4-1) show that the sulfate concentrations on the Calcasieu and Mermentau Rivers were much lower than at the other sites.

Chloride concentrations in water from the basin ranged from less than 0.1 mg/L at Mill Creek near Oberlin to 16,000 mg/L at Calcasieu Pass at St. John Island near Cameron. The SMCL for drinking water is 250 mg/L (U.S. Environmental Protection Agency, 1986; Louisiana Department of Environmental Quality, 1984). Median concentrations ranged from 5.3 mg/L at Calcasieu River near Kinder to 8,900 mg/L at Calcasieu Pass at St. John Island near Cameron. The boxplots summarizing the data for six representative sites in the basin (fig. 2.2.4-1) show that chloride concentrations at Calcasieu River near Kinder were significantly lower than at the other sites.

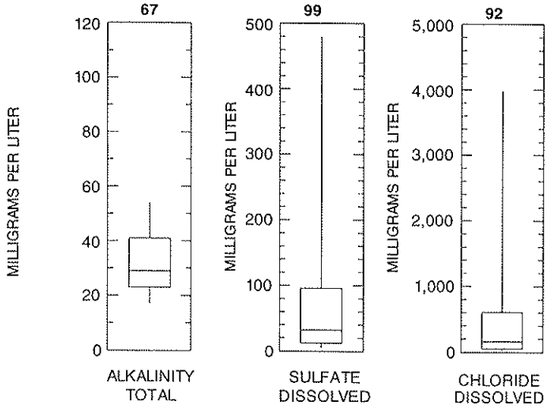
16 CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON



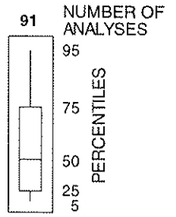
8 CALCASIEU RIVER NEAR KINDER



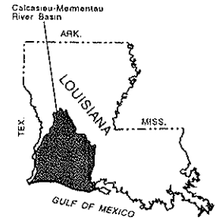
17 GRAND LAKE NORTHEAST OF CONTROL STRUCTURE NEAR GRAND CHENIER

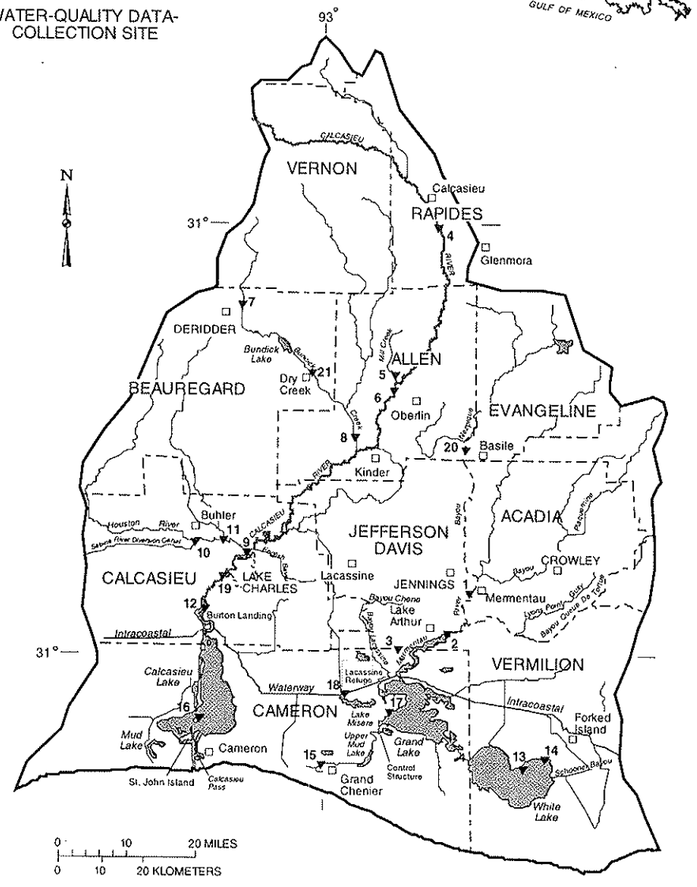


EXPLANATION



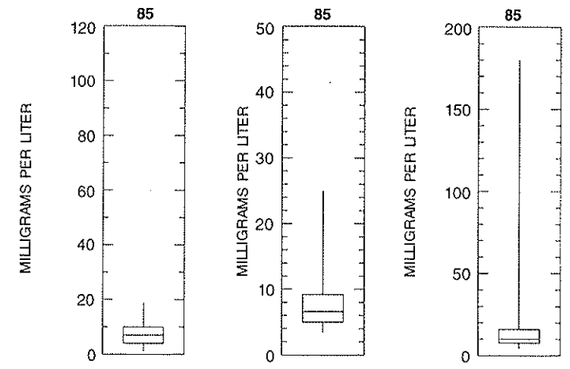
2 WATER-QUALITY DATA-COLLECTION SITE



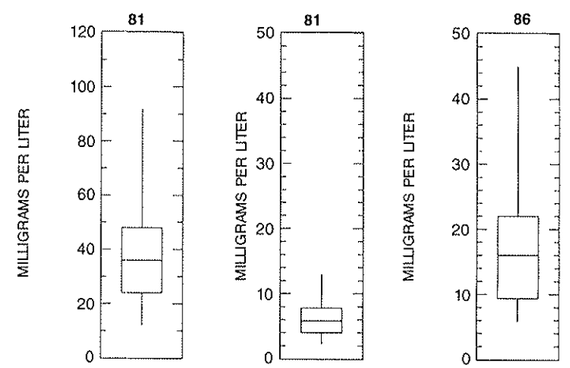


CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER



1 MERMENTAU RIVER AT MERMENTAU



14 WHITE LAKE (NORTHEAST CORNER) NEAR FORKED ISLAND

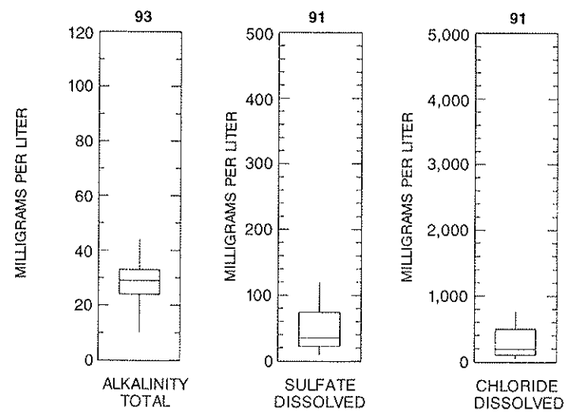


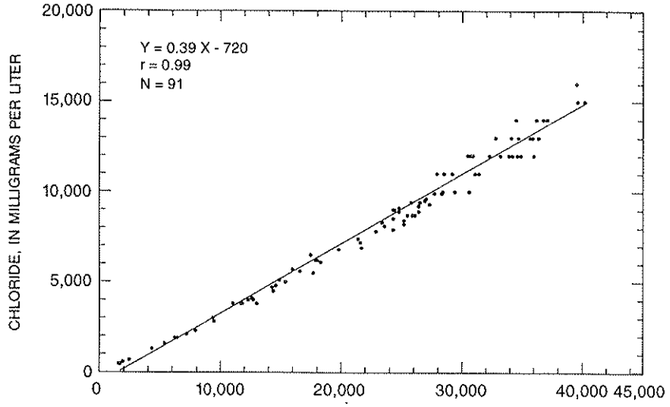
Figure 2.2.4-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and boxplots summarizing data for total alkalinity as calcium carbonate and dissolved sulfate and chloride concentrations in water from selected sites.

A DIRECT RELATION EXISTS BETWEEN SPECIFIC CONDUCTANCE AND DISSOLVED CHLORIDE

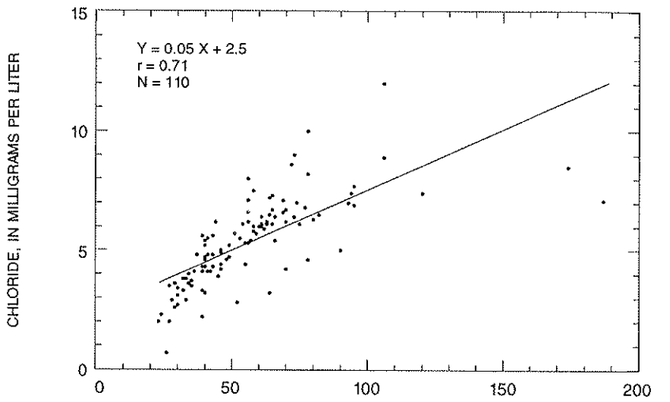
Linear regression equations indicate that dissolved chloride can be estimated from specific conductance for selected streams in the Calcasieu-Mermentau River basin.

Regression equations relating chloride concentrations to specific conductance values were calculated for six sites in the Calcasieu-Mermentau River basin (fig. 2.2.5-1). The correlation coefficient values, r, ranged from 0.71 at Calcasieu River near Kinder to 1.00 at Houston River near Buhler and White Lake (northeast corner) near Forked Island. These equations can be used to estimate chloride concentrations from specific conductance for water uses such as irrigation of chloride-sensitive crops. The regression equations indicate that chloride constitutes a greater percentage of the dissolved solids in water from Grand Lake than in water from Calcasieu Pass. For example, application of the regression equations to specific conductance of 2,000 µS/cm yields an estimated chloride concentration of 60 mg/L for Calcasieu Pass at St. John Island near Cameron, and 679 mg/L for Grand Lake northeast of the control structure near Grand Chenier.

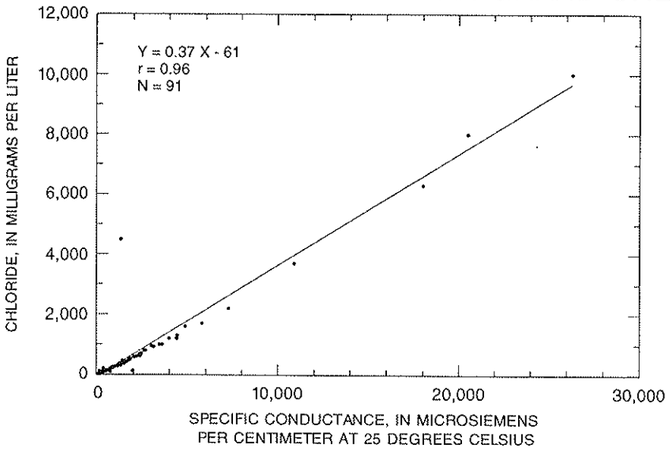
16 CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON

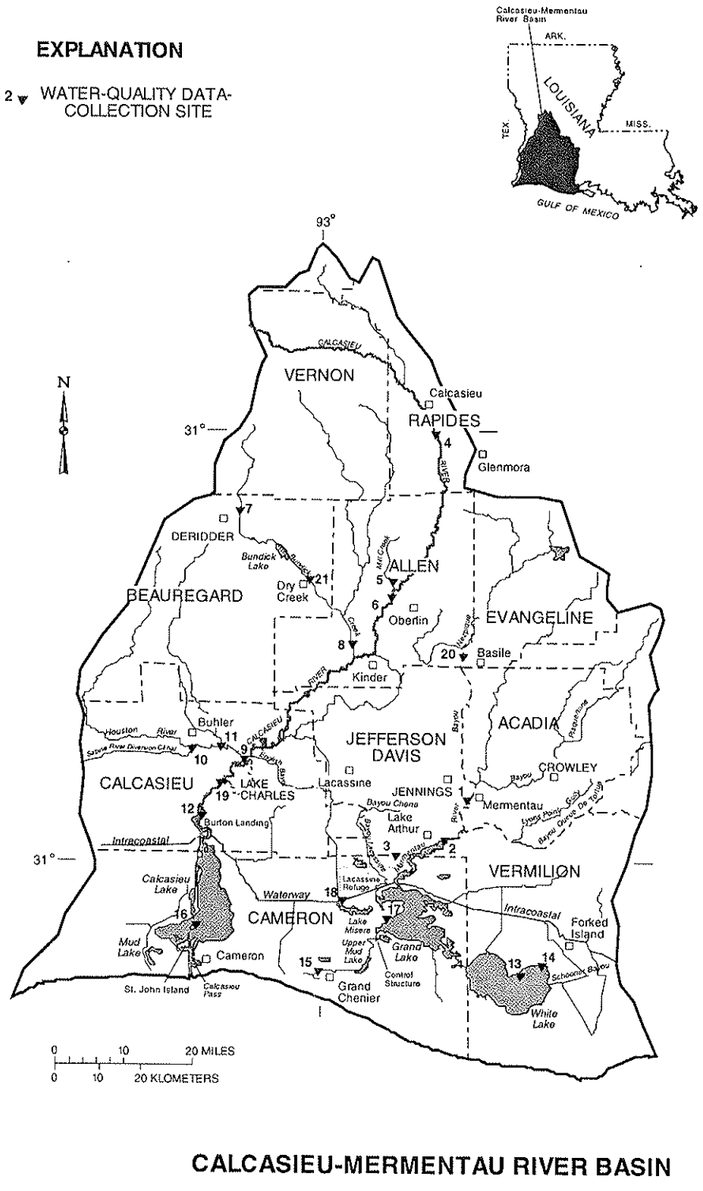


8 CALCASIEU RIVER NEAR KINDER



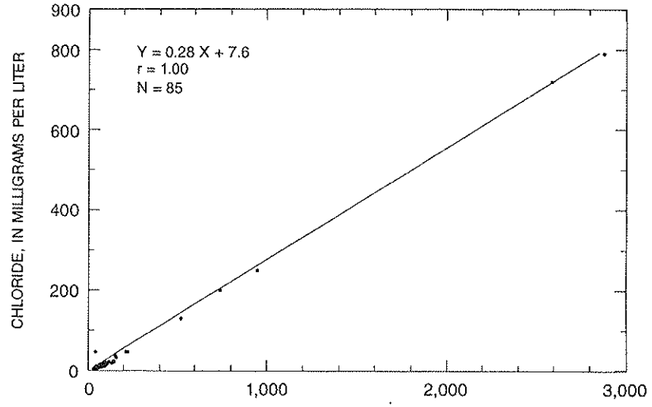
17 GRAND LAKE NORTHEAST OF CONTROL STRUCTURE NEAR GRAND CHENIER



