



U.S. Department of the Interior
Bureau of Land Management

Open File Report #128

BLM Stream Gage Data / Gulkana Wild and Scenic River, Alaska



The BLM Mission

The Bureau of Land Management sustains the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

Cover Photo

View upstream on the Gulkana River / Bob Wick (BLM)

Authors

Mike Sondergaard and Jon Kostohrys.

Disclaimer

The mention of trade names or commercial products in this report does not constitute endorsement or recommendation for use by the federal government.

Open File Reports

Open File Reports issued by the Bureau of Land Management-Alaska present the results of inventories or other investigations on a variety of scientific and technical subjects. These reports, made available to the public outside the formal BLM-Alaska technical publication series, can include preliminary or incomplete data and are not published and distributed in quantity.

*To request a copy of this or another BLM-Alaska scientific report,
or for more information, please contact:*

BLM Alaska Public Information Center
222 West Seventh Avenue, #13, Anchorage, AK 99513
(907) 271-5960

Most BLM-Alaska scientific reports are also available for loan or inspection at the Alaska Resources Library and Information Services in Anchorage, (907) 27-ARLIS <http://www.arlis.org> and other major libraries in Alaska.

Open File Report #128

**BLM Stream Gage Data
Gulkana Wild and Scenic River, Alaska**



**BLM Streamflow Data from
June 1997 thru December 2016**

June 2018

Mike Sondergaard and Jon Kostohrys

Table of Contents

Abstract	v
Introduction.....	1
Description of the Study Area	3
Methods and Data Sources	7
Continuous Long-Term Gaging Data	
Description Summaries	7
Descriptions of USGS and BLM	
Long-term Gage Sites	9
Results.....	15
Discussion	22
Recommendations.....	23
References	23
Acknowledgements	24
Appendix A.....	25
Appendix B	33

List of Figures

Figure 1. 1996 Gulkana River Reservation of Water Reaches	2
Figure 2. BLM Paxson Outlet gage site.....	11
Figure 3 —BLM West Fork gage site	12
Figure 4. BLM Middle Fork gage site.....	14
Figure 5. Annual discharge hydrograph for the four Gulkana River basin sites (BLM and USGS).	15

List of Tables

Table 1. Temperature and Precipitation for Gulkana Airport, Alaska	5
Table 2. Temperature and Precipitation for Paxson, Alaska.....	6
Table 3. Summary of Long-Term BLM and USGS gage locations and periods of record sites used for calculating long-term stream gage hydrology.	7
Table 4. 1997-2016 monthly mean discharge (cfs) for BLM Paxson Lake Outlet Site.....	16
Table 5. June 1997–April 2006 monthly mean discharge (cfs) for the BLM Middle Fork Gulkana River Site.....	16
Table 6. June 1997–April 2006 monthly mean discharge (cfs) for the BLM West Fork Gulkana River Site.....	17
Table 7. 1972-2016 monthly mean discharge (cfs) for Gulkana River at Sourdough (USGS Site).....	18
Table 8. Flow-duration percentile of monthly discharges (cfs) for the BLM Paxson Lake Outlet Site.....	19
Table 9. Flow-duration percentile of monthly discharges (cfs) for the BLM Middle Fork Gulkana River Site	20
Table 10. Flow-duration percentile of monthly discharges (cfs) for the BLM West Fork Gulkana River Site	21
Table 11. Flow-duration percentile of monthly discharges (cfs) for the USGS Gulkana River at Sourdough Site.....	22

Appendix A:

Table A1. Instantaneous Discharge Measurements for the Paxson Outlet Gage Site, Gulkana River (1997-2016)	27
Table A2. Instantaneous Discharge Measurements for the Middle Fork Gage Site, Gulkana River (1997-2005)	30
Table A3. Instantaneous Discharge Measurements for the West Fork Gage Site, Gulkana River (1997-2005)	31

Appendix B:

Table B1. 1997 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	35
Table B2. 1998 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	36
Table B3. 1999 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	37
Table B4. 2000 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	38
Table B5. 2001 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	39
Table B6. 2002 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	40
Table B7. 2003 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	41
Table B8. 2004 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	42
Table B9. 2005 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	43
Table B10. 2006 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	44
Table B11. 2007 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	45
Table B12. 2008 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	46
Table B13. 2009 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	47
Table B14. 2010 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	48
Table B15. 2011 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	49
Table B16. 2012 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	50
Table B17. 2013 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	51
Table B18. 2014 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	52
Table B19. 2015 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	53
Table B20. 2016 Paxson Lake Outlet--Daily Mean Discharge (cfs).....	54
Table B21. 1997 Middle Fork--Daily Mean Discharge (cfs)	55
Table B22. 1998 Middle Fork--Daily Mean Discharge (cfs)	56
Table B23. 1999 Middle Fork--Daily Mean Discharge (cfs)	57
Table B24. 2000 Middle Fork--Daily Mean Discharge (cfs)	58
Table B25. 2001 Middle Fork--Daily Mean Discharge (cfs)	59
Table B26. 2002 Middle Fork--Daily Mean Discharge (cfs)	60
Table B27. 2003 Middle Fork--Daily Mean Discharge (cfs)	61
Table B28. 2004 Middle Fork--Daily Mean Discharge (cfs)	62
Table B29. 2005 Middle Fork--Daily Mean Discharge (cfs)	63
Table B30. 2006 Middle Fork--Daily Mean Discharge (cfs)	64
Table B31. 1997 West Fork--Daily Mean Discharge (cfs).....	65
Table B32. 1998 West Fork--Daily Mean Discharge (cfs).....	66
Table B33. 1999 West Fork--Daily Mean Discharge (cfs).....	67
Table B34. 2000 West Fork--Daily Mean Discharge (cfs).....	68
Table B35. 2001 West Fork--Daily Mean Discharge (cfs).....	69
Table B36. 2002 West Fork--Daily Mean Discharge (cfs).....	70
Table B37. 2003 West Fork--Daily Mean Discharge (cfs).....	71

TABLES

Appendix B (continued):

Table B38. 2004 West Fork--Daily Mean Discharge (cfs)..... 72

Table B39. 2005 West Fork--Daily Mean Discharge (cfs)..... 73

Table B40. 2006 West Fork--Daily Mean Discharge (cfs)..... 74

Abstract

This report summarizes gaging information collected by the Bureau of Land Management (BLM) and related US Geological Survey (USGS) gaging information between 1972 to 2016 in the Gulkana River watershed. Other relevant hydrologic and physical information collected in this watershed between 1949 and 2012 are also reported. This information is summarized to support achievement of various BLM management goals and objectives for this watershed with an emphasis on the Gulkana Wild and Scenic River Corridor system.

The 1980 *Alaska National Interest Lands Conservation Act*, Title 6, Section 1204 enabling legislation designated a portion of the Gulkana River watershed in Alaska (referred to as the Gulkana River Wild and Scenic River Corridor) as a new addition to the National Wild and Scenic River System (NWSRS). Congress established the NWRWS in 1966 (PLO 90--542, 16 U.S.C. 1271 et seq.). The Gulkana River corridor addition classifies approximately 181 river miles (291 km) as “wild” (i.e., water bodies considered free of impoundments, generally inaccessible except by trail, and its watersheds or shorelines are essentially primitive, unpolluted waters).

