Prepared in cooperation with the Missouri Department of Natural Resources

Quality of Surface Water in Missouri, Water Year 2021

Data Report 1179

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

Cover. Photograph showing a sunset over the Mississippi River in southeastern Missouri, taken by Miya Barr, U.S. Geological Survey.

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Conversion Factors

U.S. customary units to International System of Units

Multiply	By	To obtain
	Length	
inch (in.)	2.54	centimeter (cm)
mile (mi)	1.609	kilometer (km)
	Area	
square mile (mi^2)	2.590	square kilometer (km^2)
	Flow rate	
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$$°F=(1.8\times°C)+32$$

Datum

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83).

Supplemental Information

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25 °C).

Density population of bacteria is given in colonies per 100 milliliters (col/100 mL) of water.

Concentrations of chemical constituents in water are given either in milligrams per liter (mg/L) or micrograms per liter (µg/L).

A water year is the period from October 1 to September 30 and is designated by the year in which it ends; for example, water year 2021 was from October 1, 2020, to September 30, 2021.

Abbreviations

ag	agriculture
AWQMN	Ambient Water-Quality Monitoring Network
CIAT	2-Chloro-4-isopropylamino-6-amino-*s*-triazine
DLDQC	detection limit by DQCALC software
DTPL	Dissected Till Plains
E. coli	*Escherichia coli*
fo	forest
LRL	laboratory reporting level
LT–MDL	long-term method detection limit
MDNR	Missouri Department of Natural Resources
MIALPL	Mississippi Alluvial Plain
MRL	minimum reporting level
NWIS	National Water Information System
NWQL	National Water Quality Laboratory
NWQN	National Water Quality Network
OSPL	Osage Plains
OZPLSA	Ozark Plateaus—Salem Plateau
OZPLSP	Ozark Plateaus—Springfield Plateau
pr	prairie
USGS	U.S. Geological Survey
wi	watershed indicator

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Abstract

The U.S. Geological Survey, in cooperation with the Missouri Department of Natural Resources, maintains a statewide group of stations known as the Ambient Water-Quality Monitoring Network, which includes selected streams and springs in Missouri. During water year 2021 (October 1, 2020, through September 30, 2021), the U.S. Geological Survey collected water-quality data at 72 stations: 70 Ambient Water-Quality Monitoring Network stations and 2 U.S. Geological Survey National Water Quality Network stations. Four of the stations have data from additional sampling completed in cooperation with the U.S. Army Corps of Engineers. Water-quality data provided in this report include dissolved oxygen, specific conductance, water temperature, suspended solids, suspended sediment, *Escherichia coli* bacteria, fecal coliform bacteria, dissolved nitrate plus nitrite as nitrogen, total phosphorus, dissolved and total recoverable lead and zinc, and selected pesticide compounds. Monitoring stations have been classified based on the physiographic province or primary land use in the drainage basin or based on the unique hydrologic characteristics of the waterbodies (springs, large rivers) monitored. A summary of hydrologic conditions, including peak streamflows, monthly mean streamflows, and 7-day low flows, also is provided for representative streamgages in the State.

Introduction

In the State of Missouri, implementation of the Federal Clean Water Act (33 U.S.C. §1251 et seq.) is the responsibility of the Missouri Department of Natural Resources (MDNR). Section 305(b) of the Clean Water Act requires that each State develop a water-quality monitoring program and periodically generate a report providing a description of the water quality of all navigable waters in the State (U.S. Environmental Protection Agency, 1997). Water-quality status is described in terms of the suitability of these navigable waters for various uses, such as drinking, fishing, swimming, and supporting aquatic life. These uses formally were defined as "designated uses" in State and Federal regulations. Section 303(d) of the Clean Water Act requires States to identify impaired waters and determine the total maximum daily loads of contaminants that can be present in waterbodies and still meet applicable water-quality standards for their designated uses (U.S. Environmental Protection Agency, 2022). A total maximum daily load addresses a single contaminant for each waterbody.

Missouri has an area of about 69,000 square miles and an estimated population of 6.15 million people as of 2020 (U.S. Census Bureau, 2021). Within Missouri, 115,701 miles (mi) of classified streams support a variety of uses, including wildlife, recreation, agriculture, industry, transportation, and public utilities. About 11,673 mi (about 10 percent) of these classified streams had data available for assessment in the State's most recent water-quality report (Missouri Department of Natural Resources, 2020). Of the 11,673 mi of assessed streams, an estimated 6,099 mi (about 52 percent) fully support the designated uses, an estimated 5,574 mi (about 48 percent) are impaired, and the remaining stream miles were unassessed or did not have recent data within the past 5 years. Impairments may be caused by various physical changes or chemical contaminants leading to the inability of the waterbody to meet the criteria for at least one of the designated uses (Missouri Department of Natural Resources, 2020).

The purpose of this report is to summarize surface-water-quality data collected for the MDNR–U.S. Geological Survey (USGS) cooperative Ambient Water-Quality Monitoring Network (AWQMN) for water year 2021 (October 1, 2020, through September 30, 2021). The annual summary of data for selected constituents provides the MDNR with current information to assess the quality of surface water within the State. This report is one in a series of annual summaries (Otero-Benitez and Davis, 2009a, b; Barr, 2010, 2011, 2012, 2014, 2015; Barr and Schneider, 2014; Barr and Heimann, 2016; Barr and Bartels, 2018, 2019; Kay, 2019, 2021; Buckley 2022). Data on the physical characteristics and water-quality constituents in samples collected during water year 2021 are provided in figures and tables for 72 surface-water stations throughout the State.

The Ambient Water-Quality Monitoring Network

As part of the Missouri AWQMN, the USGS, in cooperation with the MDNR, collects surface-water-quality data to assess water resources in Missouri each water year. The MDNR and the

USGS established the fixed-station AWQMN in 1964 with 18 stations, 5 of which were still being sampled during water year 2021. The number and location of AWQMN stations since 1964 have varied as the State's needs have changed. Data collected at AWQMN stations during water year 2021 are stored and maintained in the USGS National Water Information System (NWIS) database and are available for public access (U.S. Geological Survey, 2022). These data are a permanent source of accessible, accurate, impartial, and timely information.

The AWQMN data provide an understanding of the State's current water resources, including spatial and temporal trends of the water resources. Historical surface-water-quality data have been published annually in the Water Data Report series since water year 1964 and can be accessed at https://wdr.water.usgs.gov/ (U.S. Geological Survey, 2006b–2010). Beginning in water year 2011, discrete water-quality data were no longer published annually but can be accessed through NWIS (U.S. Geological Survey, 2022).

The objectives of the AWQMN are to (1) obtain sufficient data to provide an accurate representation of the quality and quantity of surface water throughout the State; (2) provide a database of water-quality data accessible by the public and government agencies; and (3) provide consistent methodology in data collection, laboratory analysis, and data reporting, allowing for accurate comparison of data between sites and through time, and to identify anthropogenic effects (mining, agriculture, urban) on water resources (Missouri Department of Natural Resources, 2022). Data from the AWQMN are critical to meeting information needs of the public and Federal, State, and local agencies involved in water-quality planning and management by supporting the design, implementation, and evaluation of preventive and remediation programs. Recently, constituent concentration data from the AWQMN have been used to determine the statewide water-quality status and identify trends in water quality over 25 years (Barr and Davis, 2010; Richards and Barr, 2021).

Samples were collected from the 72 primary AWQMN stations; no alternate sampling sites were needed for the water year 2021 sampling schedule. Sampling frequency at each station is determined by several factors: drainage basin size, anthropogenic activities (such as mining, agriculture, and urban), volatility of chemical conditions through time, request for annual data, and cost. Each of the streams in the AWQMN is classified for one or more designated uses. For specific information on the designated uses applicable to the streams sampled in the AWQMN, refer to Missouri Department of Natural Resources (2020, 2022).

Constituents collected within the AWQMN have been established by the MDNR based on their data needs at each station. Samples were collected by USGS personnel using published methods and techniques (U.S. Geological Survey, 2006a). Onsite measurements of dissolved oxygen, specific conductance, and water temperature were collected at each station according to procedures described in Wilde (variously dated). Water samples were collected and processed for fecal indicator bacteria (*Escherichia coli* [*E. coli*] and fecal coliform) densities using the membrane filtration procedure described in Myers and others (2014). Methods from the USGS (U.S. Geological Survey, 2006a), Guy (1969), Wilde and others (2002), and Sandstrom and Wilde (2014) were used by the USGS to collect and process representative samples for analyses of nutrients, primary chemical constituents, trace elements, suspended solids, suspended sediment, and pesticides. All laboratory analyses were done by the USGS National Water Quality Laboratory (NWQL) in Lakewood, Colorado, according to procedures described in Garbarino and others (2006), Fishman (1993), Patton and Kryskalla (2011), Patton and Truitt (1992, 2000), Sandstrom and others (2001, 2015), and Zaugg and others (1995). Suspended-sediment concentrations were analyzed at the USGS Central Midwest Water Science Center Sediment Laboratory in Rolla, Missouri, and processed and computed according to procedures described in Guy (1969).

In addition to the surface-water-quality data collected for the AWQMN, data collected as part of other cooperative efforts are included in this report to improve the summary of water-quality conditions for the State. Additional data-collection efforts include water samples collected by the USGS at 2 USGS National Water Quality Network (NWQN, a national water-quality sampling network operated by the USGS) stations and suspended-sediment samples collected at 4 USGS streamgages on the Mississippi and Missouri Rivers (not shown). The suspended-sediment samples are collected in cooperation with the U.S. Army Corps of Engineers as part of a larger monitoring effort. The suspended-sediment concentration data in this report are provided for comparison to the State's total suspended-solids criteria and consist of composited cross-sectional concentrations and mean cross-sectional concentrations computed from five depth-integrated samples within the cross section (Edwards and Glysson, 1999).

The unique eight-digit number used by the USGS to identify each surface-water station is assigned when a station is first established. The eight-digit number for each station includes a two-digit prefix that designates the primary river system (05 is the upper Mississippi River, 06 is the Missouri River, and 07 is the lower Mississippi River) plus a six-digit downstream-order number; for example, the station number 05587455 indicates the station is in the upper Mississippi River system (05), and the remaining six digits (587455) indicate the location of the station in downstream order. In this system, the station numbers increase downstream along the main stem. A station on a tributary that enters between two main stem stations is assigned a station number between the numbers on the main stem.

The total planned number of samples at all sites in the AWQMN may not have been collected during water year 2021. The 2019 novel coronavirus global pandemic, as identified by the World Health Organization (World Health Organization, 2022), continued during water year 2021 and occasionally impeded the timely sampling of the AWQMN stations because some sampling trips were canceled because of safety requirements within the USGS. Every effort was made to collect the required number of samples at all AWQMN stations, and in some cases, additional makeup samples were collected during water year 2021. A summary of collected versus planned samples is provided in table 1.

