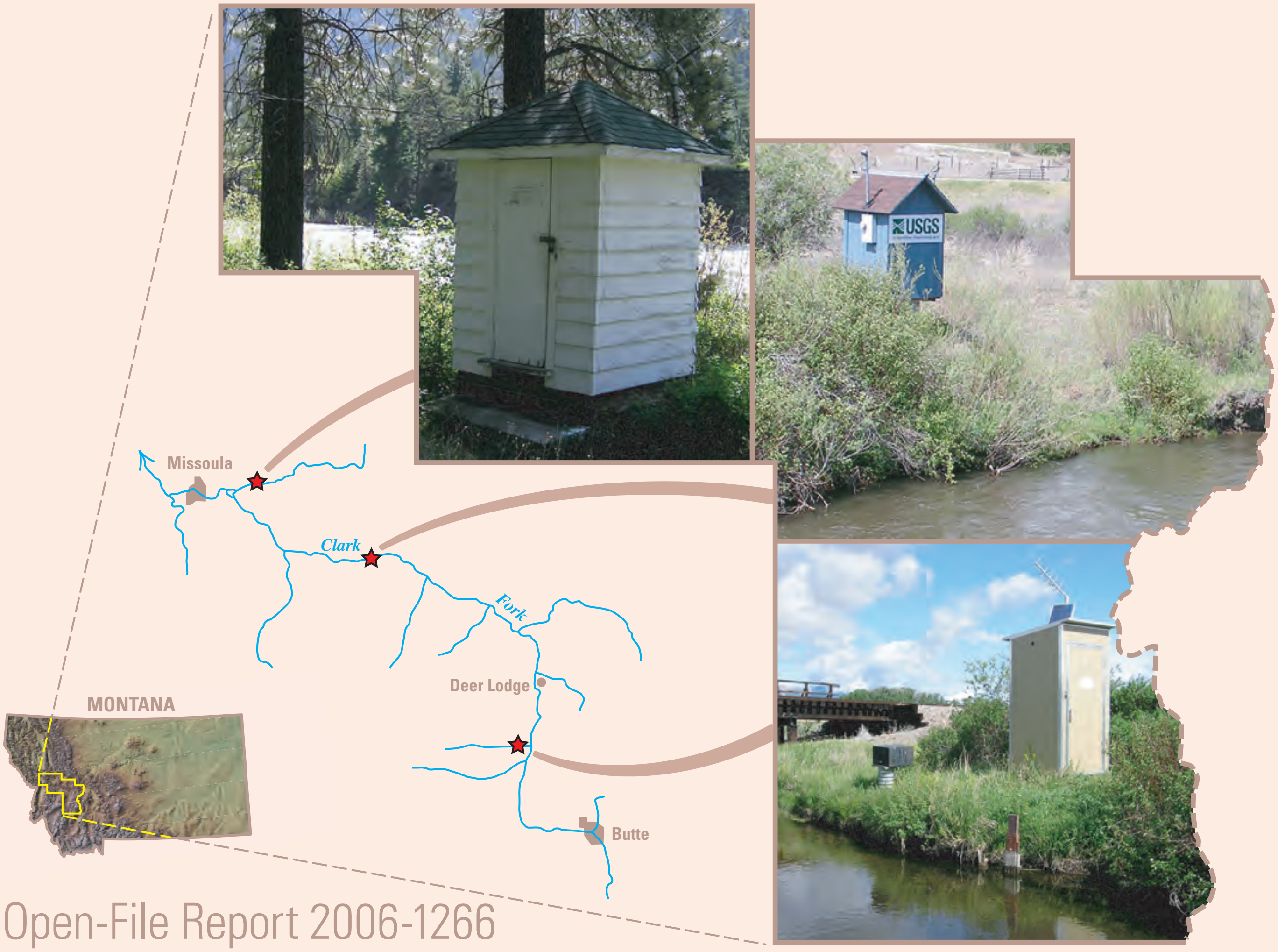
In cooperation with the U.S. Environmental Protection Agency

Water-Quality, Bed-Sediment, and Biological Data (October 2004 through September 2005) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana



Open-File Report 2006-1266

U.S. Department of the Interior
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COVER PHOTOGRAPHS: **Banner:** Lost Creek near Galen, Mont. (12323850).

Left: Gage house at Blackfoot River near Bonner, Mont. (12340000).

Center: Gage house at Clark Fork near Drummond, Mont. (12331800).

Lower: Gage house at Lost Creek near Galen, Mont. (12323850).

Photographs by Kent A. Dodge, U.S. Geological Survey, taken in the spring of 2006.

Water-Quality, Bed-Sediment, and Biological Data (October 2004 through September 2005) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana

By Kent A. Dodge, Michelle I. Hornberger, and Jessica L. Dyke

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Conversion Factors, Datum, Abbreviated water-quality units, and Acronyms

Multiply	By	To obtain
acre-foot (acre-ft)	1,233	cubic meter (m^3)
cubic foot per second (ft^3/s)	0.02832	cubic meter per second (m^3/s)
foot (ft)	0.3048	meter (m)
gallon (gal)	3.785	liter (L)
gallon (gal)	3,785	milliliter (mL)
inch (in.)	25.4	millimeter (mm)
inch (in.)	25,400	micrometer (µm)
mile (mi)	1.609	kilometer (km)
ounce (oz)	28.35	gram (g)
part per million (ppm)	1	microgram per gram (µg/g)
square mile (mi^2)	2.59	square kilometer (km^2)
ton per day (ton/d)	907.2	kilogram per day (kg/d)

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

$$°F = (1.8 \times °C) + 32$$

Vertical coordinate information is referenced to the National Geodetic Vertical Datum of 1929 (NGVD 29). Horizontal coordinate information is referenced to the North American Datum of 1927 (NAD 27).

Water year definition:

Water year is the 12-month period from October 1 through September 30 of the following calendar year. The water year is designated by the calendar year in which it ends. For example, water year 2005 is the period from October 1, 2004, through September 30, 2005.

Abbreviated water-quality units used in this report:

µg/g	micrograms per gram
µg/L	micrograms per liter
µg/mL	micrograms per milliliter
µm	micrometer
µS/cm	microsiemens per centimeter at 25 degrees Celsius
mg/L	milligrams per liter
ppm	part per million

Acronyms used in this report:

ICAPES	inductively coupled argon plasma-emission spectroscopy
LRL	laboratory reporting level
LT-MDL	long-term method detection level
NWQL	USGS National Water Quality Laboratory, Denver, Colo.
RSD	relative standard deviation
spp.	species
SRM	standard reference material
USGS	U.S. Geological Survey

Water-Quality, Bed-Sediment, and Biological Data (October 2004 through September 2005) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana

By Kent A. Dodge, Michelle I. Hornberger[1], and Jessica L. Dyke[1]

Abstract

Water, bed sediment, and biota were sampled in streams from Butte to below Missoula as part of a long-term monitoring program, conducted in cooperation with the U.S. Environmental Protection Agency, to characterize aquatic resources in the upper Clark Fork basin of western Montana. Sampling sites were located on the Clark Fork, six major tributaries, and three smaller tributaries. Water-quality samples were collected periodically at 18 sites during October 2004 through September 2005 (water year 2005). Bed-sediment and biological samples were collected once in August 2005. The primary constituents analyzed were trace elements associated with tailings from historical mining and smelting activities. This report summarizes the results of water-quality, bed-sediment, and biota samples collected in water year 2005 and provides statistical summaries of data collected since 1985.

Water-quality data for samples collected periodically from streams include concentrations of selected major ions, trace elements, and suspended sediment. Daily values of suspended-sediment concentration and suspended-sediment discharge were determined for three sites. Bed-sediment data include trace-element concentrations in the fine-grained fraction. Biological data include trace-element concentrations in whole-body tissue of aquatic benthic insects. Quality-assurance data are reported for analytical results of water, bed sediment, and biota. Statistical summaries of water-quality, bed-sediment, and biological data are provided for the period of record since 1985 for each site.

Introduction

The Clark Fork originates near Warm Springs in western Montana at the confluence of Silver Bow and Warm Springs Creeks (fig. 1). Along the 148-mi reach of stream from Silver Bow Creek in Butte to the Clark Fork at Milltown Reservoir, 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-mi^2 Clark Fork basin above Missoula include irrigation, stock watering, light industry, hydroelectric power generation, and habitat for trout fisheries. Current land uses primarily 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 one hundred years, but are now either discontinued or substantially smaller 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 1870 to 1980. Moderate- and small-scale mining also occurred in the basins of most of the major tributaries to the upper Clark Fork. Tailings derived from past mineral processing commonly contain large quantities of trace elements such as arsenic, cadmium, copper, lead, and zinc. Tailings have been eroded, mixed with stream sediment, transported downstream, and deposited in stream channels, on flood plains, and in the Warm Springs Ponds and Milltown Reservoir. The widely dispersed tailings continue to be re-eroded, transported, and redeposited along the stream channel and flood plain, especially during high flows. The occurrence of elevated trace-element concentrations in water and bed sediment can pose a potential risk to aquatic biota and human health.

Concern about the potential toxicity of trace elements to aquatic biota and human health has resulted in a comprehensive effort by State, Federal, and private entities to characterize the aquatic resources in the upper Clark Fork basin to guide and monitor remedial cleanup activities. A long-term data base was considered necessary to detect trends over time in order 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, 1988, 1989, 1990, 1991; Lambing and others, 1994, 1995; and Dodge and others, 1996, 1997, 1998, 1999,

[1] U.S Geological Survey, Menlo Park, Calif.

2000, 2001, 2002, 2003, 2004, 2005). Trace-element data for bed sediment and biota (aquatic benthic insects) have been collected intermittently since 1986 at selected sites as part of studies on bed-sediment contamination and bioaccumulation of metals conducted 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 sampling program for water, bed sediment, and biota was implemented by the USGS in cooperation with the U.S. Environmental Protection Agency to provide systematic, long-term monitoring to better quantify the seasonal and annual variability in selected constituents.

The purpose of this report is to present water-quality data for 18 sites and trace-element data for 13 bed-sediment and biological sites in the upper Clark Fork basin collected from October 2004 through September 2005 (water year 2005). Quality-assurance data are presented for water-quality, bed-sediment, and biota samples. Statistical summaries also are provided for water-quality, bed-sediment, and biological data collected since 1985.

Sampling Locations and Types of Data

Sampling sites in the upper Clark Fork basin from Butte to below Missoula (fig. 1) are located on the Clark Fork mainstem, six major tributaries (Blacktail Creek, Warm Springs Creek, Little Blackfoot River, Flint Creek, Rock 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 data type are listed in table 1. Mainstem sampling sites were selected to divide the upper Clark Fork into reaches of relatively uniform length, with each reach encompassing either a major tributary or depositional environment (Warm Springs Ponds

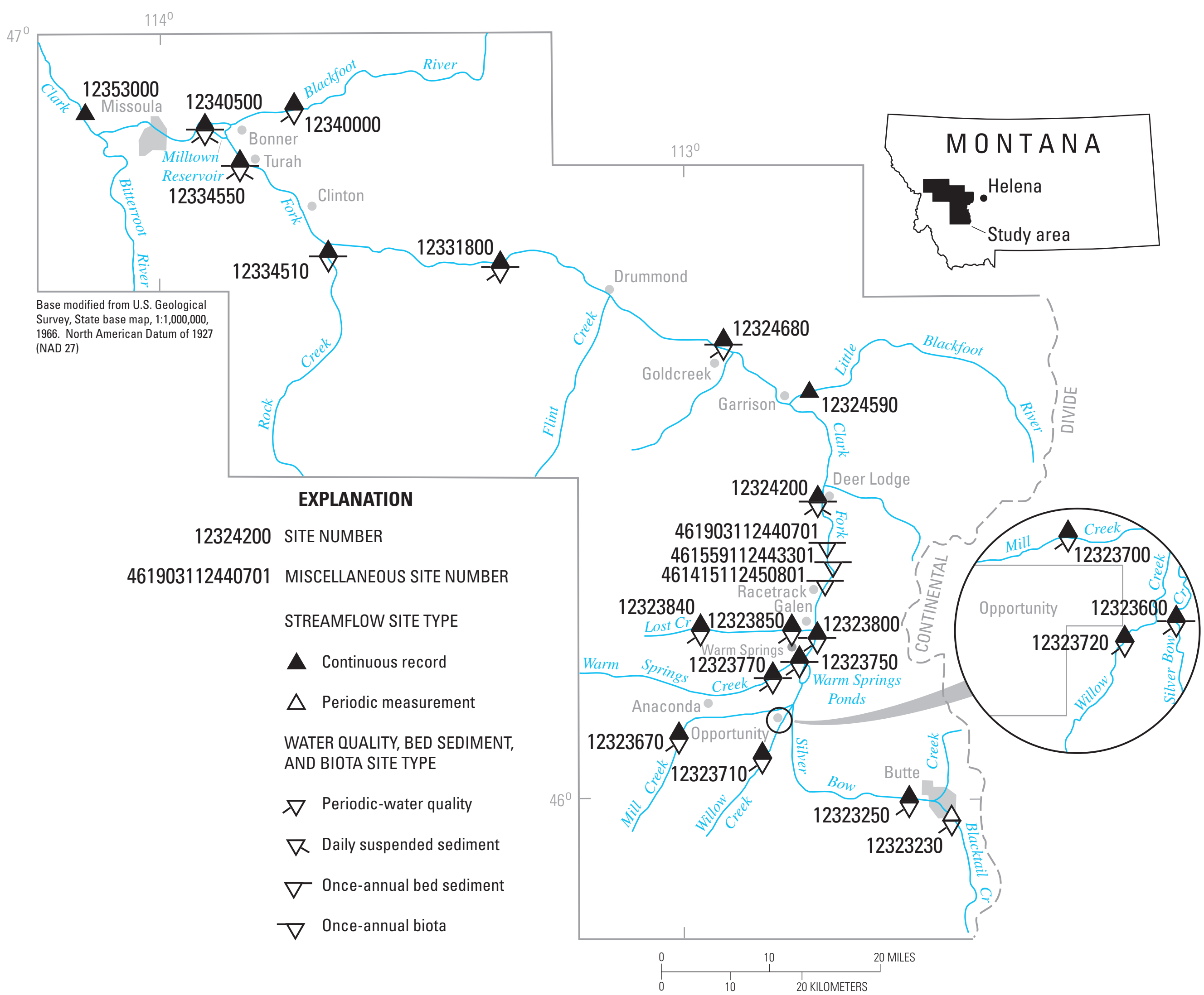

Figure 1. Location of study area.

and Milltown Reservoir). Major tributaries were sampled to describe water-quality, bed-sediment, and biological characteristics of important hydrologic sources in the upper basin and to provide reference comparisons to the mainstem. 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. Water-quality data were obtained periodically at 18 sites; daily suspended-sediment data were obtained at 3 of these sites. Trace-element data for 13 bed-sediment and 13 biological sites were obtained once-annually. Continuous streamflow data were collected at 20 sites.

A list of properties measured onsite and constituents analyzed in samples of water, bed sediment, and biota is given in table 2. Data-quality objectives for analyses of water-quality samples are listed in table 3. Onsite measurements of properties, laboratory analyses of water, bed-sediment, and biota samples, and associated quality-assurance data for water year 2005 are listed in tables 4 through 19 at the back of the report. Statistical summaries of water-quality, bed-sediment, and biological data collected between March 1985 and September 2005 are given in tables 20 through 22 at the back of the report.

Quality assurance of data was maintained through the use of documented procedures designed to provide environmentally representative data. Acceptable performance of the procedures was 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 concentrations of chemical and physical constituents analyzed in periodically collected stream samples. At 17 sites on the Clark Fork mainstem and tributaries, samples were collected 8 times per year on a schedule designed to describe seasonal and hydrologic variability. At Warm Springs Creek at Warm Springs, samples were collected 6 times during the water year. At the three daily suspended-sediment sites, suspended-sediment samples were collected 2 to 9 times per week during water year 2005 (table 1).

Methods

Water samples were collected 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 USGS National Field Manual for the Collection of Water-Quality Data (variously dated). These methods provide 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. Sampling equipment consisted of depth-integrating suspended-sediment samplers (DH-48, DH-81, and D-74TM), which were either constructed of plastic or coated with a non-metallic epoxy paint, and equipped with nylon or Teflon nozzles.

Instantaneous streamflow at the time of water sampling was determined at all sites, either by direct measurement or from stage-discharge rating tables (Rantz and others, 1982). Onsite measurements of specific conductance, pH, and water temperature were made during collection of periodic water-quality samples. Onsite sample processing, including filtration and preservation, was performed according to procedures described by Ward and Harr (1990), Horowitz and others (1994), and USGS (variously dated).

Water samples were analyzed for the constituents listed in table 2. The terms “filtered” and “unfiltered recoverable” replace the terms “dissolved” and “total recoverable,” respectively, which were used in the past. The trace elements (arsenic, cadmium, copper, iron, lead, manganese, and zinc) were analyzed for filtered (0.45-μm pore size) and unfiltered recoverable concentrations by the USGS National Water Quality Laboratory (NWQL) in Denver, Colo. Concentrations of calcium and magnesium also were determined in filtered samples to enable calculation of hardness. Filtered concentrations of arsenic, cadmium, copper, lead, manganese, and zinc were analyzed by inductively coupled plasma-mass spectrometry (Faires, 1993; Garbarino, 1999). Filtered concentrations of calcium, magnesium, and iron were analyzed by inductively coupled plasma-atomic emission spectrometry (Fishman, 1993). Unfiltered recoverable concentrations of trace elements were determined from unfiltered samples that were first digested with dilute hydrochloric acid (Hoffman and others, 1996) and then analyzed by inductively coupled plasma-mass spectrometry (Garbarino and Struzeski, 1998). For part of water year 2005, unfiltered recoverable arsenic was analyzed by graphite furnace-atomic absorption spectrometry (Jones and Garbarino, 1999).

Water samples also were collected from multiple vertical transits for analysis of suspended sediment whenever periodic water-quality samples were collected. These samples were analyzed for suspended-sediment concentration and the percentage of suspended-sediment mass finer than 0.062-mm diameter (silt size and smaller) by the USGS Montana Water Science Center sediment laboratory (herein referred to as 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 were collected by local contract observers using the depth-integration method at a single vertical near mid-stream. The samples were analyzed for suspended-sediment concentration and were used to determine daily mean suspended-sediment concentrations according to methods described by Porterfield (1972).

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

[Abbreviation: P, present. Symbol: --, no data]

Station number (fig. 1)	Station name	Continuous-record streamflow	Periodic water quality[1]	Daily suspended sediment	Fine-grained bed sediment[2]	Bulk bed sediment[2,3]	Biota[2]
12323230	Blacktail Creek at Harrison Avenue, at Butte	--	03/93-08/95, 12/96-08/03, 12/04-P	--	--	--	--
12323250	Silver Bow Creek below Blacktail Creek, at Butte	10/83-P	03/93-08/95, 12/96-P	--	--	--	--
12323600	Silver Bow Creek at Opportunity	07/88-P	03/93-08/95, 12/96-P	03/93-09/95	07/92-P	08/93-08/95, 08/97-08/04	07/92, 08/94, 08/95, 08/97-P
12323670	Mill Creek near Anaconda	10/04-P	12/04-P	--	--	--	--
12323700	Mill Creek at Opportunity	04/03-P	03/03-P	--	--	--	--
12323710	Willow Creek near Anaconda	03/05-P	12/04-P	--	--	--	--
12323720	Willow Creek at Opportunity	04/03-P	03/03-P	--	--	--	--
12323750	Silver Bow Creek at Warm Springs	03/72-09/79, 04/93-P	03/93-P	04/93-09/95	07/92-P	08/93, 08/95-08/04	07/92-P
12323770	Warm Springs Creek at Warm Springs	10/83-P	03/93-P	--	08/95, 08/97, 08/99, 08/02, 08/05	08/95, 08/97, 08/99, 08/02	08/95, 08/97, 08/99, 08/02, 08/05
12323800	Clark Fork near Galen	07/88-P	07/88-P	--	08/87, 08/91-P	08/93-08/04	08/87, 08/91-P
12323840	Lost Creek near Anaconda	10/04-P	12/04-P	--	--		--
12323850	Lost Creek near Galen	04/03-P	03/03-P	--	--	--	--
461415112450801	Clark Fork below Lost Creek, near Galen	--	--	--	08/96-P	08/96-08/04	08/96-P
461559112443301	Clark Fork at County Bridge, near Racetrack	--	--	--	08/96-P	08/96-08/04	08/96-P
461903112440701	Clark Fork at Dempsey Creek diversion, near Racetrack	--	--	--	08/96-P	08/96-08/04	08/96-P
12324200	Clark Fork at Deer Lodge	10/78-P	03/85-P	03/85-08/86, 04/87-03/03, 08/03-P	08/86, 08/87, 08/90-P	08/93-08/04	08/86, 08/87, 08/90-P
12324590	Little Blackfoot River near Garrison	10/72-P	03/85-08/04	--	08/86, 08/87, 08/94, 08/98, 08/01, 08/04	08/94, 08/98, 08/01, 08/04	08/87, 08/94, 08/98, 08/01, 08/04
12324680	Clark Fork at Goldcreek	10/77-P	03/93-P	--	07/92-P	08/93-08/04	07/92-P

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

[Abbreviation: P, present. Symbol: --, no data]

Station number (fig. 1)	Station name	Continuous-record streamflow	Periodic water quality[1]	Daily suspended sediment	Fine-grained bed sediment[2]	Bulk bed sediment[2,3]	Biota[2]
12331500	Flint Creek near Drummond	08/90-04/03, 08/03-09/04	03/85-08/04	--	08/86, 08/89, 07/92-08/04	08/93-08/04	08/86, 07/92-08/04
12331800	Clark Fork near Drummond	04/93-P	03/93-P	--	08/86, 08/87, 08/91-P	08/93-08/04	08/86, 08/91-P
12334510	Rock Creek near Clinton	10/72-P	03/85-08/04	--	08/86, 08/87, 08/89, 08/91-99, 08/01-P	08/93-99, 08/01-08/04	08/87, 08/91-99, 08/01-P
12334550	Clark Fork at Turah Bridge, near Bonner	03/85-P	03/85-P	03/85-03/03, 08/03-P	08/86, 08/91-P	08/93-08/04	08/86, 08/91-P
12340000	Blackfoot River near Bonner	10/39-P	03/85-P	07/86-04/87, 06/88-09/95	08/86, 08/87, 08/91, 08/93-96, 08/98-01, 09/03	08/93, 08/94, 08/99-01, 09/03	08/86, 08/87, 08/91, 08/93, 08/96, 08/98, 09/00, 09/03
12340500	Clark Fork above Missoula	03/29-P	07/86-P[4]	07/86-04/87, 06/88-01/96, 03/96-03/03, 08/03-P	08/97-P	08/97-08/04	08/97-P
12353000	Clark Fork below Missoula[5]	10/29-P	03/85-09/95	--	08/86, 08/90-08/04	08/93-08/04	08/86, 08/90-08/04

[1]Onsite measurements of physical properties and laboratory analyses of selected major ions, trace elements, and suspended sediment. Prior to March 1993, laboratory analyses included only trace elements and suspended sediment, with the exception of Clark Fork below Missoula.

[2]Laboratory analyses of trace elements.

[3]Bulk bed-sediment sampling was discontinued in 2005.

[4]Prior to October 1989, water-quality data for Clark Fork above Missoula only included suspended-sediment data.

[5]Bed sediment and biota sampled about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

Table 2. Properties measured onsite and constituents analyzed in samples of water, bed sediment, and biota from the upper Clark Fork basin, Montana.

Water		Bed Sediment	Biota
Property	**Constituent**	**Constituent**	**Constituent**
Streamflow	Hardness (calculated)	Arsenic	Arsenic
Specific conductance	Calcium	Cadmium	Cadmium
pH	Magnesium	Chromium	Chromium
Temperature	Arsenic	Copper	Copper
	Cadmium	Iron	Iron
	Copper	Lead	Lead
	Iron	Manganese	Manganese
	Lead	Nickel	Nickel
	Manganese	Zinc	Zinc
	Zinc		
	Suspended sediment		

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

[Abbreviations: µg/L, micrograms per liter; mg/L, milligrams per liter; mm, millimeter. Symbol: --, not determined]

Constituent	Data-quality objectives		
	Detectability	Precision	Bias
	Laboratory reporting level	Maximum relative standard deviation of laboratory replicate analyses, in percent	Maximum deviation of spike recovery, in percent
Calcium, filtered	0.02 mg/L	20	--
Magnesium, filtered	.008 mg/L	20	--
Arsenic, filtered	.2 µg/L	20	25
Arsenic, unfiltered recoverable[1]	.12–2 µg/L	20	25
Cadmium, filtered	.04 µg/L	20	25
Cadmium, unfiltered recoverable	.04 µg/L	20	25
Copper, filtered	.4 µg/L	20	25
Copper, unfiltered recoverable	.6 µg/L	20	25
Iron, filtered	6 µg/L	20	25
Iron, unfiltered recoverable	6 µg/L	20	25
Lead, filtered	.08 µg/L	20	25
Lead, unfiltered recoverable	.06 µg/L	20	25
Manganese, filtered	.2 µg/L	20	25
Manganese, unfiltered recoverable	.2 µg/L	20	25
Zinc, filtered	.6 µg/L	20	25
Zinc, unfiltered recoverable	2 µg/L	20	25
Sediment, suspended, percent finer than 0.062 mm	1 percent	--	--
Sediment, suspended	1 mg/L	--	--

[1]The laboratory reporting level changed during water year 2005.

Results

Water-quality data for samples collected periodically during water year 2005 are presented in table 4. Daily mean streamflow, daily mean suspended-sediment concentration, and daily suspended-sediment discharge for water year 2005 at the three daily suspended-sediment stations are reported in tables 5 through 7, along with monthly summary statistics and annual totals for streamflow and sediment load.

Quality Assurance

Quality-assurance procedures used for the collection and field processing of water-quality samples are described by Ward and Harr (1990), Knapton and Nimick (1991), Horowitz and others (1994), Edwards and Glysson (1999), and USGS (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 Montana Sediment Laboratory are described by Dodge and Lambing (2006).

The quality of analytical results reported for water-quality samples was evaluated by 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 which provide quantitative information on the precision and bias of the overall field and laboratory process. Each type of quality-control sample was submitted at a proportion equivalent to about 5 percent of the total number of water-quality samples. Therefore, the total number of quality-control samples represented about 15 percent of the total number of water-quality samples.

In addition to quality-control samples submitted from the field, internal quality-assurance practices at the NWQL are performed systematically to provide quality control of analytical procedures (Pritt and Raese, 1995). These internal practices include analyses of quality-control samples such as calibration standards, standard reference water samples, replicate samples, deionized-water blanks, or spiked samples at a proportion equivalent to at least 10 percent of the sample load. The NWQL participates in a blind-sample program where 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, U.S. Environmental Protection Agency, Environment Canada, and the USGS Branch of Quality Systems to assess analytical performance.

