Prepared in cooperation with the U.S. Environmental Protection Agency

Water-Quality, Bed-Sediment, and Biological Data (October 2015 through September 2016) and Statistical Summaries of Data for Streams in the Clark Fork Basin, Montana

Open-File Report 2017–1136

Cover. Collecting aquatic insects for tissue analysis, Blackfoot River near Bonner (12340000).
Photograph by Michelle Hornberger, U.S. Geological Survey, taken August 6, 2017.

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By Kent A. Dodge, Michelle I. Hornberger, and Matthew A. Turner

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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.)	25.4	millimeter (mm)
inch (in.)	25,400	micrometer (μm)
mile (mi)	1.609	kilometer (km)
Area		
square mile (mi ²)	2.590	square kilometer (km ²)
Volume		
gallon (gal)	3.785	liter (L)
gallon (gal)	3,785	milliliter (mL)
acre-foot (acre-ft)	1,233	cubic meter (m ³)
Flow rate		
cubic foot per second (ft ³ /s)	0.02832	cubic meter per second (m ³ /s)
Mass		
ounce (oz)	28.35	gram (g)
parts per million	1	micrograms per gram (μg/g)
parts per million	1	micrograms per milliliter (μg/mL)
ton	907.2	kilogram (kg)
ton per day (ton/d)	907.2	kilogram per day

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

$$^{\circ}\text{F}=(1.8\times^{\circ}\text{C})+32$$

Datum

Horizontal coordinate information is referenced to the North American Datum of 1927 (NAD 27).

Supplemental Information

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

Water year is the 12-month period from October 1 through September 30 and is designated by the calendar year in which it ends. For example, water year 2016 is the period from October 1, 2015, through September 30, 2016.

Abbreviations

CRM	certified reference material
ICP–AES	inductively coupled plasma-atomic emission spectrometry
ICP–MS	inductively coupled plasma-mass spectrometry
LRL	laboratory reporting level
MRL	minimum reporting level
NIST	National Institute of Standards and Technology
NWQL	National Water Quality Laboratory
RSD	relative standard deviation
spp.	species
SRM	standard reference material
USGS	U.S. Geological Survey

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Abstract

Water, bed sediment, and biota were sampled in selected streams from Butte to near Missoula, Montana, as part of a monitoring program in the upper Clark Fork Basin of western Montana. The sampling program was led by the U.S. Geological Survey, in cooperation with the U.S. Environmental Protection Agency, to characterize aquatic resources in the Clark Fork Basin, with emphasis on trace elements associated with historic mining and smelting activities. Sampling sites were on the Clark Fork and selected tributaries. Water samples were collected periodically at 20 sites from October 2015 through September 2016. Bed-sediment and biota samples were collected once at 13 sites during August 2016.

This report presents the analytical results and quality-assurance data for water-quality, bed-sediment, and biota samples collected at sites from October 2015 through September 2016. Water-quality data include concentrations of selected major ions, trace elements, and suspended sediment. Samples for analysis of turbidity were collected at 13 sites, whereas samples for analysis of dissolved organic carbon were collected at 10 sites. In addition, samples for analysis of nitrogen (nitrate plus nitrite) were collected at two sites. Daily values of mean suspended-sediment concentration and suspended-sediment discharge were determined for three sites. Seasonal daily values of turbidity were determined for five sites. Bed-sediment data include trace-element concentrations in the fine-grained (less than 0.063 millimeter) fraction. Biological data include trace-element concentrations in whole-body tissue of aquatic benthic insects. Statistical summaries of water-quality, bed-sediment, and biological data for sites in the upper Clark Fork Basin are provided for the period of record.

Introduction

The Clark Fork originates near the town of Warm Springs in western Montana at the confluence of Silver Bow and Warm Springs Creeks (fig. 1). Along the 148-mile (mi) reach of stream from Silver Bow Creek in Butte to the Clark Fork near Missoula, six major tributaries enter: Blacktail Creek, Warm Springs Creek, Little Blackfoot River, Flint Creek, Rock Creek, and Blackfoot River. Principal surface water uses in the 6,000-square-mile (mi²) upper Clark Fork Basin above Missoula include irrigation, stock watering, small-scale industry (Cannon and Johnson, 2004), and habitat for trout fisheries. Primary current (2017) land uses are cattle production, logging, mining, residential development, and recreation. Large-scale mining and smelting were prevalent land uses in the upper basin for more than 100 years but are now either discontinued or substantially reduced in scale.

Deposits of copper, gold, silver, and lead ores were extensively mined, milled, and smelted in the drainages of Silver Bow and Warm Springs Creeks from about the 1860s to the 1980s (U.S. Environmental Protection Agency, 2004). Moderate- and small-scale mining also took place in the basins of most of the major tributaries to the upper Clark Fork. Tailings produced during past mineral processing commonly contain large quantities of trace elements such as arsenic, cadmium, copper, lead, and zinc. Eroded tailings mix with stream sediment and are deposited farther downstream in stream channels, on flood plains, in the Warm Springs Ponds, and at the location of the former Milltown Reservoir (fig. 1) whose dam (Milltown Dam, not shown in figure) was breached on March 28, 2008 (Andrews, 1987). The presence of elevated trace-element concentrations in water and bed sediment can pose a potential risk to aquatic biota and human health (U.S. Environmental Protection Agency, 2004).

Figure 1. Location of study area in the Clark Fork Basin, Montana.

Concern about the potential toxicity of trace elements to aquatic biota and human health has resulted in a comprehensive effort by State, Federal, Tribal, and private entities to characterize the aquatic resources in the upper Clark Fork Basin to guide and monitor remedial cleanup activities. The development of a long-term database was considered necessary to detect trends over time to evaluate the effectiveness of remediation. Water-quality data have been collected by the U.S. Geological Survey (USGS) at selected sites in the upper Clark Fork Basin since 1985 (Lambing, 1987 through 1991; Lambing and others, 1994, 1995; Dodge and others, 1996 through 2010, 2012, 2013, 2014a, 2014b, 2017; Dodge and Hornberger, 2015). Trace-element data for bed sediment and biota (aquatic benthic insects) have been collected intermittently at selected sites since 1986 as part of studies on the contamination of bed-sediment quality and bioaccumulation of metals led by the USGS National Research Program (Axtmann and Luoma, 1991; Cain and others, 1992, 1995; Axtmann and others, 1997; Hornberger and others, 1997). In March 1993, an expanded monitoring program for water, bed sediment, and biota in the upper basin was implemented by the USGS, in cooperation with the U.S. Environmental Protection Agency, to systematically quantify the seasonal and annual variability in selected constituents.

The purpose of this report is to present water-quality data from samples collected at 20 sites and bed-sediment and biological data from samples collected at 13 sites in the Clark Fork Basin from October 2015 through September 2016 (fig. 1). Quality-assurance data are presented for water-quality, bed-sediment, and biota samples collected during the same period. Statistical summaries also are provided for water-quality, bed-sediment, and biological data collected at the sites for the period of record.

Sampling Locations and Types of Data

Sampling sites for the monitoring program in the upper Clark Fork Basin from Butte to near Missoula (fig. 1) are on the Clark Fork main stem (including Silver Bow Creek), three major tributaries (Blacktail Creek, Warm Springs Creek, and Blackfoot River), and three smaller tributaries (Mill Creek, Willow Creek, and Lost Creek). The sites, types of data collected, and period of record for each type of data are listed in table 1. Main-stem sampling sites were selected to divide the upper Clark Fork into reaches of approximate uniform length and to have each reach encompassing either a major tributary or depositional environment (Warm Springs Ponds and the former Milltown Reservoir). Major tributaries were sampled to describe water-quality, bed-sediment, and biological characteristics of important hydrologic sources in the upper Clark Fork Basin and to provide reference comparisons to the main

stem. The three smaller tributaries were sampled to gain better spatial resolution on sources of metals entering the Clark Fork in an area of historical metal-processing activities near Anaconda, Montana. Water-quality samples were collected periodically at 20 sites. Daily suspended-sediment samples were collected at three sites, and daily turbidity values were computed using data measured by continuous turbidity monitors recording every 15 minutes at five sites. Bed-sediment and biological samples were collected annually at 13 sites, and one additional site (Warm Springs Creek at Warm Springs [USGS site number 12323770]) was sampled every third year. Continuous streamflow data were collected at 19 sites.

Properties measured onsite and constituents for which water, bed-sediment, and biota samples were analyzed are listed in table 2. Data-quality objectives for analyses of water samples are listed in table 3. Results of onsite measurements of stream properties; laboratory analyses of water-quality, bed-sediment, and biota samples; and quality-assurance data for water year 2016 (October 1, 2015, through September 30, 2016) are listed in tables 4 through 24 at the back of the report. Statistical summaries of long-term water-quality, bed-sediment, and biological data collected between March 1985 and September 2016 are listed in tables 25 through 27 at the back of the report.

Quality assurance of data was maintained through the use of documented procedures described in the following sections. These quality-assurance data were designed to provide environmentally representative data. Acceptable results of the procedures were verified with quality-control samples that were collected systematically to provide a measure of the accuracy, precision, and bias of the environmental data, and to identify problems associated with sampling, processing, or analysis.

Water-Quality Data

Water-quality data consist of onsite measurements of selected stream properties and laboratory determination of concentrations of chemical and physical constituents in periodically collected stream samples. Water samples were collected at 20 sites in the upper Clark Fork Basin six to eight times per year on a schedule designed to describe seasonal and hydrologic variability. At the three daily suspended-sediment sites, suspended-sediment samples were collected by a contract observer two to nine times per week, depending on season and flow conditions. Continuous turbidity monitors were operated seasonally (March to September 2016) at five sites; turbidity data (recorded every 15 minutes) were used to compute daily mean turbidity values (table 1). Water-quality data are available in the USGS National Water Information System web interface (U.S. Geological Survey, 2017).

Table 1. Type and period of data collection at sampling sites in the Clark Fork Basin, Montana.

[--, no data; P, present; D, discontinued]

Site number (fig. 1)	Site name	Continuous- record streamflow	Periodic water quality ¹	Daily suspended sediment	Daily turbidity (seasonal)	Fine-grained bed sediment ²	Biota ²
12323230	Blacktail Creek at Harrison Avenue, at Butte	--	03/1993–08/1995, 12/1996–08/2003, 12/2004–P	--	--	--	--
12323250	Silver Bow Creek below Blacktail Creek, at Butte	10/1983–P	03/1993–08/1995, 12/1996–P	--	--	--	--
12323600	Silver Bow Creek at Opportunity	07/1988–P	03/1993–08/1995, 12/1996–P	03/1993–09/1995, D	--	07/1992–P	07/1992, 08/1994–08/1995, 08/1997–P
12323670	Mill Creek near Anaconda	10/2004–P	12/2004–P	--	06/2006–09/2012, D	--	--
12323700	Mill Creek at Opportunity	04/2003–P	03/2003–P	--	04/2013–P	--	--
12323710	Willow Creek near Anaconda	03/2005–P	12/2004–P	--	06/2006–09/2012, D	--	--
12323720	Willow Creek at Opportunity	04/2003–P	03/2003–P	--	04/2013–P	--	--
12323750	Silver Bow Creek at Warm Springs	03/1972–09/1979, 04/1993–P	03/1993–P	04/1993–09/1995, D	--	07/1992–P	07/1992–P
12323760	Warm Springs Creek near Anaconda	10/1997–P	10/2005–P	--	05/2006–09/2012, D	--	--
12323770	Warm Springs Creek at Warm Springs	10/1983–P	03/1993–P	--	04/2013–P	08/1995, 08/1997, 08/1999, 08/2002, 08/2005, 08/2008, 08/2011, 08/2014	08/1995, 08/1997, 08/1999, 08/2002, 08/2005, 08/2008, 08/2011, 08/2014
12323800	Clark Fork near Galen	07/1988–P	07/1988–P	--	--	08/1987, 08/1991–P	08/1987, 08/1991–P
12323840	Lost Creek near Anaconda	10/2004–P	12/2004–P	--	05/2006–P	--	--
12323850	Lost Creek near Galen	04/2003–P	03/2003–P	--	--	--	--
461415112450801	Clark Fork below Lost Creek, near Galen	--	--	--	--	08/1996–P	08/1996–P

Table 1. Type and period of data collection at sampling sites in the Clark Fork Basin, Montana.—Continued

[--, no data; P, present; D, discontinued]

Site number (fig. 1)	Site name	Continuous- record streamflow	Periodic water quality ¹	Daily suspended sediment	Daily turbidity (seasonal)	Fine-grained bed sediment ²	Biota ²
461559112443301	Clark Fork at county bridge, near Racetrack	--	--	--	--	08/1996–P	08/1996–P
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	--	--	--	--	08/1996–P	08/1996–P
12324200	Clark Fork at Deer Lodge	10/1978–P	03/1985–P	03/1985–08/1986, 04/1987–03/2003, 08/2003–2014, D	03/2016–P	08/1986–08/1987, 08/1990–P	08/1986–08/1987, 08/1990–P
12324400	Clark Fork above Little Blackfoot River, near Gar- rison	02/2009–P	03/2009–P	--	--	08/2009–P	08/2009–P
12324680	Clark Fork at Gold- creek	10/1977–P	03/1993–P	--	--	07/1992–P	07/1992–P
12331800	Clark Fork near Drummond	04/1993–P	03/1993–P	--	--	08/1986, 08/1987, 08/1991–P	08/1986, 08/1991–P
12334550	Clark Fork at Turah Bridge, near Bonner	03/1985–P	03/1985–P	03/1985–03/2003, 08/2003–P	--	08/1986, 08/1991–P	08/1986, 08/1991–P
12340000	Blackfoot River near Bonner	10/1939–P	03/1985–P	07/1986–04/1987, 06/1988–09/1995, 10/2005–P	--	08/1986–08/1987, 08/1991, 08/1993–08/1996, 08/1998–08/2001, 09/2003, 08/2006–P	08/1986–08/1987, 08/1991, 08/1993, 08/1996, 08/1998, 09/2000, 09/2003, 08/2006–P
12340500	Clark Fork above Missoula	03/1929–P	07/1986–P ³	07/1986–04/1987, 06/1988–01/1996, 03/1996–03/2003, 08/2003–P	04/2007–09/2007, D	08/1997–P	08/1997–P

¹Onsite measurements of physical properties and laboratory analyses for selected major ions, trace elements, and suspended sediment. Before March 1993, laboratory analyses included only trace elements and suspended sediment. In 2012, dissolved organic carbon and turbidity analyses were included at select sites. In 2013, nutrient sample analyses were included for two sites near Butte, Montana.

²Laboratory analyses of fine-grained bed sediment and aquatic benthic insects for trace elements.

³Before October 1989, water-quality data for Clark Fork above Missoula included only suspended-sediment data.

Table 2. Properties and constituents measured onsite or analyzed in water, bed-sediment, and biota samples from the Clark Fork Basin, Montana.

Water		Bed sediment	Biota
Property	Constituent	Constituent	Constituent
Streamflow	Hardness (calculated)	Arsenic	Arsenic
pH	Calcium	Cadmium	Cadmium
Specific conductance	Magnesium	Chromium	Chromium
Temperature	Potassium	Copper	Copper
Turbidity	Sodium	Iron	Iron
	Alkalinity	Lead	Lead
	Chloride	Manganese	Manganese
	Fluoride	Nickel	Nickel
	Silica	Zinc	Zinc
	Sulfate		
	Nitrate plus nitrite		
	Cadmium		
	Copper		
	Iron		
	Lead		
	Manganese		
	Zinc		
	Arsenic		
	Dissolved organic carbon		
	Suspended sediment		

Methods

Water samples were collected and composited from vertical transits throughout the entire stream depth at multiple locations across the stream using depth- and width-integration methods described by Ward and Harr (1990), Edwards and Glysson (1999), and the U.S. Geological Survey (variously dated). The use of these methods provides a vertically and laterally discharge-weighted composite sample that is intended to be representative of the entire flow passing through the cross section of a stream. Samplers consisted of isokinetic depth-integrating water-quality samplers (Davis and the Federal Interagency Sedimentation Project, 2005) that were constructed of plastic or coated with a nonmetallic rubber-coating paint and equipped with polytetrafluoroethylene nozzles.

Instantaneous streamflow was determined at the time of water sampling either by direct measurement or from stage-discharge rating tables (Rantz and others, 1982). Daily mean streamflow values during ice periods were labeled as estimated because backwater affected the stage-discharge relation. Onsite measurements of pH, specific conductance, and water temperature were made during collection of periodic water samples. Onsite sample processing, including filtration and preservation, was completed according to procedures

described by Ward and Harr (1990), Horowitz and others (1994), and the U.S. Geological Survey (variously dated).

Composited water samples were analyzed for the constituents listed in table 2. Filtered (0.45-micrometer [μm] pore size) and unfiltered recoverable concentrations of trace elements (arsenic, cadmium, copper, iron, lead, manganese, and zinc); filtered concentrations of calcium, magnesium, potassium, sodium, chloride, fluoride, silica, sulfate, nitrogen (nitrate plus nitrite), and organic carbon; and unfiltered turbidity (selected sites) were measured by the USGS National Water Quality Laboratory (NWQL) in Denver, Colo. Concentrations of calcium and magnesium were used to calculate water hardness.

Concentrations of arsenic, cadmium, copper, lead, manganese, and zinc in filtered samples were measured using inductively coupled plasma-mass spectrometry (ICP-MS) (Garbarino and others, 2006). Concentrations of calcium, magnesium, and iron in filtered samples were measured using inductively coupled plasma-atomic emission spectrometry (ICP-AES) (Fishman and Friedman, 1989). Concentrations of potassium, sodium, alkalinity, chloride, fluoride, silica, sulfate, nitrogen (nitrate plus nitrite), and dissolved organic carbon were measured in filtered samples collected at select sites in the upper Clark Fork Basin. Potassium was measured

by Standard Method 3120 (American Public Health Association, 1998); sodium and silica were analyzed by ICP–AES (Fishman and Friedman, 1989); alkalinity was measured by electrometric titration (Fishman and Friedman, 1989); chloride, fluoride, and sulfate were measured by ion chromatography (Fishman and Friedman, 1989); nitrogen (nitrate plus nitrite) was measured by colorimetric enzymatic reduction (Patton and Kryskalla, 2011); and dissolved organic carbon was measured by persulfate oxidation and infrared spectrometry (Brenton and Arnett, 1993). Recoverable concentrations of trace elements were measured in unfiltered samples that were first digested with dilute hydrochloric acid (Hoffman and others, 1996). For cadmium, iron, lead, and manganese, the digested samples were analyzed by ICP–MS as described by Garbarino and Struzeski (1998). For arsenic, copper, and zinc, the digested samples were analyzed by ICP–MS as described by Garbarino and others (2006). Turbidity was measured by the NWQL using Standard Method 2130 (American Public Health Association, 1998) in selected unfiltered samples.

Water samples for analysis of suspended sediment also were collected from multiple vertical transits when periodic water samples were collected. Water samples were analyzed for suspended-sediment concentration and the percentage of suspended-sediment mass finer than 0.062-millimeter (mm) diameter (silt size and smaller) by the USGS Wyoming-Montana Water Science Center Sediment Laboratory (hereinafter referred to as the “Wyoming-Montana Sediment Laboratory”) in Helena, Mont., according to methods described by Guy (1969) and Dodge and Lambing (2006).

Suspended-sediment samples for the three daily suspended-sediment sites (table 1) were collected by local contract observers using the depth-integration method at a single vertical transit near midstream as described by Guy (1969). The samples were analyzed for suspended-sediment concentration, which was used to calculate daily mean suspended-sediment concentrations according to methods described by Porterfield (1972).

Suspended-sediment discharge was determined according to the following equation (Porterfield, 1972):

$$Q_s = Q_w \times C_s \times k \quad (1)$$

where

- Q_s is suspended-sediment discharge, in tons per day;
- Q_w is streamflow, in cubic feet per second;
- C_s is suspended-sediment concentration, in milligrams per liter; and
- k is a units-conversion constant (0.0027) to convert instantaneous suspended-sediment discharge to an equivalent daily suspended-sediment discharge.

Turbidity was measured using turbidity monitors (Yellow Springs Instruments Company 6136 turbidity sensor) at five sites in the upper Clark Fork Basin (table 1). The turbidity

sites are operated seasonally, generally from early spring (after ice breakup) to early fall (before stream freeze-up). Turbidity values are recorded at 15-minute intervals and can be viewed in real-time in the USGS National Water Information System web interface (U.S. Geological Survey, 2017). These values differ from the turbidity values reported from laboratory analyses of the discrete water-quality samples because of differences in instrumentation and sampling procedures. Continuous recordings enable determination of the minimum and maximum turbidity values for each day and a daily mean turbidity, which is based on the average of all values in a 24-hour period. Procedures for the operation of continuous turbidity monitors and for daily record computations are described by Wagner and others (2006).

Results

Water-quality data from samples collected periodically during water year 2016 (October 1, 2015, through September 30, 2016) are listed in table 4. In water year 2016, there were two water-quality samples with missing dissolved iron because they did not pass review and could not be resolved by reruns. Two turbidity samples were inadvertently not collected. Daily mean streamflow, daily mean suspended-sediment concentration, and daily suspended-sediment discharge for water year 2016 at the three daily suspended-sediment sites are listed in tables 5 through 7 along with monthly summary statistics and annual totals for streamflow and suspended-sediment discharge. Daily maximum, minimum, and mean turbidity at five sites are listed in tables 8 through 12 along with monthly summary statistics. Water-quality data are available in the USGS National Water Information System (U.S. Geological Survey, 2017).

Quality Assurance

Quality-assurance procedures used for the collection and field processing of water samples are described by Ward and Harr (1990), Horowitz and others (1994), Edwards and Glysson (1999), Lambing (2006), and the U.S. Geological Survey (variously dated). Standard procedures used by the NWQL for internal sample handling and quality assurance are described by Friedman and Erdmann (1982), Jones (1987), and Pritt and Raese (1995). Quality-assurance procedures used by the Wyoming-Montana Sediment Laboratory are described by Dodge and Lambing (2006). Standard procedures used for the calibration, measurement, and quality assurance of turbidity monitors are described by Anderson (2005).

The quality of analytical results reported for water samples was evaluated using quality-control samples that were submitted from the field and analyzed concurrently in the laboratory with routine samples. These quality-control samples consisted of replicates, spikes, and blanks that provided quantitative information on the precision and bias of the overall field and laboratory processes. Each type of quality-control

sample was submitted at a proportion equivalent to about 5 percent of the total number of water samples; therefore, the total number of quality-control samples represented about 15 percent of the total number of water samples.

In addition to the use of quality-control samples submitted from the field, internal quality-assurance practices are done systematically by the NWQL to provide quality control of analytical procedures (D.L. Stevenson, U.S. Geological Survey, written commun., 2012). These internal practices include analyses of quality-control samples such as calibration standard samples, standard reference water samples, replicate samples, deionized-water blank samples, or spiked samples at a proportion equivalent to at least 10 percent of the sample load. The NWQL participates in a blind-sample program in which standard reference water samples prepared by the USGS Branch of Quality Systems are routinely inserted into the sample line for each analytical method at a frequency proportional to the sample load. The laboratory also participates in external evaluation studies and audits with the National Environmental Laboratory Accreditation Program, the U.S. Environmental Protection Agency, Environment Canada, and the USGS Branch of Quality Systems to assess analytical performance.

Replicate data can be collected in different ways to provide an assessment of precision (reproducibility) of analytical results. Replicate samples are two or more samples considered to be almost identical in composition. Replicate samples can be collected in the field (field replicate) either by repeating the collection process to obtain two or more independent composite samples or by splitting a single composite sample into two or more subsamples. The individual replicate samples are then analyzed separately. Likewise, a single sample can be analyzed two or more times in the laboratory to obtain a measure of analytical precision (laboratory replicate).

Precision of analytical results for field replicates can be affected by numerous sources of variability within the field and laboratory environments, including sample collection, processing, and analysis. Data on overall precision for samples exposed to field and laboratory sources of variability were provided by obtaining replicate stream samples for chemical analysis in the field by splitting a composite stream sample. Replicate stream samples for suspended-sediment analysis were obtained in the field by collecting two independent cross-sectional samples. Analyses of field replicate samples indicate the reproducibility of environmental data that are affected by the combined potential variability introduced by field and laboratory processes.

Precision of analytical results for laboratory replicates (Boughton, 2017), which exclude field sources of variability, was determined using two independent chemical analyses of aliquots from a single sample selected from the group of samples constituting each analytical run. A separate analysis of the sample was made at the beginning and end of each analytical run to provide information on the reproducibility of laboratory analytical results independent of possible variability caused by field sample collection and processing. Laboratory replicates

are not obtainable for suspended-sediment samples because the samples are consumed during the analysis.

Spiked samples (Boughton, 2017) are used to evaluate bias, which measures the ability of an analytical method to accurately quantify a known amount of analyte added to a sample. Because some constituents in stream water potentially can interfere with the analysis of a sample for a targeted analyte, it is important to determine if such effects are causing biased (consistently high or low) results. Deionized-water blank samples and aliquots of stream samples were spiked in the laboratory with known amounts of the same trace elements for which water samples were being analyzed. Analyses of spiked blanks indicate if the spiking procedure and analytical method are within control for a water matrix that is presumably free of chemical interference. Analyses of spiked aliquots of stream samples indicate if the chemical matrix of the stream water interferes with the analytical measurement and if these interferences could contribute substantial bias to reported trace-element concentrations for stream samples.

Deionized-water blank samples were submitted for every field trip and analyzed to identify the presence and magnitude of contamination that could potentially bias analytical results. The type of blank sample routinely tested was a field blank. Field blanks are aliquots of deionized water that are certified as constituent free and are processed in the field through the sampling equipment used to collect stream samples. These blanks then are subjected to the same processing (sample splitting, filtration, preservation, transportation, and laboratory handling) as stream samples. Blank samples are analyzed for the same constituents as stream samples to identify if any detectable concentrations exist.

All water samples were handled in accordance with chain-of-custody procedures that provide documentation of sample identity, shipment, receipt, and laboratory handling (Driscoll and Hatcher, 2010). All environmental and quality-control samples submitted from a sampling episode were stored in a secure area of the NWQL and analyzed as a discrete sample group, independent of other samples submitted to the NWQL; therefore, the quality-control data apply solely to the analytical results for stream samples reported herein and provide a direct measure of data quality for this monitoring program.

Data-quality objectives (table 3) were established for water-quality data as part of the study plan for the expanded long-term monitoring program started in 1993. The objectives identify the analytical requirements of detectability and serve as a guide for identifying questionable data by establishing acceptable limits for precision and bias of laboratory results. Comparisons of quality-control data to data-quality objectives were used to evaluate if sampling and analytical procedures produced environmentally representative data in a consistent manner. Data that did not meet the objectives were evaluated for acceptability; if necessary, additional quality-control samples were submitted and corrective action was taken.

The NWQL uses a statistically based convention for establishing minimum laboratory reporting levels (LRLs)

Table 3. Data-quality objectives for analyses of water samples collected in the Clark Fork Basin, Montana.

[lab, laboratory; NTRU, nephelometric turbidity ratio unit; --, not determined; mg/L, milligram per liter; µg/L, microgram per liter; mm, millimeter]

Constituent	Data-quality objectives		
	Detectability	Precision	Bias
	Laboratory reporting level	Maximum relative standard deviation of replicate analyses (percent)	Maximum deviation of spike recovery (percent)
Turbidity, unfiltered, lab, NTRU	2.0 units	20	--
Calcium, filtered	0.022 mg/L	20	--
Magnesium, filtered	0.011 mg/L	20	--
Potassium, filtered	0.03 mg/L	20	--
Sodium, filtered	0.06 mg/L	20	--
Alkalinity, filtered, lab	4.0–4.6 mg/L	20	--
Chloride, filtered	0.02 mg/L	20	--
Fluoride, filtered	0.01 mg/L	20	--
Silica, filtered	0.018 mg/L	20	--
Sulfate, filtered	0.02 mg/L	20	--
Nitrate plus nitrite, filtered	0.01 mg/L	20	--
Cadmium, filtered	0.030 µg/L	20	25
Cadmium, unfiltered recoverable	0.03 µg/L	20	25
Copper, filtered	0.80 µg/L	20	25
Copper, unfiltered recoverable	0.8 µg/L	20	25
Iron, filtered	4.0 µg/L	20	25
Iron, unfiltered recoverable	4.6 µg/L	20	25
Lead, filtered	0.040 µg/L	20	25
Lead, unfiltered recoverable	0.04 µg/L	20	25
Manganese, filtered	0.40 µg/L	20	25
Manganese, unfiltered recoverable	0.4 µg/L	20	25
Zinc, filtered	2.0 µg/L	20	25
Zinc, unfiltered recoverable	2 µg/L	20	25
Arsenic, filtered	0.10 µg/L	20	25
Arsenic, unfiltered recoverable	0.01–0.2 µg/L	20	25
Organic carbon, filtered	0.23 mg/L	20	--
Sediment, suspended, percent finer than 0.062 mm	1 percent	20	--
Sediment, suspended	1 mg/L	20	--

for analytical results and for reporting low-concentration data (Childress and others, 1999). Quality-control data are collected by the NWQL on a continuing basis to determine long-term method detection levels and LRLs. These values are reevaluated each year and, consequently, can change from year to year. The methods used to determine the LRLs are designed to limit the likelihood of a false positive or false negative error to 1 percent or less; accordingly, concentrations are reported as less than the LRL for samples in which the analyte was not detected. The LRL for organics is twice the long-term method detection level. A thorough description of these laboratory definitions can be found at the USGS NWQL

website (http://www.nwql.cr.usgs.gov/qas/Reporting_Limits/Website/Abbreviations_Definitions.pdf). Estimated values are noted with a remark code of “E” for describing streamflow (for ice-affected periods) and turbidity (for periods that exceed the manufacturers’ threshold for the sonde).

The precision of analytical results for a constituent can be determined by estimating a standard deviation of the differences in concentrations between replicate analyses for several sets of samples. These replicate analyses may consist either of individual analyses of a pair of samples considered to be almost identical (field replicates) or of multiple analyses of an individual sample (laboratory replicates). The differences in

concentration between replicate analyses can be used to estimate a standard deviation according to the following equation (Taylor, 1987):

$$S = \sqrt{\frac{\sum d^2}{2k}} \quad (2)$$

where

- S is the standard deviation of the difference in concentration between replicate analyses,
- d is the difference in concentration between each pair of replicate analyses, and
- k is the number of pairs of replicate analyses.

Precision also can be expressed as a relative standard deviation (RSD), in percent, which is computed from the standard deviation and the mean concentration for all the replicate analyses. Expressing precision relative to a mean concentration standardizes the comparison of precision among individual constituents. The RSD is calculated according to the following equation (Taylor, 1987):

$$RSD = \frac{S}{\bar{x}} \times 100 \quad (3)$$

where

- RSD is the relative standard deviation,
- S is the standard deviation, and
- $\bar{x}$ is the mean concentration for all replicate analyses.

Paired analyses of field replicates are listed in table 13. The overall precision for each constituent estimated from analyses of field replicates, which include field and laboratory sources of variability, is listed in table 14. The data-quality objective used to indicate acceptable precision of results for field replicates was a maximum RSD of 20 percent (table 3). Precision estimates for the analytical results of field replicates were within the 20-percent RSD limit for all constituents.

The precision for each constituent estimated from laboratory replicate analyses, which include only laboratory sources of variability, is listed in table 15. Statistics for the precision of analytical results for laboratory replicates are calculated using unrounded values stored in laboratory data files. The data-quality objective used to indicate acceptable precision of results for laboratory replicates was a maximum RSD of 20 percent (table 3). Precision estimates for the laboratory replicates were within the 20-percent RSD limit for all constituents (table 15). No adjustments were made to analytical data based on the precision of replicate analyses.

Recovery efficiency for analyses of constituents is determined by comparing a sample and a spiked aliquot of the same sample. The data-quality objective for acceptable spike recovery of trace elements in water samples determined by the NWQL was a maximum deviation of 25 percent from a theoretical 100-percent recovery of added constituent (table 3).

At the laboratory, a spiked deionized-water blank sample and a spiked aliquot of a stream sample were prepared and analyzed along with the original unspiked sample. The differences between the spiked and unspiked sample concentrations were determined and used to compute recovery, in percent, according to equation 4:

$$R = \frac{D}{C} \times 100 \quad (4)$$

where

- R is the spike recovery, in percent;
- D is the difference between the spiked and unspiked sample concentrations; and
- C is the concentration of material used to spike the sample.

If the spike recovery of a trace element was outside a range from 75 to 125 percent, the instrument was recalibrated and the entire sample set and all spiked samples were reanalyzed for that particular trace element until recoveries were improved to the extent possible. Recovery efficiency for individual trace elements in laboratory-spiked deionized-water blank samples and in laboratory-spiked stream samples is listed in tables 16 and 17, respectively. The mean spike recovery for deionized-water blank samples spiked with trace elements (table 16) ranged from 95.9 to 106 percent; the smallest individual constituent recovery was copper, unfiltered recoverable, at 87.4 percent, and the largest was lead, unfiltered recoverable, at 116 percent. The 95-percent confidence intervals (Taylor, 1987) for the mean spike recovery for each constituent for which deionized-water blank samples were analyzed (table 16) did not exceed a 25-percent deviation from an expected 100-percent recovery. The mean spike recovery for spiked stream samples (table 17) ranged from 84.3 to 101 percent; the smallest individual constituent recovery was iron, unfiltered recoverable, at 48.2 percent and the largest was arsenic, unfiltered recoverable, at 137 percent. The 95-percent confidence intervals for the mean spike recovery for each constituent for which stream water samples were analyzed (table 17) did not exceed a 25-percent deviation from an expected 100-percent recovery, except for cadmium, unfiltered recoverable (130 percent); iron, unfiltered recoverable (48.2 percent); and arsenic, unfiltered recoverable (61.9 and 137 percent). No adjustments were made to analytical data based on the mean spike recovery.

High or low bias is indicated if the 95-percent confidence interval does not include 100-percent recovery, thereby indicating a consistent deviation or bias, either high or low. Confidence intervals for percent recovery include 100 percent for all laboratory-spiked deionized-water blank samples (table 16) except for cadmium, filtered (94.3–97.5 percent); manganese, filtered (105–107 percent); and manganese unfiltered recoverable (101–107 percent). Confidence intervals for percent recovery include 100 percent for all laboratory-spiked stream samples (table 17) except for cadmium, filtered

(95.0–99.5 percent); copper, unfiltered recoverable (79.5–99.5 percent); and zinc, unfiltered recoverable (86.6–96.3 percent). No adjustments were made to analytical results for stream samples based on spike recoveries.

Analytical results for field blanks are listed in table 18. A field blank with constituent concentrations less than or equal to the LRL for the analytical method indicates that the entire process of sample collection, field processing, and laboratory analysis is presumably free of contamination. If detectable concentrations of trace elements in field blanks were greater than or equal to twice the LRL, the concentrations were noted during data review. Analytical results from the field blank collected as part of the subsequent sample set were evaluated for evidence of a consistent trend that could indicate systematic contamination. Sporadic, infrequent, nonconsecutive exceedances of twice the LRL most likely represented random contamination or instrument calibration error that was not persistent in the process and was not likely to cause positive bias in a long-term record of analytical results; however, if concentrations for a particular constituent exceeded twice the LRL in field blanks from two consecutive field trips, additional blank samples were collected from individual components of the processing sequence and were submitted for analysis to identify the source of contamination.

Constituent concentrations in field blanks (table 18) almost always were less than the LRL. Two sample concentrations of filtered silica (0.032 and 0.036 milligrams per liter [mg/L]) exceeded the LRL of 0.018 mg/L. One sample concentration of copper, unfiltered recoverable was detected at 0.3 micrograms per liter [$\mu\text{g/L}$]; one sample concentration of iron, filtered (11.0 $\mu\text{g/L}$) exceeded the LRL of 4.0 $\mu\text{g/L}$; one sample concentration of iron, unfiltered recoverable (8.3 $\mu\text{g/L}$) exceeded the LRL of 4.6 $\mu\text{g/L}$; and one sample concentration of lead, unfiltered recoverable (0.03 $\mu\text{g/L}$) was detected. No adjustments were made to water-quality sample data pending the results of this review.

Bed-Sediment Data

Bed-sediment data for the long-term monitoring program in the Clark Fork Basin consist of trace-element concentrations in the fine-grained (less than 0.063 mm) fraction of bed-sediment samples. Bed-sediment samples were collected once annually at 13 sites (fig. 1 and table 1) during low, stable flow conditions at about the same time of year as previous samples (typically August) to facilitate data comparisons among years. Warm Springs Creek at Warm Springs (USGS site number 12323770) is sampled once every 3 years rather than once annually and was not sampled during water year 2016. Bed-sediment data are available in a machine readable data release (Boughton, 2017), in each annual report or by request in Microsoft® Excel format from the authors.

Methods

Fine-grained bed-sediment samples were collected in August 2016 using protocols described by Axtmann and Luoma (1991). Samples were collected from the surfaces of streambed deposits in areas near the edge of the stream using an acid-washed polypropylene scoop. Whenever possible, samples were collected from both sides of the stream.

Individual samples of bed sediment were collected by scooping material from the surfaces of three to five randomly selected deposits along pools or low-velocity areas. The three to five individual samples were combined to form a single composite sample. This collection process was repeated three times to obtain three composite samples. Each composite sample was wet-sieved onsite through a 0.063-mm polyester-mesh sieve using ambient stream water. The fraction of bed sediment in each composite sample that was finer than 0.063 mm was collected in an acid-washed 500-milliliter (mL) polyethylene bottle and transported to the laboratory on ice.