Table 1. U.S. Geological Survey station number, station name, contributing drainage area, sampling frequency, station class, and station type for selected surface-water-quality monitoring stations in Missouri, water year 2021.

[Water year 2021 is defined as October 1, 2020, through September 30, 2021. USGS, U.S. Geological Survey; mi^2, square mile; DTPL, Dissected Till Plains; ag, agriculture; OTHER, station does not fit into any category; BRMIG, Big River—Mississippi River below Grafton, Illinois; wi, watershed (drainage area) indicator; BRMOSJ, Big River—Missouri River at St. Joseph, Missouri; BRMOS, Big River—Missouri River at Sibley, Missouri; MINING, mining; OSPL, Osage Plains; pr, prairie; OZPLSP, Ozark Plateaus—Springfield Plateau; fo, forest; OZPLSA, Ozark Plateaus—Salem Plateau; NA, not applicable; SPRING, spring; BRMOH, Big River—Missouri River at Hermann, Missouri; URBAN, urban; BRMIT, Big River—Mississippi River at Thebes, Illinois; MIALPL, Mississippi Alluvial Plain]

USGS station number (figs. 1 and 3)	Station name[a]	Contributing drainage area (mi^2)	Water year 2021 sampling frequency—Collected/planned	Station class and type (fig. 1; table 2)[b]
05495000	Fox River at Wayland, Missouri	400	6/6	DTPL ag
05496000	Wyaconda River above Canton, Missouri	393	6/6	DTPL ag
05497150	North Fabius River near Ewing, Missouri	471	6/6	DTPL ag
05500000	South Fabius River near Taylor, Missouri	620	9/9	DTPL ag
05514500[c]	Cuivre River near Troy, Missouri	903	5/6	OTHER
05587455[d]	Mississippi River below Grafton, Illinois	171,300	12/12	BRMIG
06817700	Nodaway River near Graham, Missouri	1,520	6/6	DTPL wi ag
06818000[d]	Missouri River at St. Joseph, Missouri	426,500	12/12	BRMOSJ
06821190	Platte River at Sharps Station, Missouri	2,380	6/6	DTPL wi ag
06894100	Missouri River at Sibley, Missouri	426,500	9/9	BRMOS
06896187	Middle Fork Grand River near Grant City, Missouri	82.4	6/6	DTPL ag
06898100	Thompson River at Mount Moriah, Missouri	891	6/6	DTPL ag
06898800	Weldon River near Princeton, Missouri	452	6/6	DTPL ag
06899580	No Creek near Dunlap, Missouri	34	9/9	DTPL ag
06899950	Medicine Creek near Harris, Missouri	192	10/9	DTPL ag
06900100	Little Medicine Creek near Harris, Missouri	66.5	10/9	DTPL ag
06900900	Locust Creek near Unionville, Missouri	77.5	9/9	DTPL ag
06902000	Grand River near Sumner, Missouri	6,880	7/9	DTPL wi ag
06905500	Chariton River near Prairie Hill, Missouri	1,870	6/6	DTPL wi ag
06905725	Mussel Fork near Mystic, Missouri	24	9/9	DTPL ag
06906300	East Fork Little Chariton River near Huntsville, Missouri	220	6/6	MINING
06907300[c]	Lamine River near Pilot Grove, Missouri	949	6/9	OTHER
06917630	East Drywood Creek at Prairie State Park, Missouri	3.38	4/6	OSPL pr
06918070	Osage River above Schell City, Missouri	5,410	4/6	OSPL wi ag
06918600	Little Sac River near Walnut Grove, Missouri	119	8/9	OZPLSP ag/fo
06921070	Pomme de Terre River near Polk, Missouri	276	9/9	OZPLSA fo/ag
06921590	South Grand River at Archie, Missouri	356	6/6	OSPL ag
06923700	Niangua River at Bennett Spring, Missouri	441	6/6	OZPLSA fo/ag
06926510	Osage River below St. Thomas, Missouri	14,584	6/6	OZPLSA wi fo/ag
06927850	Osage Fork of the Gasconade River near Lebanon, Missouri	43.6	6/6	OZPLSA fo/ag
06928440	Roubidoux Spring at Waynesville, Missouri	NA	6/6	SPRING
06930450	Big Piney River at Devils Elbow, Missouri	746	8/9	OZPLSA fo/ag
06930800	Gasconade River above Jerome, Missouri	2,570	8/9	OZPLSA wi fo/ag
06934500[d, e]	Missouri River at Hermann, Missouri	522,500	14/14	BRMOH
07014000	Huzzah Creek near Steelville, Missouri	259	5/6	OZPLSA fo/ag
07014200	Courtois Creek at Berryman, Missouri	173	6/6	OZPLSA fo/ag
07014500	Meramec River near Sullivan, Missouri	1,475	8/9	OZPLSA wi fo/ag
07016400	Bourbeuse River above Union, Missouri	808	9/9	OZPLSA fo/ag

Table 1. U.S. Geological Survey station number, station name, contributing drainage area, sampling frequency, station class, and station type for selected surface-water-quality monitoring stations in Missouri, water year 2021.—Continued

[Water year 2021 is defined as October 1, 2020, through September 30, 2021. USGS, U.S. Geological Survey; mi^2, square mile; DTPL, Dissected Till Plains; ag, agriculture; OTHER, station does not fit into any category; BRMIG, Big River—Mississippi River below Grafton, Illinois; wi, watershed (drainage area) indicator; BRMOSJ, Big River—Missouri River at St. Joseph, Missouri; BRMOS, Big River—Missouri River at Sibley, Missouri; MINING, mining; OSPL, Osage Plains; pr, prairie; OZPLSP, Ozark Plateaus—Springfield Plateau; fo, forest; OZPLSA, Ozark Plateaus—Salem Plateau; NA, not applicable; SPRING, spring; BRMOH, Big River—Missouri River at Hermann, Missouri; URBAN, urban; BRMIT, Big River—Mississippi River at Thebes, Illinois; MIALPL, Mississippi Alluvial Plain]

USGS station number (figs. 1 and 3)	Station name[a]	Contributing drainage area (mi^2)	Water year 2021 sampling frequency—Collected/planned	Station class and type (fig. 1; table 2)[b]
07018100	Big River near Richwoods, Missouri	735	9/9	MINING
07019280	Meramec River at Paulina Hills, Missouri	3,920	9/9	URBAN wi
07020550	South Fork Saline Creek near Perryville, Missouri	55.3	5/6	OZPLSA fo/ag
07021020	Castor River at Greenbriar, Missouri	423	6/6	OZPLSA fo/ag
07022000[d, e]	Mississippi River at Thebes, Illinois	713,200	14/14	BRMIT
07036100	St. Francis River near Saco, Missouri	664	5/9	OZPLSA fo/ag
07037300	Big Creek at Sam A. Baker State Park, Missouri	189	4/6	OZPLSA fo/ag
07042450	St. Johns Ditch at Henderson Mound, Missouri	313	9/9	MIALPL
07046250	Little River Ditches near Rives, Missouri	1,620	8/9	MIALPL
07050150	Roaring River Spring at Cassville, Missouri	NA	5/6	OZPLSP ag/fo
07052152	Wilson Creek near Brookline, Missouri	51	9/9	URBAN
07052160	Wilson Creek near Battlefield, Missouri	58.3	11/12	URBAN
07052250	James River near Boaz, Missouri	462	6/6	URBAN
07052345	Finley Creek below Riverdale, Missouri	261	9/9	OZPLSP ag/fo
07052500	James River at Galena, Missouri	987	9/9	URBAN
07052820	Flat Creek below Jenkins, Missouri	274	9/9	OZPLSP ag/fo
07053700[c]	Lake Taneycomo at Branson, Missouri	NA	6/6	OTHER
07053900	Swan Creek near Swan, Missouri	148	6/6	OZPLSA fo/ag
07057500	North Fork River near Tecumseh, Missouri	561	4/6	OZPLSA fo/ag
07057750	Bryant Creek below Evans, Missouri	214	4/6	OZPLSA fo/ag
07061600	Black River below Annapolis, Missouri	493	3/6	OZPLSA fo/ag
07066110	Jacks Fork above Two River, Missouri	425	6/9	OZPLSA fo/ag
07067500	Big Spring near Van Buren, Missouri	NA	3/4	SPRING
07068000	Current River at Doniphan, Missouri	2,038	9/9	OZPLSA wi fo/ag
07068510	Little Black River below Fairdealing, Missouri	194	6/6	OZPLSA fo/ag
07071000	Greer Spring at Greer, Missouri	NA	2/4	SPRING
07071500	Eleven Point River near Bardley, Missouri	793	6/6	OZPLSA fo/ag
07185764	Spring River above Carthage, Missouri	425	7/9	OZPLSP ag/fo
07186480	Center Creek near Smithfield, Missouri	303	6/9	MINING
07186600	Turkey Creek near Joplin, Missouri	41.8	6/9	URBAN
07187000	Shoal Creek above Joplin, Missouri	427	7/9	OZPLSP ag/fo
07188838	Little Sugar Creek near Pineville, Missouri	195	7/9	OZPLSP ag/fo
07189000	Elk River near Tiff City, Missouri	851	11/9	OZPLSP ag/fo
07189100	Buffalo Creek at Tiff City, Missouri	60.8	6/9	OZPLSP ag/fo

[a]Station names were obtained from the USGS National Water Information System database (U.S. Geological Survey, 2022).

[b]Station classifications are based on physiography, land use, or unique station types, following the convention used in annual data summaries since water year 2007 (October 1, 2006, through September 30, 2007; Otero-Benitez and Davis, 2009a).

[c]Station data are not included in this report because this station does not fit within the classification system used for this report.

[d]Additional water temperature and suspended-sediment samples were collected at this station in cooperation with the U.S. Army Corps of Engineers.

[e]Stations 06934500 and 07022000 are not part of the Ambient Water-Quality Monitoring Network but are included in this report. The USGS National Water Quality Network funds these two stations.

Laboratory Reporting Conventions

The USGS NWQL uses method reporting conventions (Foreman and others, 2021) to establish the minimum concentration for which more than one quantitative measurement can be made. These reporting conventions are the minimum reporting level (MRL), the laboratory reporting level (LRL), the detection limit by DQCALC software (DLDQC), the reporting level by DQCALC software, and the detection limit by blank data. The MRL is defined by the NWQL as the smallest measured concentration of a substance that can be measured reliably using a given analytical method. The DLDQC is the lowest concentration of a substance that, with 90-percent confidence, will not exceed a blank sample concentration more than 1 percent of the time. The reporting level by DQCALC software is equal to two times the DLDQC or more, and the chance for a false positive is less than 1 percent. The detection limit by blank data is the lowest concentration that will not be exceeded more than 1 percent of the time. A long-term method detection limit (LT–MDL) is a detection level obtained by determining the standard deviation of 24 or more method detection limit spiked-sample measurements for an extended period. The LRL is computed as twice the LT–MDL.