Replicate data can be obtained in different ways to provide an assessment of precision (reproducibility) of analytical results. Replicate samples are two or more samples considered to be essentially identical in composition. Replicate samples can be obtained in the field (field replicate) by either 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 variability (laboratory replicate).

Precision of analytical results for field replicates is affected by numerous sources of variability within the field and laboratory environments, including sample collection, sample processing, and sample analysis. To provide data on precision for samples exposed to all sources of variability, replicate stream samples for chemical analysis were obtained in the field by splitting a composite stream sample, and replicate stream samples for suspended-sediment analysis were obtained in the field by concurrently collecting two independent cross-sectional samples. Analyses of these field replicates indicate the reproducibility of environmental data that are affected by the combined variability potentially introduced by field and laboratory processes.

Analytical precision was evaluated with laboratory replicates, which exclude field sources of variability. Two independent analyses were made of an individual sample selected randomly in the laboratory from the group of samples comprising 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 collection and processing of samples.

Spiked samples 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 can potentially interfere with the analysis of a targeted analyte, it is important to determine whether such effects are causing biased (consistently high or low) results. Deionized-water blanks and aliquots of stream samples were spiked in the laboratory with known amounts of the same trace elements analyzed in water samples. 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 whether these interferences could contribute significant bias to reported trace-element concentrations for stream samples.

Blank samples of deionized water were submitted for every field trip and analyzed to identify the presence and magnitude of contamination that potentially could bias analytical results. The particular type of blank sample routinely tested was a “field” blank. Field blanks are aliquots of deionized water that are certified as trace-element free and are processed through the sampling equipment used to collect stream samples. These blanks are then 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 those of stream samples to identify whether 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. All routine 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 that was initiated in 1993. The objectives identify 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 are used to evaluate whether sampling and analytical procedures are producing 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 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 (LT-MDLs) and laboratory reporting levels (LRLs). These values are reevaluated each year and, consequently, can change from year to year. The methods are designed to limit the possible occurrence 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 either not detected or did not pass identification criteria. Analytes that are detected at concentrations between the LT-MDL and LRL and that pass identification criteria are estimated. Estimated concentrations are noted with a remark code of “E.” These data need to be used with the understanding that their uncertainty is greater than that of data reported without the “E” remark code.

The precision of analytical results for a constituent can be determined by estimating a standard deviation of the differences between replicate measurements for several sets of samples. These replicate measurements may consist either of individual analyses of a pair of samples considered to be essentially identical (field replicates) or 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):

$$S = \sqrt{\frac{\Sigma d^2}{2k}} \qquad (1)$$

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 comparison of precision among individual constituents. The RSD, in percent, is calculated according to the following equation (Taylor, 1987):

$$RSD = \frac{S}{\overline{x}} \times 100 \qquad (2)$$

where

RSD is the relative standard deviation,

S is the standard deviation,

and

$\overline{x}$ is the mean of all replicate concentrations.

Paired analyses of field replicates are presented in table 8. The precision estimated for each constituent based on these paired results, which include both field and laboratory sources of variability, is reported in table 9. Data-quality objectives for precision are not directly applicable to field replicates because of the inability to determine whether the variability results from field sample collection and processing, or laboratory handling and analysis. However, the precision for field replicate analyses is calculated to illustrate overall reproducibility of environmental data that incorporates both field and laboratory sources of variability. The data-quality objective used to indicate acceptable precision of results for field replicates was a maximum relative standard deviation of 20 percent (table 3). Precision estimates for field replicate analyses were within the 20-percent relative standard deviation limit for all constituents (table 9).

Analytical precision for chemical constituents based on laboratory replicate analyses of individual samples, which includes only laboratory sources of variability, is reported in table 10. Statistics for analytical precision of laboratory-replicate analyses are based on unrounded values stored in laboratory data files. The data-quality objective for analytical precision of laboratory-replicate analyses was a maximum relative standard deviation of 20 percent (table 3). Precision estimates for laboratory-replicate analyses were less than the 20-percent relative standard deviation limit for all constituents (table 10); thus, the data-quality objectives for precision were met.

Recovery efficiency for analyses of constituents is determined by analyses of an unspiked sample and a spiked aliquot of the same sample. The data-quality objective for acceptable spike recovery of trace elements in water samples 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 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 3:

$$R = \frac{D}{C} \times 100 \qquad (3)$$

where

R is the spike recovery, in percent;

D is the difference between the spiked sample concentration and unspiked sample concentration;

and

C is the concentration of material used to spike the sample.

If the spike recovery for a trace element was outside a range of 75 to 125 percent, the instrument was recalibrated and the entire sample set and spiked samples were reanalyzed for that particular trace element until recoveries were improved to the extent possible. Results of recovery efficiency for individual trace elements in spiked deionized-water blanks and spiked stream samples are presented in tables 11 and 12, respectively. The mean spike recovery for deionized-water samples spiked with trace elements (table 11) ranged from 93.8 to 104 percent. The 95-percent confidence intervals (Taylor, 1987) for the mean spike recovery for each constituent analyzed in deionized-water samples (table 11) did not exceed a 25-percent deviation from an expected 100-percent recovery. The mean spike recovery for spiked stream samples (table 12) ranged from 88.3 to 104 percent. The 95-percent confidence intervals for the mean of spike recovery for each constituent analyzed in stream samples (table 12) did not exceed a 25-percent deviation from an expected 100-percent recovery, except for filtered cadmium (62.7-133), filtered copper (57.9-129), and filtered zinc (60.8-128). No adjustments were made to analytical data for filtered cadmium, copper, and zinc because the mean spike recoveries were 97.8, 93.6, and 94.3 percent, respectively, which indicated that there was no systematic bias.

High or low bias is indicated if the confidence interval does not include 100 percent recovery, thereby indicating a consistent deviation in one direction. All laboratory-spiked deionized-water blank samples (table 11) had confidence intervals for percent recovery that included 100 percent, except filtered arsenic (95.5-99.3 percent). The 95-percent confidence intervals for percent recovery in all laboratory-spiked stream samples (table 12) included 100 percent, except unfiltered recoverable arsenic (101-108) and unfiltered recoverable manganese (78.3-98.3). Both the 95-percent confidence interval (101-108) and mean (104) percent recoveries for unfiltered recoverable arsenic in laboratory-spiked stream samples indicate a persistent, but very minor, high bias. In contrast, the 95-percent confidence interval (90.7-111) and mean (101) percent recoveries for unfiltered recoverable arsenic in laboratory-spiked deionized water blanks (table 11) indicate no bias. Thus, it appears that the minor bias in spiked stream samples is not necessarily caused by the analytical method, but might be a result of analytical interference from the chemical matrix of the stream samples. The same comparison is made for laboratory spiked stream samples for unfiltered recoverable manganese. Both the 95-percent confidence interval (78.3-98.3) and mean (88.3) percent recoveries for unfiltered recoverable manganese in laboratory-spiked stream samples (table 12) indicate a persistent low bias of moderate magnitude. However, the 95-percent confidence interval (82.2-105) and mean (93.8) percent recoveries for laboratory-spiked deionized water (table 11) indicate no bias. Because the mean spike recoveries for all constituents met data-quality objectives, no adjustments were made to analytical results for stream samples on the basis of spike recoveries.

Analytical results for field blanks are presented in table 13. A field blank with constituent concentrations equal to or less than 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 in field blanks were equal to or greater than twice the LRL, the concentrations were noted during data review. Analytical results from the field blank for the next sample set were evaluated for a consistent trend that may indicate systematic contamination. Sporadic, infrequent exceedances of twice the LRL probably represent random contamination or instrument calibration error that is not persistent in the process and which is 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, blank samples were collected from individual components of the processing sequence and were submitted for analysis in order to identify the source of contamination.

Trace-element concentrations in field blanks (table 13) were almost always less than the LRL. Two detections exceeded twice the LRL in two separate samples. One occurred on March 7 for filtered zinc (1.9 µg/L) which was greater than the LRL of 0.6 µg/L; several other blanks exceeded the LRL for filtered zinc but they did not exceed twice the LRL. The other occurred on June 2 for unfiltered recoverable iron (30 µg/L) which was greater than the LRL of 6 µg/L. Since no trends were indicated in subsequent sampling trips, no adjustments were made to water-quality sample results based on these two detections.

Bed-Sediment Data

Bed-sediment data consist of analyses of trace-element concentrations in the fine-grained fraction of bed-sediment samples. Collection of bulk bed sediment (fine-grained plus coarse-grained fractions) was discontinued in 2005; therefore, no analytical results or statistical summaries are presented. Bed-sediment samples were collected once-annually during low, stable flow conditions and the same season (typically August) as previous samples to facilitate data comparisons among years.

Methods

Fine-grained bed-sediment samples were collected in August 2005 using protocols described by E.V. Axtmann (U.S. Geological Survey, written commun., 1994). Samples were collected from the surfaces of streambed deposits in low-velocity areas near the edge of the stream using an acid-washed polypropylene scoop. Whenever possible, samples were collected from both sides of the stream. Three composite samples of bed sediment were collected at each site.

Individual samples of bed sediment were collected by scooping material from the surfaces of three to five randomly selected deposits along pool 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 0.064-mm nylon-mesh sieve using ambient stream water. The fraction of bed sediment in each composite sample that was finer than 0.064 mm was transferred to an acid-washed 500-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, Calif. Bed-sediment samples were oven-dried at 60°C and ground using an acid-washed ceramic mortar and pestle. Single aliquots of approximately 0.6 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). An additional aliquot was analyzed from one of the sieved replicate samples at each station. After a digestion period of up to 2 weeks, 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 then were filtered through a 0.45-µm filter using a syringe and 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 argon plasma-emission spectroscopy *(ICAPES)*. The smallest concentration of a constituent that can be reliably reported for analyses of bed sediment is termed the minimum reporting level.

Results

Concentrations of trace elements measured in samples of fine-grained bed sediment collected during August 2005 are summarized in table 14. Liquid-phase concentrations, in µg/mL, that were analyzed in the reconstituted aliquots of digested bed sediment were converted to solid-phase concentrations, in µg/g, using the following equation:

$$\mu g/g = \frac{\mu g/mL \times \text{volume of digested sample, in mL}}{\text{dry weight of sample, in g} \times \text{dilution ratio}} \qquad (4)$$

The reported solid-phase concentrations in table 14 are the mean 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 both the dilution ratio and the dry weight of the sample, minimum reporting levels for some trace elements might differ among stations and among years.

Quality Assurance

The protocols for field collection and processing of bed-sediment samples are designed to prevent contamination from metal sources. Non-metallic sampling and processing equipment was acid-washed and rinsed with deionized water prior to the first sample collection. Nylon-mesh sieves were washed in a 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 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 an increasing concentration gradient to minimize effects from potential site-to-site carryover contamination.

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 (E.V. Axtmann, U.S. Geological Survey, written commun., 1994). Quality-control samples consisted of standard reference materials and procedural blanks. Each type of quality-control sample was analyzed in a proportion equivalent to about 10 percent of the total number of bed-sediment samples.

Standard reference materials (SRMs) 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 the 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 summarized in table 15. Two SRMs consisting of agricultural soils representing low and high concentrations of trace elements were analyzed to test recovery efficiency for a range of concentrations generally similar to those occurring in the bed sediment of 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 whether analytical recovery is consistent between multiple sets of analyses.

Although data-quality objectives have not been established for bed sediment, percent recoveries for individual trace elements shown in table 15 illustrate analytical performance. Mean SRM recoveries for the low-concentration standard (SRM 2709) ranged from 82.2 to 89.1 percent of the certified concentrations for copper, iron, lead, manganese, and nickel. Mean recoveries were lower for arsenic, chromium, and zinc (65.4, 60.2, and 75.6 percent, respectively). Cadmium concentrations were near the minimum reporting level in SRM 2709 and were not reported. The lack of measurable recoveries for cadmium in the SRM is likely the result of analyzing concentrations very close to the liquid-phase detection limit (0.0003 µg/mL) coupled with signal enhancement resulting from matrix interference. Percent recoveries for arsenic, cadmium, copper, iron, lead, manganese, and zinc in the high-concentration standard (SRM 2711) ranged from 80.6 to 94.4 percent of the certified concentration. Chromium and nickel had lower recoveries (51.5 and 78.9 percent, respectively) for the high-concentration SRM, possibly due to the strong binding nature of these elements to sediment. The generally small range of variation (less than 10 percent for most constituents) for the 95-percent confidence interval indicates good reproducibility of multiple analyses of the SRMs. No adjustments were made to trace-element concentrations in bed-sediment samples on the basis of recovery efficiencies.

Procedural blanks for bed-sediment samples consisted 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. Procedural blanks, therefore, represent the same chemical matrix and exposure to analytical materials and handling as the reagents used to digest and reconstitute bed-sediment samples. Analytical results of procedural blanks for bed sediment (table 16) are reported as a liquid-phase concentration, in µg/mL, which is equivalent to parts per million. A procedural blank was prepared and analyzed concurrently with bed-sediment samples for each site. Concentrations of trace elements in all procedural blanks were below the minimum reporting level; thus, no contamination bias was indicated and no adjustments to the data were necessary.

Biological Data

Biological data consist of analyses of trace-element concentrations in the whole-body tissue of aquatic benthic insects. Insect samples were collected once-annually at the same sites and dates as bed-sediment samples (table 1), allowing for a direct comparison of biological data with bed-sediment data among the years.

Methods

Insect samples were collected using protocols described in Hornberger and others (1997). Immature stages of benthic insects were collected using a large nylon-mesh kick net. A single riffle at each station 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 due to their occurrence at most, but not all, sites. In a few instances, *Hydropsyche tana* were collected. *Hydropsyche* species (spp.) that could not be positively identified were considered to belong to the *morosa* group and are categorized as *Hydropsyche* spp. or *Hydropsyche morosa* group (in previous reports). The caddisfly *Arctopsyche grandis* and the stonefly *Claasenia sabulosa* were collected where available to represent additional insect taxa that are commonly distributed in the upper Clark Fork basin. In addition, the caddisfly group *Brachycentrus* spp. was sometimes collected when targeted taxa were not available.

Samples of each taxon were sorted by genus in the field and placed in acid-washed plastic containers. Samples were frozen on dry ice within 30 minutes of collection in a small amount of ambient stream water. Between 1986 and 1998, macroinvertebrate containers were kept on ice to allow the insects to evacuate their gut contents for a period of 6 to 8 hours. Excess water was drained and insects were frozen for transport to the laboratory. In order to reduce the possibility of metal loss through intracellular breakdown during depuration, samples were frozen on dry ice in the field between 1999 and 2005. A comparison of immediately frozen versus depurated samples showed that while no significant difference occurred for most metals, concentrations of copper in the depurated macroinvertebrate samples were about 20 percent lower than those which 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 ultra-pure deionized water to remove particulate matter and then sorted to their lowest possible taxonomic level. If large numbers of specimens had been 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-µm filter, and analyzed undiluted by ICAPES 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 minimum reporting level.

Results

Concentrations of trace elements in whole-body tissue of aquatic insects collected during August 2005 are summarized in table 17. 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 µg/mL, analyzed in the reconstituted samples were converted to solid-phase concentrations, in µg/g, using equation 4. As with bed sediment, minimum reporting levels may differ among sites as a result of variable sample weights. In general, the smaller the biological sample weight (a function of insect abundance), the higher the minimum reporting level. Therefore, higher minimum reporting levels do not necessarily imply a higher trace-element concentration in tissue.

Quality Assurance

The protocols for field collection and processing of biota samples are designed to prevent contamination from metal sources. Non-metallic nets, sampling equipment, and processing equipment were employed in all sample collection. Equipment was acid-washed and rinsed in ultra-pure deionized water prior to the first sample collection. Nets and equipment were thoroughly rinsed in ambient stream water at each new mainstem site. New nets were used for all tributary sites. Biota samples were collected sequentially at sites along an increasing concentration gradient to minimize effects from potential site-to-site carryover contamination.

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 tissue SRM (lobster hepatopancreas) and procedural blanks for each station. Quality-control samples were analyzed in a proportion equivalent to about 20 percent of the total number of biota samples.

Recovery efficiency for trace-element analyses of the SRM for biota is summarized in table 18. The reference material tested was lobster hepatopancreas. Data-quality objectives have not been established for analytical recovery in biota, but percent recoveries are shown to illustrate analytical performance. Mean SRM recoveries ranged from 92.6 to 100 percent of the certified concentrations for arsenic, cadmium, copper, iron, manganese, and zinc. Lower mean recoveries were measured for lead (84.7 percent) and nickel (84.8 percent). A higher mean recovery was measured for chromium (119 percent), with 2 of the 12 analyses having concentrations less than the minimum reporting level. With the exception of chromium and lead, both of which had low certified concentrations (0.77 µg/g and 0.35 µg/g, respectively) in the SRM, the range of variation generally was small (less than about 6 percent) for the 95-percent confidence interval, thereby indicating good reproducibility of multiple analyses of the SRM. No adjustments were made to trace-element concentrations in biota samples on the basis of recovery efficiencies.

Procedural blanks for biota consisted of the same reagents used to digest and reconstitute tissue of aquatic insects and were analyzed undiluted. Analytical results of procedural blanks for biota (table 19) are reported as a liquid-phase concentration, in µg/mL, which is equivalent to parts per million. 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 minimum reporting level; thus, no contamination bias was indicated and no adjustments to the data were necessary.

Statistical Summaries of Data

Statistical summaries of water-quality, bed-sediment, and biological data are provided in tables 20 through 22 for the period of record at each site since 1985. The summaries include the period of record, number of samples, and maximum, minimum, mean, and median concentrations.

Statistical summaries of water-quality data (table 20) are based on results of cross-sectional samples collected periodically by the USGS during the period of record for each site. The summaries do not include data for supplemental single-vertical samples collected during several years by a contract observer at Clark Fork at Turah Bridge, near Bonner; Blackfoot River near Bonner; and Clark Fork above Missoula. Inclusion of results for supplemental samples that targeted high-flow conditions or maintenance drawdowns of Milltown Reservoir would disproportionately skew the long-term statistics at these three sites relative to the other sites in the network. Statistical summaries of fine-grained bed-sediment (table 21) and biological data (table 22) are based on results of samples collected once-annually 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. Sampling of bulk bed sediment has been discontinued; therefore, a statistical summary is not presented.

Statistics for bed-sediment data (table 21) are based on the mean trace-element concentrations determined for each year from the averaged results of analyses of composite samples. Therefore, the number of samples for bed sediment represents the number of years that the constituent was analyzed. In contrast, statistics for biological data (table 22) are based on individual analyses for each composite sample collected, rather than on a single mean concentration for each year. Also, the number of samples for arsenic for both bed sediment and biota is smaller than the other trace elements because it was only recently (2003) included for analysis.

Differences in the number of biota composite samples among species reflect differences in species abundance, both within and between 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. 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 variable minimum reporting levels. Where minimum reporting levels vary among years, differences in concentration over time are difficult to determine, especially when a large percentage of the samples have concentrations less than minimum reporting levels.

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 stations 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 be clearly identified to the species level, but the individual insects had *morosa* characteristics.

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Data

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323230—Blacktail Creek at Harrison Avenue, at Butte

Date	Time	Streamflow, instantaneous (ft³/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/15/2004	0900	3.3	7.7	326	5.5	130	36.2	9.00	2.0
03/09/2005	0810	2.8	7.8	323	4.5	130	37.7	9.06	1.3
04/18/2005	0910	7.1	7.6	264	5.0	100	29.4	7.29	2.6
05/16/2005	0900	22	7.7	203	9.5	74	21.2	5.03	5.8
06/01/2005	1120	25	7.7	161	9.0	65	19.3	4.09	5.0
06/13/2005	1030	20	7.8	200	8.5	83	24.6	5.23	5.9
07/25/2005	1050	2.8	7.8	335	12.5	140	39.7	8.88	2.8
08/23/2005	0930	2.3	7.8	333	12.0	130	38.6	8.48	2.3

Date	Arsenic, unfiltered recoverable (µg/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)
12/15/2004	2	0.07	0.07	8.9	8.0	49	1,030	2.80
03/09/2005	E1.	E.03	E.04	.9	3.4	54	290	<.08
04/18/2005	4	.05	.07	3.4	7.2	201	690	.19
05/16/2005	7	.04	.05	8.5	12.4	179	540	.24
06/01/2005	7	.06	.07	7.5	14.2	143	810	.25
06/13/2005	6	E.04	.04	5.7	8.0	161	360	.12
07/25/2005	3.3	E.04	.04	2.5	3.7	41	200	E.07
08/23/2005	3.0	E.03	.05	1.7	4.1	43	300	<.08

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/15/2004	2.74	26.4	55	2.2	11	89	22	0.20
03/09/2005	.41	28.7	29	3.2	5	83	8	.06
04/18/2005	1.24	29.2	46	4.2	12	85	9	.17
05/16/2005	.92	19.0	28	3.9	7	54	13	.77
06/01/2005	2.67	23.1	51	6.2	18	71	24	1.6
06/13/2005	.62	14.2	23	3.2	4	71	7	.38
07/25/2005	.26	32.5	38	3.7	5	87	3	.02
08/23/2005	.61	35.4	47	2.2	5	83	9	.06

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323250—Silver Bow Creek below Blacktail Creek, at Butte

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/15/2004	1005	16	7.5	554	6.5	160	44.9	12.1	2.9
03/09/2005	0935	16	7.6	564	6.5	170	47.7	12.0	2.3
04/18/2005	1030	21	7.6	475	7.0	140	39.4	8.90	3.6
05/16/2005	1025	38	7.6	370	11.0	110	32.4	7.92	5.7
06/01/2005	1240	67	7.6	238	9.0	79	23.4	5.02	6.9
06/13/2005	0955	34	7.8	361	9.5	130	38.1	8.44	6.2
07/25/2005	1215	16	7.9	545	15.0	190	53.2	13.1	5.6
08/23/2005	1045	15	7.9	552	16.5	180	50.9	12.7	5.7

Date	Arsenic, unfiltered recoverable (µg/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)
12/15/2004	3	0.97	1.18	10.2	42.1	38	370	0.26
03/09/2005	3	1.18	1.54	9.1	61.9	37	570	.30
04/18/2005	4	.16	.26	11.3	21.8	268	290	.33
05/16/2005	9	.10	.22	12.1	22.5	126	460	.37
06/01/2005	19	.12	1.39	14.0	111	78	2,970	.68
06/13/2005	7	.09	.20	10.2	18.8	116	420	.26
07/25/2005	6.5	.12	.18	11.9	18.4	25	140	.27
08/23/2005	6.4	.10	.14	11.6	17.3	32	120	.27

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/15/2004	2.27	331	366	277	286	84	10	0.43
03/09/2005	2.73	498	509	284	323	83	9	.39
04/18/2005	1.68	113	129	54.0	68	88	5	.28
05/16/2005	2.41	70.8	102	27.8	47	86	10	1.0
06/01/2005	31.0	88.7	340	35.3	230	76	97	18
06/13/2005	2.27	58.1	98	27.2	38	86	9	.83
07/25/2005	1.11	61.3	88	26.7	38	77	5	.22
08/23/2005	1.09	48.4	70	31.9	43	81	4	.16

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323600—Silver Bow Creek at Opportunity

Date	Time	Stream-flow, instanta-neous (ft³/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Mag-nesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/15/2004	1635	21	8.4	565	3.0	200	59.9	13.2	11.0
03/08/2005	1330	26	8.8	558	7.5	200	57.4	12.7	12.5
04/18/2005	1505	37	9.0	492	6.0	180	52.8	11.1	12.4
05/17/2005	0710	165	7.9	316	6.5	110	34.6	6.44	10.3
06/01/2005	1720	119	8.2	319	8.5	120	38.7	6.60	9.5
06/13/2005	1210	95	8.6	332	10.5	130	39.5	7.32	10.8
07/26/2005	0735	27	8.2	493	11.0	180	52.5	11.3	16.6
08/24/2005	0720	17	8.1	597	10.5	230	66.5	14.9	13.7

Date	Arsenic, unfiltered recoverable (µg/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)
12/15/2004	14	0.88	1.21	30.0	81.3	14	460	0.40
03/08/2005	17	.78	1.29	32.7	93.2	9	550	.30
04/18/2005	17	.39	.94	23.1	87.8	9	570	.23
05/17/2005	46	.57	4.09	41.0	554	83	4,730	1.49
06/01/2005	80	.49	3.87	36.2	472	62	9,190	.93
06/13/2005	16	.24	.79	24.0	93.0	63	640	.96
07/26/2005	19.2	.23	.78	18.5	79.6	23	450	.58
08/24/2005	18.3	2.72	3.85	60.0	206	13	440	.40

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/15/2004	12.7	359	391	256	315	83	11	0.62
03/08/2005	15.1	489	482	157	263	86	11	.77
04/18/2005	14.5	341	426	65.1	216	80	13	1.3
05/17/2005	125	352	829	203	791	66	202	90
06/01/2005	149	335	1,050	147	1,100	73	93	30
06/13/2005	17.6	159	213	77.2	159	89	18	4.6
07/26/2005	12.3	180	241	63.5	168	90	11	.80
08/24/2005	13.0	713	799	611	856	81	14	.64

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323670—Mill Creek near Anaconda

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/15/2004	1330	10	8.3	179	3.0	82	21.7	6.75	9.8
03/08/2005	0940	7.4	8.6	195	3.5	92	24.4	7.58	8.7
04/18/2005	1155	14	8.2	161	4.0	72	19.3	5.71	11.3
05/16/2005	1315	113	7.7	86	8.0	33	9.40	2.25	19.1
06/01/2005	1410	153	8.0	67	6.0	28	8.29	1.83	11.7
06/22/2005	1145	165	7.8	56	9.5	24	7.12	1.45	7.3
07/25/2005	1440	27	8.2	129	13.0	58	16.6	4.08	23.4
08/23/2005	1305	12	8.5	169	15.0	78	21.8	5.60	21.3

Date	Arsenic, unfiltered recoverable (µg/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)
12/15/2004	10	0.08	0.05	1.0	1.3	41	90	0.17
03/08/2005	9	.11	.05	1.1	1.9	27	90	E.05
04/18/2005	13	.04	.06	1.6	2.8	42	130	.10
05/16/2005	25	.05	.18	4.5	10.3	62	620	.24
06/01/2005	15	.04	.08	3.8	5.7	35	170	.11
06/22/2005	10	.04	.15	2.4	7.2	26	590	.08
07/25/2005	25.5	.05	.08	2.6	4.3	80	170	.22
08/23/2005	23.8	.04	.07	1.7	2.9	89	180	.16

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/15/2004	0.27	6.4	7	1.2	E1	81	1	0.03
03/08/2005	.31	7.0	9	1.1	E1	75	2	.04
04/18/2005	.54	5.8	13	1.3	E2	78	2	.08
05/16/2005	3.12	5.9	37	2.1	8	64	29	8.8
06/01/2005	.83	3.6	11	2.4	4	51	6	2.5
06/22/2005	2.35	5.1	36	1.6	7	57	29	13
07/25/2005	.59	8.9	17	1.2	3	79	2	.15
08/23/2005	.57	6.8	18	.8	E2	75	3	.10