Bed-sediment samples were processed and analyzed at the USGS National Research Program Ecology and Contaminants Project Laboratory in Menlo Park, California. Bed-sediment samples were oven-dried at 60 degrees Celsius ($^{\circ}\text{C}$) and ground into smaller particle sizes using an acid-washed, ceramic mortar and pestle. Single aliquots of approximately 0.5–0.6 grams (g) of sediment from each of the three composite bed-sediment samples were digested using a hot, concentrated, nitric acid reflux according to methods described by Luoma and Bryan (1981). Laboratory replicates were analyzed by taking an aliquot from one of the three sieved replicate samples at each site. After a 2-week digestion period, the aliquots were evaporated to dryness on a hot plate. The dry residue was reconstituted in 10 mL of 0.6N (normal) hydrochloric acid. The reconstituted aliquots were then filtered through a 0.45- μm pore-size filter using a syringe and an in-line disposable filter cartridge. The filtrate was diluted to a 1:10 ratio with 0.6N hydrochloric acid. These final solutions were analyzed for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc using inductively coupled plasma-optical emission spectrometry (Hornberger and others, 1997). The smallest concentration of a constituent that can be reliably reported for analyses of bed sediment is termed the minimum reporting level (MRL).

Results

Concentrations of trace elements measured in samples of fine-grained bed sediment collected during August 2016 are listed in table 19. Liquid-phase concentrations, measured in micrograms per milliliter, were analyzed in the reconstituted aliquots of digested bed sediment. Solid-phase concentrations, measured in micrograms per gram, were calculated using the following equation:

$$\mu\text{g/g} = \frac{(\mu\text{g/mL})(\text{volume of digested sample, in mL})}{(\text{dry weight of sample, in grams})(\text{dilution ratio})} \quad (5)$$

where

$\mu\text{g/g}$ is micrograms per gram,
 $\mu\text{g/mL}$ is micrograms per milliliter, and
 mL is milliliters.

The reported solid-phase concentrations (table 19) are the means of all analyses for replicate aliquots from each composite bed-sediment sample collected at the site. Because the conversion from liquid-phase to solid-phase concentration is dependent on the dilution ratio and the dry weight of the sample, MRLs for some trace elements might differ among sites and among years.

Quality Assurance

The USGS protocols for field collection and processing of bed-sediment samples are designed to prevent contamination from metal sources. Nonmetallic sampling and processing equipment (white plastic scoop, funnel-frame apparatus, and 500-mL sample bottles) were acid-washed and rinsed with deionized water before the collection of the first sample. Polyester-mesh sieves were washed in laboratory-grade detergent and rinsed with deionized water. All equipment received a final rinse onsite with stream water. Sampling equipment used at more than one site was rinsed thoroughly between sites with stream water. Separate sieves were used at each site and, therefore, did not require between-site cleaning. Bed-sediment samples were collected sequentially at sites along a general increasing concentration gradient (that is, downstream sites have lower metal concentrations in bed sediments compared to upstream sites) to minimize effects from potential site-to-site carryover contamination (Axtmann and Luoma, 1991).

Quality assurance of analytical results for bed-sediment samples included laboratory-instrument calibration with standard solutions and analysis of quality-control samples designed to identify the presence and magnitude of bias (Ellen V. Axtmann, U.S. Geological Survey, written commun., 1994). Quality-control samples consisted of standard reference materials (SRMs) issued by the National Institute of Standards and Technology (NIST) and procedural blanks. Ten low-concentration SRMs, 10 high-concentration SRMs, and 13 procedural blanks were analyzed.

Standard reference materials are commercially prepared materials that have certified concentrations of trace elements. Analyses of SRMs are used to indicate the ability of the method to accurately measure a known quantity of a constituent. Multiple analyses of SRMs are made to derive a mean and 95-percent confidence interval for recovery. Recovery efficiency for trace-element analyses of SRMs for bed sediment is listed in table 20. Two SRMs, consisting of agricultural soils and representing low and high concentrations of trace elements, were analyzed to test recovery efficiency for a range of

concentrations similar to those discovered in the bed sediment in streams in the upper Clark Fork Basin.

The digestion process used to analyze bed-sediment samples is not a "total" digestion (does not liberate elements associated with crystalline lattices); therefore, 100-percent recovery may not be achieved for elements strongly bound to the sediment. The percent recovery of trace elements for SRM analyses that use less than a total digestion is useful to indicate which trace elements display strong sediment-binding characteristics in the SRM and if analytical recovery is consistent among multiple sets of analyses.

Although data-quality objectives have not been established for bed sediment, percent recoveries for individual trace elements (table 20) illustrate analytical performance. Metal recoveries of sediment digests were evaluated with NIST 2709a San Joaquin soils and NIST 2711a Montana soil II. Mean recoveries in SRM 2709a ranged from 49.1 to 91.0 percent of the certified concentrations (table 20). The mean recoveries were within 24 percent of the 95-percent confidence interval for copper, iron, manganese, nickel and zinc. Elements with low certified concentrations (cadmium, 0.371 $\mu\text{g/g}$) or with a strong association with crystalline lattices (arsenic, chromium, lead) had lower percent recoveries (between 49.1 and 67.6 percent). Mean recoveries in SRM 2711a ranged from 51.3 to 100 percent (table 20). The percent recoveries were within 16 percent of the 95-percent confidence interval for arsenic, cadmium, copper, iron, lead, nickel, and zinc and within 21 percent for manganese. Chromium had the lowest mean recovery (51.3 percent) because of the strong binding nature of the crystalline lattice. No adjustments were made to trace-element concentrations in bed-sediment samples based on recovery efficiencies.

Procedural blanks for bed-sediment samples consisted of the analysis of the same reagents used for sample digestion and reconstitution. Concentrated nitric acid used for sample digestion was heated and evaporated to dryness. After evaporation, 0.6N hydrochloric acid was added to reconstitute the dry residue. Analytical results of procedural blanks for bed sediment (table 21) are reported as a liquid-phase concentration, in micrograms per milliliter. A procedural blank was prepared and analyzed concurrently with bed-sediment samples for each site. Concentrations of trace elements in all procedural blanks were less than the MRL for all constituents. No adjustments were made to analytical data based on procedural blanks.

Biological Data

Biological data for the long-term monitoring program in the Clark Fork Basin consist of analyses of trace-element concentrations in the whole-body tissue of aquatic benthic insects. Insect samples are collected once annually at the same 13 sites and on the same dates as bed-sediment samples (fig. 1 and table 1), allowing for a direct comparison of biological

data with bed-sediment data through the years. Warm Springs Creek at Warm Springs is sampled once every 3 years rather than once annually and was not sampled during water year 2016. Biological data are available in a machine readable data release (Boughton, 2018), in each annual report or by request in Microsoft® Excel format from the authors.

Methods

Insect samples were collected using protocols described in Hornberger and others (1997). Benthic insects at immature stages were collected with a large nylon-mesh kick net. A single riffle at each site was sampled repeatedly until an adequate number of individual insects were collected to provide sufficient mass for analysis. Targeted taxa for collection were the order Trichoptera (caddisflies) and the order Plecoptera (stoneflies).

Two caddisfly species of the genus *Hydropsyche* (*Hydropsyche cockerelli* and *Hydropsyche occidentalis*) were targeted for collection in this study because of their presence at most sites. *Hydropsyche* species (spp.) that could not be positively identified were categorized as *Hydropsyche* spp. or *Hydropsyche morosa* group. On the few occasions when *Hydropsyche* were not present, other caddisflies, including *Brachycentrus* spp. and *Rhyacophila* spp., were collected. The caddisfly *Arctopsyche grandis* and the stoneflies *Claassenia sabulosa* and *Hesperoperla* spp. were collected where available to represent additional insect taxa that are commonly distributed in the Clark Fork Basin.

Samples of each taxon were sorted by genus in the field and placed in acid-washed plastic containers. Samples were frozen in a small amount of ambient stream water on dry ice within 30 minutes of collection. Between 1986 and 1998, macroinvertebrate containers were kept on ice to allow the insects to evacuate their gut contents (depurate) for 6 to 8 hours. Excess water was drained and insects were frozen for transport to the laboratory. Since 1999, samples were immediately frozen on dry ice in the field to reduce the possibility of metal loss through intracellular breakdown during depuration. A comparison of immediately frozen to depurated samples indicated that although there was no substantial difference for most metals, concentrations of copper were about 20 percent lower in the depurated samples than in the samples that were immediately frozen. The data were not adjusted for this difference.

Insect samples were processed and analyzed at the USGS National Research Program Ecology and Contaminants Project Laboratory in Menlo Park, Calif. Insects were thawed and rinsed with ultrapure deionized water to remove particulate matter and then sorted to their lowest possible taxonomic level. If large numbers of specimens were collected at a site, similar-sized individuals were composited into replicate subsamples. Subsamples were placed in tared scintillation vials and oven-dried at 70 °C. Subsamples were weighed to obtain a final dry weight and digested by reflux using concentrated

nitric acid (Cain and others, 1992). After digestion, insect samples were evaporated to dryness on a hot plate. The dry residue was reconstituted in 0.6N hydrochloric acid, filtered through a 0.45- μ m pore-size filter, and analyzed undiluted by inductively coupled plasma-optical emission spectrometry (Hornberger and others, 1997) for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, and zinc. The smallest concentration of a constituent that can be reliably reported for analyses of biota is termed the MRL.

Results

Concentrations of trace elements in whole-body tissue of aquatic insects collected during August 2016 are listed in table 22. The variability in the number of composite samples among species and among sites reflects differences in insect abundance, with the number of composite samples increasing with the relative abundance of insects. Liquid-phase concentrations, in micrograms per milliliter, analyzed in the reconstituted samples were converted to solid-phase concentrations, in micrograms per gram, using equation 5 (used earlier in this report to calculate solid-phase concentrations of trace elements in bed sediment). All tissue samples were analyzed undiluted (dilution ratio 1:1). As with MRLs for trace elements in bed sediment, MRLs for trace elements in insects may differ among sites as a result of varied sample weights. In general, the smaller the biological-sample weight (primarily a function of insect abundance), the higher the MRL; therefore, higher MRLs do not necessarily imply a higher trace-element concentration in tissue.

Quality Assurance

The USGS protocols for field collection and processing of biota samples are designed to prevent contamination from metal sources. Nonmetallic nets, sampling equipment, and processing equipment were used in all sample collection. Equipment was acid-washed and rinsed in ultrapure deionized water before the first sample collection. Nets and equipment were thoroughly rinsed in stream water at each main-stem site. New nets were used at each tributary site. Biota samples were collected sequentially at sites along an increasing concentration gradient, which was from downstream sites to upstream sites, to minimize effects from potential site-to-site carryover contamination (Hornberger and others, 1997).

Quality assurance of analytical results for biota samples included laboratory-instrument calibration with standard solutions and analyses of quality-control samples designed to quantify precision and to identify the presence and magnitude of bias. Quality-control samples consisted of 12 replicates of the certified reference material (CRM) TORT-3 (lobster hepatopancreas) purchased from the National Research Council Canada. Quality-control samples were analyzed in a proportion equivalent to about 20 percent of the total number of biota samples.

Recovery efficiencies for trace-element analyses of the TORT-3 CRM are listed in table 23. Data-quality objectives have not been established for analytical recovery in biota, but percent recoveries indicate analytical performance. Mean CRM recoveries for TORT-3 ranged from 85.8 to 182 percent for all constituents. The mean recoveries were within 15 percent (based on the 95-percent confidence interval) for arsenic, cadmium, chromium, copper, iron, manganese, nickel, and zinc. Mean recovery was the highest for lead analysis (182 percent), likely because of the low certified concentration in the standard (0.225 µg/g). No adjustments were made to trace-element concentrations in biota samples based on recovery efficiencies.

Procedural blanks for biota consisted of undiluted aliquots of the same reagents used to digest and reconstitute tissue of aquatic insects. Analytical results of procedural blanks for biota (table 24) are reported as a liquid-phase concentration, in micrograms per milliliter. A procedural blank was prepared and analyzed concurrently with biota samples for each site. Concentrations of trace elements in all procedural blanks were less than the MRL; therefore, no adjustments to the data were necessary.

Statistical Summaries of Data

Statistical summaries of long-term water-quality, bed-sediment, and biological data for the Clark Fork Basin are listed in tables 25 through 27 for the period of record at each site. The summaries include the period of record; number of samples; and maximum, minimum, mean, and median concentrations.

Statistical summaries of water-quality data (table 25) are based on results of cross-section samples collected periodically by the USGS for the long-term monitoring program in the Clark Fork Basin during the period of record for each site. The summaries do not include data for supplemental samples collected at selected sites that targeted high-flow conditions or maintenance drawdowns of the Milltown Reservoir, which might disproportionately skew the long-term statistics relative to the other sites in the network. Statistical summaries of bed-sediment (table 26) and biological data (table 27) are based on results of samples collected once each year during the indicated years. Because not all sites were sampled for bed sediment and biota every year, the data for some sites do not represent a consecutive annual record. Statistical summaries are not presented for discontinued sites.

Statistics for bed-sediment data (table 26) are based on the mean trace-element concentrations determined for each year from the mean of the analyses of composite samples; therefore, the number of samples for bed sediment represents the number of years that the constituent was analyzed. The number of arsenic results for bed sediment is smaller than the number for other trace elements because sampling for arsenic began in September 2003. In addition, the number of samples

analyzed for silver in bed sediment is smaller because analysis for this constituent was discontinued in 2004.

In contrast, statistics for biological data (table 27) are based on individual analyses for each composite sample collected rather than on a single mean concentration for each year. Differences in the number of composited biota samples among species reflect differences in species abundance, within and among sites and among years. As a result, the statistics for biota describe a wider range of variation in trace-element concentrations than would be evident if results from individual composite samples were averaged. Also, the number of samples for arsenic in biota samples is smaller than the number for other trace elements because sampling for arsenic began in September 2003. The abundance of aquatic insects at a particular site in a given year limits the biomass of the sample, which, in turn, may result in varied MRLs. When MRLs vary among years, differences in concentration with time are difficult to determine, especially when a large percentage of the samples have concentrations less than MRLs.

The presence or absence of insect species at a given site can vary among years and may result in different taxa being analyzed in the long-term period of record. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, statistics for sites sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics for the *Hydropsyche morosa* group are based on the combined results for two or more species because these samples could not clearly be identified to the species level, but the individual insects had *morosa* characteristics.

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Data

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323230—Blacktail Creek at Harrison Avenue, at Butte									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/19/2015	0850	5.9	7.5	305	9.0	E2.2	115	33.2	7.92
03/21/2016	0905	13	7.6	264	3.5	E4.5	103	29.7	7.08
04/18/2016	0900	26	7.5	217	4.0	E6.9	83.8	24.2	5.66
05/09/2016	0915	20	7.6	212	9.0	E5.2	137	39.9	9.06
05/23/2016	0910	32	7.6	197	7.0	E7.3	83.3	23.5	5.97
06/06/2016	0905	15	7.6	227	12.5	E5.2	96.0	27.2	6.84
07/11/2016	0900	8.7	7.6	274	9.0	E4.3	116	33.6	7.89
08/08/2016	0900	4.7	7.5	315	9.0	<2.0	133	38.5	8.94

Date	Nitrate plus nitrite, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)
10/19/2015	1.20	0.052	0.116	1.2	1.8	81.7	328	0.090	0.37
03/21/2016	0.62	<0.030	0.033	2.2	3.9	219	663	0.123	0.64
04/18/2016	0.27	0.038	0.037	5.5	8.6	282	969	0.273	1.46
05/09/2016	0.32	<0.030	<0.030	4.1	5.6	313	766	0.228	0.70
05/23/2016	0.20	0.031	0.03	4.5	7.6	310	976	0.219	1.14
06/06/2016	0.43	<0.030	0.03	3.5	4.9	390	954	0.241	0.83
07/11/2016	0.84	0.037	<0.03	2.6	3.6	163	451	0.113	0.52
08/08/2016	1.23	0.031	0.03	2.1	3.0	49.8	224	0.043	0.41

Date	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)
10/19/2015	37.8	44.6	<2.0	2.7	2.1	3.0
03/21/2016	54.6	73.1	<2.0	4.1	2.0	2.9
04/18/2016	31.0	54.5	2.2	5.5	3.5	4.6
05/09/2016	35.2	47.6	<2.0	5.1	4.4	5.1
05/23/2016	25.9	52.9	<2.0	6	4.4	5.6
06/06/2016	41.5	60.7	<2.0	4	5.1	6.3
07/11/2016	29.9	37.8	2.5	5	3.1	3.7
08/08/2016	41.4	48.1	3.0	6	2.2	2.9

Date	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/19/2015	78	2	0.03
03/21/2016	87	9	0.32
04/18/2016	87	12	0.84
05/09/2016	95	4	0.22
05/23/2016	83	13	1.1
06/06/2016	95	7	0.28
07/11/2016	88	3	0.07
08/08/2016	84	8	0.10

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323250—Silver Bow Creek below Blacktail Creek, at Butte									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/19/2015	1025	22	7.8	536	10.0	E3.2	179	50.1	13.1
03/21/2016	1040	26	7.8	444	10.0	E3.7	157	44.4	11.2
04/18/2016	1040	40	7.6	365	6.0	E6.0	131	37.3	9.24
05/09/2016	1045	34	7.6	356	9.5	E5.2	127	36.2	8.85
05/23/2016	1040	49	7.6	324	7.5	E5.8	121	34.5	8.51
06/06/2016	1020	27	8.2	387	14.5	E5.0	141	40.1	10.0
07/11/2016	1100	26	7.6	453	10.5	E5.0	167	47.7	11.7
08/08/2016	1035	18	7.7	516	13.0	<2.0	195	55.7	13.6

Date	Nitrate plus nitrite, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)
10/19/2015	1.19	0.069	0.142	2.7	9.9	39.2	251	0.160	1.69
03/21/2016	2.03	0.071	0.089	3.6	7.5	94.5	467	0.120	1.30
04/18/2016	1.06	0.066	0.088	5.0	10.6	160	730	0.250	2.20
05/09/2016	1.31	0.045	0.092	4.3	10.7	183	820	0.252	2.33
05/23/2016	0.91	0.057	0.08	4.7	10.7	210	804	0.243	2.29
06/06/2016	1.08	0.043	0.07	4.1	7.3	130	538	0.229	1.42
07/11/2016	1.54	0.074	0.09	4.7	8.6	55.1	311	0.176	2.00
08/08/2016	1.82	0.117	0.13	4.4	7.5	26.6	119	0.161	0.94

Date	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/19/2015	90.4	115	23.9	35.5	3.1	4.2	71	6	0.36
03/21/2016	96.6	124	27.3	36.2	2.8	3.5	79	7	0.49
04/18/2016	59.6	83.1	20.2	35.5	3.5	4.6	82	15	1.6
05/09/2016	48.9	80.6	22.3	38.3	4.1	5.2	87	11	1.0
05/23/2016	38.8	70.1	18.4	28	4.3	5.1	86	12	1.6
06/06/2016	44.7	64.6	21.8	32	4.7	5.7	91	6	0.44
07/11/2016	40.6	69.1	49.9	59	4.1	4.6	84	6	0.42
08/08/2016	58.4	74.9	53.2	62	4.9	5.6	85	3	0.15

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323600—Silver Bow Creek at Opportunity									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/19/2015	1150	34	8.5	537	10.0	E2.1	193	56.8	12.3
03/21/2016	1245	56	8.6	500	7.0	E5.1	176	52.9	10.8
04/18/2016	1215	88	8.4	363	7.0	E11	143	42.9	8.73
05/09/2016	1220	93	8.3	320	7.0	E8.9	130	40.1	7.24
05/23/2016	1220	131	8.2	301	6.0	E8.8	124	37.9	7.14
06/06/2016	1155	102	8.7	312	14.5	E5.2	127	38.9	7.31
07/11/2016	1230	48	8.2	436	11.0	E7.8	169	50.0	10.7
08/08/2016	1210	28	8.4	621	15.0	E8.4	248	75.0	14.6

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
10/19/2015	4.89	26.2	106	37.9	0.44	21.1	94.6	0.163	0.172
03/21/2016	4.47	28.3	111	38.4	0.45	19.9	79.9	0.198	0.315
04/18/2016	3.78	20.6	84.3	22.4	0.30	26.8	55.7	0.120	0.345
05/09/2016	2.88	14.5	85.8	15.1	0.25	20.5	47.5	0.090	0.248
05/23/2016	2.69	14.1	83.4	12.5	0.25	23.3	43.2	0.081	0.26
06/06/2016	2.69	14.4	87.5	15.0	0.23	20.0	44.3	0.066	0.17
07/11/2016	4.99	22.4	97.2	27.5	0.47	20.4	72.9	0.087	0.29
08/08/2016	6.93	32.5	106	63.9	0.54	25.7	104	0.134	0.41

Date	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
10/19/2015	7.8	12.1	15.7	157	0.113	0.95	25.5	55.3
03/21/2016	9.9	21.1	23.9	333	0.123	1.81	174	234
04/18/2016	9.7	25.7	99.4	878	0.344	3.81	91.3	170
05/09/2016	7.6	17.1	73.7	543	0.239	2.34	93.6	144
05/23/2016	8.0	20.1	116	659	0.325	2.92	55.6	114
06/06/2016	7.4	12.9	52.7	319	0.219	1.56	57.7	89.6
07/11/2016	8.7	20.7	37.6	463	0.287	3.17	195	314
08/08/2016	8.5	22.3	11.8	456	0.151	3.46	50.6	271

Date	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/19/2015	30.5	44.1	5.6	6.1	3.14	95	3	0.28
03/21/2016	45.8	87.7	5.5	6.8	3.43	88	12	1.8
04/18/2016	31.5	84.1	5.9	7.4	6.60	93	26	6.2
05/09/2016	25.4	56.2	6.2	6.6	6.01	94	18	4.5
05/23/2016	27.8	63	6.0	7.2	6.92	91	21	7.4
06/06/2016	13.9	33	6.9	6.7	6.16	94	10	2.8
07/11/2016	26.9	69	6.4	7.0	7.44	93	15	1.9
08/08/2016	22.9	75	8.2	9.9	6.39	84	17	1.3

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323670—Mill Creek near Anaconda									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/19/2015	1600	14	8.0	178	10.0	<2.0	76.9	21.1	5.87
03/22/2016	0815	14	7.7	173	3.0	E2.1	78.0	21.3	6.02
04/18/2016	1530	44	8.0	119	9.0	E3.1	51.0	14.3	3.70
05/09/2016	1550	139	7.5	75	3.5	E6.5	31.4	9.03	2.16
05/23/2016	1535	107	7.7	87	6.0	E2.2	37.1	10.8	2.47
06/06/2016	1505	171	7.7	69	12.5	E6.0	28.7	8.43	1.87
07/11/2016	1545	46	7.9	106	12.0	<2.0	51.5	15.0	3.41
08/08/2016	1515	17	8.1	152	14.5	<2.0	78.2	22.4	5.40

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
10/19/2015	0.75	3.86	83.8	0.39	0.34	11.7	8.23	0.060	0.065
03/22/2016	0.69	5.25	80.3	0.46	0.37	12.6	10.9	0.047	0.089
04/18/2016	0.71	4.91	52.5	0.36	0.30	15.5	7.48	0.053	0.064
05/09/2016	0.53	2.92	33.9	0.22	0.28	12.8	3.98	0.043	0.116
05/23/2016	0.47	3.44	39.3	0.22	0.30	14.3	4.40	0.038	0.05
06/06/2016	0.48	2.28	30.9	0.16	0.29	10.1	3.32	0.038	0.09
07/11/2016	0.49	2.64	49.5	0.20	0.30	9.89	4.66	0.038	0.04
08/08/2016	0.62	3.18	71.8	0.26	0.32	11.6	6.16	0.040	0.05

Date	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
10/19/2015	1.4	1.6	52.7	112	0.097	0.26	5.79	10.7
03/22/2016	1.4	2.7	35.9	128	0.076	0.51	7.31	12.9
04/18/2016	4.3	5.0	91.0	229	0.167	0.64	6.22	13.3
05/09/2016	3.0	6.3	47.5	524	0.162	1.71	7.30	29.6
05/23/2016	2.6	3.8	45.1	163	0.126	0.52	4.39	10.2
06/06/2016	3.2	5.4	40.1	420	0.118	1.21	5.32	25.0
07/11/2016	1.5	2.2	61.6	164	0.094	0.43	7.78	13.8
08/08/2016	1.3	2.1	86.2	151	0.118	0.39	9.37	16.5

Date	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/19/2015	<2.0	2.3	18.3	19.8	1.59	73	1	0.04
03/22/2016	<2.0	2.7	16.0	18.1	1.37	83	1	0.04
04/18/2016	2.4	3.4	16.8	17.3	2.73	83	5	0.59
05/09/2016	<2.0	7.1	13.0	15.1	3.18	69	18	6.8
05/23/2016	<2.0	3	13.7	13.8	2.79	79	4	1.2
06/06/2016	<2.0	6	12.4	13.7	2.68	72	14	6.5
07/11/2016	<2.0	3	12.7	13.3	1.62	83	4	0.50
08/08/2016	<2.0	<2	16.5	19.3	1.26	71	1	0.05

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323700—Mill Creek at Opportunity									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (μ S/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/19/2015	1650	5.2	8.0	206	11.0	<2.0	88.8	24.8	6.55
03/22/2016	0935	8.4	8.0	198	3.5	<2.0	86.3	24.0	6.40
04/18/2016	1630	25	8.1	131	10.0	E3.0	59.9	16.9	4.32
05/09/2016	1700	52	7.7	84	4.5	E9.1	35.6	10.4	2.33
05/23/2016	1625	41	7.8	95	6.5	E2.5	39.9	11.5	2.69
06/06/2016	1555	72	7.7	73	13.0	E7.1	30.7	8.93	2.04
07/11/2016	1650	26	8.0	120	10.0	<2.0	57.3	16.6	3.84
08/08/2016	1605	5.2	8.2	172	15.0	<2.0	80.1	22.8	5.66

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (μ g/L)	Cadmium, unfiltered recoverable (μ g/L)
10/19/2015	1.02	5.61	87.8	0.60	0.36	12.6	17.3	0.074	0.077
03/22/2016	0.79	6.20	83.6	0.62	0.38	12.2	20.0	0.052	0.054
04/18/2016	0.80	5.80	54.8	0.42	0.32	16.9	10.9	0.051	0.095
05/09/2016	0.61	3.26	35.9	0.25	0.29	13.4	5.66	0.054	0.299
05/23/2016	0.51	3.73	41.4	0.25	0.30	14.3	6.16	0.054	0.08
06/06/2016	0.51	2.53	32.2	0.19	0.29	10.2	4.23	0.042	0.23
07/11/2016	0.54	3.32	53.6	0.27	0.31	10.6	7.10	0.049	0.07
08/08/2016	0.83	4.57	80.1	0.41	0.34	12.0	11.6	0.053	0.06

Date	Copper, filtered (μ g/L)	Copper, unfiltered recoverable (μ g/L)	Iron, filtered (μ g/L)	Iron, unfiltered recoverable (μ g/L)	Lead, filtered (μ g/L)	Lead, unfiltered recoverable (μ g/L)	Manganese, filtered (μ g/L)	Manganese, unfiltered recoverable (μ g/L)
10/19/2015	2.1	2.4	73.4	116	0.098	0.15	7.88	8.8
03/22/2016	1.5	2.3	24.7	78.7	<0.040	0.19	2.20	4.6
04/18/2016	3.1	4.9	50.4	269	0.145	0.90	4.47	16.4
05/09/2016	3.5	13.1	49.6	932	0.203	4.31	8.31	58.5
05/23/2016	3.0	4.9	44.0	205	0.140	0.84	3.57	12.9
06/06/2016	3.2	10.6	41.0	736	0.187	3.21	5.95	40.0
07/11/2016	2.1	3.0	72.0	164	0.144	0.46	4.65	15.0
08/08/2016	1.9	2.3	90.3	138	0.138	0.27	4.83	6.9

Date	Zinc, filtered (μ g/L)	Zinc, unfiltered recoverable (μ g/L)	Arsenic, filtered (μ g/L)	Arsenic, unfiltered recoverable (μ g/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/19/2015	3.5	3.9	25.9	28.8	3.04	89	1	0.01
03/22/2016	<2.0	2.7	15.9	15.9	1.41	78	1	0.02
04/18/2016	<2.0	4.6	18.4	20.6	2.84	76	6	0.41
05/09/2016	<2.0	14.2	16.6	23.3	3.45	65	35	4.9
05/23/2016	2.1	5	16.4	17.6	3.01	71	6	0.66
06/06/2016	2.1	12	15.4	20.9	2.70	58	32	6.2
07/11/2016	<2.0	3	20.4	20.1	1.60	71	2	0.14
08/08/2016	2.5	2	30.7	35.4	1.43	88	1	0.01

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323710—Willow Creek near Anaconda									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/19/2015	1410	1.7	7.7	126	9.0	<2.0	46.6	15.5	1.93
03/21/2016	1600	E2.3	7.8	126	5.0	E3.8	46.1	15.2	1.96
04/18/2016	1415	11	7.7	91	5.5	E10	34.2	11.4	1.38
05/09/2016	1420	27	7.5	70	4.0	E9.8	25.2	8.39	1.02
05/23/2016	1420	27	7.5	75	6.0	E8.5	27.5	9.29	1.05
06/06/2016	1350	18	7.8	89	12.0	E4.6	34.9	11.9	1.27
07/11/2016	1440	5.0	7.9	107	9.0	E2.6	44.3	15.0	1.69
08/08/2016	1410	1.9	8.0	110	12.0	E2.2	43.8	14.9	1.59

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
10/19/2015	1.09	7.20	55.4	0.57	0.07	24.5	7.97	0.031	0.030
03/21/2016	0.91	7.05	51.1	0.69	0.07	21.7	11.8	<0.030	0.035
04/18/2016	0.87	4.94	35.7	0.53	0.06	26.8	8.22	0.035	0.044
05/09/2016	0.72	4.67	29.8	0.33	0.06	23.8	4.90	0.040	0.075
05/23/2016	0.72	4.87	31.8	0.31	0.06	25.4	4.99	<0.030	0.05
06/06/2016	0.80	5.24	38.6	0.32	0.06	24.6	5.69	<0.030	0.04
07/11/2016	0.86	5.83	48.0	0.36	0.07	24.3	5.92	0.039	0.06
08/08/2016	1.09	6.63	49.0	0.47	0.07	25.9	5.89	0.044	0.06

Date	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
10/19/2015	1.5	1.6	123	224	0.164	0.30	11.4	18.4
03/21/2016	1.4	2.0	106	285	0.098	0.35	14.4	23.8
04/18/2016	3.4	4.3	213	584	0.373	0.89	12.8	24.0
05/09/2016	2.7	4.5	90.0	532	0.268	1.33	14.3	36.4
05/23/2016	2.5	3.8	89.5	494	0.222	0.96	8.49	22.1
06/06/2016	2.2	3.0	74.1	268	0.197	0.57	9.72	17.5
07/11/2016	4.0	4.7	108	220	0.262	0.59	11.7	20.0
08/08/2016	5.5	6.8	126	218	0.361	0.71	9.24	16.3

Date	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/19/2015	<2.0	<2.0	17.1	19.0	3.32	88	1	<0.01
03/21/2016	<2.0	<2.0	11.5	13.5	3.05	85	3	0.02
04/18/2016	3.0	4.3	16.8	17.7	6.19	86	6	0.18
05/09/2016	<2.0	6.5	14.0	15.2	4.77	79	20	1.5
05/23/2016	<2.0	4	14.0	14.7	6.24	72	12	0.87
06/06/2016	<2.0	2	14.7	15.2	4.35	87	5	0.24
07/11/2016	<2.0	5	18.1	18.0	4.07	95	4	0.05
08/08/2016	<2.0	<2	25.3	27.9	5.05	91	4	0.02

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323720—Willow Creek at Opportunity									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/19/2015	1240	5.4	8.0	293	10.0	<2.0	128	37.2	8.45
03/21/2016	1400	7.1	8.2	281	8.0	E3.2	116	34.1	7.53
04/18/2016	1255	13	8.0	221	8.0	E7.5	99.8	29.6	6.27
05/09/2016	1305	25	7.8	148	7.0	E9.3	62.9	19.3	3.56
05/23/2016	1300	41	7.8	197	7.0	E5.4	85.7	25.2	5.52
06/06/2016	1235	42	8.0	274	16.5	E5.7	133	38.3	8.96
07/11/2016	1320	27	8.1	380	11.0	E3.6	173	48.4	12.8
08/08/2016	1255	10	8.2	272	13.0	E2.8	128	38.6	7.75

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
10/19/2015	1.48	10.2	125	2.31	0.44	21.9	23.9	<0.030	0.035
03/21/2016	1.39	12.0	118	2.53	0.39	21.8	27.7	<0.030	0.042
04/18/2016	2.02	12.0	91.3	1.69	0.27	28.6	19.1	0.032	0.060
05/09/2016	1.03	7.36	64.2	0.85	0.17	26.6	9.6	0.031	0.107
05/23/2016	1.31	10.3	84.7	1.14	0.29	26.1	14.2	0.039	0.08
06/06/2016	2.73	10.5	133	1.61	0.48	30.8	10.2	0.057	0.11
07/11/2016	2.55	16.7	175	3.16	0.66	25.9	22.5	0.050	0.07
08/08/2016	1.68	8.91	121	2.30	0.42	21.2	19.4	<0.030	0.05

Date	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
10/19/2015	1.8	3.2	17.1	155	0.174	0.83	33.3	38.0
03/21/2016	2.1	4.2	36.7	191	0.105	0.79	47.8	62.5
04/18/2016	5.0	8.5	103	466	0.355	1.52	52.2	65.1
05/09/2016	6.3	11.4	112	507	0.456	2.19	35.9	55.9
05/23/2016	6.5	11.2	95.0	340	0.280	1.71	24.0	33.5
06/06/2016	8.6	13.9	109	383	0.466	2.08	38.6	51.5
07/11/2016	7.7	10.0	74.7	256	0.204	1.09	31.4	44.6
08/08/2016	2.4	3.9	28.2	204	0.208	1.00	11.5	17.8

Date	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/19/2015	2.6	4.4	13.0	13.8	2.24	94	3	0.04
03/21/2016	<2.0	4.0	19.5	23.1	2.60	94	4	0.08
04/18/2016	3.0	7.6	29.7	31.8	5.53	97	10	0.35
05/09/2016	3.2	11.7	33.0	34.5	6.02	92	15	1.0
05/23/2016	5.2	11	42.5	45.2	7.38	88	11	1.2
06/06/2016	5.4	12	132	130	10.6	90	12	1.4
07/11/2016	4.6	9	126	128	12.9	90	5	0.36
08/08/2016	<2.0	4	16.8	21.0	2.63	97	5	0.14

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323750—Silver Bow Creek at Warm Springs									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	1015	60	8.7	524	10.0	<2.0	205	56.4	15.6
03/22/2016	1330	74	8.9	495	6.0	E4.5	194	56.0	13.2
04/19/2016	1035	147	8.4	458	8.0	E3.0	188	54.5	12.7
05/10/2016	1110	158	8.4	304	5.0	E6.9	121	35.4	7.96
05/24/2016	1020	246	8.8	352	7.0	E3.3	149	43.4	9.97
06/07/2016	0940	186	8.7	255	12.5	E8.7	110	32.0	7.23
07/12/2016	1015	69	8.8	364	11.0	E2.6	155	43.7	11.2
08/09/2016	1020	42	9.3	416	14.0	E2.8	190	53.9	13.4

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
10/20/2015	4.51	20.1	113	21.5	1.02	7.82	123	<0.030	<0.030
03/22/2016	3.88	21.8	104	26.2	0.71	6.37	105	0.053	0.109
04/19/2016	4.23	22.6	100	25.1	0.62	12.2	87.5	0.036	0.095
05/10/2016	2.49	13.9	75.7	12.4	0.43	16.6	53.4	0.040	0.152
05/24/2016	3.37	17.6	89.0	15.8	0.52	17.4	60.5	0.052	0.12
06/07/2016	2.14	10.0	75.5	6.85	0.44	16.6	39.9	0.045	0.21
07/12/2016	2.41	14.6	101	10.6	0.66	14.5	66.0	<0.030	0.05
08/09/2016	2.89	17.9	95.4	15.8	0.74	18.4	93.5	<0.030	0.03

Date	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
10/20/2015	2.6	3.0	15.0	71.8	0.049	0.21	35.5	70.3
03/22/2016	2.8	7.2	12.8	173	0.075	1.22	38.8	91.5
04/19/2016	2.8	7.2	24.8	280	0.133	1.55	104	126
05/10/2016	4.5	11.9	54.5	482	0.239	2.55	91.4	131
05/24/2016	5.0	9.7	50.2	315	0.160	1.51	118	155
06/07/2016	5.2	14.0	60.6	623	0.243	3.31	67.3	123
07/12/2016	3.5	4.6	40.2	160	0.109	0.57	66.4	100
08/09/2016	1.7	2.5	22.7	84.5	0.089	0.37	45.1	81.8

Date	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	<2.0	2.3	23.2	24.5	5.17	93	1	0.16
03/22/2016	2.8	14.2	8.5	9.9	2.88	95	5	1.0
04/19/2016	4.3	16.1	11.2	13.6	3.73	88	7	2.8
05/10/2016	2.8	15.9	21.7	23.8	5.42	88	15	6.4
05/24/2016	3.7	16	19.8	23.8	5.95	86	8	5.3
06/07/2016	2.7	16	41.7	44.9	5.77	87	20	10
07/12/2016	<2.0	4	38.8	39.3	5.87	89	3	0.56
08/09/2016	<2.0	2	28.5	34.5	4.61	81	3	0.34