The Gulkana River watershed drains approximately 2,140 square miles (5,543 square kilometers), with the river originating in the Alaska Range near Summit Lake at about 3,806 feet (1,160 meters) and flowing south into the 290-mile (467 kilometers) Copper River, eventually draining into Prince William Sound. Several hundred lakes and ponds are scattered throughout the spruce-dominated forest of the watershed. The Gulkana River was designated as a wild and scenic river corridor based on its variety of high recreational, fish, wildlife, and other socio-economic values.

Management objectives established for the Gulkana Wild and Scenic River corridor include maintaining the pristine, free-flowing condition of the river and tributaries, optimal and long-term utilization of its fish and wildlife resources, and high-quality primitive recreational opportunities.

BLM long-term and relevant USGS historical gage data, BLM instantaneous gage data and other relevant hydrologic and physical information are summarized to support achievement of these and other BLM management goals and objectives for this Wild and Scenic River corridor and watershed.

Introduction

This **BLM Stream Gage Data: Gulkana Wild and Scenic River, Alaska**, open file report summarizes long-term and instantaneous stream gaging methods data information collected by the Bureau of Land Management (BLM) between 1997 and 2016. Relevant long-term US Geological Survey (USGS) gage data collected in the Gulkana watershed from 1972 to 2016 is also summarized. Data collected and analyzed is within the Gulkana National Wild and Scenic River corridor and watershed (Fig 1). Other relevant hydrologic and physical information collected in this watershed between 1949 and 2012 are also reported. This information is summarized to support achievement of various BLM management goals and objectives for the corridor and watershed.

The Gulkana River is a clear-running, fresh water tributary of the Copper River. A large portion of the Gulkana River watershed was added to the National Wild and Scenic River system on Dec. 2, 1980, as an element of the *Alaska National Interest Lands and Conservation Act* (ANILCA) (ANILCA, Public Law 96–487). ANILCA designated segments of the Gulkana River and portions of its Middle Fork and West Fork tributaries as “Wild”.

Section 10(a) of the *Wild and Scenic Rivers Act* (WSRA) specifically mandates that:

“Each component of the national wild and scenic rivers system shall be administered in such a manner as to protect and enhance the values which caused it to be included in said system ...”

This designation is also consistent with the *Federal Land Policy and Management Act* (FLPMA) [43 USC 1701] mandate to manage public lands “in a manner that will protect the quality of ecological, environmental, and water resources, and preserve and protect certain lands in their natural condition that will provide food and habitat for fish and wildlife” (FLPMA 1976, Sec. 102 (a)(8)). In addition, this reservation will allow the BLM to meet its obligations under Title VIII of the *Alaska National Interest Lands Conservation Act of 1980* (ANILCA) [Public Law 96–487] to protect and provide the opportunity for continued subsistence uses on the public lands by Native and non-Native rural residents of Alaska.

Management objectives established for the Gulkana Wild and Scenic River corridor include maintaining the pristine, free-flowing condition of the river and tributaries, optimal and long-term utilization of its fish and wildlife resources, and high-quality primitive recreational opportunities. Consistent with these objectives, BLM submitted three reservations of water to the Alaska Department of Natural Resources (DNR) in 1996 that are pending adjudication (**Figure 1**). The hydrologic information reported in this publication will be used to support the adjudication of these applications.

BLM Stream Gage Data
Gulkana Wild and Scenic River, Alaska

Gulkana Wild & Scenic River 1996 Reservation of Water Reach Locations
U.S. DEPARTMENT OF THE INTERIOR | BUREAU OF LAND MANAGEMENT | GLENNALLEN FIELD OFFICE

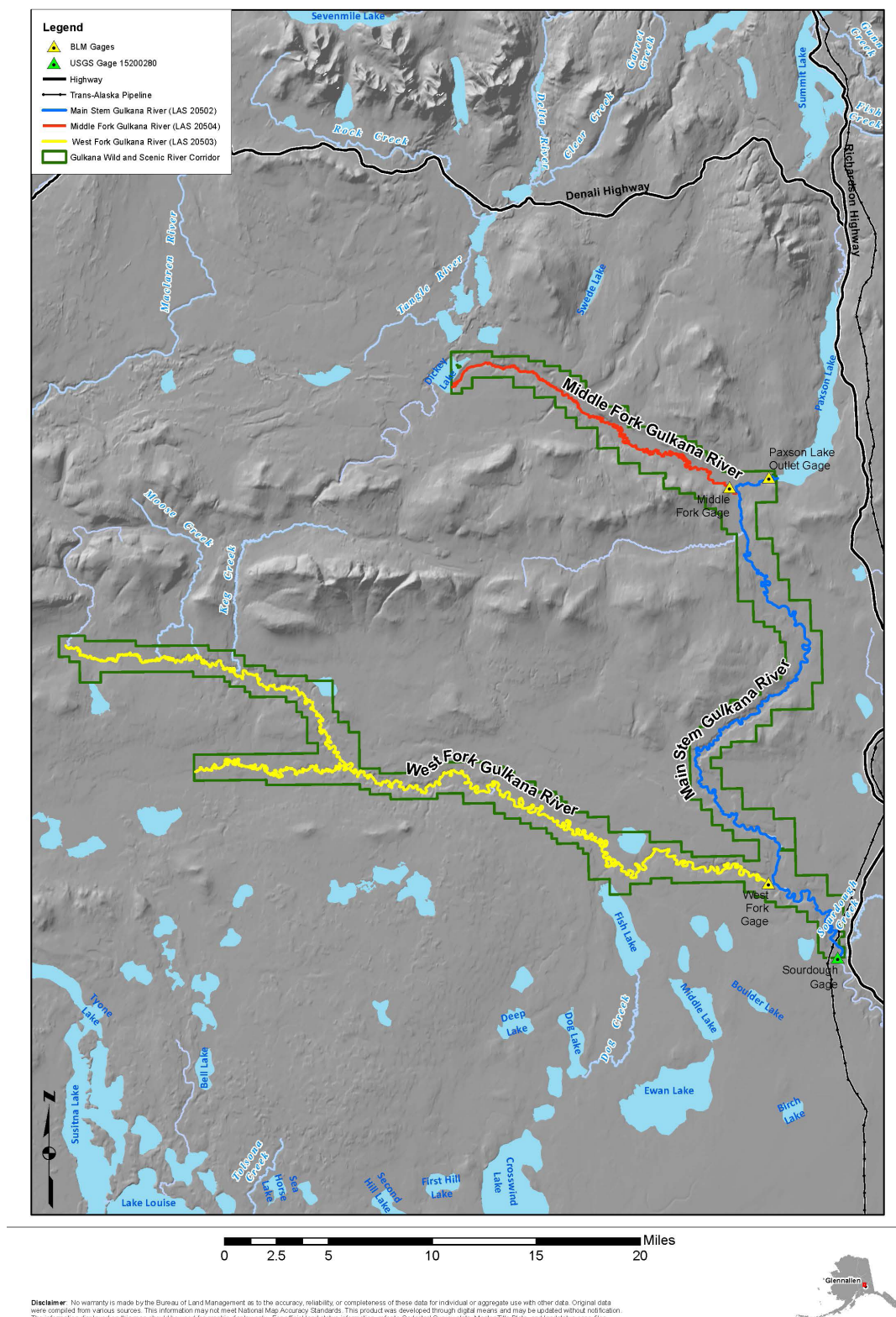


Figure 1. 1996 Gulkana River Reservation of Water Reaches

Description of the Study Area

Physiography

The Gulkana River watershed drains approximately 2,140 square miles (5,542.6 km²) of the eastern portion of Southcentral Alaska. The river begins in the Alaska Range southwest of Summit Lake and flows south into Paxson Lake, exiting again before converging first with the Gulkana's Middle Fork and then with the West Fork. The river continues flowing into the Copper River near the village of Gulkana, ultimately draining into the Gulf of Alaska. Several hundred lakes and ponds are scattered throughout the spruce-dominated forest of the Gulkana River watershed (BLM 2014).