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323700—Mill Creek at Opportunity

Date	Time	Stream-flow, instanta-neous (ft^3/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Mag-nesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/15/2004	1515	2.0	8.0	200	2.0	86	23.6	6.66	18.6
03/08/2005	1150	.48	8.1	214	5.0	94	25.8	7.12	9.0
04/18/2005	1340	.43	7.8	222	6.5	98	27.0	7.38	10.2
05/16/2005	1600	68	7.8	95	9.0	36	10.1	2.56	27.0
06/01/2005	1555	117	7.9	72	7.0	31	8.91	2.04	18.2
06/22/2005	1405	117	7.9	61	13.0	25	7.36	1.56	14.7
07/25/2005	1615	5.5	8.2	147	16.5	65	18.6	4.56	36.6
08/23/2005	1500	1.1	8.1	190	18.5	83	23.9	5.74	25.8

Date	Arsenic, unfiltered recoverable (µg/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)
12/15/2004	20	0.08	0.10	1.7	2.2	57	100	0.14
03/08/2005	10	.07	.07	1.2	2.2	64	120	<.08
04/18/2005	12	.05	.07	1.5	2.5	70	130	E.06
05/16/2005	46	.08	.63	6.1	27.8	64	1,510	.31
06/01/2005	24	.07	.29	4.7	9.9	40	490	.15
06/22/2005	21	.06	.25	3.5	12.4	31	710	.14
07/25/2005	40.0	.06	.08	3.2	4.5	90	140	.23
08/23/2005	27.9	.05	.06	2.1	3.0	75	120	E.07

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/15/2004	0.17	14.1	13	5.2	5	77	2	0.01
03/08/2005	.08	32.8	27	3.9	4	67	1	<.01
04/18/2005	.15	27.1	30	3.8	4	80	1	<.01
05/16/2005	9.55	7.5	79	4.5	28	65	81	15
06/01/2005	2.22	4.0	24	3.8	12	26	29	9.2
06/22/2005	3.86	4.1	37	2.8	12	44	45	14
07/25/2005	.40	11.1	14	2.8	3	77	1	.01
08/23/2005	.15	15.5	19	1.7	2	90	1	<.01

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323710—Willow Creek near Anaconda

Date	Time	Stream-flow, instanta-neous (ft³/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Mag-nesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/15/2004	1145	1.0	7.9	113	0.5	40	13.4	1.65	12.8
03/09/2005	1125	1.0	8.2	114	2.0	41	13.7	1.61	9.9
04/21/2005	0750	1.9	7.7	114	0.5	42	13.9	1.69	11.1
05/16/2005	1200	39	7.5	66	6.0	23	7.74	.877	16.6
06/02/2005	0745	26	7.8	80	5.0	31	10.6	1.04	12.2
06/22/2005	1015	13	7.8	95	10.0	37	12.8	1.22	12.9
07/25/2005	1340	3.3	7.9	102	11.0	38	13.0	1.30	19.8
08/23/2005	1210	1.9	7.6	108	13.0	40	13.6	1.41	24.3

Date	Arsenic, unfiltered recoverable (µg/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)
12/15/2004	13	E0.03	E0.03	1.2	1.5	43	110	0.11
03/09/2005	10	E.02	E.03	1.0	1.7	36	90	E.05
04/21/2005	13	E.03	.06	1.9	2.9	55	190	E.07
05/16/2005	21	.04	.19	4.2	10.5	125	1,260	.37
06/02/2005	14	E.03	.06	3.1	4.1	68	270	.15
06/22/2005	14	.05	.04	2.1	2.8	45	130	.12
07/25/2005	20.7	E.03	.06	2.4	3.0	66	170	.16
08/23/2005	27.0	E.04	.07	1.8	3.4	90	290	.18

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/15/2004	0.25	17.8	20	1.7	E1	86	4	0.01
03/09/2005	.20	13.1	15	1.1	E1	77	3	.01
04/21/2005	.48	18.2	29	1.5	2	92	4	.02
05/16/2005	4.08	11.5	49	2.5	10	44	93	9.8
06/02/2005	.75	11.4	19	2.5	3	46	13	.91
06/22/2005	.35	16.4	19	1.9	2	76	5	.18
07/25/2005	.47	20.0	30	3.3	E2	89	4	.04
08/23/2005	.84	23.0	49	1.4	3	94	9	.05

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323720—Willow Creek at Opportunity

Date	Time	Stream-flow, instanta-neous (ft^3/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Mag-nesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/15/2004	1540	6.2	8.2	305	5.5	130	37.0	9.31	13.3
03/08/2005	1225	4.5	8.3	298	8.5	130	36.5	8.72	11.5
04/18/2005	1410	5.6	8.3	340	6.0	150	42.0	10.5	18.8
05/16/2005	1635	47	7.7	210	12.0	80	23.4	5.18	68.9
06/01/2005	1625	53	8.0	272	10.0	120	34.8	7.57	117
06/22/2005	1435	23	8.3	348	20.5	170	47.3	12.3	164
07/25/2005	1650	6.5	8.5	318	16.0	160	44.3	10.9	22.2
08/23/2005	1525	5.4	8.4	312	16.5	140	39.8	9.00	17.0

Date	Arsenic, unfiltered recoverable (µg/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)
12/15/2004	14	E0.02	0.05	2.1	6.4	26	140	.18
03/08/2005	13	E.03	.05	1.9	4.7	20	120	.09
04/18/2005	21	E.03	.07	2.8	7.7	20	180	.10
05/16/2005	84	.06	.52	13.0	48.8	111	1,420	.52
06/01/2005	133	.11	.28	21.4	37.0	91	520	.47
06/22/2005	164	.06	.12	11.0	17.0	41	220	.24
07/25/2005	22.5	E.02	E.04	2.9	4.0	8	50	E.06
08/23/2005	18.1	E.03	.04	3.0	4.6	9	60	E.06

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/15/2004	1.18	20.1	21	2.9	5	89	5	0.08
03/08/2005	.98	33.0	30	2.3	5	86	4	.05
04/18/2005	1.62	45.7	56	4.2	9	95	4	.06
05/16/2005	14.4	47.7	104	16.7	68	75	84	11
06/01/2005	5.09	25.8	49	17.9	35	70	27	3.9
06/22/2005	1.97	17.0	29	4.6	10	86	10	.62
07/25/2005	.47	5.9	8	1.7	2	96	2	.04
08/23/2005	.64	5.8	10	1.9	3	81	2	.03

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323750—Silver Bow Creek at Warm Springs

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/16/2004	0830	39	8.7	638	2.0	270	74.7	19.7	15.8
03/08/2005	1435	37	8.9	631	7.0	270	78.1	18.9	11.1
04/18/2005	1615	34	8.6	685	7.0	310	87.6	21.1	9.8
05/17/2005	0840	270	8.8	442	8.0	170	45.5	13.3	36.9
06/02/2005	0930	249	9.1	356	8.0	150	41.6	10.1	29.2
06/23/2005	1250	183	9.0	407	12.0	180	52.1	10.9	26.2
07/26/2005	0835	42	8.6	512	13.5	240	68.5	15.7	27.0
08/24/2005	0820	30	8.8	590	13.5	260	76.3	17.8	31.1

Date	Arsenic, unfiltered recoverable (µg/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)
12/16/2004	17	0.16	0.19	6.6	10.1	E5	110	E0.08
03/08/2005	13	.08	.15	4.7	10.2	E6	190	<.08
04/18/2005	13	E.03	.08	2.7	7.8	E4	250	E.05
05/17/2005	49	E.03	.37	6.6	28.8	72	1,000	.25
06/02/2005	34	.04	.12	6.6	13.4	37	240	.12
06/23/2005	28	.07	.14	7.7	11.4	22	200	.11
07/26/2005	28.6	E.03	.06	3.3	5.1	16	140	E.07
08/24/2005	32.5	E.04	.07	2.9	4.4	6	120	<.08

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/16/2004	0.35	78.0	80	6.5	10	79	4	0.42
03/08/2005	.58	168	189	4.6	12	87	4	.40
04/18/2005	1.09	195	245	4.7	12	82	3	.28
05/17/2005	6.72	175	304	4.3	38	89	37	27
06/02/2005	1.18	207	265	3.4	14	87	5	3.4
06/23/2005	1.06	192	222	6.6	13	88	4	2.0
07/26/2005	.58	62.8	135	3.5	5	75	3	.34
08/24/2005	.55	55.0	127	3.7	5	72	3	.24

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323770—Warm Springs Creek at Warm Springs

Date	Time	Streamflow, instantaneous (ft³/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/16/2004	0815	22	8.3	424	0.0	210	64.3	12.4	4.5
04/18/2005	1550	22	8.5	430	5.5	220	67.9	12.8	6.3
05/17/2005	0745	94	8.1	281	7.0	130	40.2	7.68	8.2
06/02/2005	0855	177	8.0	176	5.5	84	26.3	4.30	6.1
07/26/2005	0810	50	8.2	295	10.0	150	47.0	7.81	6.9
08/24/2005	0800	39	8.3	338	10.5	170	52.2	8.99	6.5

Date	Arsenic, unfiltered recoverable (µg/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)
12/16/2004	5	0.05	0.08	2.1	7.2	9	70	<0.08
04/18/2005	7	.04	.08	3.0	6.6	7	60	<.08
05/17/2005	22	.04	.41	5.1	108	20	1,700	.10
06/02/2005	11	E.03	.17	5.0	45.5	23	670	.09
07/26/2005	7.6	E.03	.07	2.9	8.2	18	90	E.06
08/24/2005	7.2	E.04	.07	2.6	8.7	16	100	E.05

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/16/2004	0.36	394	435	3.0	3	73	9	0.53
04/18/2005	.23	219	242	1.1	2	73	2	.12
05/17/2005	10.3	160	1,270	2.0	39	60	106	27
06/02/2005	3.90	65.3	298	7.6	17	63	37	18
07/26/2005	.51	217	249	1.5	3	74	4	.54
08/24/2005	.55	177	255	1.4	3	67	4	.42

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323800—Clark Fork near Galen

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/16/2004	1005	65	9.0	569	1.0	250	72.3	17.0	11.4
03/08/2005	1550	54	8.7	593	8.0	280	81.7	17.6	9.1
04/19/2005	0745	59	8.2	592	5.0	280	82.3	18.1	7.3
05/17/2005	0955	383	8.6	401	9.0	160	44.5	12.1	29.6
06/02/2005	1050	427	8.8	289	8.5	120	35.3	6.90	20.4
06/22/2005	1615	566	8.6	218	16.5	93	28.7	5.29	21.0
07/26/2005	0950	77	8.4	390	13.0	190	58.0	11.7	15.2
08/23/2005	1700	70	9.0	440	18.0	220	63.9	13.5	20.1

Date	Arsenic, unfiltered recoverable (µg/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)
12/16/2004	12	0.12	0.17	4.9	9.3	7	90	<0.08
03/08/2005	11	.07	.13	4.8	12.2	E4	180	<.08
04/19/2005	10	.06	.12	4.8	8.2	11	210	E.04
05/17/2005	50	E.03	.64	6.8	89.3	63	2,030	.22
06/02/2005	27	.04	.18	6.8	31.3	29	520	.10
06/22/2005	28	E.03	.22	7.8	53.3	18	780	.12
07/26/2005	16.1	E.04	.06	4.0	8.1	13	100	E.06
08/23/2005	21.5	E.03	.07	4.0	9.0	7	120	E.05

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/16/2004	0.36	158	152	5.3	9	96	2	0.35
03/08/2005	.82	176	208	4.4	12	79	6	.87
04/19/2005	.98	204	274	7.2	12	84	4	.64
05/17/2005	14.3	177	785	3.2	80	67	94	97
06/02/2005	2.94	116	307	2.8	20	71	20	23
06/22/2005	4.95	52.5	251	2.4	24	70	35	53
07/26/2005	.57	91.3	152	2.3	5	85	4	.83
08/23/2005	.80	41.1	139	1.2	6	76	4	.76

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323840—Lost Creek near Anaconda

Date	Time	Streamflow, instantaneous (ft³/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/15/2004	1430	4.5	8.4	221	3.0	100	30.8	6.69	2.7
03/08/2005	1100	2.8	8.6	221	4.5	110	31.4	6.79	2.5
04/18/2005	1250	4.0	8.4	211	4.5	100	30.3	6.46	2.8
05/16/2005	1400	8.3	7.4	163	8.5	50	15.7	2.71	156
06/01/2005	1500	15	8.2	170	7.0	84	26.0	4.60	8.0
06/22/2005	1310	17	8.2	176	13.0	87	27.2	4.48	10.2
07/25/2005	1520	.97	8.4	227	13.0	110	35.7	6.16	9.3
08/23/2005	1400	4.0	8.3	224	14.5	110	33.9	6.11	5.6

Date	Arsenic, unfiltered recoverable (µg/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)
12/15/2004	3	E0.02	E0.02	1.2	1.7	<6	30	<0.08
03/08/2005	2	.05	E.03	1.5	4.5	<6	60	<.08
04/18/2005	3	E.03	E.04	1.5	3.6	E4	60	<.08
05/16/2005	3,860	.90	147	90.5	29,100	25	99,700	.18
06/01/2005	11	.04	.11	4.5	18.9	15	640	E.06
06/22/2005	10	.04	.07	3.4	8.2	11	210	E.04
07/25/2005	8.9	.04	.04	3.3	4.4	8	20	<.08
08/23/2005	6.2	.05	.08	3.6	8.9	<6	160	E.05

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/15/2004	0.13	0.5	1	1.2	3	83	3	0.04
03/08/2005	.38	.8	2	1.0	3	87	11	.08
04/18/2005	.35	.9	3	1.1	E2	66	2	.02
05/16/2005	1,290	42.4	8,830	30.0	7,780	97	58,900	1,320
06/01/2005	2.80	2.0	18	1.8	11	30	53	2.1
06/22/2005	.95	2.3	8	1.7	4	41	16	.73
07/25/2005	.18	1.9	3	1.2	2	73	1	<.01
08/23/2005	.70	1.2	6	1.3	4	80	8	.09

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12323850—Lost Creek near Galen

Date	Time	Stream-flow, instanta-neous (ft^3/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Mag-nesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/16/2004	0935	43	8.7	618	1.5	310	89.0	20.3	8.7
03/08/2005	1520	37	8.7	627	9.5	320	95.5	20.9	13.7
04/19/2005	0720	42	8.3	702	4.0	380	109	25.5	15.9
05/17/2005	0925	20	8.2	934	8.5	450	122	35.7	36.9
06/02/2005	1020	11	8.4	705	8.5	340	97.0	24.6	12.6
06/22/2005	1545	11	8.5	663	22.0	330	93.6	24.4	15.7
07/26/2005	0930	2.4	8.0	668	13.0	310	85.2	24.0	24.6
08/23/2005	1630	5.6	8.3	680	18.0	330	92.9	24.4	23.6

Date	Arsenic, unfiltered recoverable (µg/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)
12/16/2004	8	E0.02	0.04	1.7	4.0	E5	80	<0.08
03/08/2005	14	E.03	.04	2.6	7.4	E5	80	<.08
04/19/2005	15	.04	.09	2.9	10.1	10	160	E.04
05/17/2005	37	E.03	.06	5.4	18.7	61	110	E.06
06/02/2005	14	E.02	.06	2.6	6.3	14	50	E.05
06/22/2005	15	E.02	E.03	3.0	4.4	7	40	<.08
07/26/2005	24.7	.04	.08	3.2	6.3	25	80	.11
08/23/2005	23.4	E.04	.07	3.5	6.1	17	80	.10

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/16/2004	0.25	6.1	8	2.4	4	29	29	3.4
03/08/2005	.33	13.5	14	2.3	3	63	10	1.0
04/19/2005	.63	15.7	24	3.8	7	65	15	1.7
05/17/2005	.38	39.5	45	2.8	8	67	7	.38
06/02/2005	.12	8.3	10	1.3	2	49	11	.33
06/22/2005	.19	3.8	6	1.2	E1	36	17	.50
07/26/2005	.45	28.3	32	3.6	3	76	6	.04
08/23/2005	.39	11.3	17	1.7	2	72	5	.08

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12324200—Clark Fork at Deer Lodge

Date	Time	Stream-flow, instanta-neous (ft³/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Mag-nesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/16/2004	1105	186	8.4	541	1.0	240	71.5	16.0	9.1
03/08/2005	1705	146	8.7	565	8.0	270	78.6	17.2	10.2
04/18/2005	1735	152	8.6	605	7.0	280	82.0	18.7	11.5
05/17/2005	1110	436	8.1	438	10.0	180	51.6	13.2	18.2
06/02/2005	1200	552	8.2	353	9.5	150	44.3	10.2	20.8
06/23/2005	0715	698	8.1	259	15.0	110	35.0	6.53	19.3
07/26/2005	1055	88	8.5	484	14.5	210	64.0	13.2	16.2
08/24/2005	0935	90	8.1	524	12.0	240	70.6	14.7	14.2

Date	Arsenic, unfiltered recoverable (µg/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)
12/16/2004	11	0.06	0.15	4.4	20.0	6	290	E0.04
03/08/2005	12	.06	.13	6.0	22.9	7	300	E.06
04/18/2005	13	.05	.14	5.4	18.8	E4	250	E.06
05/17/2005	78	E.04	2.06	10.6	468	41	6,960	.40
06/02/2005	39	.06	.52	12.7	97.6	35	1,690	.20
06/23/2005	31	.07	.43	11.4	96.8	23	1,740	.19
07/26/2005	17.1	.06	.06	8.6	11.8	7	40	E.07
08/24/2005	15.9	.06	.07	8.4	14.2	6	70	E.04

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/16/2004	2.13	47.0	74	8.4	23	78	17	8.5
03/08/2005	2.46	66.5	95	4.2	20	79	14	5.5
04/18/2005	1.95	51.2	88	5.1	19	84	10	4.1
05/17/2005	61.7	97.9	1,010	9.3	359	67	387	456
06/02/2005	14.1	35.6	339	8.1	87	58	83	124
06/23/2005	14.2	18.3	255	7.4	72	37	114	215
07/26/2005	.37	13.0	18	5.1	7	82	1	.24
08/24/2005	.69	21.6	47	10.8	13	79	3	.73

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12324680—Clark Fork at Goldcreek

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/16/2004	1255	322	8.8	458	1.0	210	60.1	13.3	7.2
03/09/2005	1410	312	8.8	442	8.0	210	61.0	13.3	7.9
04/19/2005	0915	365	8.4	446	4.5	210	60.7	13.6	7.5
05/17/2005	1315	1,460	8.2	280	10.0	110	31.9	7.34	9.6
06/02/2005	1400	1,880	8.1	286	8.5	130	36.7	8.19	11.1
06/23/2005	1015	1,500	8.2	253	14.5	120	35.7	6.83	12.4
07/26/2005	1225	248	8.5	392	16.5	190	55.4	11.5	10.5
08/24/2005	1055	221	8.4	431	13.5	200	58.3	12.3	10.9

Date	Arsenic, unfiltered recoverable (µg/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)
12/16/2004	8	E0.03	0.10	3.1	14.1	E4	200	<0.08
03/09/2005	10	.05	.12	4.9	21.4	7	390	E.06
04/19/2005	8	E.03	.14	3.7	17.5	19	330	E.05
05/17/2005	24	E.03	.60	6.3	99.5	60	2,690	.33
06/02/2005	22	.05	.43	9.3	74.7	48	2,110	.25
06/23/2005	18	.07	.29	9.1	62.7	21	940	.19
07/26/2005	11.1	E.03	.05	4.5	6.1	7	50	<.08
08/24/2005	11.1	E.03	.04	5.0	7.6	E5	70	<.08

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/16/2004	1.52	16.8	54	3.4	16	85	10	8.7
03/09/2005	2.38	27.0	71	2.7	21	78	19	16
04/19/2005	2.08	19.5	68	4.5	21	82	14	14
05/17/2005	16.6	23.7	314	4.5	104	74	148	583
06/02/2005	12.2	17.4	257	6.7	89	44	143	726
06/23/2005	7.79	12.3	138	5.1	44	61	52	211
07/26/2005	.18	10.0	20	1.8	3	72	2	1.3
08/24/2005	.33	7.7	32	2.3	5	74	4	2.4

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12331800—Clark Fork near Drummond

Date	Time	Stream-flow, instanta-neous (ft³/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Mag-nesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/20/2004	0930	451	8.5	487	3.0	220	63.4	15.7	7.5
03/09/2005	1515	447	8.6	473	10.0	230	65.5	15.6	8.6
04/18/2005	1020	469	8.4	477	7.5	230	66.2	16.2	9.3
05/17/2005	1515	1,810	8.2	289	11.0	120	34.7	8.44	9.5
06/02/2005	1630	2,210	8.2	312	9.5	140	39.6	10.1	12.2
06/23/2005	1150	2,030	8.2	289	16.0	130	39.7	8.16	12.9
07/26/2005	1340	323	8.5	495	18.5	240	67.5	16.7	11.5
08/24/2005	1210	270	8.4	536	15.5	260	72.8	18.1	11.6

Date	Arsenic, unfiltered recoverable (µg/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)
12/20/2004	8	0.30	0.10	2.6	12.3	12	220	E0.05
03/09/2005	10	.05	.17	4.9	24.5	E5	470	E.07
04/18/2005	11	E.03	.17	3.8	24.7	E6	510	E.07
05/17/2005	24	E.03	.55	6.4	77.7	51	2,280	.40
06/02/2005	30	.07	.82	12.8	146	37	3,320	.29
06/23/2005	18	.07	.28	8.6	48.3	14	880	.18
07/26/2005	12.7	E.04	.04	4.3	6.1	<6	40	E.04
08/24/2005	11.7	E.03	E.04	4.2	6.3	7	50	<.08

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/20/2004	1.78	11.5	53	5.0	17	74	14	17
03/09/2005	3.45	20.1	78	3.7	31	78	27	33
04/18/2005	4.11	17.8	98	4.0	35	85	26	33
05/17/2005	17.8	23.7	295	4.9	104	80	132	645
06/02/2005	23.0	18.1	403	9.0	201	61	222	1,320
06/23/2005	7.48	14.0	137	5.4	45	69	49	269
07/26/2005	.30	11.7	21	2.9	5	77	5	4.4
08/24/2005	.45	7.3	30	2.6	6	72	8	5.8

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12334550—Clark Fork at Turah Bridge, near Bonner

Date	Time	Streamflow, instantaneous (ft^3/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/20/2004	1055	702	8.6	390	2.0	170	48.6	12.7	5.0
03/09/2005	1630	702	8.7	383	8.5	180	50.2	12.9	5.8
04/20/2005	1530	900	8.5	343	7.0	160	43.9	11.8	5.2
05/17/2005	1710	3,340	8.1	186	11.5	77	21.4	5.63	4.7
06/03/2005	1045	4,310	8.1	214	9.0	95	27.3	6.57	7.4
06/29/2005	1020	3,130	8.3	263	13.0	120	35.7	8.01	8.7
07/26/2005	1505	746	8.8	312	18.5	150	40.1	11.0	5.9
08/24/2005	1320	520	8.6	360	14.5	170	48.4	12.9	5.9

Date	Arsenic, unfiltered recoverable (µg/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)
12/20/2004	5	0.10	0.06	2.0	6.6	<6	120	<0.08
03/09/2005	6	E.03	.10	3.6	14.6	E3	280	E.04
04/20/2005	6	<.04	.10	2.4	12.2	6	290	E.05
05/17/2005	10	E.02	.42	3.6	48.1	47	1,700	.23
06/03/2005	16	E.04	.40	6.9	62.8	46	1,700	.24
06/29/2005	11	.05	.16	5.7	25.9	22	550	.12
07/26/2005	6.1	<.04	E.03	2.4	3.7	E4	30	<.08
08/24/2005	6.0	<.04	E.03	2.5	4.6	<6	70	<.08

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/20/2004	0.86	3.0	24	3.1	10	88	7	13
03/09/2005	2.07	7.3	51	2.3	21	82	17	32
04/20/2005	2.10	5.4	49	2.2	20	81	15	36
05/17/2005	10.3	12.1	221	3.6	81	65	123	1,110
06/03/2005	10.9	7.5	221	5.9	93	68	110	1,280
06/29/2005	4.01	8.2	79	4.6	30	66	35	296
07/26/2005	.18	4.4	11	1.3	3	82	2	4.0
08/24/2005	.35	3.9	19	1.6	5	75	5	7.0

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12340000—Blackfoot River near Bonner

Date	Time	Streamflow, instantaneous (ft³/s)	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Temperature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/20/2004	1215	641	8.4	240	2.0	120	30.2	11.0	0.9
04/20/2005	1415	1,570	8.4	185	6.5	91	23.2	7.99	.8
05/18/2005	0930	5,250	8.2	161	9.0	77	20.2	6.51	.8
06/03/2005	0845	4,070	8.3	172	9.0	89	23.6	7.28	.8
07/27/2005	0745	772	8.4	247	15.0	130	32.6	12.3	1.2
08/24/2005	1455	E540	8.6	257	16.0	140	33.6	12.7	1.4

Date	Arsenic, unfiltered recoverable (µg/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)
12/20/2004	<2	E0.02	<0.04	E0.4	E0.3	<6	30	<0.08
04/20/2005	<2	<.04	<.04	.9	1.2	12	100	<.08
05/18/2005	<2	<.04	E.03	1.1	4.8	24	750	E.05
06/03/2005	<2	E.02	<.04	.9	2.7	29	400	0.09
07/27/2005	1.1	<.04	<.04	.6	1.2	E5	50	<.08
08/24/2005	1.5	<.04	<.04	.6	0.7	E4	30	<.08

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/20/2004	<0.06	0.8	2	<0.6	<2	73	2	3.5
04/20/2005	.13	1.9	12	.9	<2	81	6	25
05/18/2005	1.34	2.1	54	1.1	6	87	66	936
06/03/2005	.62	1.7	33	.6	4	89	33	363
07/27/2005	.10	1.6	9	.7	E1	82	4	8.3
08/24/2005	E.04	1.5	6	.6	<2	81	2	E2.9

Table 4. Water-quality data for the upper Clark Fork basin, Montana, October 2004 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeters; ton/d, tons per day. Symbol: <, less than laboratory reporting level]

12340500—Clark Fork above Missoula

Date	Time	Stream-flow, instanta-neous (ft^3/s)	pH, onsite (standard units)	Specific conduct-ance, onsite (µS/cm)	Temper-ature, water (°C)	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Mag-nesium, filtered (mg/L)	Arsenic, filtered (µg/L)
12/20/2004	1350	1,290	8.6	323	3.0	150	40.5	12.2	3.2
03/10/2005	0750	1,280	8.4	312	7.0	150	40.3	11.8	3.6
04/20/2005	1030	2,360	8.4	248	7.0	120	31.2	9.30	2.5
05/18/2005	0715	9,110	8.1	170	9.5	77	20.7	6.11	2.7
06/03/2005	0645	7,960	8.2	193	9.0	91	25.1	6.79	4.0
06/29/2005	1235	5,180	8.3	243	13.5	120	32.9	8.39	5.4
07/27/2005	0900	1,430	8.5	276	18.0	140	37.0	11.6	3.8
08/24/2005	1630	959	8.5	306	16.0	150	39.4	12.3	3.7

Date	Arsenic, unfiltered recoverable (µg/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)
12/20/2004	3	E0.03	0.04	1.4	3.3	<6	70	<0.08
03/10/2005	3	<.04	.05	2.1	6.5	7	120	E.05
04/20/2005	2	<.04	.06	1.4	5.5	13	150	E.05
05/18/2005	6	<.04	.22	2.3	26.2	43	1,260	.16
06/03/2005	7	E.03	.21	4.2	31.9	32	930	.17
06/29/2005	6	E.03	.10	4.3	14.8	16	330	.09
07/27/2005	4.0	<.04	.06	2.4	6.1	9	80	E.05
08/24/2005	3.9	<.04	E.03	1.8	4.2	7	80	E.04

Date	Lead, unfiltered recoverable (µg/L)	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment, suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)	Sediment discharge, suspended (ton/d)
12/20/2004	0.43	7.5	12	2.3	6	86	5	17
03/10/2005	.73	30.3	34	6.3	9	90	7	24
04/20/2005	.83	14.1	25	1.5	9	92	9	57
05/18/2005	5.91	8.8	121	2.4	44	90	89	2,190
06/03/2005	5.32	8.0	122	3.9	48	90	55	1,180
06/29/2005	2.23	13.6	49	3.8	19	89	18	252
07/27/2005	.52	13.8	25	1.3	8	92	5	19
08/24/2005	.46	14.1	30	1.2	5	84	5	13

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2004 through September 2005.