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323760—Warm Springs Creek near Anaconda									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (μ S/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	0840	73	8.3	270	8.0	<2.0	126	37.4	8.01
04/19/2016	0845	68	8.4	251	4.5	<2.0	134	40.1	8.17
05/10/2016	0910	221	8.1	157	3.0	E3.3	77.8	23.9	4.39
05/24/2016	0835	185	8.0	175	4.5	<2.0	88.0	26.8	5.12
07/12/2016	0825	150	8.2	195	7.0	<2.0	102	31.0	6.03
08/09/2016	0830	70	8.3	248	8.0	<2.0	125	37.7	7.60

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (μ g/L)	Cadmium, unfiltered recoverable (μ g/L)
10/20/2015	1.37	2.83	127	1.26	0.41	10.3	14.4	<0.030	<0.030
04/19/2016	1.30	3.41	118	1.24	0.37	11.7	13.9	0.030	<0.030
05/10/2016	0.82	1.80	68.0	0.59	0.29	9.76	11.6	0.041	0.042
05/24/2016	0.89	2.13	77.2	0.71	0.33	10.4	11.3	0.037	0.04
07/12/2016	0.97	2.20	84.6	0.90	0.40	9.72	14.6	0.047	0.04
08/09/2016	1.25	3.04	114	1.15	0.40	10.1	15.1	<0.030	0.03

Date	Copper, filtered (μ g/L)	Copper, unfiltered recoverable (μ g/L)	Iron, filtered (μ g/L)	Iron, unfiltered recoverable (μ g/L)	Lead, filtered (μ g/L)	Lead, unfiltered recoverable (μ g/L)	Manganese, filtered (μ g/L)	Manganese, unfiltered recoverable (μ g/L)
10/20/2015	<0.80	1.7	8.0	196	<0.040	0.26	0.44	5.1
04/19/2016	0.88	2.5	8.2	106	<0.040	0.34	0.62	4.2
05/10/2016	1.1	4.8	11.2	250	<0.040	0.56	4.20	14.4
05/24/2016	1.3	2.6	10.0	102	0.021	0.27	2.80	8.1
07/12/2016	1.1	2.2	11.1	84.7	<0.040	0.20	3.10	9.0
08/09/2016	0.81	1.8	8.4	57.0	<0.040	0.21	0.95	5.0

Date	Zinc, filtered (μ g/L)	Zinc, unfiltered recoverable (μ g/L)	Arsenic, filtered (μ g/L)	Arsenic, unfiltered recoverable (μ g/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	<2.0	2.4	2.5	3.0	1.43	71	3	0.59
04/19/2016	<2.0	3.1	2.1	2.2	1.15	71	5	0.92
05/10/2016	2.7	8.4	1.4	2.0	2.10	61	12	7.2
05/24/2016	4.6	7	2.8	2.9	1.95	60	5	2.5
07/12/2016	4.8	11	1.6	1.9	1.28	70	3	1.2
08/09/2016	<2.0	5	2.2	2.8	0.77	81	4	0.76

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323770—Warm Springs Creek at Warm Springs									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	0935	29	8.1	379	8.5	<2.0	185	55.8	11.1
03/22/2016	1245	30	8.3	371	5.5	E2.9	185	56.1	10.9
04/19/2016	0955	50	8.2	325	5.0	E2.1	174	52.3	10.6
05/10/2016	1020	151	7.9	188	3.5	E5.7	94.0	29.0	5.23
05/24/2016	0940	130	7.9	213	5.5	E2.4	108	32.8	6.25
06/07/2016	0850	195	7.8	158	10.0	E9.3	76.7	23.7	4.28
07/12/2016	0935	75	8.2	240	8.0	E2.0	124	38.1	6.98
08/09/2016	0935	14	8.2	328	10.5	<2.0	175	53.1	10.2

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
10/20/2015	1.79	4.11	148	1.85	0.44	11.4	48.8	<0.030	<0.030
03/22/2016	1.55	4.40	149	1.89	0.45	9.90	49.4	0.031	0.040
04/19/2016	1.50	4.12	133	1.56	0.40	11.9	35.8	0.044	0.050
05/10/2016	0.93	2.12	75.8	0.73	0.31	10.1	19.2	0.037	0.080
05/24/2016	1.01	2.37	85.6	0.89	0.36	10.6	21.5	0.043	0.06
06/07/2016	0.90	1.83	60.1	0.55	0.36	9.27	17.3	0.031	0.13
07/12/2016	1.13	2.61	97.1	1.11	0.42	10.3	24.3	0.044	0.05
08/09/2016	1.51	3.82	131	1.54	0.43	10.5	39.1	0.036	0.04

Date	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
10/20/2015	2.9	5.7	23.5	104	0.049	0.24	31.7	55.5
03/22/2016	1.9	4.6	9.2	62.0	<0.040	0.28	51.6	100
04/19/2016	2.5	8.5	11.6	138	<0.040	0.71	39.1	103
05/10/2016	2.7	18.1	13.2	349	0.059	1.98	21.7	89.6
05/24/2016	2.3	10.0	12.2	164	<0.040	0.97	23.1	56.1
06/07/2016	3.7	38.5	16.6	668	0.073	4.09	26.4	137
07/12/2016	2.2	7.9	15.5	127	0.050	0.73	27.6	47.7
08/09/2016	2.5	5.0	15.9	58.8	0.050	0.27	31.5	53.3

Date	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	<2.0	2.3	7.1	7.8	1.69	71	1	0.08
03/22/2016	<2.0	2.1	4.5	4.6	0.88	73	3	0.24
04/19/2016	<2.0	3.7	4.7	5.4	1.28	78	5	0.68
05/10/2016	<2.0	10.9	3.8	5.4	2.31	74	15	6.1
05/24/2016	2.2	6	3.4	3.9	2.27	73	7	2.5
06/07/2016	2.0	19	4.8	8.9	2.28	69	32	17
07/12/2016	<2.0	7	4.1	4.5	1.47	72	3	0.61
08/09/2016	<2.0	3	6.2	7.5	0.91	81	1	0.04

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323800—Clark Fork near Galen								
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	1145	89	8.3	482	10.0	204	58.3	14.1
03/23/2016	0750	126	8.3	470	4.0	207	60.9	13.3
04/19/2016	1210	206	8.4	427	9.5	176	51.6	11.4
05/10/2016	1315	313	8.3	249	7.0	109	32.6	6.67
05/24/2016	1205	387	8.6	301	8.0	128	37.6	8.18
06/07/2016	1110	398	8.3	206	13.0	93.9	28.1	5.76
07/12/2016	1155	147	8.6	307	12.0	142	41.9	9.14
08/09/2016	1230	60	8.9	400	16.0	183	52.7	12.5

Date	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)
10/20/2015	0.036	0.035	4.3	6.4	24.5	73.7	0.162	0.48
03/23/2016	0.069	0.140	3.0	12.8	11.0	268	0.059	1.75
04/19/2016	0.049	0.139	4.3	14.6	20.7	410	0.110	2.29
05/10/2016	0.038	0.156	4.0	23.2	32.3	598	0.165	3.37
05/24/2016	0.049	0.16	4.8	24.5	29.6	510	0.115	3.40
06/07/2016	0.044	0.23	5.4	38.6	29.6	813	0.193	5.18
07/12/2016	0.079	0.10	3.9	7.8	25.5	147	0.087	0.71
08/09/2016	0.033	0.05	3.2	6.0	16.3	101	0.080	0.61

Date	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	27.9	41.4	2.8	4.4	16.3	17.6	87	2	0.48
03/23/2016	56.1	137	4.6	17.9	6.8	9.2	73	11	3.7
04/19/2016	75.2	145	4.6	20.2	10.2	12.6	70	14	7.8
05/10/2016	50.8	129	2.2	19.1	12.6	16.6	67	26	22
05/24/2016	67.0	124	3.0	23	14.6	19.7	72	35	37
06/07/2016	38.2	140	2.3	26	22.4	27.1	82	35	38
07/12/2016	26.7	60.1	2.9	8	22.3	22.9	87	4	1.6
08/09/2016	25.9	65.9	<2.0	5	21.1	24.6	82	3	0.49

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323840—Lost Creek near Anaconda									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	0750	1.6	8.0	241	8.0	<2.0	112	33.7	6.78
03/22/2016	1115	5.5	8.3	231	4.5	<2.0	115	34.4	7.13
04/19/2016	0745	7.3	7.9	216	4.5	<2.0	111	33.6	6.65
05/10/2016	0800	14	7.8	151	3.5	E4.5	78.0	23.7	4.57
05/24/2016	0740	13	7.9	165	5.0	E3.3	85.2	26.1	4.88
06/07/2016	0750	9.8	7.9	182	9.5	E3.0	95.0	29.1	5.40
07/12/2016	0740	5.7	8.0	219	7.5	<2.0	112	34.6	6.25
08/09/2016	0735	7.4	8.0	218	9.0	<2.0	112	34.3	6.28

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
10/20/2015	1.51	3.34	116	0.94	0.44	11.7	9.77	0.036	<0.030
03/22/2016	1.27	3.32	112	0.96	0.50	10.8	11.5	<0.030	0.031
04/19/2016	1.35	3.08	102	0.77	0.42	12.8	9.89	0.031	0.034
05/10/2016	0.96	2.31	71.8	0.51	0.31	11.6	6.22	<0.030	0.06
05/24/2016	1.05	2.40	77.5	0.53	0.32	11.8	6.82	<0.030	0.05
06/07/2016	1.18	2.87	86.4	0.64	0.32	11.7	7.21	0.031	0.04
07/12/2016	1.16	3.14	107	0.71	0.40	11.5	7.38	<0.030	<0.03
08/09/2016	1.31	3.10	106	0.66	0.40	12.1	7.80	<0.030	0.04

Date	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
10/20/2015	1.8	2.3	13.6	39.6	<0.040	0.10	1.32	2.4
03/22/2016	1.6	3.5	5.7	71.3	<0.040	0.32	0.87	3.5
04/19/2016	1.8	5.7	14.9	128	0.058	0.58	1.61	6.3
05/10/2016	1.7	7.8	17.7	276	0.100	1.09	1.83	10.8
05/24/2016	1.7	6.7	18.7	210	<0.040	0.86	1.52	8.3
06/07/2016	2.0	5.7	14.4	158	0.041	0.62	2.22	8.6
07/12/2016	1.7	2.6	9.9	36.6	<0.040	0.16	0.78	2.2
08/09/2016	1.6	4.3	16.4	159	0.040	0.50	1.51	7.9

Date	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	<2.0	<2.0	5.2	5.5	1.83	50	1	<0.01
03/22/2016	<2.0	<2.0	3.3	3.4	0.87	86	2	0.03
04/19/2016	<2.0	2.6	3.9	4.3	1.34	73	6	0.12
05/10/2016	<2.0	4.3	3.4	3.9	2.37	73	17	0.64
05/24/2016	<2.0	3	3.8	3.9	2.15	72	10	0.35
06/07/2016	<2.0	4	5.5	6.0	2.03	67	8	0.21
07/12/2016	<2.0	2	6.6	6.4	1.51	78	1	0.02
08/09/2016	<2.0	4	7.7	9.2	1.13	68	5	0.10

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12323850—Lost Creek near Galen									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	1105	41	8.1	613	9.0	<2.0	294	85.6	19.4
03/22/2016	1510	51	8.4	588	7.0	E4.1	292	85.0	19.3
04/19/2016	1135	51	8.3	577	8.0	E2.9	301	87.4	20.2
05/10/2016	1215	26	8.3	554	6.0	E2.2	285	83.5	18.6
05/24/2016	1120	23	8.3	659	8.0	<2.0	337	97.0	23.1
06/07/2016	1030	6.0	8.2	645	15.5	<2.0	335	95.3	23.5
07/12/2016	1120	5.0	8.4	654	11.5	<2.0	326	92.0	23.5
08/09/2016	1145	1.9	8.2	661	13.5	<2.0	306	82.9	24.0

Date	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
10/20/2015	2.62	11.6	190	5.30	0.49	15.2	134	<0.030	<0.030
03/22/2016	2.16	12.4	189	4.52	0.52	15.9	125	<0.030	0.046
04/19/2016	2.18	12.8	182	4.50	0.46	16.7	123	--	0.050
05/10/2016	1.89	11.5	170	4.04	0.43	16.6	122	<0.030	<0.030
05/24/2016	2.28	14.0	193	4.79	0.55	17.9	159	0.033	<0.03
06/07/2016	2.57	16.7	187	4.58	0.50	17.7	153	<0.030	<0.03
07/12/2016	2.71	20.2	199	4.84	0.64	18.5	152	0.031	<0.03
08/09/2016	3.39	30.2	223	5.27	0.82	23.9	132	0.046	0.08

Date	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
10/20/2015	1.4	2.4	13.0	134	<0.040	0.17	5.94	9.3
03/22/2016	1.2	6.8	9.9	183	0.043	0.83	14.4	22.7
04/19/2016	1.6	6.1	11.5	179	0.055	0.74	15.6	22.5
05/10/2016	1.2	4.3	17.1	123	0.054	0.45	21.4	26.6
05/24/2016	1.8	4.4	15.1	95.1	<0.040	0.37	16.0	20.6
06/07/2016	1.7	3.3	11.3	61.6	0.045	0.19	24.8	26.7
07/12/2016	1.5	2.7	10.7	55.7	<0.040	0.18	7.81	11.9
08/09/2016	2.3	4.5	30.9	255	0.049	0.22	16.3	23.1

Date	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	<2.0	2.1	9.2	10.0	2.15	84	13	1.4
03/22/2016	<2.0	4.6	10.4	12.0	1.28	84	8	1.1
04/19/2016	<2.0	3.9	10.4	11.1	1.44	73	18	2.5
05/10/2016	<2.0	3.1	9.0	9.5	1.84	86	15	1.1
05/24/2016	<2.0	3	16.0	16.3	2.86	54	22	1.4
06/07/2016	<2.0	<2	13.2	12.9	2.07	33	25	0.41
07/12/2016	<2.0	2	8.1	8.6	1.70	62	23	0.31
08/09/2016	<2.0	4	13.7	17.5	2.30	67	22	0.11

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12324200—Clark Fork at Deer Lodge									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (μ S/cm)	Water temperature, onsite (°C)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	1310	172	8.4	530	10.0	--	235	68.2	15.6
03/23/2016	0915	241	8.2	501	4.0	E7.6	220	64.7	14.1
04/19/2016	1335	311	8.2	468	10.5	--	209	62.2	13.2
05/10/2016	1455	425	8.1	300	7.0	E13	132	39.5	8.07
05/24/2016	1335	477	8.2	366	10.0	E11	163	47.6	10.8
06/07/2016	1235	386	8.3	278	17.0	E10	126	37.5	7.75
07/12/2016	1315	168	8.6	407	15.5	E3.2	193	57.4	12.1
08/09/2016	1350	76	8.6	490	17.0	<2.0	218	63.7	14.4

Date	Cadmium, filtered (μ g/L)	Cadmium, unfiltered recoverable (μ g/L)	Copper, filtered (μ g/L)	Copper, unfiltered recoverable (μ g/L)	Iron, filtered (μ g/L)	Iron, unfiltered recoverable (μ g/L)	Lead, filtered (μ g/L)	Lead, unfiltered recoverable (μ g/L)
10/20/2015	0.039	0.061	5.4	15.1	10.7	184	0.066	1.39
03/23/2016	0.071	0.175	4.9	29.8	6.6	458	0.052	3.62
04/19/2016	0.077	0.270	6.5	54.0	13.4	942	0.137	7.27
05/10/2016	0.078	0.276	12.5	57.7	120	1,090	1.24	7.77
05/24/2016	0.072	0.30	7.8	66.6	21.1	1,210	0.171	9.58
06/07/2016	0.049	0.23	9.5	57.3	19.9	862	0.188	7.21
07/12/2016	0.053	0.06	7.6	15.5	20.1	160	0.117	1.34
08/09/2016	0.031	0.03	6.0	8.4	9.6	36.3	0.050	0.23

Date	Manganese, filtered (μ g/L)	Manganese, unfiltered recoverable (μ g/L)	Zinc, filtered (μ g/L)	Zinc, unfiltered recoverable (μ g/L)	Arsenic, filtered (μ g/L)	Arsenic, unfiltered recoverable (μ g/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	25.8	51.5	3.8	11.7	12.2	13.7	87	10	4.6
03/23/2016	38.1	114	7.3	28.7	8.3	11.5	83	16	10
04/19/2016	25.5	142	5.9	46.9	11.5	17.5	78	39	33
05/10/2016	38.2	141	9.4	49.3	12.1	18.2	71	44	50
05/24/2016	23.3	132	7.1	56	15.1	22.5	61	55	71
06/07/2016	17.4	110	3.4	41	19.6	26.6	81	32	33
07/12/2016	18.9	42.5	2.2	11	16.0	16.7	91	4	1.8
08/09/2016	2.54	6.8	<2.0	3	13.0	15.0	75	8	1.6

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12324400—Clark Fork above Little Blackfoot River, near Garrison								
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	1435	221	8.5	530	10.0	234	67.8	15.7
03/23/2016	1120	274	8.4	503	5.0	236	69.4	15.2
04/19/2016	1450	325	8.4	472	12.0	207	60.4	13.7
05/10/2016	1650	457	8.3	308	7.5	143	43.2	8.63
05/24/2016	1530	544	8.4	394	11.0	176	50.7	12.0
06/07/2016	1405	429	8.5	316	19.0	141	41.5	9.16
07/12/2016	1440	189	8.6	443	16.0	212	62.1	13.9
08/09/2016	1500	66	8.6	482	18.0	216	60.4	15.8

Date	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)
10/20/2015	0.032	0.052	5.0	14.5	7.0	174	0.048	1.24
03/23/2016	0.069	0.153	5.4	27.4	8.0	397	0.080	3.17
04/19/2016	0.072	0.297	7.7	63.9	12.4	1,050	0.168	8.20
05/10/2016	0.050	0.332	8.8	74.5	24.8	1,290	0.226	10.9
05/24/2016	0.135	0.33	10.9	84.9	21.0	1,320	0.273	11.2
06/07/2016	0.046	0.18	10.5	41.8	--	555	0.190	4.83
07/12/2016	0.044	0.05	7.9	12.9	11.1	103	0.082	0.79
08/09/2016	<0.030	0.03	7.4	9.7	7.7	21.5	0.044	0.15

Date	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	24.5	66.3	2.2	10.9	12.4	13.8	76	9	5.4
03/23/2016	44.4	107	6.2	26.5	9.2	11.9	77	20	15
04/19/2016	22.3	160	4.6	53.9	13.2	20.2	79	44	39
05/10/2016	20.6	161	5.6	62.6	12.4	20.2	76	53	65
05/24/2016	21.6	147	6.0	67	17.3	27.1	69	60	88
06/07/2016	19.5	81.0	2.7	30	19.2	23.5	84	21	24
07/12/2016	9.22	28.8	<2.0	8	15.3	15.7	82	3	1.5
08/09/2016	4.68	10.3	<2.0	3	15.3	17.8	59	3	0.53

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12324680—Clark Fork at Goldcreek								
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/20/2015	1535	280	8.6	455	10.5	203	59.5	13.3
03/23/2016	1245	415	8.7	428	6.0	194	57.1	12.4
04/19/2016	1545	591	8.5	350	11.5	155	45.9	9.87
05/11/2016	1130	776	8.3	271	6.5	120	35.7	7.47
05/25/2016	1120	1,120	8.2	306	9.5	138	40.5	8.97
06/07/2016	1520	776	8.5	285	18.5	129	38.5	8.00
07/12/2016	1540	325	8.7	402	17.0	197	58.7	12.3
08/10/2016	0705	129	8.1	445	11.5	198	57.5	13.2

Date	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)
10/20/2015	<0.030	0.034	4.0	7.9	6.3	91.3	0.042	0.69
03/23/2016	0.044	0.087	4.0	16.4	6.2	249	0.057	1.92
04/19/2016	0.040	0.202	5.2	39.1	37.2	890	0.199	5.66
05/11/2016	0.035	0.168	5.2	36.3	30.6	738	0.189	4.79
05/25/2016	0.044	0.22	6.5	47.3	27.9	999	0.183	7.13
06/07/2016	0.055	0.10	11.0	20.6	--	326	--	2.31
07/12/2016	0.035	0.05	6.1	9.5	8.7	102	0.061	0.62
08/10/2016	<0.030	0.04	3.8	6.2	9.4	45.5	<0.040	0.26

Date	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/20/2015	9.84	40.1	<2.0	5.9	8.9	9.7	91	4	3.0
03/23/2016	23.2	64.4	2.4	15.5	7.3	9.1	86	12	13
04/19/2016	14.3	113	3.0	37.2	9.0	13.3	82	38	61
05/11/2016	12.1	93.5	3.1	31.7	8.2	12.3	78	31	65
05/25/2016	12.3	108	4.5	43	10.8	15.2	71	46	139
06/07/2016	24.2	51.2	6.0	16	13.3	14.1	90	12	25
07/12/2016	6.52	27.6	<2.0	5	10.6	10.2	90	4	3.5
08/10/2016	15.7	36.8	<2.0	5	8.6	10.2	78	3	1.0

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12331800—Clark Fork near Drummond									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (μ S/cm)	Water temperature, onsite (°C)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	
10/21/2015	0805	461	8.2	494	9.5	220	62.0	15.7	
03/23/2016	1425	586	8.4	452	8.0	212	61.0	14.4	
04/20/2016	0805	778	8.1	381	10.0	178	51.6	12.0	
05/11/2016	1000	1,030	8.1	290	7.0	88.8	21.1	8.76	
05/25/2016	0955	1,290	8.1	333	10.0	150	43.7	10.0	
06/08/2016	0810	878	8.1	333	17.5	159	46.3	10.6	
07/13/2016	0805	495	8.1	469	14.5	230	65.9	15.9	
08/10/2016	0815	212	8.1	563	14.0	261	72.2	19.5	

Date	Cadmium, filtered (μ g/L)	Cadmium, unfiltered recoverable (μ g/L)	Copper, filtered (μ g/L)	Copper, unfiltered recoverable (μ g/L)	Iron, filtered (μ g/L)	Iron, unfiltered recoverable (μ g/L)	Lead, filtered (μ g/L)	Lead, unfiltered recoverable (μ g/L)	
10/21/2015	<0.030	0.067	2.7	10.0	6.4	216	0.059	1.57	
03/23/2016	0.034	0.088	3.9	14.9	6.3	288	0.073	2.22	
04/20/2016	0.037	0.249	4.7	41.6	24.8	1,100	0.189	7.80	
05/11/2016	0.031	0.212	5.1	42.7	30.7	994	0.239	7.33	
05/25/2016	0.042	0.33	6.4	57.4	25.4	1,410	0.217	9.78	
06/08/2016	0.042	0.12	6.7	22.2	13.8	397	0.169	3.15	
07/13/2016	0.033	0.05	4.9	8.0	13.7	109	0.098	0.85	
08/10/2016	<0.030	0.09	2.8	10.6	6.6	206	0.060	1.55	

Date	Manganese, filtered (μ g/L)	Manganese, unfiltered recoverable (μ g/L)	Zinc, filtered (μ g/L)	Zinc, unfiltered recoverable (μ g/L)	Arsenic, filtered (μ g/L)	Arsenic, unfiltered recoverable (μ g/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/21/2015	11.5	62.1	3.3	13.5	8.7	9.5	79	14	17
03/23/2016	17.6	62.4	3.0	17.9	7.7	9.5	77	16	25
04/20/2016	8.06	144	3.9	51.0	9.5	14.2	73	57	120
05/11/2016	8.69	123	3.8	46.7	8.3	13.6	63	54	150
05/25/2016	10.4	146	5.0	66	10.4	17.1	58	86	300
06/08/2016	9.64	68.2	3.2	23	12.8	14.2	89	17	40
07/13/2016	6.83	33.7	2.8	9	10.6	10.9	87	5	6.7
08/10/2016	26.2	126	2.8	16	10.2	12.3	59	26	15

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

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12334550—Clark Fork at Turah Bridge, near Bonner								
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/21/2015	0930	703	8.2	396	9.0	179	50.2	13.1
03/24/2016	0845	999	8.2	350	6.0	144	39.0	11.2
04/20/2016	0945	1,770	8.2	243	9.0	109	31.0	7.70
05/11/2016	0800	2,860	8.0	170	6.5	82.5	21.5	7.02
05/25/2016	0755	2,890	8.0	208	8.5	92.6	26.2	6.60
06/08/2016	1040	2,200	8.1	204	15.0	97.1	27.6	6.85
07/13/2016	0950	1,120	8.2	285	13.0	139	38.6	10.2
08/10/2016	0945	487	8.2	336	12.0	177	51.3	11.8

Date	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)
10/21/2015	<0.030	0.037	1.8	7.2	5.9	156	<0.040	1.05
03/24/2016	<0.030	0.079	2.3	12.0	9.7	272	0.056	1.82
04/20/2016	<0.030	0.128	3.0	21.0	31.0	632	0.151	3.83
05/11/2016	0.036	0.105	2.8	18.6	11.5	597	0.165	3.45
05/25/2016	<0.030	0.14	3.4	23.5	35.3	643	0.163	4.02
06/08/2016	<0.030	0.05	3.5	9.0	21.2	276	0.166	1.34
07/13/2016	<0.030	<0.03	2.7	3.5	14.5	70.4	<0.040	0.25
08/10/2016	<0.030	0.07	1.5	6.6	9.6	603	<0.040	1.53

Date	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/21/2015	3.46	39.2	2.4	10.5	5.9	6.7	84	10	19
03/24/2016	7.13	45.1	2.7	15.9	4.9	6.2	81	16	43
04/20/2016	5.43	73.5	3.0	28.5	5.1	7.2	74	34	162
05/11/2016	4.73	71.1	2.5	25.9	3.9	5.8	52	45	347
05/25/2016	5.13	65.2	3.5	29	5.2	7.5	61	42	328
06/08/2016	5.78	33.8	2.1	14	5.6	6.0	73	14	83
07/13/2016	2.93	8.8	<2.0	4	4.8	5.3	77	3	9.1
08/10/2016	4.56	76.7	<2.0	13	4.7	6.0	96	37	49

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12340000—Blackfoot River near Bonner									
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (μ S/cm)	Water temperature, onsite (°C)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	
10/21/2015	1100	430	8.4	281	8.0	142	35.3	13.0	
04/20/2016	1215	2,360	8.2	164	9.0	82.9	21.9	6.85	
05/11/2016	1410	3,710	8.2	160	8.0	82.3	21.6	6.87	
05/25/2016	1345	3,180	8.3	178	10.5	92.2	23.8	7.97	
07/13/2016	1200	1,040	8.5	235	15.5	129	32.8	11.3	
08/10/2016	1100	579	8.4	246	14.5	128	30.5	12.6	

Date	Cadmium, filtered (μ g/L)	Cadmium, unfiltered recoverable (μ g/L)	Copper, filtered (μ g/L)	Copper, unfiltered recoverable (μ g/L)	Iron, filtered (μ g/L)	Iron, unfiltered recoverable (μ g/L)	Lead, filtered (μ g/L)	Lead, unfiltered recoverable (μ g/L)	
10/21/2015	<0.030	<0.030	<0.80	<0.80	5.0	43.8	<0.040	<0.04	
04/20/2016	<0.030	<0.030	<0.80	<0.80	15.7	135	<0.040	0.12	
05/11/2016	<0.030	<0.030	<0.80	1.4	17.4	289	<0.040	0.37	
05/25/2016	<0.030	<0.03	<0.80	0.80	10.8	159	<0.040	0.20	
07/13/2016	<0.030	<0.03	<0.80	<0.80	7.0	39.6	<0.040	0.05	
08/10/2016	<0.030	<0.03	<0.80	0.60	<4.0	41.6	<0.040	0.07	

Date	Manganese, filtered (μ g/L)	Manganese, unfiltered recoverable (μ g/L)	Zinc, filtered (μ g/L)	Zinc, unfiltered recoverable (μ g/L)	Arsenic, filtered (μ g/L)	Arsenic, unfiltered recoverable (μ g/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/21/2015	1.14	4.9	<2.0	<2.0	1.1	1.4	83	2	2.3
04/20/2016	2.26	14.3	<2.0	<2.0	1.0	1.1	81	8	51
05/11/2016	1.87	21.7	<2.0	2.2	0.69	0.82	90	19	190
05/25/2016	2.08	13.6	<2.0	<2	0.76	0.80	86	11	94
07/13/2016	1.58	5.2	<2.0	<2	1.1	1.5	85	2	5.6
08/10/2016	2.04	8.8	<2.0	<2	1.1	1.3	73	4	6.3

Table 4. Water-quality data for the Clark Fork Basin, Montana, October 2015 through September 2016.—Continued

[hh, hour; mm, minute; ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; E, estimated; <, less than laboratory reporting level; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, no data. Unfiltered cadmium and zinc show different reporting levels because of new instrumentation at the National Water Quality Laboratory]

12340500—Clark Fork above Missoula								
Date	Time (hhmm)	Streamflow, instantaneous (ft ³ /s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Water temperature, onsite (°C)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)
10/21/2015	1255	1,160	8.4	345	9.0	158	42.7	12.6
03/24/2016	1120	2,000	8.3	279	6.0	129	35.5	9.71
04/20/2016	1415	4,320	8.3	198	10.0	95.4	26.3	7.20
05/11/2016	1545	6,790	8.2	166	8.5	125	39.7	6.29
05/25/2016	1515	6,360	8.3	194	11.0	90.6	24.5	7.13
06/08/2016	1245	5,380	8.3	186	16.5	93.2	25.3	7.28
07/13/2016	1355	2,190	8.5	261	15.0	136	36.5	10.8
08/10/2016	1305	1,040	8.3	286	14.0	141	36.8	11.9

Date	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)
10/16/2014	<0.030	<0.030	1.3	3.7	5.7	109	<0.040	0.51
03/25/2015	<0.030	0.041	1.7	6.0	14.1	191	0.047	0.92
04/22/2015	<0.030	0.054	1.6	9.0	20.1	326	0.071	1.56
05/13/2015	<0.030	0.040	1.6	7.9	23.8	425	0.080	1.59
05/28/2015	<0.030	0.07	2.1	11.0	20.0	408	0.088	1.93
06/10/2015	<0.030	0.04	2.6	4.5	11.8	214	0.043	0.70
07/15/2015	<0.030	<0.03	1.7	2.2	9.6	56.4	<0.040	0.18
08/12/2015	<0.030	0.04	1.1	3.7	6.4	342	<0.040	0.82

Date	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
10/16/2014	5.78	23.0	<2.0	5.8	4.0	4.6	88	6	19
03/25/2015	6.62	28.7	<2.0	8.6	3.1	3.5	85	11	59
04/22/2015	4.82	38.4	<2.0	12.0	2.6	3.4	76	19	222
05/13/2015	4.70	38.6	<2.0	12.4	2.3	3.1	77	24	440
05/28/2015	5.17	39.2	<2.0	16	3.0	3.9	72	23	395
06/10/2015	4.71	23.5	<2.0	6	2.8	3.1	80	13	189
07/15/2015	3.66	9.8	<2.0	3	3.2	3.5	74	2	12
08/12/2015	5.78	45.8	<2.0	8	2.8	3.7	95	19	53

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana (12334550), October 2015 through September 2016.[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		October			November			December	
1	625	11	19	865	20	47	e410	2	2.2
2	635	11	19	986	25	67	e450	4	4.9
3	654	10	18	984	25	66	e540	7	10
4	663	10	18	960	21	54	e620	11	18
5	668	10	18	934	16	40	e700	14	26
6	673	10	18	914	12	30	e760	17	35
7	681	10	18	886	10	24	e820	19	42
8	708	12	23	869	9	21	863	21	49
9	706	16	30	874	9	21	971	23	60
10	697	16	30	891	10	24	1,010	20	55
11	688	13	24	872	9	21	940	16	41
12	691	11	21	852	8	18	898	12	29
13	693	10	19	851	8	18	886	10	24
14	685	10	18	852	8	18	886	10	24
15	680	9	17	859	8	19	866	10	23
16	682	9	17	843	8	18	850	11	25
17	681	9	17	830	8	18	800	9	19
18	677	10	18	836	8	18	701	8	15
19	677	10	18	857	8	19	782	8	17
20	695	10	19	828	6	13	834	10	23
21	704	10	19	741	4	8.0	754	9	18
22	715	10	19	687	4	7.4	743	8	16
23	727	10	20	716	4	7.7	806	8	17
24	735	10	20	e740	4	8.0	706	7	13
25	740	10	20	e740	6	12	e660	6	11
26	735	10	20	e620	5	8.4	e620	4	6.7
27	735	10	20	e500	4	5.4	e580	3	4.7
28	742	10	20	e400	3	3.2	e560	3	4.5
29	745	10	20	e380	2	2.1	599	3	4.9
30	750	11	22	e400	2	2.2	621	4	6.7
31	782	15	32	--	--	--	604	3	4.9
Total¹	21,669	--	631	23,567	--	638.4	22,840	--	649.5
Mean	699	11	20	786	9	21	737	10	21
Max	782	16	32	986	25	67	1,010	23	60
Min	625	9	17	380	2	2.1	410	2	2.2

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana (12334550), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		January			February			March	
1	e580	2	3.1	788	16	34	978	16	42
2	e500	2	2.7	752	14	28	940	14	36
3	e420	1	1.1	695	13	24	928	14	35
4	e450	4	4.9	666	12	22	915	12	30
5	e560	8	12	751	11	22	909	13	32
6	e590	8	13	771	12	25	934	14	35
7	699	9	17	754	13	26	973	14	37
8	716	9	17	744	15	30	962	14	36
9	713	9	17	770	16	33	934	15	38
10	e690	8	15	776	19	40	915	16	40
11	e640	7	12	783	23	49	960	21	54
12	e580	6	9.4	832	31	70	1,000	24	65
13	e660	6	11	926	44	110	1,030	23	64
14	772	7	15	1,000	49	132	1,080	21	61
15	833	8	18	1,080	57	166	1,070	20	58
16	776	6	13	1,450	207	810	1,030	16	44
17	764	6	12	1,470	133	528	1,000	14	38
18	791	7	15	1,320	68	242	985	14	37
19	805	7	15	1,210	38	124	927	14	35
20	796	8	17	1,160	33	103	930	15	38
21	801	8	17	1,080	26	76	969	20	52
22	784	9	19	1,010	22	60	1,010	23	63
23	782	9	19	989	19	51	1,010	19	52
24	803	11	24	918	16	40	997	16	43
25	795	11	24	905	14	34	996	15	40
26	774	9	19	916	14	35	980	13	34
27	759	8	16	926	14	35	961	13	34
28	817	12	26	946	16	41	965	12	31
29	843	20	46	977	18	47	952	12	31
30	861	21	49	--	--	--	939	14	35
31	821	18	40	--	--	--	925	16	40
Total¹	22,175	--	539.2	27,365	--	3,037	30,104	--	1,310
Mean	715	9	17	944	34	105	971	16	42
Max	861	21	49	1,470	207	810	1,080	24	65
Min	420	1	1.1	666	11	22	909	12	30

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana (12334550), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		April			May			June	
1	938	17	43	2,160	32	187	2,300	23	143
2	944	19	48	2,100	32	181	2,200	20	119
3	983	22	58	2,100	31	176	2,160	18	105
4	1,070	24	69	2,180	29	171	2,140	19	110
5	1,160	26	81	2,340	32	202	2,100	18	102
6	1,190	26	84	2,500	38	256	2,130	18	104
7	1,180	26	83	2,660	47	338	2,190	18	106
8	1,210	28	91	2,820	54	411	2,230	16	96
9	1,330	44	158	3,020	65	530	2,200	16	95
10	1,530	67	277	3,060	63	521	2,140	15	87
11	1,680	67	304	2,790	39	294	2,030	12	66
12	1,750	68	321	2,570	29	201	1,920	10	52
13	1,890	75	383	2,450	26	172	1,740	8	38
14	2,060	89	495	2,360	21	134	1,610	7	30
15	2,070	81	453	2,310	20	125	1,580	6	26
16	1,960	61	323	2,340	20	126	1,640	5	22
17	1,850	50	250	2,250	20	122	1,740	5	23
18	1,800	46	224	2,160	18	105	1,640	4	18
19	1,780	42	202	2,260	24	146	1,500	4	16
20	1,780	37	178	2,690	39	283	1,400	3	11
21	1,910	44	227	2,760	42	313	1,300	4	14
22	2,140	56	324	2,970	52	417	1,200	3	9.7
23	2,470	91	607	2,950	51	406	1,140	3	9.2
24	2,740	101	747	2,870	39	302	1,090	2	5.9
25	2,830	104	795	2,900	42	329	1,050	1	2.8
26	2,680	79	572	2,790	42	316	1,010	2	5.5
27	2,550	62	427	2,710	38	278	959	2	5.2
28	2,450	50	331	2,800	37	280	899	2	4.9
29	2,340	38	240	2,710	36	263	821	2	4.4
30	2,270	34	208	2,550	28	193	768	2	4.1
31	--	--	--	2,430	25	164	--	--	--
Total¹	54,535	--	8,603	79,560	--	7,942	48,827	--	1,434.7
Mean	1,818	52	287	2,566	36	256	1,628	9	48
Max	2,830	104	795	3,060	65	530	2,300	23	143
Min	938	17	43	2,100	18	105	768	1	2.8

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana (12334550), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		July			August			September	
1	741	2	4.0	464	6	7.5	342	6	5.5
2	743	1	2.0	436	5	5.9	346	5	4.7
3	719	1	1.9	417	5	5.6	352	5	4.8
4	697	2	3.8	407	5	5.5	349	5	4.7
5	675	2	3.6	397	5	5.4	368	5	5.0
6	680	2	3.7	354	5	4.8	434	9	11
7	671	1	1.8	366	5	4.9	488	13	17
8	655	1	1.8	382	6	6.2	485	13	17
9	637	1	1.7	427	13	15	483	12	16
10	683	1	1.8	476	32	41	469	11	14
11	978	6	16	478	24	31	458	10	12
12	1,210	5	16	467	21	26	452	8	9.8
13	1,100	3	8.9	453	19	23	451	6	7.3
14	1,020	2	5.5	433	17	20	446	5	6.0
15	915	2	4.9	415	15	17	447	5	6.0
16	880	2	4.8	403	13	14	448	5	6.0
17	865	2	4.7	389	12	13	442	6	7.2
18	827	3	6.7	383	11	11	451	8	9.7
19	788	4	8.5	400	11	12	458	9	11
20	750	4	8.1	399	10	11	459	9	11
21	706	3	5.7	395	9	9.6	501	12	16
22	668	5	9.0	389	8	8.4	603	15	24
23	631	6	10	388	8	8.4	607	16	26
24	598	5	8.1	387	8	8.4	622	15	25
25	572	4	6.2	386	8	8.3	625	12	20
26	547	4	5.9	375	7	7.1	603	12	20
27	537	5	7.2	356	7	6.7	623	12	20
28	533	6	8.6	350	8	7.6	623	14	24
29	514	6	8.3	351	8	7.6	615	14	23
30	490	7	9.3	348	8	7.5	602	14	23
31	481	8	10	347	7	6.6	--	--	--
Total¹	22,511	--	198.5	12,418	--	366	14,652	--	406.7
Mean	726	3	6	401	11	12	488	10	14
Max	1,210	8	16	478	32	41	625	16	26
Min	481	1	1.7	347	5	4.8	342	5	4.7

¹Total for water year 2016 (unrounded sum of daily values): streamflow=380,223 ft³/s (annual runoff=754,200 acre-feet); suspended-sediment discharge=25,756.0 tons.