Surface-Water-Quality Data Analysis Methods

The distribution of data for selected constituents is shown graphically using side-by-side boxplots (box and whiskers distributions). The plots show the center of the data (median, the center line of the boxplot), the variation (interquartile range [25th to 75th percentiles] or the height of the box), the skewness (quartile skew, which is the relative size of the box halves). The spread (upper and lower adjacent values are the vertical lines or whiskers and represent 1.5 times the interquartile range greater than the 75th and less than the 25th percentiles) and the presence or absence of unusual values or outliers (denoted by open circles) are also shown in the plots. If the median equals the 25th and 75th percentiles, the boxplot is represented by a single horizontal line. Boxplots with censored data (suspended solids, dissolved nitrate plus nitrite as nitrogen, total phosphorus, and dissolved and total recoverable lead and zinc) were modified by making the lower limit of the box equal to the MRL or LT–MDL, as appropriate.

All data collected from the stations during water year 2021 were obtained from the NWIS database (U.S. Geological Survey, 2022). These data can be compiled, by the public, from NWIS using search criteria such as the USGS station number and the desired date range (October 1, 2020, through September 30, 2021). In some instances, pesticide concentrations are reported as estimated or as a result that is less than the compound's LRL. For use in this report, values reported at a concentration less than the LRL, whether censored or not, are reported as "<LRL" to aid in the identification of compounds with results greater than the LRL.

Station Classification for Data Analysis

The stations used in this report are located throughout the State of Missouri (fig. 1) and monitor drainage areas with a variety of geologic settings, land uses (fig. 2), and unique hydrologic systems. Most of the stations were grouped into first-order classifications according to the physiographic region (Fenneman, 1938; fig. 1) or the primary land use in the drainage area monitored by the station (fig. 2). The remaining stations were grouped into first-order classifications according to the unique hydrologic characteristics of the waterbody they monitor (fig. 1).

The physiography-based stations monitor drainage areas in the Dissected Till Plains (DTPL) in the north, the Osage Plains (OSPL) in the west-central region, the Mississippi Alluvial Plain (MIALPL) in the southeast, the Ozark Plateaus—Salem Plateau (OZPLSA) in the middle of the State, and the Ozark Plateaus—Springfield Plateau (OZPLSP) in the southwest (fig. 1). Water quality at the stations classified by physiography is expected to be substantially affected by natural chemical processes, including interactions with the geologic and biologic media.

Stations classified by the primary land use monitor drainage areas with substantial amounts of mining (MINING) or urban (URBAN) land use. These stations are grouped separately from the physiography-based stations to assess the effects of mining and urban land use on water quality.

Stations classified based on the unique hydrologic characteristics of the waterbodies they monitor refer to springs (SPRING) and the stations on the Mississippi River (BRMIG and BRMIT) and the Missouri River (BRMOSJ, BRMOS, and BRMOH). Stations on the Mississippi and Missouri Rivers are referred to as the "Big River stations" (fig. 1) in this report. Water chemistry at the SPRING stations is expected to differ from the other stations because the SPRING stations reflect the chemistry of the groundwater source. Water chemistry at the Big River stations is expected to differ from other stations because of the large size of the drainage areas they represent.

Each station that was classified by physiographic province was further subdivided into second-order classifications (referred to as "station type" in table 1). Second-order classifications were based on contributing drainage area or land use within the drainage area represented by the station (figs. 1, 2; table 2). The second-order classifications include watershed indicator (wi) stations (the term "watershed" is used for consistency with previous reports and denotes a drainage area) and land-use indicators. Stations with the wi classification are the most downstream stations in a drainage area greater than 1,000 square miles. Water-quality data obtained from wi stations can be interpreted as being representative of

Figure 1. Physiographic regions of Missouri and location and class of selected surface-water-quality monitoring stations, water year 2021. [The term "watershed" is used for consistency with previous reports and denotes a drainage area]

the general condition of the drainage area. Land-use indicator stations include stations where forest (fo), agriculture (ag), or prairie (pr) is the predominate land use in the drainage area upstream from the station. Water quality at land-use indicator stations is likely to be affected by a specific land use. When stations were in drainage areas where multiple land uses were present, the convention was to mention them in predominant order. The agriculture and forest (ag/fo) land-use indicator, for example, implies that the primary land use of the drainage area is agriculture, although a substantial part of the land use is forest (fig. 2).

Classifications used in this report follow the convention used in annual data summaries since water year 2007 (October 1, 2006, through September 30, 2007; Otero-Benitez and Davis, 2009a). Three stations from the AWQMN are classified as OTHER (table 2), and sampling results from these sites are not included. The three excluded stations were Cuivre River near Troy, Mo. (05514500), and Lamine River near Pilot Grove, Mo. (06907300), in areas of transitional physiography and possible backwater flow from nearby major rivers, and Lake Taneycomo at Branson, Mo. (07053700), a station on a semiriverine system downstream from a major impoundment. These stations were recently reclassified by Richards and Barr (2021).

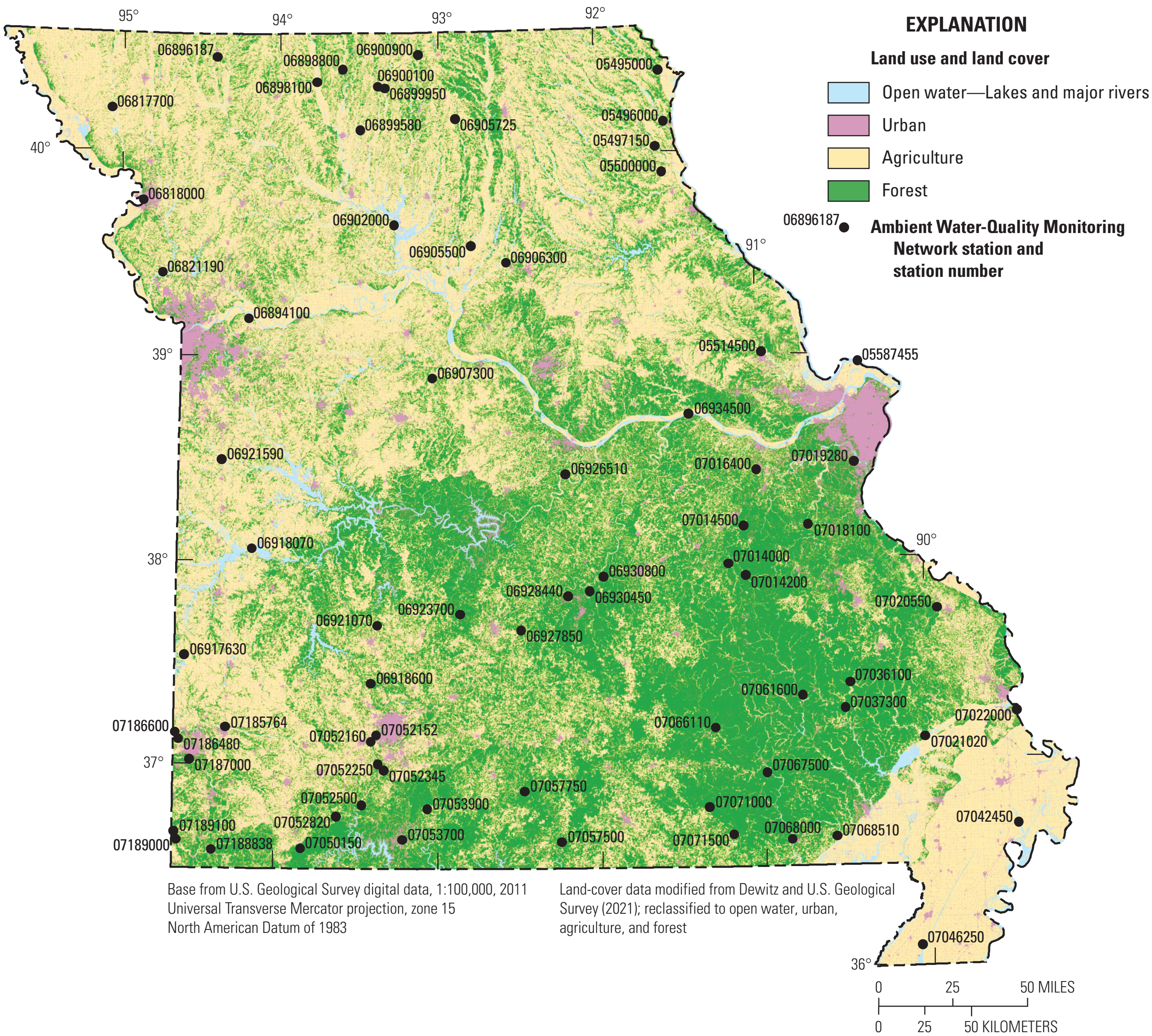

Figure 2. Land use in Missouri.

Table 2. Station classes and number of stations in each class and type for Missouri, water year 2021.

[The classification system is based on the physiography of the State, primary and secondary land use and coverage, unique station type, and drainage area, as well as a station's representativeness of the general condition of the watershed. See the "Station Classification for Data Analysis" section of this report for the full explanation of station classes and types]

Station class and type (fig. 1)[a]		Number of stations (table 1)[b]
Abbreviation	Definition	
BRMIG	Big River—Mississippi River below Grafton, Illinois	1
BRMIT[c]	Big River—Mississippi River at Thebes, Illinois	1
BRMOSJ	Big River—Missouri River at St. Joseph, Missouri	1
BRMOS	Big River—Missouri River at Sibley, Missouri	1
BRMOH[c]	Big River—Missouri River at Hermann, Missouri	1
MIALPL	Mississippi Alluvial Plain	2[d]
OZPLSA fo/ag	Ozark Plateaus—Salem Plateau forest and agriculture	18
OZPLSA wi fo/ag	Ozark Plateaus—Salem Plateau watershed indicator, forest and agriculture	4
OZPLSP ag/fo	Ozark Plateaus—Springfield Plateau agriculture and forest	9
DTPL ag	Dissected Till Plains agriculture	12
DTPL wi ag	Dissected Till Plains watershed indicator, agriculture	4
OSPL ag	Osage Plains agriculture	1
OSPL wi ag	Osage Plains watershed indicator, agriculture	1
OSPL pr	Osage Plains prairie	1
SPRING	Springs	3
MINING	Mining	3
OTHER	Station not classified because of unique conditions; data not analyzed	3
URBAN	Urban	5
URBAN wi	Urban watershed indicator	1

[a]The term "watershed" is used for consistency with previous reports and denotes a drainage area.