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; milligrams per liter; min, minimum; mg/L, ton/d, tons per day. Symbol: ---, no data or value not computed]

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	126	11	3.7	154	15	6.2	e140	20	7.6
2	132	10	3.6	160	20	8.6	e160	19	8.2
3	135	10	3.6	168	21	9.5	171	18	8.3
4	132	10	3.6	168	19	8.6	172	17	7.9
5	133	10	3.6	165	16	7.1	175	16	7.6
6	132	10	3.6	172	13	6.0	179	15	7.2
7	130	11	3.9	168	11	5.0	178	15	7.2
8	132	11	3.9	164	11	4.9	177	14	6.7
9	130	12	4.2	168	12	5.4	178	14	6.7
10	136	12	4.4	170	13	6.0	183	16	7.9
11	152	14	5.7	170	14	6.4	195	19	10
12	163	17	7.5	168	14	6.4	196	20	11
13	164	18	8.0	165	14	6.2	183	20	9.9
14	171	18	8.3	166	15	6.7	189	19	9.7
15	169	15	6.8	168	15	6.8	189	18	9.2
16	165	13	5.8	177	18	8.6	185	17	8.5
17	160	12	5.2	173	21	9.8	185	16	8.0
18	166	12	5.4	173	22	10	183	17	8.4
19	163	12	5.3	175	22	10	187	18	9.1
20	168	12	5.4	180	21	10	187	19	9.6
21	175	16	7.6	169	20	9.1	171	20	9.2
22	169	14	6.4	172	20	9.3	e160	20	8.6
23	165	13	5.8	192	20	10	e130	21	7.4
24	162	12	5.2	200	23	12	e160	21	9.1
25	158	11	4.7	214	26	15	174	22	10
26	154	11	4.6	222	26	16	e180	24	12
27	156	12	5.1	202	26	14	e180	28	14
28	163	12	5.3	e190	24	12	e170	30	14
29	168	13	5.9	e170	22	10	e170	27	12
30	164	13	5.8	e150	20	8.1	176	23	11
31	158	13	5.5	---	---	---	e150	20	8.1
Total	**4,751**	**---**	**163.4**	**5,253**	**---**	**263.7**	**5,413**	**---**	**284.1**
Mean	**153**	**13**	**5.3**	**175**	**18**	**8.8**	**175**	**19**	**9.2**
Max	**175**	**18**	**8.3**	**222**	**26**	**16**	**196**	**30**	**14**
Min	**126**	**10**	**3.6**	**150**	**11**	**4.9**	**130**	**14**	**6.7**

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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)
	January			February			March		
1	e140	17	6.4	171	31	14	158	16	6.8
2	e140	17	6.4	172	29	13	156	16	6.7
3	e140	19	7.2	172	28	13	155	15	6.3
4	e130	24	8.4	175	26	12	149	15	6.0
5	e120	23	7.5	171	25	12	150	15	6.1
6	e110	20	5.9	157	25	11	151	15	6.1
7	e130	17	6.0	159	24	10	149	15	6.0
8	e150	16	6.5	161	24	10	146	14	5.5
9	e150	16	6.5	151	23	9.4	146	13	5.1
10	e150	16	6.5	154	22	9.1	145	12	4.7
11	e150	16	6.5	156	21	8.8	142	12	4.6
12	e160	16	6.9	164	20	8.9	143	18	6.9
13	e150	16	6.5	164	20	8.9	143	23	8.9
14	e140	16	6.0	158	20	8.5	143	24	9.3
15	e130	16	5.6	150	22	8.9	144	26	10
16	e150	16	6.5	143	23	8.9	145	28	11
17	160	19	8.2	151	23	9.4	146	28	11
18	193	44	23	157	23	9.7	143	28	11
19	250	116	78	161	23	10	143	25	9.7
20	223	73	44	163	23	10	148	20	8.0
21	205	72	40	159	23	9.9	147	18	7.1
22	192	56	29	153	23	9.5	143	18	6.9
23	191	50	26	152	22	9.0	140	18	6.8
24	185	39	19	153	20	8.3	132	18	6.4
25	178	31	15	157	19	8.1	146	19	7.5
26	173	30	14	153	18	7.4	144	19	7.4
27	172	30	14	154	17	7.1	147	20	7.9
28	172	32	15	154	16	6.7	152	20	8.2
29	174	31	15	---	---	---	157	19	8.1
30	173	31	14	---	---	---	150	17	6.9
31	171	31	14	---	---	---	143	14	5.4
Total	**5,052**	**---**	**473.5**	**4,445**	**---**	**271.5**	**4,546**	**---**	**228.3**
Mean	**163**	**31**	**15**	**159**	**23**	**9.7**	**147**	**19**	**7.4**
Max	**250**	**116**	**78**	**175**	**31**	**14**	**158**	**28**	**11**
Min	**110**	**16**	**5.6**	**143**	**16**	**6.7**	**132**	**12**	**4.6**

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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	141	12	4.6	133	14	5.0	403	63	69
2	141	10	3.8	125	12	4.0	522	90	127
3	139	14	5.3	126	9	3.1	518	65	91
4	140	18	6.8	124	12	4.0	511	72	99
5	141	19	7.2	120	12	3.9	484	77	101
6	142	18	6.9	121	22	7.2	533	83	119
7	144	16	6.2	120	22	7.1	577	85	132
8	146	14	5.5	123	51	17	490	33	44
9	148	15	6.0	165	60	27	453	19	23
10	140	14	5.3	249	61	41	412	17	19
11	134	12	4.3	322	61	53	370	22	22
12	131	12	4.2	278	62	47	388	34	36
13	129	14	4.9	237	44	28	418	28	32
14	147	16	6.4	214	39	23	363	15	15
15	153	23	9.5	231	44	27	398	37	40
16	150	19	7.7	270	90	66	448	92	111
17	146	19	7.5	438	330	390	598	205	331
18	150	15	6.1	438	155	183	785	120	254
19	158	16	6.8	435	137	161	690	69	129
20	155	20	8.4	539	210	306	572	82	127
21	150	20	8.1	550	145	215	585	98	155
22	146	17	6.7	520	86	121	656	101	179
23	143	20	7.7	507	85	116	711	102	196
24	142	21	8.1	504	78	106	615	58	96
25	141	20	7.6	448	56	68	512	38	53
26	142	16	6.1	373	42	42	480	35	45
27	144	14	5.4	320	46	40	541	40	58
28	146	20	7.9	313	40	34	571	30	46
29	144	18	7.0	323	34	30	558	25	38
30	142	14	5.4	323	35	31	529	20	29
31	---	---	---	302	27	22	---	---	---
Total	**4,315**	**---**	**193.4**	**9,291**	**---**	**2,228.3**	**15,691**	**---**	**2,816**
Mean	**144**	**17**	**6.4**	**300**	**68**	**72**	**523**	**62**	**94**
Max	**158**	**23**	**9.5**	**550**	**330**	**390**	**785**	**205**	**331**
Min	**129**	**10**	**3.8**	**120**	**9**	**3.1**	**363**	**15**	**15**

Table 5. Daily mean streamflow and suspended-sediment data for Clark Fork at Deer Lodge, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft^3/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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	485	14	18	96	10	2.6	109	29	8.5
2	462	12	15	103	10	2.8	111	28	8.4
3	436	10	12	97	16	4.2	108	24	7.0
4	404	8	8.7	93	19	4.8	102	20	5.5
5	372	7	7.0	82	19	4.2	100	20	5.4
6	319	6	5.2	77	18	3.7	103	22	6.1
7	294	5	4.0	75	17	3.4	102	24	6.6
8	292	4	3.2	73	16	3.2	106	26	7.4
9	268	3	2.2	88	14	3.3	91	26	6.4
10	243	3	2.0	90	12	2.9	108	26	7.6
11	241	3	2.0	85	8	1.8	128	25	8.6
12	213	3	1.7	94	8	2.0	127	24	8.2
13	187	3	1.5	88	6	1.4	133	24	8.6
14	175	5	2.4	91	6	1.5	130	23	8.1
15	166	13	5.8	91	6	1.5	127	23	7.9
16	145	21	8.2	86	5	1.2	124	22	7.4
17	130	22	7.7	84	5	1.1	149	21	8.4
18	125	19	6.4	86	6	1.4	166	20	9.0
19	116	15	4.7	88	8	1.9	165	19	8.5
20	101	10	2.7	88	9	2.1	162	19	8.3
21	95	10	2.6	90	8	1.9	157	18	7.6
22	94	11	2.8	85	6	1.4	155	18	7.5
23	93	12	3.0	96	4	1.0	151	18	7.3
24	91	10	2.5	94	3	.76	174	18	8.5
25	91	6	1.5	94	7	1.8	187	18	9.1
26	98	2	.53	87	14	3.3	179	18	8.7
27	92	12	3.0	85	21	4.8	170	20	9.2
28	83	28	6.3	89	25	6.0	165	20	8.9
29	82	23	5.1	91	26	6.4	168	20	9.1
30	82	17	3.8	100	27	7.3	166	20	9.0
31	85	12	2.8	112	29	8.8	---	---	---
Total	**6,160**	**---**	**154.33**	**2,778**	**---**	**94.46**	**4,123**	**---**	**236.8**
Mean	**199**	**11**	**5.0**	**90**	**13**	**3.0**	**137**	**22**	**7.9**
Max	**485**	**28**	**18**	**112**	**29**	**8.8**	**187**	**29**	**9.2**
Min	**82**	**2**	**.53**	**73**	**3**	**.76**	**91**	**18**	**5.4**

Total for water year 2005 (unrounded sum of the daily values): streamflow, 71,818 ft^3/s (142,500 acre-ft); sediment load, 7,407.79 tons.

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2004 through September 2005.

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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	863	8	19	771	6	12	628	5	8.5
2	851	7	16	753	5	10	683	5	9.2
3	841	6	14	777	4	8.4	701	6	11
4	827	6	13	790	3	6.4	690	6	11
5	820	6	13	762	3	6.2	681	6	11
6	828	6	13	766	3	6.2	684	6	11
7	826	6	13	775	4	8.4	698	6	11
8	822	6	13	770	4	8.3	703	6	11
9	823	6	13	761	4	8.2	713	6	12
10	813	6	13	756	4	8.2	699	6	11
11	799	6	13	756	4	8.2	717	5	9.7
12	807	5	11	747	4	8.1	740	5	10
13	815	5	11	732	4	7.9	717	5	9.7
14	831	6	13	723	4	7.8	668	5	9.0
15	840	8	18	716	4	7.7	725	5	9.8
16	852	9	21	725	4	7.8	707	4	7.6
17	845	8	18	737	4	8.0	687	4	7.4
18	850	8	18	730	4	7.9	684	4	7.4
19	855	8	18	719	4	7.8	686	5	9.3
20	842	7	16	724	4	7.8	697	7	13
21	851	7	16	690	4	7.5	672	7	13
22	858	6	14	654	4	7.1	665	6	11
23	845	6	14	698	4	7.5	e600	6	9.7
24	831	5	11	746	5	10	e500	5	6.8
25	818	5	11	772	6	13	e570	5	7.7
26	798	4	8.6	779	7	15	652	5	8.8
27	793	5	11	744	6	12	633	5	8.5
28	789	6	13	664	6	11	e560	5	7.6
29	787	6	13	674	5	9.1	e500	7	9.4
30	788	6	13	606	5	8.2	e700	11	21
31	781	5	11	---	---	---	670	14	25
Total	**25,589**	**---**	**432.6**	**22,017**	**---**	**261.7**	**20,630**	**---**	**328.1**
Mean	**825**	**6**	**14**	**734**	**4**	**8.7**	**665**	**6**	**11**
Max	**863**	**9**	**21**	**790**	**7**	**15**	**740**	**14**	**25**
Min	**781**	**4**	**8.6**	**606**	**3**	**6.2**	**500**	**4**	**6.8**

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

Day	Mean stream-flow (ft³/s)	Suspended sediment		Mean stream-flow (ft³/s)	Suspended sediment		Mean stream-flow (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	591	14	22	707	10	19	607	9	15
2	e400	10	11	705	9	17	625	12	20
3	e320	6	5.2	689	10	19	629	10	17
4	e270	4	2.9	690	12	22	634	13	22
5	e220	4	2.4	696	13	24	636	14	24
6	e230	4	2.5	674	13	24	648	14	24
7	e280	4	3.0	619	13	22	669	16	29
8	e400	4	4.3	634	12	21	690	18	34
9	e420	4	4.5	639	12	21	708	19	36
10	e420	4	4.5	588	12	19	719	20	39
11	e440	4	4.8	587	12	19	708	21	40
12	e480	4	5.2	607	11	18	707	22	42
13	e540	4	5.8	646	11	19	707	19	36
14	e560	5	7.6	637	10	17	666	17	31
15	e500	5	6.8	609	10	16	660	14	25
16	e400	5	5.4	572	10	15	655	14	25
17	e460	6	7.5	528	10	14	666	14	25
18	e550	13	19	527	9	13	656	12	21
19	e750	30	61	552	8	12	629	12	20
20	926	35	88	593	8	13	641	15	26
21	968	42	110	635	8	14	658	16	28
22	892	21	51	602	7	11	658	16	28
23	850	13	30	584	7	11	650	12	21
24	819	10	22	590	7	11	618	9	15
25	778	9	19	601	6	9.7	604	9	15
26	759	8	16	609	6	9.9	622	11	18
27	746	8	16	604	6	9.8	615	14	23
28	746	8	16	600	7	11	663	18	32
29	744	10	20	---	---	---	735	23	46
30	740	10	20	---	---	---	741	21	42
31	722	10	19	---	---	---	700	14	26
Total	**17,921**	**---**	**612.4**	**17,324**	**---**	**451.4**	**20,524**	**---**	**845**
Mean	**578**	**10**	**20**	**619**	**10**	**16**	**662**	**15**	**27**
Max	**968**	**42**	**110**	**707**	**13**	**24**	**741**	**23**	**46**
Min	**220**	**4**	**2.4**	**527**	**6**	**9.7**	**604**	**9**	**15**

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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	666	13	23	1,080	17	50	2,740	34	252
2	667	15	27	1,020	16	44	3,690	86	857
3	682	16	29	968	13	34	4,340	139	1,630
4	702	16	30	951	13	33	4,710	193	2,450
5	691	13	24	970	12	31	4,970	165	2,210
6	675	13	24	1,030	12	33	4,810	112	1,450
7	676	15	27	1,140	16	49	4,690	91	1,150
8	737	20	40	1,260	22	75	4,450	69	829
9	797	24	52	1,430	32	124	4,100	51	565
10	793	19	41	1,800	57	277	3,830	39	403
11	762	16	33	2,630	131	930	3,490	36	339
12	734	16	32	3,160	165	1,410	3,560	35	336
13	720	16	31	2,760	70	522	3,970	51	547
14	782	16	34	2,480	48	321	3,660	39	385
15	783	15	32	2,400	38	246	3,340	30	271
16	760	16	33	2,540	47	322	3,460	36	336
17	797	23	49	3,100	95	795	3,660	42	415
18	836	24	54	3,760	125	1,270	4,290	84	973
19	871	22	52	3,810	108	1,110	4,180	65	734
20	888	18	43	4,600	136	1,690	3,700	42	420
21	896	17	41	4,540	98	1,200	3,410	36	331
22	883	18	43	4,520	101	1,230	3,290	30	266
23	892	20	48	4,400	67	796	3,260	30	264
24	948	26	67	4,060	55	603	3,090	26	217
25	1,010	28	76	3,710	45	451	2,790	25	188
26	1,090	33	97	3,350	40	362	2,680	23	166
27	1,200	42	136	3,020	32	261	2,710	21	154
28	1,230	29	96	2,790	29	218	3,000	25	202
29	1,160	22	69	2,670	27	195	3,090	32	267
30	1,110	20	60	2,620	27	191	2,920	25	197
31	---	---	---	2,530	23	157	---	---	---
Total	**25,438**	**---**	**1,443**	**81,099**	**---**	**15,030**	**109,880**	**---**	**18,804**
Mean	**848**	**20**	**48**	**2,616**	**55**	**485**	**3,663**	**57**	**627**
Max	**1,230**	**42**	**136**	**4,600**	**165**	**1,690**	**4,970**	**193**	**2,450**
Min	**666**	**13**	**23**	**951**	**12**	**31**	**2,680**	**21**	**154**

Table 6. Daily mean streamflow and suspended-sediment data for Clark Fork at Turah Bridge, near Bonner, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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)
	July			August			September		
1	2,690	18	131	631	4	6.8	517	4	5.6
2	2,410	15	98	664	8	14	519	4	5.6
3	2,220	14	84	660	9	16	515	4	5.6
4	2,080	12	67	630	8	14	513	3	4.2
5	1,950	11	58	599	8	13	512	3	4.1
6	1,830	8	40	574	7	11	507	3	4.1
7	1,700	7	32	544	7	10	506	3	4.1
8	1,600	7	30	536	7	10	501	3	4.1
9	1,530	7	29	547	7	10	499	3	4.0
10	1,490	6	24	549	7	10	538	3	4.4
11	1,450	6	23	545	7	10	564	3	4.6
12	1,410	5	19	537	6	8.7	584	4	6.3
13	1,330	4	14	542	6	8.8	597	4	6.4
14	1,240	4	13	542	6	8.8	612	4	6.6
15	1,170	4	13	543	6	8.8	621	4	6.7
16	1,120	3	9.1	534	5	7.2	610	4	6.6
17	1,050	3	8.5	519	5	7.0	712	10	19
18	1,010	3	8.2	533	5	7.2	837	20	45
19	960	3	7.8	537	5	7.2	835	16	36
20	902	2	4.9	533	5	7.2	796	12	26
21	855	2	4.6	517	5	7.0	757	9	18
22	819	2	4.4	505	5	6.8	736	9	18
23	801	2	4.3	518	5	7.0	758	9	18
24	778	2	4.2	519	5	7.0	788	10	21
25	750	2	4.0	523	5	7.1	856	12	28
26	739	2	4.0	526	5	7.1	859	11	26
27	727	2	3.9	514	5	6.9	839	8	18
28	720	3	5.8	506	4	5.5	820	7	15
29	698	3	5.7	500	4	5.4	801	7	15
30	646	3	5.2	498	4	5.4	794	7	15
31	625	4	6.8	506	4	5.5	---	---	---
Total	**39,300**	**---**	**766.4**	**16,931**	**---**	**266.4**	**19,903**	**---**	**401.0**
Mean	**1,268**	**5**	**25**	**546**	**6**	**8.6**	**663**	**7**	**13**
Max	**2,690**	**18**	**131**	**664**	**9**	**16**	**859**	**20**	**45**
Min	**625**	**2**	**3.9**	**498**	**4**	**5.4**	**499**	**3**	**4.0**

Total for water year 2005 (unrounded sum of daily values): streamflow, 416,556 ft³/s (826,200 acre-ft); sediment load, 39,642 tons.

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2004 through September 2005.

[Abbreviations: acre-ft, acre-feet; ft^3/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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	1,510	6	24	1,370	5	18	1,190	3	9.6
2	1,470	7	28	1,330	4	14	1,250	3	10
3	1,460	7	28	1,370	3	11	1,250	3	10
4	1,440	6	23	1,350	3	11	1,220	3	9.9
5	1,420	5	19	1,370	3	11	1,210	2	6.5
6	1,420	5	19	1,360	3	11	1,200	2	6.5
7	1,430	5	19	1,330	3	11	1,210	2	6.5
8	1,430	6	23	1,370	3	11	1,230	2	6.6
9	1,390	5	19	1,350	3	11	1,230	3	10
10	1,390	5	19	1,350	3	11	1,230	3	10
11	1,370	4	15	1,360	2	7.3	1,280	4	14
12	1,360	4	15	1,350	2	7.3	1,340	3	11
13	1,360	5	18	1,330	2	7.2	1,340	2	7.2
14	1,360	5	18	1,310	2	7.1	1,270	2	6.9
15	1,360	6	22	1,300	2	7.0	1,350	2	7.3
16	1,370	6	22	1,290	2	7.0	1,330	2	7.2
17	1,410	6	23	1,310	3	11	1,310	2	7.1
18	1,450	6	23	1,300	3	11	1,290	2	7.0
19	1,460	5	20	1,270	3	10	1,300	2	7.0
20	1,450	5	20	1,290	2	7.0	1,290	4	14
21	1,450	5	20	1,260	2	6.8	1,280	4	14
22	1,480	4	16	1,170	2	6.3	1,290	3	10
23	1,460	4	16	1,230	3	10	e1,100	2	5.9
24	1,450	4	16	1,300	3	11	e900	2	4.9
25	1,460	3	12	1,390	3	11	e1,100	3	8.9
26	1,410	3	11	1,440	4	16	1,300	3	11
27	1,400	3	11	1,400	4	15	1,210	3	9.8
28	1,390	3	11	1,260	3	10	e1,000	3	8.1
29	1,380	3	11	1,220	3	9.9	e900	3	7.3
30	1,380	3	11	1,140	3	9.2	e1,100	3	8.9
31	1,370	4	15	---	---	---	e1,200	3	9.7
Total	**43,940**	**---**	**567**	**39,470**	**---**	**307.1**	**37,700**	**---**	**272.8**
Mean	**1,417**	**5**	**18**	**1,316**	**3**	**10**	**1,216**	**3**	**8.8**
Max	**1,510**	**7**	**28**	**1,440**	**5**	**18**	**1,350**	**4**	**14**
Min	**1,360**	**3**	**11**	**1,140**	**2**	**6.3**	**900**	**2**	**4.9**

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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	3	7.7	1,450	6	23	1,100	5	15
2	e700	3	5.7	1,470	6	24	1,140	6	18
3	e630	3	5.1	1,420	6	23	1,130	4	12
4	e530	3	4.3	1,380	5	19	1,130	5	15
5	e500	3	4.0	1,390	5	19	1,150	5	16
6	e550	3	4.5	1,370	4	15	1,160	6	19
7	e630	3	5.1	1,260	4	14	1,170	6	19
8	e800	3	6.5	1,230	4	13	1,200	6	19
9	e830	4	9.0	1,270	3	10	1,240	6	20
10	e850	4	9.2	1,220	4	13	1,320	9	32
11	e900	4	9.7	1,190	4	13	1,290	6	21
12	e950	4	10	1,220	5	16	1,340	6	22
13	e1,050	3	8.5	1,210	5	16	1,390	6	23
14	e1,000	3	8.1	1,230	5	17	1,340	9	33
15	e830	3	6.7	1,200	6	19	1,330	8	29
16	e700	3	5.7	1,120	7	21	1,320	7	25
17	e800	3	6.5	1,030	8	22	1,360	7	26
18	e1,000	5	14	1,030	7	19	1,350	9	33
19	e1,250	6	20	1,110	6	18	1,320	7	25
20	e1,500	12	49	1,130	5	15	1,310	7	25
21	e1,900	10	51	1,180	4	13	1,330	7	25
22	e2,100	9	51	1,120	3	9.1	1,350	6	22
23	e2,000	7	38	1,100	2	5.9	1,320	7	25
24	1,920	6	31	1,100	2	5.9	1,280	4	14
25	1,740	4	19	1,100	2	5.9	1,240	6	20
26	1,690	4	18	1,110	3	9.0	1,260	6	20
27	1,660	4	18	1,110	3	9.0	1,260	6	20
28	1,650	5	22	1,090	4	12	1,420	8	31
29	1,630	5	22	---	---	---	1,600	10	43
30	1,610	5	22	---	---	---	1,650	9	40
31	1,530	8	33	---	---	---	1,600	10	43
Total	**36,380**	**---**	**524.3**	**33,840**	**---**	**418.8**	**40,400**	**---**	**750**
Mean	**1,174**	**5**	**17**	**1,209**	**5**	**15**	**1,303**	**7**	**24**
Max	**2,100**	**12**	**51**	**1,470**	**8**	**24**	**1,650**	**10**	**43**
Min	**500**	**3**	**4.0**	**1,030**	**2**	**5.9**	**1,100**	**4**	**12**