Table 6. Daily mean streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana (12340000), October 2015 through September 2016.[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		October			November			December	
1	411	2	2.2	533	5	7.2	e340	2	1.8
2	410	2	2.2	559	9	14	e400	2	2.2
3	411	2	2.2	550	8	12	e430	2	2.3
4	409	2	2.2	527	6	8.5	e450	2	2.4
5	410	2	2.2	511	4	5.5	e520	2	2.8
6	412	3	3.3	517	2	2.8	e500	2	2.7
7	416	3	3.4	519	2	2.8	e450	2	2.4
8	424	4	4.6	522	3	4.2	e520	2	2.8
9	424	4	4.6	524	3	4.2	e640	3	5.2
10	421	4	4.5	543	4	5.9	e600	4	6.5
11	419	3	3.4	546	4	5.9	e560	4	6.0
12	410	2	2.2	534	3	4.3	e540	3	4.4
13	411	2	2.2	524	2	2.8	e520	3	4.2
14	415	2	2.2	525	2	2.8	e520	3	4.2
15	414	2	2.2	518	2	2.8	521	2	2.8
16	414	2	2.2	512	2	2.8	504	2	2.7
17	415	2	2.2	505	2	2.7	e480	2	2.6
18	416	2	2.2	531	3	4.3	e470	1	1.3
19	419	4	4.5	520	2	2.8	e460	1	1.2
20	428	3	3.5	505	1	1.4	e480	1	1.3
21	428	2	2.3	456	1	1.2	e470	1	1.3
22	425	4	4.6	e480	1	1.3	e470	1	1.3
23	421	3	3.4	e490	1	1.3	e480	1	1.3
24	420	2	2.3	e480	1	1.3	e460	1	1.2
25	419	2	2.3	e480	2	2.6	e440	2	2.4
26	418	2	2.3	e400	2	2.2	e400	2	2.2
27	416	2	2.2	e350	2	1.9	e380	3	3.1
28	414	2	2.2	e320	1	0.86	e360	3	2.9
29	415	2	2.2	e320	1	0.86	e410	2	2.2
30	418	3	3.4	e330	2	1.8	e440	2	2.4
31	454	5	6.1	--	--	--	e440	2	2.4
Total¹	12,957	--	91.5	14,631	--	115.02	14,655	--	84.5
Mean	418	3	3.0	488	3	3.8	473	2	2.7
Max	454	5	6.1	559	9	14	640	4	6.5
Min	409	2	2.2	320	1	0.86	340	1	1.2

Table 6. Daily mean streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana (12340000), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		January			February			March	
1	e380	2	2.1	451	3	3.7	709	5	9.6
2	e360	2	1.9	e420	3	3.4	707	5	9.5
3	e310	1	0.84	e410	2	2.2	701	4	7.6
4	e330	1	0.89	e430	2	2.3	688	5	9.3
5	e430	1	1.2	e440	2	2.4	681	4	7.4
6	e480	1	1.3	450	2	2.4	692	4	7.5
7	e520	1	1.4	441	2	2.4	705	4	7.6
8	e500	1	1.4	443	2	2.4	716	5	9.7
9	e500	1	1.4	447	2	2.4	718	6	12
10	e470	1	1.3	444	3	3.6	723	5	9.8
11	e420	2	2.3	451	4	4.9	747	6	12
12	e390	2	2.1	478	5	6.5	770	7	15
13	e410	3	3.3	519	6	8.4	805	7	15
14	e430	3	3.5	555	6	9.0	895	11	27
15	e440	2	2.4	635	11	19	918	9	22
16	e440	2	2.4	960	35	91	920	7	17
17	e440	2	2.4	1,020	40	110	921	6	15
18	e460	2	2.5	899	26	63	900	5	12
19	e450	2	2.4	823	16	36	878	4	9.5
20	e450	2	2.4	798	12	26	868	4	9.4
21	e450	2	2.4	760	10	21	880	5	12
22	e450	2	2.4	727	7	14	911	6	15
23	e440	2	2.4	700	6	11	933	7	18
24	e440	2	2.4	670	5	9.0	953	6	15
25	e440	2	2.4	657	4	7.1	966	7	18
26	e430	2	2.3	647	4	7.0	963	6	16
27	458	2	2.5	655	5	8.8	958	6	16
28	467	3	3.8	690	6	11	955	6	15
29	475	3	3.8	711	6	12	940	5	13
30	470	3	3.8	--	--	--	935	4	10
31	464	3	3.8	--	--	--	950	7	18
Total¹	13,594	--	71.43	17,731	--	501.9	26,006	--	409.9
Mean	439	2	2.3	611	8	17	839	6	13
Max	520	3	3.8	1,020	40	110	966	11	27
Min	310	1	0.84	410	2	2.2	681	4	7.4

Table 6. Daily mean streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana (12340000), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		April			May			June	
1	954	9	23	2,740	10	74	2,690	8	58
2	969	6	16	2,590	9	63	2,640	10	71
3	1,020	7	19	2,580	8	56	2,650	10	72
4	1,170	10	32	2,760	10	75	2,690	10	73
5	1,300	13	46	3,150	14	119	2,770	11	82
6	1,380	12	45	3,620	20	195	2,840	11	84
7	1,430	12	46	3,910	21	222	2,930	13	103
8	1,530	12	50	4,060	23	252	2,980	13	105
9	1,790	17	82	4,330	27	316	2,950	13	104
10	2,210	27	161	4,220	25	285	2,870	13	101
11	2,450	26	172	3,750	20	202	2,700	10	73
12	2,560	20	138	3,300	16	143	2,490	9	61
13	2,760	21	156	2,980	12	97	2,260	7	43
14	2,860	20	154	2,730	9	66	2,110	8	46
15	2,740	13	96	2,550	8	55	1,990	6	32
16	2,500	9	61	2,480	8	54	1,880	6	30
17	2,310	8	50	2,370	7	45	1,840	5	25
18	2,240	8	48	2,300	7	43	1,730	4	19
19	2,260	8	49	2,440	8	53	1,640	4	18
20	2,360	8	51	2,790	10	75	1,570	4	17
21	2,660	14	101	2,870	10	77	1,470	2	7.9
22	3,230	27	235	2,950	12	96	1,410	3	11
23	3,860	40	417	3,060	12	99	1,360	2	7.3
24	4,330	45	526	3,180	12	103	1,320	2	7.1
25	4,430	41	490	3,160	11	94	1,300	2	7.0
26	4,160	30	337	3,090	12	100	1,280	2	6.9
27	3,850	22	229	3,100	12	100	1,220	2	6.6
28	3,520	16	152	3,070	10	83	1,170	2	6.3
29	3,210	14	121	2,940	8	64	1,110	2	6.0
30	2,980	11	89	2,840	8	61	1,060	2	5.7
31	--	--	--	2,760	9	67	--	--	--
Total¹	75,023	--	4,192	94,670	--	3,434	60,920	--	1,288.8
Mean	2,501	18	140	3,054	13	111	2,031	7	43
Max	4,430	45	526	4,330	27	316	2,980	13	105
Min	954	6	16	2,300	7	43	1,060	2	5.7

Table 6. Daily mean streamflow and suspended-sediment data for Blackfoot River near Bonner, Montana (12340000), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		July			August			September	
1	1,030	2	5.6	545	2	2.9	404	2	2.2
2	1,010	1	2.7	541	2	2.9	400	2	2.2
3	989	1	2.7	530	2	2.9	403	2	2.2
4	956	1	2.6	526	2	2.8	403	3	3.3
5	913	1	2.5	521	2	2.8	415	4	4.5
6	911	1	2.5	510	2	2.8	428	3	3.5
7	929	1	2.5	507	2	2.7	439	3	3.6
8	895	2	4.8	532	2	2.9	440	4	4.8
9	873	2	4.7	551	3	4.5	442	3	3.6
10	890	2	4.8	566	3	4.6	428	2	2.3
11	1,000	2	5.4	549	2	3.0	414	2	2.2
12	1,070	2	5.8	524	4	5.7	417	2	2.3
13	1,040	2	5.6	503	3	4.1	411	2	2.2
14	984	2	5.3	491	2	2.7	420	2	2.3
15	932	2	5.0	477	2	2.6	418	2	2.3
16	894	2	4.8	460	2	2.5	406	2	2.2
17	874	2	4.7	449	3	3.6	407	2	2.2
18	850	2	4.6	444	3	3.6	428	3	3.5
19	831	3	6.7	468	4	5.1	426	4	4.6
20	800	3	6.5	473	4	5.1	423	2	2.3
21	758	2	4.1	464	4	5.0	428	2	2.3
22	728	3	5.9	446	2	2.4	475	4	5.1
23	690	4	7.5	431	2	2.3	468	3	3.8
24	678	3	5.5	424	2	2.3	457	4	4.9
25	657	2	3.5	422	2	2.3	445	2	2.4
26	638	2	3.4	423	3	3.4	436	4	4.7
27	627	2	3.4	420	4	4.5	431	5	5.8
28	613	3	5.0	411	2	2.2	425	3	3.4
29	599	4	6.5	406	2	2.2	408	2	2.2
30	583	3	4.7	409	2	2.2	403	2	2.2
31	564	2	3.0	408	3	3.3	--	--	--
Total¹	25,806	--	142.3	14,831	--	101.9	12,748	--	95.1
Mean	832	2	4.6	478	3	3.3	425	3	3.2
Max	1,070	4	7.5	566	4	5.7	475	5	5.8
Min	564	1	2.5	406	2	2.2	400	2	2.2

¹Total for water year 2016 (unrounded sum of daily values): streamflow=443,729 ft³/s (annual runoff=880,100 acre-feet); suspended-sediment discharge=10,528.35 tons.

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana (12340500), October 2015 through September 2016.[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		October			November			December	
1	1,060	5	14	1,410	12	46	e740	18	36
2	1,070	5	14	1,570	12	51	e840	22	50
3	1,080	5	15	1,580	11	47	e960	31	80
4	1,090	5	15	1,530	11	45	e1,050	40	113
5	1,100	5	15	1,480	9	36	e1,200	49	159
6	1,110	5	15	1,460	7	28	e1,250	58	196
7	1,120	5	15	1,440	5	19	e1,250	58	196
8	1,150	6	19	1,420	5	19	e1,350	38	139
9	1,150	6	19	1,430	5	19	e1,600	16	69
10	1,140	7	22	1,470	5	20	1,590	9	39
11	1,130	7	21	1,450	5	20	1,490	8	32
12	1,120	6	18	1,420	4	15	1,430	7	27
13	1,130	6	18	1,400	4	15	1,400	6	23
14	1,120	6	18	1,400	4	15	1,390	6	23
15	1,120	6	18	1,400	4	15	1,370	5	18
16	1,120	6	18	1,390	4	15	1,340	5	18
17	1,120	6	18	1,360	4	15	1,270	5	17
18	1,120	6	18	1,380	4	15	1,160	4	13
19	1,120	6	18	1,390	4	15	1,230	4	13
20	1,140	6	18	1,350	4	15	1,300	4	14
21	1,160	5	16	1,220	4	13	1,210	4	13
22	1,160	6	19	1,180	5	16	1,200	4	13
23	1,170	6	19	1,220	4	13	1,280	4	14
24	1,170	6	19	1,240	5	17	1,190	4	13
25	1,180	6	19	1,240	5	17	1,120	4	12
26	1,170	6	19	1,040	6	17	1,030	4	11
27	1,170	5	16	850	17	39	e960	3	7.8
28	1,170	5	16	e720	44	86	e920	3	7.5
29	1,180	6	19	e700	51	96	e1,000	3	8.1
30	1,190	8	26	e720	31	60	e1,050	2	5.7
31	1,250	9	30	--	--	--	e1,050	2	5.7
Total¹	35,280	--	564	38,860	--	859	37,220	--	1,385.8
Mean	1,138	6	18	1,295	10	29	1,201	14	45
Max	1,250	9	30	1,580	51	96	1,600	58	196
Min	1,060	5	14	700	4	13	740	2	5.7

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana (12340500), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment		Mean streamflow (ft³/s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		January			February			March	
1	e950	2	5.1	1,220	7	23	1,710	9	42
2	e850	2	4.6	1,170	7	22	1,670	7	32
3	e720	4	7.8	1,090	6	18	1,650	7	31
4	e770	5	10	1,090	6	18	1,620	8	35
5	e980	6	16	1,170	6	19	1,610	8	35
6	e1,050	7	20	1,200	6	19	1,640	8	35
7	e1,200	8	26	1,170	7	22	1,690	8	37
8	e1,200	9	29	1,160	7	22	1,700	8	37
9	e1,200	9	29	1,190	7	22	1,680	8	36
10	e1,150	8	25	1,190	9	29	1,660	8	36
11	e1,050	7	20	1,210	12	39	1,720	10	46
12	e980	6	16	1,290	17	59	1,790	11	53
13	1,050	4	11	1,420	22	84	1,860	12	60
14	1,190	4	13	1,540	26	108	2,020	14	76
15	1,260	4	14	1,690	33	151	2,040	13	72
16	1,200	4	13	2,390	95	613	2,010	10	54
17	1,190	4	13	2,590	79	552	1,980	8	43
18	1,230	4	13	2,310	42	262	1,940	8	42
19	1,240	4	13	2,100	26	147	1,860	8	40
20	1,230	3	10	2,020	21	115	1,840	8	40
21	1,230	3	10	1,900	16	82	1,890	10	51
22	1,220	3	9.9	1,770	13	62	1,960	11	58
23	1,200	4	13	1,730	10	47	2,000	11	59
24	1,220	4	13	1,620	10	44	2,010	10	54
25	1,220	4	13	1,580	9	38	2,020	10	55
26	1,180	5	16	1,580	8	34	2,000	8	43
27	1,200	7	23	1,600	9	39	1,980	8	43
28	1,250	8	27	1,650	10	45	1,980	8	43
29	1,300	10	35	1,700	10	46	1,950	7	37
30	1,310	9	32	--	--	--	1,930	7	36
31	1,270	8	27	--	--	--	1,920	9	47
Total¹	35,290	--	527.4	45,340	--	2,781	57,330	--	1,408
Mean	1,138	5	17	1,563	18	96	1,849	9	45
Max	1,310	10	35	2,590	95	613	2,040	14	76
Min	720	2	4.6	1,090	6	18	1,610	7	31

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana (12340500), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		April			May			June	
1	1,940	9	47	5,190	16	224	5,210	13	183
2	1,950	10	53	4,950	15	200	5,020	12	163
3	2,050	13	72	4,910	14	186	4,990	11	148
4	2,280	16	98	5,160	15	209	5,000	12	162
5	2,530	18	123	5,720	18	278	5,050	11	150
6	2,650	17	122	6,340	24	411	5,140	11	153
7	2,700	18	131	6,870	27	501	5,280	12	171
8	2,810	19	144	7,180	29	562	5,390	13	189
9	3,170	28	240	7,620	44	905	5,340	12	173
10	3,830	40	414	7,660	46	951	5,230	11	155
11	4,300	40	464	6,880	25	464	4,930	10	133
12	4,470	35	422	6,180	18	300	4,610	8	100
13	4,820	37	482	5,690	16	246	4,200	7	79
14	5,170	40	558	5,330	14	201	3,890	8	84
15	5,090	36	495	5,090	12	165	3,730	5	50
16	4,720	26	331	5,040	10	136	3,660	4	40
17	4,390	22	261	4,840	10	131	3,720	5	50
18	4,250	20	230	4,670	10	126	3,520	4	38
19	4,230	18	206	4,850	12	157	3,280	4	35
20	4,330	18	210	5,670	20	306	3,110	4	34
21	4,740	21	269	5,890	20	318	2,910	3	24
22	5,540	31	464	6,190	25	418	2,720	3	22
23	6,530	53	934	6,280	27	458	2,610	3	21
24	7,350	70	1,390	6,320	22	375	2,520	2	14
25	7,600	66	1,350	6,330	22	376	2,450	2	13
26	7,210	42	818	6,170	25	416	2,380	2	13
27	6,750	34	620	6,050	20	327	2,280	2	12
28	6,310	26	443	6,110	18	297	2,150	2	12
29	5,870	20	317	5,910	18	287	2,010	2	11
30	5,550	19	285	5,640	16	244	1,900	2	10
31	--	--	--	5,430	14	205	--	--	--
Total¹	135,130	--	11,993	182,160	--	10,380	114,230	--	2,442
Mean	4,504	29	400	5,876	20	335	3,808	7	81
Max	7,600	70	1,390	7,660	46	951	5,390	13	189
Min	1,940	9	47	4,670	10	126	1,900	2	10

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana (12340500), October 2015 through September 2016.—Continued[ft³/s, cubic foot per second; mg/L, milligram per liter; ton/d, ton per day; e, estimated; --, no data or value not computed; max, maximum; min, minimum]

Day	Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment		Mean streamflow (ft ³ /s)	Suspended sediment	
		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)		Mean concentration (mg/L)	Discharge (ton/d)
		July			August			September	
1	1,820	1	4.9	992	5	13	776	4	8.4
2	1,790	1	4.8	965	5	13	768	4	8.3
3	1,750	1	4.7	939	5	13	781	4	8.4
4	1,690	1	4.6	917	4	9.9	782	6	13
5	1,630	1	4.4	904	3	7.3	809	7	15
6	1,620	1	4.4	860	4	9.3	880	5	12
7	1,620	1	4.4	863	4	9.3	951	7	18
8	1,580	2	8.5	901	5	12	958	6	16
9	1,540	2	8.3	949	6	15	964	6	16
10	1,590	2	8.6	1,020	17	47	926	5	13
11	2,000	4	22	1,020	13	36	897	5	12
12	2,350	5	32	991	10	27	891	4	9.6
13	2,210	3	18	952	9	23	888	3	7.2
14	2,070	3	17	919	8	20	895	4	9.7
15	1,900	2	10	890	7	17	895	5	12
16	1,810	2	9.8	861	6	14	885	4	9.6
17	1,770	2	9.6	844	5	11	874	4	9.4
18	1,710	4	18	834	6	14	911	5	12
19	1,640	4	18	866	6	14	913	5	12
20	1,560	4	17	889	5	12	906	4	9.8
21	1,480	5	20	878	5	12	935	5	13
22	1,400	4	15	857	4	9.3	1,100	7	21
23	1,320	4	14	849	4	9.2	1,110	8	24
24	1,260	4	14	844	4	9.1	1,110	7	21
25	1,220	4	13	838	4	9.1	1,110	6	18
26	1,180	4	13	832	4	9.0	1,080	5	15
27	1,140	4	12	811	4	8.8	1,080	5	15
28	1,120	4	12	794	4	8.6	1,090	7	21
29	1,090	4	12	789	4	8.5	1,060	7	20
30	1,050	4	11	787	4	8.5	1,030	7	19
31	1,030	4	11	779	4	8.4	--	--	--
Total¹	48,940	--	376	27,434	--	437.3	28,255	--	418.4
Mean	1,579	3	12	885	6	14	942	5	14
Max	2,350	5	32	1,020	17	47	1,110	8	24
Min	1,030	1	4.4	779	3	7.3	768	3	7.2

¹Total for water year 2016 (unrounded sum of daily values): streamflow=785,469 ft³/s (annual runoff=1,558,000 acre-feet); suspended-sediment discharge=33,571.9 tons.

Table 8. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Mill Creek at Opportunity, Montana (12323700), March through September 2016.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	March			April			May			June		
1	--	--	--	2.0	1.0	1.5	5.0	3.0	4.0	5.5	3.0	4.0
2	--	--	--	2.0	1.0	1.5	4.5	3.0	3.5	5.5	4.0	4.5
3	--	--	--	2.5	1.5	1.5	4.5	2.5	3.0	8.5	5.0	6.5
4	--	--	--	3.5	2.0	2.5	4.0	2.5	3.0	--	--	--
5	--	--	--	3.5	2.0	2.5	5.5	3.0	4.0	--	--	--
6	--	--	--	3.5	1.5	2.0	10	5.0	7.0	--	--	--
7	--	--	--	3.5	1.5	2.5	12	6.0	8.0	--	--	--
8	--	--	--	8.0	3.0	4.0	25	7.5	12	--	--	--
9	--	--	--	14	5.5	8.5	32	10	17	18	7.5	12
10	--	--	--	16	7.0	11	11	5.5	7.0	9.0	5.0	6.5
11	--	--	--	12	5.5	8.0	5.5	4.0	4.5	6.5	3.5	5.0
12	--	--	--	12	6.0	8.5	5.0	3.5	4.0	5.5	3.0	4.0
13	--	--	--	42	10	21	5.0	3.0	3.5	5.0	2.5	3.0
14	--	--	--	19	8.0	12	4.5	3.0	3.5	3.5	2.0	2.5
15	--	--	--	11	5.5	7.5	4.5	3.0	3.5	--	--	--
16	--	--	--	23	5.0	7.0	3.5	2.5	3.0	5.0	2.0	3.0
17	--	--	--	7.0	3.5	5.0	4.0	2.5	3.0	4.0	2.0	2.5
18	--	--	--	--	--	--	4.5	2.5	3.0	3.5	2.0	2.5
19	--	--	--	--	--	--	7.0	3.5	4.5	3.0	1.5	2.5
20	--	--	--	--	--	--	7.0	3.5	5.0	3.0	1.5	2.0
21	--	--	--	6.5	4.0	5.0	9.0	4.0	6.0	3.0	1.5	2.5
22	--	--	--	9.5	5.0	6.5	--	--	--	3.0	1.5	2.0
23	--	--	--	14	7.0	9.5	--	--	--	3.0	1.0	2.0
24	--	--	--	17	8.0	11	--	--	--	3.0	1.5	2.0
25	--	--	--	9.5	6.0	7.0	--	--	--	2.5	1.0	1.5
26	--	--	--	7.5	5.0	6.0	--	--	--	2.5	1.0	1.5
27	--	--	--	7.0	4.5	5.5	--	--	--	2.5	1.0	1.5
28	--	--	--	5.5	4.0	4.5	--	--	--	3.0	1.0	1.5
29	2.5	1.5	1.5	5.0	3.5	4.0	--	--	--	2.5	1.0	2.0
30	1.5	1.0	1.5	5.5	3.5	4.0	--	--	--	3.0	1.0	2.0
31	2.0	1.0	1.5	--	--	--	5.0	3.5	4.0	--	--	--
Month ¹	2.5	1.0	1.5	42	1.0	6.3	32	2.5	5.3	18	1.0	3.3

Table 8. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Mill Creek at Opportunity, Montana (12323700), March through September 2016.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	July			August			September		
1	3.0	1.0	1.5	--	--	--	1.5	1.0	1.0
2	2.5	1.0	1.5	--	--	--	1.5	1.0	1.0
3	2.5	1.0	1.5	--	--	--	1.5	1.0	1.5
4	2.5	1.0	1.5	--	--	--	1.5	1.0	1.5
5	2.0	1.0	1.5	--	--	--	--	--	--
6	2.0	1.0	1.5	--	--	--	--	--	--
7	2.0	0.5	1.0	--	--	--	--	--	--
8	2.0	1.0	1.5	--	--	--	--	--	--
9	2.5	1.5	1.5	1.5	1.0	1.0	--	--	--
10	4.5	1.5	2.5	1.5	1.0	1.0	1.0	1.0	1.0
11	4.0	1.5	2.5	1.5	0.5	1.0	1.0	0.5	1.0
12	3.0	1.5	2.0	1.5	1.0	1.0	1.5	1.0	1.0
13	2.5	1.5	2.0	1.5	1.0	1.0	1.0	1.0	1.0
14	3.0	2.0	2.5	1.0	1.0	1.0	1.5	1.0	1.0
15	3.0	2.0	2.5	1.5	0.5	1.0	1.5	1.0	1.0
16	3.0	1.5	2.0	1.5	1.0	1.0	1.5	0.5	1.0
17	3.0	1.5	2.0	1.5	1.0	1.0	0.5	0.5	0.5
18	3.0	1.5	2.0	1.5	0.5	1.0	1.0	0.5	0.5
19	3.5	1.0	2.0	1.5	0.5	1.0	0.5	0.5	0.5
20	2.0	1.0	1.5	1.0	1.0	1.0	1.5	0.5	0.5
21	2.0	1.0	1.0	1.0	0.5	1.0	1.0	0.5	0.5
22	2.0	1.0	1.0	1.5	0.5	1.0	1.0	0.5	0.5
23	1.5	0.5	1.0	1.0	0.5	1.0	1.0	0.5	0.5
24	1.5	0.5	1.0	1.0	0.5	1.0	1.0	0.5	0.5
25	1.5	0.5	1.0	1.5	0.5	1.0	1.0	0.5	0.5
26	2.0	1.0	1.0	1.5	0.5	1.0	0.5	0.5	0.5
27	2.5	1.0	1.0	1.0	0.5	0.5	1.0	0.5	0.5
28	1.5	1.0	1.0	1.5	0.5	1.0	1.0	0.5	0.5
29	1.5	1.0	1.0	1.5	0.5	1.0	1.0	0.5	0.5
30	--	--	--	2.0	1.0	1.0	1.5	0.5	1.0
31	--	--	--	2.0	1.0	1.5	--	--	--
Month ¹	4.5	0.5	1.6	2.0	0.5	1.0	1.5	0.5	0.8

¹For months with missing daily values, the means are calculated using available values.

Table 9. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Willow Creek at Opportunity, Montana (12323720), March through September 2016.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	March			April			May			June		
1	--	--	--	4.5	2.5	3.5	11	7.5	8.5	10	6.0	8.0
2	--	--	--	4.5	2.0	3.0	12	8.0	9.0	9.0	5.0	7.0
3	--	--	--	--	--	--	10	7.0	8.0	8.5	5.0	6.5
4	--	--	--	--	--	--	9.5	8.0	8.5	7.5	5.0	6.0
5	--	--	--	8.5	4.5	5.5	10	8.0	9.0	7.0	4.5	5.5
6	--	--	--	7.5	5.5	6.0	18	9.0	12	12	4.5	7.0
7	--	--	--	8.0	5.5	6.5	15	12	13	--	--	--
8	--	--	--	9.5	7.0	8.0	15	12	13	--	--	--
9	--	--	--	19	8.5	12	17	11	13	14	4.0	5.0
10	--	--	--	19	13	15	17	11	13	6.0	3.5	4.5
11	--	--	--	19	15	17	13	9.5	11	6.5	3.5	4.5
12	--	--	--	18	15	16	11	9.0	10	6.5	3.5	5.0
13	--	--	--	36	15	20	11	8.0	9.0	7.0	3.5	5.0
14	--	--	--	110	14	35	9.0	7.0	8.0	6.5	3.5	4.5
15	--	--	--	14	10	12	11	8.0	9.5	6.5	3.0	4.0
16	--	--	--	12	10	11	10	6.5	8.0	7.5	3.5	5.0
17	--	--	--	14	10	12	11	8.0	9.5	5.5	2.5	3.5
18	--	--	--	--	--	--	13	8.5	10	9.5	2.5	4.5
19	--	--	--	--	--	--	18	9.5	12	7.0	3.0	4.0
20	--	--	--	--	--	--	14	8.5	10	5.0	3.0	3.5
21	--	--	--	15	10	12	15	7.5	10	5.5	3.0	3.5
22	--	--	--	15	10	12	11	7.5	8.5	8.0	3.0	4.0
23	--	--	--	24	14	16	11	7.0	8.0	8.5	2.5	4.0
24	--	--	--	29	17	21	9.5	7.0	8.0	6.0	3.5	4.5
25	--	--	--	19	16	17	8.0	5.5	6.5	4.5	2.0	3.0
26	--	--	--	19	14	16	--	--	--	--	--	--
27	--	--	--	18	14	15	9.5	7.5	8.5	--	--	--
28	--	--	--	--	--	--	9.0	5.5	7.0	--	--	--
29	4.5	2.5	3.5	14	12	13	8.5	5.0	6.5	--	--	--
30	5.0	3.0	4.0	15	8.5	13	10	5.5	7.0	--	--	--
31	4.5	2.5	3.0	--	--	--	8.0	5.5	6.5	--	--	--
Month¹	5.0	2.5	3.5	110	2.0	13	18	5.0	9.4	14	2.0	4.9

Table 9. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Willow Creek at Opportunity, Montana (12323720), March through September 2016.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	July			August			September		
1	--	--	--	4.0	2.5	3.0	3.0	2.0	2.5
2	--	--	--	4.0	2.0	3.0	3.0	2.0	2.5
3	--	--	--	5.0	2.0	3.0	3.0	2.0	2.5
4	--	--	--	4.0	2.0	3.0	3.5	2.0	2.5
5	--	--	--	5.5	2.5	3.5	3.5	2.5	3.0
6	--	--	--	6.0	3.5	4.5	4.0	2.5	3.0
7	6.5	3.5	5.0	12	4.0	5.5	3.0	2.5	2.5
8	6.5	3.0	4.5	11	4.0	5.5	3.5	2.5	2.5
9	6.5	2.5	4.0	5.5	3.5	4.0	3.0	2.0	2.5
10	6.5	3.0	4.0	5.5	3.5	4.5	2.5	2.0	2.5
11	8.0	2.5	4.5	5.0	3.0	4.0	2.5	2.0	2.5
12	4.5	1.5	2.5	5.0	3.0	4.0	3.0	2.0	2.5
13	3.0	1.5	2.0	4.5	3.0	3.5	3.0	2.0	2.5
14	3.5	1.5	2.0	4.0	3.0	3.5	3.0	2.0	2.5
15	3.5	1.5	2.5	4.0	3.0	3.5	3.5	2.5	2.5
16	4.0	2.0	2.5	4.0	3.0	3.5	3.5	2.0	3.0
17	4.0	2.0	2.5	4.0	3.0	3.0	3.0	2.0	2.5
18	5.5	2.0	3.0	4.0	2.5	3.0	3.0	2.0	2.5
19	4.5	2.0	3.0	3.5	2.5	3.0	3.5	2.0	2.5
20	5.0	3.0	4.0	3.5	2.5	2.5	4.0	2.5	3.0
21	4.5	2.0	3.0	3.5	2.5	3.0	4.0	3.0	3.0
22	5.0	2.0	3.0	3.5	2.5	2.5	4.0	3.0	3.5
23	4.5	2.0	3.0	3.0	2.0	2.5	5.0	3.0	3.5
24	4.0	2.0	3.0	3.5	2.0	2.5	5.5	3.5	4.5
25	4.5	2.0	3.0	3.0	2.5	2.5	4.5	3.0	3.5
26	5.5	2.0	3.0	3.5	2.5	2.5	4.0	3.0	3.0
27	4.5	2.0	3.0	3.0	2.0	2.5	4.0	2.5	3.0
28	4.5	2.0	3.0	3.0	2.0	2.5	4.5	3.0	3.5
29	5.5	2.5	3.5	3.0	2.0	2.5	4.5	2.5	3.5
30	4.0	2.5	3.5	2.5	2.0	2.5	5.0	3.0	3.5
31	4.5	2.5	3.0	3.0	2.0	2.5	--	--	--
Month ¹	8.0	1.5	3.2	12	2.0	3.3	5.5	2.0	2.9

¹For months with missing daily values, the means are calculated using available values.

Table 10. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Warm Springs Creek at Warm Springs, Montana (12323770), March through September 2016.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	March			April			May			June		
1	--	--	--	3.0	1.5	2.0	5.0	2.5	3.5	5.0	2.5	3.5
2	--	--	--	3.0	1.5	2.0	5.0	2.5	3.5	5.5	3.0	4.0
3	--	--	--	3.0	1.5	2.0	4.5	2.5	3.5	6.0	3.0	4.0
4	--	--	--	3.0	1.5	2.0	5.5	3.0	4.0	7.5	3.5	5.0
5	--	--	--	3.5	1.5	2.5	9.0	4.0	6.5	10	4.5	6.5
6	--	--	--	3.0	1.5	2.0	14	5.5	11	14	5.5	9.5
7	--	--	--	3.5	1.5	2.0	16	7.5	11	23	6.5	9.5
8	--	--	--	3.0	1.5	2.0	30	7.5	17	19	8.0	11
9	--	--	--	3.5	2.0	2.5	18	8.5	13	13	6.0	8.0
10	--	--	--	4.0	2.0	2.5	9.5	4.5	6.0	8.5	4.5	6.0
11	--	--	--	3.5	1.5	2.0	5.5	3.5	4.5	6.5	3.5	5.0
12	--	--	--	3.5	1.5	2.0	5.0	3.0	4.0	6.0	3.0	4.0
13	--	--	--	10	2.0	7.0	5.0	2.5	3.5	6.0	2.5	3.5
14	--	--	--	8.5	4.0	5.5	5.5	2.5	3.5	6.0	2.5	4.0
15	--	--	--	6.0	3.0	4.0	5.0	3.0	4.0	6.0	3.0	4.5
16	--	--	--	4.5	2.0	3.0	5.0	2.5	3.5	7.5	4.0	5.5
17	--	--	--	7.0	2.0	3.0	4.5	2.5	3.0	6.0	2.5	4.0
18	--	--	--	4.0	1.5	2.5	5.0	2.5	3.5	5.5	2.5	4.0
19	--	--	--	4.5	1.5	3.0	9.0	3.5	5.0	5.0	2.5	3.5
20	--	--	--	4.0	2.0	3.0	9.5	4.0	6.0	5.0	2.5	3.0
21	--	--	--	5.5	3.0	4.0	6.5	3.5	5.0	4.5	1.5	2.5
22	--	--	--	--	--	--	6.0	3.5	4.5	4.0	1.5	2.5
23	--	--	--	--	--	--	5.5	2.5	4.0	4.0	1.0	2.5
24	--	--	--	--	--	--	5.0	3.0	3.5	3.5	2.0	2.5
25	--	--	--	--	--	--	5.0	3.0	3.5	3.5	1.5	2.0
26	--	--	--	--	--	--	5.0	3.0	3.5	3.5	1.5	2.0
27	--	--	--	7.5	3.5	4.5	8.0	3.5	5.0	3.5	1.0	2.0
28	--	--	--	5.5	3.0	4.0	6.0	3.0	4.5	3.5	1.0	2.0
29	--	--	--	5.0	2.5	3.5	5.5	3.0	4.0	3.5	1.0	2.0
30	3.0	1.5	2.0	6.0	3.0	4.0	5.0	3.0	3.5	3.0	1.0	2.0
31	3.0	1.5	2.0	--	--	--	5.5	3.0	4.0	--	--	--
Month ¹	3.0	1.5	4.0	10	1.5	3.1	30	2.5	5.3	23	1.0	4.3

Table 10. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Warm Springs Creek at Warm Springs, Montana (12323770), March through September 2016.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	July			August			September		
1	2.5	1.0	2.0	--	--	--	7.0	3.0	4.5
2	2.5	0.5	1.5	--	--	--	17	6.0	11
3	2.5	0.5	1.0	--	--	--	--	--	--
4	--	--	--	--	--	--	14	9.0	11
5	--	--	--	--	--	--	19	12	15
6	2.0	0.5	1.0	--	--	--	--	--	--
7	2.5	0.5	1.0	--	--	--	8.5	5.5	6.5
8	2.5	0.5	1.0	--	--	--	9.0	5.0	6.5
9	2.5	0.5	1.0	7.5	6.5	7.0	7.5	4.5	5.5
10	3.0	1.0	1.5	7.5	6.0	6.5	6.0	4.5	5.0
11	6.5	1.5	3.0	6.5	5.5	6.0	7.0	5.0	6.0
12	3.0	1.0	2.0	7.5	5.5	6.5	6.5	5.5	6.0
13	2.5	0.5	1.5	6.5	5.0	5.5	7.5	4.5	6.0
14	2.5	0.5	1.0	6.0	4.5	5.0	--	--	--
15	2.0	0.5	1.0	5.5	4.0	4.5	4.5	2.5	3.5
16	2.5	0.5	1.0	--	--	--	4.5	1.5	2.5
17	2.0	0.5	1.0	4.0	1.5	2.5	4.0	1.5	2.5
18	--	--	--	11	3.5	5.5	5.0	1.5	3.0
19	--	--	--	10	4.5	5.5	4.0	1.5	2.5
20	--	--	--	11	4.5	7.0	4.0	2.0	2.5
21	--	--	--	15	2.5	7.5	--	--	--
22	--	--	--	10	2.5	5.0	--	--	--
23	--	--	--	--	--	--	--	--	--
24	--	--	--	--	--	--	--	--	--
25	--	--	--	--	--	--	2.0	1.0	1.0
26	--	--	--	8.0	6.5	7.5	2.5	1.0	1.5
27	--	--	--	11	6.0	7.0	1.5	1.0	1.0
28	--	--	--	8.5	5.0	6.5	2.0	1.0	1.5
29	--	--	--	7.5	4.5	6.0	--	--	--
30	--	--	--	7.0	4.0	5.5	--	--	--
31	--	--	--	8.0	3.5	5.5	--	--	--
Month¹	6.5	0.5	1.4	15	1.5	5.9	19	1.0	5.0

¹For months with missing daily values, the means are calculated using available values.