The Gulkana River and its Middle Fork originate in the Gulkana Uplands physiographic region, an area largely crafted by glacial activity and runoff (Wahrhaftig 1965). The Gulkana River begins at an elevation of about 4,000 feet (1,219 meters) in the foothills of the Alaska Range. The Middle Fork begins at about 3,300 feet (1,006 meters) in a small group of lakes in the uplands southwest of Dickey Lake. The upper West Fork's North and South Branches originate in the lakes and hills of the Lake Louise Plateau physiographic region (Wahrhaftig 1965) about 20 miles (32 kilometers) north of Lake Louise at about 2,400 feet (731 meters) elevation (BLM 1999).

Much of the Gulkana river is entrenched in fine-grained glaciolacustrine sediments. Most reaches of the river consist of meandering, single thread, low gradient channels (BLM 1999). At Canyon Rapids on the main stem (river mile 20-20.5 on main stem) and along the upper Middle Fork (river mile 4-5 on Middle Fork), gradients increase and bedrock canyon walls confine the channel resulting in class III/IV rapids. Moderate gradient reaches with class II rapids occur, for example, on the main stem from the outlet of Paxson Lake to the confluence with the Middle Fork (between mile 0 and 3 on the main stem), and from Canyon Rapids downstream for a distance of about 7 miles (roughly from mile 20.5 to mile 27 on the main stem) (BLM 1983).

Channel width varies tremendously at different points within the Gulkana River system. For example, channel width ranges from about 10 feet (3 meters) in places along the upper North Branch to as much as 225 feet (68.6 meters) at Sourdough boat launch (BLM 1999). Immediately adjacent to the river channel, the landscape consists of a complex of nearly level to moderately sloping flood plains and stream terraces. Other common flood plain features include point bars, cutoff meanders, and swamps. Cut-off meanders, small lakes and ponds are present on many stream terraces. Steep escarpments and bluffs as much as 200 feet (67 meters) high parallel the river corridor in many places (BLM 1999).

Uplands in the northern and northwestern portion of the drainage area consist of strongly sloping to steep glacial hills and glacial and bedrock cored mountains at higher elevations. Undulating glaciolacustrine terraces and pitted outwash plains are at lower elevations. In the southern and southwestern portion of the area, the landscape consists of broad, nearly level to undulating lacustrine terraces, which extend for several miles on each side of the river. Other features associated with the terraces include scattered areas of gravelly and sandy glaciofluvial deposits and glaciolacustrine strandline deposits (BLM 1999).

Many upland landforms are mantled with a thin, discontinuous layer of silty loess. Most loess was deposited rapidly following drainage of the glacial lake, when exposed lakebed and flood plains were more extensive and nearby glaciers created strong proglacial winds (BLM 1999).

Peat and other organic deposits mantle extensive areas on glaciolacustrine terraces and stream terraces. These range from surface organic mats to peat deposits many feet/meters thick in bogs, fens, and wet meadows. Elevated peat mounds are present on stream terraces near the confluence of the Gulkana's Middle Fork and Main Stem, and along the margins of ponds and lakes throughout the area (BLM 1999).

Climate

The climate of the Gulkana River Basin is subarctic continental, characterized by long, cold winters and short, warm summers. Mean January temperature reported between 1949 and 2012 is -6°F (-21.1°C) at the Gulkana Airport (**Table 1**) 30 miles south of the USGS Sourdough gage, and for the period 1795 to 2010, -1°F (-18.3°C) at Paxson at the north end of Paxson Lake (**Table 2**). Daily low temperatures of -50°F (-46°C) or less occur frequently during the winter (mid-October to April), and two week or longer periods of severe cold weather are common within the Gulkana Wild & Scenic River (WSR) corridor. Mean July temperature is 57°F (13.9°C) at the Gulkana Airport and 54°F (12.2°C) at Paxson. Daily high temperatures in summer within the Gulkana WSR corridor occasionally exceed 80°F (27°C). Daily minimum temperatures in summer are generally between 37° to 42°F (2.8° to 5.6°C) within the corridor; however, freezing temperatures have been recorded in every month (BLM 1999).

Mean annual precipitation for the **Table 1** record period is 11.3 inches (28.7 cm) at Gulkana Airport and 21.1 inches (53.6 cm) at Paxson. Average annual snowfall is 51.2 inches (130 cm) at Gulkana Airport and 100.9 inches (254.3 cm) for the same **Table 2** record period at Paxson (Western Regional Climate Center).

Permafrost

Since the mean annual air temperature in the region is less than 26°F (-3.3°C), permafrost, perennially frozen ground, underlies most of the basin. (BLM 1999). With increasing terrace height, age, and distance from the river channel, permafrost is common within the soil at a relatively shallow depth. Shallow permafrost is extensive on the highest and oldest stream terraces and in the uplands. In most places, permafrost results in small ice crystals disseminated throughout the soil. On glaciolacustrine terraces, a perched water table and saturated conditions are common above the permafrost during the summer due to restricted drainage (BLM 1999). The BLM recognizes that permafrost may have an impact on surface water/groundwater relationships but assumes it is not a significant impact.

Table 1. Temperature and Precipitation for Gulkana Airport, Alaska.

(Publicly available period of record 1949-2012; Source: Western Regional Climate Center)

Month	Temperature			Precipitation	Snow
	Maximum Monthly Average (°F.)	Minimum Monthly Average (°F.)	Mean Monthly Average (°F.)	Mean Monthly Total (inches)	Mean Monthly Total (inches)
January	2.5	-14.2	-5.8	0.50	7.1
February	14.4	-6.7	3.8	0.51	7.6
March	27.9	1.3	14.6	0.32	5.0
April	42.5	19.9	31.2	0.21	2.6
May	55.7	32.9	44.3	0.64	0.5
June	65.7	42.3	54.0	1.42	0.0
July	68.4	46.3	47.3	1.82	0.0
August	64.8	42.3	53.5	1.60	0.1
September	53.9	33.2	43.5	1.52	1.1
October	35.3	18.7	27.1	0.93	8.0
November	14.1	-1.4	6.4	0.73	8.9
December	5.1	-10.7	-2.8	0.83	10.3
Yearly Averages	37.5	17.00	27.3	—	—
Yearly Totals	—	—	—	11.03	52.2
Extremes	91.0	-58.0	—	—	—
Month/Year	06/53	12/85			

Table 2. Temperature and Precipitation for Paxson, Alaska.