[b]Only primary sampling stations listed in table 1 are included in this analysis. Alternate stations are omitted.

[c]Stations BRMIT and BRMOH are not part of the Ambient Water-Quality Monitoring Network but were used in this report. Stations BRMIT and BRMOH are funded by the U.S. Geological Survey National Water Quality Monitoring Program.

[d]One station in this class, Little River Ditches near Rives, Missouri (07046250), has a drainage area greater than 1,000 square miles but is not considered a watershed indicator station because the human-made canals and ditches within its drainage area are not connected hydrologically.

Hydrologic Conditions

Streamflow varies seasonally in Missouri and tends to reflect precipitation patterns and land uses (Slater and Villarini, 2017). During water year 2021, the mean annual precipitation of the conterminous United States was 29.77 inches (in.), which is 0.17 in. less than the 20th century mean (National Oceanic and Atmospheric Administration, 2021b). Total precipitation across Missouri during water year 2021 was 43.07 in., which is 2.57 in. greater than the 20th century precipitation mean for the State (National Oceanic and Atmospheric Administration, 2021a).

Data from six streamgages were used to identify the variation in hydrologic conditions described in this report. These six streamgages were selected based on their geographical distribution across the State (fig. 3) and long period of available streamflow information. Each selected streamgage has a period of record of at least 49 years. This summary of statewide hydrologic condition data for water year 2021 in comparison to historical conditions is a legacy of information, including the streamgages used, that was previously provided in the annual Water-Data Reports. The six selected streamgages are Fox River at Wayland, Mo. (05495000); Grand River near Gallatin, Mo. (06897500); South Grand River at Archie, Mo. (06921590); Gasconade River at Jerome, Mo. (06933500); James River at Galena, Mo. (07052500); and Current River at Van Buren, Mo. (07067000). Data from these streamgages were used to compare monthly mean streamflow during water year 2021 to the long-term monthly mean streamflow (majority have about 100 years of record; fig. 4) and to demonstrate how streamflow can vary across the State. Monthly mean streamflow is the arithmetic mean of daily streamflow for a given month. For comparison to water year 2021, a long-term mean was attained from all monthly mean streamflows for the available period of record. It should be noted that the water year 2021 monthly mean streamflow is denoted by the continuous line plot and the long-term monthly mean streamflow is denoted by the bars in figure 4. This change was made to better show the data trends and match most of the previous reports, unlike previous water year reports for 2018 and 2019, which reversed the naming convention.

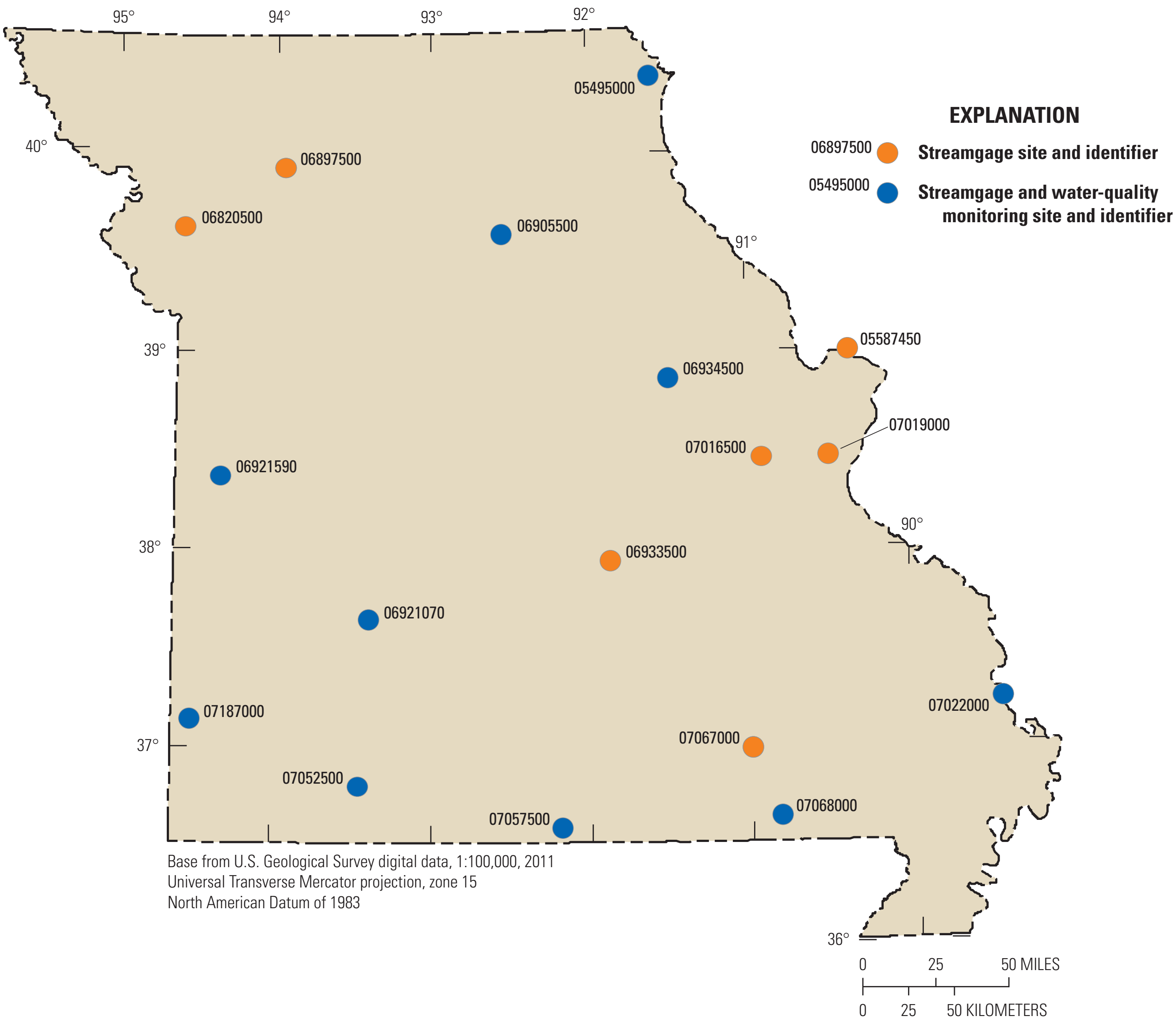

Figure 3. Location of selected streamgages used to provide a summary of hydrologic conditions in Missouri, water year 2021.

Of these six streamgages, three (05495000, 06921590, and 07052500) are part of the AWQMN and three (06897500, 06933500, and 07067000) are not part of the AWQMN (table 1; figs. 3, 4). The water year 2021 monthly mean streamflow at station 05495000 exceeded the long-term monthly mean streamflow during 6 months of the water year, and the monthly mean streamflow in July was more than twice the long-term mean. For station 06897500, the water year 2021 monthly mean streamflow exceeded the long-term monthly mean streamflow during 3 months of the water year (February, March, and July). For station 06921590, the water year 2021 monthly mean streamflow exceeded the long-term monthly mean streamflow during 5 months of the water year, and the highest monthly mean streamflow for the year was recorded in May. The water year 2021 monthly mean streamflow exceeded the long-term monthly mean streamflow during 6 months of the water year at stations 06933500 and 07052500. For station 07067000, the water year 2021 monthly mean streamflow exceeded that of the long-term monthly mean streamflow for 10 months of the water year, and the highest monthly mean streamflow for the year was recorded in March (fig. 4).

All six streamgages exceeded their respective long-term monthly mean streamflows in the month of March. During the month of May, four of the six stations (06921590, 07052500, 06933500, and 07067000) exceeded their long-term monthly mean streamflows, and higher exceedances were in the western and southwestern regions of the State. The other two stations (05495000 and 06897500), which are both in the northern part of the State, had monthly mean streamflows below their long-term mean streamflows during the month of May.

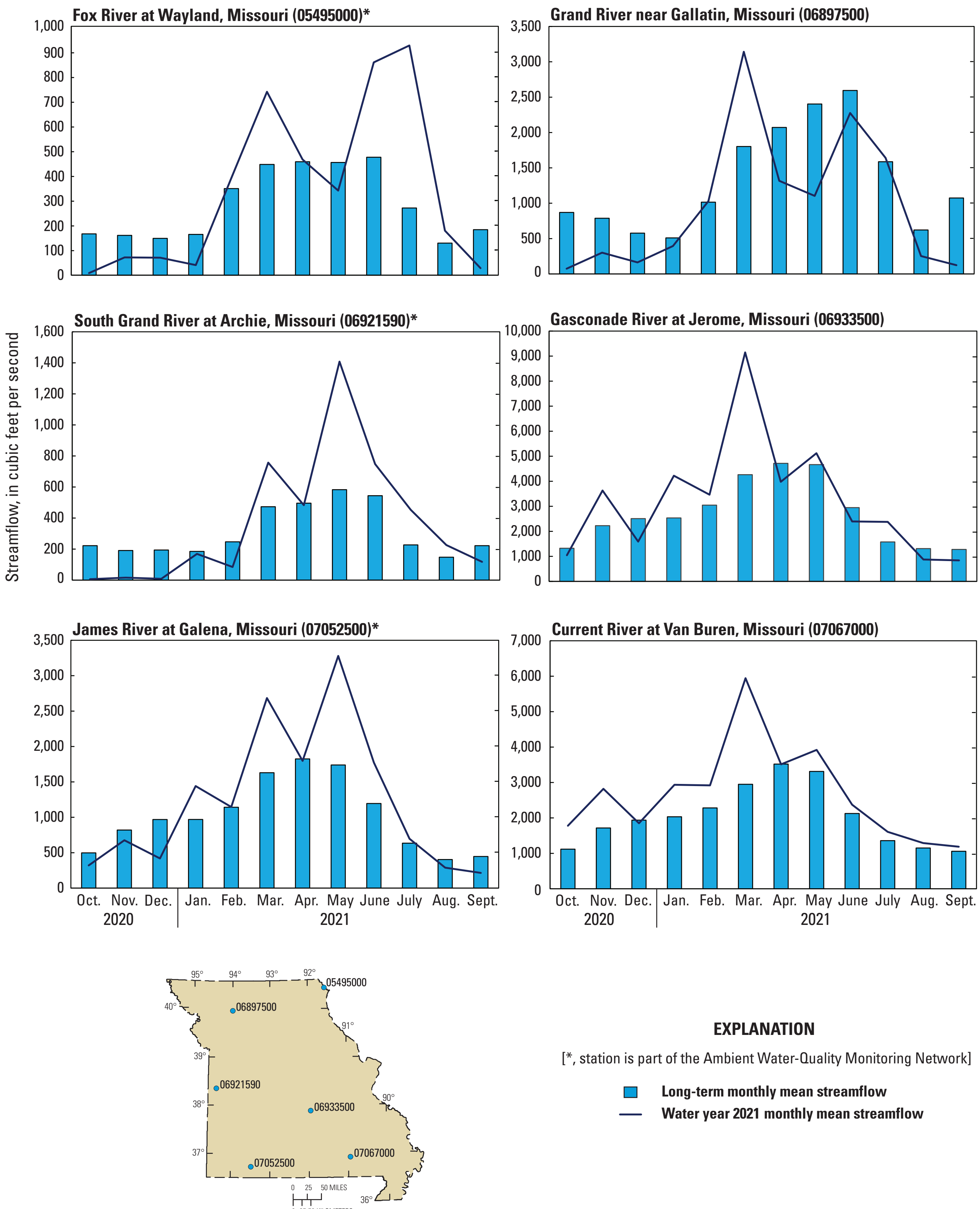

Figure 4. Monthly mean streamflow for water year 2021 and long-term monthly mean streamflow at six representative streamgages in Missouri.