Table 11. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Lost Creek near Anaconda, Montana (12323840), March through August 2016.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	March			April			May			June		
1	--	--	--	5.0	3.5	4.0	11	4.5	7.0	9.0	5.0	5.5
2	--	--	--	5.0	3.5	4.0	12	6.0	7.5	7.0	4.5	5.5
3	--	--	--	6.0	3.5	4.0	12	6.0	8.0	9.5	4.0	6.0
4	--	--	--	9.0	3.5	4.5	14	6.5	9.0	8.0	4.5	5.5
5	--	--	--	5.5	3.5	4.0	18	6.5	10	27	5.0	7.0
6	--	--	--	4.5	3.0	3.5	22	7.5	9.5	9.5	5.5	6.5
7	--	--	--	5.0	3.0	3.5	21	7.5	10	10	5.0	6.0
8	--	--	--	6.0	3.5	4.5	24	8.0	13	11	5.5	6.5
9	--	--	--	6.5	4.0	5.0	19	9.5	13	9.0	6.0	7.0
10	--	--	--	6.5	4.5	5.5	24	7.0	9.5	15	5.5	7.0
11	--	--	--	7.5	4.0	5.0	11	6.5	8.0	7.0	5.0	5.5
12	--	--	--	8.5	5.0	5.5	8.0	5.5	7.0	8.5	4.5	5.5
13	--	--	--	21	5.0	11	9.0	5.0	6.5	5.5	4.0	4.5
14	--	--	--	8.5	3.5	5.0	10	4.5	6.0	8.0	3.0	4.5
15	--	--	--	6.5	2.5	4.0	7.5	4.5	5.5	7.0	4.5	5.5
16	--	--	--	6.0	3.0	3.5	8.0	5.0	6.0	6.5	4.0	5.0
17	--	--	--	8.0	2.5	4.0	12	5.5	6.5	5.0	3.5	4.0
18	--	--	--	6.5	2.5	3.5	9.0	5.5	7.0	5.0	3.0	3.5
19	--	--	--	6.0	2.5	4.0	18	6.5	9.5	4.5	3.0	3.5
20	--	--	--	6.0	2.5	4.0	18	8.0	10	5.5	3.5	4.0
21	--	--	--	9.0	3.5	5.5	18	8.0	11	4.5	3.0	3.5
22	--	--	--	12	3.5	6.0	12	7.0	8.5	5.5	3.0	4.0
23	--	--	--	16	4.5	9.5	13	7.0	8.5	11	3.0	4.5
24	--	--	--	26	4.0	8.0	18	7.5	9.0	7.0	4.0	4.5
25	--	--	--	8.5	3.5	5.5	11	7.0	8.5	8.5	4.0	5.0
26	--	--	--	9.5	4.0	6.5	10	5.0	7.0	19	4.5	6.0
27	--	--	--	10	6.0	7.0	14	6.0	8.5	8.0	4.0	5.0
28	--	--	--	9.5	5.5	7.0	--	--	--	8.0	4.5	5.5
29	--	--	--	9.5	5.5	6.5	10	5.0	6.0	11	4.0	6.0
30	5.0	3.5	4.0	13	5.5	8.0	8.0	4.5	6.0	8.0	4.0	5.5
31	7.0	3.5	4.5	--	--	--	9.0	4.5	5.5	--	--	--
Month ¹	7.0	3.5	4.2	26	2.5	5.4	24	4.5	8.2	27	3.0	5.2

Table 11. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Lost Creek near Anaconda, Montana (12323840), March through August 2016.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	July			August		
1	6.5	3.5	4.5	--	--	--
2	4.5	3.0	4.0	5.5	3.0	4.0
3	4.5	4.0	4.0	29	2.5	4.5
4	5.0	3.0	4.5	6.5	3.5	4.5
5	5.5	4.0	4.5	4.0	2.5	3.0
6	5.0	4.0	4.0	3.0	1.5	2.0
7	5.0	3.5	4.0	68	1.0	6.0
8	4.5	1.0	3.5	14	7.0	8.5
9	4.0	1.0	1.5	13	6.5	7.5
10	7.0	2.0	4.5	9.0	6.5	7.5
11	4.0	3.5	4.0	8.5	3.0	6.5
12	5.0	3.5	3.5	8.5	6.0	7.0
13	4.5	3.0	3.5	10	6.0	7.5
14	3.5	2.5	3.5	8.5	4.0	6.5
15	3.5	2.0	3.0	7.5	6.0	6.5
16	4.0	2.0	2.5	6.5	5.0	5.5
17	3.5	1.5	2.0	7.0	3.0	5.5
18	1.5	1.0	1.5	7.0	4.0	6.0
19	--	--	--	6.5	5.0	5.5
20	--	--	--	6.5	5.5	6.0
21	--	--	--	6.5	5.5	6.0
22	--	--	--	7.0	5.5	6.0
23	--	--	--	7.5	6.5	6.5
24	--	--	--	9.0	6.0	6.5
25	--	--	--	6.5	4.0	5.0
26	--	--	--	6.5	5.0	6.0
27	--	--	--	6.5	5.0	5.5
28	--	--	--	6.0	4.5	5.0
29	--	--	--	6.0	4.5	5.0
30	--	--	--	--	--	--
31	--	--	--	--	--	--
Month¹	7.0	1.0	3.5	68	1.0	5.8

¹For months with missing daily values, the means are calculated using available values.

Table 12. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Clark Fork at Deer Lodge, Montana (12324200), March through September 2016.

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	March			April			May			June		
1	--	--	--	11	8.0	9.5	16	11	13	12	7.5	10
2	--	--	--	27	8.5	13	16	10	12	11	7.5	9.5
3	--	--	--	12	7.0	9.0	18	11	13	11	7.5	9.0
4	--	--	--	17	8.5	10	28	11	14	11	7.0	8.5
5	--	--	--	15	8.0	10	--	--	--	11	8.0	9.5
6	--	--	--	16	8.5	12	--	--	--	11	8.5	9.5
7	--	--	--	17	9.0	12	--	--	--	17	11	13
8	--	--	--	18	10	12	38	14	19	19	14	16
9	--	--	--	29	15	19	31	16	21	22	15	18
10	--	--	--	50	13	21	23	15	18	23	12	16
11	--	--	--	18	12	15	16	11	13	15	9.5	12
12	--	--	--	18	13	15	13	9.5	11	12	8.0	10
13	--	--	--	--	--	--	16	9.0	11	--	--	--
14	--	--	--	--	--	--	11	8.0	9.5	--	--	--
15	--	--	--	--	--	--	10	8.5	9.5	--	--	--
16	--	--	--	--	--	--	11	9.5	10	--	--	--
17	--	--	--	--	--	--	15	8.0	10	--	--	--
18	--	--	--	--	--	--	11	7.5	9.0	7.0	5.5	6.0
19	--	--	--	21	14	17	14	9.0	11	7.0	5.0	6.0
20	--	--	--	21	13	15	21	13	17	7.0	5.5	6.0
21	--	--	--	23	14	17	41	18	24	6.5	5.5	6.0
22	--	--	--	20	15	17	44	23	34	6.5	5.0	5.5
23	--	--	--	22	17	20	24	14	18	7.0	5.0	5.5
24	--	--	--	31	20	27	19	15	16	6.0	5.0	5.0
25	11	7.5	8.5	31	19	24	21	15	18	5.5	4.5	5.0
26	10	7.5	8.0	25	16	20	50	12	17	5.5	4.5	5.0
27	9.0	6.5	7.5	22	14	18	20	15	17	5.5	4.0	5.0
28	9.5	6.5	7.5	18	12	15	19	15	17	5.0	4.0	4.5
29	8.0	6.0	7.0	16	12	13	17	11	14	6.0	4.0	4.5
30	9.5	7.0	8.0	16	12	13	14	9.5	12	9.0	4.0	5.0
31	11	8.0	9.0	--	--	--	13	9.0	11	--	--	--
Month ¹	11	6.0	7.9	50	7.0	16	50	7.5	15	23	4.0	8.4

Table 12. Seasonal daily maximum, minimum, and mean turbidity, with monthly summary statistics at Clark Fork at Deer Lodge, Montana (12324200), March through September 2016.—Continued

[Turbidity values are based on near-infrared monochrome light emitted at wavelengths of 780 to 900 nanometers with a detection angle of 90 ± 2.5 degrees to incident beam, reported in formazin nephelometric units (FNU). --, no data]

Day	Maximum	Minimum	Mean	Maximum	Minimum	Mean	Maximum	Minimum	Mean
	July			August			September		
1	8.5	5.5	6.0	2.0	1.5	1.5	3.5	2.0	2.5
2	--	--	--	3.5	1.5	2.0	3.0	2.0	2.5
3	--	--	--	4.0	1.5	2.0	2.5	2.0	2.5
4	--	--	--	3.5	1.5	2.0	3.0	2.5	2.5
5	--	--	--	4.0	1.5	2.0	12	2.5	3.5
6	--	--	--	16	2.0	3.0	4.5	3.0	3.5
7	3.5	2.5	2.5	8.5	2.0	3.0	4.5	3.0	3.5
8	3.0	2.0	2.5	--	--	--	4.0	3.0	3.5
9	2.5	2.0	2.5	16	1.5	2.0	--	--	--
10	4.5	2.5	2.5	--	--	--	--	--	--
11	4.0	2.0	2.5	--	--	--	--	--	--
12	4.5	1.5	2.5	--	--	--	--	--	--
13	4.5	1.5	2.0	--	--	--	--	--	--
14	2.0	1.5	1.5	--	--	--	3.5	2.0	2.5
15	3.0	1.5	1.5	--	--	--	3.5	2.5	3.0
16	2.0	1.5	1.5	--	--	--	4.0	2.5	3.0
17	2.0	1.5	1.5	--	--	--	4.0	3.0	3.5
18	3.0	1.5	2.0	--	--	--	--	--	--
19	3.0	1.5	2.0	--	--	--	5.0	3.5	4.0
20	3.5	2.0	2.5	--	--	--	5.5	4.5	4.5
21	3.0	1.5	2.0	--	--	--	--	--	--
22	3.0	1.5	2.0	--	--	--	--	--	--
23	2.5	1.5	2.0	--	--	--	--	--	--
24	2.0	1.5	2.0	--	--	--	--	--	--
25	29	1.5	3.5	--	--	--	--	--	--
26	7.0	1.5	2.0	2.5	2.0	2.0	--	--	--
27	2.5	1.5	2.0	3.0	2.0	2.0	--	--	--
28	2.0	1.5	1.5	3.0	2.0	2.0	5.0	3.0	4.0
29	2.5	1.5	1.5	3.0	2.0	2.0	5.5	3.0	3.5
30	2.0	1.0	1.5	3.0	2.0	2.0	5.5	3.0	3.5
31	2.0	1.0	1.5	3.0	2.0	2.5	--	--	--
Month¹	29	1.0	2.2	16	1.5	2.1	12	2.0	3.3

¹For months with missing daily values, the means are calculated using available values.

Table 13. Analyses of field replicates for water samples, Clark Fork Basin, Montana.

[hh, hour, mm, minute; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; --, no data; <, less than laboratory reporting level; E, estimated]

Site number (fig. 1)	Site name	Date	Time (hhmm)	Turbidity, unfiltered, lab (NTRU)	Hardness, filtered (mg/L as CaCO ₃)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO ₃)
12324680	Clark Fork at Goldcreek	10/20/2015	1535	--	203	59.5	13.3	--	--	--
		10/20/2015	1540	--	202	58.7	13.4	--	--	--
12323250	Silver Bow Creek below Blacktail Creek, at Butte	03/21/2016	1040	E3.7	157	44.4	11.2	--	--	--
		03/21/2016	1045	E3.7	154	43.5	11.1	--	--	--
12324400	Clark Fork above Little Blackfoot River, near Garrison	03/23/2016	1120	--	236	69.4	15.2	--	--	--
		03/23/2016	1125	--	231	67.6	15.1	--	--	--
12323840	Lost Creek near Anaconda	04/19/2016	0745	<2.0	111	33.6	6.65	1.35	3.08	102
		04/19/2016	0750	E2.2	109	32.6	6.81	1.34	3.04	102
12324200	Clark Fork at Deer Lodge	05/10/2016	1455	E13	132	39.5	8.07	--	--	--
		05/10/2016	1500	E12	129	38.3	8.23	--	--	--
12334550	Clark Fork at Turah Bridge, near Bonner	05/25/2016	0755	--	92.6	26.2	6.60	--	--	--
		05/25/2016	0800	--	93.9	26.8	6.58	--	--	--
12340500	Clark Fork above Missoula	06/08/2016	1245	--	93.2	25.3	7.28	--	--	--
		06/08/2016	1250	--	89.9	24.6	6.94	--	--	--
12323750	Silver Bow Creek at Warm Springs	07/12/2016	1015	E2.6	155	43.7	11.2	2.41	14.6	101
		07/12/2016	1020	E2.7	156	44.0	11.2	2.48	14.6	101
12323700	Mill Creek at Opportunity	08/08/2016	1605	<2.0	80.1	22.8	5.66	0.83	4.57	80.1
		08/08/2016	1610	<2.0	81.9	22.9	5.98	0.83	4.61	75.5

Table 13. Analyses of field replicates for water samples, Clark Fork Basin, Montana.—Continued

[hh, hour, mm, minute; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; --, no data; <, less than laboratory reporting level; E, estimated]

Site number (fig. 1)	Site name	Date	Time (hhmm)	Chloride, filtered (mg/L)	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Nitrate plus nitrite, filtered (mg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
12324680	Clark Fork at Goldcreek	10/20/2015	1535	--	--	--	--	--	<0.030	0.034
		10/20/2015	1540	--	--	--	--	--	<0.030	<0.030
12323250	Silver Bow Creek below Blacktail Creek, at Butte	03/21/2016	1040	--	--	--	--	2.03	0.071	0.089
		03/21/2016	1045	--	--	--	--	2.04	0.070	0.101
12324400	Clark Fork above Little Blackfoot River, near Garrison	03/23/2016	1120	--	--	--	--	--	0.069	0.153
		03/23/2016	1125	--	--	--	--	--	0.067	0.173
12323840	Lost Creek near Anaconda	04/19/2016	0745	0.77	0.42	12.8	9.89	--	0.031	0.034
		04/19/2016	0750	0.76	0.42	12.2	9.89	--	0.033	0.043
12324200	Clark Fork at Deer Lodge	05/10/2016	1455	--	--	--	--	--	0.078	0.276
		05/10/2016	1500	--	--	--	--	--	0.081	0.266
12334550	Clark Fork at Turah Bridge, near Bonner	05/25/2016	0755	--	--	--	--	--	<0.030	0.14
		05/25/2016	0800	--	--	--	--	--	0.031	0.13
12340500	Clark Fork above Missoula	06/08/2016	1245	--	--	--	--	--	<0.030	0.04
		06/08/2016	1250	--	--	--	--	--	<0.030	0.03
12323750	Silver Bow Creek at Warm Springs	07/12/2016	1015	10.6	0.66	14.5	66.0	--	<0.030	0.05
		07/12/2016	1020	10.6	0.67	14.4	66.0	--	<0.030	0.05
12323700	Mill Creek at Opportunity	08/08/2016	1605	0.41	0.34	12.0	11.6	--	0.053	0.06
		08/08/2016	1610	0.41	0.34	11.8	11.6	--	0.044	0.06

Table 13. Analyses of field replicates for water samples, Clark Fork Basin, Montana.—Continued

[hh, hour, mm, minute; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; --, no data; <, less than laboratory reporting level; E, estimated]

Site number (fig. 1)	Site name	Date	Time (hhmm)	Copper, filtered (µg/L)	Copper, unfiltered recoverable (µg/L)	Iron, filtered (µg/L)	Iron, unfiltered recoverable (µg/L)	Lead, filtered (µg/L)	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)
12324680	Clark Fork at Goldcreek	10/20/2015	1535	4.0	7.9	6.3	91.3	0.042	0.69	9.84	40.1
		10/20/2015	1540	3.8	8.2	6.8	88.8	<0.040	0.62	9.71	39.7
12323250	Silver Bow Creek below Blacktail Creek, at Butte	03/21/2016	1040	3.6	7.5	94.5	467	0.120	1.30	96.6	124
		03/21/2016	1045	3.4	7.5	92.0	470	0.117	1.28	96.2	128
12324400	Clark Fork above Little Blackfoot River, near Garrison	03/23/2016	1120	5.4	27.4	8.0	397	0.080	3.17	44.4	107
		03/23/2016	1125	5.3	26.9	8.5	417	0.075	3.40	44.2	103
12323840	Lost Creek near Anaconda	04/19/2016	0745	1.8	5.7	14.9	128	0.058	0.58	1.61	6.3
		04/19/2016	0750	2.0	5.2	13.2	130	0.057	0.55	1.63	6.0
12324200	Clark Fork at Deer Lodge	05/10/2016	1455	12.5	57.7	120	1,090	1.24	7.77	38.2	141
		05/10/2016	1500	13.1	59.8	132	1,010	1.10	8.10	37.3	138
12334550	Clark Fork at Turah Bridge, near Bonner	05/25/2016	0755	3.4	23.5	35.3	643	0.163	4.02	5.13	65.2
		05/25/2016	0800	3.8	24.7	33.8	626	0.168	3.99	5.35	67.6
12340500	Clark Fork above Missoula	06/08/2016	1245	2.6	4.5	11.8	214	0.043	0.70	4.71	23.5
		06/08/2016	1250	1.7	4.5	8.3	214	0.044	0.68	4.73	24.5
12323750	Silver Bow Creek at Warm Springs	07/12/2016	1015	3.5	4.6	40.2	160	0.109	0.57	66.4	100
		07/12/2016	1020	3.5	5.0	40.4	151	0.109	0.56	66.5	100
12323700	Mill Creek at Opportunity	08/08/2016	1605	1.9	2.3	90.3	138	0.138	0.27	4.83	6.9
		08/08/2016	1610	1.9	2.3	91.7	147	0.139	0.27	4.72	7.2

Table 13. Analyses of field replicates for water samples, Clark Fork Basin, Montana.—Continued

[hh, hour, mm, minute; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; --, no data; <, less than laboratory reporting level; E, estimated]

Site number (fig. 1)	Site name	Date	Time (hhmm)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Organic carbon, filtered (mg/L)	Sediment, suspended (percent finer than 0.062 mm)	Sediment, suspended (mg/L)
12324680	Clark Fork at Goldcreek	10/20/2015	1535	<2.0	5.9	8.9	9.7	--	91	4
		10/20/2015	1540	<2.0	6.5	8.8	9.5	--	84	4
12323250	Silver Bow Creek below Blacktail Creek, at Butte	03/21/2016	1040	27.3	36.2	2.8	3.5	--	79	7
		03/21/2016	1045	27.2	36.3	2.7	3.4	--	76	8
12324400	Clark Fork above Little Blackfoot River, near Garrison	03/23/2016	1120	6.2	26.5	9.2	11.9	--	77	20
		03/23/2016	1125	6.1	26.5	9.1	12.2	--	77	19
12323840	Lost Creek near Anaconda	04/19/2016	0745	<2.0	2.6	3.9	4.3	1.34	73	6
		04/19/2016	0750	<2.0	3.0	3.9	4.3	1.68	68	5
12324200	Clark Fork at Deer Lodge	05/10/2016	1455	9.4	49.3	12.1	18.2	--	71	44
		05/10/2016	1500	10.4	51.1	12.3	18.3	--	73	42
12334550	Clark Fork at Turah Bridge, near Bonner	05/25/2016	0755	3.5	29	5.2	7.5	--	61	42
		05/25/2016	0800	3.7	31	5.4	7.7	--	64	40
12340500	Clark Fork above Missoula	06/08/2016	1245	<2.0	6	2.8	3.1	--	80	13
		06/08/2016	1250	<2.0	6	2.9	3.3	--	78	12
12323750	Silver Bow Creek at Warm Springs	07/12/2016	1015	<2.0	4	38.8	39.3	5.87	89	3
		07/12/2016	1020	<2.0	5	38.9	41.1	5.90	92	3
12323700	Mill Creek at Opportunity	08/08/2016	1605	2.5	2	30.7	35.4	1.43	88	1
		08/08/2016	1610	<2.0	<2	30.7	35.5	1.41	70	1

Table 14. Precision of analyses of field replicates for water samples, Clark Fork Basin, Montana.[lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter]

Constituent and reporting unit	Number of replicate pairs	Standard deviation ¹ (listed units)	Relative standard deviation (percent)	Within limits ² of data-quality objective
Turbidity, unfiltered, lab (NTRU)	5	0.49	12	Yes
Calcium, filtered (mg/L)	9	0.67	1.7	Yes
Magnesium, filtered (mg/L)	9	0.13	1.4	Yes
Potassium, filtered (mg/L)	3	0.03	1.9	Yes
Sodium, filtered (mg/L)	3	0.02	0.31	Yes
Alkalinity, filtered, lab (mg/L as CaCO ₃)	3	1.9	2.0	Yes
Chloride, filtered (mg/L)	3	0.00	0.10	Yes
Fluoride, filtered (mg/L)	3	0.00	0.86	Yes
Silica, filtered (mg/L)	3	0.26	2.0	Yes
Sulfate, filtered (mg/L)	3	0.00	0.00	Yes
Cadmium, filtered (µg/L)	9	0.00	11	Yes
Cadmium, unfiltered recoverable (µg/L)	9	0.01	8.7	Yes
Copper, filtered (µg/L)	9	0.28	6.6	Yes
Copper, unfiltered recoverable (µg/L)	9	0.61	3.8	Yes
Iron, filtered (µg/L)	9	3.1	6.5	Yes
Iron, unfiltered recoverable (µg/L)	9	20	5.5	Yes
Lead, filtered (µg/L)	9	0.03	16	Yes
Lead, unfiltered recoverable (µg/L)	9	0.01	4.5	Yes
Manganese, filtered (µg/L)	9	0.25	0.82	Yes
Manganese, unfiltered recoverable (µg/L)	9	1.6	2.4	Yes
Zinc, filtered (µg/L)	9	0.43	7.3	Yes
Zinc, unfiltered recoverable (µg/L)	9	0.74	4.0	Yes
Arsenic, filtered (µg/L)	9	0.08	0.67	Yes
Arsenic, unfiltered recoverable (µg/L)	9	0.44	3.0	Yes
Organic carbon, filtered (mg/L)	3	0.14	4.8	Yes
Sediment, suspended (percent finer than 0.062 mm)	9	4.9	6.3	Yes
Sediment, suspended (mg/L)	9	0.82	5.4	Yes

¹Standard deviation is calculated using one-half of the laboratory reporting level for censored values (less than the laboratory reporting level).²The data-quality objective for an acceptable level of precision is a maximum relative standard deviation of 20 percent for field replicate analyses (table 3).

Table 15. Precision of analyses of laboratory replicates for water samples, Clark Fork Basin, Montana.

[mg/L, milligram per liter; µg/L, microgram per liter]

Constituent and reporting unit	Number of replicate pairs	Standard deviation (listed units)	Relative standard deviation (percent)	Within limits ¹ of data-quality objective
Calcium, filtered (mg/L)	8	0.39	1.0	Yes
Magnesium, filtered (mg/L)	8	0.14	1.5	Yes
Cadmium, filtered (µg/L)	8	0.00	7.0	Yes
Cadmium, unfiltered recoverable (µg/L)	8	0.00	4.5	Yes
Copper, filtered (µg/L)	8	0.07	1.5	Yes
Copper, unfiltered recoverable (µg/L)	8	0.21	2.2	Yes
Iron, filtered (µg/L)	8	0.99	2.4	Yes
Iron, unfiltered recoverable (µg/L)	8	5.7	1.6	Yes
Lead, filtered (µg/L)	8	0.01	3.7	Yes
Lead, unfiltered recoverable (µg/L)	8	0.01	0.94	Yes
Manganese, filtered (µg/L)	8	0.18	1.0	Yes
Manganese, unfiltered recoverable (µg/L)	8	0.24	0.52	Yes
Zinc, filtered (µg/L)	8	0.10	3.1	Yes
Zinc, unfiltered recoverable (µg/L)	8	0.34	3.1	Yes
Arsenic, filtered (µg/L)	8	0.10	0.68	Yes
Arsenic, unfiltered recoverable (µg/L)	8	0.67	4.2	Yes

¹The data-quality objective for an acceptable level of precision is a maximum relative standard deviation of 20 percent for laboratory replicate analyses (table 3).

Table 16. Recovery efficiency for analyses of laboratory-spiked deionized-water blank samples.

[µg/L, microgram per liter]

Constituent and reporting unit	Number of samples	95-percent confidence interval for spike recovery, in percent	Mean spike recovery, in percent	Within limits ¹ of data-quality objective
Cadmium, filtered (µg/L)	3	94.3–97.5	95.9	Yes
Cadmium, unfiltered recoverable (µg/L)	3	96.5–102	99.1	Yes
Copper, filtered (µg/L)	3	90.2–104	97.1	Yes
Copper, unfiltered recoverable (µg/L)	3	87.4–109	98.2	Yes
Iron, filtered (µg/L)	3	93.2–108	100	Yes
Iron, unfiltered recoverable (µg/L)	4	99.0–108	104	Yes
Lead, filtered (µg/L)	3	96.3–105	100	Yes
Lead, unfiltered recoverable (µg/L)	3	89.1–116	103	Yes
Manganese, filtered (µg/L)	4	105–107	106	Yes
Manganese, unfiltered recoverable (µg/L)	5	101–107	104	Yes
Zinc, filtered (µg/L)	3	89.1–104	96.6	Yes
Zinc, unfiltered recoverable (µg/L)	4	97.8–105	102	Yes
Arsenic, filtered (µg/L)	3	96.0–104	100	Yes
Arsenic, unfiltered recoverable (µg/L)	3	95.5–109	102	Yes

¹The data-quality objective for acceptable bias is a maximum deviation of 25 percent from a theoretical 100-percent recovery (table 3).

Table 17. Recovery efficiency for analyses of laboratory-spiked stream samples, Clark Fork Basin, Montana.

[µg/L, microgram per liter]

Constituent and reporting unit	Number of samples	95-percent confidence interval for spike recovery, in percent	Mean spike recovery, in percent	Within limits ¹ of data-quality objective
Cadmium, filtered (µg/L)	3	95.0–99.5	97.2	Yes
Cadmium, unfiltered recoverable (µg/L)	3	64.7–130	97.3	No ²
Copper, filtered (µg/L)	3	79.9–107	93.2	Yes
Copper, unfiltered recoverable, µg/L)	3	79.5–99.5	89.5	Yes
Iron, filtered (µg/L)	3	79.8–117	98.4	Yes
Iron, unfiltered recoverable (µg/L)	4	48.2–120	84.3	No ³
Lead, filtered (µg/L)	3	87.4–115	101	Yes
Lead, unfiltered recoverable (µg/L)	3	79.7–118	99.0	Yes
Manganese, filtered (µg/L)	4	95.0–102	98.4	Yes
Manganese, unfiltered recoverable (µg/L)	5	81.5–103	92.2	Yes
Zinc, filtered (µg/L)	3	76.8–108	92.2	Yes
Zinc, unfiltered recoverable (µg/L)	4	86.6–96.3	91.4	Yes
Arsenic, filtered (µg/L)	3	96.7–102	99.1	Yes
Arsenic, unfiltered recoverable (µg/L)	3	61.9–137	99.5	No ⁴

¹The data-quality objective for acceptable bias is a maximum deviation of 25 percent from a theoretical 100-percent recovery (table 3).²Exceedance of data-quality objective is an artifact of a small sample size with a recovery percent range from 86.6 to 112.³Exceedance of data-quality objective is an artifact of a small sample size with a recovery percent range from 64.1 to 109.⁴Exceedance of data-quality objective is an artifact of a small sample size with a recovery percent range from 85.2 to 115.

Table 18. Analyses of field blanks for water samples.

[hh, hour; mm, minute; $\mu\text{S}/\text{cm}$, microsiemen per centimeter at 25 degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; mg/L, milligram per liter; CaCO_3 , calcium carbonate; <, less than laboratory reporting level; --, no data; $\mu\text{g}/\text{L}$, microgram per liter]

Date	Time (hhmm)	pH, onsite (standard units)	Specific conductance, onsite ($\mu\text{S}/\text{cm}$)	Turbidity, unfiltered, lab (NTRU)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Potassium, filtered (mg/L)	Sodium, filtered (mg/L)	Alkalinity, filtered, lab (mg/L as CaCO_3)	Chloride, filtered (mg/L)
10/19/2015	1405	5.3	2	<2.0	<0.022	<0.011	<0.03	<0.06	<4.6	<0.02
¹ 04/13/2016	1000	5.6	2	<2.0	<0.022	<0.011	<0.03	<0.06	<4.0	<0.02
04/20/2016	1410	5.2	2	--	<0.022	<0.011	--	--	--	--
05/10/2016	0755	5.4	2	<2.0	<0.022	<0.011	<0.03	<0.06	<4.0	<0.02
05/24/2016	1330	5.4	2	<2.0	<0.022	<0.011	--	--	--	--
06/08/2016	0805	5.4	2	--	<0.022	<0.011	--	--	--	--
07/12/2016	1150	5.2	2	--	<0.022	<0.011	--	--	--	--
08/09/2016	1015	5.3	2	<2.0	<0.022	<0.011	<0.03	<0.06	<4.0	<0.02

Date	Fluoride, filtered (mg/L)	Silica, filtered (mg/L)	Sulfate, filtered (mg/L)	Nitrate plus nitrite, filtered (mg/L)	Cadmium, filtered ($\mu\text{g}/\text{L}$)	Cadmium, unfiltered recoverable ($\mu\text{g}/\text{L}$)	Copper, filtered ($\mu\text{g}/\text{L}$)	Copper, unfiltered recoverable ($\mu\text{g}/\text{L}$)	Iron, filtered ($\mu\text{g}/\text{L}$)	Iron, unfiltered recoverable ($\mu\text{g}/\text{L}$)
10/19/2015	<0.01	0.018	<0.02	--	<0.030	<0.030	<0.80	<0.80	<4.0	8.3
¹ 04/13/2016	<0.01	0.032	<0.02	<0.01	<0.030	<0.030	<0.80	<0.80	<4.0	<4.6
04/20/2016	--	--	--	--	<0.030	<0.030	<0.80	<0.80	<4.0	<4.6
05/10/2016	<0.01	<0.018	<0.02	--	<0.030	<0.030	<0.80	<0.80	<4.0	<4.6
05/24/2016	--	--	--	--	<0.030	<0.03	<0.80	<0.8	<4.0	<4.6
06/08/2016	--	--	--	--	<0.030	<0.03	<0.80	<0.8	<4.0	<4.6
07/12/2016	--	--	--	--	<0.030	<0.03	<0.80	<0.8	<4.0	<4.6
08/09/2016	<0.01	0.036	<0.02	--	<0.030	<0.03	<0.80	0.3	11.0	<4.6

Date	Lead, filtered ($\mu\text{g}/\text{L}$)	Lead, unfiltered recoverable ($\mu\text{g}/\text{L}$)	Manganese, filtered ($\mu\text{g}/\text{L}$)	Manganese, unfiltered recoverable ($\mu\text{g}/\text{L}$)	Zinc, filtered ($\mu\text{g}/\text{L}$)	Zinc, unfiltered recoverable ($\mu\text{g}/\text{L}$)	Arsenic, filtered ($\mu\text{g}/\text{L}$)	Arsenic, unfiltered recoverable ($\mu\text{g}/\text{L}$)	Organic carbon, filtered (mg/L)
10/19/2015	<0.040	<0.04	<0.40	<0.4	<2.0	<2.0	<0.10	<0.20	<0.23
¹ 04/13/2016	<0.040	<0.04	<0.40	<0.4	<2.0	<2.0	<0.10	<0.20	<0.23
04/20/2016	<0.040	<0.04	<0.40	<0.4	<2.0	<2.0	<0.10	<0.20	--
05/10/2016	<0.040	<0.04	<0.40	<0.4	<2.0	<2.0	<0.10	<0.20	<0.23
05/24/2016	<0.040	<0.04	<0.40	<0.4	<2.0	<2	<0.10	<0.2	--
06/08/2016	<0.040	<0.04	<0.40	<0.4	<2.0	<2	<0.10	<0.2	--
07/12/2016	<0.040	<0.04	<0.40	<0.4	<2.0	<2	<0.10	<0.2	--
08/09/2016	<0.040	0.03	<0.40	<0.4	<2.0	<2	<0.10	<0.01	<0.23

¹Annual office equipment blank collected before any equipment was used in the field.

Table 19. Bed-sediment data for the Clark Fork Basin, Montana, August 2016.

[Trace-element concentrations in bed sediment were determined for the fine-grained fraction (material less than 0.063 millimeter in diameter). Reported concentrations are the mean of all replicate analyses from each composite sample. µg/g, microgram per gram of dry sample weight; <, less than laboratory reporting level]

Site number (fig. 1)	Site name	Number of composite samples	Concentration (µg/g)								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	3	20.4	9.4	21.3	446	30,000	93.0	5,800	15.4	1,810
12323750	Silver Bow Creek at Warm Springs	3	96.3	5.0	17.0	238	26,300	121	3,460	15.0	639
12323800	Clark Fork near Galen	3	102	4.2	18.1	791	25,500	96.3	6,380	22.5	837
461415112450801	Clark Fork below Lost Creek, near Galen	3	158	5.5	16.4	1,430	27,500	158	6,480	17.2	1,210
461559112443301	Clark Fork at county bridge, near Racetrack	3	80.4	3.6	13.9	818	23,400	108	2,700	11.5	816
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	3	68.7	4.4	14.5	815	24,500	126	2,850	11.8	935
12324200	Clark Fork at Deer Lodge	3	62.6	4.6	17.0	819	20,500	104	4,220	12.4	862
12324400	Clark Fork above Little Blackfoot River, near Garrison	3	55.4	4.2	26.3	822	24,200	107	2,260	12.5	947
12324680	Clark Fork at Goldcreek	3	43.4	3.5	24.7	510	22,600	91.5	2,120	11.8	815
12331800	Clark Fork near Drummond	3	30.1	2.9	16.9	334	17,700	66.9	2,810	10.7	750
12334550	Clark Fork at Turah Bridge, near Bonner	3	18.8	1.7	20.9	236	17,100	49.6	674	10.8	507
12340000	Blackfoot River near Bonner	3	5.1	<0.1	17.8	17.0	18,700	9.8	363	11.8	49.3
12340500	Clark Fork above Missoula	3	13.4	1.1	18.7	125	16,300	27.1	802	10.1	343

Table 20. Recovery efficiency for analyses of standard reference materials for bed-sediment samples.

[Dilution ratio is the proportion of initial volume of concentrated nitric acid used as a digesting reagent to final volume of solution after addition of 0.6N (normal) hydrochloric acid used for reconstituting dried residue. µg/g, microgram per gram of dry sample weight; SRM, standard reference material (agricultural soils)]

Constituent	Number of analyses	Dilution ratio	Certified concentration (µg/g)	Mean SRM recovery (percent)	95-percent confidence interval for SRM recovery (percent)
SRM sample 2709a					
Arsenic	10	1:10	10.5	60.5	58.5–62.4
Cadmium	10	1:10	0.371	66.8	64.6–69.0
Chromium	10	1:10	130	67.6	66.6–68.7
Copper	10	1:10	33.9	77.0	76.0–78.1
Iron	10	1:10	33,600	91.0	90.1–91.8
Lead	10	1:10	17.3	49.1	47.8–50.5
Manganese	10	1:10	529	87.5	86.8–88.2
Nickel	10	1:10	85	89.7	88.7–90.7
Zinc	10	1:10	103	79.4	78.4–80.5
SRM sample 2711a					
Arsenic	10	1:10	107	86.5	84.4–88.7
Cadmium	10	1:10	54.1	100	99.0–101
Chromium	10	1:10	52.3	51.3	50.2–52.5
Copper	10	1:10	140	90.5	89.4–91.5
Iron	10	1:10	28,200	85.4	84.3–86.5
Lead	10	1:10	1,400	98.7	97.5–99.9
Manganese	10	1:10	675	80.0	79.0–81.0
Nickel	10	1:10	21.7	91.0	89.9–92.2
Zinc	10	1:10	414	93.6	92.5–94.7

Table 21. Analyses of procedural blanks for bed-sediment samples.

[Dilution ratio is the proportion of initial volume of concentrated nitric acid used as a digesting reagent to final volume of solution after addition of 0.6N (normal) hydrochloric acid used for reconstituting dried residue, µg/mL, microgram per milliliter; <, less than minimum reporting level for liquid-phase concentration, in µg/mL]

Site number (fig. 1)	Site name	Dilution ratio	Concentration (µg/mL)								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manga- nese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12323750	Silver Bow Creek at Warm Springs	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12323800	Clark Fork near Galen	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
461415112450801	Clark Fork below Lost Creek, near Galen	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
461559112443301	Clark Fork at county bridge, near Racetrack	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12324200	Clark Fork at Deer Lodge	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12324400	Clark Fork above Little Blackfoot River, near Garrison	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12324680	Clark Fork at Goldcreek	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12331800	Clark Fork near Drummond	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12334550	Clark Fork at Turah Bridge, near Bonner	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12340000	Blackfoot River near Bonner	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005
12340500	Clark Fork above Missoula	1:10	<0.003	<0.0005	<0.007	<0.005	<0.02	<0.004	<0.001	<0.004	<0.0005

Table 22. Biological data for the Clark Fork Basin, Montana, August 2016.