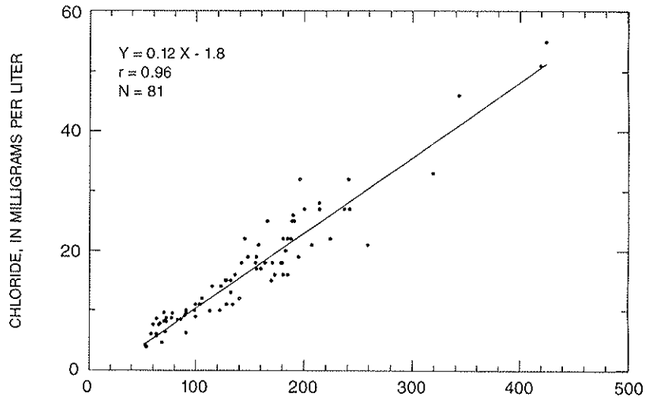


CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER



1 MERMENTAU RIVER AT MERMENTAU



14 WHITE LAKE (NORTHEAST CORNER) NEAR FORKED ISLAND

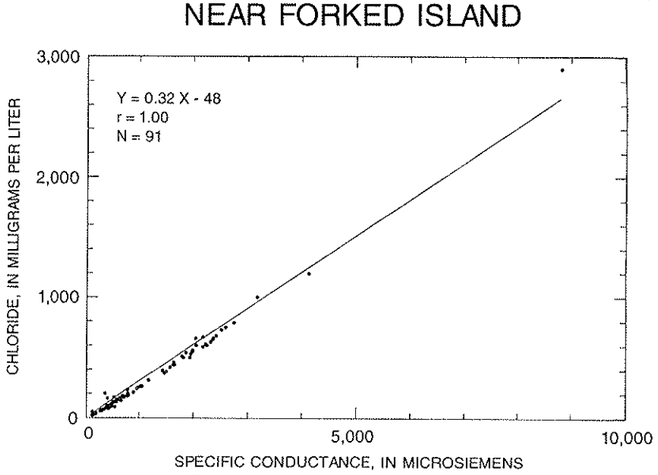


Figure 2.2.5-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and graphs showing relation between specific conductance and dissolved Chloride in water from selected sites.

CONCENTRATIONS OF SELECTED DISSOLVED TRACE METALS WERE WITHIN THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S RECOMMENDED LEVELS

Median concentrations of dissolved iron ranged from 7 to 260 µg/L.

The available data for trace metals indicated that concentrations of dissolved copper, lead, and zinc were less than the maximum contaminant levels of the U.S. Environmental Protection Agency's primary and secondary drinking water regulations (1976; 1986; 1994; 1996). Iron concentrations in water from the basin occasionally exceeded 300 µg/L (micrograms per liter), which is the criterion for domestic water supplies. However, iron concentrations did not exceed the agency's criterion of 1,000 µg/L for freshwater aquatic life.

Concentrations of copper in water samples collected in the Calcasieu-Mermentau River basin ranged from less than the detection level at most sites to 37 µg/L at Houston River near Buhler and Mermentau River at Mermentau. The median copper concentrations ranged from 3 to 6 µg/L at the 13 sites for which 10 or more samples were analyzed. Copper concentrations for six representative sites are summarized using boxplots in figure 2.2.6-1. The boxplots (fig. 2.2.6-1) illustrate that at the sites, with the exception of Houston River near Buhler, at least 95 percent of the samples analyzed had copper concentrations of less than 20 µg/L.

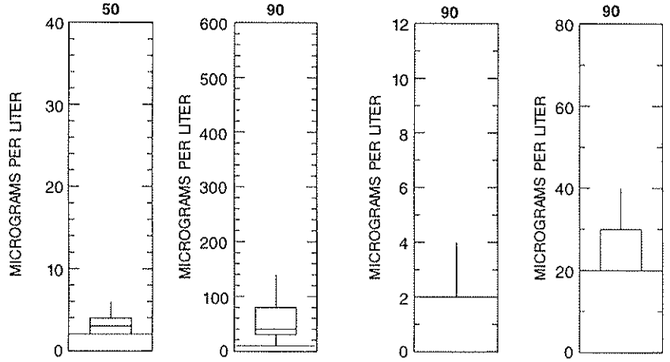
Iron concentrations ranged from less than the detection level at several sites to 910 µg/L at Calcasieu River at mile 40.0 at Lake Charles. Median iron concentrations in the basin ranged from 7 to 260 µg/L. Boxplots and tables (fig. 2.2.6-1) summarizing data for six representative sites within the basin show that, with the exception of Houston River near Buhler, 95 percent of iron concentrations were less than 500 µg/L.

Concentrations of lead in water from the basin generally were low at all sites. The concentrations ranged from less than the detection level at all sites to 38 µg/L at Calcasieu River near Lake Charles. The median concentrations were less than 2 µg/L at 10 of the 13 sites for which 10 or more samples were analyzed. Boxplots for six representative sites (fig. 2.2.6-1) show that at least 95 percent of the samples analyzed had lead concentrations of less than or equal to 10 µg/L.

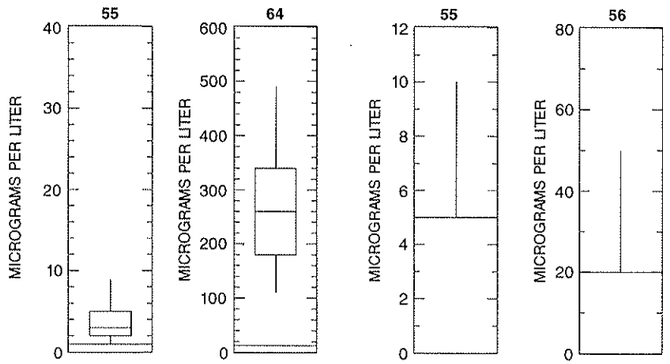
Zinc concentrations in water from the Calcasieu-Mermentau River basin generally were low at all sites. However, the maximum zinc concentration at Calcasieu River near Kinder was 170 µg/L. Zinc concentrations in the basin ranged from less than the detection level at most sites to 170 µg/L at Calcasieu River near Kinder. Median zinc concentrations were less than 20 µg/L at 10 of the 13 sites for which 10 or more samples were analyzed. Boxplots for six representative sites (fig. 2.2.6-1) show that less than 25 percent of the zinc concentrations were greater than 20 µg/L in most of the samples analyzed except at Mermentau River at Mermentau and Calcasieu Pass at St. John Island near Cameron.

[2]"Traditionally, dissolved trace-element concentrations have been reported at the micrograms per liter level. Recent evidence, mostly from large rivers, indicates that actual dissolved-phase concentrations for a number of trace elements are within the range of 10's to 100's of nanograms per liter (ng/L). Present data above the micrograms per liter level should be viewed with caution. Such data may actually represent elevated environmental concentrations from natural or human causes; however, these data could reflect contamination introduced during sampling, processing, or analysis. To confidently produce dissolved trace-element data with insignificant contamination, the U.S. Geological Survey begin using new trace-element protocols after the period of record associated with this report."

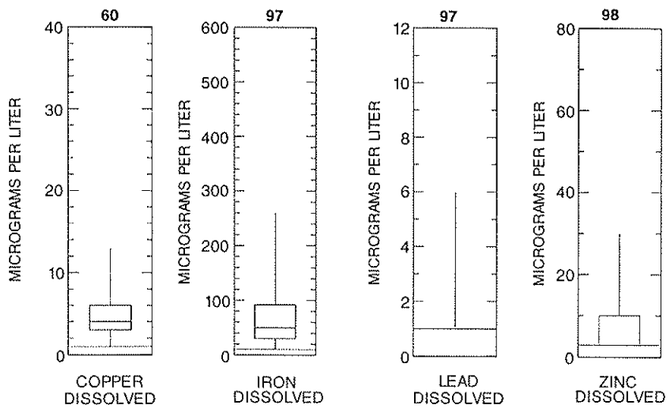
16 CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON



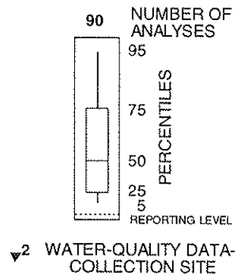
8 CALCASIEU RIVER NEAR KINDER

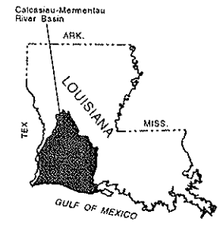


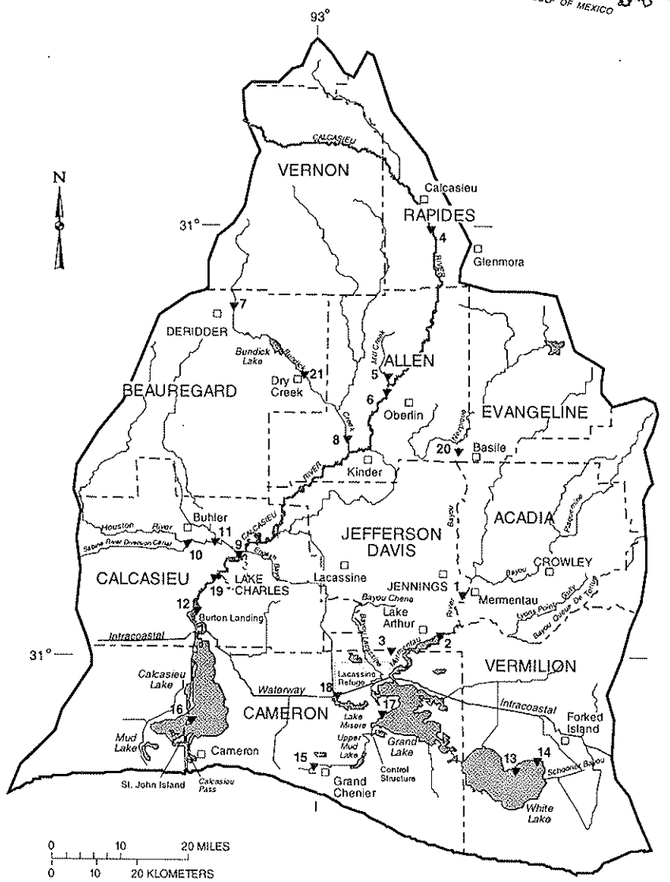
17 GRAND LAKE NORTHEAST OF CONTROL STRUCTURE NEAR GRAND CHENIER



EXPLANATION

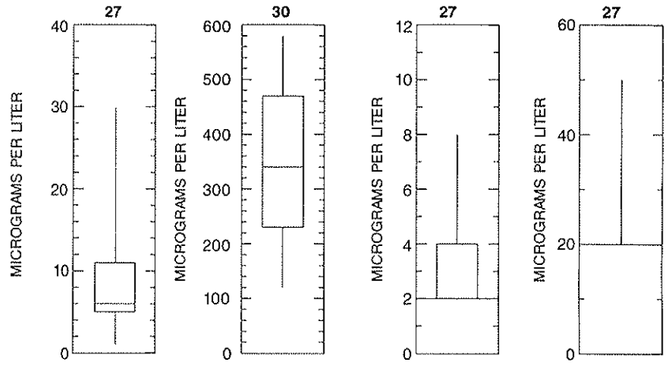




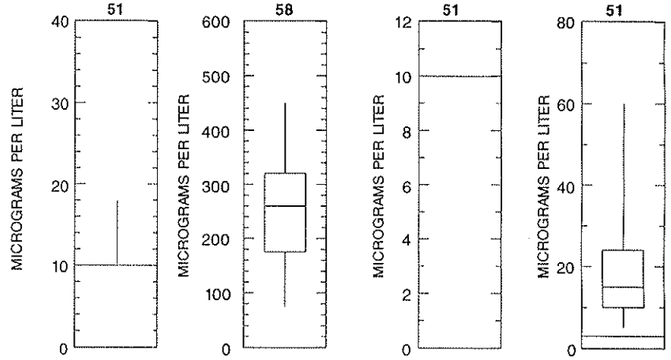


CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER



1 MERMENTAU RIVER AT MERMENTAU



14 WHITE LAKE (NORTHEAST CORNER) NEAR FORKED ISLAND

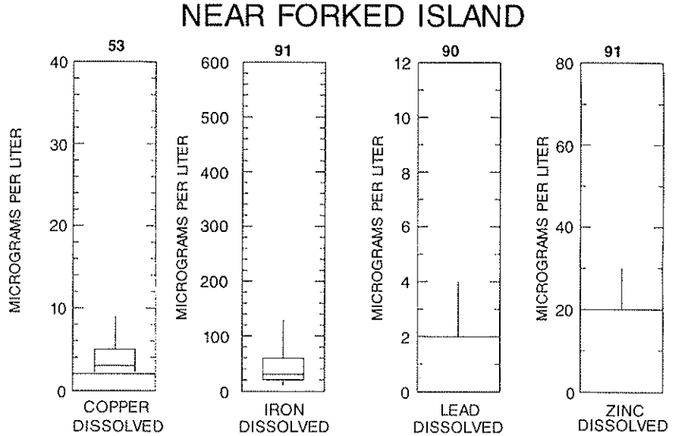


Figure 2.2.6-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and boxplots summarizing data for dissolved copper, iron, lead, and zinc concentrations in water from selected sites.