Peak streamflow and 7-day low flow values (the smallest values of mean streamflow computed during any 7 consecutive days during the analysis period) for selected streamgages are provided in tables 3 and 4, respectively, for water year 2021. These tables include information on historical hydrologic conditions at the stations to provide context for the 2021 data. Peak streamflow during water year 2021 was less than the long-term period of record peak streamflow at every streamgage (table 3). The 7-day low flow and minimum daily mean streamflow recorded during water year 2021 were greater than the historical records for every station (table 4).

Distribution, Concentration, and Detection Frequency of Selected Constituents

This report presents results for dissolved oxygen, specific conductance, water temperature, suspended solids, suspended sediment, *E. coli* bacteria, fecal coliform bacteria, dissolved nitrate plus nitrite as nitrogen (hereafter referred to as “nitrate plus nitrite”), total phosphorus, dissolved and total recoverable lead and zinc, and selected pesticide compounds. Boxplots of these constituents excluding selected pesticide compounds are shown in figures 5–8 for the surface-water stations according to their classification.

Table 3. Peak streamflow for water year 2021 and periods of record for selected streamgages in Missouri.

[Water year 2021 is defined as October 1, 2020, through September 30, 2021. USGS, U.S. Geological Survey; ft^3/s, cubic foot per second; n/a, not available]

USGS station number[a] (figs. 1 and 3)	Station name[b] (period of record in years)	Water year 2021		Long-term period of record	
		Peak streamflow (ft^3/s)	Date	Peak streamflow (ft^3/s)	Date
05495000	Fox River at Wayland, Missouri (1922–2021)	8,390	July 12, 2021	26,400	Apr. 22, 1973
05587450	Mississippi River at Grafton, Illinois (1987–2021)	282,000	Apr. 14, 2021	598,000	Aug. 1, 1993
06905500	Chariton River near Prairie Hill, Missouri (1929–2021)	n/a	n/a	44,400	May 31, 2019
06933500	Gasconade River at Jerome, Missouri (1903–2021)	38,800	Mar. 14, 2021	197,000	May 1, 2017
06934500	Missouri River at Hermann, Missouri (1958–2021)	316,000	June 29, 2021	750,000	July 31, 1993
07019000	Meramec River near Eureka, Missouri (1904–2021)	31,700	Mar. 20, 2021	175,000	Aug. 22, 1915
07022000	Mississippi River at Thebes, Illinois (1933–2021)	624,000	Mar. 22, 2021	1,050,000	Jan. 2, 2016
07057500	North Fork River near Tecumseh, Missouri (1945–2021)	6,180	Jan. 26, 2021	189,000	Apr. 30, 2017
07068000	Current River at Doniphan, Missouri (1921–2021)	27,800	Mar. 15, 2021	183,000	May 1, 2017

[a]Stations 05587450, 06933500, and 07019000 are streamgages only and are not part of the Ambient Water-Quality Monitoring Network.

[b]Station names were obtained from the USGS National Water Information System database (U.S. Geological Survey, 2022).

Table 4. The 7-day low flow for water year 2021, period of record 7-day low flow, minimum daily mean streamflow for water year 2021, and period of record minimum daily mean streamflow for selected streamgages in Missouri.

[Water year 2021 is defined as October 1, 2020, through September 30, 2021. USGS, U.S. Geological Survey; ft^3/s, cubic foot per second]

USGS station number[a] (figs. 1 and 3)	Station name[b] (period of record in years)	7-day low flow (ft^3/s)		Minimum daily mean streamflow (ft^3/s)		
		Water year 2021	Period of record	Water year 2021	Period of record	Date
05495000	Fox River at Wayland, Missouri (1922–2021)	1.72	0	1.07	0	Sept. 10, 1930
06820500	Platte River near Agency, Missouri (1925–2021)	22.9	0	18.7	0	July 19, 1934
06921070	Pomme de Terre River near Polk, Missouri (1969–2021)	5.96	0.211	5.44	0.17	Aug. 13, 2012
07016500	Bourbeuse River at Union, Missouri (1921–2021)	48.7	13.0	48.0	12.0	Oct. 10, 1956
07067000	Current River at Van Buren, Missouri (1921–2021)	1,121	479	1,110	476	Oct. 8, 1956
07187000	Shoal Creek above Joplin, Missouri (1941–2021)	91.7	15.9	90.9	15.0	Sept. 7, 1954

[a]Stations 06820500, 07016500, and 07067000 are streamgages only and are not part of the Ambient Water-Quality Monitoring Network.

[b]Station names were obtained from the USGS National Water Information System database (U.S. Geological Survey, 2022).

Physical Properties, Suspended-Solids Concentration, Suspended-Sediment Concentration, and Fecal Indicator Bacteria Density

The physical properties analyzed for this report were dissolved oxygen, specific conductance, and water temperature. The median dissolved oxygen ranged from 7.0 milligrams per liter (mg/L) at the BRMIT station to 10.2 mg/L at the BRMOSJ station (fig. 5). Median specific conductance values varied substantially among the station classes, ranging from 130 microsiemens per centimeter at 25 degrees Celsius at the OSPL pr station to 823 microsiemens per centimeter at 25 degrees Celsius at the BRMOS station. At the BRMOSJ station, the interquartile range in specific conductance was smaller than the other large river sites. Median water temperature ranged from 12.3 degrees Celsius (°C) at the BRMOSJ station to 24.7 °C at the BRMIT station. The interquartile range in water temperature at the SPRING stations was much smaller than for other station classes.

Suspended solids and suspended sediment are measures of the solid material suspended in the water column. These two measures are not considered directly comparable because of differences in collection and analytical techniques. The concentrations of suspended solids were determined for all classes and types except BRMIT and BRMOH. Median suspended-solids concentrations ranged from the MRL (15 mg/L) to 102 mg/L (fig. 5). Suspended-solids samples in the OZPL (SA fo/ag, SA wi fo/ag, and SP ag/fo), SPRING, MINING, and URBAN classes had median concentrations at the MRL (15 mg/L). The DTPL wi ag class had the largest median suspended-solids concentration. Suspended-sediment concentrations were determined at four Big River station classes (BRMIG, BRMIT, BRMOSJ, and BRMOH; fig. 5). Median suspended-sediment concentrations ranged from 75 mg/L at the BRMIG station to 157 mg/L at the BRMOH station (fig. 5).

Median *E. coli* and fecal coliform bacteria densities varied among all station classes, but median bacteria densities in all station classes were less than 700 colonies per 100 milliliters (col/100 mL) of water. Median *E. coli* bacteria densities ranged from 17 to 370 col/100 mL of water. The smallest median *E. coli* density was measured at the SPRING stations, and the largest median *E. coli* density was measured at the BRMOS station. Median fecal coliform bacteria densities ranged from 24 to 660 col/100 mL of water. The smallest median fecal coliform densities were in samples collected at the SPRING stations. The largest median fecal coliform densities were in samples collected at the BRMOS station (fig. 6).

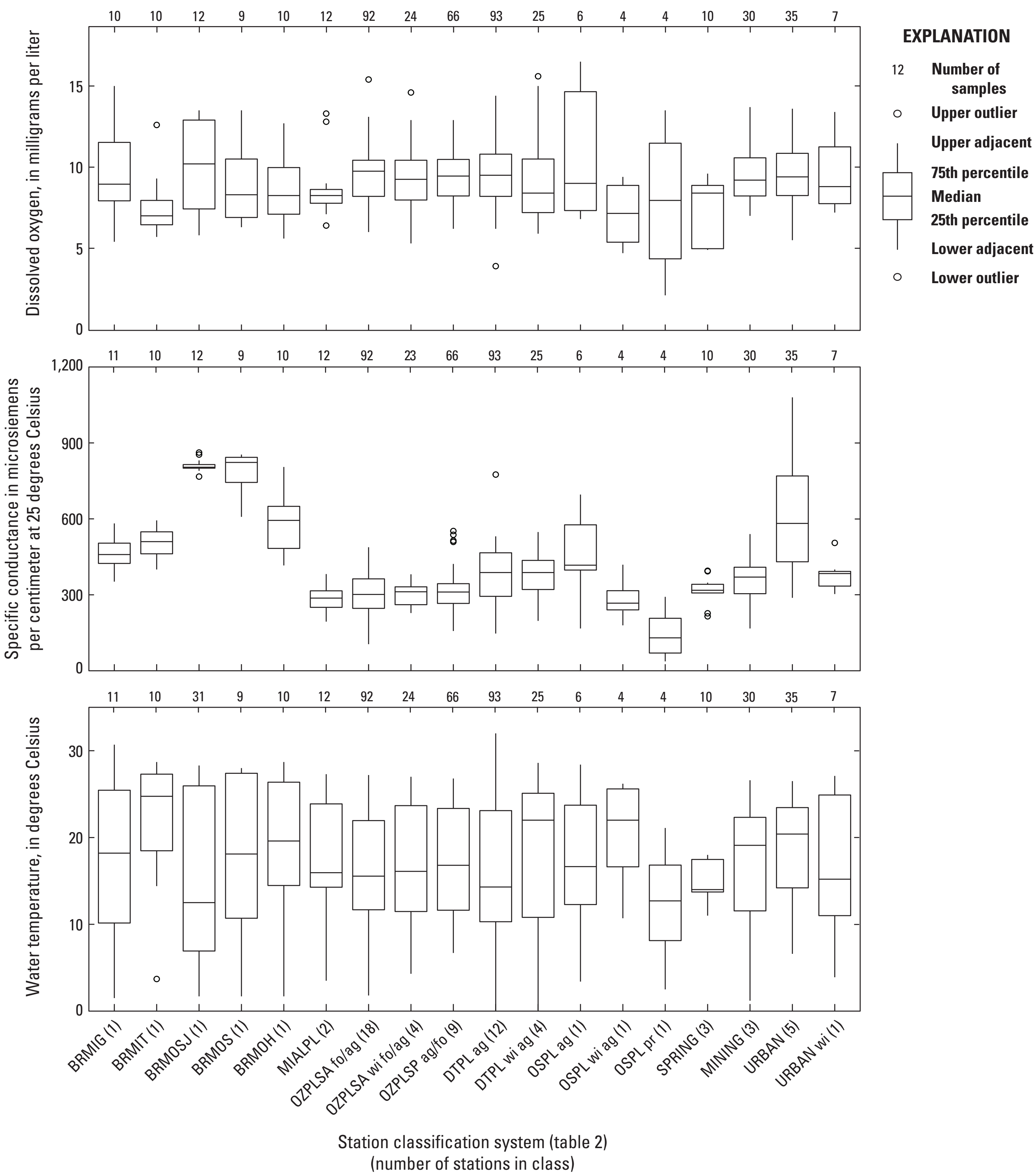

Figure 5. Distribution of dissolved oxygen, specific conductance, water temperature, suspended-solids concentrations, and suspended-sediment concentrations from surface-water-quality stations in Missouri, water year 2021.