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft^3/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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	1,560	10	42	3,450	10	93	5,700	18	277
2	1,560	8	34	3,210	10	87	7,130	30	578
3	1,600	9	39	3,040	9	74	8,140	58	1,270
4	1,660	8	36	2,970	8	64	8,800	81	1,920
5	1,670	8	36	3,000	9	73	9,050	90	2,200
6	1,660	8	36	3,240	8	70	8,980	68	1,650
7	1,680	8	36	3,840	12	124	8,890	60	1,440
8	1,830	8	40	4,530	20	245	8,330	52	1,170
9	2,010	12	65	5,090	27	371	7,620	34	700
10	2,080	10	56	5,690	32	492	6,940	26	487
11	2,080	11	62	6,630	48	859	6,380	25	431
12	2,080	9	51	7,600	116	2,380	6,310	20	341
13	2,070	8	45	7,410	114	2,280	6,780	28	513
14	2,240	8	48	6,740	65	1,180	6,320	28	478
15	2,280	9	55	6,660	55	989	5,970	22	355
16	2,110	10	57	7,060	50	953	5,950	23	369
17	2,200	8	48	8,330	66	1,480	6,130	23	381
18	2,310	10	62	9,070	80	1,960	7,050	54	1,030
19	2,360	9	57	8,680	64	1,500	7,040	44	836
20	2,370	8	51	9,170	71	1,760	6,240	30	505
21	2,380	8	51	8,900	58	1,390	5,820	23	361
22	2,320	10	63	8,580	57	1,320	5,600	20	302
23	2,290	10	62	8,200	53	1,170	5,460	19	280
24	2,610	10	70	7,800	46	969	5,170	15	209
25	2,980	9	72	7,150	36	695	4,790	17	220
26	3,450	13	121	6,600	31	552	4,670	16	202
27	3,930	21	223	6,070	26	426	4,670	14	177
28	4,000	14	151	5,790	22	344	5,020	16	217
29	3,840	13	135	5,680	18	276	5,170	18	251
30	3,630	12	118	5,640	18	274	4,970	16	215
31	---	---	---	5,540	18	269	---	---	---
Total	**70,840**	**---**	**2,022**	**191,360**	**---**	**24,719**	**195,090**	**---**	**19,365**
Mean	**2,361**	**10**	**67**	**6,173**	**41**	**797**	**6,503**	**33**	**646**
Max	**4,000**	**21**	**223**	**9,170**	**116**	**2,380**	**9,050**	**90**	**2,200**
Min	**1,560**	**8**	**34**	**2,970**	**8**	**64**	**4,670**	**14**	**177**

Table 7. Daily mean streamflow and suspended-sediment data for Clark Fork above Missoula, Montana, October 2004 through September 2005.—Continued

[Abbreviations: acre-ft, acre-feet; ft³/s, cubic feet per second; e, estimated; max, maximum; mg/L, milligrams per liter; min, minimum; ton/d, tons per day. Symbol: ---, no data or value not computed]

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)
	July			August			September		
1	4,630	13	163	1,230	7	23	923	3	7.5
2	4,250	9	103	1,220	6	20	940	3	7.6
3	3,990	8	86	1,220	6	20	936	3	7.6
4	3,700	8	80	1,120	5	15	930	3	7.5
5	3,510	8	76	1,100	4	12	899	3	7.3
6	3,280	8	71	1,090	4	12	895	2	4.8
7	3,050	8	66	1,060	4	11	905	3	7.3
8	2,820	8	61	1,060	5	14	911	3	7.4
9	2,730	9	66	1,030	4	11	908	3	7.4
10	2,590	8	56	1,050	4	11	960	3	7.8
11	2,580	7	49	1,030	4	11	1,010	4	11
12	2,510	6	41	1,010	5	14	1,050	4	11
13	2,410	5	33	1,020	5	14	1,050	5	14
14	2,250	5	30	1,040	5	14	1,070	5	14
15	2,220	5	30	1,040	5	14	1,080	4	12
16	2,070	5	28	1,010	4	11	1,050	6	17
17	2,020	5	27	990	5	13	1,170	4	13
18	1,970	5	27	986	4	11	1,330	6	22
19	1,910	5	26	1,030	4	11	1,350	5	18
20	1,810	5	24	1,020	3	8.3	1,310	5	18
21	1,690	5	23	1,000	3	8.1	1,210	5	16
22	1,660	5	22	971	3	7.9	1,190	5	16
23	1,590	5	21	984	3	8.0	1,220	6	20
24	1,520	5	21	977	4	11	1,240	5	17
25	1,470	5	20	960	4	10	1,320	5	18
26	1,450	5	20	973	3	7.9	1,340	5	18
27	1,430	6	23	962	3	7.8	1,330	5	18
28	1,430	4	15	945	2	5.1	1,300	5	18
29	1,380	4	15	921	2	5.0	1,280	5	17
30	1,310	4	14	911	2	4.9	1,280	5	17
31	1,260	6	20	907	2	4.9	---	---	---
Total	**72,490**	**---**	**1,357**	**31,867**	**---**	**350.9**	**33,387**	**---**	**397.2**
Mean	**2,338**	**6**	**44**	**1,028**	**4**	**11**	**1,113**	**4**	**13**
Max	**4,630**	**13**	**163**	**1,230**	**7**	**23**	**1,350**	**6**	**22**
Min	**1,260**	**4**	**14**	**907**	**2**	**4.9**	**895**	**2**	**4.8**

Total for water year 2005 (unrounded sum of daily values): streamflow, 826,764 ft³/s (1,640,000 acre-ft); sediment load, 51,051.1 tons.

Table 8. Analyses of field replicates for water samples, upper Clark Fork basin, Montana.

[Abbreviations: E, estimated; µg/L, micrograms per liter; mg/L, milligrams per liter; mm, millimeter. Symbol: <, less than laboratory reporting level]

Site number (fig. 1)	Site name	Date	Time	Hardness, filtered (mg/L as $CaCO_3$)	Calcium, filtered (mg/L)	Magnesium filtered (mg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)
12340500	Clark Fork above Missoula	12/20/04	1350	150	40.5	12.2	3.2	3
		12/20/04	1355	150	39.8	11.8	3.1	3
12323600	Silver Bow Creek at Opportunity	03/08/05	1330	200	57.4	12.7	12.5	17
		03/08/05	1335	200	57.8	12.6	12.6	17
12323750	Silver Bow Creek at Warm Springs	04/18/05	1615	310	87.6	21.1	9.8	13
		04/18/05	1620	310	88.8	21.1	9.9	13
12324200	Clark Fork at Deer Lodge	05/17/05	1110	180	51.6	13.2	18.2	78
		05/17/05	1115	180	51.5	13.4	18.6	76
12334550	Clark Fork at Turah Bridge, near Bonner	06/03/05	1045	95	27.3	6.57	7.4	16
		06/03/05	1050	96	27.5	6.59	7.6	16
12323670	Mill Creek near Anaconda	06/22/05	1145	24	7.12	1.45	7.3	10
		06/22/05	1150	24	7.15	1.44	7.3	10
12323700	Mill Creek at Opportunity	07/25/05	1615	65	18.6	4.56	36.6	40
		07/25/05	1620	67	19.0	4.66	37.2	38
12323840	Lost Creek near Anaconda	08/23/05	1400	110	33.9	6.11	5.6	6.2
		08/23/05	1405	110	34.3	6.15	5.6	6.6

Table 8. Analyses of field replicates for water samples, upper Clark Fork basin, Montana.—Continued

[Abbreviations: E, estimated; µg/L, micrograms per liter; mg/L, milligrams per liter; mm, millimeter. Symbol: <, less than laboratory reporting level]

Site number	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)
12340500	12/20/04	E0.03	0.04	1.4	3.3	<6	70	<0.08	0.43
	12/20/04	E.03	E.03	1.4	3.5	<6	80	<.08	.43
12323600	03/08/05	.78	1.29	32.7	93.2	9	550	.30	15.1
	03/08/05	.85	1.25	32.5	94.9	9	560	.30	15.0
12323750	04/18/05	E.03	.08	2.7	7.8	E4	250	E.05	1.09
	04/18/05	E.03	.09	2.8	7.5	E5	250	E.05	1.13
12324200	05/17/05	E.04	2.06	10.6	468	41	6,960	.40	61.7
	05/17/05	E.04	2.05	11.2	478	44	6,910	.43	62.0
12334550	06/03/05	E.04	.40	6.9	62.8	46	1,700	.24	10.9
	06/03/05	E.04	.41	7.2	63.8	44	1,680	.25	11.1
12323670	06/22/05	.04	.15	2.4	7.2	26	590	.08	2.35
	06/22/05	.04	.17	2.4	7.8	29	580	.09	2.38
12323700	07/25/05	.06	.08	3.2	4.5	90	140	.23	.40
	07/25/05	.07	.09	3.1	4.5	96	130	.23	.40
12323840	08/23/05	.05	.08	3.6	8.9	<6	160	E.05	.70
	08/23/05	.05	.07	3.8	9.3	7	150	E.05	.72

Table 8. Analyses of field replicates for water samples, upper Clark Fork basin, Montana.—Continued

[Abbreviations: E, estimated; µg/L, micrograms per liter; mg/L, milligrams per liter; mm, millimeter. Symbol: <, less than laboratory reporting level]

Site number	Date	Manganese, filtered (µg/L)	Manganese, unfiltered recoverable (µg/L)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (µg/L)	Sediment suspended, percent finer than 0.062 mm	Sediment, suspended (mg/L)
12340500	12/20/04	7.5	12	2.3	6	86	5
	12/20/04	7.4	12	2.0	6	86	4
12323600	03/08/05	489	482	157	263	86	11
	03/08/05	498	497	160	271	82	12
12323750	04/18/05	195	245	4.7	12	82	3
	04/18/05	197	246	4.0	11	91	3
12324200	05/17/05	97.9	1,010	9.3	359	67	387
	05/17/05	104	995	9.6	366	66	399
12334550	06/03/05	7.5	221	5.9	93	68	110
	06/03/05	7.9	224	6.9	95	66	114
12323670	06/22/05	5.1	36	1.6	7	57	29
	06/22/05	5.1	38	1.7	7	55	30
12323700	07/25/05	11.1	14	2.8	3	77	1
	07/25/05	11.4	14	2.1	3	82	1
12323840	08/23/05	1.2	6	1.3	4	80	8
	08/23/05	1.3	6	1.4	3	86	11

Table 9. Precision of analyses of field replicates for water samples, upper Clark Fork basin, Montana.

[Abbreviations: µg/L, micrograms per liter; mg/L, milligrams per liter; mm, millimeter]

Constituent and reporting unit	Number of replicate pairs	Standard deviation[1], in listed units	Relative standard deviation, in percent
Calcium, filtered, mg/L	8	0.39	0.97
Magnesium, filtered, mg/L	8	.12	1.2
Arsenic, filtered, µg/L	8	.19	1.5
Arsenic, unfiltered recoverable, µg/L	8	.71	3.1
Cadmium, filtered, µg/L	8	.02	13
Cadmium, unfiltered recoverable, µg/L	8	.01	2.4
Copper, filtered, µg/L	8	.19	2.3
Copper, unfiltered recoverable, µg/L	8	2.6	3.1
Iron, filtered, µg/L	8	2.2	7.5
Iron, unfiltered recoverable, µg/L	8	15	1.1
Lead, filtered, µg/L	8	.01	4.7
Lead, unfiltered recoverable, µg/L	8	.09	.81
Manganese, filtered, µg/L	8	2.8	2.7
Manganese, unfiltered recoverable, µg/L	8	5.4	2.1
Zinc, filtered, µg/L	8	.84	3.6
Zinc, unfiltered recoverable, µg/L	8	2.7	2.9
Sediment, suspended, percent finer than 0.062 mm	8	3.2	4.2
Sediment, suspended, mg/L	8	3.3	4.7

[1]Standard deviation was calculated using the laboratory reporting level for censored values.

Table 10. Precision of analyses of laboratory replicates for water samples, upper Clark Fork basin, Montana.

[Abbreviations: µg/L, micrograms per liter; mg/L, milligrams per liter]

Constituent and reporting unit	Number of replicate pairs	Standard deviation[1], in listed units	Relative standard deviation, in percent	Within limits of data-quality objective[2]
Calcium, filtered, mg/L	8	0.88	2.3	Yes
Magnesium, filtered, mg/L	8	.10	1.1	Yes
Arsenic, filtered, µg/L	8	.12	2.5	Yes
Arsenic, unfiltered recoverable, µg/L	7	.52	7.2	Yes
Cadmium, filtered, µg/L	8	.00	11	Yes
Cadmium, unfiltered recoverable, µg/L	8	.00	4.6	Yes
Copper, filtered, µg/L	8	.08	2.0	Yes
Copper, unfiltered recoverable, µg/L	8	.14	.67	Yes
Iron, filtered, µg/L	8	3.0	9.6	Yes
Iron, unfiltered recoverable, µg/L	8	13	2.3	Yes
Lead, filtered, µg/L	8	.02	4.7	Yes
Lead, unfiltered recoverable, µg/L	8	.05	1.9	Yes
Manganese, filtered, µg/L	8	2.8	6.6	Yes
Manganese, unfiltered recoverable, µg/L	8	7.5	3.8	Yes
Zinc, filtered, µg/L	8	.30	7.4	Yes
Zinc, unfiltered recoverable, µg/L	8	.22	1.7	Yes

[1]Standard deviation was calculated using the laboratory reporting level for censored values.

[2]Data-quality objective for an acceptable level of precision is a maximum relative deviation of 20 percent for laboratory replicate analyses (table 3).

Table 11. Recovery efficiency for analyses of laboratory-spiked deionized-water blanks.

[Abbreviation: µg/L, micrograms 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 of data–quality objective[1]
Arsenic, filtered, µg/L	5	95.5–99.3	97.4	Yes
Arsenic, unfiltered recoverable, µg/L	5	90.7–111	101	Yes
Cadmium, filtered, µg/L	5	97.3–106	102	Yes
Cadmium, unfiltered recoverable, µg/L	5	88.1–107	97.5	Yes
Copper, filtered, µg/L	5	97.4–107	102	Yes
Copper, unfiltered recoverable, µg/L	5	88.4–107	97.6	Yes
Iron, filtered, µg/L	5	95.2–105	100	Yes
Iron, unfiltered recoverable, µg/L	5	90.5–105	97.6	Yes
Lead, filtered, µg/L	5	95.5–106	101	Yes
Lead, unfiltered recoverable, µg/L	5	99.4–108	104	Yes
Manganese, filtered, µg/L	5	86.4–117	102	Yes
Manganese, unfiltered recoverable, µg/L	5	82.2–105	93.8	Yes
Zinc, filtered, µg/L	5	88.3–116	102	Yes
Zinc, unfiltered recoverable, µg/L	5	83.5–109	96.1	Yes

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

Table 12. Recovery efficiency for analyses of laboratory-spiked stream samples, upper Clark Fork basin, Montana.

[Abbreviation: µg/L, micrograms 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 of data–quality objective[1]
Arsenic, filtered, µg/L	5	98.3–107	103	Yes
Arsenic, unfiltered recoverable, µg/L	5	101–108	104	Yes
Cadmium, filtered, µg/L	5	62.7–133	97.8	Yes
Cadmium, unfiltered recoverable, µg/L	5	88.5–108	98.2	Yes
Copper, filtered, µg/L	5	57.9–129	93.6	Yes
Copper, unfiltered recoverable, µg/L	5	84.8–101	93.0	Yes
Iron, filtered, µg/L	5	95.6–103	99.3	Yes
Iron, unfiltered recoverable, µg/L	5	95.9–108	102	Yes
Lead, filtered, µg/L	5	96.1–109	102	Yes
Lead, unfiltered recoverable, µg/L	5	99.7–106	103	Yes
Manganese, filtered, µg/L	5	87.3–108	97.5	Yes
Manganese, unfiltered recoverable, µg/L	5	78.3–98.3	88.3	Yes
Zinc, filtered, µg/L	5	60.8–128	94.3	Yes
Zinc, unfiltered recoverable, µg/L	5	80.8–102	91.6	Yes

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

Table 13. Analyses of field blanks for water samples.

[Abbreviations; °C, degrees Celsius; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter. Symbol: <, less than laboratory reporting level]

Date	Time	pH, onsite (standard units)	Specific conductance, onsite (µS/cm)	Calcium, filtered (mg/L)	Magnesium, filtered (mg/L)	Arsenic, filtered (µg/L)	Arsenic, unfiltered recoverable (µg/L)	Cadmium, filtered (µg/L)	Cadmium, unfiltered recoverable (µg/L)
12/15/2004	1130	5.5	2	<0.02	<0.008	<0.2	<2	<0.04	<0.04
03/07/2005	1200	5.5	2	<.02	<.008	<.2	<2	.06	<.04
04/20/2005	1000	5.6	2	<.02	<.008	<.2	<2	<.04	<.04
05/16/2005	1500	5.6	2	.02	<.008	<.2	<2	<.04	<.04
06/02/2005	1500	5.5	1	<.02	<.008	<.2	<2	<.04	<.04
06/23/2005	0600	5.7	2	<.02	<.008	<.2	<2	<.04	<.04
07/26/2005	0600	5.7	2	<.02	<.008	<.2	<.12	<.04	<.04
08/24/2005	0600	5.7	1	<.02	<.008	<.2	<.12	<.04	<.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)	Zinc, filtered (µg/L)	Zinc, unfiltered recoverable (ug/L)
12/15/2004	<0.4	<0.6	<6	<6	<0.08	<0.06	<0.2	<0.2	<0.6	<2
03/07/2005	.5	.7	<6	<6	<.08	<.06	<.2	<.2	1.9	<2
04/20/2005	<.4	<.6	<6	<6	<.08	<.06	<.2	<.2	.7	<2
05/16/2005	<.4	<.6	<6	<6	<.08	<.06	<.2	<.2	<.6	<2
06/02/2005	<.4	<.6	<6	30	<.08	<.06	<.2	<.2	<.6	<2
06/23/2005	<.4	<.6	<6	<6	<.08	<.06	<.2	<.2	.9	<2
07/26/2005	<.4	<.6	<6	<6	<.08	.06	<.2	<.2	.7	<2
08/24/2005	<.4	<.6	<6	<6	<.08	.06	<.2	<.2	.9	<2

Table 14. Analyses of fine-grained bed sediment, upper Clark Fork basin, Montana, August 2005.

[Trace-element concentrations in bed sediment were determined for the fine-grained fraction (material less than 0.064 millimeter in diameter). Reported concentrations are the mean of all analyses for replicate aliquots from each composite sample. Abbreviation: µg/g, micrograms per gram of dry sample weight. Symbol: <, less than minimum reporting level for solid-phase concentration, in µg/g]

Site number (fig. 1)	Site name	Number of composite samples	Concentration, in µg/g								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	3	165	34.6	19.7	3,570	32,400	538	3,170	12.4	6,880
12323750	Silver Bow Creek at Warm Springs	3	141	6.4	<15.7	229	27,300	53	11,300	12.6	728
12323770	Warm Springs Creek at Warm Springs	3	66	4.5	29.0	991	22,000	82	12,100	19.2	414
12323800	Clark Fork near Galen	3	107	6.4	25.2	1,020	25,200	102	17,300	16.2	1,020
461415112450801	Clark Fork below Lost Creek, near Galen	3	107	6.3	24.2	1,350	27,500	141	6,560	13.4	1,220
461559112443301	Clark Fork at County Bridge, near Racetrack	3	86	6.4	19.2	1,100	23,500	119	5,050	11.6	1,090
461903112440701	Clark Fork at Demspey Creek diversion, near Racetrack	3	71	5.7	20.4	967	24,300	117	5,680	12.4	1,080
12324200	Clark Fork at Deer Lodge	3	72	4.7	23.6	875	26,100	123	1,110	11.7	951
12324680	Clark Fork at Goldcreek	3	39	4.0	25.2	548	22,300	79	1,770	12.6	759
12331800	Clark Fork near Drummond	3	34	3.2	21.9	352	18,500	64	2,410	10.4	742
12334510	Rock Creek near Clinton	3	<6	.7	16.1	12	14,200	10	253	8.7	24
12334550	Clark Fork at Turah Bridge, near Bonner	3	30	3.1	17.2	307	17,300	54	1,330	11.2	686
12340500	Clark Fork above Missoula	3	17	2.6	20.3	259	18,200	46	515	10.9	590

Table 15. Recovery efficiency for analyses of standard reference materials for bed sediment.

[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. Abbreviations: µg/g, micrograms per gram of dry sample weight; SRM,standard reference material (agricultural soils). Symbol: --, recovery could not be determined because all analyses were less than the minimum reporting level]

Constituent	Number of analyses	Dilution ratio	Certified concentration (µg/g)	Mean SRM recovery, in percent	95–percent confidence interval for SRM recovery, in percent
SRM sample 2709					
Arsenic	10	1:10	17.7	65.4	61.7–69.1
Cadmium	10	1:10	.4	--	--
Chromium	10	1:10	130	60.2	58.1–62.4
Copper	10	1:10	35	83.6	77.5–89.7
Iron	10	1:10	35,000	85.0	83.5–86.4
Lead	10	1:10	19	86.1	82.9–89.3
Manganese	10	1:10	538	89.1	87.7–90.6
Nickel	10	1:10	88	82.2	80.3–84.0
Zinc	10	1:10	106	75.6	72.9–78.3
SRM sample 2711					
Arsenic	10	1:10	105	83.4	81.2–85.7
Cadmium	10	1:10	41.7	94.4	92.2–96.6
Chromium	10	1:10	47	51.5	49.1–53.9
Copper	10	1:10	114	93.7	92.1–95.3
Iron	10	1:10	28,900	80.7	79.3–82.1
Lead	10	1:10	1,160	88.9	86.9–90.9
Manganese	10	1:10	638	80.6	79.4–81.7
Nickel	10	1:10	20.6	78.9	76.6–81.2
Zinc	10	1:10	350	88.1	86.7–89.4

Table 16. Analyses of procedural blanks for bed sediment.

[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 0.6 N (normal) hydrochloric acid used for reconstituting dried residue. Abbreviation: µg/mL, micrograms per milliliter. Symbol: <, less than minimum reporting level for liquid-phase concentration, in µg/mL]

Site number (fig. 1)	Site Name	Dilution ratio	Trace element concentration, in µg/mL								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1:10	<0.009	<0.0003	<0.01	<0.002	<0.02	<0.004	<0.0004	<0.001	<0.003
12323750	Silver Bow Creek at Warm Springs	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
12323770	Warm Springs Creek at Warm Springs	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
12323800	Clark Fork near Galen	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
461415112450801	Clark Fork below Lost Creek, near Galen	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
461559112443301	Clark Fork at County Bridge, near Racetrack	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
461903112440701	Clark Fork at Demspey Creek diversion, near Racetrack	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
12324200	Clark Fork at Deer Lodge	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
12324680	Clark Fork at Goldcreek	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
12331800	Clark Fork near Drummond	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
12334510	Rock Creek near Clinton	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
12334550	Clark Fork at Turah Bridge, near Bonner	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003
12340500	Clark Fork above Missoula	1:10	<.009	<.0003	<.01	<.002	<.02	<.004	<.0004	<.001	<.003

Table 17. Analyses of biota, upper Clark Fork basin, Montana, August 2005.

[Analyses are for the whole-body tissue of aquatic insects. Composite samples are 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. Abbreviations: µg/g, micrograms per gram of dry sample weight; spp., species. Symbol: <, less than minimum reporting level for solid-phase concentration, in µg/g]

Taxon	Number of composite samples	Concentration, in µg/g								
		Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600—Silver Bow Creek at Opportunity										
Hydropsyche cockerelli	1	13.1	4.9	1.4	382	2,110	45.0	847	2.0	789
Hydropsyche spp.	1	15.1	6.1	<9.7	418	2,550	51.4	1,040	2.5	909
12323750—Silver Bow Creek at Warm Springs										
Hydropsyche cockerelli	3	10.4	.4	<2.6	19.7	833	1.7	1,440	0.6	147
Hydropsyche occidentalis	2	10.8	.4	<5.4	24.4	959	2.1	1,770	.9	144
12323770—Warm Springs Creek at Warm Springs										
Arctopsyche grandis	2	9.6	3.4	<0.3	130	1,080	5.2	3,180	2.5	197
Hydropsyche occidentalis	2	13.2	1.2	.3	130	1,660	7.4	3,130	2.1	151
12323800—Clark Fork near Galen										
Hydropsyche cockerelli	1	13.2	1.6	1.5	133	1,520	8.5	2,960	1.9	191
Hydropsyche occidentalis	1	12.5	1.3	1.7	92.4	1,450	8.4	3,940	1.5	198
461415112450801—Clark Fork below Lost Creek, near Galen										
Hydropsyche cockerelli	2	9.5	1.8	1.1	124	1,150	7.1	1,700	1.1	195
461559112443301—Clark Fork at County Bridge, near Racetrack										
Hydropsyche cockerelli	3	11.5	1.5	1.0	118	993	7.3	1,930	1.0	192
461903112440701—Clark Fork at Dempsey Creek Diversion, near Racetrack										
Hydropsyche cockerelli	1	8.0	1.7	1.3	106	1,180	6.3	1,480	1.0	188
Hydropsyche occidentalis	1	10.2	1.2	1.5	90.7	1,270	7.0	2,320	1.4	211
12324200—Clark Fork at Deer Lodge										
Hydropsyche cockerelli	1	7.3	2.0	<4.6	133	844	9.3	979	0.9	185
Hydropsyche occidentalis	2	9.3	1.8	1.4	145	1,240	13.6	2,080	1.4	309
12324680—Clark Fork at Goldcreek										
Arctopsyche grandis	4	2.5	1.6	<1.6	29.2	245	1.5	640	0.4	163
Claassenia sabulosa	2	1.6	.7	<1.2	55.7	179	.7	130	.3	264
Hydropsyche cockerelli	2	4.7	1.5	2.5	60.4	759	3.5	1,100	0.8	181
Hydropsyche occidentalis	1	5.3	1.5	<2.6	57.6	1,250	4.6	1,320	1.0	203

Table 17. Analyses of biota, upper Clark Fork basin, Montana, August 2005.—Continued

[Analyses are for the whole-body tissue of aquatic insects. Composite samples are 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. Abbreviations: µg/g, micrograms per gram of dry sample weight; spp., species. Symbol: <, less than minimum reporting level for solid-phase concentration, in µg/g]

Taxon	Number of composite samples	Concentration, in µg/g								
		Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12331800—Clark Fork near Drummond										
Arctopsyche grandis	3	4.1	0.8	1.1	26.2	343	2.4	577	0.5	153
Claassenia sabulosa	2	1.2	1.0	.7	55.2	119	.6	142	.2	272
Hydropsyche cockerelli	1	5.7	1.0	<2.7	60.5	1,040	5.6	795	1.1	175
Hydropsyche occidentalis	2	6.0	1.0	2.2	55.4	1,130	6.1	1,040	1.0	202
12334510—Rock Creek near Clinton										
Arctopsyche grandis	2	1.6	0.2	<0.9	9.8	640	<0.4	258	1.0	127
Claassenia sabulosa	1	1.0	.1	<.3	37.7	96	<.2	50	.3	213
12334550—Clark Fork at Turah Bridge, near Bonner										
Arctopsyche grandis	3	3.7	1.3	<2.2	27.0	483	3.0	680	0.7	192
Claassenia sabulosa	3	1.5	.9	.6	67.8	237	.7	144	.2	255
Hydropsyche cockerelli	2	4.0	1.0	1.0	39.1	948	5.5	751	1.0	180
Hydropsyche occidentalis	3	4.7	1.1	1.4	43.5	1,180	6.2	1,080	1.2	238
12340500—Clark Fork above Missoula										
Arctopsyche grandis	3	2.4	0.9	<1.7	27.4	572	2.9	1,160	0.9	173
Claassenia sabulosa	1	1.9	1.0	<2.9	43.6	226	.6	153	.4	271
Hydropsyche cockerelli	2	4.2	1.1	<2.1	53.8	1,730	7.0	1,670	1.7	213
Hydropsyche occidentalis	1	3.9	1.2	<4.4	58.6	1,710	7.4	2,460	1.8	251

Table 18. Recovery efficiency for analyses of standard reference material for biota.