HIGH MEDIAN CONCENTRATIONS OF AMMONIA PLUS ORGANIC NITROGEN AT HOUSTON RIVER AND MERMENTAU RIVER

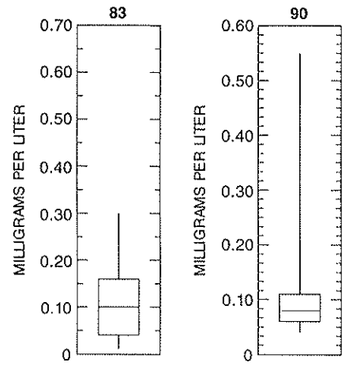
Median concentrations of ammonia plus organic nitrogen were 1.1 mg/L at Houston River near Buhler and 1.2 mg/L at Mermentau River at Mermentau.

Concentrations of ammonia plus organic nitrogen in water from the basin ranged from 0.1 mg/L at Calcasieu River near Kinder and Mermentau River at Mermentau to 4.6 mg/L at Houston River near Buhler. Median concentrations ranged from 0.7 to 1.2 mg/L. However, median concentrations of ammonia plus organic nitrogen as nitrogen at the Mermentau River at Mermentau and Houston River near Buhler were generally greater than the other sites. Concentrations of ammonia plus organic nitrogen in water from the six representative sites for which boxplots are shown generally were less than 3.0 mg/L (fig. 2.2.7-1).

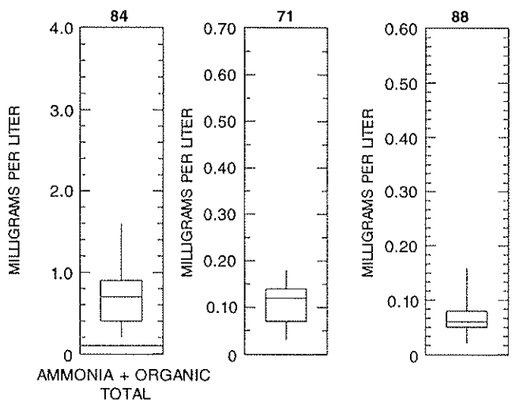
Concentrations of nitrite plus nitrate as nitrogen in the Calcasieu-Mermentau River basin ranged from less than 0.01 mg/L at most sites to 1.7 mg/L at White Lake (northeast corner) near Forked Island. Median nitrite plus nitrate nitrogen concentrations ranged from 0.04 to 0.26 mg/L. Boxplots at six representative sites show that concentrations in 75 percent of all samples analyzed were less than 0.50 mg/L (fig. 2.2.7-1).

Concentrations of total phosphorus in water in the Calcasieu-Mermentau River basin ranged from less than 0.01 mg/L at the White Lake sites and at most of the Calcasieu River sites to 5.5 mg/L at Calcasieu Pass at St. John Island near Cameron. Median concentrations ranged from 0.06 to 0.19 mg/L. Boxplots for six representative sites show that phosphorus concentrations in 75 percent of all samples analyzed were less than 0.30 mg/L (fig. 2.2.7-1).

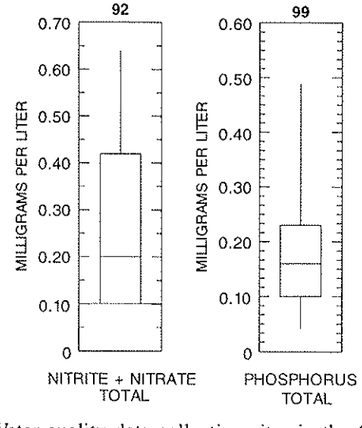
16 CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON

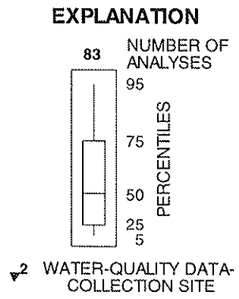


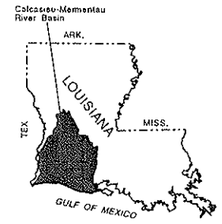
8 CALCASIEU RIVER NEAR KINDER

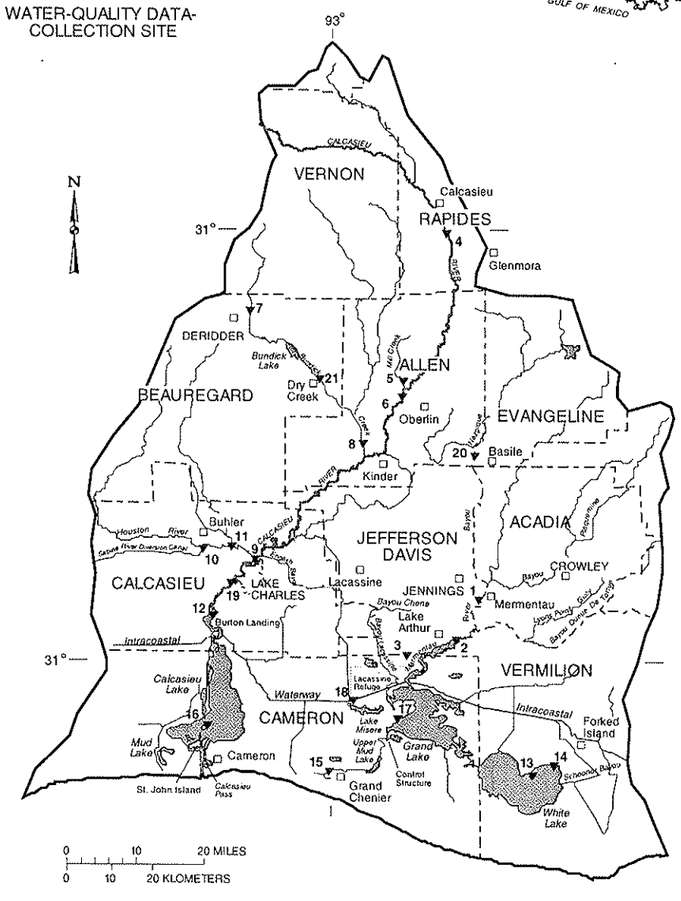


17 GRAND LAKE NORTHEAST OF CONTROL STRUCTURE NEAR GRAND CHENIER



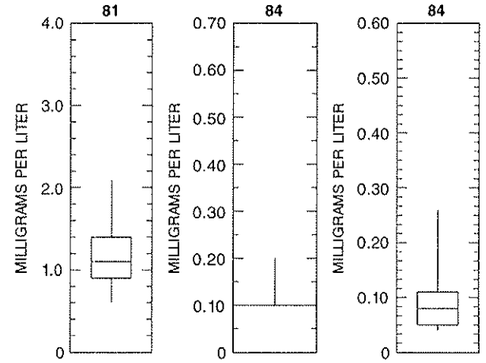




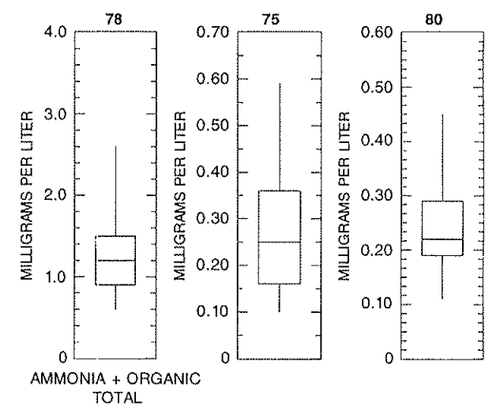


CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER



1 MERMENTAU RIVER AT MERMENTAU



14 WHITE LAKE (NORTHEAST CORNER) NEAR FORKED ISLAND

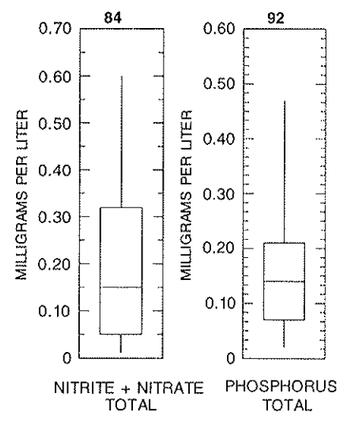


Figure 2.2.7-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and boxplots summarizing data for concentrations of nutrients in water from selected sites.

ORGANIC COMPOUNDS DETECTED IN SURFACE WATERS IN THE BASIN

The most commonly occurring organic compounds in the Calcasieu-Mermentau River basin were diazinon and 2,4-D.

Diazinon was detected at more sites and with greater frequency than any of the other organic compounds that were analyzed, with the exception of 2,4-D. The highest diazinon concentration was 0.23 µg/L in a sample collected at Calcasieu River near Lake Charles. Diazinon was detected at least once at 14 of the 16 sites for which water samples were analyzed for the compound. Tables rather than boxplots are used to summarize occurrences of diazinon at six representative sites in figure 2.2.8-1, because the total number of samples analyzed for each site was less than 10 or the number of samples that contained organic compounds in concentrations greater than the reporting level was equal to or less than 10. Of these six sites, diazinon was detected at every site for which it was analyzed.

The herbicide 2,4-D was detected at least once at 12 of the 14 sites for which water samples were analyzed for the compound. The maximum concentration of 2,4-D in water from the basin was 0.94 µg/L, at Calcasieu River at mile 40.0 at Lake Charles. The tables listing the number of samples in which organic compounds were detected for six representative sites in the basin indicate that 2,4-D was detected in 75 percent of the samples collected at Mermentau River at Lacassine Refuge (fig. 2.2.8-1).

Low-level concentrations of the other organic compounds occasionally were detected at other sites.

16 CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON

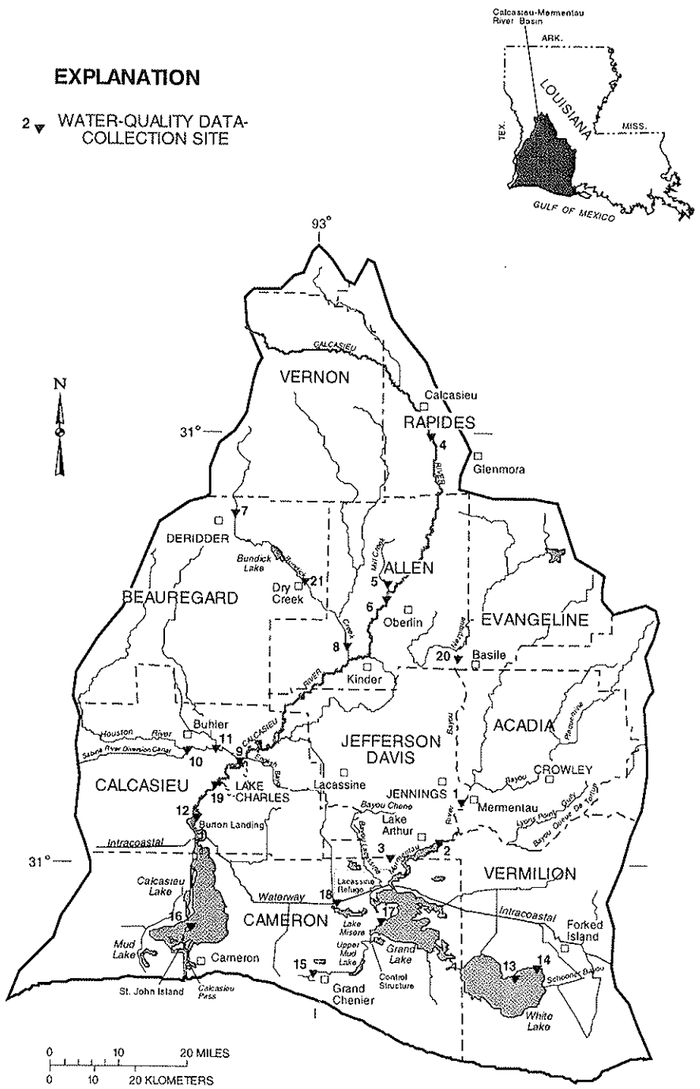
ORGANIC COMPOUND TOTAL	TOTAL NUMBER OF ANALYSES	REPORTING LEVEL (µg/L)	NUMBER OF ANALYSES AT OR ABOVE REPORTING LEVEL
DDT	90	0.001	2
PCB	90	0.1	2
DIAZINON	66	0.01	14
LINDANE	90	0.001	7
CHLORDANE	90	0.1	1
MALATHION	66	0.01	0
ENDRIN	90	0.001	1
PARATHION	66	0.01	1
DIELDRIN	90	0.01	1
ENDOSULFAN	28	0.001	2
2,4-D	39	0.01	20

8 CALCASIEU RIVER NEAR KINDER

ORGANIC COMPOUND TOTAL	TOTAL NUMBER OF ANALYSES	REPORTING LEVEL (µg/L)	NUMBER OF ANALYSES AT OR ABOVE REPORTING LEVEL
DDT	8	0.01	0
PCB	8	0.1	0
DIAZINON	8	0.01	4
LINDANE	8	0.01	1
CHLORDANE	8	0.1	0
MALATHION	8	0.01	0
ENDRIN	8	0.01	0
PARATHION	8	0.01	0
DIELDRIN	8	0.01	0
ENDOSULFAN	2	0.01	0
2,4-D	5	0.01	1

17 GRAND LAKE NORTHEAST OF CONTROL STRUCTURE NEAR GRAND CHENIER

ORGANIC COMPOUND TOTAL	TOTAL NUMBER OF ANALYSES	REPORTING LEVEL (µg/L)	NUMBER OF ANALYSES AT OR ABOVE REPORTING LEVEL
DDT	99	0.001	1
PCB	98	0.1	0
DIAZINON	65	0.01	17
LINDANE	99	0.001	6
CHLORDANE	99	0.1	0
MALATHION	65	0.01	0
ENDRIN	97	0.001	0
PARATHION	65	0.01	0
DIELDRIN	99	0.01	2
ENDOSULFAN	38	0.001	2
2,4-D	46	0.01	18



CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER

ORGANIC COMPOUND TOTAL	TOTAL NUMBER OF ANALYSES	REPORTING LEVEL (µg/L)	NUMBER OF ANALYSES AT OR ABOVE REPORTING LEVEL
DDT	13	0.01	0
PCB	13	0.1	1
DIAZINON	12	0.01	3
LINDANE	13	0.01	0
CHLORDANE	13	0.1	0
MALATHION	12	0.01	0
ENDRIN	13	0.01	0
PARATHION	12	0.01	0
DIELDRIN	13	0.01	0
ENDOSULFAN	11	0.01	0
2,4-D	13	0.01	8

3 MERMENTAU RIVER AT LACASSINE REFUGE

ORGANIC COMPOUND TOTAL	TOTAL NUMBER OF ANALYSES	REPORTING LEVEL (µg/L)	NUMBER OF ANALYSES AT OR ABOVE REPORTING LEVEL
DDT	24	0.001	1
PCB	24	0.1	0
DIAZINON	24	0.01	13
LINDANE	24	0.001	6
CHLORDANE	24	0.1	0
MALATHION	24	0.01	0
ENDRIN	24	0.001	1
PARATHION	24	0.01	0
DIELDRIN	24	0.001	14
ENDOSULFAN	24	0.001	3
2,4-D	24	0.01	18

14 WHITE LAKE (NORTHEAST CORNER) NEAR FORKED ISLAND

ORGANIC COMPOUND TOTAL	TOTAL NUMBER OF ANALYSES	REPORTING LEVEL (µg/L)	NUMBER OF ANALYSES AT OR ABOVE REPORTING LEVEL
DDT	92	0.001	2
PCB	92	0.1	2
DIAZINON	66	0.01	13
LINDANE	92	0.001	2
CHLORDANE	92	0.1	0
MALATHION	66	0.01	0
ENDRIN	92	0.01	1
PARATHION	66	0.01	0
DIELDRIN	92	0.001	8
ENDOSULFAN	30	0.001	2
2,4-D	41	0.01	6

Figure 2.2.8-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and tables listing organic compounds detected in water from selected sites.