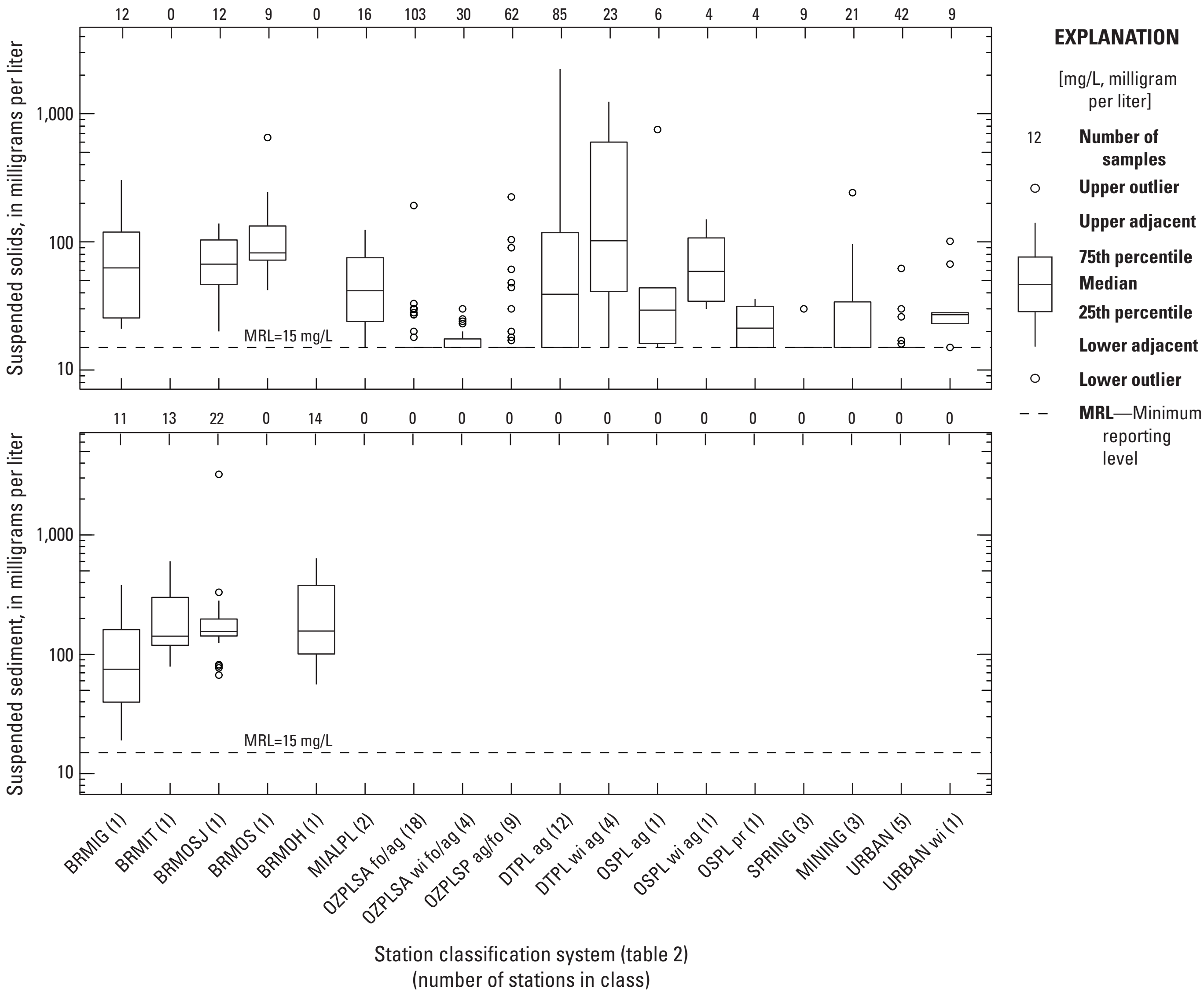

Figure 5.—Continued

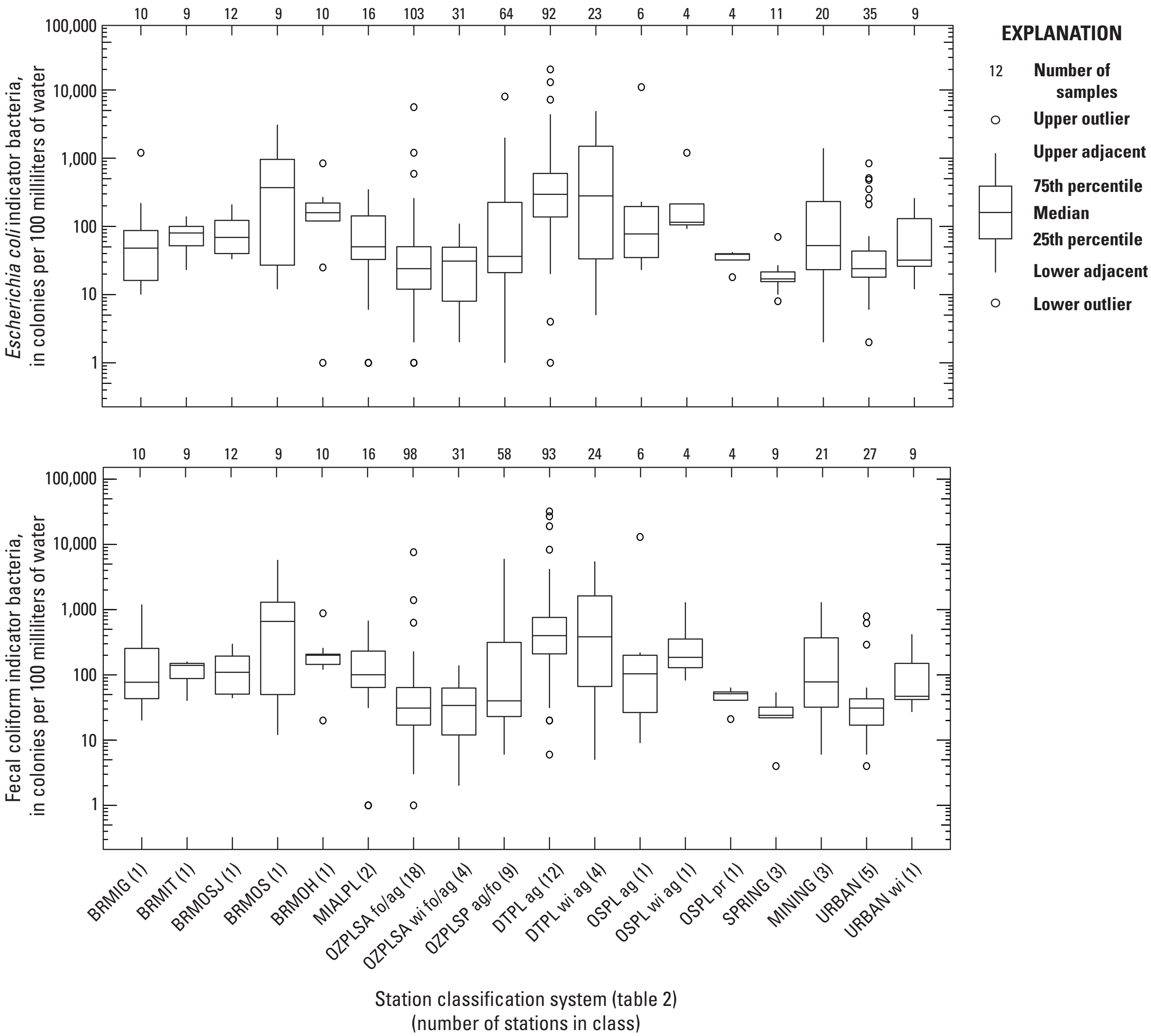

Figure 6. Distribution of fecal indicator bacteria density in samples from surface-water-quality stations in Missouri, water year 2021.

Dissolved Nitrate Plus Nitrite and Total Phosphorus Concentrations

Samples were collected at all stations for the analysis of nutrients, including dissolved nitrate plus nitrite and total phosphorus. Median dissolved nitrate plus nitrite and total phosphorus concentrations varied considerably among all station classes and types (fig. 7). Median dissolved nitrate plus nitrite ranged from 0.16 mg/L at the OSPL pr station to 5.27 mg/L at the URBAN stations (fig. 7). Median total phosphorus ranged from the LT–MDL (0.02 mg/L) to 0.27 mg/L. The smallest median total phosphorus concentrations were at the OZPLSA fo/ag, and SPRING stations. More than one-half of the samples from the SPRING stations had total phosphorus concentrations less than the LT–MDL, indicating that the true median concentration at these stations is less than 0.02 mg/L. The largest median concentration was detected at the BRMIT station (fig. 7).

Dissolved and Total Recoverable Lead and Zinc Concentrations

The median concentration of dissolved lead ranged from less than 0.02 to 0.42 microgram per liter (µg/L), and the median concentration of total recoverable lead ranged from 0.14 to 11.85 µg/L. The smallest median concentrations of dissolved lead were at the LT–MDL (0.02 µg/L) in samples collected at the BRMOSJ, BRMOS, and SPRING stations. Samples from the MINING stations had the largest median concentration of dissolved lead (fig. 8). The smallest median concentration of total recoverable lead was measured at the SPRING stations (0.14 µg/L), and the largest median total recoverable lead concentration of 11.85 µg/L was at the MINING stations. No dissolved or total recoverable lead or zinc samples were collected at the BRMIT and BRMOH stations.