(Publicly available period of record 1975-2010; Source: Western Regional Climate Center)

Month	Temperature			Precipitation	Snow
	Maximum Monthly Average (°F.)	Minimum Monthly Average (°F.)	Mean Monthly Average (°F.)	Mean Monthly Total (inches)	Mean Monthly Total (inches)
January	8.3	-10.2	-0.7	1.00	15.3
February	15.6	-5.2	4.9	0.75	10.6
March	24.9	-0.1	12.7	0.78	11.3
April	37.1	13.9	25.5	0.61	5.3
May	51.7	29.1	40.1	0.64	2.8
June	63.7	38.2	51.0	1.28	0.4
July	65.5	42.1	53.8	2.45	0.0
August	60.7	38.7	49.7	3.20	0.0
September	48.7	30.5	39.5	3.16	3.6
October	32.1	15.6	23.9	2.14	16.8
November	14.9	-2.3	6.3	1.03	14.9
December	11.0	-5.9	1.8	1.37	19.9
Yearly Averages	36.7	15.4	25.7	—	—
Yearly Totals	—	—	—	21.08	100.9
Extremes	86.0	-50.0	—	—	—
Month/Year	06/04	01/09			

Methods and Data Sources

Stream gage networks are commonly installed to provide information on seasonal and long-term mean daily continuous streamflows reported as cubic feet per second (cfs) over multiple drainage basins. A stream gaging network consists of an index gaging station that is operated over a long period of time (typically many years), and an associated network of semi-permanent stream gages which are operated concurrently on nearby reaches, tributaries, and sometimes streams, if hydrologically similar (Klein 2013, page 3).

The objective for establishing a stream gaging network is to cost effectively collect a combination of flow records of different lengths in the drainage to be able to correlate short-term (5 years or less) stream gages with those having long-term (ideally 5 years or longer) historical periods of continuous record to develop periods of record equal to or greater than 5 years for all target locations.

Stream gage networks are also designed to increase the precision and accuracy of seasonal and long-term hydrologic estimations for short-term gage locations and reduce uncertainty for sites with limited or no data (Klein 2013, page 3), and or data gaps.

Continuous Long-Term Gaging Data Description Summaries

To obtain at least five years of empirical continuous mean daily flow historical records in the Main Stem, Middle Fork, and West Fork drainages, the BLM is using data from a USGS operated long-term stream gage database. The USGS gage at Sourdough (ID: 15200280) (from now on referred to as the Sourdough gage) with over 25 years of record was used as an index gage along with a supplemental network of semi-permanent (greater than 5 years) continuous measurement gages operated by the BLM: Paxson Outlet (PO); Middle Fork (MF); and West Fork (WF). Locations of each are illustrated on **Figure 1** and summarized in **Table 3**.

Table 3. Summary of Long-Term BLM and USGS gage locations and periods of record sites used for calculating long-term stream gage hydrology.

Site Name	Operator	Site ID	Location	Period of Record
Sourdough Gage (SD)	USGS	15200280	N 62°31'15" W 145°31'51"	Oct. 1972 thru Sept. 1978, May thru Sept. 1982, Oct. 1988 thru September 1993, May 1997 thru Sept. 2004, and May 2007 thru Sept. 2016
Paxson Outlet (PO)	BLM	None	N 62°51'17.30" W 145°37'20.04"	June 1997 thru December 2016.
Middle Fork (MF)	BLM	None	N 62°51'0.26" W 145°40'49.74"	June 1997 thru April 2006
West Fork (WF)	BLM	None	N 62°34'27.32" W 145°38'5.61"	June 1997 thru April 2006

BLM stream gaging measurement and analyses methods followed USGS procedures described in Rantz and others (1982). USGS Sourdough gage data for these analyses were derived from USGS records for this site at https://nwis.waterdata.usgs.gov/nwis/wys_rpt/?site_no=15200280&agency_cd=USGS.

BLM Long-term Gage Station Methods

Site Visits – At all BLM continuous (long-term year-round) data gage locations, site visits were made three to seven times a year to download data, measure discharge, and perform routine maintenance (quality control/assurance). Each site was established to measure both continuous mean daily flow discharge over a range of seasonal flows throughout the year to determine the stage-discharge relationships. Access to the Paxson Outlet gage during ice-free periods was by a jet boat from the BLM's Paxson Lake boat ramp directly to the gage site past the lake outlet. Access to the Middle Fork gage during the ice-free season was done via ATV on the Middle Fork trail from the Richardson Highway. The West Fork gage was accessed by jet boat during ice-free periods from the BLM's Sourdough boat launch. During the winter period, the three long-term BLM gages were accessed by snowmachine. After each site visit, discharge data that were recorded in the survey books were input into Excel spreadsheets and stored on the BLM server.

Streamflow Records Computation Methods for BLM Data—BLM's streamflow records computation is a systematic process used to compute streamflow records following those described in Rantz and others (1982). Excel spreadsheets and included functions were used to make all discharge computations. Before being converted to discharge, the stage record was corrected to reference elevation based on level surveys. These corrected stage values are used to develop rating curves, then apply any necessary shifts due to fill and scour of the hydraulic control. The discharge from the rating curves is then used to compute hourly discharges, which are the basis to compute mean daily, mean monthly, and mean annual flow values for the calendar year January through December. Where no discharge measurements were made at the gage sites or when the recorded data was considered unreliable during the spring ice break-up, fall freeze-up, or when the recorder malfunctioned, the data was estimated from a simple linear regression analysis with the USGS Sourdough gage data (https://nwis.waterdata.usgs.gov/nwis/wys_rpt/?site_no=15200280&agency_cd=USGS) or Tangle River (BLM data on file, Glennallen Field Office, contact local hydrologist). In addition, air temperature and precipitation data from the Gulkana Airport, Paxson, and Sourdough climatological sites were used to help estimate these gaps in data. The Paxson Outlet air temperature and precipitation data were looked at to help smooth rating curves but since routine quality assurance measures and inspections were not performed for these parameters at this site, the use of this data was cursory.

For the winter period (Mid-October to April) if not gaged, streamflow was computed directly from winter ice measurements by regressing discharge on time (date) for the periods between measurements at each site. This methodology is based on the assumption that once ice and snow cover isolate the stream from precipitation and temperature changes, the flow to the stream recedes uniformly as the water table is lowered by reduction of water volume in the aquifer (Rogers and Armbruster, 1990). Temperature and precipitation data from the Gulkana Airport, Sourdough, and Paxson climate sites were used to help determine when freeze up and spring

breakup occurred. Where no winter discharge measurements were made at the gage sites, the data was estimated from a regression analysis with the USGS gaging data at Sourdough.

For the BLM long-term gages at Paxson Outlet, Middle Fork, and West Fork, the BLM's Glennallen Field Office Hydrologist is responsible for all aspects of the project including site selection, installation, maintenance, levels, data processing, database management, publication, web address links, and safety. The BLM State Office Soil/Water/Air Lead located in Anchorage provides technical assistance and records review.

Descriptions of USGS and BLM Long-term Gage Sites

USGS Sourdough Gage (15200280)

The 2017 revision of the USGS Gulkana River at Sourdough, Alaska gage (15200280) station description, available through the USGS Anchorage Field Office, provides the location description, gage instrumentation and history (**Figure 1**). According to USGS (Murray 2017) the USGS Sourdough Gage is located at Lat 62°31'15", Long 145°31'51" referenced to North American Datum of 1927, in NE 1/4 SE 1/4 NE 1/4 sec.35, T.9 N., R.2 W., Valdez-Cordova Division, AK, Hydrologic Unit 19020102 (Gulkana C-4 quad), at Alyeska Pipeline Service Company bridge 70 ft. streamward on downstream edge, 0.3 mi downstream from Sourdough Creek and 0.8 mi southwest of Sourdough.