FECAL COLIFORM AND FECAL STREPTOCOCCUS BACTERIA CONCENTRATIONS VARIED GREATLY THROUGHOUT THE BASIN

Median fecal coliform concentrations ranged from 6 to 180 cols/100 mL.

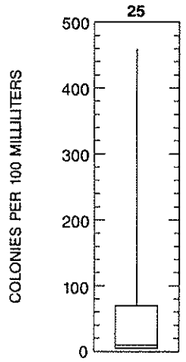
Concentrations of fecal coliform bacteria varied greatly at the 15 sites in the Calcasieu-Mermentau River basin for which data are available. Concentrations ranged from less than 2 cols/100 mL at several sites to 65,000 cols/100 mL at Houston River near Buhler. Median concentrations ranged from 6 to 180 cols/100 mL. Although fecal coliform concentrations exceeded 200 cols/100 mL some of the time at most of the sites, additional data are needed to determine if the U.S. Environmental Protection Agency's (1976; 1986) maximum contaminant level is being exceeded. Boxplots of fecal coliform, fecal streptococcus bacteria, and phytoplankton concentrations at six representative sites in the basin show that the samples collected at Calcasieu River near Kinder, Houston River near Buhler, and Mermentau River at Mermentau generally had higher fecal coliform concentrations than at the other sites (fig. 2.2.9-1).

Concentrations of fecal streptococcus bacteria also varied greatly at sites in the basin. Concentrations ranged from less than the detection levels at Calcasieu River near Lake Charles to 50,000 cols/100 mL at Houston River near Buhler. Median fecal streptococcus concentrations, which ranged from 200 to 500 cols/100 mL, generally were higher than the median fecal coliform concentrations. Boxplots of fecal streptococcus concentrations at six representative sites show that the samples collected at Houston River near Buhler and Mermentau River at Mermentau generally had higher fecal streptococcus concentrations than at the other sites (fig. 2.2.9-1).

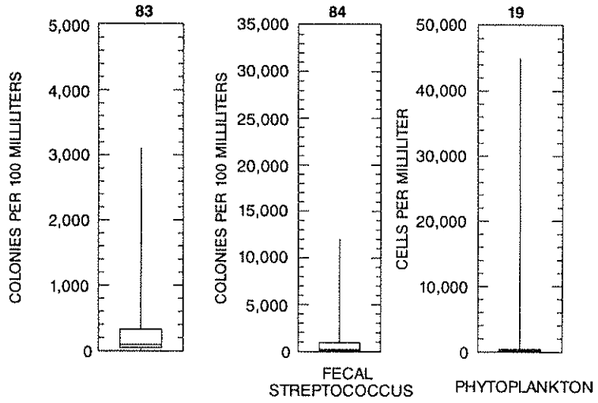
The median ratio of fecal coliform to fecal streptococcus bacteria was less than 0.7 at most of the sites sampled for analysis of bacteria concentrations within the Calcasieu-Mermentau River basin, indicating that sources of fecal coliform bacteria probably were livestock or poultry wastes (Millipore Corporation, 1972, p. 36). Additional study is needed to confirm these results.

Concentrations of phytoplankton varied greatly at sites in the basin due to the seasonal influence. Concentrations ranged from 0 cells/mL at Calcasieu River near Kinder and Calcasieu River near Lake Charles to 45,000 cells/mL at Calcasieu River near Kinder. Median concentrations ranged from 170 to 1,400 cells/mL. Boxplots of phytoplankton concentrations at two representative sites show that less than 25 percent of the samples analyzed at Calcasieu River near Kinder had concentrations greater than 1,000 cells/mL (fig. 2.2.9-1).

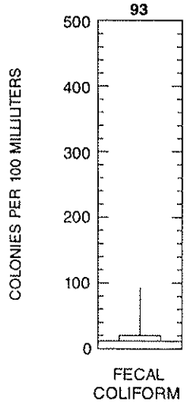
16 CALCASIEU PASS AT ST. JOHN ISLAND NEAR CAMERON

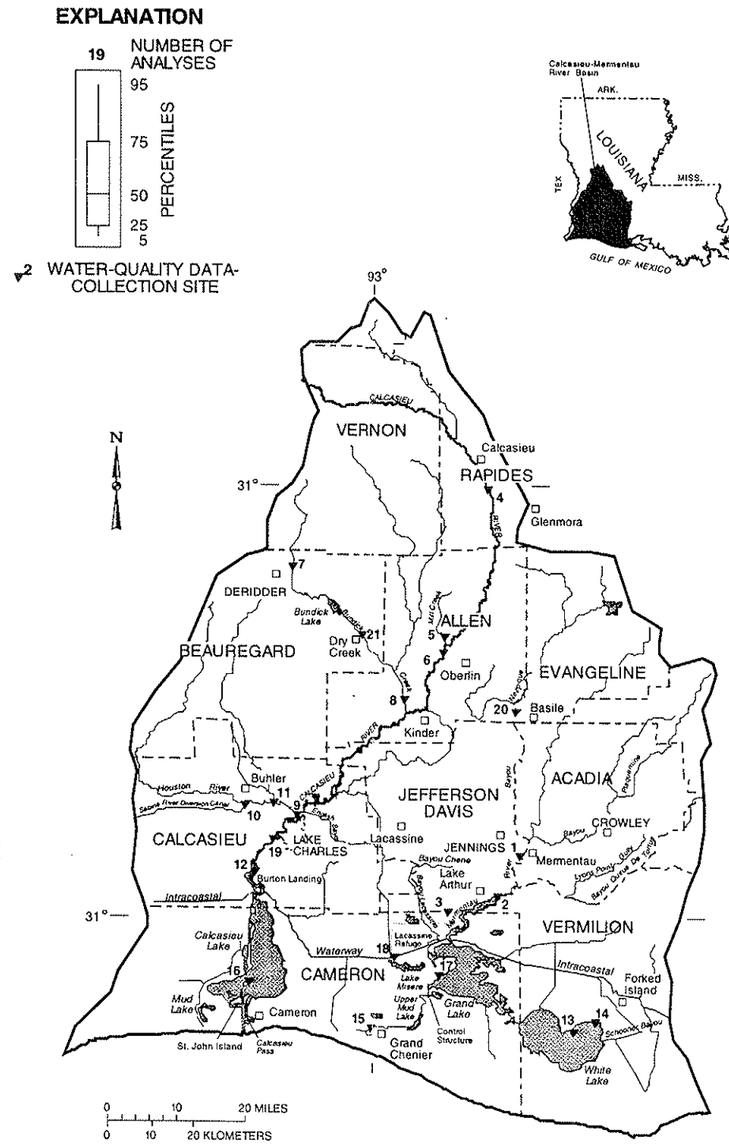


8 CALCASIEU RIVER NEAR KINDER



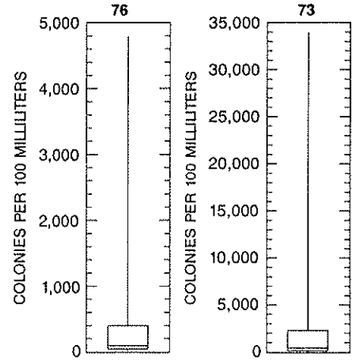
17 GRAND LAKE NORTHEAST OF CONTROL STRUCTURE NEAR GRAND CHENIER



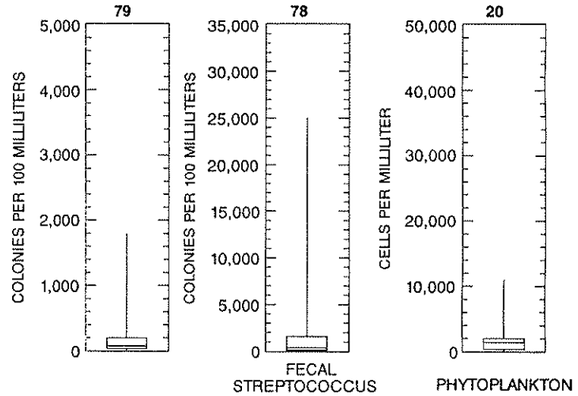


CALCASIEU-MERMENTAU RIVER BASIN

10 HOUSTON RIVER NEAR BUHLER



1 MERMENTAU RIVER AT MERMENTAU



14 WHITE LAKE (NORTHEAST CORNER) NEAR FORKED ISLAND

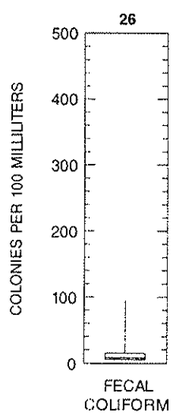


Figure 2.2.9-1. Water-quality data-collection sites in the Calcasieu-Mermentau River basin, Louisiana, and boxplots summarizing data for concentrations of fecal coliform and fecal streptococcus bacteria and phytoplankton in water from selected sites.

2.3 Summary and Conclusions

VALUES FOR pH OUTSIDE THE U.S. ENVIRONMENTAL PROTECTION AGENCY RANGE FOR FRESHWATER AQUATIC LIFE

Values for pH often were less than 6.5, the lower limit of the U.S. Environmental Protection Agency recommended range for freshwater aquatic life.

The Calcasieu-Mermentau River basin in Louisiana is about 130 miles long and 95 miles wide at its widest point. Surface waters in the basin are used primarily by area industries and for rice irrigation. The principal sources of fresh surface water in the basin are the Bayou Nezpique, Calcasieu River, Mermentau River, Intracoastal Waterway, Grand Lake, and White Lake.

Water quality in the Calcasieu-Mermentau River basin in Louisiana was investigated as part of a statewide investigation to evaluate water-quality conditions in the major surface-water drainage basins in Louisiana. The water-quality conditions in the Calcasieu-Mermentau River basin were evaluated using data collected from 21 sites during the water years 1943-95. Data for 33 water-quality properties and constituents from water-quality analyses stored in the U.S. Geological Survey Water-Data Storage and Retrieval System (WATSTORE), a computerized data base, were used for the evaluation. Results are reported as boxplots, linear-regression plots, and tabulated data.

The data were statistically analyzed and summarized for seven categories of water-quality properties and constituents: (1) physical properties--specific conductance, pH, water temperature, dissolved oxygen, and dissolved solids; (2) major inorganic cations--dissolved calcium, magnesium, sodium, and potassium; (3) major inorganic anions--total alkalinity as calcium carbonate, dissolved sulfate, and dissolved chloride; (4) trace metals--dissolved copper, iron, lead, and zinc; (5) nutrients--nitrogen and phosphorus constituents; (6) organic compounds--pesticides and PCB's; and (7) biological constituents--fecal coliform and fecal streptococcus bacteria and phytoplankton.

The physical properties varied for waters in the basin. The median values for specific conductance ranged from 46 µS/cm (microsiemens per centimeter at 25 degrees Celsius) to 25,200 µS/cm. For pH, values often were less than 6.5, the lower limit of the U.S. Environmental Protection Agency's recommended range for freshwater aquatic life. Median values for water temperature ranged from 15.0 to 25.0 °C (degrees Celsius).

Dissolved oxygen concentrations exceeded the State's minimum water-quality criterion of 5 mg/L (milligrams per liter) in more than 75 percent of the samples analyzed for most sites. However, the statistical data indicated that between 50 and 75 percent of the samples collected at Mermentau River at Mermentau, Louisiana, had dissolved oxygen concentrations of less than or equal to 5.0 mg/L.

The data for major inorganic cations and anions in water from the basin indicated that concentrations of major ions were below recommended levels for drinking water, where such levels have been established. However, there were high concentrations of sodium and chloride at the coastal sites.

The available data for trace metals indicated that dissolved copper, lead, and zinc were less than the maximum contaminant levels of the U.S. Environmental Protection Agency's primary and secondary drinking water regulations. Iron concentrations in water from the basin occasionally exceeded 300 µg/L (micrograms per liter), which is the criterion for domestic water supplies. However, iron concentrations did not exceed the agency's criterion of 1,000 µg/L for freshwater aquatic life.

Median concentrations of ammonia plus organic nitrogen as nitrogen ranged from 0.7 to 1.2 mg/L. Median concentrations of ammonia plus organic nitrogen as nitrogen were generally greater at Mermentau River at Mermentau, Louisiana; and Houston River near Buhler, Louisiana than at the other sites. Median concentrations of total phosphorus at the rivers and bayous ranged from less than 0.01 to 5.5 mg/L.