The median concentrations of dissolved zinc and total recoverable zinc ranged from the LT–MDL of 2.0 to 12.1 µg/L and the LT–MDL of 2.0 to 29.5 µg/L, respectively (fig. 8). Median dissolved zinc concentrations were calculated to be at the LT–MDL (2.0 µg/L) for all stations, except for BRMOS, SPRING, MINING, and URBAN. The URBAN station had the largest median concentration of dissolved zinc. The smallest median concentrations of total recoverable zinc were at the LT–MDL of 2.0 µg/L at the OZPLSA (fo/ag and wi fo/ag), OZPLSP ag/fo, DTPL ag, and SPRING stations. The largest median concentration of total recoverable zinc was at the OSPL ag station (29.5 µg/L).

Selected Pesticide Concentrations and Detection Frequencies

Samples collected for the analysis of dissolved pesticide compounds during water year 2021 are provided in this report for seven stations. The AWQMN and the NWQN use different sampling and analytical methods for pesticide compounds, which have somewhat different detection limits. Samples from 4 stations were analyzed for a suite of 85 pesticides (both stations in the MIALPL, 1 OSPL wi ag station, and 1 URBAN station). An expanded list of 103 pesticides was analyzed in samples from 3 Big River stations (BRMIG, BRMIT, and BRMOH) as part of the NWQN. Only compounds analyzed by both pesticide methods and having detections greater than the LRL are discussed in this report. Note that the analysis of pesticide data provided in table 5 includes nondetections if at least one sample had a detection greater than the LRL for that compound.

A total of 9 pesticide compounds (acetochlor, atrazine, 2-Chloro-4-isopropylamino-6-amino-*s*-triazine [CIAT; a degradation product of atrazine], metalaxyl, metolachlor, metribuzin, prometon, simazine, and tebuthiuron; table 5) were detected at concentrations greater than their LRL in at least 1 sample during water year 2021. Of the 9 pesticides detected, 7 were detected in 50 percent or more of the samples collected from the 6 station classifications. The seven pesticides were acetochlor, atrazine, CIAT, metolachlor, metribuzin, prometon, and simazine. Each of the 7 stations sampled for pesticides had at least 1 pesticide detection greater than the LRL. The pesticide compounds with the greatest number of detections above the LRL included acetochlor, atrazine, CIAT, and metolachlor.

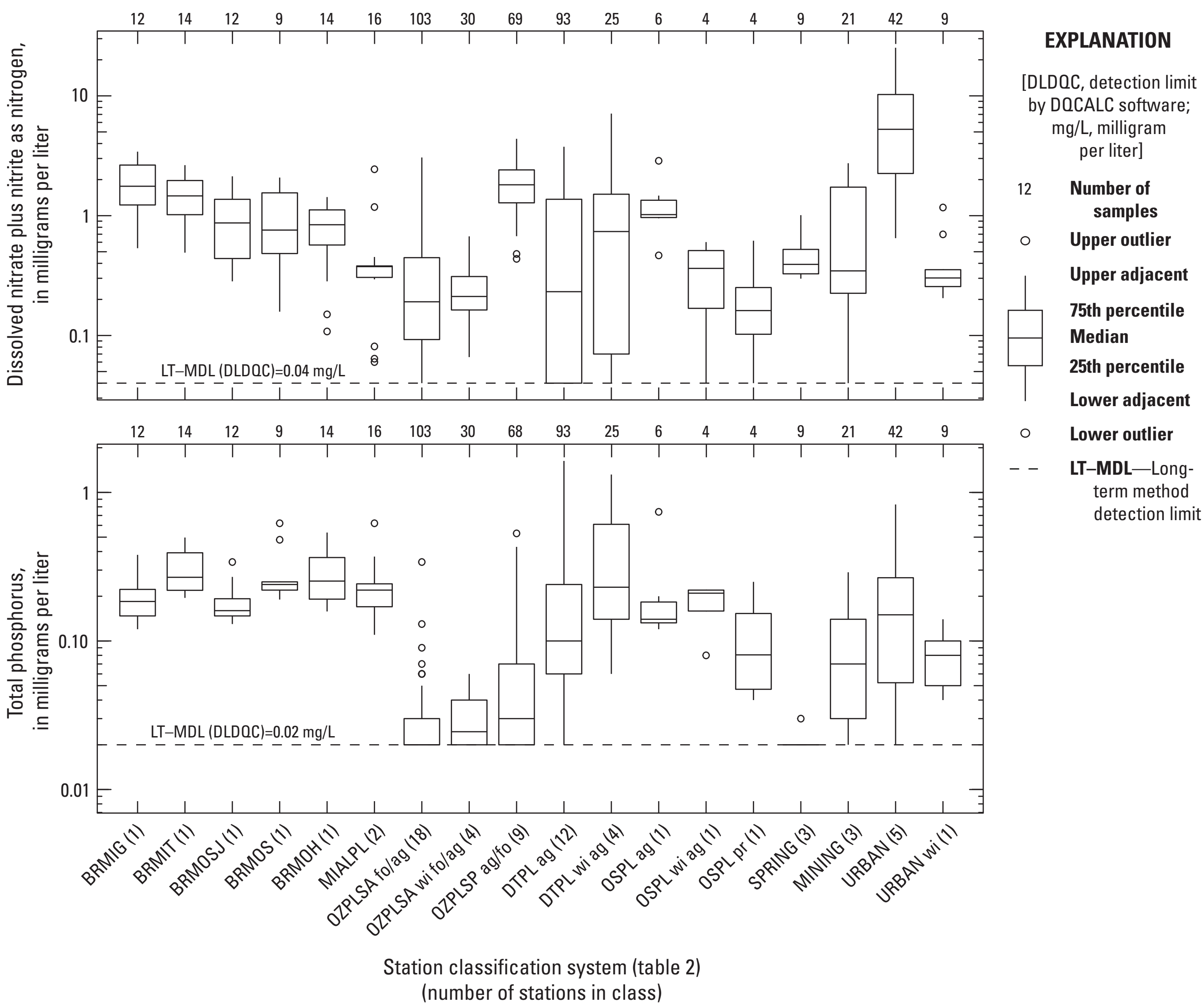

Figure 7. Distribution of dissolved nitrate plus nitrite as nitrogen and total phosphorus concentrations in samples from surface-water-quality stations in Missouri, water year 2021.

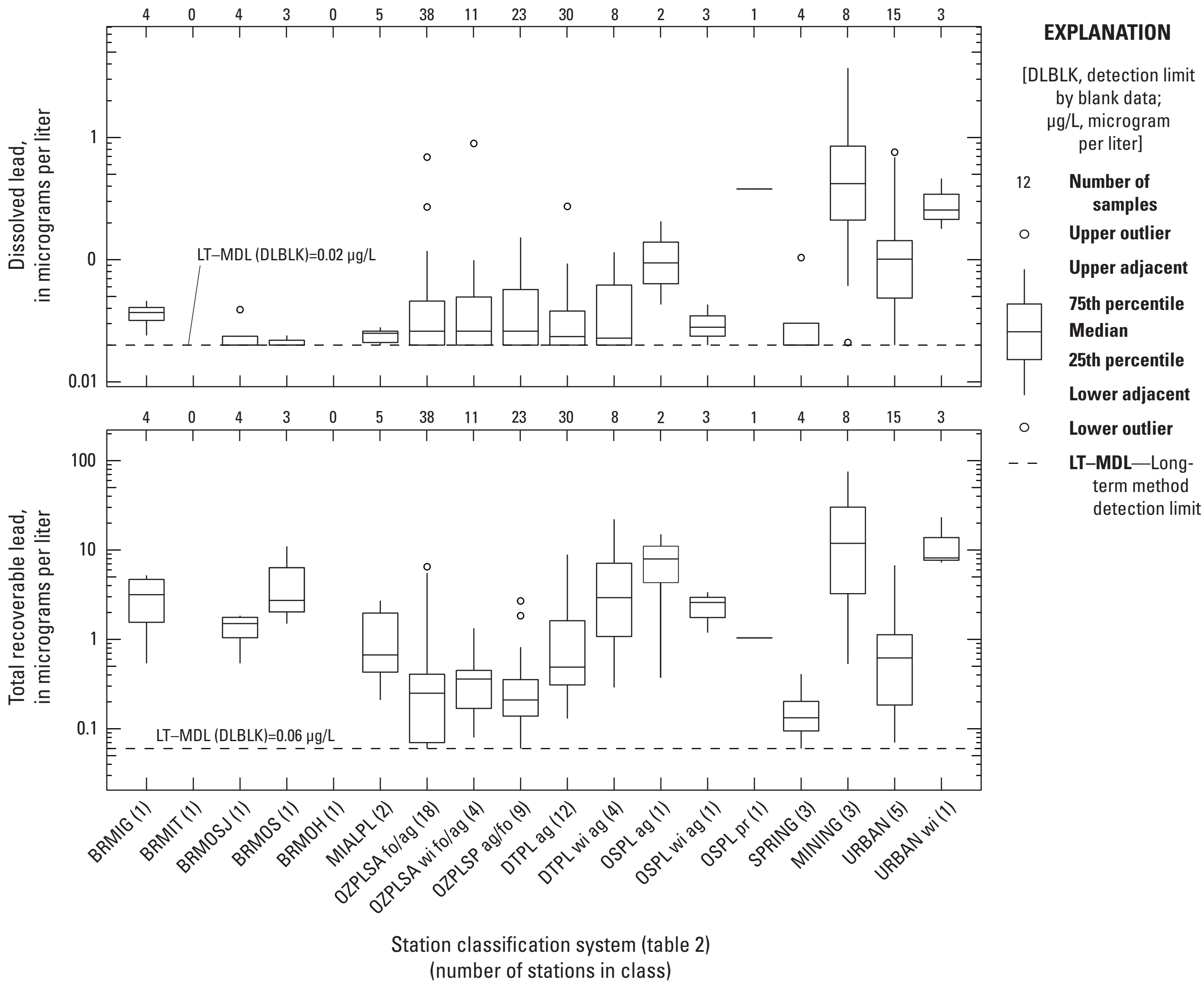

Figure 8. Distribution of dissolved and total recoverable lead and zinc concentrations from surface-water-quality stations in Missouri, water year 2021.