[Analyses are for the whole-body tissue of aquatic insects. Composite samples were made by combining similar-sized insects of the same species into a sample of sufficient mass for analysis. Concentrations for biota samples composed of two or more composite samples are the means of all analyses. All tissues were analyzed undiluted (dilution ratio 1:1). µg/g, microgram per gram of dry sample weight]

Taxon	Number of composite samples	Concentration (µg/g)								
		Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manga- nese	Nickel	Zinc
12323600–Silver Bow Creek at Opportunity										
<i>Hydropsyche cockerelli</i>	3	5.2	5.1	4.6	157	2,470	12.8	3,690	3.8	566
12323750–Silver Bow Creek at Warm Springs										
<i>Hydropsyche cockerelli</i>	2	12.6	0.6	1.4	31.1	815	3.2	1,500	1.7	176
<i>Hydropsyche occidentalis</i>	1	21.6	1.1	3.2	43.6	1,720	7.3	3,020	3.2	210
12323800–Clark Fork near Galen										
<i>Hydropsyche cockerelli</i>	3	17.6	2.5	4.4	134	2,290	13.1	2,400	4.5	381
<i>Hydropsyche occidentalis</i>	2	14.5	1.5	3.5	102	1,840	10.0	2,560	3.8	277
461415112450801–Clark Fork below Lost Creek, near Galen										
<i>Hydropsyche cockerelli</i>	1	20.2	3.7	5.5	247	3,040	21.4	2,170	4.5	336
<i>Hydropsyche occidentalis</i>	2	18.2	1.9	3.6	164	1,900	14.8	2,740	3.7	313
<i>Hydropsyche</i> species	1	14.4	1.5	3.0	138	2,040	16.0	2,790	4.4	276
461559112443301–Clark Fork at county bridge, near Racetrack										
<i>Arctopsyche grandis</i>	1	9.3	3.5	4.5	90.9	803	9.1	3,140	6.4	572
<i>Hydropsyche cockerelli</i>	2	13.3	2.7	2.7	110	1,550	9.3	2,000	2.2	242
<i>Hydropsyche occidentalis</i>	1	12.9	1.5	2.0	72.4	1,200	9.4	2,880	2.5	237
461903112440701–Clark Fork at Dempsey Creek diversion, near Racetrack										
<i>Arctopsyche grandis</i>	3	5.1	1.8	0.8	45.3	391	3.6	948	0.8	223
<i>Claassenia sabulosa</i>	1	1.9	0.8	0.3	54.4	188	0.9	187	0.4	277
<i>Hydropsyche cockerelli</i>	4	9.7	2.0	2.1	92.3	1,120	8.0	1,330	1.4	220
<i>Hydropsyche occidentalis</i>	2	9.2	1.0	2.0	74.5	949	7.2	1,410	1.5	236
12324200–Clark Fork at Deer Lodge										
<i>Hydropsyche cockerelli</i>	4	7.0	2.3	1.8	84.7	863	7.7	977	1.3	212
<i>Hydropsyche occidentalis</i>	1	8.0	1.2	1.9	80.7	975	8.5	1,280	1.5	240
12324400–Clark Fork above Little Blackfoot River, near Garrison										
<i>Arctopsyche grandis</i>	3	5.2	1.6	1.1	42.2	328	3.7	811	1.1	242
<i>Claassenia sabulosa</i>	2	2.0	0.4	0.5	64.1	225	2.0	179	0.7	266
<i>Hydropsyche cockerelli</i>	1	7.4	1.6	1.4	92.7	808	8.5	1,110	1.5	213
<i>Hydropsyche occidentalis</i>	1	7.3	1.1	1.8	78.1	908	9.6	1,800	1.7	230
12324680–Clark Fork at Goldcreek										
<i>Arctopsyche grandis</i>	3	3.5	2.1	0.6	34.8	294	2.6	942	0.7	213
<i>Claassenia sabulosa</i>	3	2.1	0.6	0.8	51.8	235	1.7	266	0.9	325
<i>Hydropsyche cockerelli</i>	1	5.1	1.5	2.0	49.2	535	5.1	1,250	1.3	205
<i>Hydropsyche occidentalis</i>	1	7.4	1.3	2.6	77.4	1,100	9.8	2,820	2.0	279
12331800–Clark Fork near Drummond										
<i>Arctopsyche grandis</i>	3	2.8	0.8	0.6	23.5	306	3.5	1,240	0.8	195
<i>Claassenia sabulosa</i>	3	1.6	0.4	0.5	53.7	192	1.5	218	0.7	280
<i>Hydropsyche cockerelli</i>	2	4.9	0.9	1.6	43.1	819	7.7	1,720	1.4	210
<i>Hydropsyche occidentalis</i>	2	7.5	1.3	3.8	72.5	1,700	14.0	2,750	3.9	296

Table 22. Biological data for the Clark Fork Basin, Montana, August 2016.—Continued

[Analyses are for the whole-body tissue of aquatic insects. Composite samples were made by combining similar-sized insects of the same species into a sample of sufficient mass for analysis. Concentrations for biota samples composed of two or more composite samples are the means of all analyses. All tissues were analyzed undiluted (dilution ratio 1:1). µg/g, microgram per gram of dry sample weight]

Taxon	Number of composite samples	Concentration (µg/g)								
		Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manga-nese	Nickel	Zinc
12334550—Clark Fork at Turah Bridge, near Bonner										
<i>Arctopsyche grandis</i>	2	4.2	0.9	1.0	20.0	440	7.0	677	1.1	227
<i>Claassenia sabulosa</i>	1	1.1	0.5	0.2	81.1	99	0.4	109	0.4	361
<i>Hydropsyche cockerelli</i>	1	4.9	1.0	1.5	30.4	777	5.1	684	1.3	212
<i>Hydropsyche occidentalis</i>	3	4.6	0.7	2.7	29.7	1,290	5.0	704	1.7	188
12340000—Blackfoot River near Bonner										
<i>Arctopsyche grandis</i>	2	2.7	0.2	1.3	11.9	576	0.6	420	0.8	151
<i>Hydropsyche cockerelli</i>	2	3.6	0.2	3.2	14.5	1,340	1.7	542	1.7	146
<i>Hydropsyche occidentalis</i>	1	4.0	0.2	2.8	18.3	1,180	1.8	693	2.7	211
12340500—Clark Fork above Missoula										
<i>Arctopsyche grandis</i>	2	3.6	1.0	1.3	24.6	622	2.5	1,170	1.0	228
<i>Claassenia sabulosa</i>	2	1.0	0.3	0.6	44.2	232	0.9	110	0.9	327
<i>Hydropsyche cockerelli</i>	2	6.9	0.7	2.3	28.0	1,050	4.4	1,160	1.3	231
<i>Hydropsyche occidentalis</i>	2	4.5	0.7	2.4	31.4	1,080	4.5	1,580	1.6	244

Table 23. Recovery efficiency for analyses of standard reference material for biota samples.

[µg/g, microgram per gram of dry sample weight; CRM, certified reference material (lobster hepatopancreas)]

Constituent	Number of analyses	Certified concentration (µg/g)	Mean CRM recovery (percent)	95-percent confidence interval for CRM recovery (percent)
CRM sample TORT-3				
Arsenic	12	59.5	112	111–112
Cadmium	12	42.3	91.0	90.1–91.8
Chromium	12	1.95	85.8	83.9–87.7
Copper	12	497	88.3	88.0–88.7
Iron	12	179	92.5	91.9–93.2
Lead	12	0.225	182	170–192
Manganese	12	15.6	89.5	88.4–90.5
Nickel	12	5.3	88.7	87.2–90.3
Zinc	12	136	91.9	90.4–93.3

Table 24. Analyses of procedural blanks for biota samples.

[Procedural blanks were not diluted before analyses. µg/mL, microgram per milliliter; <, less than minimum reporting level for liquid-phase concentration, in µg/mL.]

Site number (fig. 1)	Site name	Dilution ratio	Concentration (µg/mL)								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manga- nese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
12323750	Silver Bow Creek at Warm Springs	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
12323800	Clark Fork near Galen	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.10
461415112450801	Clark Fork below Lost Creek, near Galen	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
461559112443301	Clark Fork at county bridge, near Race-track	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
12324200	Clark Fork at Deer Lodge	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
12324400	Clark Fork above Little Blackfoot River, near Gar-rison	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
12324680	Clark Fork at Gold-creek	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
12331800	Clark Fork near Drummond	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.10
12334550	Clark Fork at Turah Bridge, near Bon-ner	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02
12340000	Blackfoot River near Bonner	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.10
12340500	Clark Fork above Missoula	1:1	<0.002	<0.0003	<0.007	<0.006	<0.05	<0.003	<0.001	<0.001	<0.02

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323230—Blacktail Creek at Harrison Avenue, at Butte					
Period of record for water-quality data: March 1993–August 1995, December 1996–August 2003, December 2004–September 2016					
Streamflow, instantaneous (ft ³ /s)	179	156	1.9	16	9.3
pH, onsite (standard units)	179	8.4	7.3	7.7	7.7
Specific conductance, onsite (µS/cm)	179	412	116	262	262
Temperature, water (°C)	179	17.5	1.0	7.9	8.5
Turbidity, unfiltered, lab (NTRU)	23	7.5	<2.0	³ 3.9	3.5
Hardness, filtered (mg/L as CaCO ₃)	179	153	37.7	104	105
Calcium, filtered (mg/L)	179	42.9	10.6	29.7	29.8
Magnesium, filtered (mg/L)	179	11.1	2.71	7.23	7.20
Potassium, filtered (mg/L)	49	6.40	2.00	2.75	2.57
Sodium, filtered (mg/L)	49	18.0	6.40	10.6	10.2
Alkalinity, filtered, lab (mg/L as CaCO ₃)	21	124	54.5	85.5	78.4
Chloride, filtered (mg/L)	49	18.0	2.80	8.53	8.00
Fluoride, filtered (mg/L)	49	0.60	0.18	0.28	0.30
Silica, filtered (mg/L)	49	32.0	14.0	24.3	24.4
Sulfate, filtered (mg/L)	49	40.2	14.7	26.2	26.0
Nitrate plus nitrite, filtered (mg/L)	23	1.24	0.16	0.63	0.52
Cadmium, filtered (µg/L)	177	0.50	<0.03	² 0.04	0.02
Cadmium, unfiltered recoverable (µg/L)	179	0.12	<0.01	² 0.04	<1.0
Copper, filtered (µg/L)	178	10.0	<1.0	³ 3.5	3.0
Copper, unfiltered recoverable (µg/L)	179	52.0	0.91	6.2	4.9
Iron, filtered (µg/L)	179	739	15.2	197	175
Iron, unfiltered recoverable (µg/L)	179	4,220	123	659	590
Lead, filtered (µg/L)	179	2.80	<0.02	² 0.18	0.06
Lead, unfiltered recoverable (µg/L)	179	47.0	<1.00	¹ 1.52	0.64
Manganese, filtered (µg/L)	179	144	14.2	44.1	39.4
Manganese, unfiltered recoverable (µg/L)	179	240	23.5	61.0	52.7
Zinc, filtered (µg/L)	177	11	<1.0	³ 3.2	2.4
Zinc, unfiltered recoverable (µg/L)	179	130	<3.0	² 7.4	4.0
Arsenic, filtered (µg/L)	178	13.0	1.0	4.0	3.4
Arsenic, unfiltered recoverable (µg/L)	179	18.0	1.0	² 5.3	4.5
Organic carbon, filtered (mg/L)	21	9.52	1.40	4.73	4.29
Sediment, suspended (percent finer than 0.062 mm)	179	97	50	83	85
Sediment, suspended concentration (mg/L)	179	139	1	11	7
Sediment, suspended discharge (ton/d)	179	59	0.01	0.90	0.17

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323250—Silver Bow Creek below Blacktail Creek, at Butte					
Period of record for water-quality data: March 1993–August 1995, December 1996–September 2016					
Streamflow, instantaneous (ft ³ /s)	187	202	13	31	25
pH, onsite (standard units)	187	8.2	7.2	7.6	7.6
Specific conductance, onsite (μ S/cm)	187	691	209	457	460
Temperature, water (°C)	187	20.0	1.0	10.3	10.0
Turbidity, unfiltered, lab (NTRU)	23	8.6	<2.0	² 4.0	3.7
Hardness, filtered (mg/L as CaCO ₃)	187	217	66.0	147	150
Calcium, filtered (mg/L)	187	62.7	19.0	41.9	42.2
Magnesium, filtered (mg/L)	187	16.1	4.51	10.4	10.7
Potassium, filtered (mg/L)	49	35.0	3.64	7.50	5.70
Sodium, filtered (mg/L)	49	66.0	12.0	24.9	24.7
Alkalinity, filtered, lab (mg/L as CaCO ₃)	21	119	66.9	87.7	88.6
Chloride, filtered (mg/L)	48	88.0	6.70	23.8	21.2
Fluoride, filtered (mg/L)	48	0.80	0.26	0.41	0.40
Silica, filtered (mg/L)	48	28.0	17.0	22.1	22.0
Sulfate, filtered (mg/L)	48	96.0	35.0	71.1	73.8
Nitrate plus nitrite, filtered (mg/L)	23	4.40	0.34	1.10	0.91
Cadmium, filtered (μ g/L)	187	6.2	0.04	0.76	0.15
Cadmium, unfiltered recoverable (μ g/L)	187	6.0	0.06	1.03	0.24
Copper, filtered (μ g/L)	187	303	2.6	26.3	11.3
Copper, unfiltered recoverable (μ g/L)	187	550	7.3	60.8	21.3
Iron, filtered (μ g/L)	187	392	9.6	101	81.2
Iron, unfiltered recoverable (μ g/L)	187	7,400	85.4	752	535
Lead, filtered (μ g/L)	187	2.4	<0.5	² 0.41	0.24
Lead, unfiltered recoverable (μ g/L)	187	250	0.61	9.41	2.29
Manganese, filtered (μ g/L)	187	1,700	20.7	264	121
Manganese, unfiltered recoverable (μ g/L)	187	1,600	25.9	301	148
Zinc, filtered (μ g/L)	187	2,200	5.3	250	58.6
Zinc, unfiltered recoverable (μ g/L)	187	2,200	20.5	304	75.0
Arsenic, filtered (μ g/L)	187	13.4	2.3	5.8	5.3
Arsenic, unfiltered recoverable (μ g/L)	187	45.0	3.0	9.1	8.0
Organic carbon, filtered (mg/L)	21	9.97	4.93	7.16	7.21
Sediment, suspended (percent finer than 0.062 mm)	186	98	42	83	85
Sediment, suspended concentration (mg/L)	186	405	2	18	9
Sediment, suspended discharge (ton/d)	186	70	0.08	2.1	0.59

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323600—Silver Bow Creek at Opportunity					
Period of record for water-quality data: March 1993–August 1995, December 1996–September 2016					
Streamflow, instantaneous (ft ³ /s)	187	648	13	78	56
pH, onsite (standard units)	189	9.5	7.2	8.4	8.3
Specific conductance, onsite (μS/cm)	189	633	202	414	403
Temperature, water (°C)	189	24.0	−1.0	9.5	9.5
Turbidity, unfiltered, lab (NTRU)	23	12	2.1	5.7	5.2
Hardness, filtered (mg/L as CaCO ₃)	189	248	60.2	150	148
Calcium, filtered (mg/L)	189	75.0	18.5	44.4	44.0
Magnesium, filtered (mg/L)	189	15.0	3.42	9.45	9.10
Potassium, filtered (mg/L)	60	16.0	1.79	4.54	4.10
Sodium, filtered (mg/L)	60	33.5	5.06	18.5	17.6
Alkalinity, filtered, lab (mg/L as CaCO ₃)	31	111	71.6	93.1	91.5
Chloride, filtered (mg/L)	59	63.9	3.20	17.7	14.1
Fluoride, filtered (mg/L)	59	0.80	0.16	0.39	0.40
Silica, filtered (mg/L)	59	28.0	9.56	20.2	21.0
Sulfate, filtered (mg/L)	59	190	32.0	65.9	62.0
Cadmium, filtered (μg/L)	188	41.0	<0.1	² 0.87	0.44
Cadmium, unfiltered recoverable (μg/L)	189	49.0	0.17	² 1.58	0.94
Copper, filtered (μg/L)	187	450	6.5	36.2	27.6
Copper, unfiltered recoverable (μg/L)	189	3,900	12.1	154	84.2
Iron, filtered (μg/L)	189	397	<3	² 51.0	30.0
Iron, unfiltered recoverable (μg/L)	188	24,100	114	1,340	664
Lead, filtered (μg/L)	189	5.1	<0.5	² 0.62	0.31
Lead, unfiltered recoverable (μg/L)	189	650	0.67	28.9	12.7
Manganese, filtered (μg/L)	189	9,300	25.5	331	240
Manganese, unfiltered recoverable (μg/L)	189	10,000	55.3	439	330
Zinc, filtered (μg/L)	188	13,000	11.2	223	102
Zinc, unfiltered recoverable (μg/L)	189	15,000	26.8	394	221
Arsenic, filtered (μg/L)	189	34.0	1.0	10.1	9.5
Arsenic, unfiltered recoverable (μg/L)	189	235	5.5	21.2	15.9
Organic carbon, filtered (mg/L)	28	8.35	3.06	5.54	5.44
Sediment, suspended (percent finer than 0.062 mm)	190	95	37	78	84
Sediment, suspended concentration (mg/L)	190	801	3	44	18
Sediment, suspended discharge (ton/d)	187	781	0.18	19	2.6

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323670—Mill Creek near Anaconda					
Period of record for water-quality data: December 2004–September 2016					
Streamflow, instantaneous (ft ³ /s)	95	309	7.4	64	38
pH, onsite (standard units)	96	8.6	7.5	8.0	8.0
Specific conductance, onsite (μ S/cm)	96	213	56	129	129
Temperature, water (°C)	96	17.0	0.0	8.6	9.0
Turbidity, unfiltered, lab (NTRU)	89	21	<2.0	² 2.4	<2.0
Hardness, filtered (mg/L as CaCO ₃)	96	98.0	23.7	56.6	52.9
Calcium, filtered (mg/L)	96	26.7	7.00	15.7	14.9
Magnesium, filtered (mg/L)	96	8.01	1.45	4.21	3.92
Potassium, filtered (mg/L)	23	0.82	0.47	0.62	0.62
Sodium, filtered (mg/L)	23	6.04	2.14	3.82	3.45
Alkalinity, filtered, lab (mg/L as CaCO ₃)	23	85.1	30.8	54.5	52.5
Chloride, filtered (mg/L)	23	0.54	0.16	0.30	0.26
Fluoride, filtered (mg/L)	23	0.37	0.28	0.31	0.30
Silica, filtered (mg/L)	23	15.5	9.27	12.3	12.1
Sulfate, filtered (mg/L)	23	13.9	3.12	6.18	5.37
Cadmium, filtered (μ g/L)	95	0.11	0.02	² 0.04	0.04
Cadmium, unfiltered recoverable (μ g/L)	96	0.19	0.03	0.07	0.07
Copper, filtered (μ g/L)	96	5.1	0.72	2.2	2.1
Copper, unfiltered recoverable (μ g/L)	96	10.6	1.3	3.7	3.1
Iron, filtered (μ g/L)	96	125	21.2	48.4	42.6
Iron, unfiltered recoverable (μ g/L)	96	730	64.9	194	154
Lead, filtered (μ g/L)	96	0.36	0.02	² 0.12	0.11
Lead, unfiltered recoverable (μ g/L)	96	3.12	0.15	0.70	0.52
Manganese, filtered (μ g/L)	96	12.0	3.1	5.9	5.7
Manganese, unfiltered recoverable (μ g/L)	96	36.6	6.2	13.4	11.5
Zinc, filtered (μ g/L)	96	4.3	<1.4	² 1.6	1.3
Zinc, unfiltered recoverable (μ g/L)	96	9.2	<2.0	³ 3.0	2.6
Arsenic, filtered (μ g/L)	96	32.9	7.3	16.0	14.9
Arsenic, unfiltered recoverable (μ g/L)	96	34.8	7.8	17.2	15.6
Organic carbon, filtered (mg/L)	23	3.48	1.26	2.24	2.27
Sediment, suspended (percent finer than 0.062 mm)	96	96	14	64	67
Sediment, suspended concentration (mg/L)	96	42	1	6	4
Sediment, suspended discharge (ton/d)	95	28	0.02	2.0	0.36

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323700—Mill Creek at Opportunity					
Period of record for water-quality data: March 2003–September 2016					
Streamflow, instantaneous (ft ³ /s)	110	261	0.43	37	15
pH, onsite (standard units)	112	8.3	7.5	8.0	8.0
Specific conductance, onsite (μS/cm)	112	242	59	146	144
Temperature, water (°C)	112	20.0	−1.0	9.3	9.5
Turbidity, unfiltered, lab (NTRU)	30	9.1	<2.0	² 2.4	<2.0
Hardness, filtered (mg/L as CaCO ₃)	112	112	24.0	62.6	60.2
Calcium, filtered (mg/L)	112	31.0	7.01	17.6	17.0
Magnesium, filtered (mg/L)	112	8.44	1.56	4.54	4.42
Potassium, filtered (mg/L)	30	1.02	0.48	0.70	0.72
Sodium, filtered (mg/L)	30	8.15	2.29	4.40	4.12
Alkalinity, filtered, lab (mg/L as CaCO ₃)	30	88.2	31.9	57.2	56.0
Chloride, filtered (mg/L)	30	0.82	0.18	0.38	0.32
Fluoride, filtered (mg/L)	30	0.40	0.29	0.33	0.32
Silica, filtered (mg/L)	30	16.9	9.47	12.3	12.0
Sulfate, filtered (mg/L)	30	27.7	4.11	10.4	9.40
Cadmium, filtered (μg/L)	112	0.13	0.02	0.06	0.06
Cadmium, unfiltered recoverable (μg/L)	112	0.86	0.03	0.13	0.09
Copper, filtered (μg/L)	112	6.1	1.0	2.8	2.4
Copper, unfiltered recoverable (μg/L)	112	38.8	1.5	5.9	3.8
Iron, filtered (μg/L)	112	108	15.9	48.1	42.4
Iron, unfiltered recoverable (μg/L)	112	1,960	44.3	284	160
Lead, filtered (μg/L)	112	0.35	<0.04	³ 0.13	0.12
Lead, unfiltered recoverable (μg/L)	112	12.7	0.07	1.30	0.52
Manganese, filtered (μg/L)	112	32.8	2.1	6.5	5.0
Manganese, unfiltered recoverable (μg/L)	112	113	2.9	17.5	12.0
Zinc, filtered (μg/L)	111	7.7	<1.4	² 2.7	2.5
Zinc, unfiltered recoverable (μg/L)	112	41	<2.0	³ 5.9	4.0
Arsenic, filtered (μg/L)	112	55.1	9.0	20.8	18.6
Arsenic, unfiltered recoverable (μg/L)	112	53.5	10.0	23.4	21.2
Organic carbon, filtered (mg/L)	30	4.10	1.33	2.34	2.28
Sediment, suspended (percent finer than 0.062 mm)	112	91	26	70	71
Sediment, suspended concentration (mg/L)	112	107	1	11	4
Sediment, suspended discharge (ton/d)	110	55	<0.01	³ 3.0	0.14

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323710—Willow Creek near Anaconda					
Period of record for water-quality data: December 2004–September 2016					
Streamflow, instantaneous (ft ³ /s)	86	114	1.0	15	8.3
pH, onsite (standard units)	89	8.2	7.5	7.7	7.7
Specific conductance, onsite (μ S/cm)	89	151	65	103	107
Temperature, water (°C)	89	16.0	0.0	7.4	7.5
Turbidity, unfiltered, lab (NTRU)	82	39	<2.0	² 5.2	3.2
Hardness, filtered (mg/L as CaCO ₃)	89	56.3	21.5	37.6	38.5
Calcium, filtered (mg/L)	89	18.3	7.22	12.6	13.0
Magnesium, filtered (mg/L)	89	2.60	0.78	1.50	1.48
Potassium, filtered (mg/L)	23	1.13	0.70	0.92	0.91
Sodium, filtered (mg/L)	23	7.94	4.39	5.93	5.99
Alkalinity, filtered, lab (mg/L as CaCO ₃)	23	55.4	26.3	41.7	38.9
Chloride, filtered (mg/L)	23	0.83	0.30	0.46	0.38
Fluoride, filtered (mg/L)	23	0.08	0.06	0.07	0.07
Silica, filtered (mg/L)	23	26.9	20.9	24.5	24.7
Sulfate, filtered (mg/L)	23	15.7	4.90	7.4	6.36
Cadmium, filtered (μ g/L)	87	0.05	<0.02	² 0.03	0.03
Cadmium, unfiltered recoverable (μ g/L)	89	0.33	<0.03	² 0.06	0.05
Copper, filtered (μ g/L)	89	5.5	0.82	2.2	2.1
Copper, unfiltered recoverable (μ g/L)	89	16.8	1.0	3.6	3.0
Iron, filtered (μ g/L)	89	277	28	91.9	81.8
Iron, unfiltered recoverable (μ g/L)	89	2,380	85.7	347	231
Lead, filtered (μ g/L)	89	0.39	0.03	² 0.17	0.16
Lead, unfiltered recoverable (μ g/L)	89	7.96	0.10	0.82	0.53
Manganese, filtered (μ g/L)	89	34.5	6.0	13.4	11.9
Manganese, unfiltered recoverable (μ g/L)	89	99.9	12.8	24.6	21.7
Zinc, filtered (μ g/L)	89	3.3	0.65	² 1.7	1.4
Zinc, unfiltered recoverable (μ g/L)	89	17.8	<2.0	² 3.0	2.0
Arsenic, filtered (μ g/L)	89	25.7	7.7	15.9	14.9
Arsenic, unfiltered recoverable (μ g/L)	89	27.9	9.8	17.0	15.4
Organic carbon, filtered (mg/L)	23	7.07	3.05	4.77	4.44
Sediment, suspended (percent finer than 0.062 mm)	89	97	25	78	83
Sediment, suspended concentration (mg/L)	89	195	1	13	4
Sediment, suspended discharge (ton/d)	86	50	<0.01	² 1.8	0.10

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level; mg/L, milligram per liter; CaCO₃, calcium carbonate; μg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323720—Willow Creek at Opportunity					
Period of record for water-quality data: March 2003–September 2016					
Streamflow, instantaneous (ft ³ /s)	112	116	4.5	17	9.8
pH, onsite (standard units)	112	9.0	7.6	8.1	8.1
Specific conductance, onsite (μS/cm)	112	380	116	262	279
Temperature, water (°C)	112	24.0	0.0	11.0	11.0
Turbidity, unfiltered, lab (NTRU)	30	9.3	<2.0	² 4.0	3.6
Hardness, filtered (mg/L as CaCO ₃)	112	173	54.2	114	122
Calcium, filtered (mg/L)	112	48.4	16.5	33.3	35.8
Magnesium, filtered (mg/L)	112	12.8	2.99	7.52	7.99
Potassium, filtered (mg/L)	30	2.73	0.94	1.48	1.39
Sodium, filtered (mg/L)	30	16.7	6.12	9.63	9.25
Alkalinity, filtered, lab (mg/L as CaCO ₃)	30	175	53.3	103	110
Chloride, filtered (mg/L)	30	3.28	0.79	1.82	1.67
Fluoride, filtered (mg/L)	30	0.66	0.15	0.36	0.40
Silica, filtered (mg/L)	30	30.8	18.4	23.3	22.8
Sulfate, filtered (mg/L)	30	36.5	9.21	19.1	19.2
Cadmium, filtered (μg/L)	112	0.12	<0.03	² 0.04	0.04
Cadmium, unfiltered recoverable (μg/L)	111	0.52	0.02	0.10	0.07
Copper, filtered (μg/L)	112	21.4	0.87	5.1	3.6
Copper, unfiltered recoverable (μg/L)	111	48.8	2.6	10.4	7.7
Iron, filtered (μg/L)	112	274	6.1	53.2	47.4
Iron, unfiltered recoverable (μg/L)	111	1,670	27.4	284	228
Lead, filtered (μg/L)	112	0.89	0.04	² 0.23	0.20
Lead, unfiltered recoverable (μg/L)	111	14.4	0.27	2.08	1.43
Manganese, filtered (μg/L)	112	200	3.3	32.3	25.7
Manganese, unfiltered recoverable (μg/L)	111	228	4.7	45.3	38.0
Zinc, filtered (μg/L)	112	19.8	<1.4	² 4.8	3.8
Zinc, unfiltered recoverable (μg/L)	111	68	1.2	11.4	9.0
Arsenic, filtered (μg/L)	112	164	9.3	37.8	26.2
Arsenic, unfiltered recoverable (μg/L)	112	164	11.4	40.2	27.4
Organic carbon, filtered (mg/L)	30	12.9	1.60	4.90	4.20
Sediment, suspended (percent finer than 0.062 mm)	112	99	54	87	90
Sediment, suspended concentration (mg/L)	112	87	1	10	6
Sediment, suspended discharge (ton/d)	112	11	0.01	0.83	0.17

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323750—Silver Bow Creek at Warm Springs Period of record for water-quality data: March 1993–September 2016					
Streamflow, instantaneous (ft ³ /s)	196	1,030	16	138	89
pH, onsite (standard units)	194	9.6	8.0	8.8	8.8
Specific conductance, onsite (µS/cm)	194	783	182	453	460
Temperature, water (°C)	195	25.0	0.0	10.4	10.0
Turbidity, unfiltered, lab (NTRU)	23	11	<2.0	² 3.7	3.0
Hardness, filtered (mg/L as CaCO ₃)	194	314	74.9	188	190
Calcium, filtered (mg/L)	194	90.4	22.5	54.5	55.0
Magnesium, filtered (mg/L)	194	21.4	4.52	12.5	12.8
Potassium, filtered (mg/L)	54	8.30	1.72	3.89	3.84
Sodium, filtered (mg/L)	54	23.0	8.20	16.1	17.0
Alkalinity, filtered, lab (mg/L as CaCO ₃)	26	113	69.2	90.6	94.0
Chloride, filtered (mg/L)	54	26.2	1.30	10.9	10.00
Fluoride, filtered (mg/L)	54	1.20	0.41	0.67	0.66
Silica, filtered (mg/L)	54	20.0	6.30	12.6	12.2
Sulfate, filtered (mg/L)	54	210	39.2	101	93.6
Cadmium, filtered (µg/L)	194	0.31	<0.03	² 0.06	0.03
Cadmium, unfiltered recoverable (µg/L)	194	0.57	<0.03	² 0.12	0.07
Copper, filtered (µg/L)	194	40.0	1.6	7.0	5.0
Copper, unfiltered recoverable (µg/L)	194	96.8	2.4	14.3	10.0
Iron, filtered (µg/L)	194	93	<5	² 21.1	17
Iron, unfiltered recoverable (µg/L)	194	3,000	35.8	308	235
Lead, filtered (µg/L)	194	1.0	<0.08	² 0.13	0.05
Lead, unfiltered recoverable (µg/L)	194	41.8	<1.00	² 2.20	1.23
Manganese, filtered (µg/L)	194	875	11.8	109	72.9
Manganese, unfiltered recoverable (µg/L)	194	899	24.0	165	127
Zinc, filtered (µg/L)	194	73	<1.0	² 6.3	3.5
Zinc, unfiltered recoverable (µg/L)	194	180	2.0	² 26.5	14.2
Arsenic, filtered (µg/L)	194	60.0	6.8	22.6	22.1
Arsenic, unfiltered recoverable (µg/L)	194	94.0	9.9	26.1	24.4
Organic carbon, filtered (mg/L)	23	5.95	2.88	4.78	4.86
Sediment, suspended (percent finer than 0.062 mm)	195	98	43	83	86
Sediment, suspended concentration (mg/L)	196	229	1	9	6
Sediment, suspended discharge (ton/d)	196	279	0.05	5.6	1.4

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323760—Warm Springs Creek near Anaconda					
Period of record for water-quality data: October 2005–September 2016					
Streamflow, instantaneous (ft ³ /s)	66	573	41	137	92
pH, onsite (standard units)	66	8.8	7.8	8.4	8.4
Specific conductance, onsite (μS/cm)	66	278	125	221	236
Temperature, water (°C)	66	16.0	0.5	8.2	8.0
Turbidity, unfiltered, lab (NTRU)	60	18	<2.0	² 2.0	<2.0
Hardness, filtered (mg/L as CaCO ₃)	66	145	58.5	109	114
Calcium, filtered (mg/L)	66	42.8	18.5	32.6	34.2
Magnesium, filtered (mg/L)	66	9.34	2.96	6.63	6.99
Potassium, filtered (mg/L)	17	1.37	0.80	1.11	1.17
Sodium, filtered (mg/L)	17	3.44	1.54	2.62	2.83
Alkalinity, filtered, lab (mg/L as CaCO ₃)	17	127	60.3	101	111
Chloride, filtered (mg/L)	17	1.53	0.49	1.00	1.06
Fluoride, filtered (mg/L)	17	0.42	0.29	0.37	0.37
Silica, filtered (mg/L)	17	11.7	8.25	10	9.92
Sulfate, filtered (mg/L)	17	15.9	7.98	12.5	13.0
Cadmium, filtered (μg/L)	66	0.05	<0.02	² 0.02	0.02
Cadmium, unfiltered recoverable (μg/L)	66	0.14	<0.02	² 0.03	0.02
Copper, filtered (μg/L)	65	6.4	<0.80	² 1.1	0.88
Copper, unfiltered recoverable (μg/L)	66	28.0	<0.80	³ 3.2	2.1
Iron, filtered (μg/L)	66	37.0	<4	⁷ 7.9	6.7
Iron, unfiltered recoverable (μg/L)	66	1,000	19.1	123	75.8
Lead, filtered (μg/L)	66	0.11	<0.02	² 0.03	<0.08
Lead, unfiltered recoverable (μg/L)	66	3.51	0.07	0.41	0.25
Manganese, filtered (μg/L)	66	4.2	0.13	² 1.3	1.1
Manganese, unfiltered recoverable (μg/L)	66	45.2	0.90	6.0	4.2
Zinc, filtered (μg/L)	66	5.6	<1.4	² 1.1	<2.0
Zinc, unfiltered recoverable (μg/L)	66	20.1	<2.0	³ 3.5	2
Arsenic, filtered (μg/L)	66	3.9	1.3	2.2	2.1
Arsenic, unfiltered recoverable (μg/L)	66	5.6	1.5	2.6	2.5
Organic carbon, filtered (mg/L)	17	2.92	0.77	1.42	1.28
Sediment, suspended (percent finer than 0.062 mm)	66	84	32	66	66
Sediment, suspended concentration (mg/L)	66	65	1	7	4
Sediment, suspended discharge (ton/d)	66	68	0.13	4.2	0.94

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323770—Warm Springs Creek at Warm Springs Period of record for water-quality data: March 1993–September 2016					
Streamflow, instantaneous (ft ³ /s)	152	420	2.8	95	57
pH, onsite (standard units)	151	8.7	7.4	8.2	8.2
Specific conductance, onsite (µS/cm)	151	795	139	291	299
Temperature, water (°C)	152	20.0	0.0	8.3	8.0
Turbidity, unfiltered, lab (NTRU)	30	11	<2.0	² 2.4	<2.0
Hardness, filtered (mg/L as CaCO ₃)	151	415	39.8	142	146
Calcium, filtered (mg/L)	151	130	10.5	43.3	44.1
Magnesium, filtered (mg/L)	151	22.0	3.29	8.26	8.38
Potassium, filtered (mg/L)	49	4.70	0.83	1.47	1.37
Sodium, filtered (mg/L)	49	19.2	1.78	3.72	3.31
Alkalinity, filtered, lab (mg/L as CaCO ₃)	32	149	60.1	114	126
Chloride, filtered (mg/L)	49	3.60	0.50	1.28	1.11
Fluoride, filtered (mg/L)	49	0.60	0.30	0.42	0.40
Silica, filtered (mg/L)	49	13.0	8.40	10.4	10.1
Sulfate, filtered (mg/L)	49	270	15.3	46.9	35.8
Cadmium, filtered (µg/L)	150	0.10	<0.03	² 0.04	0.03
Cadmium, unfiltered recoverable (µg/L)	150	0.41	<0.03	² 0.08	0.04
Copper, filtered (µg/L)	150	16.0	1.0	3.1	2.7
Copper, unfiltered recoverable (µg/L)	150	147	2.3	17.9	8.6
Iron, filtered (µg/L)	151	36.8	<5.0	² 12.4	10.8
Iron, unfiltered recoverable (µg/L)	151	2,110	17.2	289	120
Lead, filtered (µg/L)	150	1.8	<0.025	² 0.07	<1.0
Lead, unfiltered recoverable (µg/L)	150	14.0	<1.00	² 1.76	0.66
Manganese, filtered (µg/L)	150	570	18.8	102	73.4
Manganese, unfiltered recoverable (µg/L)	150	1,400	37.1	178	131
Zinc, filtered (µg/L)	150	10	<1.0	² 2.0	1.1
Zinc, unfiltered recoverable (µg/L)	151	60	<2.0	² 8.4	3.1
Arsenic, filtered (µg/L)	150	14.0	2.0	5.0	4.4
Arsenic, unfiltered recoverable (µg/L)	150	27.0	3.0	7.1	5.9
Organic carbon, filtered (mg/L)	30	3.27	0.88	1.60	1.50
Sediment, suspended (percent finer than 0.062 mm)	152	95	43	71	71
Sediment, suspended concentration (mg/L)	152	127	1	16	7
Sediment, suspended discharge (ton/d)	152	87	0.03	7.6	1.0