The gage shelter and primary reference wire-weight are on the downstream side of the bridge. Elevation of land surface is 1,846 ft. amsl (NGVD29) based on an Alyeska Engineering survey benchmark which is used to determine water surface levels. The drainage area at the gage location is 1,760 mi² (1.1M acres). The gage was installed in 1972 as a bank stilling well with stream intakes. The gage instrumentation was replaced in 2007 with a Design Analysis H-522+ HDR Goes-enabled DCP coupled to a Waterlog H-311 Radar non-contact stage sensor and two Therm-X 44020 thermistors for air and water. The surface water period of record used for this report is October 1972 thru September 1978, May thru September 1982, October 1988 thru September 1993, May 1997 thru September 2004, and May 2007 thru September 2016 (Murray 2017).

Current meter measurements are made by wading between 125–200 feet downstream of the bridge and upstream of the section control (boulder riffle) during low-to-moderate flow (up to approximately 1100 cfs). To determine distances a range finder is used instead of a tag line due to boat traffic. High flow measurements are made by bridge board and suspension weight or ADCP tethered from the downstream edge of the Alyeska Pipeline bailey bridge, or by boat. Ice measurements are made with a Price AA Polymer cup ice current meter or StreamPro with section by section on a 1-inch section rod a minimum of 50 ft. from the downstream edge of the bridge and above wading cross-section, in general vicinity of large boulder mid-channel (Murray 2017).

BLM Paxson Outlet Gage

This gage site (**Figure 2**) is located on the Main Stem of the Gulkana River less than half a mile downstream of Paxson Lake at N62°51'17.30", W145°37'20.04" (Right bank of river looking down stream, Mile 0.3, Main Stem). The BLM began operating this continuous measurement gage in June of 1997 and it has continued operating to present (~20–years). This gage operates year-round in an open water (ice-free) section located downstream of and close to the outlet of Paxson Lake. River stage data is collected and stored on site by a Sutron 8210 data logger <http://www.sutron.com/> with an Pressure System/KPSI <http://www.pressuresystems.com> pressure transducer (accuracy ± 0.01 ft.). The pressure sensor cable is threaded through a 2–inch galvanized pipe extending through the top of the bank to bottom of a small pool in the streambed. The remaining cable from the stream bank to the Sutron 8210 is buried approximately two inches into the ground. The Sutron 8210 is housed in a weatherproof box and is programmed to record stage, as well as water temperature, air temperature, and precipitation. For water temperature, air temperature, and precipitation, routine quality assurance measures and inspections are not performed at a level acceptable for use in general scientific and interpretive studies.

Data parameter values are recorded to the Sutron every hour and represent a single instantaneous value. Near real time data is transmitted via GOES transmitter to the National Weather Service River Observation website <http://water.weather.gov/ahps2/index.php?wfo=PAFG>. The stream gage was surveyed to elevation benchmarks and to the current water level using an engineer's level and stadia rod. There are two temporary benchmarks that were established on the same bank near gaging site, both utilizing four foot long spaded survey stakes with unlabeled brass caps. Three– to–six cross-sectional instantaneous seasonal discharge (streamflow) rating curve calibration measurements are made year-round by wading and using a Price AA current meter to measure water velocity and a top-setting wading rod and tag line for depth and width. For the period of record (June 1997 thru September 2016), there were 91 instantaneous measurements made at the Paxson Outlet gage site.



Figure 2. BLM Paxson Outlet gage site.

BLM West Fork Gage

The BLM West Fork continuous measurement gage site (Figure 3) is located on the West Fork of the Gulkana River approximately 1/3 mile upstream from the confluence with the Main Stem of the Gulkana N62°34'27.32", W145°38'5.61" (right bank of river looking down stream, Mile 72, West Fork). The West Fork gage was located far enough upstream to not be backwater affected by high flow events on the Main Stem. The BLM began operation of an automated gage at this site in June of 1997 and discontinued the gage in September of 2005 resulting in nine years of data. For the period of record, continuous recorded gage data were collected only during the late spring, summer, and early fall during ice-free periods, generally from late May/early June to late September/early October.

For the period of record, stage data were recorded by a Stevens AxSys System data logger (<http://www.stevenswater.com/>) with a Stevens Submersible Depth Transmitter (SDT) II (Accuracy –1% of full scale, 4.0 ± 0.2 mA at 22° C). The SDT transducer cable and transducer was weighted down with small sections of rebar up to rivers edge where the cable was buried three inches into the soil until it reached the AxSys data recorder. The data recorder was programmed to record maximum stage every hour and was housed in a small metal container and hidden under the protection of a large spruce tree. The stream gage was surveyed to elevation reference marks and to the current water level using an engineer's level and stadia rod. There were two benchmarks

established near the gaging area, both utilizing the base of large spruce trees with 8-inch spike nails. Cross-sectional discharge (streamflow) measurements were made (3–5 per open water season) using a Price AA current meter to measure water velocity and a top-setting wading rod and tag line for depth and width. Most discharge measurements were made by wading, however, high flow events required the use of boat measuring equipment (boom and cross piece assembly and sounding reel and weight), with the Price AA current meter. For the winter period, under ice discharge measurements consisted of drilling a series of holes in the ice to define the cross-section, then measuring the depth and velocity in each hole using a USGS vertical-axis, vane type current meter mounted on a graduated rod. The stream-gaging methods used at this site were based on those described in Rantz and others, Vol. 1 and 2 (1982) and in Melcher and Walker (OFR 90–554). For the period of record (June 1997 thru April 2006), there were 52 instantaneous measurements made at the Middle Fork gage site.



Figure 3—BLM West Fork gage site

BLM Middle Fork Gage

The BLM Middle Fork continuous measurement gage (**Figure 4**) site is located on the Middle Fork of the Gulkana River approximately 1/3 mile upstream of the confluence with the Main Stem of the Gulkana at N62°51'0.26", W145°40'49.74" (left bank of river looking down stream, mile 31.5, Middle Fork). The Middle Fork gage was located far enough upstream to not be backwater affected by high flow events on the Main Stem. The BLM began operation of an automated gage site in June of 1997 and discontinued the gage in September of 2005 resulting in nine years of data. For the period of record, continuous recorded gage data were collected only during the late spring, summer, and early fall during ice-free periods, generally from late May/early June to late September/early October. For the period of record river stage data were recorded by a Stevens AxSys System data logger <http://www.stevenswater.com/> with a Stevens Submersible Depth Transmitter (SDT) II (Accuracy—1% of full scale, 4.0 ± 0.2 mA at 22° C). The SDT cable and pressure transducers were threaded through a perforated 3-inch plastic conduit from the riverbank to the streambed and weighted down with rocks and small sections of rebar. The remaining cable was buried three inches into the soil from the riverbank to the AxSys data logger. The data recorder was programmed to record maximum stage depth every hour and was housed in a small metal container and hidden under the protection of a large spruce tree. The stream gage was surveyed to elevation benchmarks located near the gage site and to the current water level using an engineer's level and stadia rod. There were two temporary benchmarks established near the gage site, both utilizing the base of large spruce trees with 8-inch spike nails.