Analysis of the available organic-chemical data indicated that diazinon and 2,4-D were detected at more sites and with greater frequency than any of the other organic compounds that were analyzed. Low-level concentrations of other organic compounds were occasionally detected at other sites. Diazinon was detected at least once at 14 of the 16 sites for which water samples were analyzed for organic compounds, and 2,4-D was detected at least once at 12 of the 14 sites for which water samples were analyzed for organic compounds.

The median ratios of fecal coliform to fecal streptococcus bacteria were less than 0.7 for most of the sites within the Calcasieu-Mermentau River basin, indicating that sources of fecal bacteria probably were predominantly livestock or poultry wastes. Additional samples closer to the potential source of contamination need to be collected and analyzed to confirm these results. Phytoplankton concentrations varied greatly at sites in the basin due to the seasonal influence. Concentrations ranged from 0 to 45,000 cells per milliliter.

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TABLE 2.2-1. STATISTICAL SUMMARY OF WATER-QUALITY DATA FOR THE CALCASIEU-MERMENTAU RIVER BASIN IN LOUISIANA, 1943-95

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95

[Number in parentheses with the site name is the map number shown in fig. 2.0-1. Water temperature is in degrees Celsius, specific conductance is in microsiemens per centimeter at 25 degrees Celsius, and other units are given; <, less than]

Bayou Nezpique near Basile, Louisiana (20)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	6	(a)	(a)	232	44	(b)	(b)	(b)	(b)	(b)	(b)
pH (standard units)	14	(a)	(a)	7.9	5.6	6.5	5.6	6.2	6.4	7.0	7.9
Water temperature	3	(a)	(a)	24.0	11.0	(b)	(b)	(b)	(b)	(b)	(b)
Dissolved solids (milligrams per liter)	9	(a)	(a)	158	68	(b)	(b)	(b)	(b)	(b)	(b)
Major cations (milligrams per liter)											
Calcium, dissolved	6	0.01	6	12	3.1	(b)	(b)	(b)	(b)	(b)	(b)
Magnesium, dissolved	6	.01	6	4.6	.50	(b)	(b)	(b)	(b)	(b)	(b)
Sodium, dissolved	6	.01	6	38	5.0	(b)	(b)	(b)	(b)	(b)	(b)
Potassium, dissolved	6	.01	6	4.0	1.3	(b)	(b)	(b)	(b)	(b)	(b)
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	5	1	5	59	6.0	(b)	(b)	(b)	(b)	(b)	(b)
Sulfate, dissolved	15	.1	14	8.2	<.1	(c)	<.1	1.2	2.8	5.2	8.2
Chloride, dissolved	16	.1	16	55	5.0	19	5.0	7.1	16	24	55

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Bundick Creek near DeRidder, Louisiana (7)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	9	(a)	(a)	229	36	(b)	(b)	(b)	(b)	(b)	(b)
pH (standard units)	16	(a)	(a)	7.1	5.1	6.2	5.1	5.9	6.3	6.6	7.1
Water temperature	5	(a)	(a)	26.0	11.0	(b)	(b)	(b)	(b)	(b)	(b)
Dissolved solids (milligrams per liter)	11	(a)	(a)	87	37	67	37	55	60	85	87
Major cations (milligrams per liter)											
Calcium, dissolved	9	0.01	9	7.6	2.2	(b)	(b)	(b)	(b)	(b)	(b)
Magnesium, dissolved	9	.01	9	2.2	.30	(b)	(b)	(b)	(b)	(b)	(b)
Sodium, dissolved	9	.01	9	27	2.7	(b)	(b)	(b)	(b)	(b)	(b)
Potassium, dissolved	9	.01	9	3.5	.70	(b)	(b)	(b)	(b)	(b)	(b)
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	5	1	5	26	7.0	(b)	(b)	(b)	(b)	(b)	(b)
Sulfate, dissolved	16	.1	16	9.6	.6	3.8	0.6	2.0	2.7	5.4	9.6
Chloride, dissolved	16	.1	16	36	5.0	10	5.0	6.0	8.0	10	36

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Bundick Creek near Dry Creek, Louisiana (21)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	6	(a)	(a)	85	34	(b)	(b)	(b)	(b)	(b)	(b)
pH (standard units)	26	(a)	(a)	7.4	5.4	6.4	5.5	6.0	6.4	6.7	7.3
Water temperature	5	(a)	(a)	26.0	13.0	(b)	(b)	(b)	(b)	(b)	(b)
Dissolved solids (milligrams per liter)	8	(a)	(a)	76	30	(b)	(b)	(b)	(b)	(b)	(b)
Major cations (milligrams per liter)											
Calcium, dissolved	6	0.01	6	3.9	2.1	(b)	(b)	(b)	(b)	(b)	(b)
Magnesium, dissolved	6	.01	6	1.0	.40	(b)	(b)	(b)	(b)	(b)	(b)
Sodium, dissolved	6	.01	6	14	4.0	(b)	(b)	(b)	(b)	(b)	(b)
Potassium, dissolved	6	.01	6	1.7	.40	(b)	(b)	(b)	(b)	(b)	(b)
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	6	1	6	24	7	(b)	(b)	(b)	(b)	(b)	(b)
Sulfate, dissolved	27	.1	27	32	.6	3.6	0.8	1.5	1.9	3.2	23
Chloride, dissolved	29	.1	29	10	3.2	7.0	3.5	5.4	7.2	8.2	10

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu Pass at St. John Island near Cameron, Louisiana (16)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	91	(a)	(a)	40,200	1,570	23,300	3,550	14,900	25,200	31,400	36,900
pH (standard units)	91	(a)	(a)	8.5	6.7	7.8	6.9	7.6	7.8	8.0	8.2
Water temperature	34	(a)	(a)	32.0	8.0	19.2	8.4	13.8	20.0	25.6	30.9
Dissolved oxygen (milligrams per liter)	84	(a)	(a)	13.6	4.9	8.6	6.2	7.6	8.4	9.5	11.5
Major cations (milligrams per liter)											
Calcium, dissolved	80	0.01	80	340	12	180	25	120	190	250	310
Magnesium, dissolved	80	.01	80	1,100	25	530	42	270	560	800	940
Sodium, dissolved	24	.01	24	7,900	250	4,800	250	2,200	5,200	7,100	7,800
Potassium, dissolved	24	.01	24	380	11	180	11	80	200	260	370
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	91	1	91	147	11	75	22	55	78	95	116
Sulfate, dissolved	91	.1	91	3,600	27	1,000	81	430	1,100	1,500	2,000
Chloride, dissolved	91	.1	91	16,000	440	8,300	1,000	5,000	8,900	12,000	14,000
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	2	0.01	2	0.79	0.69	(b)	(b)	(b)	(b)	(b)	(b)
Nitrogen, nitrite plus nitrate, total as nitrogen	83	.01	80	.34	<.01	(c)	0.01	0.04	0.10	0.16	0.30
Phosphorus, total as phosphorus	90	.01	90	5.5	.01	0.21	.04	.06	.08	.11	.55

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu Pass at St. John Island near Cameron, Louisiana--continued (16)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	25	5	16	480	<5	(c)	<5	<5	10	70	460
Trace metals (micrograms per liter)											
Copper, dissolved	50	2	45	8	<2	(c)	<2	2	3	4	6
Iron, dissolved	90	10	82	270	<10	(c)	<10	30	40	80	140
Lead, dissolved	90	2	12	12	<2	(c)	<2	<2	<2	<2	4
Zinc, dissolved	90	20	57	70	<20	(c)	<20	<20	20	30	40
Organic compounds (micrograms per liter)											
DDT, total	90	0.001	2	0.005	<0.001	(c)	<0.001	<0.001	<0.001	<0.001	0.001
PCB, total	90	.1	2	.1	<.1	(c)	<.1	<.1	<.1	<.1	.1
Diazinon, total	66	.01	14	.03	<.01	(c)	<.01	<.01	<.01	<.01	.01
Lindane, total	90	.001	7	.001	<.001	(c)	<.001	<.001	<.001	<.001	.001
Chlordane, total	90	.1	1	.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	66	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	90	.001	1	.001	<.001	(c)	<.001	<.001	<.001	<.001	<.001
Parathion, total	66	.01	1	.01	<.01	(c)	<.01	<.01	<.01	<.01	.01
Dieldrin, total	90	.01	1	.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endosulfan, total	28	.001	2	.001	<.001	(c)	<.001	<.001	<.001	<.001	.001
2,4-D, total	39	.01	20	.16	<.01	(c)	<.01	<.01	.01	.02	.07

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River at Burton Landing near Lake Charles, Louisiana (12)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	58	(a)	(a)	34,000	244	16,700	1,230	7,070	16,400	23,200	33,700
pH (standard units)	58	(a)	(a)	8.1	6.4	7.2	6.4	7.0	7.2	7.5	7.7
Water temperature	56	(a)	(a)	32.0	10.0	22.6	13.0	17.6	21.5	30.0	31.5
Dissolved oxygen (milligrams per liter)	56	(a)	(a)	9.3	1.7	5.4	2.0	3.7	5.8	7.2	8.6
Dissolved solids (milligrams per liter)	41	(a)	(a)	21,900	186	10,200	245	4,220	10,500	14,900	21,600
Major cations (milligrams per liter)											
Calcium, dissolved	34	0.01	34	290	9.2	150	11	60	160	240	290
Magnesium, dissolved	34	.01	34	740	1.8	340	5.8	110	320	580	730
Sodium, dissolved	30	.01	30	7,000	28	2,600	42	960	2,300	4,300	6,400
Potassium, dissolved	28	.01	28	330	2.1	120	2.6	38	90	180	320
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	44	1	44	116	14	63	19	42	68	82	103
Sulfate, dissolved	43	.1	43	2,000	8.0	400	22	120	240	680	1,100
Chloride, dissolved	44	.1	44	12,000	53	5,600	160	2,100	5,500	8,300	11,000
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	2	0.1	2	1.0	0.9	(b)	(b)	(b)	(b)	(b)	(b)
Nitrogen, nitrite plus nitrate, total as nitrogen	3	.10	1	.17	<.10	(b,c)	(b)	(b)	(b)	(b)	(b)
Phosphorus, total as phosphorus	19	.01	19	.21	.01	0.06	0.01	0.03	0.06	0.07	0.21

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River at Burton Landing near Lake Charles, Louisiana--continued (12)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Trace metals (micrograms per liter)											
Copper, dissolved	2	1	2	6	2	(b)	(b)	(b)	(b)	(b)	(b)
Iron, dissolved	3	10	3	60	40	(b)	(b)	(b)	(b)	(b)	(b)
Lead, dissolved	2	1	1	1	<1	(b,c)	(b)	(b)	(b)	(b)	(b)
Zinc, dissolved	2	20	2	20	20	(b)	(b)	(b)	(b)	(b)	(b)

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River at mile 40.0 at Lake Charles, Louisiana (19)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles 5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	93	(a)	(a)	18,800	31	3,100	43	210	1,520	4,140	14,200
pH (standard units)	93	(a)	(a)	7.8	5.8	6.9	6.2	6.6	6.9	7.2	7.6
Water temperature	34	(a)	(a)	32.5	10.0	20.0	10.8	15.6	19.2	24.6	31.8
Dissolved oxygen (milligrams per liter)	87	(a)	(a)	10.8	2.7	6.6	3.9	5.3	6.6	7.8	9.0
Major cations (milligrams per liter)											
Calcium, dissolved	79	0.01	79	150	1.8	21	2.1	3.9	13	25	83
Magnesium, dissolved	79	.01	79	440	.60	54	.80	2.2	28	60	270
Sodium, dissolved	25	.01	25	1,000	2.6	160	2.9	8.0	58	260	850
Potassium, dissolved	25	.01	25	80	1.2	9.3	1.2	1.6	4.5	11	64
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	93	1	93	80	4	23	6	11	21	29	56
Sulfate, dissolved	91	.1	91	890	2.4	130	3.5	12	63	160	580
Chloride, dissolved	90	.1	90	6,600	4.0	970	6.2	41	460	1,200	4,200
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	2	0.01	2	0.71	0.59	(b)	(b)	(b)	(b)	(b)	(b)
Nitrogen, nitrite plus nitrate, total as nitrogen	86	.01	84	1.6	<.01	(c)	0.02	0.07	0.12	0.15	0.35
Phosphorus, total as phosphorus	93	.01	93	2.4	.03	0.20	.05	.08	.12	.16	.96

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River at mile 40.0 at Lake Charles, Louisiana--continued (19)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	36	5	30	1,100	<5	(c)	<5	8	28	120	1,000
Trace metals (micrograms per liter)											
Copper, dissolved	52	2	44	30	<2	(c)	<2	2	3	5	9
Iron, dissolved	92	10	92	910	10	170	30	90	140	210	380
Lead, dissolved	91	2	20	16	<2	(c)	<2	<2	<2	<2	5
Zinc, dissolved	92	20	23	40	<20	(c)	<20	<20	<20	<20	30
Organic compounds (micrograms per liter)											
DDT, total	90	0.001	2	0.008	<0.001	(c)	<0.001	<0.001	<0.001	<0.001	0.001
PCB, total	90	.1	3	.4	<.1	(c)	<.1	<.1	<.1	<.1	.1
Diazinon, total	66	.01	23	.03	<.01	(c)	<.01	<.01	<.01	.01	.02
Lindane, total	90	.001	5	.002	<.001	(c)	<.001	<.001	<.001	<.001	.001
Chlordane, total	90	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	66	.01	2	.04	<.01	(c)	<.01	<.01	<.01	<.01	.01
Endrin, total	90	.001	1	.002	<.001	(c)	<.001	<.001	<.001	<.001	.001
Parathion, total	66	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	90	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endosulfan, total	30	.001	3	.001	<.001	(c)	<.001	<.001	<.001	<.001	.001
2,4-D, total	40	.01	30	.94	<.01	(c)	<.01	<.01	.04	.12	.40