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323800—Clark Fork near Galen					
Period of record for water-quality data: July 1988–September 2016					
Streamflow, instantaneous (ft ³ /s)	236	1,380	14	222	144
pH, onsite (standard units)	224	9.2	7.5	8.5	8.6
Specific conductance, onsite (µS/cm)	225	720	182	405	414
Temperature, water (°C)	236	23.5	0.0	9.8	10.0
Hardness, filtered (mg/L as CaCO ₃)	223	365	76.4	176	182
Calcium, filtered (mg/L)	223	110	23.2	52.2	53.1
Magnesium, filtered (mg/L)	223	22.0	4.44	11.2	11.6
Potassium, filtered (mg/L)	32	5.90	2.00	3.51	3.30
Sodium, filtered (mg/L)	32	19.0	3.60	12.0	12.5
Alkalinity, filtered, lab (mg/L as CaCO ₃)	3	117	84.4	96.3	87.4
Chloride, filtered (mg/L)	32	11.0	2.00	6.47	6.22
Fluoride, filtered (mg/L)	32	1.10	0.40	0.62	0.60
Silica, filtered (mg/L)	32	17.0	8.10	11.7	11.8
Sulfate, filtered (mg/L)	32	220	34.0	97.2	98.5
Cadmium, filtered (µg/L)	223	1.0	<0.03	² 0.06	0.03
Cadmium, unfiltered recoverable (µg/L)	223	3.0	<0.10	² 0.17	0.06
Copper, filtered (µg/L)	223	50.0	1.4	7.1	5.1
Copper, unfiltered recoverable (µg/L)	222	240	4.1	25.0	14.6
Iron, filtered (µg/L)	223	110	<3.0	² 16.7	13.0
Iron, unfiltered recoverable (µg/L)	223	9,200	56.2	444	265
Lead, filtered (µg/L)	223	3.00	<0.08	² 0.14	<5.00
Lead, unfiltered recoverable (µg/L)	223	31.0	<1.00	³ 3.15	1.75
Manganese, filtered (µg/L)	223	460	13.1	96.1	69.9
Manganese, unfiltered recoverable (µg/L)	223	1,400	40.9	200	152
Zinc, filtered (µg/L)	223	110	<1.0	² 7.8	3.4
Zinc, unfiltered recoverable (µg/L)	223	360	2.7	² 32.8	19.8
Arsenic, filtered (µg/L)	223	53.0	4.0	15.0	14.0
Arsenic, unfiltered recoverable (µg/L)	223	78.0	3.0	18.8	16.9
Sediment, suspended (percent finer than 0.062 mm)	236	97	32	76	77
Sediment, suspended concentration (mg/L)	237	338	1	17	8
Sediment, suspended discharge (ton/d)	236	459	0.12	19	2.9

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323840—Lost Creek near Anaconda					
Period of record for water-quality data: December 2004–September 2016					
Streamflow, instantaneous (ft ³ /s)	95	73	0.37	12	9.1
pH, onsite (standard units)	95	8.6	7.4	8.1	8.2
Specific conductance, onsite (µS/cm)	95	253	121	199	212
Temperature, water (°C)	95	17.0	0.0	7.7	8.0
Turbidity, unfiltered, lab (NTRU)	95	24,200	<2.0	² 257	<2.0
Hardness, filtered (mg/L as CaCO ₃)	95	122	50.4	96.2	102
Calcium, filtered (mg/L)	95	37.1	15.7	29.2	30.6
Magnesium, filtered (mg/L)	95	7.47	2.71	5.67	5.96
Potassium, filtered (mg/L)	30	1.51	0.88	1.23	1.26
Sodium, filtered (mg/L)	30	3.68	1.87	2.88	2.86
Alkalinity, filtered, lab (mg/L as CaCO ₃)	30	118	59.5	96.2	102
Chloride, filtered (mg/L)	30	2.13	0.51	0.78	0.71
Fluoride, filtered (mg/L)	30	0.50	0.28	0.39	0.40
Silica, filtered (mg/L)	30	12.8	9.65	11.4	11.3
Sulfate, filtered (mg/L)	30	13.8	5.89	8.72	8.10
Cadmium, filtered (µg/L)	93	0.90	<0.02	² 0.04	0.02
Cadmium, unfiltered recoverable (µg/L)	94	147	<0.02	² 1.6	0.04
Copper, filtered (µg/L)	94	90.5	0.80	2.8	1.7
Copper, unfiltered recoverable (µg/L)	94	29,100	1.3	316	4.5
Iron, filtered (µg/L)	94	26.5	<6.0	² 10.5	9.4
Iron, unfiltered recoverable (µg/L)	94	99,700	22.3	1,250	115
Lead, filtered (µg/L)	94	0.18	<0.02	² 0.04	<0.12
Lead, unfiltered recoverable (µg/L)	94	1,290	0.08	14.5	0.49
Manganese, filtered (µg/L)	94	42.4	<0.2	² 1.8	1.4
Manganese, unfiltered recoverable (µg/L)	94	8,830	1.2	101	5.0
Zinc, filtered (µg/L)	93	30.0	<1.4	² 1.6	<2.8
Zinc, unfiltered recoverable (µg/L)	93	7,780	<2	² 87.0	2.2
Arsenic, filtered (µg/L)	94	156	1.8	5.8	3.4
Arsenic, unfiltered recoverable (µg/L)	94	3,860	2.0	45.8	4.0
Organic carbon, filtered (mg/L)	30	3.84	0.87	1.74	1.66
Sediment, suspended (percent finer than 0.062 mm)	95	97	22	58	61
Sediment, suspended concentration (mg/L)	95	58,900	1	632	6
Sediment, suspended discharge (ton/d)	95	1,320	<0.01	² 15	0.13

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12323850—Lost Creek near Galen					
Period of record for water-quality data: March 2003–September 2016					
Streamflow, instantaneous (ft ³ /s)	110	71	1.3	24	18
pH, onsite (standard units)	112	8.7	7.9	8.3	8.3
Specific conductance, onsite (μS/cm)	112	934	540	638	627
Temperature, water (°C)	112	26.5	0.0	10.2	10.0
Turbidity, unfiltered, lab (NTRU)	23	5.4	<2.0	² 1.8	<2.0
Hardness, filtered (mg/L as CaCO ₃)	112	451	203	304	301
Calcium, filtered (mg/L)	112	122	48.5	86.2	86.1
Magnesium, filtered (mg/L)	112	35.7	17.3	21.5	20.9
Potassium, filtered (mg/L)	23	3.68	1.89	2.54	2.40
Sodium, filtered (mg/L)	23	31.5	10.1	16.1	12.9
Alkalinity, filtered, lab (mg/L as CaCO ₃)	23	224	166	191	188
Chloride, filtered (mg/L)	23	5.62	3.90	4.74	4.71
Fluoride, filtered (mg/L)	23	0.82	0.43	0.55	0.50
Silica, filtered (mg/L)	23	23.9	11.7	16.7	16.6
Sulfate, filtered (mg/L)	23	200	95.3	137	134
Cadmium, filtered (μg/L)	110	0.05	<0.02	² 0.03	0.02
Cadmium, unfiltered recoverable (μg/L)	112	0.12	<0.02	² 0.04	0.03
Copper, filtered (μg/L)	112	6.7	0.80	2.1	1.8
Copper, unfiltered recoverable (μg/L)	112	22.5	1.5	5.1	4.2
Iron, filtered (μg/L)	112	84.5	4.0	² 14.7	11.6
Iron, unfiltered recoverable (μg/L)	112	392	14.0	108	83.4
Lead, filtered (μg/L)	111	0.33	<0.025	² 0.05	0.03
Lead, unfiltered recoverable (μg/L)	112	1.90	0.04	0.40	0.28
Manganese, filtered (μg/L)	112	54.0	1.91	15.9	15.0
Manganese, unfiltered recoverable (μg/L)	112	56.5	2.20	21.0	20.3
Zinc, filtered (μg/L)	111	3.8	<1.0	² 1.5	1
Zinc, unfiltered recoverable (μg/L)	112	10.3	<2.0	² 2.9	2.1
Arsenic, filtered (μg/L)	112	41.8	6.0	13.9	12.6
Arsenic, unfiltered recoverable (μg/L)	112	43.0	6.0	14.8	13.0
Organic carbon, filtered (mg/L)	23	4.33	1.28	2.20	2.07
Sediment, suspended (percent finer than 0.062 mm)	112	94	18	62	64
Sediment, suspended concentration (mg/L)	112	79	2	16	15
Sediment, suspended discharge (ton/d)	110	4.2	0.01	1.0	0.74

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324200—Clark Fork at Deer Lodge					
Period of record for water-quality data: March 1985–September 2016					
Streamflow, instantaneous (ft ³ /s)	289	2,000	23	305	229
pH, onsite (standard units)	237	8.9	7.4	8.3	8.3
Specific conductance, onsite (µS/cm)	272	642	228	464	488
Temperature, water (°C)	288	23.0	0.0	10.2	10.5
Turbidity, unfiltered, lab (NTRU)	6	13.0	<2.0	² 7.8	7.6
Hardness, filtered (mg/L as CaCO ₃)	229	282	94.9	197	206
Calcium, filtered (mg/L)	229	82.0	28.2	58.2	60.7
Magnesium, filtered (mg/L)	229	18.7	5.53	12.5	13.2
Potassium, filtered (mg/L)	31	6.30	2.40	3.62	3.60
Sodium, filtered (mg/L)	31	25.0	8.60	14.9	14.0
Alkalinity, filtered, lab (mg/L as CaCO ₃)	3	142	105	119	109
Chloride, filtered (mg/L)	31	12.0	1.20	7.00	7.10
Fluoride, filtered (mg/L)	31	0.70	0.10	0.61	0.60
Silica, filtered (mg/L)	31	34.0	11.0	16.6	16.0
Sulfate, filtered (mg/L)	31	140	44.0	96.2	98.0
Cadmium, filtered (µg/L)	238	2.0	<0.10	² 0.08	0.04
Cadmium, unfiltered recoverable (µg/L)	238	5.0	<0.10	² 0.36	0.10
Copper, filtered (µg/L)	239	120	3.2	10.3	7.8
Copper, unfiltered recoverable (µg/L)	237	1,500	8.2	73.4	34.0
Iron, filtered (µg/L)	239	190	<3	² 15.7	10.0
Iron, unfiltered recoverable (µg/L)	239	29,000	27.2	1,310	494
Lead, filtered (µg/L)	239	6.00	<0.04	² 0.29	0.04
Lead, unfiltered recoverable (µg/L)	239	200	0.23	² 9.67	4.08
Manganese, filtered (µg/L)	239	400	1.0	39.6	31.3
Manganese, unfiltered recoverable (µg/L)	239	4,600	6.8	208	120
Zinc, filtered (µg/L)	239	230	<2.0	² 10.6	7.0
Zinc, unfiltered recoverable (µg/L)	237	1,700	3.0	75.0	35.8
Arsenic, filtered (µg/L)	239	39.0	6.0	14.3	13.2
Arsenic, unfiltered recoverable (µg/L)	238	215	4.8	22.9	17.0
Sediment, suspended (percent finer than 0.062 mm)	280	99	31	72	74
Sediment, suspended concentration (mg/L)	289	2,250	1	63	21
Sediment, suspended discharge (ton/d)	289	8,690	0.18	130	12

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324400—Clark Fork above Little Blackfoot River, near Garrison Period of record for water-quality data: March 2009–September 2016					
Streamflow, instantaneous (ft ³ /s)	62	2,310	66	427	306
pH, onsite (standard units)	62	8.9	7.9	8.4	8.4
Specific conductance, onsite (μ S/cm)	62	530	249	416	444
Temperature, water (°C)	62	22.0	1.0	12.0	12.8
Hardness, filtered (mg/L as CaCO ₃)	62	236	104	184	198
Calcium, filtered (mg/L)	62	69.4	31.8	53.6	57.2
Magnesium, filtered (mg/L)	62	15.8	5.93	12.1	13.2
Cadmium, filtered (μ g/L)	62	0.23	0.02	0.07	0.06
Cadmium, unfiltered recoverable (μ g/L)	62	0.84	0.03	0.24	0.18
Copper, filtered (μ g/L)	62	40.6	2.8	9.3	7.9
Copper, unfiltered recoverable (μ g/L)	62	222	9.7	55.8	33.8
Iron, filtered (μ g/L)	61	64.4	4.5	17.6	13.5
Iron, unfiltered recoverable (μ g/L)	61	3,860	21.5	850	541
Lead, filtered (μ g/L)	62	0.72	0.04	0.17	0.13
Lead, unfiltered recoverable (μ g/L)	62	32.3	0.15	7.2	4.08
Manganese, filtered (μ g/L)	62	65.1	4.68	27.5	23.4
Manganese, unfiltered recoverable (μ g/L)	62	344	10.3	115	100
Zinc, filtered (μ g/L)	62	37.1	<2.0	25.6	4.9
Zinc, unfiltered recoverable (μ g/L)	62	181	3.0	45.2	28.8
Arsenic, filtered (μ g/L)	62	36.7	7.8	15.0	15.2
Arsenic, unfiltered recoverable (μ g/L)	62	46.0	10.5	20.9	17.9
Sediment, suspended (percent finer than 0.062 mm)	62	92	42	73	76
Sediment, suspended concentration (mg/L)	62	205	1	41	22
Sediment, suspended discharge (ton/d)	62	550	0.31	75	22

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12324680—Clark Fork at Goldcreek					
Period of record for water-quality data: March 1993–September 2016					
Streamflow, instantaneous (ft ³ /s)	195	4,450	87	757	513
pH, onsite (standard units)	194	9.1	7.9	8.4	8.3
Specific conductance, onsite (μ S/cm)	194	510	206	366	376
Temperature, water (°C)	195	23.0	0.0	10.4	10.5
Hardness, filtered (mg/L as CaCO ₃)	194	232	85.8	161	169
Calcium, filtered (mg/L)	194	68.0	25.9	47.6	49.4
Magnesium, filtered (mg/L)	194	15.0	5.15	10.3	10.7
Potassium, filtered (mg/L)	28	6.90	2.00	3.11	3.00
Sodium, filtered (mg/L)	28	19.0	6.90	11.5	12.0
Chloride, filtered (mg/L)	28	7.20	2.50	4.73	4.40
Fluoride, filtered (mg/L)	28	0.60	0.10	0.43	0.40
Silica, filtered (mg/L)	28	25.0	14.0	18.3	18.0
Sulfate, filtered (mg/L)	28	88.0	31.0	59.5	55.5
Cadmium, filtered (μ g/L)	194	0.2	<0.02	² 0.04	0.03
Cadmium, unfiltered recoverable (μ g/L)	194	2.0	<0.10	² 0.17	0.08
Copper, filtered (μ g/L)	193	36.0	2.1	6.5	5.2
Copper, unfiltered recoverable (μ g/L)	193	440	5.2	37.5	21.4
Iron, filtered (μ g/L)	193	100	<3	² 19.9	12.9
Iron, unfiltered recoverable (μ g/L)	194	12,000	27.3	801	410
Lead, filtered (μ g/L)	191	0.68	<0.04	² 0.12	<1.00
Lead, unfiltered recoverable (μ g/L)	193	73.0	0.14	² 5.20	2.76
Manganese, filtered (μ g/L)	194	57.3	4.0	18.5	16.4
Manganese, unfiltered recoverable (μ g/L)	194	1,100	9.3	111	80.2
Zinc, filtered (μ g/L)	194	26	<1.0	² 5.1	3.5
Zinc, unfiltered recoverable (μ g/L)	194	510	2.0	39.4	26.2
Arsenic, filtered (μ g/L)	194	22.5	5.6	10.0	9.8
Arsenic, unfiltered recoverable (μ g/L)	194	75.0	7.0	14.3	12.0
Sediment, suspended (percent finer than 0.062 mm)	195	94	43	76	78
Sediment, suspended concentration (mg/L)	195	752	1	44	19
Sediment, suspended discharge (ton/d)	195	7,960	0.55	185	27

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; μ S/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; μ g/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12331800—Clark Fork near Drummond					
Period of record for water-quality data: March 1993–September 2016					
Streamflow, instantaneous (ft ³ /s)	195	5,540	149	1,030	768
pH, onsite (standard units)	194	8.7	7.8	8.3	8.2
Specific conductance, onsite (μ S/cm)	194	630	189	407	418
Temperature, water (°C)	195	22.5	0.5	11.1	11.0
Hardness, filtered (mg/L as CaCO ₃)	194	298	73.9	184	190
Calcium, filtered (mg/L)	194	83.0	21.0	52.6	54.4
Magnesium, filtered (mg/L)	194	22.0	5.2	12.7	13.0
Potassium, filtered (mg/L)	28	10.0	2.10	3.67	3.40
Sodium, filtered (mg/L)	28	20.0	5.60	11.5	12.0
Chloride, filtered (mg/L)	28	7.80	2.70	4.83	4.65
Fluoride, filtered (mg/L)	28	0.50	0.20	0.39	0.40
Silica, filtered (mg/L)	28	24.0	10.0	18.7	18.5
Sulfate, filtered (mg/L)	28	130	25.0	64.8	64.5
Cadmium, filtered (μ g/L)	193	0.30	<0.03	² 0.05	0.03
Cadmium, unfiltered recoverable (μ g/L)	194	2.0	<0.03	² 0.21	0.09
Copper, filtered (μ g/L)	191	21.0	1.0	6.2	4.9
Copper, unfiltered recoverable (μ g/L)	192	360	4.6	39.5	21.8
Iron, filtered (μ g/L)	194	150	<3	² 18.6	10.0
Iron, unfiltered recoverable (μ g/L)	193	8,800	19.7	923	457
Lead, filtered (μ g/L)	190	1.2	<0.04	² 0.16	0.05
Lead, unfiltered recoverable (μ g/L)	190	56.0	0.17	² 6.96	3.38
Manganese, filtered (μ g/L)	193	60.7	3.3	16.4	14.6
Manganese, unfiltered recoverable (μ g/L)	194	880	8.0	134	88.4
Zinc, filtered (μ g/L)	194	21.0	<1.4	² 5.5	4.2
Zinc, unfiltered recoverable (μ g/L)	194	490	2.9	53.4	30.0
Arsenic, filtered (μ g/L)	194	23.9	3.2	10.4	10.0
Arsenic, unfiltered recoverable (μ g/L)	194	62	7.7	15.5	12.8
Sediment, suspended (percent finer than 0.062 mm)	195	93	38	74	75
Sediment, suspended concentration (mg/L)	195	530	2	57	25
Sediment, suspended discharge (ton/d)	195	4,720	1.7	284	46

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12334550—Clark Fork at Turah Bridge, near Bonner Period of record for water-quality data: March 1985–September 2016					
Streamflow, instantaneous (ft ³ /s)	292	10,600	296	1,950	1,190
pH, onsite (standard units)	238	8.8	7.4	8.2	8.2
Specific conductance, onsite (µS/cm)	267	483	139	296	308
Temperature, water (°C)	291	22.0	0.0	9.6	10.0
Hardness, filtered (mg/L as CaCO ₃)	228	205	53.6	130	132
Calcium, filtered (mg/L)	228	59.0	14.9	36.6	37.0
Magnesium, filtered (mg/L)	228	14.0	3.95	9.38	9.40
Potassium, filtered (mg/L)	32	5.70	1.51	2.45	2.45
Sodium, filtered (mg/L)	32	12.0	3.34	7.95	8.45
Alkalinity, filtered, lab (mg/L as CaCO ₃)	4	155	52.5	108	111
Chloride, filtered (mg/L)	32	5.60	1.50	3.13	2.95
Fluoride, filtered (mg/L)	32	0.40	0.17	0.29	0.30
Silica, filtered (mg/L)	32	19.0	12.0	14.9	15.0
Sulfate, filtered (mg/L)	32	68.0	12.6	41.8	41.0
Nitrate plus nitrite, filtered (mg/L)	8	0.069	<0.013	² 0.027	0.012
Phosphorus, unfiltered (mg/L)	10	0.240	0.014	0.080	0.068
Total nitrogen, unfiltered (mg/L)	2	0.49	0.38	0.44	--
Cadmium, filtered (µg/L)	236	0.10	<0.02	² 0.03	<1
Cadmium, unfiltered recoverable (µg/L)	237	4.00	<0.01	² 0.22	0.04
Copper, filtered (µg/L)	236	25.0	1.1	4.5	3.4
Copper, unfiltered recoverable (µg/L)	235	500	2.7	30.2	14.0
Iron, filtered (µg/L)	237	359	<3	² 24.5	14.3
Iron, unfiltered recoverable (µg/L)	237	19,000	32.6	898	356
Lead, filtered (µg/L)	233	7.00	<.02	² 0.25	<1.00
Lead, unfiltered recoverable (µg/L)	233	100	<1.00	² 6.04	2.30
Manganese, filtered (µg/L)	237	48.6	<1.0	² 8.3	7.0
Manganese, unfiltered recoverable (µg/L)	237	2,000	8.8	108	57.3
Zinc, filtered (µg/L)	235	39	<2.0	² 5.4	3.8
Zinc, unfiltered recoverable (µg/L)	237	1,100	2.9	² 50.9	22.0
Arsenic, filtered (µg/L)	237	17.0	2.7	6.0	5.5
Arsenic, unfiltered recoverable (µg/L)	237	110	3.0	9.2	7.0
Sediment, suspended (percent finer than 0.062 mm)	281	98	27	74	76
Sediment, suspended concentration (mg/L)	292	1,370	2	52	18
Sediment, suspended discharge (ton/d)	292	34,700	3.0	575	60

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340000—Blackfoot River near Bonner					
Period of record for water-quality data: March 1985–September 2016					
Streamflow, instantaneous (ft ³ /s)	214	13,400	344	2,750	1,380
pH, onsite (standard units)	174	8.7	7.5	8.3	8.3
Specific conductance, onsite (µS/cm)	191	294	131	209	204
Temperature, water (°C)	214	22.5	0.0	9.7	10.0
Turbidity, unfiltered, lab (NTRU)	7	30	<2.0	² 7.2	2.0
Hardness, filtered (mg/L as CaCO ₃)	166	146	55.1	104	98.6
Calcium, filtered (mg/L)	166	37.7	14.0	26.6	25.4
Magnesium, filtered (mg/L)	166	13.2	4.90	9.19	8.66
Potassium, filtered (mg/L)	26	2.80	0.48	0.87	0.80
Sodium, filtered (mg/L)	26	3.41	1.17	2.46	2.50
Alkalinity, filtered, lab (mg/L as CaCO ₃)	9	148	71.5	117	131
Chloride, filtered (mg/L)	26	1.60	0.23	0.64	0.58
Fluoride, filtered (mg/L)	26	0.10	<0.10	² 0.10	<0.10
Silica, filtered (mg/L)	26	12.0	6.80	8.64	8.10
Sulfate, filtered (mg/L)	26	6.60	1.10	4.58	4.80
Nitrate plus nitrite, filtered (mg/L)	30	0.040	<0.005	² 0.010	0.005
Phosphorus, unfiltered (mg/L)	31	0.167	0.003	0.027	0.015
Total nitrogen, unfiltered (mg/L)	14	0.33	0.08	0.15	0.14
Cadmium, filtered (µg/L)	172	1.00	<0.02	² 0.02	<0.10
Cadmium, unfiltered recoverable (µg/L)	174	2.00	<0.01	² 0.08	<0.10
Copper, filtered (µg/L)	170	7.0	<0.80	² 1.2	0.60
Copper, unfiltered recoverable (µg/L)	171	34.0	<0.70	² 4.0	1.6
Iron, filtered (µg/L)	173	104	<3	² 17.5	10.2
Iron, unfiltered recoverable (µg/L)	174	3,600	13.9	380	163
Lead, filtered (µg/L)	168	8.00	<0.02	² 0.25	<0.50
Lead, unfiltered recoverable (µg/L)	169	25.0	<0.04	² 1.86	0.09
Manganese, filtered (µg/L)	173	11.0	<1.0	² 2.4	2.0
Manganese, unfiltered recoverable (µg/L)	174	180	<10.0	² 26.4	13.6
Zinc, filtered (µg/L)	172	15.0	<0.60	² 1.8	<3.0
Zinc, unfiltered recoverable (µg/L)	174	60.0	<1.0	² 4.6	<10.0
Arsenic, filtered (µg/L)	173	2.0	<1.0	² 0.96	0.96
Arsenic, unfiltered recoverable (µg/L)	174	4.0	<1.0	² 1.3	1.0
Sediment, suspended (percent finer than 0.062 mm)	212	98	42	80	82
Sediment, suspended concentration (mg/L)	214	271	1	27	8
Sediment, suspended discharge (ton/d)	214	7,670	1.1	486	31

Table 25. Statistical summary of long-term water-quality data for the Clark Fork Basin, Montana, March 1985 through September 2016.—Continued

[ft³/s, cubic foot per second; µS/cm, microsiemen per centimeter at 25 °C; °C, degrees Celsius; lab, laboratory; NTRU, nephelometric turbidity ratio unit; <, less than laboratory reporting level¹; mg/L, milligram per liter; CaCO₃, calcium carbonate; µg/L, microgram per liter; mm, millimeter; ton/d, ton per day; --, indicates either too few samples (less than three) or insufficient data to compute statistic]

Property or constituent and reporting unit	Number of samples	Maximum	Minimum	Mean	Median
12340500—Clark Fork above Missoula					
Period of record for water-quality data: July 1986–September 2016					
Streamflow, instantaneous (ft ³ /s)	257	22,900	720	4,600	2,520
pH, onsite (standard units)	215	8.8	7.9	8.3	8.3
Specific conductance, onsite (µS/cm)	235	399	142	250	259
Temperature, water (°C)	255	22.0	0.0	9.8	10.0
Turbidity, unfiltered, lab (NTRU)	40	100	<2.0	² 13.0	4.9
Hardness, filtered (mg/L as CaCO ₃)	215	168	60.5	116	117
Calcium, filtered (mg/L)	215	46.0	14.0	31.4	31.5
Magnesium, filtered (mg/L)	215	13.4	5.28	9.19	9.15
Potassium, filtered (mg/L)	28	4.50	0.90	1.72	1.50
Sodium, filtered (mg/L)	28	7.80	2.40	5.29	5.35
Chloride, filtered (mg/L)	28	4.20	0.90	1.92	1.80
Fluoride, filtered (mg/L)	28	0.30	<0.10	² 0.19	0.20
Silica, filtered (mg/L)	28	16.0	9.40	11.8	11.0
Sulfate, filtered (mg/L)	28	43.0	9.30	23.3	23.0
Phosphorus, unfiltered (mg/L)	2	0.102	0.066	0.084	--
Total nitrogen, unfiltered (mg/L)	2	0.470	0.320	0.395	--
Cadmium, filtered (µg/L)	214	0.20	<0.02	² 0.03	<0.10
Cadmium, unfiltered recoverable (µg/L)	215	5.0	<0.01	² 0.13	<1.0
Copper, filtered (µg/L)	214	12.6	0.7	2.7	2.0
Copper, unfiltered recoverable (µg/L)	213	400	1.9	17.4	8.0
Iron, filtered (µg/L)	215	200	<3	² 21.2	14.9
Iron, unfiltered recoverable (µg/L)	215	13,000	40.9	575	247
Lead, filtered (µg/L)	208	1.20	<0.02	² 0.12	<1.00
Lead, unfiltered recoverable (µg/L)	210	78.0	<1.00	² 3.06	1.27
Manganese, filtered (µg/L)	215	230	3.5	14.4	12.5
Manganese, unfiltered recoverable (µg/L)	215	1,100	8.8	59.9	39.8
Zinc, filtered (µg/L)	214	16.0	<1.0	² 3.2	2.1
Zinc, unfiltered recoverable (µg/L)	215	1,100	<3.0	² 29.4	12.0
Arsenic, filtered (µg/L)	215	9.0	1.0	3.4	3.1
Arsenic, unfiltered recoverable (µg/L)	215	69.0	1.0	5.1	4.0
Sediment, suspended (percent finer than 0.062 mm)	253	99	14	82	87
Sediment, suspended concentration (mg/L)	258	950	2	41	12
Sediment, suspended discharge (ton/d)	257	21,900	5.8	1,020	85

¹Differing less-than (<) values for an individual constituent are the result of changes in the laboratory reporting level during the period of record.

²Value for the mean is estimated by using a log-probability regression to predict the values of data less than the laboratory reporting level (Helsel and Cohn, 1988). Minimum values that are not censored when the mean indicates that a censored value was used in the mean calculation are a result of changes in the laboratory reporting level during the period of record.

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork Basin, Montana, August 1986 through August 2016.

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of samples represents the number of years that the constituent was analyzed, with each year represented by a single mean concentration of composite samples. Arsenic was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323600—Silver Bow Creek at Opportunity Period of record for bed-sediment data: 1992–2016					
Arsenic	14	186	20	89	66
Cadmium	25	43.9	5.9	24.9	26.0
Chromium	23	50.7	16.8	29.2	25.9
Copper	25	9,020	446	3,340	3,570
Iron	25	45,300	28,200	34,500	33,200
Lead	25	1,030	93	517	503
Manganese	25	9,220	1,160	3,270	2,770
Nickel	24	21.4	12.0	14.9	14.8
Silver	12	20.0	8.3	15.5	15.8
Zinc	25	13,400	1,490	5,950	6,660
12323750—Silver Bow Creek at Warm Springs Period of record for bed-sediment data: 1992–2016					
Arsenic	14	177	66	111	101
Cadmium	25	12.2	4.2	6.8	6.4
Chromium	23	46.8	<15.7	23.6	22.9
Copper	25	769	169	335	294
Iron	25	32,500	15,400	23,900	23,800
Lead	25	121	49	73	73
Manganese	25	17,700	1,470	7,300	7,230
Nickel	24	20.0	9.2	14.9	14.7
Silver	12	4.4	0.3	1.9	1.8
Zinc	25	2,220	554	873	686
12323770—Warm Springs Creek at Warm Springs Period of record for bed-sediment data: 1995, 1997, 1999, 2002, 2005, 2008, 2011, 2014					
Arsenic	4	66	34	54	58
Cadmium	8	5.8	1.2	3.2	3.1
Chromium	8	39.3	24.1	31.1	31.1
Copper	8	1,060	496	839	864
Iron	8	26,600	16,800	21,500	21,900
Lead	8	86	42	75	81
Manganese	8	12,100	555	6,620	6,900
Nickel	8	25.5	14.5	19.6	19.4
Silver	4	5.1	3.1	3.8	3.5
Zinc	8	453	237	379	385

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of samples represents the number of years that the constituent was analyzed, with each year represented by a single mean concentration of composite samples. Arsenic was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323800—Clark Fork near Galen					
Period of record for bed-sediment data: 1987, 1991–2016					
Arsenic	14	156	73	108	105
Cadmium	27	20.1	3.8	7.6	6.4
Chromium	23	44.6	18.1	28.5	26.4
Copper	27	2,300	791	1,170	1,110
Iron	27	39,800	22,600	27,800	27,000
Lead	27	235	92	128	126
Manganese	27	17,300	1,530	8,420	6,380
Nickel	24	23.2	13.9	18.7	18.6
Silver	14	7.3	<3.2	¹ 4.4	¹ 4.5
Zinc	27	3,560	721	1,320	1,090
461415112450801—Clark Fork below Lost Creek, near Galen					
Period of record for bed-sediment data: 1996–2016					
Arsenic	14	204	90	124	110
Cadmium	21	10.5	4.8	6.6	6.2
Chromium	20	42.4	16.4	28.5	27.3
Copper	21	2,050	1,150	1,490	1,450
Iron	21	32,800	24,400	28,900	28,800
Lead	21	218	123	162	161
Manganese	21	9,820	1,430	5,250	5,000
Nickel	21	19.9	11.7	15.8	16.3
Silver	8	7.8	4.2	6.5	6.7
Zinc	21	1,680	930	1,250	1,210
461559112443301—Clark Fork at county bridge, near Racetrack					
Period of record for bed-sediment data: 1996–2016					
Arsenic	14	132	56	92	90
Cadmium	21	8.7	3.6	6.2	5.9
Chromium	20	45.2	13.9	27.6	26.3
Copper	21	1,810	818	1,250	1,270
Iron	21	31,700	21,200	27,100	28,100
Lead	21	186	103	140	137
Manganese	21	6,310	1,600	3,220	3,060
Nickel	21	18.4	10.3	14.1	14.5
Silver	8	6.1	<3.3	¹ 5.0	¹ 5.4
Zinc	21	1,550	816	1,140	1,130

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of samples represents the number of years that the constituent was analyzed, with each year represented by a single mean concentration of composite samples. Arsenic was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
461903112440701—Clark Fork at Dempsey Creek diversion, near Racetrack Period of record for bed-sediment data: 1996–2016					
Arsenic	14	109	58	81	80
Cadmium	21	10.3	4.1	6.0	5.2
Chromium	20	39.2	14.5	26.1	24.8
Copper	21	1,580	721	1,100	1,090
Iron	21	33,700	20,600	26,900	26,100
Lead	21	155	92	129	132
Manganese	21	8,370	1,200	3,640	3,080
Nickel	21	16.9	8.7	12.7	12.4
Silver	8	6.2	2.7	4.9	5.0
Zinc	21	1,570	900	1,100	1,080
12324200—Clark Fork at Deer Lodge Period of record for bed-sediment data: 1986–87, 1990–2016					
Arsenic	14	102	49	74	71
Cadmium	29	10.0	3.5	5.8	5.0
Chromium	23	50.7	17.0	31.0	28.2
Copper	29	4,180	683	1,220	1,060
Iron	29	35,300	20,500	27,100	26,100
Lead	29	242	103	141	138
Manganese	29	6,020	1,070	2,580	2,410
Nickel	24	21.1	11.5	14.6	13.9
Silver	16	7.9	2.4	4.7	4.5
Zinc	29	1,730	844	1,150	1,050
12324400—Clark Fork above Little Blackfoot River, near Garrison Period of record for bed-sediment data: 2009–2016					
Arsenic	8	91	49	69	69
Cadmium	8	5.5	4.1	4.6	4.4
Chromium	8	52.8	15.0	33.4	32.6
Copper	8	1,290	666	1,020	1,030
Iron	8	32,400	16,800	25,000	25,400
Lead	8	145	92	120	120
Manganese	8	3,560	1,150	2,530	2,660
Nickel	8	17.2	9.2	13.1	13.2
Silver	0	--	--	--	--
Zinc	8	1,240	780	1,010	1,040

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of samples represents the number of years that the constituent was analyzed, with each year represented by a single mean concentration of composite samples. Arsenic was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12324680—Clark Fork at Goldcreek					
Period of record for bed-sediment data: 1992–2016					
Arsenic	14	62	23	40	37
Cadmium	25	8.1	2.0	4.3	3.8
Chromium	23	55.3	9.9	31.3	29.4
Copper	25	1,080	281	652	675
Iron	25	32,100	11,500	22,900	23,700
Lead	25	152	45	91	93
Manganese	25	2,730	977	1,830	1,840
Nickel	24	18.6	7.6	13.4	13.7
Silver	12	4.8	2.3	3.2	3.2
Zinc	25	1,320	427	867	869
12331800—Clark Fork near Drummond					
Period of record for bed-sediment data: 1986–87, 1991–2016					
Arsenic	14	66	17	37	32
Cadmium	28	7.7	1.7	4.0	4.0
Chromium	23	41.9	9.2	26.7	27.0
Copper	28	747	183	459	452
Iron	28	44,000	14,800	24,300	21,800
Lead	28	135	27	83	82
Manganese	28	4,820	832	2,010	1,840
Nickel	24	16.8	4.8	12.6	13.1
Silver	15	4.7	<3.2	¹ 3.0	¹ 2.9
Zinc	28	1,230	380	893	943
12334550—Clark Fork at Turah Bridge, near Bonner					
Period of record for bed-sediment data: 1986, 1991–2016					
Arsenic	14	43	17	26	23
Cadmium	27	7.3	1.2	3.2	3.1
Chromium	23	42.5	13.6	25.8	26.7
Copper	27	635	211	336	322
Iron	27	25,900	12,600	19,000	17,300
Lead	27	115	37	64	62
Manganese	27	2,340	383	1,200	1,130
Nickel	24	19.1	6.9	12.1	11.4
Silver	14	3.9	<1.9	¹ 2.1	¹ 1.9
Zinc	27	1,160	448	751	759

Table 26. Statistical summary of long-term bed-sediment data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of samples represents the number of years that the constituent was analyzed, with each year represented by a single mean concentration of composite samples. Arsenic was not analyzed until 2003; therefore, the number of samples is smaller than that for the other trace elements. <, less than the minimum reporting level; --, indicates insufficient data (less than three samples) to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12340000—Blackfoot River near Bonner					
Period of record for bed-sediment data: 1986–87, 1991, 1993–96, 1998–2001, 2003, 2006–16					
Arsenic	12	6	<0.2	¹ 4	¹ 4
Cadmium	23	2.0	<0.1	¹ 0.4	¹ 0.2
Chromium	19	35.2	13.3	21.5	22.0
Copper	23	27	11	20	21
Iron	23	23,000	12,400	17,500	18,100
Lead	23	20	<13	¹ 12	¹ 11
Manganese	23	746	298	520	542
Nickel	20	14.3	6.0	11.2	11.4
Silver	12	<1.9	<0.3	¹ 0.5	¹ 0.3
Zinc	23	82	35	60	60
12340500—Clark Fork above Missoula					
Period of record for bed-sediment data: 1997–2016					
Arsenic	14	54	12	27	26
Cadmium	20	5.8	1.0	2.6	2.6
Chromium	19	40.7	12.8	25.3	26.2
Copper	20	551	125	313	281
Iron	20	27,000	13,800	19,900	19,900
Lead	20	78	25	49	49
Manganese	20	2,250	477	1,050	942
Nickel	20	15.8	7.6	12.2	12.1
Silver	7	2.9	0.8	¹ 2.0	¹ 2.1
Zinc	20	1,090	343	646	611

¹Value determined by substituting one-half of the minimum reporting level for censored (<) values when both uncensored and censored values were used to determine the mean and median.