Cross-sectional discharge (streamflow) measurements were made (3–4 times per open water period) by wading using a Price AA current meter to measure water velocity and a top-setting wading rod and tag line for depth and width. For the winter period, under ice discharge measurements consisted of drilling a series of holes in the ice to define the cross-section, then measuring the depth and velocity in each hole using a USGS vertical-axis, vane type current meter mounted on a graduated rod. The stream-gaging methods used at this site were based on those described in Rantz and others, Vol. 1 and 2 (1982) and in Melcher and Walker (OFR 90–554). For the period of record (June 1997 thru April 2006), there were 41 instantaneous measurements made at the Middle Fork gage site.



Figure 4. BLM Middle Fork gage site

Results

The instantaneous discharge measurements and daily mean discharge values for the BLM Paxson Outlet, Middle Fork, and West Fork gage site locations are listed in Appendices A (Tables A1 to A3) & B (Tables B1 to B3). Sourdough gage daily mean discharge values and methods used to collect the data can be found at the USGS web site https://nwis.waterdata.usgs.gov/nwis/wys_rpt/?site_no=15200280&agency_cd=USGS. The monthly mean data, calculated from the daily flow values for the BLM and USGS sites, are listed in **Tables 4–7** below. Hydrologically, these three BLM and the USGS gage sites (**Figure 1**) are characterized by low winter flow, large increases during spring break-up, occasional summer peaks in response to rainfall and a gradual decline during autumn as illustrated by the hydrograph below (**Figure 5**).

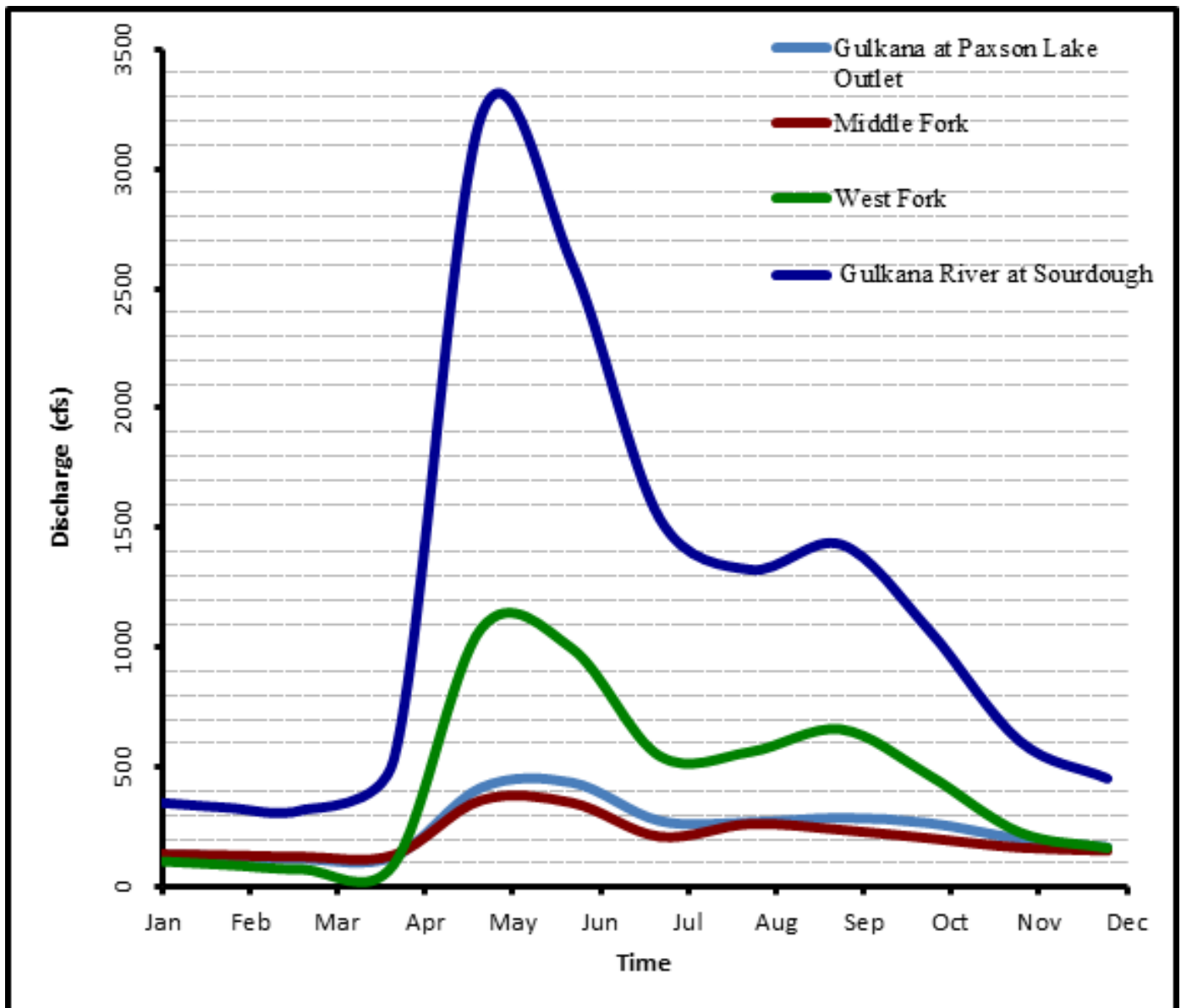


Figure 5. Annual discharge hydrograph for the four Gulkana River basin sites (BLM and USGS).

Table 4. 1997-2016 monthly mean discharge (cfs) for BLM Paxson Lake Outlet Site

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997	ND	ND	ND	ND	ND	445	225	291	195	159	141	125
1998	111	99	89	98	259	269	196	239	243	229	187	152
1999	124	102	84	93	378	401	196	251	203	223	176	148
2000	142	135	123	121	271	487	408	255	362	305	222	197
2001	186	168	148	167	418	352	328	287	238	180	144	125
2002	122	126	116	105	405	371	195	362	360	373	288	232
2003	206	199	183	170	352	409	278	236	269	246	200	161
2004	131	126	128	149	479	370	140	130	143	234	171	182
2005	155	117	121	130	446	349	303	230	363	263	191	197
2006	174	160	147	139	391	473	325	480	433	392	324	262
2007	212	173	141	126	724	395	213	186	229	205	172	153
2008	122	90	78	84	317	284	281	356	300	259	204	201
2009	134	115	112	115	497	468	223	226	235	233	193	161
2010	134	108	90	82	245	283	285	298	326	207	173	154
2011	136	121	108	135	536	369	288	329	252	187	172	160
2012	148	138	128	187	531	578	303	213	258	358	218	144
2013	120	121	126	132	264	1,280	273	205	383	295	238	141
2014	136	149	111	83	404	406	492	305	300	244	125	95
2015	108	129	154	147	481	290	256	260	289	381	277	224
2016	153	136	92	215	463	409	273	308	312	278	189	119
Mean	145	132	120	130	414	434	274	272	285	263	200	167

ND—Not determined

Table 5. June 1997–April 2006 monthly mean discharge (cfs) for the BLM Middle Fork Gulkana River Site.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997	ND	ND	ND	ND	ND	448	174	256	169	137	126	120
1998	114	109	104	115	222	226	161	256	244	169	147	123
1999	113	104	96	108	391	360	209	244	226	212	164	161
2000	155	135	125	124	252	491	304	204	305	255	201	179
2001	179	166	152	157	438	330	249	223	191	160	143	136
2002	133	131	128	126	186	296	177	665	349	300	243	204
2003	181	170	159	174	416	399	240	203	241	178	143	136
2004	116	109	116	140	677	325	145	138	144	211	170	161
2005	148	136	125	131	351	324	253	208	300	231	161	155
2006	149	144	138	136	ND	ND	ND	ND	ND	ND	ND	ND
Mean	143	134	127	134	367	355	212	266	241	206	166	153

ND—Not determined

Table 6. June 1997–April 2006 monthly mean discharge (cfs) for the BLM West Fork Gulkana River Site.