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River near Glenmora, Louisiana (4)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	21	(a)	(a)	75	24	49	24	34	46	64	75
pH (standard units)	37	(a)	(a)	7.2	5.5	6.5	5.8	6.1	6.4	6.8	7.2
Water temperature	17	(a)	(a)	26.0	7.0	16.9	7.0	12.0	16.0	22.5	26.0
Dissolved oxygen (milligrams per liter)	10	(a)	(a)	14.0	6.1	8.4	6.1	7.1	8.0	8.8	14.0
Dissolved solids (milligrams per liter)	23	(a)	(a)	78	31	58	32	50	61	67	78
Major cations (milligrams per liter)											
Calcium, dissolved	20	0.01	20	5.2	1.2	3.4	1.2	2.5	3.5	4.1	5.2
Magnesium, dissolved	20	.01	20	1.6	.30	.90	.30	.52	1.0	1.2	1.6
Sodium, dissolved	18	.01	18	7.6	1.5	4.5	1.5	2.6	4.4	6.4	7.6
Potassium, dissolved	20	.01	20	3.8	.10	1.3	.12	.85	1.2	1.5	3.7
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	19	1	19	22	3	13	3	7	11	20	22
Sulfate, dissolved	37	.1	37	8.2	.2	2.6	.4	1.8	2.6	3.4	4.9
Chloride, dissolved	38	.1	38	9.0	1.0	5.5	1.5	3.8	5.8	7.2	8.4
Nutrients (milligrams per liter)											
Nitrogen, nitrite plus nitrate, total as nitrogen	1	0.01	1	0.09	(d)	(b)	(b)	(b)	(b)	(b)	(b)
Phosphorus, total as phosphorus	2	.01	2	.12	0.07	(b)	(b)	(b)	(b)	(b)	(b)

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River near Glenmora, Louisiana--continued (4)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Trace metals (micrograms per liter)											
Copper, dissolved	5	20	0	<20	<20	(b,c)	(b)	(b)	(b)	(b)	(b)
Iron, dissolved	5	10	5	230	130	(b)	(b)	(b)	(b)	(b)	(b)
Lead, dissolved	5	2	2	11	<2	(b,c)	(b)	(b)	(b)	(b)	(b)
Zinc, dissolved	5	20	3	50	<20	(b,c)	(b)	(b)	(b)	(b)	(b)
Organic compounds (micrograms per liter)											
DDT, total	3	0.001	0	<0.001	<0.001	(b,c)	(b)	(b)	(b)	(b)	(b)
PCB, total	3	.1	0	<.1	<.1	(b,c)	(b)	(b)	(b)	(b)	(b)
Diazinon, total	2	.01	2	.01	.01	(b)	(b)	(b)	(b)	(b)	(b)
Lindane, total	3	.001	0	<.001	<.001	(b,c)	(b)	(b)	(b)	(b)	(b)
Chlordane, total	3	.1	0	<.1	<.1	(b,c)	(b)	(b)	(b)	(b)	(b)
Malathion, total	2	.01	1	.08	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Endrin, total	3	.001	0	<.001	<.001	(b,c)	(b)	(b)	(b)	(b)	(b)
Parathion, total	2	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Dieldrin, total	3	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
2,4-D, total	3	.01	1	.88	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River near Kinder, Louisiana (8)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	111	(a)	(a)	187	23	57	28	40	56	69	99
pH (standard units)	118	(a)	(a)	7.7	5.2	6.5	5.4	6.1	6.4	6.9	7.4
Water temperature	105	(a)	(a)	30.0	5.0	19.9	8.2	14.8	20.5	26.0	29.0
Dissolved oxygen (milligrams per liter)	98	(a)	(a)	13.5	4.2	8.5	6.3	7.4	8.4	9.4	11.5
Dissolved solids (milligrams per liter)	115	(a)	(a)	168	23	57	31	44	56	66	84
Major cations (milligrams per liter)											
Calcium, dissolved	110	0.01	110	6.4	1.5	2.9	1.7	2.3	2.8	3.2	5.2
Magnesium, dissolved	110	.01	110	1.8	.10	.92	.50	.71	.92	1.1	1.5
Sodium, dissolved	105	.01	105	31	1.7	6.3	2.2	3.6	5.3	7.7	14
Potassium, dissolved	106	.01	106	5.2	.80	1.5	.90	1.2	1.4	1.6	2.2
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	110	1	110	63	2	14	4	8	12	18	29
Sulfate, dissolved	118	.1	118	18	.4	4.5	1.9	2.6	3.8	5.4	11
Chloride, dissolved	120	.1	120	12	.7	5.3	2.6	4.0	5.3	6.5	8.5
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	84	0.1	84	2.1	0.1	0.7	0.2	0.4	0.7	0.9	1.6
Nitrogen, nitrite plus nitrate, total as nitrogen	71	.01	71	.27	.01	.11	.03	.07	.12	.14	.18
Phosphorus, total as phosphorus	88	.01	88	.95	.01	.08	.02	.05	.06	.08	.16

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River near Kinder, Louisiana--continued (8)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents											
Fecal coliform bacteria (colonies per 100 milliliters)	83	1	83	24,000	2	710	6	45	90	330	3,100
Fecal streptococcus bacteria (colonies per 100 milliliters)	84	1	84	24,000	8	1,800	24	88	200	940	12,000
Phytoplankton (cells per milliliter)	19	0	19	45,000	0	2,600	0	90	170	420	45,000
Trace metals (micrograms per liter)											
Copper, dissolved	55	1	47	17	<1	(c)	<1	2	3	5	9
Iron, dissolved	64	10	64	560	60	270	110	180	260	340	490
Lead, dissolved	55	5	8	29	<5	(c)	<5	<5	<5	<5	10
Zinc, dissolved	56	20	12	170	<20	(c)	<20	<20	<20	<20	50
Organic compounds (micrograms per liter)											
DDT, total	8	0.01	0	<0.01	<0.01	(b,c)	(b)	(b)	(b)	(b)	(b)
PCB, total	8	.1	0	<.1	<.1	(b,c)	(b)	(b)	(b)	(b)	(b)
Diazinon, total	8	.01	4	.14	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Lindane, total	8	.01	1	.03	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Chlordane, total	8	.1	0	<.1	<.1	(b,c)	(b)	(b)	(b)	(b)	(b)
Malathion, total	8	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Endrin, total	8	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Parathion, total	8	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Dieldrin, total	8	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Endosulfan, total	2	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
2,4-D, total	5	.01	1	.04	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River near Lake Charles, Louisiana (9)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	51	(a)	(a)	14,600	35	1,200	38	59	98	467	10,200
pH (standard units)	50	(a)	(a)	8.0	4.9	6.6	5.6	6.3	6.6	6.9	7.4
Water temperature	49	(a)	(a)	33.0	6.5	20.7	8.5	14.2	21.5	27.0	32.8
Dissolved oxygen (milligrams per liter)	49	(a)	(a)	10.9	3.6	7.3	4.8	5.8	7.4	8.2	10.2
Dissolved solids (milligrams per liter)	50	(a)	(a)	8,770	23	618	26	51	76	256	4,840
Major cations (milligrams per liter)											
Calcium, dissolved	50	0.01	50	110	1.9	11	2.2	3.0	4.1	7.2	61
Magnesium, dissolved	50	.01	50	320	.50	21	.56	.90	1.6	7.9	160
Sodium, dissolved	50	.01	50	2,700	2.6	180	3.1	6.1	12	65	1,500
Potassium, dissolved	50	.01	50	100	1.0	8.3	1.1	1.4	1.9	5.2	60
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	50	1	50	53	4	16	6	9	14	20	34
Sulfate, dissolved	50	.1	50	650	3.0	46	3.5	4.2	5.8	18	350
Chloride, dissolved	50	.1	50	4,900	3.6	310	4.9	7.7	17	110	2,500
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	49	0.01	49	4.0	0.32	0.84	0.37	0.58	0.71	0.95	1.6
Nitrogen, nitrite plus nitrate, total as nitrogen	49	.01	49	.64	.01	.10	.01	.05	.09	.10	.30
Phosphorus, total as phosphorus	48	.01	48	.36	.01	.10	.05	.06	.08	.12	.21

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River near Lake Charles, Louisiana--continued (9)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents											
Fecal coliform bacteria (colonies per 100 milliliters)	12	5	11	4,800	<5	(c)	60	85	180	240	4,800
Fecal streptococcus bacteria (colonies per 100 milliliters)	20	5	18	5,000	<5	(c)	<5	28	210	440	4,400
Phytoplankton (cells per milliliter)	41	0	41	7,300	0	1,800	13	120	570	3,400	7,200
Trace metals (micrograms per liter)											
Copper, dissolved	15	20	0	<20	<20	(c)	<20	<20	<20	<20	<20
Iron, dissolved	15	10	15	520	20	190	20	100	140	250	520
Lead, dissolved	15	2	8	38	<2	(c)	<2	<2	2	3	38
Zinc, dissolved	15	20	10	90	<20	(c)	<20	<20	20	40	90
Organic compounds (micrograms per liter)											
DDT, total	13	0.01	0	<0.01	<0.01	(c)	<0.01	<0.01	<0.01	<0.01	<0.01
PCB, total	7	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
Diazinon, total	13	.01	2	.23	<.01	(c)	<.01	<.01	<.01	<.01	.23
Lindane, total	13	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Chlordane, total	13	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Malathion, total	13	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	13	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Parathion, total	14	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	13	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
2,4-D, total	11	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River near Oberlin, Louisiana (6)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	127	(a)	(a)	309	23	112	31	49	84	167	245
pH (standard units)	123	(a)	(a)	8.0	5.2	6.6	5.6	6.2	6.6	6.9	7.6
Water temperature	134	(a)	(a)	32.0	4.5	19.3	7.4	13.0	19.0	26.5	31.0
Dissolved oxygen (milligrams per liter)	97	(a)	(a)	13.6	4.2	8.1	6.0	7.0	7.6	9.2	11.4
Dissolved solids (milligrams per liter)	118	(a)	(a)	222	23	90	38	52	75	114	183
Major cations (milligrams per liter)											
Calcium, dissolved	119	0.01	119	16	1.0	5.0	1.8	2.9	4.0	6.3	12
Magnesium, dissolved	119	.01	118	2.1	<.01	(c)	.30	.60	.75	1.2	1.5
Sodium, dissolved	121	.01	121	55	1.9	15	2.6	4.8	9.0	23	43
Potassium, dissolved	121	.01	121	3.7	.40	1.6	.80	1.1	1.5	2.1	3.1
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	121	1	121	102	2	30	5	9	21	46	84
Sulfate, dissolved	124	.1	124	60	1.0	12	2.9	5.0	7.8	15	41
Chloride, dissolved	126	.1	126	17	.4	5.8	2.1	3.9	5.8	7.4	9.8
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	58	0.01	58	2.8	0.30	0.82	0.36	0.54	0.70	0.99	1.6
Nitrogen, nitrite plus nitrate, total as nitrogen	72	.10	43	.94	<.10	(c)	<.10	<.10	.10	.16	.30
Phosphorus, total as phosphorus	72	.01	72	.29	.02	.07	.03	.04	.06	.08	.17

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Calcasieu River near Oberlin, Louisiana--continued (6)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	55	1	55	8,800	4	730	10	45	110	560	4,700
Fecal streptococcus	54	1	54	39,000	7	3,000	17	110	500	2,000	18,000
Trace metals (micrograms per liter)											
Copper, dissolved	21	2	21	20	2	6	2	3	6	8	20
Iron, dissolved	21	10	21	710	120	250	120	140	190	340	680
Lead, dissolved	21	2	11	8	<2	(c)	<2	<2	2	3	7
Zinc, dissolved	21	20	4	40	<20	(c)	<20	<20	<20	<20	30
Organic compounds (micrograms per liter)											
DDT, total	15	0.01	0	<0.01	<0.01	(c)	<0.01	<0.01	<0.01	<0.01	<0.01
PCB, total	15	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Diazinon, total	14	.01	6	.05	<.01	(c)	<.01	<.01	<.01	.02	.05
Lindane, total	15	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Chlordane, total	15	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	14	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	15	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Parathion, total	14	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	15	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endosulfan, total	8	.01	0	<.01	<.01	(b,c)	(b)	(b)	(b)	(b)	(b)
2,4-D, total	15	.01	0	.53	<.01	(c)	<.01	<.01	<.01	.02	.53

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Grand Lake northeast of Control Structure near Grand Chenier, Louisiana (17)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	98	(a)	(a)	26,300	88	1,870	103	239	493	1,850	7,440
pH (standard units)	99	(a)	(a)	8.3	6.1	7.4	6.8	7.2	7.4	7.6	7.9
Water temperature	39	(a)	(a)	33.0	8.5	21.0	9.0	16.0	21.5	27.5	30.5
Dissolved oxygen (milligrams per liter)	96	(a)	(a)	12.2	6.0	8.7	6.8	7.8	8.4	9.4	11.2
Major cations (milligrams per liter)											
Calcium, dissolved	88	0.01	88	210	3.9	23	4.6	6.9	11	26	95
Magnesium, dissolved	88	.01	88	640	1.7	40	2.0	5.1	10	43	150
Sodium, dissolved	32	.01	32	4,300	6.6	330	8.8	24	180	380	1,900
Potassium, dissolved	32	.01	32	150	2.1	15	2.1	3.8	9.4	16	80
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	67	1	67	109	16	33	17	23	29	41	54
Sulfate, dissolved	99	.1	99	1,400	2.3	94	5.1	12	32	96	480
Chloride, dissolved	92	.1	92	10,000	8.7	680	14	49	160	610	4,000
Nutrients (milligrams per liter)											
Nitrogen, nitrite plus nitrate, total as nitrogen	92	0.10	56	0.78	<0.10	(c)	<0.10	<0.10	0.20	0.42	0.64
Phosphorus, total as phosphorus	99	.01	99	4.1	.02	.23	.04	.10	.16	.23	.49