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323600—Silver Bow Creek at Opportunity					
Period of record for biological data: 1992, 1994–95, 1997–2016					
<i>Brachycentrus</i> spp.					
Arsenic	0	--	--	--	--
Cadmium	5	12.5	5.8	10.1	11.6
Chromium	5	5.9	0.7	2.1	0.9
Copper	5	846	235	587	592
Iron	5	1,190	335	617	469
Lead	5	21.5	7.4	13.7	13.8
Manganese	5	817	231	515	503
Nickel	5	2.1	<0.1	¹ 1.3	¹ 1.6
Zinc	5	995	629	803	815
<i>Hydropsyche cockerelli</i>					
Arsenic	28	33.3	4.3	10.7	8.6
Cadmium	34	9.7	2.4	4.9	4.7
Chromium	34	25.5	1.0	4.2	3.9
Copper	34	1,090	78.6	299	298
Iron	34	6,150	689	2,710	2,470
Lead	34	74.3	11.8	30.4	21.3
Manganese	34	4,000	180	1,300	1,150
Nickel	34	4.3	0.7	2.8	2.9
Zinc	34	1,590	432	772	745
<i>Hydropsyche</i> spp.					
Arsenic	14	23.1	6.1	12.1	10.7
Cadmium	19	11.0	2.0	5.4	5.0
Chromium	19	4.7	0.6	2.6	3.0
Copper	19	930	80.7	428	352
Iron	19	3,630	1,050	2,260	2,210
Lead	19	237	19.3	45.5	36.5
Manganese	19	1,790	612	1,040	1,040
Nickel	19	4.1	0.7	2.2	2.3
Zinc	19	1,290	388	875	876
<i>Hydropsyche tana</i>					
Arsenic	0	--	--	--	--
Cadmium	6	9.2	4.8	6.8	6.9
Chromium	6	11.5	0.9	4.5	1.8
Copper	6	456	10.5	236	298
Iron	6	1,520	875	1,100	1,050
Lead	6	21.0	15.6	18.6	18.3
Manganese	6	969	307	634	675
Nickel	6	1.8	0.7	1.4	1.6
Zinc	6	1,070	760	961	1,020

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323750—Silver Bow Creek at Warm Springs Period of record for biological data: 1992–2016					
<i>Claassenia sabulosa</i>					
Arsenic	2	5.0	1.8	3.4	--
Cadmium	2	1.1	0.5	0.8	--
Chromium	2	2.8	0.6	1.7	--
Copper	2	66.4	47.6	57.0	--
Iron	2	300	151	226	--
Lead	2	1.5	0.6	1.0	--
Manganese	2	922	98	510	--
Nickel	2	0.6	0.5	0.6	--
Zinc	2	400	340	370	--
<i>Hydropsyche cockerelli</i>					
Arsenic	25	23.6	7.9	12.4	11.8
Cadmium	51	2.1	0.2	0.6	0.5
Chromium	51	4.3	0.4	1.2	1.0
Copper	51	97.0	16.7	35.9	31.1
Iron	51	1,650	351	835	799
Lead	51	6.0	0.3	3.2	3.0
Manganese	51	3,890	491	1,240	1,010
Nickel	51	1.8	0.3	1.0	0.9
Zinc	51	276	115	175	169
<i>Hydropsyche occidentalis</i>					
Arsenic	10	31.0	10.5	18.6	16.8
Cadmium	25	1.6	0.2	0.7	0.4
Chromium	25	6.8	0.3	2.0	1.0
Copper	25	48.9	11.0	33.7	32.8
Iron	25	2,960	372	1,260	1,010
Lead	25	8.2	<1.7	1.4	1.3
Manganese	25	6,940	996	2,400	1,940
Nickel	25	3.2	0.7	1.5	1.5
Zinc	25	220	140	182	183
<i>Hydropsyche</i> spp.					
Arsenic	1	--	--	14.0	--
Cadmium	5	2.3	0.4	1.0	0.6
Chromium	5	2.5	0.5	1.4	1.3
Copper	5	47.6	34.9	39.9	40.4
Iron	5	1,100	561	763	767
Lead	5	5.1	1.9	4.0	4.5
Manganese	5	1,190	443	817	804
Nickel	5	1.9	<0.4	1.0	10.8
Zinc	5	284	141	188	162

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323770—Warm Springs Creek at Warm Springs					
Period of record for biological data: 1995, 1997, 1999, 2002, 2005, 2008, 2011, 2014					
<i>Arctopsyche grandis</i>					
Arsenic	5	9.8	7.6	8.9	9.5
Cadmium	9	3.6	0.4	2.5	2.5
Chromium	9	5.0	0.8	2.7	2.8
Copper	9	132	53.2	102	102
Iron	9	1,490	684	1,030	1,040
Lead	9	7.7	3.0	5.6	5.3
Manganese	9	3,560	738	2,230	2,280
Nickel	9	4.0	1.1	2.5	2.3
Zinc	9	267	181	206	197
<i>Hesperoperla</i> spp.					
Arsenic	2	2.9	1.2	2.0	--
Cadmium	2	2.6	1.0	1.8	--
Chromium	2	2.0	0.9	1.4	--
Copper	2	64.9	55.9	60.4	--
Iron	2	456	375	416	--
Lead	2	1.9	1.4	1.6	--
Manganese	2	270	202	236	--
Nickel	2	1.1	0.6	0.8	--
Zinc	2	573	427	500	--
<i>Hydropsyche occidentalis</i>					
Arsenic	4	13.6	9.8	12.4	13.0
Cadmium	6	1.4	0.7	1.1	1.2
Chromium	6	8.6	0.3	3.7	3.2
Copper	6	183	116	151	150
Iron	6	2,360	1,520	1,870	1,840
Lead	6	12.6	6.7	8.2	7.4
Manganese	6	3,190	1,440	2,580	2,680
Nickel	6	4.5	2.0	3.1	3.2
Zinc	6	204	148	169	168
<i>Hydropsyche</i> spp.					
Arsenic	0	--	--	--	--
Cadmium	2	1.1	0.6	0.8	--
Chromium	2	1.6	1.4	1.5	--
Copper	2	95.9	94.8	95.4	--
Iron	2	1,220	1,150	1,180	--
Lead	2	5.9	5.2	5.6	--
Manganese	2	3,390	956	2,170	--
Nickel	2	2.0	1.8	1.9	--
Zinc	2	129	125	127	--

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323800—Clark Fork near Galen					
Period of record for biological data: 1987, 1991–2016					
<i>Claassenia sabulosa</i>					
Arsenic	1	--	--	2.0	--
Cadmium	1	--	--	0.2	--
Chromium	1	--	--	1.5	--
Copper	1	--	--	54.7	--
Iron	1	--	--	242	--
Lead	1	--	--	1.0	--
Manganese	1	--	--	323	--
Nickel	1	--	--	0.5	--
Zinc	1	--	--	237	--
<i>Hydropsyche cockerelli</i>					
Arsenic	19	20.5	13.2	15.3	14.2
Cadmium	44	2.7	0.7	1.6	1.5
Chromium	44	9.6	0.7	2.4	2.2
Copper	44	181	48.7	109	116
Iron	44	2,660	816	1,610	1,520
Lead	44	17.1	1.2	9.2	8.8
Manganese	44	3,620	1,070	2,270	2,270
Nickel	44	6.5	0.9	2.2	1.8
Zinc	44	536	136	230	224
<i>Hydropsyche morosa</i> group					
Arsenic	0	--	--	--	--
Cadmium	5	3.2	2.4	2.5	2.4
Chromium	5	4.6	1.8	2.6	2.2
Copper	5	185	156	173	175
Iron	5	1,890	1,360	1,510	1,430
Lead	5	12.4	7.1	8.5	7.9
Manganese	5	3,960	2,360	3,500	3,860
Nickel	5	3.6	1.9	2.3	2.1
Zinc	5	349	292	309	303
<i>Hydropsyche occidentalis</i>					
Arsenic	23	17.7	9.1	14.3	14.6
Cadmium	55	1.6	0.6	1.1	1.2
Chromium	55	6.6	0.4	2.2	2.0
Copper	55	151	49.2	95.1	93.1
Iron	55	2,590	642	1,520	1,450
Lead	55	13.5	1.6	8.3	8.4
Manganese	55	6,170	653	2,490	2,230
Nickel	55	3.8	0.8	1.9	1.8
Zinc	55	286	168	209	203

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323800—Clark Fork near Galen—Continued					
Period of record for biological data: 1987, 1991–2016					
<i>Hydropsyche tana</i>					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	1.5	--
Chromium	1	--	--	1.4	--
Copper	1	--	--	92.9	--
Iron	1	--	--	1,340	--
Lead	1	--	--	9.0	--
Manganese	1	--	--	2,160	--
Nickel	1	--	--	2.1	--
Zinc	1	--	--	206	--
<i>Hydropsyche</i> spp.					
Arsenic	5	15.7	5.5	11.1	14.2
Cadmium	9	3.5	0.7	1.8	1.3
Chromium	5	2.4	1.1	1.8	1.9
Copper	9	154	55.3	110	126
Iron	9	2,110	914	1,350	1,300
Lead	9	13.5	3.8	9.0	10.5
Manganese	5	4,760	668	2,410	1,520
Nickel	5	2.7	0.9	1.6	1.5
Zinc	9	329	132	239	228
461415112450801—Clark Fork below Lost Creek, near Galen					
Period of record for biological data: 1996–2016					
<i>Claassenia sabulosa</i>					
Arsenic	1	--	--	1.5	--
Cadmium	2	0.4	0.3	0.4	--
Chromium	2	1.9	0.4	1.2	--
Copper	2	70.1	67.1	68.6	--
Iron	2	209	189	199	--
Lead	2	1.2	0.7	1.0	--
Manganese	2	238	90.4	164	--
Nickel	2	0.2	<0.2	0.2	--
Zinc	2	245	208	226	--
<i>Hydropsyche cockerelli</i>					
Arsenic	22	27.8	8.8	16.6	17.1
Cadmium	33	3.7	1.1	1.9	1.8
Chromium	33	5.5	0.8	2.4	2.5
Copper	33	338	48.8	155	141
Iron	33	4,080	691	1,850	1,840
Lead	33	28.6	3.0	13.8	13.3
Manganese	33	3,160	1,230	1,820	1,720
Nickel	33	4.5	0.9	1.8	1.7
Zinc	33	339	151	244	248

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461415112450801—Clark Fork below Lost Creek, near Galen—Continued Period of record for biological data: 1996–2016					
<i>Hydropsyche occidentalis</i>					
Arsenic	12	20.9	12.7	16.3	15.8
Cadmium	26	2.1	0.5	1.4	1.4
Chromium	26	6.5	1.2	2.4	2.1
Copper	26	219	52.1	123	121
Iron	26	2,830	963	1,680	1,580
Lead	26	20.4	6.6	11.7	11.1
Manganese	26	4,150	1,220	2,520	2,240
Nickel	26	3.9	0.5	1.7	1.5
Zinc	26	330	174	252	251
<i>Hydropsyche</i> spp.					
Arsenic	5	14.5	7.0	11.1	12.0
Cadmium	9	1.8	1.0	1.4	1.3
Chromium	9	3.0	0.9	1.6	1.3
Copper	9	153	45.1	101	103
Iron	9	2,040	533	1,260	1,200
Lead	9	20.5	4.1	10.2	8.7
Manganese	9	2,800	775	1,440	1,230
Nickel	9	4.4	0.9	1.9	1.4
Zinc	9	276	143	192	179
<i>Rhyacophila</i> spp.					
Arsenic	2	5.2	3.5	4.4	--
Cadmium	2	4.3	3.9	4.1	--
Chromium	2	1.1	1.0	1.0	--
Copper	2	93.1	73.7	83.4	--
Iron	2	346	324	335	--
Lead	2	5.9	4.8	5.4	--
Manganese	2	320	192	256	--
Nickel	2	0.3	0.3	0.3	--
Zinc	2	411	301	356	--

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461559112443301—Clark Fork at county bridge, near Racetrack Period of record for biological data: 1996–2016					
<i>Arctopsyche grandis</i>					
Arsenic	3	13.0	5.2	9.2	9.3
Cadmium	3	3.5	1.2	2.3	2.4
Chromium	3	4.5	1.9	3.2	3.3
Copper	3	101	81.0	90.9	90.9
Iron	3	1,410	803	1,030	889
Lead	3	13.2	9.1	10.5	9.1
Manganese	3	3,140	1,430	2,350	2,480
Nickel	3	6.4	1.4	3.2	1.9
Zinc	3	572	243	358	260
<i>Claassenia sabulosa</i>					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	0.4	--
Chromium	1	--	--	0.3	--
Copper	1	--	--	40.3	--
Iron	1	--	--	113	--
Lead	1	--	--	0.8	--
Manganese	1	--	--	172	--
Nickel	1	--	--	0.2	--
Zinc	1	--	--	213	--
<i>Hydropsyche cockerelli</i>					
Arsenic	19	20.2	11.1	14.3	13.8
Cadmium	30	2.8	0.8	1.7	1.6
Chromium	30	3.0	0.6	1.9	2.2
Copper	30	198	50.0	108	104
Iron	30	3,330	657	1,430	1,180
Lead	30	18.7	3.7	9.8	9.0
Manganese	30	2,360	646	1,680	1,860
Nickel	30	2.0	0.7	1.6	1.3
Zinc	30	302	139	210	196
<i>Hydropsyche occidentalis</i>					
Arsenic	17	16.8	9.2	13.0	12.8
Cadmium	30	2.3	0.7	1.4	1.4
Chromium	30	3.7	1.1	2.1	2.0
Copper	30	164	59.5	114	116
Iron	30	3,690	1,030	1,650	1,550
Lead	30	15.7	4.3	10.8	10.7
Manganese	30	3,770	660	2,010	1,910
Nickel	30	2.5	1.1	1.5	1.4
Zinc	30	361	181	234	229

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461559112443301—Clark Fork at county bridge, near Racetrack—Continued Period of record for biological data: 1996–2016					
<i>Hydropsyche</i> spp.					
Arsenic	6	12.8	5.7	9.6	9.8
Cadmium	8	2.4	1.0	1.6	1.5
Chromium	8	3.9	0.7	1.6	1.0
Copper	8	144	68.1	97	84.0
Iron	8	1,880	787	1,220	1,170
Lead	8	15.0	5.7	8.8	7.1
Manganese	8	2,370	886	1,320	1,150
Nickel	8	2.0	0.7	1.3	1.2
Zinc	8	229	151	193	194
461903112440701—Clark Fork at Dempsey Creek diversion, near Racetrack Period of record for biological data: 1996–2016					
<i>Arctopsyche grandis</i>					
Arsenic	11	17.5	4.4	7.3	5.9
Cadmium	12	7.1	0.9	2.6	2.1
Chromium	12	12.9	0.7	12.2	10.9
Copper	12	196	30.8	69.2	49.0
Iron	12	2,800	333	742	456
Lead	12	17.6	2.1	16.8	15.2
Manganese	12	2,060	510	1,070	1,010
Nickel	12	2.5	0.5	1.1	0.9
Zinc	12	489	87	244	236
<i>Claassenia sabulosa</i>					
Arsenic	8	3.8	1.2	2.2	2.0
Cadmium	8	2.4	0.4	1.0	0.8
Chromium	8	1.7	0.2	0.7	0.5
Copper	8	87.2	47.5	62.4	58.8
Iron	8	485	94	215	180
Lead	8	3.4	0.4	1.3	1.0
Manganese	8	1,260	98	329	208
Nickel	8	1.0	0.2	0.4	0.3
Zinc	8	394	168	279	266
<i>Hydropsyche cockerelli</i>					
Arsenic	19	18.8	8.0	12.3	10.4
Cadmium	28	2.1	0.7	1.5	1.5
Chromium	28	4.6	0.5	1.8	1.6
Copper	28	247	60.7	109	92.7
Iron	28	3,010	552	1,300	1,130
Lead	28	21.9	3.5	9.0	8.2
Manganese	28	2,650	487	1,410	1,290
Nickel	28	2.5	0.5	1.3	1.3
Zinc	28	285	162	218	218

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461903112440701—Clark Fork at Dempsey Creek diversion, near Racetrack—Continued Period of record for biological data: 1996–2016					
<i>Hydropsyche occidentalis</i>					
Arsenic	22	24.0	7.2	14.0	13.9
Cadmium	39	2.4	0.7	1.3	1.3
Chromium	39	6.2	0.3	2.1	1.9
Copper	39	345	57.1	124	106
Iron	39	3,390	630	1,690	1,520
Lead	39	21.8	4.4	12.1	11.4
Manganese	39	4,460	826	2,230	2,150
Nickel	39	2.4	1.0	1.6	1.5
Zinc	39	386	189	259	241
<i>Hydropsyche</i> spp.					
Arsenic	2	6.5	6.4	6.4	--
Cadmium	4	1.7	0.9	1.3	1.3
Chromium	4	2.1	0.8	1.4	1.2
Copper	4	140	65.5	94.1	85.4
Iron	4	1,610	875	1,120	987
Lead	4	13.2	7.3	9.7	9.1
Manganese	4	1,150	638	824	756
Nickel	4	1.6	0.6	1.1	1.1
Zinc	4	212	162	184	180
12324200—Clark Fork at Deer Lodge Period of record for biological data: 1986–87, 1990–2016					
<i>Arctopsyche grandis</i>					
Arsenic	7	13.3	5.8	8.8	8.3
Cadmium	9	4.7	2.6	¹ 3.5	¹ 3.4
Chromium	9	4.7	1.0	¹ 2.3	¹ 2.0
Copper	9	183	34.9	96.8	88.6
Iron	9	2,320	537	1,180	1,090
Lead	9	17.4	3.8	¹ 10.7	¹ 11.2
Manganese	9	1,620	380	1,150	1,320
Nickel	9	1.9	<1.3	¹ 1.4	¹ 1.3
Zinc	9	370	140	268	269
<i>Hydropsyche cockerelli</i>					
Arsenic	19	17.1	5.8	9.5	9.6
Cadmium	42	4.9	0.6	1.9	1.8
Chromium	42	4.3	0.4	1.9	1.9
Copper	42	241	54.7	107	101
Iron	42	3,340	490	1,290	1,090
Lead	42	24.9	3.8	10.6	9.6
Manganese	42	1,580	396	1,030	1,030
Nickel	42	3.3	0.3	1.4	1.2
Zinc	42	391	132	205	196

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324200—Clark Fork at Deer Lodge—Continued Period of record for biological data: 1986–87, 1990–2016					
<i>Hydropsyche occidentalis</i>					
Arsenic	24	21.1	6.6	11.1	9.7
Cadmium	61	3.4	0.6	1.4	1.3
Chromium	61	3.7	0.6	2.0	1.9
Copper	61	222	49.4	123	121
Iron	61	3,240	558	1,510	1,480
Lead	61	20.1	3.5	11.8	11.8
Manganese	61	2,850	649	1,600	1,650
Nickel	61	12.9	1.0	1.7	1.5
Zinc	61	346	166	246	238
<i>Hydropsyche</i> spp.					
Arsenic	1	--	--	6.0	--
Cadmium	4	2.6	1.6	2.2	2.3
Chromium	1	--	--	0.8	--
Copper	4	222	91	166	176
Iron	4	2,220	1,070	1,770	1,900
Lead	4	16.7	9.0	14.4	15.9
Manganese	1	--	--	837	--
Nickel	1	--	--	0.9	--
Zinc	4	298	196	242	237
12324400—Clark Fork above Little Blackfoot River, near Garrison Period of record for biological data: 2009–16					
<i>Arctopsyche grandis</i>					
Arsenic	15	16.6	3.2	6.1	5.2
Cadmium	15	4.9	0.9	2.7	3.2
Chromium	15	4.6	0.6	1.6	1.3
Copper	15	209	35.4	78.5	55.4
Iron	15	2,580	257	758	529
Lead	15	18.0	2.8	6.8	5.3
Manganese	15	1,940	578	1,050	954
Nickel	15	2.2	0.5	1.1	0.8
Zinc	15	378	184	256	238
<i>Claassenia sabulosa</i>					
Arsenic	4	2.9	2.0	2.3	2.2
Cadmium	4	1.3	0.3	0.8	0.7
Chromium	4	0.6	0.3	0.5	0.6
Copper	4	73.1	58.3	67.7	69.7
Iron	4	284	173	254	279
Lead	4	2.3	1.7	2.0	2.1
Manganese	4	226	149	194	202
Nickel	4	0.8	0.6	0.7	0.7
Zinc	4	297	231	265	266

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324400—Clark Fork above Little Blackfoot River, near Garrison—Continued					
Period of record for biological data: 2009–16					
<i>Hydropsyche cockerelli</i>					
Arsenic	5	11.1	7.4	8.9	8.8
Cadmium	5	4.0	0.9	2.2	1.6
Chromium	5	3.4	1.4	2.2	2.0
Copper	5	158	81.5	112	101
Iron	5	2,150	746	1,230	1,050
Lead	5	18.8	8.5	12.1	10.1
Manganese	5	1,870	1,110	1,370	1,270
Nickel	5	1.8	1.4	1.6	1.5
Zinc	5	284	212	233	216
<i>Hydropsyche occidentalis</i>					
Arsenic	12	14.7	6.4	9.6	8.6
Cadmium	12	2.5	1.0	1.8	1.8
Chromium	12	3.6	0.7	2.1	2.0
Copper	12	182	78.1	124	125
Iron	12	2,390	908	1,470	1,270
Lead	12	17.9	8.8	12.6	11.4
Manganese	12	2,100	975	1,480	1,390
Nickel	12	1.9	1.0	1.5	1.6
Zinc	12	299	223	252	250
<i>Hydropsyche</i> spp.					
Arsenic	1	--	--	13.6	--
Cadmium	1	--	--	1.7	--
Chromium	1	--	--	4.3	--
Copper	1	--	--	187	--
Iron	1	--	--	2,570	--
Lead	1	--	--	18.5	--
Manganese	1	--	--	919	--
Nickel	1	--	--	1.8	--
Zinc	1	--	--	296	--
12324680—Clark Fork at Goldcreek					
Period of record for biological data: 1992–2016					
<i>Arctopsyche grandis</i>					
Arsenic	46	17.0	1.8	4.9	4.1
Cadmium	75	6.6	0.6	2.0	1.8
Chromium	75	5.3	0.1	1.4	1.1
Copper	75	232	19.9	50.0	38.4
Iron	75	3,070	195	727	508
Lead	75	16.9	1.0	4.0	3.3
Manganese	75	1,580	436	885	871
Nickel	75	3.1	0.2	0.8	0.7
Zinc	75	326	146	205	190

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324680—Clark Fork at Goldcreek—Continued Period of record for biological data: 1992–2016					
<i>Claassenia sabulosa</i>					
Arsenic	34	2.9	0.4	1.4	1.4
Cadmium	54	3.5	0.1	1.0	0.7
Chromium	54	1.6	0.2	0.7	0.6
Copper	54	84.9	29.7	58.9	58.2
Iron	54	640	63.0	203	171
Lead	54	2.8	0.4	1.0	0.9
Manganese	54	325	50.6	164	155
Nickel	54	1.0	0.1	0.4	0.3
Zinc	54	364	166	267	261
<i>Hydropsyche cockerelli</i>					
Arsenic	19	9.8	4.1	6.0	5.7
Cadmium	38	4.2	0.5	1.4	1.3
Chromium	38	4.7	0.5	2.5	1.9
Copper	38	188	17.1	73.1	58.5
Iron	38	3,250	522	1,140	942
Lead	38	17.6	2.4	6.7	5.3
Manganese	38	1,710	538	1,010	981
Nickel	38	3.5	0.3	1.3	1.2
Zinc	38	359	106	193	187
<i>Hydropsyche morosa</i> group					
Arsenic	0	--	--	--	--
Cadmium	4	1.7	1.1	1.4	1.4
Chromium	4	1.4	1.3	1.4	1.4
Copper	4	72.9	43.8	60.5	62.7
Iron	4	1,320	612	1,050	1,130
Lead	4	6.9	2.4	4.6	4.6
Manganese	4	1,030	538	804	822
Nickel	4	1.4	0.9	1.2	1.2
Zinc	4	190	137	167	170
<i>Hydropsyche occidentalis</i>					
Arsenic	17	11.5	4.4	6.8	6.5
Cadmium	32	2.3	0.4	1.3	1.3
Chromium	32	3.9	0.4	1.9	1.7
Copper	32	170	26.4	72.9	63.7
Iron	32	2,720	466	1,230	1,110
Lead	32	15.7	2.9	7.5	6.0
Manganese	32	2,900	530	1,300	1,160
Nickel	32	2.5	0.8	1.3	1.1
Zinc	32	328	97.0	207	203

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324680—Clark Fork at Goldcreek—Continued Period of record for biological data: 1992–2016					
<i>Hydropsyche</i> spp.					
Arsenic	2	5.9	5.7	5.8	--
Cadmium	2	1.8	1.7	1.8	--
Chromium	2	1.6	1.6	1.6	--
Copper	2	83.5	73.6	78.6	--
Iron	2	1,150	1,110	1,130	--
Lead	2	9.2	8.0	8.6	--
Manganese	2	1,180	1,130	1,160	--
Nickel	2	0.8	0.8	0.8	--
Zinc	2	210	196	203	--
12331800—Clark Fork near Drummond Period of record for biological data: 1986, 1991–2016					
<i>Arctopsyche grandis</i>					
Arsenic	37	9.9	1.8	4.0	3.8
Cadmium	69	3.8	0.4	1.4	1.2
Chromium	69	4.2	0.2	1.1	1.0
Copper	69	103	16.9	34.8	28.2
Iron	69	2,400	193	615	490
Lead	69	12.4	1.6	4.7	3.9
Manganese	69	2,010	456	861	775
Nickel	69	2.6	0.1	0.7	0.6
Zinc	69	314	137	201	194
<i>Claassenia sabulosa</i>					
Arsenic	31	1.9	0.6	1.3	1.3
Cadmium	67	2.8	0.1	1.0	0.7
Chromium	67	3.3	0.1	0.6	0.6
Copper	67	165	18.0	63.8	60.0
Iron	67	449	45.4	177	148
Lead	67	2.9	0.2	1.0	0.9
Manganese	67	748	33.1	183	150
Nickel	67	1.1	0.1	0.3	0.3
Zinc	67	567	103	280	269
<i>Hydropsyche cockerelli</i>					
Arsenic	20	7.2	3.9	5.5	5.3
Cadmium	49	4.5	0.3	1.2	0.9
Chromium	49	3.5	0.4	1.6	1.6
Copper	49	156	30.0	57.9	51.1
Iron	49	2,500	506	1,140	912
Lead	49	15.0	4.7	8.1	7.4
Manganese	49	1,840	549	1,040	975
Nickel	49	2.0	0.5	1.2	1.1
Zinc	49	322	134	197	194

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12331800—Clark Fork near Drummond—Continued Period of record for biological data: 1986, 1991–2016					
<i>Hydropsyche morosa</i> group					
Arsenic	0	--	--	--	--
Cadmium	6	1.3	1.1	1.2	1.2
Chromium	6	2.8	1.9	2.3	2.2
Copper	6	57.4	50.2	55.2	55.8
Iron	6	1,730	1,370	1,570	1,600
Lead	6	10.8	7.0	8.9	9.0
Manganese	6	1,940	1,260	1,610	1,610
Nickel	6	1.7	1.3	1.5	1.5
Zinc	6	250	227	239	240
<i>Hydropsyche occidentalis</i>					
Arsenic	21	9.2	4.3	5.8	5.7
Cadmium	37	2.8	0.4	1.1	1.0
Chromium	37	8.1	0.4	2.3	2.1
Copper	37	118	13.3	59.0	56.3
Iron	37	2,410	424	1,260	1,190
Lead	37	17.1	3.0	8.8	9.1
Manganese	37	2,920	477	1,480	1,270
Nickel	37	6.0	0.5	1.4	1.2
Zinc	37	344	153	226	222
<i>Hydropsyche</i> spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	2.6	--
Chromium	0	--	--	--	--
Copper	1	--	--	85.0	--
Iron	1	--	--	913	--
Lead	1	--	--	9.1	--
Manganese	0	--	--	--	--
Nickel	0	--	--	--	--
Zinc	1	--	--	260	--
12334550—Clark Fork at Turah Bridge, near Bonner Period of record for biological data: 1986, 1991–2016					
<i>Arctopsyche grandis</i>					
Arsenic	37	7.2	2.8	4.4	4.3
Cadmium	79	2.7	0.4	1.2	0.9
Chromium	79	4.1	0.5	1.6	1.4
Copper	79	125	15.9	36.7	31.7
Iron	79	2,870	321	896	788
Lead	79	13.2	1.6	4.4	3.7
Manganese	79	1,050	324	656	662
Nickel	79	2.6	0.4	1.1	0.9
Zinc	79	282	111	204	203

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12334550—Clark Fork at Turah Bridge, near Bonner—Continued Period of record for biological data: 1986, 1991–2016					
<i>Claassenia sabulosa</i>					
Arsenic	26	3.1	0.2	1.1	1.0
Cadmium	52	2.5	0.05	1.1	0.8
Chromium	52	2.0	0.2	0.7	0.6
Copper	52	97.8	37.5	60.2	55.9
Iron	52	378	58.6	133	114
Lead	52	1.6	0.2	0.6	0.6
Manganese	52	229	37.2	102	90.4
Nickel	52	0.6	0.04	0.2	0.2
Zinc	52	429	144	239	244
<i>Hydropsyche cockerelli</i>					
Arsenic	28	9.8	3.7	4.8	4.8
Cadmium	56	2.2	0.3	0.9	0.7
Chromium	56	14.2	0.2	2.2	1.7
Copper	56	126	26.4	48.4	43.9
Iron	56	3,180	566	1,210	1,100
Lead	56	19.7	2.2	5.6	5.1
Manganese	56	957	426	654	664
Nickel	56	2.7	0.6	1.3	1.2
Zinc	56	332	119	191	194
<i>Hydropsyche morosa</i> group					
Arsenic	0	--	--	--	--
Cadmium	2	1.3	1.1	1.2	--
Chromium	2	4.6	2.4	3.5	--
Copper	2	84.1	26.8	55.4	--
Iron	2	1,800	986	1,390	--
Lead	2	6.6	<7.8	5.2	--
Manganese	2	1,320	537	928	--
Nickel	2	1.7	1.3	1.5	--
Zinc	2	231	171	201	--
<i>Hydropsyche occidentalis</i>					
Arsenic	24	7.3	2.9	4.7	4.3
Cadmium	44	1.8	0.3	0.9	0.9
Chromium	44	5.0	0.6	2.0	1.8
Copper	44	102	20.1	48.2	44.8
Iron	44	2,590	472	1,280	1,150
Lead	44	14.2	2.8	6.4	5.6
Manganese	44	1,600	454	845	807
Nickel	44	3.2	0.6	1.3	1.2
Zinc	44	416	126	214	220

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12334550—Clark Fork at Turah Bridge, near Bonner—Continued Period of record for biological data: 1986, 1991–2016					
<i>Hydropsyche</i> spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	1.3	--
Chromium	1	--	--	2.4	--
Copper	1	--	--	84.1	--
Iron	1	--	--	1,800	--
Lead	1	--	--	<7.8	--
Manganese	1	--	--	537	--
Nickel	1	--	--	1.3	--
Zinc	1	--	--	171	--
12340000—Blackfoot River near Bonner Period of record for biological data: 1986–87, 1991, 1993, 1996, 1998, 2000, 2003, 2006–16					
<i>Arctopsyche grandis</i>					
Arsenic	16	4.6	1.6	2.7	2.6
Cadmium	26	0.5	0.1	0.3	0.2
Chromium	21	6.9	0.5	2.0	1.5
Copper	26	19.3	9.9	13.5	12.6
Iron	26	1,880	108	744	761
Lead	26	2.3	0.5	1.1	0.9
Manganese	21	633	286	442	422
Nickel	21	3.7	0.7	1.4	1.2
Zinc	26	170	106	144	145
<i>Claassenia sabulosa</i>					
Arsenic	13	3.0	0.1	1.0	0.7
Cadmium	24	0.2	0.1	0.1	0.2
Chromium	19	5.2	0.3	1.0	0.7
Copper	24	88.5	19.0	43.3	44.0
Iron	24	317	46.2	144	137
Lead	24	0.8	0.1	0.3	0.2
Manganese	19	133	26.3	79.3	73.4
Nickel	19	1.1	0.1	0.3	0.3
Zinc	24	399	117	229	207
<i>Hydropsyche cockerelli</i>					
Arsenic	11	4.2	2.1	3.1	3.1
Cadmium	11	0.6	<0.1	0.3	0.3
Chromium	11	5.7	1.6	3.2	3.5
Copper	11	17.5	5.6	14.6	14.8
Iron	11	2,390	1,120	1,660	1,550
Lead	11	2.6	1.5	2.0	1.9
Manganese	11	814	409	555	538
Nickel	11	4.6	1.4	2.0	1.8
Zinc	11	165	132	148	147

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight (µg/g). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12340000—Blackfoot River near Bonner—Continued					
Period of record for biological data: 1986–87, 1991, 1993, 1996, 1998, 2000, 2003, 2006–16					
<i>Hydropsyche occidentalis</i>					
Arsenic	16	3.8	1.2	2.2	2.1
Cadmium	28	0.5	0.1	0.2	0.2
Chromium	28	5.8	0.8	2.2	1.9
Copper	28	20.9	12.0	15.9	15.8
Iron	28	2,090	927	1,470	1,480
Lead	28	2.0	0.8	1.5	1.6
Manganese	28	798	412	520	461
Nickel	28	4.9	0.9	1.6	1.4
Zinc	28	202	116	145	145
<i>Hydropsyche</i> spp.					
Arsenic	1	--	--	4.0	--
Cadmium	2	0.6	0.2	0.4	--
Chromium	2	2.8	1.6	2.2	--
Copper	2	18.3	13.9	16.1	--
Iron	2	1,180	1,140	1,160	--
Lead	2	2.9	1.8	2.3	--
Manganese	2	693	525	609	--
Nickel	2	2.8	2.7	2.8	--
Zinc	2	211	132	171	--
12340500—Clark Fork above Missoula					
Period of record for biological data: 1997–2016					
<i>Arctopsyche grandis</i>					
Arsenic	37	7.2	1.2	3.6	3.5
Cadmium	56	2.3	0.1	1.0	0.8
Chromium	56	4.2	0.4	1.6	1.4
Copper	56	81.2	13.7	36.7	29.8
Iron	56	2,340	302	960	830
Lead	56	8.8	1.1	3.9	3.3
Manganese	56	1,410	476	902	890
Nickel	56	2.1	0.3	1.1	1.1
Zinc	56	272	133	199	198
<i>Claassenia sabulosa</i>					
Arsenic	26	1.9	0.1	1.1	1.0
Cadmium	35	2.0	0.2	0.7	0.6
Chromium	35	1.4	0.1	0.8	0.7
Copper	35	81.1	25.8	50.8	48.6
Iron	35	424	82.0	218	226
Lead	35	3.1	0.2	0.9	0.8
Manganese	35	683	57.8	182	136
Nickel	35	0.7	0.2	0.4	0.4
Zinc	35	384	191	278	271

Table 27. Statistical summary of long-term biological data for the Clark Fork Basin, Montana, August 1986 through August 2016.—Continued

[Reported concentrations are in microgram per gram dry weight ($\mu\text{g/g}$). Number of composite samples represents the total of all individual composite samples collected for every year that the constituent was analyzed. Values for a single sample are arbitrarily listed in the “Mean” column. Because *Hydropsyche* insects were not sorted to the species level during 1986–89, *Hydropsyche* species statistics for stations sampled during those years are based on the results of all *Hydropsyche* species combined. At some sites, statistics of *Hydropsyche morosa* group are based on the combined results of two or more species. Insects collected during 1986–98 were depurated before analysis; depuration was discontinued in 1999. Arsenic was not analyzed until 2003; therefore, the number of samples may be small or zero for some taxa. spp., one or more similar species; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed; <, less than minimum reporting level]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12340500—Clark Fork above Missoula—Continued Period of record for biological data: 1997–2016					
<i>Hydropsyche cockerelli</i>					
Arsenic	27	9.3	2.4	5.6	5.4
Cadmium	36	2.0	0.4	0.8	0.8
Chromium	36	6.0	1.0	2.7	2.3
Copper	36	99.7	24.4	57.2	52.9
Iron	36	3,590	830	1,860	1,810
Lead	36	12.1	2.5	6.7	6.0
Manganese	36	1,910	764	1,160	1,170
Nickel	36	2.4	0.9	1.8	1.7
Zinc	36	266	156	217	219
<i>Hydropsyche occidentalis</i>					
Arsenic	14	7.4	2.2	5.0	5.1
Cadmium	20	1.5	0.4	0.8	0.7
Chromium	20	5.5	0.7	2.9	3.0
Copper	20	80.7	25.3	51.6	57.3
Iron	20	2,540	690	1,820	1,990
Lead	20	11.4	2.1	6.5	6.3
Manganese	20	2,470	717	1,510	1,560
Nickel	20	2.4	0.7	1.8	1.7
Zinc	20	278	183	230	230

¹Values determined by substituting one-half of the minimum reporting level for censored (<) values when both uncensored and censored values were used in determining the mean and median.

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