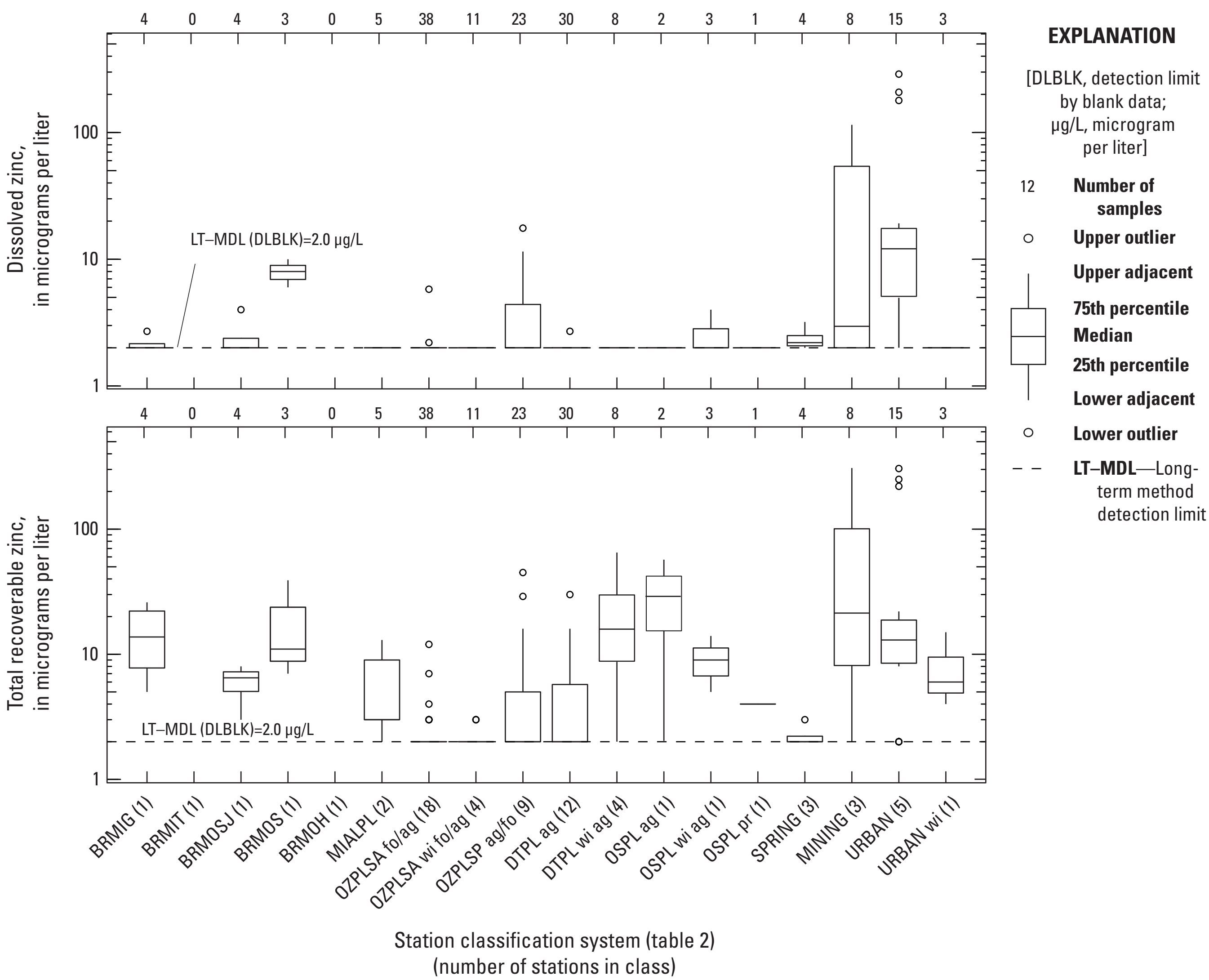

Figure 8.—Continued

Table 5. Summary of detections of selected pesticides for water year 2021 in Missouri.

[Water year 2021 is defined as October 1, 2020, through September 30, 2021. µg/L, microgram per liter; %, percent; MIALPL, Mississippi Alluvial Plain; <, less than; E, estimated concentration; CIAT, 2-Chloro-4-isopropylamino-6-amino-*s*-triazine; --, no data; OSPL wi ag, Osage Plains watershed (drainage area) indicator, agriculture; NA, not applicable; URBAN, urban; BRMIT, Big River—Mississippi River at Thebes, Illinois; BRMIG, Big River—Mississippi River below Grafton, Illinois; BRMOH, Big River—Missouri River at Hermann, Missouri]

Analyte	Number of samples	Number of detections	Laboratory reporting level (µg/L)[a, b]	Detections greater than or equal to the reporting level (%)	Minimum concentration (µg/L)	Maximum detected concentration (µg/L)
Station classification MIALPL (stations 07042450 and 07046250)						
Acetochlor	11	10	0.010	91	<0.010	E5.42
Atrazine	11	11	0.008	100	0.008	E17.8
CIAT	11	4	0.014	36	<0.014	E0.261
Metalaxyl	1	0	0.014	0	<0.014	--
Metolachlor	11	11	0.012	100	0.043	E6.60
Metribuzin	11	4	0.020	36	<0.020	E2.83
Prometon	11	0	0.012	0	<0.012	--
Simazine	11	1	0.008	9	<0.008	E0.011
Tebuthiuron	11	0	0.160	0	<0.160	--
Station classification OSPL wi ag (station 06918070)						
Acetochlor	3	2	0.010	67	<0.010	E0.292
Atrazine	3	3	0.008	100	0.009	0.648
CIAT	3	1	0.014	33	<0.014	E0.074
Metalaxyl	NA	NA	NA	NA	NA	NA
Metolachlor	3	3	0.012	100	0.012	E0.677
Metribuzin	3	1	0.020	33	<0.020	0.025
Prometon	3	0	0.012	0	<0.012	--
Simazine	3	1	0.008	33	<0.008	E0.021
Tebuthiuron	3	0	0.160	0	<0.160	--
Station classification URBAN (station 07052250)						
Acetochlor	6	1	0.010	17	<0.010	E0.014
Atrazine	6	3	0.008	50	<0.008	0.107
CIAT	6	2	0.014	33	<0.014	E0.017
Metalaxyl	NA	NA	NA	NA	NA	NA
Metolachlor	6	3	0.012	50	<0.012	0.123
Metribuzin	6	0	0.020	0	<0.020	--
Prometon	6	3	0.012	50	<0.012	E0.028
Simazine	6	0	0.008	0	<0.008	--
Tebuthiuron	6	0	0.160	0	<0.160	--
Station classification BRMIT (station 07022000)						
Acetochlor	6	3	0.010	50	<0.0166	0.723
Atrazine	6	6	0.0068	100	0.0963	E5.29
CIAT	6	6	0.011	100	0.0214	0.484
Metalaxyl	6	2	0.006	33	<0.006	0.0157
Metolachlor	6	6	0.0032	100	0.0676	E4.74
Metribuzin	6	2	0.020	33	<0.020	0.346
Prometon	6	2	0.004	33	<0.004	0.0047
Simazine	6	5	0.0072	83	<0.010	0.112
Tebuthiuron	6	0	0.003	0	<0.003	--

Table 5. Summary of detections of selected pesticides for water year 2021 in Missouri.—Continued

[Water year 2021 is defined as October 1, 2020, through September 30, 2021. µg/L, microgram per liter; %, percent; MIALPL, Mississippi Alluvial Plain; <, less than; E, estimated concentration; CIAT, 2-Chloro-4-isopropylamino-6-amino-*s*-triazine; --, no data; OSPL wi ag, Osage Plains watershed (drainage area) indicator, agriculture; NA, not applicable; URBAN, urban; BRMIT, Big River—Mississippi River at Thebes, Illinois; BRMIG, Big River—Mississippi River below Grafton, Illinois; BRMOH, Big River—Missouri River at Hermann, Missouri]

Analyte	Number of samples	Number of detections	Laboratory reporting level (µg/L)[a, b]	Detections greater than or equal to the reporting level (%)	Minimum concentration (µg/L)	Maximum detected concentration (µg/L)
Station classification BRMIG (station 05587455)						
Acetochlor	9	6	0.010	67	0.0165	E1.75
Atrazine	9	9	0.0068	100	0.0434	3.38
CIAT	9	9	0.011	100	0.0227	0.176
Metalaxyl	9	2	0.006	22	<0.006	0.0199
Metolachlor	9	9	0.0032	100	0.0461	2.53
Metribuzin	9	3	0.020	33	<0.020	0.373
Prometon	9	1	0.004	11	<0.004	0.0048
Simazine	9	6	0.0072	67	0.0082	0.047
Tebuthiuron	9	0	0.003	0	<0.003	--
Station classification BRMOH (station 06934500)						
Acetochlor	8	5	0.010	62	<0.010	0.378
Atrazine	8	8	0.0068	100	0.0921	1.31
CIAT	8	8	0.011	100	0.0259	0.209
Metalaxyl	8	2	0.006	25	<0.006	0.0067
Metolachlor	8	8	0.0032	100	0.0538	1.11
Metribuzin	8	3	0.020	37	<0.020	0.204
Prometon	8	1	0.004	12	<0.004	0.0051
Simazine	8	5	0.0072	62	<0.010	0.0502
Tebuthiuron	8	1	0.003	12	<0.003	0.0034

[a]Pesticide samples from the National Water Quality Network stations (07022000, 05587455, and 06934500) were analyzed by a different method than the Ambient Water-Quality Monitoring Network samples, resulting in different laboratory reporting levels for the two methods.

[b]As a result of changes in instrument sensitivity, the nondetect value was set to the lowest qualified calibration standard for some samples. Concentrations reported as less than the lowest qualified standard were not classified as a detection in this report.

Summary

The U.S. Geological Survey (USGS), in cooperation with the Missouri Department of Natural Resources, collects surface-water-quality data in Missouri each water year (the period from October 1 to September 30 and designated by the year in which it ends). These data, which are stored and maintained in the USGS National Water Information System database, are collected as part of the Missouri Ambient Water-Quality Monitoring Network (AWQMN) and constitute a permanent, accessible source of representative, reliable, impartial, and timely information for developing an enhanced understanding of the State's water resources. In addition to the AWQMN stations, the USGS also collects data at two USGS National Water Quality Network stations and, in cooperation with the U.S. Army Corps of Engineers, routinely collects suspended-sediment concentration data on the Missouri and Mississippi Rivers.

Surface-water-quality data summarized in this report were collected during water year 2021 at 72 stations (70 AWQMN and 2 National Water Quality Network stations), among which are 4 stations with suspended-sediment data collected in cooperation with the U.S. Army Corps of Engineers. Stations were classified corresponding to physiographic province, primary land use, or unique hydrologic characteristics of the stations. The annual summary of selected constituents provides the Missouri Department of Natural Resources with current information to assess the quality of surface water within the State and ensure the objectives of the AWQMN are being met. The data collected also provide support for the design, implementation, and evaluation of preventive and remediation programs.

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For more information about this publication, contact:
Director, USGS Central Midwest Water Science Center
1400 Independence Road
Rolla, MO 65401
573–308–3667

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