[Abbreviations: µg/g, micrograms per gram of dry sample weight; µg/mL, micrograms per milliliter; SRM, standard reference material (lobster hepatopancreas)]

Constituent	Number of analyses	Certified concentration (µg/g)	Mean SRM recovery, in percent	95–percent confidence interval for SRM recovery, in percent
SRM sample TORT–2				
Arsenic	12	21.6	97.7	96.9–98.6
Cadmium	12	26.7	92.6	91.4–93.8
Chromium	[1]12	.77	119	101–136
Copper	12	106	96.7	95.9–97.6
Iron	12	105	100	97.4–103
Lead	12	.35	84.7	74.6–94.8
Manganese	12	13.6	95.4	94.0–96.8
Nickel	12	2.5	84.8	82.7–86.9
Zinc	12	180	99.7	98.8–101

[1]Chromium concentrations in two analyses were less than the liquid-phase minimum reporting level (0.03 µg/mL) and omitted from the calculation of SRM recovery.

Table 19. Analyses of procedural blanks for biota.

[Procedural blanks were not diluted prior to analyses. Abbreviation: µg/mL, micrograms per milliliter. Symbol: <, less than minimum reporting level for liquid-phase concentration, in µg/mL]

Site number (fig. 1)	Site name	Dilution ratio	Trace-element concentration, in µg/mL								
			Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Nickel	Zinc
12323600	Silver Bow Creek at Opportunity	1:1	<0.006	<0.002	<0.03	<0.01	<0.06	<0.01	<0.01	<0.002	<0.01
12323750	Silver Bow Creek at Warm Springs	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
12323770	Warm Springs Creek at Warm Springs	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
12323800	Clark Fork near Galen	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
461415112450801	Clark Fork below Lost Creek, near Galen	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
461559112443301	Clark Fork at County Bridge, near Racetrack	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
461903112440701	Clark Fork at Dempsey Creek Diversion, near Racetrack	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
12324200	Clark Fork at Deer Lodge	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
12324680	Clark Fork at Goldcreek	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
12331800	Clark Fork near Drummond	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
12334510	Rock Creek near Clinton	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
12334550	Clark Fork at Turah Bridge, near Bonner	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01
12340500	Clark Fork above Missoula	1:1	<.006	<.002	<.03	<.01	<.06	<.01	<.01	<.002	<.01

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	91	156	1.9	14	7.6
pH, onsite (standard units)	91	8.4	7.3	7.8	7.8
Specific conductance, onsite (µS/cm)	91	412	116	267	271
Temperature, water (°C)	91	17.5	1.5	8.2	8.0
Hardness, filtered (mg/L as $CaCO_3$)	91	150	38	105	110
Calcium, filtered (mg/L)	91	41.8	10.6	30.0	30.9
Magnesium, filtered (mg/L)	91	11.0	2.71	7.3	7.4
Arsenic, filtered (µg/L)	91	13	1	3.8	3.0
Arsenic, unfiltered (µg/L)	91	18	1	[2]5	4
Cadmium, filtered (µg/L)	91	.5	<.1	[2].06	<.1
Cadmium, unfiltered (µg/L)	91	.11	<.04	[2].05	<1
Copper, filtered (µg/L)	91	10	.8	[2]3.8	3.2
Copper, unfiltered (µg/L)	91	52	1.5	7.2	5.7
Iron, filtered (µg/L)	91	478	15	157	150
Iron, unfiltered (µg/L)	91	4,220	140	685	550
Lead, filtered (µg/L)	91	2.8	<.08	[2].22	<.6
Lead, unfiltered (µg/L)	91	47	<1	[2]2.31	.92
Manganese, filtered (µg/L)	91	144	14.2	42.0	37.9
Manganese, unfiltered (µg/L)	91	240	23	60	51
Zinc, filtered (µg/L)	91	11	<1	[2]3.9	2.8
Zinc, unfiltered (µg/L)	91	130	<10	[2]10	4
Sediment, suspended (percent finer than 0.062 mm)	91	97	50	82	83
Sediment, suspended concentration (mg/L)	91	139	2	14	8
Sediment, suspended discharge (ton/d)	91	59	.02	1.3	.16

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	99	134	13	28	23
pH, onsite (standard units)	99	8.1	7.2	7.6	7.6
Specific conductance, onsite (µS/cm)	99	691	226	477	485
Temperature, water (°C)	99	20.0	1.0	10.4	9.5
Hardness, filtered (mg/L as $CaCO_3$)	99	220	66	151	160
Calcium, filtered (mg/L)	99	62.7	19.0	43.1	44.0
Magnesium, filtered (mg/L)	99	14.6	4.51	10.6	11.0
Arsenic, filtered (µg/L)	99	13	2.3	6.7	6.5
Arsenic, unfiltered (µg/L)	99	45	3	12	10
Cadmium, filtered (µg/L)	99	6.2	.09	1.37	1.10
Cadmium, unfiltered (µg/L)	99	6	.11	1.83	1.60
Copper, filtered (µg/L)	99	303	3.2	43.6	19.7
Copper, unfiltered (µg/L)	99	550	13.5	102	62
Iron, filtered (µg/L)	99	270	10	[2]82	61
Iron, unfiltered (µg/L)	99	7,400	90	1,000	640
Lead, filtered (µg/L)	99	2.4	<.5	[2].54	.20
Lead, unfiltered (µg/L)	99	250	.65	16.0	5.80
Manganese, filtered (µg/L)	99	1,700	21.4	433	386
Manganese, unfiltered (µg/L)	99	1,600	26	482	432
Zinc, filtered (µg/L)	99	2,200	26.7	445	320
Zinc, unfiltered (µg/L)	99	2,200	38	538	380
Sediment, suspended (percent finer than 0.062 mm)	98	98	42	84	86
Sediment, suspended concentration (mg/L)	98	405	2	27	11
Sediment, suspended discharge (ton/d)	98	70	.09	3.2	.82

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	102	361	13	72	50
pH, onsite (standard units)	101	9.5	7.2	8.4	8.4
Specific conductance, onsite (µS/cm)	101	633	202	415	403
Temperature, water (°C)	101	22.5	0.0	9.4	9.5
Hardness, filtered (mg/L as $CaCO_3$)	101	240	60	149	150
Calcium, filtered (mg/L)	101	71.6	18.5	44.1	43.1
Magnesium, filtered (mg/L)	101	15.0	3.42	9.44	9.04
Arsenic, filtered (µg/L)	101	34	1	11.0	10.0
Arsenic, unfiltered (µg/L)	101	235	11	29	18
Cadmium, filtered (µg/L)	101	41	.1	1.36	.90
Cadmium, unfiltered (µg/L)	101	49	.52	[2]2.44	1.60
Copper, filtered (µg/L)	101	450	18.5	51.9	40.2
Copper, unfiltered (µg/L)	101	3,900	54.3	242	132
Iron, filtered (µg/L)	101	307	3	[2]44	23
Iron, unfiltered (µg/L)	101	24,100	260	1,700	780
Lead, filtered (µg/L)	101	5.1	<.5	[2].76	.27
Lead, unfiltered (µg/L)	101	650	5.38	43.9	15.5
Manganese, filtered (µg/L)	101	9,300	68	517	418
Manganese, unfiltered (µg/L)	101	10,000	117	646	488
Zinc, filtered (µg/L)	101	13,000	27	359	200
Zinc, unfiltered (µg/L)	101	15,000	97	625	405
Sediment, suspended (percent finer than 0.062 mm)	102	95	37	78	82
Sediment, suspended concentration (mg/L)	102	801	5	54	17
Sediment, suspended discharge (ton/d)	102	781	.18	23	2.3

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	8	165	7.4	63	20
pH, onsite (standard units)	8	8.6	7.7	8.2	8.2
Specific conductance, onsite (µS/cm)	8	195	56	130	145
Temperature, water (°C)	8	15.0	3.0	7.8	7.0
Hardness, filtered (mg/L as $CaCO_3$)	8	92	24	58	65
Calcium, filtered (mg/L)	8	24.4	7.12	16.1	18.0
Magnesium, filtered (mg/L)	8	7.58	1.45	4.41	4.84
Arsenic, filtered (µg/L)	8	23.4	7.3	14.1	11.5
Arsenic, unfiltered (µg/L)	8	26	9	16	14
Cadmium, filtered (µg/L)	8	.11	.04	.06	.04
Cadmium, unfiltered (µg/L)	8	.18	.05	.09	.08
Copper, filtered (µg/L)	8	4.5	1.0	2.3	2.0
Copper, unfiltered (µg/L)	8	10.3	1.3	4.6	3.6
Iron, filtered (µg/L)	8	89	26	50	42
Iron, unfiltered (µg/L)	8	620	90	255	170
Lead, filtered (µg/L)	8	.24	.05	.14	.14
Lead, unfiltered (µg/L)	8	3.12	.27	1.07	.58
Manganese, filtered (µg/L)	8	8.9	3.6	6.2	6.2
Manganese, unfiltered (µg/L)	8	37	7	18	15
Zinc, filtered (µg/L)	8	2.4	.8	1.5	1.2
Zinc, unfiltered (µg/L)	8	8	1	4	2
Sediment, suspended (percent finer than 0.062 mm)	8	81	51	70	75
Sediment, suspended concentration (mg/L)	8	29	1	9	2
Sediment, suspended discharge (ton/d)	8	13	.03	3.1	.12

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	24	261	0.43	37	5.0
pH, onsite (standard units)	24	8.2	7.8	8.0	8.0
Specific conductance, onsite (µS/cm)	24	222	59	149	157
Temperature, water (°C)	24	18.5	1.0	9.2	8.8
Hardness, filtered (mg/L as $CaCO_3$)	24	100	24	64	69
Calcium, filtered (mg/L)	24	27.9	7.01	17.9	19.3
Magnesium, filtered (mg/L)	24	7.68	1.56	4.62	4.84
Arsenic, filtered (µg/L)	24	37.0	9.0	23.3	21.8
Arsenic, unfiltered (µg/L)	24	50	10	28	26
Cadmium, filtered (µg/L)	24	.10	.05	.07	.07
Cadmium, unfiltered (µg/L)	24	.85	.06	.18	.10
Copper, filtered (µg/L)	24	6.1	1.2	3.2	3.0
Copper, unfiltered (µg/L)	24	38.8	2.2	8.0	4.4
Iron, filtered (µg/L)	24	90	17	52	49
Iron, unfiltered (µg/L)	24	1,960	70	359	135
Lead, filtered (µg/L)	24	.32	.04	.16	.14
Lead, unfiltered (µg/L)	24	12.7	.08	1.90	.42
Manganese, filtered (µg/L)	24	32.8	3.6	10.2	7.6
Manganese, unfiltered (µg/L)	24	113	6	24	14
Zinc, filtered (µg/L)	24	7.7	1.7	3.7	3.6
Zinc, unfiltered (µg/L)	24	41	2	9	5
Sediment, suspended (percent finer than 0.062 mm)	24	90	26	73	79
Sediment, suspended concentration (mg/L)	24	107	1	16	2
Sediment, suspended discharge (ton/d)	24	55	<.01	[2]5.4	.02

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	8	39	1.0	11	2.6
pH, onsite (standard units)	8	8.2	7.5	7.8	7.8
Specific conductance, onsite (µS/cm)	8	114	66	99	105
Temperature, water (°C)	8	13.0	.5	6.0	5.5
Hardness, filtered (mg/L as $CaCO_3$)	8	42	23	36	39
Calcium, filtered (mg/L)	8	13.9	7.74	12.3	13.2
Magnesium, filtered (mg/L)	8	1.69	.88	1.35	1.36
Arsenic, filtered (µg/L)	8	24.3	9.9	15.0	12.8
Arsenic, unfiltered (µg/L)	8	27	10	17	14
Cadmium, filtered (µg/L)	8	.05	.02	.03	.03
Cadmium, unfiltered (µg/L)	8	.19	.03	.07	.06
Copper, filtered (µg/L)	8	4.2	1.0	2.2	2.0
Copper, unfiltered (µg/L)	8	10.5	1.5	3.7	3.0
Iron, filtered (µg/L)	8	125	36	66	60
Iron, unfiltered (µg/L)	8	1,260	90	314	180
Lead, filtered (µg/L)	8	.37	.05	.15	.14
Lead, unfiltered (µg/L)	8	4.08	.20	.93	.48
Manganese, filtered (µg/L)	8	23.0	11.4	16.4	17.1
Manganese, unfiltered (µg/L)	8	49	15	29	24
Zinc, filtered (µg/L)	8	3.3	1.1	2.0	1.8
Zinc, unfiltered (µg/L)	8	10	1	3	2
Sediment, suspended (percent finer than 0.062 mm)	8	94	44	76	82
Sediment, suspended concentration (mg/L)	8	93	3	17	4
Sediment, suspended discharge (ton/d)	8	9.8	.01	1.4	.04

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	24	53	4.5	16	9.0
pH, onsite (standard units)	24	8.5	7.7	8.1	8.1
Specific conductance, onsite (µS/cm)	24	371	181	295	308
Temperature, water (°C)	24	20.5	3.5	10.6	10.8
Hardness, filtered (mg/L as $CaCO_3$)	24	170	73	130	130
Calcium, filtered (mg/L)	24	47.4	22.0	37.5	38.5
Magnesium, filtered (mg/L)	24	12.3	4.37	8.87	9.08
Arsenic, filtered (µg/L)	24	164	11.5	46.7	25.2
Arsenic, unfiltered (µg/L)	24	164	12	50	25
Cadmium, filtered (µg/L)	24	.11	.02	.05	.05
Cadmium, unfiltered (µg/L)	24	.52	.03	.11	.07
Copper, filtered (µg/L)	24	21.4	1.9	6.1	3.6
Copper, unfiltered (µg/L)	24	48.8	2.8	12.5	7.8
Iron, filtered (µg/L)	24	111	7	37	28
Iron, unfiltered (µg/L)	24	1,420	30	255	140
Lead, filtered (µg/L)	24	.52	.04	[2].19	.16
Lead, unfiltered (µg/L)	24	14.4	.27	2.32	1.30
Manganese, filtered (µg/L)	24	49.3	4.1	25.4	20.2
Manganese, unfiltered (µg/L)	24	104	5.0	35	30
Zinc, filtered (µg/L)	24	20	1.7	6.0	4.4
Zinc, unfiltered (µg/L)	24	68	2	14	8
Sediment, suspended (percent finer than 0.062 mm)	24	96	70	86	86
Sediment, suspended concentration (mg/L)	24	84	1	12	4
Sediment, suspended discharge (ton/d)	24	11	.02	1.1	.11

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	108	662	16	138	88
pH, onsite (standard units)	106	9.3	8.0	8.8	8.8
Specific conductance, onsite (µS/cm)	106	783	249	470	476
Temperature, water (°C)	107	25.0	.5	11.1	11.0
Hardness, filtered (mg/L as $CaCO_3$)	106	310	97	196	195
Calcium, filtered (mg/L)	106	90.4	27.9	56.8	57.6
Magnesium, filtered (mg/L)	106	21.4	5.94	13.1	13.0
Arsenic, filtered (µg/L)	106	60	6.8	22.2	22.1
Arsenic, unfiltered (µg/L)	106	94	10	27	26
Cadmium, filtered (µg/L)	106	.31	<.1	[2].07	<.1
Cadmium, unfiltered (µg/L)	106	.56	<.1	[2].13	<1
Copper, filtered (µg/L)	106	40	1.9	9.2	7.4
Copper, unfiltered (µg/L)	106	96.8	3.4	18.7	13.0
Iron, filtered (µg/L)	106	93	<5	[2]18	14
Iron, unfiltered (µg/L)	106	3,000	70	356	270
Lead, filtered (µg/L)	106	1.0	<.08	[2].12	<.5
Lead, unfiltered (µg/L)	106	41.8	<1	[2]2.64	1.24
Manganese, filtered (µg/L)	106	875	11.8	126	90
Manganese, unfiltered (µg/L)	106	899	55	193	160
Zinc, filtered (µg/L)	106	73	<1	[2]9.3	5.9
Zinc, unfiltered (µg/L)	106	180	<10	[2]37	24
Sediment, suspended (percent finer than 0.062 mm)	107	97	43	82	85
Sediment, suspended concentration (mg/L)	108	229	1	12	6
Sediment, suspended discharge (ton/d)	108	279	.11	7.8	1.6

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	78	420	2.8	93	52
pH, onsite (standard units)	77	8.7	7.4	8.3	8.3
Specific conductance, onsite (µS/cm)	77	795	139	303	311
Temperature, water (°C)	78	20.0	0.0	9.1	9.0
Hardness, filtered (mg/L as $CaCO_3$)	77	420	40	147	150
Calcium, filtered (mg/L)	77	130	10.5	45.0	46.1
Magnesium, filtered (mg/L)	77	22.0	3.29	8.46	8.10
Arsenic, filtered (µg/L)	77	14	2	5.4	4.9
Arsenic, unfiltered (µg/L)	77	27	3	8	6
Cadmium, filtered (µg/L)	77	.1	<.04	[2].04	<.1
Cadmium, unfiltered (µg/L)	77	.41	<.1	[2].08	<1
Copper, filtered (µg/L)	77	16	1	3.7	3.0
Copper, unfiltered (µg/L)	77	108	2.3	20.5	8.6
Iron, filtered (µg/L)	77	30	<5	[2]11	9
Iron, unfiltered (µg/L)	77	1,700	40	317	110
Lead, filtered (µg/L)	77	1.8	<.08	[2].10	<.5
Lead, unfiltered (µg/L)	77	14	<1	[2]2.05	.43
Manganese, filtered (µg/L)	77	570	22.6	137	110
Manganese, unfiltered (µg/L)	77	1,400	57	237	190
Zinc, filtered (µg/L)	77	10	<1	[2]2.2	1.1
Zinc, unfiltered (µg/L)	77	60	<10	[2]10	3
Sediment, suspended (percent finer than 0.062 mm)	78	88	55	73	74
Sediment, suspended concentration (mg/L)	78	106	2	19	8
Sediment, suspended discharge (ton/d)	78	87	.05	9.2	1.0

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	149	1,050	14	208	124
pH, onsite (standard units)	136	9.0	7.5	8.5	8.6
Specific conductance, onsite (µS/cm)	137	720	197	427	440
Temperature, water (°C)	148	22.5	0.0	10.0	10.0
Hardness, filtered (mg/L as $CaCO_3$)	135	370	81	187	190
Calcium, filtered (mg/L)	135	110	24.2	55.2	57.5
Magnesium, filtered (mg/L)	135	22.0	5.08	11.9	12.1
Arsenic, filtered (µg/L)	135	53	4	15.2	13.3
Arsenic, unfiltered (µg/L)	135	78	3	20	17
Cadmium, filtered (µg/L)	135	1	<.1	[2].07	<1
Cadmium, unfiltered (µg/L)	135	3	<.1	[2].21	<1
Copper, filtered (µg/L)	135	50	2.3	9.0	7.0
Copper, unfiltered (µg/L)	134	240	4.8	30.4	17.0
Iron, filtered (µg/L)	135	110	<3	[2]16	11
Iron, unfiltered (µg/L)	135	9,200	60	523	270
Lead, filtered (µg/L)	135	3	<.08	[2].18	<1
Lead, unfiltered (µg/L)	135	31.0	<1	[2]3.76	2.00
Manganese, filtered (µg/L)	135	460	25.2	115	82.7
Manganese, unfiltered (µg/L)	135	1,400	47	248	193
Zinc, filtered (µg/L)	135	110	<1	[2]11.2	6.0
Zinc, unfiltered (µg/L)	135	360	<10	[2]44	29
Sediment, suspended (percent finer than 0.062 mm)	148	97	41	78	78
Sediment, suspended concentration (mg/L)	149	338	2	19	8
Sediment, suspended discharge (ton/d)	149	459	.12	22	2.3

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft³/s)	8	17	.97	7.1	4.2
pH, onsite (standard units)	8	8.6	7.4	8.2	8.4
Specific conductance, onsite (µS/cm)	8	227	163	202	216
Temperature, water (°C)	8	14.5	3.0	8.5	7.8
Hardness, filtered (mg/L as $CaCO_3$)	8	110	50	94	100
Calcium, filtered (mg/L)	8	35.7	15.7	28.9	30.6
Magnesium, filtered (mg/L)	8	6.79	2.71	5.50	6.14
Arsenic, filtered (µg/L)	8	156	2.5	24.6	6.8
Arsenic, unfiltered (µg/L)	8	3,860	2	488	8
Cadmium, filtered (µg/L)	8	.90	.02	.15	.04
Cadmium, unfiltered (µg/L)	8	147	.02	18.4	.06
Copper, filtered (µg/L)	8	90.5	1.2	13.7	3.4
Copper, unfiltered (µg/L)	8	29,100	1.7	3,640	6.4
Iron, filtered (µg/L)	8	25	<6	[2]9	4
Iron, unfiltered (µg/L)	8	99,700	20	12,600	110
Lead, filtered (µg/L)	8	.18	<.08	--	<.08
Lead, unfiltered (µg/L)	8	1,290	.13	162	.54
Manganese, filtered (µg/L)	8	42.4	.5	6.5	1.6
Manganese, unfiltered (µg/L)	8	8,830	1	1,110	4
Zinc, filtered (µg/L)	8	30.0	1.0	4.9	1.2
Zinc, unfiltered (µg/L)	8	7,780	2	976	4
Sediment, suspended (percent finer than 0.062 mm)	8	97	30	70	76
Sediment, suspended concentration (mg/L)	8	58,900	1	7,370	10
Sediment, suspended discharge (ton/d)	8	1,320	<.1	[2]165	.08

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	24	59	1.3	19	12
pH, onsite (standard units)	24	8.7	8.0	8.5	8.5
Specific conductance, onsite (µS/cm)	24	934	540	653	630
Temperature, water (°C)	24	26.5	1.5	13.0	12.2
Hardness, filtered (mg/L as $CaCO_3$)	24	450	200	307	300
Calcium, filtered (mg/L)	24	122	48.5	85.6	86.6
Magnesium, filtered (mg/L)	24	35.7	18.0	22.7	21.2
Arsenic, filtered (µg/L)	24	41.8	6.6	15.2	12.9
Arsenic, unfiltered (µg/L)	24	43	6	15	14
Cadmium, filtered (µg/L)	24	.05	<.04	[2].03	.03
Cadmium, unfiltered (µg/L)	24	.11	.02	.05	.04
Copper, filtered (µg/L)	24	6.7	1.5	3.2	2.9
Copper, unfiltered (µg/L)	24	22.5	3.9	7.5	6.2
Iron, filtered (µg/L)	24	61	<6	[2]11	7
Iron, unfiltered (µg/L)	24	280	10	98	75
Lead, filtered (µg/L)	24	.33	<.08	[2].08	<.08
Lead, unfiltered (µg/L)	24	1.30	.04	.39	.31
Manganese, filtered (µg/L)	24	39.5	1.9	11.6	9.4
Manganese, unfiltered (µg/L)	24	45	2	15	13
Zinc, filtered (µg/L)	24	3.8	<1	[2]1.6	1.2
Zinc, unfiltered (µg/L)	24	9	<2	[2]3	3
Sediment, suspended (percent finer than 0.062 mm)	24	86	18	55	60
Sediment, suspended concentration (mg/L)	24	34	2	14	14
Sediment, suspended discharge (ton/d)	24	3.8	.01	.89	.32

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005. —Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	201	1,920	23	290	215
pH, onsite (standard units)	149	8.9	7.4	8.3	8.3
Specific conductance, onsite (µS/cm)	184	642	234	485	506
Temperature, water (°C)	200	23.0	0.0	9.9	10.0
Hardness, filtered (mg/L as $CaCO_3$)	141	280	95	205	220
Calcium, filtered (mg/L)	141	82.0	28.2	60.5	64.0
Magnesium, filtered (mg/L)	141	19	5.9	13.1	13.8
Arsenic, filtered (µg/L)	151	39	6	14.4	13.0
Arsenic, unfiltered (µg/L)	151	215	8	25	17
Cadmium, filtered (µg/L)	151	2	<.1	[2].08	<1
Cadmium, unfiltered (µg/L)	151	5	<.1	[2].45	<1
Copper, filtered (µg/L)	151	120	3.2	11.6	9.0
Copper, unfiltered (µg/L)	150	1,500	8.2	89.8	38.2
Iron, filtered (µg/L)	151	190	<3	[2]15	9
Iron, unfiltered (µg/L)	151	29,000	30	1,670	580
Lead, filtered (µg/L)	151	6	<.08	[2].38	<1
Lead, unfiltered (µg/L)	151	200	<1	[2]11.7	4.08
Manganese, filtered (µg/L)	151	400	1	43.1	33.9
Manganese, unfiltered (µg/L)	151	4,600	12	264	150
Zinc, filtered (µg/L)	151	230	<10	[2]13.1	9.0
Zinc, unfiltered (µg/L)	151	1,700	4	98	50
Sediment, suspended (percent finer than 0.062 mm)	192	99	37	71	72
Sediment, suspended concentration (mg/L)	201	2,250	1	76	22
Sediment, suspended discharge (ton/d)	201	8,690	.24	165	11

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	107	3,920	87	743	507
pH, onsite (standard units)	106	8.8	7.9	8.4	8.3
Specific conductance, onsite (µS/cm)	106	510	206	373	394
Temperature, water (°C)	106	23.0	0.0	9.8	10.0
Hardness, filtered (mg/L as $CaCO_3$)	106	230	86	164	170
Calcium, filtered (mg/L)	106	68.0	25.9	48.4	51.2
Magnesium, filtered (mg/L)	106	15.0	5.15	10.5	11.0
Arsenic, filtered (µg/L)	106	20	5.8	10.1	10.0
Arsenic, unfiltered (µg/L)	106	75	7	15	12
Cadmium, filtered (µg/L)	106	.2	<.04	[2].04	<.1
Cadmium, unfiltered (µg/L)	106	2	<.1	[2].18	<1
Copper, filtered (µg/L)	105	36	2.1	6.9	5.6
Copper, unfiltered (µg/L)	105	440	5.2	43.1	25.0
Iron, filtered (µg/L)	106	100	<3	[2]19	12
Iron, unfiltered (µg/L)	106	12,000	30	929	460
Lead, filtered (µg/L)	105	.8	<.08	[2].11	<.5
Lead, unfiltered (µg/L)	105	73	<1	[2]6.04	3.00
Manganese, filtered (µg/L)	106	57.3	4.0	19.6	17.8
Manganese, unfiltered (µg/L)	106	1,100	10	132	90
Zinc, filtered (µg/L)	106	26	<1	[2]6.2	4.0
Zinc, unfiltered (µg/L)	106	510	2	49	30
Sediment, suspended (percent finer than 0.062 mm)	107	94	43	76	78
Sediment, suspended concentration (mg/L)	107	752	2	54	22
Sediment, suspended discharge (ton/d)	107	7,960	.94	238	33