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1997	ND	ND	ND	ND	ND	1,495	424	778	343	125	83	64
1998	48	37	34	58	451	427	398	613	465	311	153	76
1999	37	19	10	37	1,126	939	700	588	510	516	161	137
2000	116	99	85	72	878	1,449	859	419	1,063	698	342	248
2001	179	131	97	200	1,284	833	597	509	749	293	178	131
2002	109	72	54	39	748	1,107	680	1,157	1,043	1,137	605	400
2003	294	231	183	205	1,067	659	345	237	489	330	165	134
2004	109	90	73	121	1,517	966	215	132	159	218	181	151
2005	124	104	86	86	1,604	1,113	726	675	1,133	597	212	155
2006	113	84	62	46	ND	ND	ND	ND	ND	ND	ND	ND
Mean	126	96	76	96	1,085	999	549	568	662	470	231	166

ND–Not determined

Table 7. 1972-2016 monthly mean discharge (cfs) for Gulkana River at Sourdough (USGS Site)

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1972	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,260	781	390
1973	316	300	300	308	3,105	3,622	1,787	1,269	1,016	618	308	208
1974	200	200	200	282	4,215	2,023	1,283	726	505	437	301	276
1975	260	240	240	245	3,547	3,917	2,150	2,088	1,513	1,083	287	250
1976	250	250	250	279	2,827	1,899	637	857	669	513	367	340
1977	320	307	300	305	3,978	4,969	1,638	842	959	813	371	260
1978	230	213	289	414	3,210	2,157	1,827	863	691	ND	ND	ND
1982	ND	ND	ND	ND	3,354	2,943	1,732	1,043	1,394	ND	ND	ND
1988	ND	ND	ND	ND	ND	ND	ND	ND	ND	1,720	1,020	777
1989	629	478	381	867	5,630	2,836	1,289	714	858	888	512	467
1990	377	343	352	437	2,621	2,274	967	1,177	4,253	1,877	837	558
1991	418	345	364	753	3,923	3,204	2,173	2,027	1,583	827	581	463
1992	410	380	420	582	3,014	4,476	2,696	2,821	2,063	987	708	552
1993	485	444	401	1,344	4,173	1,401	825	732	1,602	ND	ND	ND
1997	ND	ND	ND	ND	4,169	2,975	874	1,450	785	473	376	318
1998	269	237	233	307	1,207	1,150	832	1,301	1,170	778	560	306
1999	251	230	216	267	2,470	2,082	1,509	1,528	1,180	1,155	448	333
2000	279	247	235	227	875	3,271	2,013	1,162	2,275	1,519	830	607
2001	465	356	312	590	2,863	2,051	1,532	1,318	1,503	778	525	432
2002	373	331	305	277	836	2,340	1,391	2,616	2,105	2,369	1,362	1,005
2003	801	670	563	608	2,392	1,881	1,069	824	1,238	857	527	463
2004	314	269	312	465	3,718	2,322	575	423	528	ND	ND	ND
2005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2007	ND	ND	ND	ND	3,725	1,502	1,057	906	1,291	868	446	336
2008	278	260	269	385	3,315	1,714	2,285	2,527	1,667	1,134	722	511
2009	405	376	329	484	5,180	2,455	1,098	947	903	859	503	368
2010	326	316	328	437	1,510	1,326	2,347	1,304	1,413	824	485	370
2011	246	213	217	407	3,553	1,623	1,281	1,605	1,031	676	452	402
2012	351	325	305	717	3,525	4,085	2,244	1,060	1,205	1,377	582	405
2013	387	359	334	316	4,528	6,386	1,010	1,034	2,072	1,316	879	642
2014	544	473	421	1,926	3,966	2,476	3,155	1,959	2,320	1,267	848	618
2015	480	408	433	539	3,277	1,307	1,186	1,078	1,619	1,742	862	597
2016	507	443	404	588	2,046	1,480	1,692	1,597	1,546	ND	ND	ND
mean	377	334	323	532	3,225	2,605	1,539	1,327	1,432	1,075	610	454

ND—Not determined

Flow-duration data are often used to statistically characterize streamflow. The exceedance probability, which also is referred to as the flow-duration percentile, is usually expressed as a percentage of a specified time interval (Risley and others 2008). For example, the 50% flow-

duration value would be exceeded about half of the time (and is the same as the median value). For the Gulkana River sites, the monthly discharge values for the period of record at each site are used to determine at what percentile a certain discharge would be exceeded. The calculated flow-duration values for the four sites are listed in **Tables 8–11**.

Table 8. Flow-duration percentile of monthly discharges (cfs) for the BLM Paxson Lake Outlet Site

Flow-duration Percentile	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0%	235	207	205	500	1162	2153	659	1031	686	515	357	290
5%	208	189	166	218	706	684	452	407	419	411	317	261
10%	191	173	152	174	648	560	374	353	385	371	284	220
15%	185	163	149	164	590	524	358	327	366	356	260	207
20%	175	157	146	148	563	499	339	314	346	322	231	201
25%	163	144	135	145	531	483	320	303	335	302	220	192
30%	152	140	129	139	509	464	307	292	321	286	212	185
35%	145	138	128	137	482	445	295	284	312	269	205	175
40%	142	135	126	131	455	424	281	277	300	260	201	165
45%	142	128	124	129	431	402	268	269	287	253	195	161
50%	138	127	122	122	411	380	258	261	271	246	190	158
55%	133	126	118	120	388	362	250	251	261	241	185	155
60%	129	123	114	117	368	347	242	244	252	235	179	153
65%	126	118	110	114	341	333	235	238	245	225	175	150
70%	124	116	106	107	290	318	225	230	238	215	171	147
75%	122	113	99	102	253	303	210	219	233	203	168	141
80%	119	111	91	88	239	288	198	200	226	198	166	129
85%	117	105	87	83	208	280	187	184	216	189	152	125
90%	115	101	82	79	168	267	171	170	193	183	142	120
95%	110	96	78	78	145	251	157	145	172	164	134	103
100%	92	81	74	68	89	205	111	123	126	149	88	85
Mean	145	132	120	130	414	434	274	272	285	262	200	167

Table 9. Flow-duration percentile of monthly discharges (cfs) for the BLM Middle Fork Gulkana River Site