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Grand Lake northeast of Control Structure near Grand Chenier, Louisiana--continued (17)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	93	10	37	1,100	<10	(c)	<10	<10	<10	20	93
Trace metals (micrograms per liter)											
Copper, dissolved	60	1	59	14	<1	(c)	1	3	4	6	13
Iron, dissolved	97	10	95	710	<10	(c)	10	30	50	90	260
Lead, dissolved	97	1	36	10	<1	(c)	<1	<1	<1	1	6
Zinc, dissolved	98	3	66	40	<3	(c)	<3	<3	10	10	30
Organic compounds (micrograms per liter)											
DDT, total	99	0.001	1	0.001	<0.001	(c)	<0.001	<0.001	<0.001	<0.001	<0.001
PCB, total	98	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Diazinon, total	65	.01	17	.08	<.01	(c)	<.01	<.01	<.01	.01	.01
Lindane, total	99	.001	6	.001	<.001	(c)	<.001	<.001	<.001	<.001	.001
Chlordane, total	99	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	65	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	97	.001	0	<.001	<.001	(c)	<.001	<.001	<.001	<.001	<.001
Parathion, total	65	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	99	.01	2	.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endosulfan, total	38	.001	2	.001	<.001	(c)	<.001	<.001	<.001	<.001	<.001
2,4-D, total	46	.01	18	.25	<.01	(c)	<.01	<.01	<.01	.02	.05

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Gulf Intracoastal Waterway at Lake Misere, Louisiana (18)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	25	(a)	(a)	8,470	51	922	60	200	351	882	6,950
pH (standard units)	25	(a)	(a)	7.7	5.9	7.1	5.9	6.8	7.1	7.4	7.7
Dissolved oxygen (milligrams per liter)	25	(a)	(a)	11.2	4.7	8.2	5.0	7.0	7.8	9.4	11.0
Major cations (milligrams per liter)											
Calcium, dissolved	25	0.01	25	65	2.6	14	3.0	6.4	10	16	56
Magnesium, dissolved	25	.01	25	200	1.1	19	1.2	2.9	6.5	18	160
Sodium, dissolved	25	.01	25	1,400	5.3	140	5.7	23	44	120	1,100
Potassium, dissolved	25	.01	25	49	1.9	6.9	2.0	2.9	3.9	6.9	40
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	25	1	25	79	10	32	12	21	27	44	74
Sulfate, dissolved	25	.1	25	360	2.3	39	2.9	9.2	15	37	290
Chloride, dissolved	25	.1	25	2,700	8.3	250	8.4	38	72	220	2,200
Nutrients (milligrams per liter)											
Nitrogen, nitrite plus nitrate, total as nitrogen	25	0.01	24	0.55	<0.01	(c)	<0.01	0.02	0.15	0.39	0.55
Phosphorus, total as phosphorus	25	.01	25	.44	.04	0.15	.04	.08	.15	.18	.39

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Gulf Intracoastal Waterway at Lake Misere, Louisiana--continued (18)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	25	5	20	520	<5	(c)	<5	10	27	68	500
Trace metals (micrograms per liter)											
Copper, dissolved	25	20	0	<20	<20	(c)	<20	<20	<20	<20	<20
Iron, dissolved	25	10	25	660	10	120	10	30	70	180	580
Lead, dissolved	25	2	3	2	<2	(c)	<2	<2	<2	<2	2
Zinc, dissolved	25	20	3	20	<20	(c)	<20	<20	<20	<20	20
Organic compounds (micrograms per liter)											
DDT, total	24	0.001	1	0.001	<0.001	(c)	<0.001	<0.001	<0.001	<0.001	<0.001
PCB, total	24	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Diazinon, total	24	.01	9	.02	<.01	(c)	<.01	<.01	<.01	.01	.02
Lindane, total	24	.001	8	.001	<.001	(c)	<.001	<.001	<.001	.001	.001
Chlordane, total	24	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	24	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	24	.001	1	.001	<.001	(c)	<.001	<.001	<.001	<.001	<.001
Parathion, total	24	.01	1	.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	24	.001	11	.005	<.001	(c)	<.001	<.001	<.001	.002	.004
Endosulfan, total	23	.001	2	.024	<.001	(c)	<.001	<.001	<.001	<.001	.001
2,4-D, total	24	.01	11	.08	<.01	(c)	<.01	<.01	<.01	.02	.07

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Houston River east of Buhler, Louisiana (11)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
				Physical properties							
Specific conductance	133	(a)	(a)	11,800	21	818	35	54	70	194	7,360
pH (standard units)	7	(a)	(a)	5.9	5.0	(b)	(b)	(b)	(b)	(b)	(b)
Water temperature	65	(a)	(a)	29.5	5.0	18.7	6.8	15.0	18.0	22.2	28.4
Dissolved oxygen (milligrams per liter)	10	(a)	(a)	5.8	2.7	4.5	2.7	3.0	4.8	5.7	5.8

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Houston River near Buhler, Louisiana (10)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	85	(a)	(a)	2,880	28	159	34	52	64	89	674
pH (standard units)	85	(a)	(a)	6.9	4.5	5.7	4.9	5.4	5.7	6.0	6.5
Water temperature	82	(a)	(a)	32.5	4.5	21.0	9.0	16.0	22.2	27.0	31.9
Dissolved oxygen (milligrams per liter)	84	(a)	(a)	10.6	.4	5.3	.9	3.7	5.4	6.7	9.6
Dissolved solids (milligrams per liter)	80	(a)	(a)	1,490	21	115	31	52	66	82	433
Major cations (milligrams per liter)											
Calcium, dissolved	85	0.01	85	34	1.5	4.1	1.9	2.6	3.2	4.2	8.6
Magnesium, dissolved	85	.01	85	50	.05	2.7	.60	.88	1.1	1.4	12
Sodium, dissolved	85	.01	85	410	2.6	21	3.3	5.0	7.2	11	99
Potassium, dissolved	85	.01	85	20	.70	1.9	.73	1.0	1.2	1.7	6.1
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	85	1	85	33	1	8	1	4	7	10	19
Sulfate, dissolved	85	.1	85	110	2.6	10	3.3	5.0	6.6	9.2	25
Chloride, dissolved	85	.1	85	790	3.7	36	4.4	7.6	10	16	180
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	81	0.1	81	4.6	0.2	1.2	0.6	0.9	1.1	1.4	2.1
Nitrogen, nitrite plus nitrate, total as nitrogen	84	.10	26	.41	<.10	(c)	<.10	<.10	<.10	.10	.20
Phosphorus, total as phosphorus	84	.01	84	.34	.03	.10	.04	.05	.08	.11	.26

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Houston River near Buhler, Louisiana--continued (10)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	76	1	76	65,000	5	1,900	10	41	98	400	4,800
Fecal streptococcus	73	1	73	50,000	5	3,600	40	140	420	2,300	34,000
Trace metals (micrograms per liter)											
Copper, dissolved	27	1	27	37	1	8	1	5	6	11	30
Iron, dissolved	30	10	30	590	110	350	120	230	340	470	580
Lead, dissolved	27	2	19	8	<2	(c)	<2	<2	2	4	8
Zinc, dissolved	27	20	14	100	<20	(c)	<20	<20	20	20	50
Organic compounds (micrograms per liter)											
DDT, total	13	0.01	0	<0.01	<0.01	(c)	<0.01	<0.01	<0.01	<0.01	<0.01
PCB, total	13	.1	1	.2	<.1	(c)	<.1	<.1	<.1	<.1	.2
Diazinon, total	12	.01	3	.09	<.01	(c)	<.01	<.01	<.01	<.01	.09
Lindane, total	13	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Chlordane, total	13	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	12	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	13	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Parathion, total	12	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	13	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endosulfan, total	11	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
2,4-D, total	13	.01	8	.11	<.01	(c)	<.01	<.01	.01	.02	.11

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mermentau River at Lacassine Refuge, Louisiana (3)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	25	(a)	(a)	1,480	60	331	61	112	176	426	1,380
pH (standard units)	25	(a)	(a)	7.6	6.3	7.1	6.3	6.8	7.1	7.4	7.6
Water temperature	95	(a)	(a)	32.0	8.0	21.6	8.9	16.0	22.5	28.0	31.0
Dissolved oxygen (milligrams per liter)	24	(a)	(a)	11.4	5.1	8.0	5.2	6.9	7.6	9.0	11.2
Major cations (milligrams per liter)											
Calcium, dissolved	25	0.01	25	27	3.4	10	3.5	5.0	9.2	13	26
Magnesium, dissolved	25	.01	25	25	1.4	6.8	1.4	2.2	3.7	9.9	24
Sodium, dissolved	25	.01	25	220	5.3	48	6.0	12	21	68	200
Potassium, dissolved	25	.01	25	10	1.7	4.5	1.7	2.7	3.8	6.5	9.7
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	25	1	25	80	14	34	14	18	25	45	80
Sulfate, dissolved	25	.1	25	55	3.2	16	3.7	6.6	10	24	51
Chloride, dissolved	121	.1	121	2,400	6.4	76	14	22	31	70	210
Nutrients (milligrams per liter)											
Nitrogen, nitrite plus nitrate, total as nitrogen	24	0.01	23	0.74	<0.01	(c)	<0.01	0.07	0.26	0.36	0.71
Phosphorus, total as phosphorus	25	.01	25	.30	.05	0.20	.05	.16	.19	.27	.30

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mermentau River at Lacassine Refuge, Louisiana--continued (3)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	25	10	19	750	<10	(c)	<10	14	26	60	520
Trace metals (micrograms per liter)											
Copper, dissolved	25	1	25	30	1	5	1	3	4	4	25
Iron, dissolved	25	10	25	570	30	130	30	40	110	150	530
Lead, dissolved	25	2	8	4	<2	(c)	<2	<2	<2	2	3
Zinc, dissolved	25	20	3	60	<20	(c)	<20	<20	<20	<20	20
Organic compounds (micrograms per liter)											
DDT, total	24	0.001	1	0.001	<0.001	(c)	<0.001	<0.001	<0.001	<0.001	<0.001
PCB, total	24	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Diazinon, total	24	.01	13	.02	<.01	(c)	<.01	<.01	.01	.01	.02
Lindane, total	24	.001	6	.002	<.001	(c)	<.001	<.001	<.001	<.001	.001
Chlordane, total	24	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	24	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	24	.001	1	.001	<.001	(c)	<.001	<.001	<.001	<.001	<.001
Parathion, total	24	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	24	.001	14	.008	<.001	(c)	<.001	<.001	.001	.003	.005
Endosulfan, total	24	.001	3	.018	<.001	(c)	<.001	<.001	<.001	<.001	.011
2,4-D, total	24	.01	18	.14	<.01	(c)	<.01	.01	.02	.03	.12

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mermentau River at Lake Arthur, Louisiana (2)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	88	(a)	(a)	988	60	223	82	126	186	249	575
pH (standard units)	73	(a)	(a)	8.0	6.3	7.1	6.6	6.8	7.1	7.4	7.7
Water temperature	12	(a)	(a)	29.5	8.0	22.0	8.0	16.2	25.0	27.4	29.5
Dissolved oxygen (milligrams per liter)	1	(a)	(a)	4.5	(d)	(b)	(b)	(b)	(b)	(b)	(b)
Dissolved solids (milligrams per liter)	63	(a)	(a)	550	56	161	62	104	145	184	326
Major cations (milligrams per liter)											
Calcium, dissolved	84	0.01	84	21	2.1	7.0	2.9	3.8	6.0	8.5	16
Magnesium, dissolved	83	.01	83	19	.70	4.5	1.7	2.6	3.7	5.4	9.4
Sodium, dissolved	12	.01	12	37	5.5	24	5.5	13	24	35	37
Potassium, dissolved	12	.01	12	41	2.9	7.5	2.9	3.3	4.4	6.0	41
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	83	1	83	105	2	36	15	18	33	50	72
Sulfate, dissolved	83	.1	83	56	1.5	5.9	1.9	2.8	4.0	6.2	15
Chloride, dissolved	87	.1	87	250	2.2	42	10	20	28	47	130
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	1	0.01	1	0.76	(d)	(b)	(b)	(b)	(b)	(b)	(b)
Nitrogen, nitrite plus nitrate, total as nitrogen	1	.01	1	.04	(d)	(b)	(b)	(b)	(b)	(b)	(b)
Phosphorus, total as phosphorus	1	.01	1	.17	(d)	(b)	(b)	(b)	(b)	(b)	(b)

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mermentau River at Lake Arthur, Louisiana--continued (2)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	1	1	1	12	(d)	(b)	(b)	(b)	(b)	(b)	(b)
Fecal streptococcus	1	4	0	<4	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Trace metals (micrograms per liter)											
Copper, dissolved	1	1	1	1	(d)	(b)	(b)	(b)	(b)	(b)	(b)
Iron, dissolved	1	10	1	80	(d)	(b)	(b)	(b)	(b)	(b)	(b)
Lead, dissolved	1	1	0	<1	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Zinc, dissolved	1	3	1	10	(d)	(b)	(b)	(b)	(b)	(b)	(b)
Organic compounds (micrograms per liter)											
DDT, total	1	0.01	0	<0.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
PCB, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Diazinon, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Lindane, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Chlordane, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Malathion, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Endrin, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Parathion, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Dieldrin, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Endosulfan, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
2,4-D, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mermentau River at Mermentau, Louisiana (1)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	81	(a)	(a)	425	53	148	60	90	140	185	313
pH (standard units)	82	(a)	(a)	7.5	5.6	6.7	5.9	6.3	6.7	7.1	7.5
Water temperature	80	(a)	(a)	31.0	4.0	21.7	9.0	17.6	23.0	28.0	30.0
Dissolved oxygen (milligrams per liter)	81	(a)	(a)	10.2	.7	4.3	1.1	2.8	4.1	5.6	8.6
Dissolved solids (milligrams per liter)	81	(a)	(a)	239	41	100	47	75	94	118	174
Major cations (milligrams per liter)											
Calcium, dissolved	81	0.01	81	25	1.6	8.9	3.4	5.5	8.6	11	18
Magnesium, dissolved	81	.01	81	9.8	.20	3.2	1.1	1.9	3.1	3.9	7.1
Sodium, dissolved	81	.01	81	46	3.0	14	4.7	7.3	13	18	30
Potassium, dissolved	81	.01	81	7.1	1.6	3.5	1.8	2.6	3.1	4.4	5.9
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	81	1	81	129	8	39	12	24	36	48	92
Sulfate, dissolved	81	.1	81	17	1.0	6.3	2.2	4.0	5.8	7.8	13
Chloride, dissolved	86	.1	86	57	3.9	18	5.8	9.4	16	22	45
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	78	0.1	78	2.9	0.1	1.3	0.6	0.9	1.2	1.5	2.6
Nitrogen, nitrite plus nitrate, total as nitrogen	75	.01	75	.69	.03	.28	.06	.16	.25	.36	.59
Phosphorus, total as phosphorus	80	.01	80	.94	.03	.25	.11	.19	.22	.29	.45