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005. —Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	107	3,860	149	1,030	755
pH, onsite (standard units)	106	8.6	7.8	8.3	8.3
Specific conductance, onsite (µS/cm)	106	630	189	412	433
Temperature, water (°C)	107	22.5	.5	10.8	11.0
Hardness, filtered (mg/L as $CaCO_3$)	106	300	74	186	195
Calcium, filtered (mg/L)	106	83	21	53.4	55.2
Magnesium, filtered (mg/L)	106	22	5.2	12.8	13.1
Arsenic, filtered (µg/L)	106	20	6.6	10.6	10.0
Arsenic, unfiltered (µg/L)	106	62	8	17	13
Cadmium, filtered (µg/L)	106	.30	<.04	[2]<.05	<.1
Cadmium, unfiltered (µg/L)	106	2	<.1	[2].23	<1
Copper, filtered (µg/L)	104	21	1	6.6	5.0
Copper, unfiltered (µg/L)	104	360	4.6	46.2	23.0
Iron, filtered (µg/L)	106	150	<3	[2]19	8
Iron, unfiltered (µg/L)	105	8,800	20	1,060	470
Lead, filtered (µg/L)	102	1.2	<.08	[2].17	<.60
Lead, unfiltered (µg/L)	102	56	<1	[2]8.32	3.50
Manganese, filtered (µg/L)	106	60.7	4.5	17.1	15.0
Manganese, unfiltered (µg/L)	106	880	8	155	97.5
Zinc, filtered (µg/L)	106	21	<3	[2]6.6	4.7
Zinc, unfiltered (µg/L)	106	490	3	67	36
Sediment, suspended (percent finer than 0.062 mm)	107	92	38	74	75
Sediment, suspended concentration (mg/L)	107	530	2	68	26
Sediment, suspended discharge (ton/d)	107	4,720	1.7	346	49

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005. —Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	204	9,560	296	1,860	1,110
pH, onsite (standard units)	150	8.8	7.4	8.2	8.3
Specific conductance, onsite (µS/cm)	179	483	139	304	316
Temperature, water (°C)	203	22.0	0.0	9.4	9.5
Hardness, filtered (mg/L as $CaCO_3$)	140	210	54	132	135
Calcium, filtered (mg/L)	140	59.0	14.9	37.3	38.2
Magnesium, filtered (mg/L)	140	14.0	3.94	9.49	9.50
Arsenic, filtered (µg/L)	149	17	2.7	6.0	5.2
Arsenic, unfiltered (µg/L)	149	110	3	10	7
Cadmium, filtered (µg/L)	149	.11	<.04	[2].03	<.1
Cadmium, unfiltered (µg/L)	149	4	<.1	[2].28	<1
Copper, filtered (µg/L)	148	25	E1.1	5.0	4.0
Copper, unfiltered (µg/L)	147	500	3	37.9	17.6
Iron, filtered (µg/L)	149	190	<3	[2]24	13
Iron, unfiltered (µg/L)	149	19,000	30	1,120	390
Lead, filtered (µg/L)	145	7	<.08	[2].34	<1
Lead, unfiltered (µg/L)	145	100	<1	[2]7.93	3.00
Manganese, filtered (µg/L)	149	37.4	1.0	8.2	7.0
Manganese, unfiltered (µg/L)	149	2,000	10	134	70
Zinc, filtered (µg/L)	148	39	<3	[2]6.5	4.2
Zinc, unfiltered (µg/L)	149	1,100	<10	[2]66	30
Sediment, suspended (percent finer than 0.062 mm)	193	98	27	73	75
Sediment, suspended concentration (mg/L)	204	1,370	2	60	18
Sediment, suspended discharge (ton/d)	204	34,700	3.5	664	60

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft³/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft³/s)	146	13,400	344	2,650	1,310
pH, onsite (standard units)	106	8.7	7.5	8.3	8.3
Specific conductance, onsite (µS/cm)	123	294	131	207	205
Temperature, water (°C)	146	21.0	0.0	9.2	9.5
Hardness, filtered (mg/L as $CaCO_3$)	99	140	55	102	97
Calcium, filtered (mg/L)	99	37	14	26.3	24.8
Magnesium, filtered (mg/L)	99	13	4.9	9.08	8.63
Arsenic, filtered (µg/L)	106	2	<1	[2]1.0	1.0
Arsenic, unfiltered (µg/L)	106	4	<1	[2]1	1
Cadmium, filtered (µg/L)	106	1	<.04	--	<.1
Cadmium, unfiltered (µg/L)	106	2	<.04	[2].14	<1
Copper, filtered (µg/L)	104	7	<1	[2]1.5	.9
Copper, unfiltered (µg/L)	103	34	<1	[2]5.6	2.6
Iron, filtered (µg/L)	106	100	<3	[2]18	10
Iron, unfiltered (µg/L)	106	3,600	10	463	205
Lead, filtered (µg/L)	102	8	<.08	[2].46	<1
Lead, unfiltered (µg/L)	102	25	<.06	[2]2.86	<5
Manganese, filtered (µg/L)	106	11	<1	[2]2.4	2.0
Manganese, unfiltered (µg/L)	106	180	<10	[2]31	20
Zinc, filtered (µg/L)	106	15	<.6	[2]2.4	<10
Zinc, unfiltered (µg/L)	106	60	<1	[2]6.4	<10
Sediment, suspended (percent finer than 0.062 mm)	144	98	42	80	82
Sediment, suspended concentration (mg/L)	146	271	1	30	8
Sediment, suspended discharge (ton/d)	146	7,670	1.1	538	30

Table 20. Statistical summary of water-quality data for the upper Clark Fork basin, Montana, March 1985 through September 2005.—Continued

[Abbreviations: ft^3/s, cubic feet per second; °C, degrees Celsius; E, estimated; µg/L, micrograms per liter; µS/cm, microsiemens per centimeter at 25°C; mg/L, milligrams per liter; mm, millimeter; ton/d, tons per day. Symbols: <, less than laboratory reporting level[1]; --, indicates insufficient data greater than the laboratory reporting level 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 2005					
Streamflow, instantaneous (ft^3/s)	170	21,600	720	4,400	2,380
pH, onsite (standard units)	127	8.7	7.9	8.3	8.3
Specific conductance, onsite (µS/cm)	147	399	142	254	261
Temperature, water (°C)	167	21.0	0.0	9.4	9.0
Hardness, filtered (mg/L as $CaCO_3$)	127	170	61	117	120
Calcium, filtered (mg/L)	127	46	14	31.5	32.0
Magnesium, filtered (mg/L)	127	13.0	5.28	9.26	9.20
Arsenic, filtered (µg/L)	127	9	1	3.3	3.0
Arsenic, unfiltered (µg/L)	127	69	1	5	4
Cadmium, filtered (µg/L)	127	.2	<.04	[2].03	<.1
Cadmium, unfiltered (µg/L)	127	5	<.1	[2].14	<1
Copper, filtered (µg/L)	126	12.6	.7	2.8	2.0
Copper, unfiltered (µg/L)	125	400	2	16.4	8.0
Iron, filtered (µg/L)	127	200	<3	[2]22	15
Iron, unfiltered (µg/L)	127	13,000	40	598	230
Lead, filtered (µg/L)	122	1.2	<.08	[2].17	<1
Lead, unfiltered (µg/L)	122	78	<1	[2]3.12	1.17
Manganese, filtered (µg/L)	127	230	6.2	17.6	14.2
Manganese, unfiltered (µg/L)	127	1,100	10	65	40
Zinc, filtered (µg/L)	127	16	<1	[2]3.8	2.1
Zinc, unfiltered (µg/L)	127	1,100	<10	[2]31	12
Sediment, suspended (percent finer than 0.062 mm)	165	99	44	87	90
Sediment, suspended concentration (mg/L)	170	824	2	37	12
Sediment, suspended discharge (ton/d)	170	21,900	5.8	945	68

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

[2]Value 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).

Table 21. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2005.

[For water year 2005, bulk bed (fine-grained plus coarse-grained) sediment was not collected as in previous years. Bed-sediment data consist of only the fine-grained fraction (material less than 0.064 millimeter in diameter). Reported concentrations are in micrograms per gram dry weight. 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. Values for a single sample are arbitrarily listed in the "Mean" column. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323600—Silver Bow Creek at Opportunity Period of record for bed-sediment data: 1992-2005					
Arsenic	3	186	163	171	165
Cadmium	14	43.9	23.7	34.0	34.6
Chromium	12	32.4	16.8	24.8	24.5
Copper	14	9,020	3,390	4,940	4,620
Iron	14	41,200	28,200	35,600	36,000
Lead	14	1,030	381	726	792
Manganese	14	9,220	1,680	3,710	2,970
Nickel	13	21.4	12.4	15.4	15.3
Silver	12	20.0	8.3	15.5	15.8
Zinc	14	13,400	5,620	8,460	7,820
12323750—Silver Bow Creek at Warm Springs Period of record for bed-sediment data: 1992-2005					
Arsenic	3	177	103	141	141
Cadmium	14	12.2	4.2	7.7	7.1
Chromium	12	34.1	<15.7	19.4	18.5
Copper	14	769	169	355	279
Iron	14	31,700	15,400	22,200	20,800
Lead	14	100	49	71	71
Manganese	14	17,700	1,470	8,490	8,370
Nickel	13	19.1	9.2	14.8	14.6
Silver	12	4.4	.3	[1]1.9	[1]1.8
Zinc	14	2,220	620	1,040	828
12323770—Warm Springs Creek at Warm Springs Period of record for bed-sediment data: 1995, 1997, 1999, 2002, 2005					
Arsenic	1	--	--	66	--
Cadmium	5	5.8	1.3	3.6	3.9
Chromium	5	33.4	27.5	30.4	30.8
Copper	5	991	779	878	881
Iron	5	22,400	16,800	20,700	21,900
Lead	5	86	67	81	85
Manganese	5	12,100	2,020	7,980	8,790
Nickel	5	21.9	17.6	19.2	19.2
Silver	4	5.1	3.1	3.8	3.5
Zinc	5	421	372	395	396

Table 21. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[For water year 2005, bulk bed (fine-grained plus coarse-grained) sediment was not collected as in previous years. Bed-sediment data consist of only the fine-grained fraction (material less than 0.064 millimeter in diameter). Reported concentrations are in micrograms per gram dry weight. 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. Values for a single sample are arbitrarily listed in the "Mean" column. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12323800—Clark Fork near Galen Period of record for bed-sediment data: 1987, 1991-2005					
Arsenic	3	119	107	112	111
Cadmium	16	20.1	4.0	9.5	8.5
Chromium	12	33.9	19.1	26.2	26.1
Copper	16	2,300	838	1,230	1,130
Iron	16	39,800	22,600	27,800	26,900
Lead	16	235	92	139	134
Manganese	16	17,300	2,780	9,560	10,200
Nickel	13	23.2	13.9	18.2	18.2
Silver	14	7.3	<3.2	[1]4.4	[1]4.5
Zinc	16	3,560	999	1,610	1,200
461415112450801—Clark Fork below Lost Creek, near Galen Period of record for bed-sediment data: 1996-2005					
Arsenic	3	204	92	134	107
Cadmium	10	10.5	5.8	7.8	7.7
Chromium	9	34.5	20.5	27.9	27.5
Copper	10	2,050	1,150	1,510	1,430
Iron	10	32,800	24,400	29,600	30,500
Lead	10	218	127	176	178
Manganese	10	9,670	3,540	5,650	5,660
Nickel	10	19.9	11.7	16.2	164.0
Silver	8	7.8	4.2	6.5	6.7
Zinc	10	1,680	1,120	1,380	1,380
461559112443301—Clark Fork at County Bridge, near Racetrack Period of record for bed-sediment data: 1996-2005					
Arsenic	3	101	56	81	86.00
Cadmium	10	8.7	5.0	7.0	7.0
Chromium	9	33.3	19.0	25.0	24.9
Copper	10	1,610	933	1,190	1,170
Iron	10	31,700	21,200	26,300	26,400
Lead	10	186	103	143	138
Manganese	10	6,310	2,100	3,670	3,560
Nickel	10	18.4	10.3	14.0	14.1
Silver	8	6.1	<3.3	[1]5.0	[1]5.4
Zinc	10	1,550	999	1,210	1,150

Table 21. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[For water year 2005, bulk bed (fine-grained plus coarse-grained) sediment was not collected as in previous years. Bed-sediment data consist of only the fine-grained fraction (material less than 0.064 millimeter in diameter). Reported concentrations are in micrograms per gram dry weight. 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. Values for a single sample are arbitrarily listed in the "Mean" column. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data 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: 1996-2005					
Arsenic	3	80	58	70	71
Cadmium	10	10.3	4.3	6.8	6.4
Chromium	9	34.1	16.0	24.7	25.6
Copper	10	1,550	721	1,020	996
Iron	10	33,700	20,600	26,100	25,200
Lead	10	155	92	129	126
Manganese	10	8,370	1,810	4,060	3,290
Nickel	10	16.9	8.7	13.0	12.7
Silver	8	6.2	2.7	4.9	5.0
Zinc	10	1,570	900	1,130	1,080
12324200—Clark Fork at Deer Lodge Period of record for bed-sediment data: 1986-1987, 1990-2005					
Arsenic	3	77	49	66	72
Cadmium	18	10.0	3.8	6.6	6.2
Chromium	12	43.9	19.5	30.3	30.4
Copper	18	4,180	683	1,320	1,060
Iron	18	35,300	21,100	27,400	26,400
Lead	18	242	103	150	149
Manganese	18	6,020	1,110	2,730	2,420
Nickel	13	21.1	11.5	15.4	15.0
Silver	16	7.9	2.4	4.7	4.5
Zinc	18	1,730	846	1,240	1,260
12324590—Little Blackfoot River near Garrison Period of record for bed-sediment data: 1986-1987, 1994, 1998, 2001, 2004					
Arsenic	1	--	--	12	--
Cadmium	6	2.3	0.2	1.1	0.9
Chromium	4	54.4	22.1	40.6	43.0
Copper	6	85	33	52	40
Iron	6	30,700	16,100	24,300	24,400
Lead	6	53	36	40	38
Manganese	6	2,700	905	1,370	1,080
Nickel	4	21.9	13.6	17.6	17.4
Silver	5	.9	<.5	[1].6	[1]<1.5
Zinc	6	204	161	176	173

Table 21. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[For water year 2005, bulk bed (fine-grained plus coarse-grained) sediment was not collected as in previous years. Bed-sediment data consist of only the fine-grained fraction (material less than 0.064 millimeter in diameter). Reported concentrations are in micrograms per gram dry weight. 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. Values for a single sample are arbitrarily listed in the "Mean" column. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12324680—Clark Fork at Goldcreek Period of record for bed-sediment data: 1992-2005					
Arsenic	3	39	24	32	32
Cadmium	14	8.1	3.1	5.1	5.4
Chromium	12	48.9	22.1	32.1	31.8
Copper	14	1,080	393	693	738
Iron	14	30,600	19,500	23,800	24,000
Lead	14	152	61	98	99
Manganese	14	2,610	1,160	1,890	1,810
Nickel	13	18.6	10.9	14.7	15.0
Silver	12	4.8	2.3	3.3	3.2
Zinc	14	1,320	590	978	1,080
12331800—Clark Fork near Drummond Period of record for bed-sediment data: 1986-1987, 1991-2005					
Arsenic	3	34	31	32	33
Cadmium	17	7.7	2.6	4.7	4.8
Chromium	12	35.4	17.0	28.6	30.8
Copper	17	747	321	495	491
Iron	17	27,000	16,500	21,500	20,400
Lead	17	135	64	91	93
Manganese	17	3,090	1,150	1,900	1,880
Nickel	13	16.8	10.4	13.7	14.0
Silver	15	4.7	<3.2	[1]3.0	[1]2.9
Zinc	17	1,230	742	991	1,000
12334510—Rock Creek near Clinton Period of record for bed-sediment data: 1986-1987, 1989, 1991-1999, 2001-2005					
Arsenic	3	6	<6	[1]5	[1]5
Cadmium	17	3.7	<.1	[1].8	[1]<.8
Chromium	11	27.9	16.1	21.1	20.5
Copper	17	16	3	11	12
Iron	17	21,400	13,100	17,300	17,200
Lead	17	16	<3	9	10
Manganese	17	724	126	373	361
Nickel	12	14.8	8.7	11.5	11.4
Silver	14	1.9	<.3	[1].5	[1]<.6
Zinc	17	58	23	42	45

Table 21. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[For water year 2005, bulk bed (fine-grained plus coarse-grained) sediment was not collected as in previous years. Bed-sediment data consist of only the fine-grained fraction (material less than 0.064 millimeter in diameter). Reported concentrations are in micrograms per gram dry weight. 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. Values for a single sample are arbitrarily listed in the "Mean" column. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12334550—Clark Fork at Turah Bridge, near Bonner Period of record for bed-sediment data: 1986, 1991-2005					
Arsenic	3	30	19	24	22
Cadmium	16	7.3	2.3	4.0	3.9
Chromium	12	34.7	15.3	24.6	27.2
Copper	16	635	211	363	322
Iron	16	24,400	12,600	18,700	17,300
Lead	16	115	47	71	65
Manganese	16	2,270	671	1,230	1,200
Nickel	13	19.1	8.7	12.9	11.6
Silver	14	3.9	<1.9	[1]2.1	[1]1.9
Zinc	16	1,160	586	848	816
12340000—Blackfoot River near Bonner Period of record for bed-sediment data: 1986-1987, 1991, 1993-1996, 1998-2001, 2003					
Arsenic	1	--	--	2	--
Cadmium	12	2.0	<0.2	[1].7	[1]<1.0
Chromium	8	25.8	15.1	20.5	21.8
Copper	12	27	11	20	21
Iron	12	20,200	12,400	16,800	16,800
Lead	12	20	<13	[1]13	[1]12
Manganese	12	683	298	531	538
Nickel	9	14.3	9.4	11.9	12.5
Silver	12	<1.9	<.3	[1].5	[1]<.6
Zinc	12	73	35	58	61
12340500—Clark Fork above Missoula Period of record for bed-sediment data: 1997-2005					
Arsenic	3	29	17	23	23
Cadmium	9	5.8	1.5	3.4	3.4
Chromium	8	30.6	19.0	25.0	24.6
Copper	9	543	166	328	282
Iron	9	24,300	18,100	20,300	20,400
Lead	9	78	37	55	54
Manganese	9	1,420	477	977	970
Nickel	9	15.8	10.9	13.2	13.0
Silver	7	2.9	.8	[1]2.0	[1]2.1
Zinc	9	1,090	438	709	696

Table 21. Statistical summary of fine-grained bed-sediment data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[For water year 2005, bulk bed (fine-grained plus coarse-grained) sediment was not collected as in previous years. Bed-sediment data consist of only the fine-grained fraction (material less than 0.064 millimeter in diameter). Reported concentrations are in micrograms per gram dry weight. 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. Values for a single sample are arbitrarily listed in the "Mean" column. Values are reported using U.S. Geological Survey rounding standards. Symbols: <, less than the minimum reporting level; --, indicates insufficient data to compute statistic]

Constituent	Number of samples	Maximum	Minimum	Mean	Median
12353000—Clark Fork below Missoula[2] Period of record for bed-sediment data: 1986, 1990-2004					
Arsenic	2	14	6	--	--
Cadmium	16	6.0	1.1	2.3	1.9
Chromium	11	27.6	12.3	21.4	21.5
Copper	16	293	69	150	140
Iron	16	21,100	13,100	18,100	18,600
Lead	16	58	12	36	36
Manganese	16	2,530	446	1,360	1,270
Nickel	12	14.1	8.4	12.0	12.5
Silver	15	3.0	.4	[1]1.3	[1]1.2
Zinc	16	675	239	396	395

[1]Value was 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 (or) median. When all data were less than the minimum reporting level, the median was determined by ranking the censored values by order of magnitude.

[2]Samples were collected about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323600—Silver Bow Creek at Opportunity Period of record for biological data: 1992, 1994-95, 1997-2005					
Brachycentrus spp.					
Arsenic	0	--	--	--	--
Cadmium	5	12.5	5.8	10.1	11.6
Chromium	5	5.9	.7	2.1	.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	<.1	[1]1.3	[1]1.6
Zinc	5	995	629	803	815
Hydropsyche cockerelli					
Arsenic	4	20.4	9.5	13.5	12.0
Cadmium	10	9.7	4.1	5.8	5.1
Chromium	10	8.0	1.0	2.9	1.9
Copper	10	1,090	269	451	378
Iron	10	2,660	689	1,390	1,120
Lead	10	47.2	19.0	27.6	21.3
Manganese	10	3,030	180	972	782
Nickel	10	3.6	.7	2.0	1.8
Zinc	10	1,590	749	949	838
Hydropsyche spp.					
Arsenic	5	23.1	10.7	17.2	18.4
Cadmium	10	10.9	4.6	7.0	5.9
Chromium	10	4.7	.6	2.1	1.5
Copper	10	930	312	597	471
Iron	10	2,550	1,050	1,860	1,990
Lead	10	51.4	21.8	38.9	38.2
Manganese	10	1,340	712	1,080	1,060
Nickel	10	2.5	.7	2.2	2.4
Zinc	10	1,290	834	1,070	1,090

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323600—Silver Bow Creek at Opportunity—Continued Period of record for biological data: 1992, 1994-95, 1997-2005					
Hydropsyche tana					
Arsenic	0	--	--	--	--
Cadmium	6	9.2	4.8	6.8	6.9
Chromium	6	11.5	.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	.7	1.4	1.6
Zinc	6	1,070	760	961	1,020
12323750—Silver Bow Creek at Warm Springs Period of record for biological data: 1992-2005					
Hydropsyche cockerelli					
Arsenic	6	23.6	7.9	15.1	15.4
Cadmium	32	2.1	.2	.7	.5
Chromium	32	4.3	.4	1.0	.8
Copper	32	97.0	16.7	38.5	30.5
Iron	32	1,590	351	770	761
Lead	32	5.7	.3	2.9	2.6
Manganese	32	3,890	491	1,310	1,160
Nickel	32	1.8	.3	.9	.8
Zinc	32	276	115	176	167
Hydropsyche occidentalils					
Arsenic	5	31.0	10.5	21.0	25.6
Cadmium	20	1.6	.2	.6	.4
Chromium	20	6.8	.3	1.7	1.0
Copper	20	48.9	11.0	32.4	30.8
Iron	20	2,960	372	1,190	971
Lead	20	8.2	<1.7	[1]3.8	[1]3.5
Manganese	20	6,940	1,200	2,560	2,150
Nickel	20	2.7	.7	1.5	1.5
Zinc	20	220	140	178	179

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323750—Silver Bow Creek at Warm Springs—Continued Period of record for biological data: 1992-2005					
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	4	2.3	0.4	1.1	0.9
Chromium	4	1.4	.5	1.0	1.2
Copper	4	47.6	34.9	40.9	40.6
Iron	4	773	561	680	693
Lead	4	5.1	1.9	3.9	4.7
Manganese	4	1,100	443	725	678
Nickel	4	1.9	<.4	[1].8	[1].5
Zinc	4	285	141	195	177
12323770—Warm Springs Creek at Warm Springs Period of record for biological data: 1995, 1997, 1999, 2002, 2005					
Arctopsyche grandis					
Arsenic	2	9.8	9.5	--	--
Cadmium	6	3.6	1.9	2.7	2.7
Chromium	6	2.9	.8	1.7	1.6
Copper	6	133	78.3	106	100
Iron	6	1,100	684	918	957
Lead	6	5.6	3.0	[1]4.7	[1]5.2
Manganese	6	3,560	1,340	2,560	2,710
Nickel	6	2.8	1.8	[1]2.3	[1]2.3
Zinc	6	222	181	196	196
Hydropsyche occidentalis					
Arsenic	2	13.6	12.7	--	--
Cadmium	4	1.2	.7	1.0	1.0
Chromium	4	3.2	.3	2.2	3.2
Copper	4	183	125	156	158
Iron	4	2,070	1,590	1,840	1,840
Lead	4	8.2	6.7	7.4	7.4
Manganese	4	3,190	2,400	2,790	2,770
Nickel	4	3.3	2.0	2.6	2.6
Zinc	4	172	148	160	160

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323770—Warm Springs Creek at Warm Springs—Continued Period of record for biological data: 1995, 1997, 1999, 2002, 2005					
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	2	1.1	0.6	--	--
Chromium	2	1.6	1.4	--	--
Copper	2	95.9	94.8	--	--
Iron	2	1,220	1,150	--	--
Lead	2	5.9	5.2	--	--
Manganese	2	3,390	956	--	--
Nickel	2	2.0	1.8	--	--
Zinc	2	129	125	--	--
12323800—Clark Fork near Galen Period of record for biological data: 1987, 1991-2005					
Hydropsyche cockerelli					
Arsenic	3	15.8	13.2	14.2	13.6
Cadmium	28	2.7	.7	1.5	1.5
Chromium	28	4.4	.8	1.8	1.6
Copper	28	181	48.7	100	98.1
Iron	28	2,460	816	1,390	1,350
Lead	28	11.7	1.2	7.6	7.6
Manganese	28	3,620	1,070	2,280	2,320
Nickel	28	3.1	.9	1.6	1.5
Zinc	28	299	136	210	208
Hydropsyche morosa 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

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005. —Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12323800—Clark Fork near Galen—Continued Period of record for biological data: 1987, 1991-2005					
Hydropsyche occidentalis					
Arsenic	4	16.5	12.5	15.2	16.0
Cadmium	36	1.7	.6	1.1	1.1
Chromium	36	6.6	.4	2.0	1.5
Copper	36	121	49.2	82.3	81.6
Iron	36	1,920	642	1,270	1,220
Lead	36	13.5	1.6	7.0	6.6
Manganese	36	6,170	1,220	2,600	2,260
Nickel	36	3.5	.8	1.6	1.5
Zinc	36	286	168	199	193
Hydropsyche tana					
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	--
Hydropsyche spp.					
Arsenic	2	15.7	14.5	--	--
Cadmium	6	3.5	.8	2.3	2.8
Chromium	2	2.4	2.2	2.3	--
Copper	6	154	78.4	126	143
Iron	6	1,540	1,190	1,360	1,360
Lead	6	13.5	5.9	10.4	10.9
Manganese	2	4,760	4,400	--	--
Nickel	2	1.8	1.5	--	--
Zinc	6	329	218	280	291

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461415112450801—Clark Fork below Lost Creek, near Galen Period of record for biological data: 1996-2005					
Claassenia sabulosa					
Arsenic	1	--	--	1.5	--
Cadmium	2	0.4	0.3	--	--
Chromium	2	1.9	.4	--	--
Copper	2	70.1	67.1	--	--
Iron	2	209	189	--	--
Lead	2	1.2	.7	--	--
Manganese	2	238	90.4	--	--
Nickel	2	.2	<.2	--	--
Zinc	2	245	208	--	--
Hydropsyche cockerelli					
Arsenic	7	11.8	8.8	11.0	11.4
Cadmium	18	2.8	1.1	1.8	1.7
Chromium	18	2.7	.8	1.8	1.9
Copper	18	147	48.8	108	102
Iron	18	2,570	691	1,280	1,130
Lead	18	15.2	4.5	9.6	8.9
Manganese	18	3,160	1,230	1,800	1,670
Nickel	18	1.9	.9	1.2	1.1
Zinc	18	321	151	213	219
Hydropsyche occidentalis					
Arsenic	3	15.6	12.7	13.7	12.9
Cadmium	17	1.8	.9	1.3	1.3
Chromium	17	3.3	1.2	2.0	1.8
Copper	17	157	52.1	103	107
Iron	17	1,920	963	1,380	1,360
Lead	17	12.4	6.6	9.5	9.5
Manganese	17	3,870	1,220	2,250	2,150
Nickel	17	1.7	.9	1.3	1.4
Zinc	17	283	174	227	236

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461415112450801—Clark Fork below Lost Creek, near Galen—Continued Period of record for biological data: 1996-2005					
Hydropsyche spp.					
Arsenic	1	--	--	12.0	--
Cadmium	5	1.8	1.2	1.5	1.4
Chromium	5	2.4	.9	1.5	1.5
Copper	5	122	45.1	91.8	103
Iron	5	1,410	533	1,110	1,200
Lead	5	20.5	4.1	10.0	8.7
Manganese	5	1,980	799	1,440	1,230
Nickel	5	2.8	1.0	1.6	1.4
Zinc	5	225	143	179	179
461559112443301—Clark Fork at County Bridge, near Racetrack Period of record for biological data: 1996-2005					
Claassenia sabulosa					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	0.4	--
Chromium	1	--	--	.3	--
Copper	1	--	--	40.3	--
Iron	1	--	--	113	--
Lead	1	--	--	.8	--
Manganese	1	--	--	172	--
Nickel	1	--	--	.2	--
Zinc	1	--	--	213	--
Hydropsyche cockerelli					
Arsenic	6	14.3	11.1	12.0	11.6
Cadmium	17	1.9	.8	1.4	1.4
Chromium	17	2.7	.6	1.5	1.1
Copper	17	121	50.0	85.5	84.3
Iron	17	1,370	657	957	981
Lead	17	10.5	3.7	6.8	6.9
Manganese	17	2,020	646	1,520	1,690
Nickel	17	1.4	.7	1.0	1.0
Zinc	17	199	139	176	176

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
461559112443301—Clark Fork at County Bridge, near Racetrack—Continued Period of record for biological data: 1996-2005					
Hydropsyche occidentalis					
Arsenic	2	14.3	13.7	--	--
Cadmium	15	2.2	.7	1.4	1.4
Chromium	15	3.7	1.1	2.1	2.0
Copper	15	160	59.5	107	107
Iron	15	1,880	1,030	1,510	1,520
Lead	15	11.7	4.3	9.6	10.1
Manganese	15	3,770	1,090	2,070	2,050
Nickel	15	1.9	1.1	1.3	1.3
Zinc	15	255	181	225	220
Hydropsyche spp.					
Arsenic	1	--	--	11.9	--
Cadmium	3	2.4	1.0	1.6	1.5
Chromium	3	1.7	.7	1.2	1.1
Copper	3	113	82.9	93.7	85.2
Iron	3	1,290	1,140	1,210	1,200
Lead	3	9.6	5.7	7.5	7.4
Manganese	3	1,600	910	1,210	1,130
Nickel	3	1.4	1.1	1.3	1.3
Zinc	3	208	151	180	181
461903112440701—Clark Fork at Dempsey Creek Diversion, near Racetrack Period of record for biological data: 1996-2005					
Arctopsyche grandis					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	1.7	--
Chromium	1	--	--	<2.4	--
Copper	1	--	--	30.8	--
Iron	1	--	--	340	--
Lead	1	--	--	<14.5	--
Manganese	1	--	--	510	--
Nickel	1	--	--	1.0	--
Zinc	1	--	--	87	--

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005. —Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

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: 1996-2005					
Hydropsyche cockerelli					
Arsenic	4	18.8	8.0	11.4	9.4
Cadmium	13	1.7	.7	1.2	1.3
Chromium	13	4.0	.4	1.3	1.0
Copper	13	190	60.7	92.3	78.8
Iron	13	2,310	552	953	831
Lead	13	17.7	3.5	6.5	5.0
Manganese	13	2,070	487	1,200	1,190
Nickel	13	1.9	.5	1.0	.7
Zinc	13	275	162	192	180
Hydropsyche occidentalis					
Arsenic	2	24.0	10.2	--	--
Cadmium	19	1.8	.7	1.2	1.2
Chromium	19	6.2	.8	2.0	1.8
Copper	19	238	74.9	102	89.0
Iron	19	3,390	940	1,510	1,500
Lead	19	21.8	6.1	11.4	11.4
Manganese	19	3,990	826	2,410	2,290
Nickel	19	2.4	1.2	1.5	1.4
Zinc	19	355	211	250	236
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	2	1.7	1.6	--	--
Chromium	2	2.1	1.4	--	--
Copper	2	140	104	--	--
Iron	2	1,610	1,070	--	--
Lead	2	13.2	10.5	--	--
Manganese	2	1,150	638	--	--
Nickel	2	1.6	1.6	--	--
Zinc	2	212	191	--	--

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324200—Clark Fork at Deer Lodge Period of record for biological data: 1986-87, 1990-2005					
Arctopsyche grandis					
Arsenic	0	--	--	--	--
Cadmium	2	2.4	<4.2	--	--
Chromium	2	1.0	<1.3	--	--
Copper	2	69.1	34.9	--	--
Iron	2	676	537	--	--
Lead	2	3.8	<7.8	--	--
Manganese	2	727	380	--	--
Nickel	2	<1.7	<1.3	--	--
Zinc	2	178	140	--	--
Hydropsyche cockerelli					
Arsenic	4	10.1	5.8	7.3	6.7
Cadmium	27	2.3	.6	1.3	1.3
Chromium	27	3.2	.4	1.6	1.6
Copper	27	136	54.7	94.6	97.7
Iron	27	3,340	490	1,090	1,040
Lead	27	18.1	3.8	9.2	8.9
Manganese	27	1,490	396	844	759
Nickel	27	2.4	.3	1.1	1.0
Zinc	27	391	132	186	185
Hydropsyche occidentalis					
Arsenic	5	12.4	6.6	9.8	9.4
Cadmium	42	2.7	.6	1.3	1.3
Chromium	42	3.6	.6	1.9	1.9
Copper	42	162	49.4	114	111
Iron	42	2,060	557	1,390	1,420
Lead	42	18.6	3.5	11.0	10.8
Manganese	42	2,850	649	1,700	1,730
Nickel	42	12.9	1.0	1.7	1.4
Zinc	42	329	166	240	233

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005. —Continued

[Concentrations are in micrograms per gram dry weight. 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324200—Clark Fork at Deer Lodge—Continued Period of record for biological data: 1986-87, 1990-2005					
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	3	2.6	2.0	2.4	2.5
Chromium	0	--	--	--	--
Copper	3	222	175	191	177
Iron	3	2,220	1,850	2,010	1,950
Lead	3	16.7	15.0	16.1	16.7
Manganese	0	--	--	--	--
Nickel	0	--	--	--	--
Zinc	3	298	197	257	276
12324590—Little Blackfoot River near Garrison Period of record for biological data: 1987, 1994, 1998, 2001, 2004					
Arctopsyche grandis					
Arsenic	3	4.2	3.2	3.6	3.3
Cadmium	18	.7	.2	.4	.4
Chromium	18	1.6	.6	.9	.8
Copper	18	14.2	9.0	11.9	11.9
Iron	18	716	177	419	414
Lead	18	1.3	.5	.8	.8
Manganese	18	1,140	318	733	719
Nickel	18	1.4	.4	.8	.8
Zinc	18	214	113	162	160
Claassenia sabulosa					
Arsenic	1	--	--	1.3	--
Cadmium	8	0.5	0.1	.2	0.2
Chromium	8	.9	.3	.6	.7
Copper	8	37.2	20.0	30.4	30.9
Iron	8	319	98.4	178	178
Lead	8	<.8	<.1	[1].4	[1].3
Manganese	8	149	46.7	75.9	62.1
Nickel	8	.7	.4	.5	.5
Zinc	8	271	172	211	206

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324590—Little Blackfoot River near Garrison—Continued Period of record for biological data: 1987, 1994, 1998, 2001, 2004					
Hydropsyche cockerelli					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	0.6	--
Chromium	1	--	--	1.6	--
Copper	1	--	--	28.4	--
Iron	1	--	--	478	--
Lead	1	--	--	3.6	--
Manganese	1	--	--	399	--
Nickel	1	--	--	1.2	--
Zinc	1	--	--	123	--
Hydropsyche occidentalis					
Arsenic	0	--	--	--	--
Cadmium	2	0.3	<0.7	--	--
Chromium	2	2.3	1.3	--	--
Copper	2	15.2	15.1	--	--
Iron	2	1,340	426	--	--
Lead	2	2.3	<3.7	--	--
Manganese	2	554	434	--	--
Nickel	2	1.1	.8	--	--
Zinc	2	137	110	--	--
Hydropsyche spp.					
Arsenic	1	--	--	3.7	--
Cadmium	1	--	--	<.2	--
Chromium	1	--	--	1.8	--
Copper	1	--	--	11.1	--
Iron	1	--	--	1,000	--
Lead	1	--	--	<2.4	--
Manganese	1	--	--	1,200	--
Nickel	1	--	--	.9	--
Zinc	1	--	--	151	--

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324680—Clark Fork at Goldcreek Period of record for biological data: 1992-2005					
Arctopsyche grandis					
Arsenic	13	6.4	1.8	4.1	3.3
Cadmium	42	6.6	.6	2.0	1.8
Chromium	42	3.3	.4	1.4	1.1
Copper	42	129	19.9	44.3	37.5
Iron	42	2,360	195	686	517
Lead	42	10.9	1.1	3.6	3.4
Manganese	42	1,580	436	835	789
Nickel	42	1.8	.2	.7	.6
Zinc	42	326	149	199	183
Claassenia sabulosa					
Arsenic	8	2.1	0.7	1.3	1.2
Cadmium	28	3.5	.1	1.0	.7
Chromium	28	1.6	.2	.6	.5
Copper	28	81.7	33.0	56.6	56.3
Iron	28	567	63.0	193	189
Lead	28	1.8	.4	.9	.9
Manganese	28	320	50.6	138	113
Nickel	28	.7	.1	.3	.3
Zinc	28	351	166	263	260
Hydropsyche cockerelli					
Arsenic	8	6.1	4.1	5.2	5.4
Cadmium	27	2.6	.5	1.3	1.3
Chromium	27	4.7	.5	2.2	2.0
Copper	27	188	17.1	69.9	58.4
Iron	27	3,250	522	1,150	930
Lead	27	16.2	2.4	6.6	5.3
Manganese	27	1,670	538	913	906
Nickel	27	2.3	.3	1.2	1.0
Zinc	27	249	106	183	184

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005. —Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12324680—Clark Fork at Goldcreek—Continued Period of record for biological data: 1992-2005					
Hydropsyche morosa 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	.9	1.2	1.2
Zinc	4	190	137	167	170
Hydropsyche occidentalis					
Arsenic	3	5.8	4.7	5.3	5.3
Cadmium	18	1.7	.4	1.2	1.3
Chromium	18	3.9	.4	1.6	1.7
Copper	18	156	26.4	62.8	58.0
Iron	18	2,720	466	1,140	1,070
Lead	18	15.7	2.9	6.9	5.8
Manganese	18	2,210	530	1,210	1,080
Nickel	18	2.5	.8	1.2	1.0
Zinc	18	277	97	195	196
12331800—Clark Fork near Drummond Period of record for biological data: 1986, 1991-2005					
Arctopsyche grandis					
Arsenic	9	4.4	2.4	3.3	3.3
Cadmium	41	3.8	.4	1.3	1.1
Chromium	41	2.5	.2	1.0	1.0
Copper	41	89.2	16.9	32.4	27.4
Iron	41	1,660	240	568	511
Lead	41	11.8	2.1	4.4	3.9
Manganese	41	2,010	456	838	733
Nickel	41	1.9	.2	.7	.6
Zinc	41	308	140	188	183

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005. —Continued

[Concentrations are in micrograms per gram dry weight. 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12331800—Clark Fork near Drummond—Continued Period of record for biological data: 1986, 1991-2005					
Claassenia sabulosa					
Arsenic	6	1.3	0.7	1.1	1.2
Cadmium	42	2.8	.1	1.1	1.0
Chromium	42	3.3	.1	.7	.6
Copper	42	165	18.0	63.5	53.8
Iron	42	387	45.4	158	135
Lead	42	2.9	.2	.9	.8
Manganese	42	410	33.1	161	140
Nickel	42	1.1	.1	.3	.2
Zinc	42	567	103	273	256
Hydropsyche cockerelli					
Arsenic	6	5.7	3.9	4.5	4.3
Cadmium	35	2.3	.3	1.1	.8
Chromium	35	3.5	.4	1.6	1.5
Copper	35	156	30.0	58.1	50.3
Iron	35	2,500	506	1,150	969
Lead	35	15.0	5.1	8.2	7.4
Manganese	35	1,680	549	977	913
Nickel	35	2.0	.5	1.1	1.0
Zinc	35	248	134	192	186
Hydropsyche morosa 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

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12331800—Clark Fork near Drummond—Continued Period of record for biological data: 1986, 1991-2005					
Hydropsyche occidentalis					
Arsenic	5	6.9	4.3	5.0	4.6
Cadmium	21	2.0	.4	1.0	1.0
Chromium	21	8.1	.4	2.3	2.2
Copper	21	118	13.3	54.1	55.0
Iron	21	2,060	424	1,250	1,180
Lead	21	14.0	2.9	8.7	8.7
Manganese	21	2,920	619	1,500	1,200
Nickel	21	2.4	.5	1.4	1.2
Zinc	21	293	157	220	221
Hydropsyche 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	--
12334510—Rock Creek near Clinton Period of record for biological data: 1987; 1991-1999; 2001-2005					
Arctopsyche grandis					
Arsenic	8	2.5	1.5	2.0	2.0
Cadmium	46	.4	<.1	[1].2	[1].2
Chromium	46	2.9	.4	1.1	1.0
Copper	46	15.7	4.7	8.6	8.5
Iron	46	1,090	191	585	531
Lead	46	1.1	<.1	[1].4	[1].4
Manganese	46	454	113	251	245
Nickel	46	1.8	.2	.9	.9
Zinc	46	189	83.9	127	130

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12334510—Rock Creek near Clinton—Continued Period of record for biological data: 1987; 1991-1999; 2001-2005					
Claassenia sabulosa					
Arsenic	4	1.1	1.0	1.0	1.0
Cadmium	23	.3	<.1	[1].2	[1].1
Chromium	23	1.8	.1	.6	.5
Copper	23	40.7	18.1	28.7	28.5
Iron	23	129	49.8	93.8	102
Lead	23	1.0	.1	.4	.3
Manganese	23	76.3	15.7	36.6	34.8
Nickel	23	.9	.1	.3	.3
Zinc	23	264	139	194	190
Hydropsyche cockerelli					
Arsenic	1	--	--	2.4	--
Cadmium	4	0.3	<0.2	[1].2	[1]<0.2
Chromium	4	1.0	.3	.8	.9
Copper	4	13.1	6.0	8.5	7.4
Iron	4	825	485	604	553
Lead	4	<1.1	.4	[1].5	[1]<1.1
Manganese	4	266	192	231	233
Nickel	4	1.0	.4	.6	.6
Zinc	4	99	82	91	91
Hydropsyche occidentalis					
Arsenic	1	--	--	2.2	--
Cadmium	5	0.4	<0.3	[1].2	[1]0.1
Chromium	5	2.4	.9	1.6	1.6
Copper	5	17.6	5.1	10.6	10.2
Iron	5	973	520	709	652
Lead	5	6.0	1.2	3.0	1.8
Manganese	5	295	169	242	262
Nickel	5	1.7	.6	1.2	1.4
Zinc	5	144	99	116	117

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12334510—Rock Creek near Clinton—Continued Period of record for biological data: 1987; 1991-1999; 2001-2005					
Hydropsyche spp.					
Arsenic	1	--	--	0.7	--
Cadmium	4	0.3	<0.5	[1].2	[1]0.2
Chromium	4	2.1	1.1	1.6	1.7
Copper	4	16.2	6.1	12.2	13.3
Iron	4	1,140	789	949	932
Lead	4	<4.9	<1.8	[1]--	[1]<2.9
Manganese	4	462	299	394	407
Nickel	4	1.3	.8	1.1	1.1
Zinc	4	135	112	123	121
12334550—Clark Fork at Turah Bridge, near Bonner Period of record for biological data: 1986; 1991-2005					
Arctopsyche grandis					
Arsenic	11	5.0	3.1	4.2	4.2
Cadmium	53	2.7	.3	1.2	.8
Chromium	53	4.1	.5	1.6	1.4
Copper	53	125	20.1	37.1	29.2
Iron	53	2,870	372	915	712
Lead	53	13.2	1.6	4.2	3.2
Manganese	53	902	324	636	643
Nickel	53	2.7	.4	1.1	.9
Zinc	53	276	111	196	196
Claassenia sabulosa					
Arsenic	7	1.9	0.8	1.2	1.1
Cadmium	33	2.5	.1	1.0	.8
Chromium	33	2.0	.2	.7	.6
Copper	33	87.6	37.5	57.0	53.4
Iron	33	340	58.6	116	105
Lead	33	1.6	.2	.6	.6
Manganese	33	215	37.2	85.7	74.5
Nickel	33	.6	.1	.2	.2
Zinc	33	284	144	224	230

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

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; 1991-2005					
Hydropsyche cockerelli					
Arsenic	7	5.1	3.7	4.2	4.0
Cadmium	35	1.8	.3	.8	.7
Chromium	35	8.0	.2	1.8	1.6
Copper	35	118	26.4	46.9	41.8
Iron	35	2,530	566	1,180	1,060
Lead	35	12.1	2.2	5.2	4.9
Manganese	35	805	426	617	589
Nickel	35	2.6	.6	1.2	1.2
Zinc	35	228	119	183	180
Hydropsyche morosa group					
Arsenic	0	--	--	--	--
Cadmium	2	1.3	1.1	--	--
Chromium	2	4.6	2.4	--	--
Copper	2	84.1	26.8	--	--
Iron	2	1,800	986	--	--
Lead	2	6.6	<7.8	--	--
Manganese	2	1,320	537	--	--
Nickel	2	1.7	1.3	--	--
Zinc	2	231	171	--	--
Hydropsyche occidentalis					
Arsenic	6	5.9	3.6	4.3	4.1
Cadmium	26	1.8	.3	.9	.8
Chromium	26	3.2	.6	1.7	1.5
Copper	26	102	27.4	47.4	42.2
Iron	26	2,310	472	1,180	1,130
Lead	26	14.2	3.0	6.4	5.7
Manganese	26	1,600	454	857	744
Nickel	26	3.2	.6	1.2	1.1
Zinc	26	416	145	211	222

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

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; 1991-2005					
Hydropsyche 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, 1987, 1991, 1993, 1996, 1998, 2000, 2003					
Arctopsyche grandis					
Arsenic	1	--	--	2.8	--
Cadmium	11	0.4	<0.1	[1].2	[1]0.2
Chromium	6	1.8	.8	1.2	1.2
Copper	11	13.4	9.9	12.0	12.0
Iron	11	1,230	108	606	617
Lead	11	2.3	.5	1.0	.6
Manganese	6	517	286	404	393
Nickel	6	1.2	.7	.9	.9
Zinc	11	143	123	135	136
Claassenia sabulosa					
Arsenic	0	--	--	--	--
Cadmium	11	0.2	0.1	0.1	0.1
Chromium	6	.9	.3	.5	.5
Copper	11	88.5	19.0	45.2	44.0
Iron	11	158	46.2	100	99.0
Lead	11	.6	.4	.5	.6
Manganese	6	127	26.3	57.1	44.7
Nickel	6	.3	.1	.2	.2
Zinc	11	329	117	209	194

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12340000—Blackfoot River near Bonner—Continued Period of record for biological data: 1986, 1987, 1991, 1993, 1996, 1998, 2000, 2003					
Hydropsyche occidentalis					
Arsenic	1	--	--	3.2	--
Cadmium	13	.5	0.1	.2	0.2
Chromium	13	2.7	.8	1.8	1.7
Copper	13	20.6	12.0	14.4	14.4
Iron	13	1,930	1,060	1,410	1,470
Lead	13	1.9	.8	1.3	1.3
Manganese	13	577	414	480	466
Nickel	13	1.8	.9	1.3	1.2
Zinc	13	150	116	135	130
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	0.6	--
Chromium	1	--	--	1.6	--
Copper	1	--	--	13.9	--
Iron	1	--	--	1,140	--
Lead	1	--	--	2.9	--
Manganese	1	--	--	525	--
Nickel	1	--	--	2.8	--
Zinc	1	--	--	132	--
12340500—Clark Fork above Missoula Period of record for biological data: 1997-2005					
Arctopsyche grandis					
Arsenic	9	4.5	2.1	3.3	3.5
Cadmium	28	1.8	.1	.7	.6
Chromium	28	3.4	.6	1.6	1.4
Copper	28	77.6	19.5	33.8	29.1
Iron	28	2,340	476	968	894
Lead	28	6.8	1.2	3.8	3.3
Manganese	28	1,410	476	950	937
Nickel	28	2.0	.5	1.1	1.0
Zinc	28	260	133	186	183

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12340500—Clark Fork above Missoula—Continued Period of record for biological data: 1997-2005					
Claassenia sabulosa					
Arsenic	3	1.9	0.7	1.2	1.1
Cadmium	12	2.0	.2	.7	.4
Chromium	12	1.1	.3	.7	.7
Copper	12	71.7	33.0	48.5	44.8
Iron	12	402	95.3	245	241
Lead	12	3.1	.5	1.2	1.1
Manganese	12	683	75.2	252	212
Nickel	12	<.4	<.3	[1].4	[1].4
Zinc	12	363	191	269	261
Hydropsyche cockerelli					
Arsenic	6	6.5	3.6	5.3	5.3
Cadmium	15	1.3	.4	.8	1.0
Chromium	15	6.0	1.8	3.1	3.1
Copper	15	96.1	29.9	56.7	56.3
Iron	15	3,590	1,400	2,050	1,900
Lead	15	10.0	4.2	6.8	6.3
Manganese	15	1,910	781	1,270	1,250
Nickel	15	2.4	1.4	1.8	1.7
Zinc	15	237	156	201	207
Hydropsyche occidentalis					
Arsenic	3	6.2	3.9	5.4	6.2
Cadmium	9	1.2	.4	.7	.7
Chromium	9	5.5	2.1	3.4	3.0
Copper	9	76.5	30.3	52.2	56.0
Iron	9	2,400	1,450	2,020	2,210
Lead	9	10.2	4.0	6.8	7.1
Manganese	9	2,460	939	1,910	1,970
Nickel	9	2.4	1.6	2.0	2.1
Zinc	9	257	192	229	230

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005. —Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12353000—Clark Fork below Missoula[2] Period of record for biological data: 1986; 1990-2004					
Arctopsyche grandis					
Arsenic	4	2.6	2.1	2.4	2.4
Cadmium	29	1.5	.2	.6	.6
Chromium	29	2.7	.5	1.3	1.4
Copper	29	38.0	9.4	21.1	19.2
Iron	29	1,590	343	797	682
Lead	29	3.9	.9	1.9	1.7
Manganese	29	1,090	511	707	692
Nickel	29	1.6	.4	.9	.9
Zinc	29	217	106	152	148
Claassenia sabulosa					
Arsenic	3	1.1	0.8	0.9	0.8
Cadmium	42	1.3	.1	.5	.4
Chromium	42	1.2	.05	.5	.5
Copper	42	75.1	31.1	48.8	47.0
Iron	42	239	66.6	114	108
Lead	42	1.3	.1	.4	.3
Manganese	42	275	48.9	107	99
Nickel	42	.3	.1	.2	.2
Zinc	42	324	146	218	211
Hydropsyche cockerelli					
Arsenic	8	2.9	2.2	2.5	2.4
Cadmium	46	1.1	.2	.5	.5
Chromium	46	3.4	.3	1.7	1.7
Copper	46	54.1	12.4	30.4	29.5
Iron	46	2,220	584	1,290	1,270
Lead	46	6.6	1.2	2.5	2.4
Manganese	46	1,210	353	768	690
Nickel	46	1.9	.5	1.2	1.3
Zinc	46	187	77	144	151

Table 22. Statistical summary of biological data for the upper Clark Fork basin, Montana, August 1986 through August 2005.—Continued

[Concentrations are in micrograms per gram dry weight. 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 arbitraily 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 prior to analysis; depuration was discontinued in 1999. Arsenic data were not collected at some sites. Values are reported using U.S. Geological Survey rounding standards. Abbreviation: spp., one or more similar species. Symbols: <, less than minimum reporting level; --, indicates either too few samples (less than three) or insufficient data to compute statistic, or element not analyzed]

Constituent	Number of composite samples	Maximum	Minimum	Mean	Median
12353000—Clark Fork below Missoula[2]—Continued Period of record for biological data: 1986; 1990-2004					
Hydropsyche occidentalis					
Arsenic	1	--	--	2.5	--
Cadmium	17	1.1	0.1	.4	0.3
Chromium	17	3.5	.1	1.4	1.5
Copper	17	38.2	13.5	23.8	20.9
Iron	17	1,420	482	941	907
Lead	17	4.2	.7	2.1	1.9
Manganese	17	1,460	491	841	812
Nickel	17	2.2	.5	1.0	.9
Zinc	17	193	112	143	144
Hydropsyche spp.					
Arsenic	0	--	--	--	--
Cadmium	1	--	--	0.5	--
Chromium	1	--	--	.8	--
Copper	1	--	--	20.8	--
Iron	1	--	--	894	--
Lead	1	--	--	1.1	--
Manganese	1	--	--	756	--
Nickel	1	--	--	1.1	--
Zinc	1	--	--	124	--

[1]Values were 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. When all data were less than the minimum reporting level, the median was determined by ranking the censored values in order of detection. No mean is reported when all values were below the minimum reporting level.

[2]Samples were collected about 30 miles downstream from streamflow-gaging station to conform to previous sampling location.

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Dodge and others—**Water-Quality, Bed-Sediment, and Biological Data (October 2004 through September 2005) and Statistical Summaries of Data for Streams in the Upper Clark Fork Basin, Montana**

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