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mermentau River at Mermentau, Louisiana--continued (1)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles 5th	25th	50th (median)	75th	95th
Biological constituents											
Fecal coliform bacteria (colonies per 100 milliliters)	79	1	79	15,000	2	500	7	35	75	200	1,800
Fecal streptococcus bacteria (colonies per 100 milliliters)	78	1	78	50,000	2	3,500	10	96	360	1,600	25,000
Phytoplankton (cells per milliliter)	20	0	20	11,000	64	1,800	65	330	1,400	2,000	11,000
Trace metals (micrograms per liter)											
Copper, dissolved	51	10	6	37	<10	(c)	<10	<10	<10	<10	18
Iron, dissolved	58	3	58	490	8	250	75	180	260	320	450
Lead, dissolved	51	10	1	17	<10	(c)	<10	<10	<10	<10	<10
Zinc, dissolved	51	3	51	60	5	20	5	10	15	24	60
Organic compounds (micrograms per liter)											
DDT, total	1	0.01	0	<0.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
PCB, total	1	.1	0	<.1	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Diazinon, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Lindane, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Chlordane, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Malathion, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Endrin, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Parathion, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Dieldrin, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
Endosulfan, total	1	.01	0	<.01	(d)	(b,c)	(b)	(b)	(b)	(b)	(b)
2,4-D, total	1	.01	1	.22	(d)	(b)	(b)	(b)	(b)	(b)	(b)

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mermentau River at Upper Mud Lake near Grand Chenier, Louisiana (15)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	23	(a)	(a)	32,300	117	7,480	121	332	2,090	14,100	31,200
pH (standard units)	23	(a)	(a)	8.2	6.8	7.4	6.8	7.1	7.5	7.6	8.2
Dissolved oxygen (milligrams per liter)	23	(a)	(a)	12.0	6.8	9.3	6.9	8.1	9.1	10.7	11.9
Major cations (milligrams per liter)											
Calcium, dissolved	22	0.01	22	310	4.7	70	4.8	6.6	20	160	300
Magnesium, dissolved	22	.01	22	770	1.8	180	1.9	5.9	47	330	750
Sodium, dissolved	22	.01	22	6,200	12	1,500	13	49	400	3,000	6,000
Potassium, dissolved	22	.01	22	250	2.4	65	2.4	4.0	17	110	250
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	23	1	23	110	17	51	17	25	47	75	109
Sulfate, dissolved	22	.1	22	1,500	7.6	290	7.6	15	92	440	1,400
Chloride, dissolved	22	.1	22	12,000	17	2,800	17	81	720	5,400	12,000
Nutrients (milligrams per liter)											
Nitrogen, nitrite plus nitrate, total as nitrogen	21	0.10	10	0.68	<0.10	(c)	<0.10	<0.10	0.10	0.34	0.67
Phosphorus, total as phosphorus	22	.01	22	1.5	.02	0.23	.02	.07	.15	.24	1.4

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mermentau River at Upper Mud Lake near Grand Chenier, Louisiana--continued (15)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	23	5	21	260	<5	(c)	<5	12	20	40	180
Trace metals (micrograms per liter)											
Copper, dissolved	22	1	22	20	1	4	1	2	3	5	19
Iron, dissolved	22	3	22	330	20	90	20	40	60	130	320
Lead, dissolved	22	2	4	3	<2	(c)	<2	<2	<2	<2	<3
Zinc, dissolved	22	20	10	50	<20	(c)	<20	<20	<20	<20	30
Organic compounds (micrograms per liter)											
DDT, total	23	0.001	3	0.007	<0.001	(c)	<0.001	<0.001	<0.001	<0.001	0.002
PCB, total	23	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Diazinon, total	23	.01	14	.02	<.01	(c)	<.01	<.01	.01	.01	.02
Lindane, total	23	.001	8	.003	<.001	(c)	<.001	<.001	<.001	.001	.002
Chlordane, total	23	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	22	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	23	.001	0	<.001	<.001	(c)	<.001	<.001	<.001	<.001	<.001
Parathion, total	23	.01	1	.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	23	.001	12	.005	<.001	(c)	<.001	<.001	.001	.001	.004
Endosulfan, total	23	.001	1	.001	<.001	(c)	<.001	<.001	<.001	<.001	.001
2,4-D, total	19	.01	10	.03	<.01	(c)	<.01	<.01	.01	.02	.03

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

Mill Creek near Oberlin, Louisiana (5)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	10	(a)	(a)	1,040	438	710	438	589	684	848	1,040
pH (standard units)	10	(a)	(a)	8.2	7.0	7.4	7.0	7.2	7.3	7.6	8.2
Water temperature	9	(a)	(a)	26.0	7.0	(b)	(b)	(b)	(b)	(b)	(b)
Dissolved solids (milligrams per liter)	3	(a)	(a)	648	346	(b)	(b)	(b)	(b)	(b)	(b)
Major cations (milligrams per liter)											
Calcium, dissolved	2	0.01	2	40	16	(b)	(b)	(b)	(b)	(b)	(b)
Magnesium, dissolved	2	.01	2	1.0	.30	(b)	(b)	(b)	(b)	(b)	(b)
Sodium, dissolved	10	.01	10	240	78	140	78	100	140	180	240
Potassium, dissolved	10	.01	10	9.1	3.5	6.2	3.5	5.1	6.2	7.2	9.1
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	10	1	10	539	160	327	160	250	314	406	539
Sulfate, dissolved	4	.1	4	58	43	(b)	(b)	(b)	(b)	(b)	(b)
Chloride, dissolved	2	.1	1	6.8	<.1	(b,c)	(b)	(b)	(b)	(b)	(b)

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

White Lake (east side) 4.8 miles west of Schooner Bayou, Louisiana (13)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	25	(a)	(a)	2,850	148	1,380	177	330	1,660	2,130	2,820
pH (standard units)	25	(a)	(a)	8.6	6.2	7.1	6.3	6.8	7.1	7.2	8.2
Dissolved oxygen (milligrams per liter)	25	(a)	(a)	12.0	7.1	9.2	7.2	7.8	8.8	10.9	11.9
Major cations (milligrams per liter)											
Calcium, dissolved	25	0.01	25	33	4.8	16	5.0	7.2	16	23	32
Magnesium, dissolved	25	.01	25	54	2.8	25	3.2	6.0	30	38	53
Sodium, dissolved	25	.01	25	440	21	210	25	47	250	340	440
Potassium, dissolved	25	.01	25	160	2.9	15	2.9	4.1	9.4	14	120
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	25	1	25	50	5	20	6	16	21	24	43
Sulfate, dissolved	25	.1	25	140	10	64	11	21	74	97	130
Chloride, dissolved	25	.1	25	860	32	380	37	78	460	610	840
Nutrients (milligrams per liter)											
Nitrogen, nitrite plus nitrate, total as nitrogen	25	0.01	25	0.81	0.01	0.20	0.01	0.04	0.10	0.36	0.71
Phosphorus, total as phosphorus	25	.01	25	.32	.01	.12	.01	.04	.09	.20	.32

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

White Lake (east side) 4.8 miles west of Schooner Bayou, Louisiana--continued (13)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	24	10	6	44	<10	(c)	<10	<10	<10	<10	22
Trace metals (micrograms per liter)											
Copper, dissolved	25	2	19	14	<2	(c)	<2	2	3	4	12
Iron, dissolved	25	10	21	810	<10	(c)	<10	10	30	80	210
Lead, dissolved	25	2	5	2	<2	(c)	<2	<2	<2	<2	2
Zinc, dissolved	24	20	4	50	<20	(c)	<20	<20	<20	<20	40
Organic compounds (micrograms per liter)											
DDT, total	25	0.001	1	0.001	<0.001	(c)	<0.001	<0.001	<0.001	<0.001	<0.001
PCB, total	25	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Diazinon, total	25	.01	9	.02	<.01	(c)	<.01	<.01	<.01	.01	.01
Lindane, total	25	.001	2	.003	<.001	(c)	<.001	<.001	<.001	<.001	.001
Chlordane, total	25	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	25	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	25	.001	0	<.001	<.001	(c)	<.001	<.001	<.001	<.001	<.001
Parathion, total	25	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	25	.001	6	.002	<.001	(c)	<.001	<.001	<.001	<.001	.001
Endosulfan, total	25	.001	2	.015	<.001	(c)	<.001	<.001	<.001	<.001	.001
2,4-D, total	23	.01	4	.02	<.01	(c)	<.01	<.01	<.01	<.01	.02

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

White Lake (northeast corner) near Forked Island, Louisiana (14)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Physical properties											
Specific conductance	93	(a)	(a)	8,820	99	1,170	165	436	779	1,810	2,640
pH (standard units)	93	(a)	(a)	8.5	6.4	7.3	6.7	7.0	7.3	7.5	7.7
Water temperature	33	(a)	(a)	33.0	7.0	20.7	8.4	16.0	21.5	26.8	32.6
Dissolved oxygen (milligrams per liter)	88	(a)	(a)	12.0	6.2	8.7	6.8	7.7	8.4	9.6	11.6
Major cations (milligrams per liter)											
Calcium, dissolved	81	0.01	81	70	1.8	17	4.8	9.4	14	22	35
Magnesium, dissolved	81	.01	81	190	1.5	23	3.7	9.4	15	34	52
Sodium, dissolved	25	.01	25	640	20	210	24	66	150	320	580
Potassium, dissolved	25	.01	25	23	2.8	9.4	2.8	4.6	8.1	14	22
Major anions (milligrams per liter)											
Alkalinity, total as $CaCO_3$	93	1	93	62	5	29	10	24	29	33	44
Sulfate, dissolved	91	.1	91	400	2.6	53	9.1	22	35	74	120
Chloride, dissolved	91	.1	91	2,900	18	320	43	98	190	500	770
Nutrients (milligrams per liter)											
Nitrogen, ammonia plus organic, total as nitrogen	2	0.01	2	0.98	0.85	(b)	(b)	(b)	(b)	(b)	(b)
Nitrogen, nitrite plus nitrate, total as nitrogen	84	.01	84	1.7	.01	0.21	0.01	0.05	0.15	0.32	0.60
Phosphorus, total as phosphorus	92	.01	92	.96	.01	.17	.02	.07	.14	.21	.47

Table 2.2-1. Statistical summary of water-quality data for the Calcasieu-Mermentau River basin in Louisiana, 1943-95--Continued

White Lake (northeast corner) near Forked Island, Louisiana--continued (14)

Water-quality property or constituent	Number of analyses	Reporting level	Number of analyses greater than or equal to reporting level	Maximum	Minimum	Mean	Percentiles				
							5th	25th	50th (median)	75th	95th
Biological constituents--bacteria (colonies per 100 milliliters)											
Fecal coliform	26	5	17	200	<5	(c)	<5	<5	8	15	96
Trace metals (micrograms per liter)											
Copper, dissolved	53	2	46	14	<2	(c)	<2	2	3	5	9
Iron, dissolved	91	10	73	280	<10	(c)	<10	20	30	60	130
Lead, dissolved	90	2	15	16	<2	(c)	<2	<2	<2	<2	4
Zinc, dissolved	91	20	19	40	<20	(c)	<20	<20	<20	<20	30
Organic compounds (micrograms per liter)											
DDT, total	92	0.001	2	0.001	<0.001	(c)	<0.001	<0.001	<0.001	<0.001	0.001
PCB, total	92	.1	2	.3	<.1	(c)	<.1	<.1	<.1	<.1	.1
Diazinon, total	66	.01	13	.02	<.01	(c)	<.01	<.01	<.01	<.01	.02
Lindane, total	92	.001	2	.002	<.001	(c)	<.001	<.001	<.001	<.001	.001
Chlordane, total	92	.1	0	<.1	<.1	(c)	<.1	<.1	<.1	<.1	<.1
Malathion, total	66	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Endrin, total	92	.01	1	.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Parathion, total	66	.01	0	<.01	<.01	(c)	<.01	<.01	<.01	<.01	<.01
Dieldrin, total	92	.001	8	.010	<.001	(c)	<.001	<.001	<.001	<.001	.001
Endosulfan, total	30	.001	2	.001	<.001	(c)	<.001	<.001	<.001	<.001	.001
2,4-D, total	41	.01	6	.06	<.01	(c)	<.01	<.01	<.01	<.01	.02

a Not applicable.

b Not calculated because sample size was less than 10.

c Not calculated because data base contained remarked values.

d Only one sample in data base.

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Water Resources Cooperative Program

The Louisiana Department of Transportation and Development-U.S. Geological Survey (DOTD-USGS) Water Resources Cooperative Program is comprehensive and responsive to the needs and concerns of Louisiana-- providing hydrologic information to aid in the management, development, and protection of the State's water resources and transportation system.

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