Flow-duration Percentile	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0%	186	179	164	225	1,226	959	461	2,044	477	377	266	234
5%	181	172	160	186	721	619	341	515	384	303	239	200
10%	179	170	155	166	620	530	300	354	337	287	227	186
15%	179	167	152	154	577	489	281	299	320	272	203	183
20%	176	158	150	151	522	454	270	273	305	255	193	172
25%	159	145	140	145	454	426	259	252	286	239	174	165
30%	158	143	137	143	424	400	233	242	274	230	169	162
35%	151	140	130	136	397	373	222	235	261	222	164	161
40%	149	137	129	134	369	356	212	229	250	216	163	160
45%	147	136	128	130	351	342	202	218	242	209	162	156
50%	145	134	127	127	336	329	192	211	232	195	160	155
55%	141	131	125	126	321	317	182	203	219	184	158	152
60%	133	131	124	125	301	305	176	198	210	172	151	138
65%	132	130	122	124	262	293	169	193	201	166	147	136
70%	119	111	118	123	217	279	166	189	190	165	146	135
75%	116	109	111	122	202	251	162	186	179	161	143	133
80%	115	109	105	120	180	232	157	177	171	155	141	127
85%	114	108	103	114	163	213	153	159	163	151	139	123
90%	112	107	100	107	140	195	145	141	156	148	128	121
95%	111	104	96	101	125	176	138	132	141	134	126	119
100%	109	101	92	99	124	152	129	129	128	130	123	117
Mean	143	134	127	134	367	355	212	266	241	206	166	153

Table 10. Flow-duration percentile of monthly discharges (cfs) for the BLM West Fork Gulkana River Site

Flow-duration Percentile	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0%	334	255	208	493	3,418	3,515	1,514	3,225	1,641	1,977	852	508
5%	299	233	182	292	2,387	1,879	1,070	1,407	1,279	1,143	566	397
10%	255	213	168	213	2,063	1,595	953	1,003	1,183	982	457	339
15%	186	136	100	170	1,877	1,419	845	832	1,069	879	356	258
20%	161	119	92	164	1,622	1,342	756	764	1,002	787	309	223
25%	131	108	89	126	1,513	1,269	690	692	962	617	227	167
30%	125	104	87	95	1,413	1,211	623	642	904	538	204	158
35%	121	100	84	76	1,300	1,127	600	594	871	456	195	150
40%	118	97	81	71	1,185	1,060	573	544	737	429	189	147
45%	116	95	78	67	1,113	1,002	551	503	624	397	182	144
50%	113	92	72	62	1,009	948	508	479	532	374	178	141
55%	110	88	69	54	930	886	465	443	498	312	173	138
60%	107	83	64	50	846	837	435	405	474	260	169	135
65%	103	79	59	47	728	762	404	367	452	236	166	131
70%	99	74	55	45	618	703	373	348	428	225	161	127
75%	89	67	49	44	505	614	343	323	386	218	157	121
80%	52	40	36	42	440	526	326	262	342	210	152	92
85%	48	36	34	39	341	476	296	179	257	199	136	71
90%	44	24	12	36	182	437	221	151	210	173	93	65
95%	35	18	9	14	76	374	170	129	143	111	82	59
100%	25	13	9	10	32	318	140	115	122	97	73	52
Mean	124	96	76	96	1,085	999	549	568	662	470	231	166

Table 11. Flow-duration percentile of monthly discharges (cfs) for the USGS Gulkana River at Sourdough Site

Flow-Duration Percentile	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0%	880	720	620	6,200	18,700	18,000	6,210	7,070	12,100	4,050	1,760	1,200
5%	650	500	460	1,400	6,517	5,491	3,077	2,810	2,591	2,202	1,100	800
10%	550	460	420	850	5,752	4,133	2,611	2,302	2,210	1,800	960	650
15%	500	440	400	680	5,190	3,722	2,380	2,007	2,040	1,550	900	600
20%	480	410	400	557	4,772	3,450	2,160	1,800	1,892	1,410	800	600
25%	440	380	380	520	4,398	3,153	1,960	1,668	1,760	1,320	750	550
30%	420	370	350	500	4,080	2,950	1,783	1,540	1,670	1,232	700	500
35%	400	360	340	460	3,800	2,760	1,650	1,409	1,554	1,150	650	490
40%	380	340	335	430	3,554	2,590	1,520	1,310	1,470	1,086	600	460
45%	370	335	320	400	3,220	2,395	1,420	1,220	1,380	1,000	550	440
50%	350	320	310	370	2,955	2,190	1,320	1,125	1,300	950	540	420
55%	330	315	300	350	2,710	2,030	1,250	1,060	1,216	884	500	400
60%	320	300	300	320	2,500	1,880	1,170	999	1,146	828	500	380
65%	300	270	300	310	2,250	1,747	1,110	947	1,057	756	480	350
70%	280	260	270	300	1,937	1,640	1,040	860	971	700	460	340
75%	270	250	250	290	1,600	1,540	945	774	878	651	413	330
80%	260	240	240	280	1,286	1,398	862	720	806	602	380	306
85%	250	230	235	250	1,024	1,290	792	659	681	581	360	280
90%	240	220	226	240	750	1,158	707	577	617	524	320	260
95%	220	210	200	222	400	982	617	466	504	450	300	250
100%	200	200	200	200	240	758	409	381	399	320	250	200
Mean	377	334	323	532	3225	2605	1538	1327	1432	1075	610	454

Discussion

Figure 2 illustrates the calendar year January thru December based hydrographs. The hydrographs are characterized by long cold winters, generally from November to late April. The stream surface forms ice and the land surface is snow covered isolating both the stream and soils from precipitation. Under ice stream discharge over the winter period gradually reduces and is driven by base-flow. The winter period is followed by a 2–3 week spring breakup starting approximately the third week of April and ending the second week of May. Increased air temperatures, increased solar exposure, accelerated snowmelt, and rain that results in river ice melt and fracture, and a very rapid increase in flows that creates high water and sometimes flooding conditions cause it. Starting in mid-May to the first week of June, peak flows occur and are followed by a steady recession of flow due to warmer temperatures and drier climatic conditions extending to mid-July. From August through the middle of October, the hydrograph is influenced by more frequent rainfall with a moderate increase in flows through August and early September and a slight decrease in flow going into October.

Recommendations

If future data are collected for these and other flow measurement locations within or relevant to the hydrologic characteristics of this watershed, they should be periodically reported through future open file or alternative equivalent reporting and cross referenced with hypertext links back to the electronic online version of this report.

References

- BLM 2014. Bureau of Land Management Alaska, "Gulkana River, Alaska." National Wild and Scenic Rivers System website at <https://rivers.gov/rivers/gulkana.php>.
- Clark, Mark H. and Darrell R. Kautz. 1999. Soil and vegetation survey of the Gulkana River area, Alaska. BLM Alaska Open File Report #74. U.S. Department of the Interior. Bureau of Land Management, Alaska State Office: Anchorage, Alaska. 353 p.
- Jackson, W.L. Bo Shelby. B.P. Van Haveren, and A. Martinez. 1989. An interdisciplinary process for protecting instream flows. *Journal of Soil and Water Conservation*: V 44 N.2. pp 121-126.
- Klein, J, Alaska Department of Fish and Game. 2013. Surface-Water Data Manual for the Statewide Aquatic Resources Coordination Unit. Special Publication Number 13-05. 61 p.
- Melcher, N.B. and J.F. Walker. 1990. Evaluation of Select Methods for Determining Streamflow During Periods of Ice Effect. USGS Open File Report 90-554. 64 p.
- Murray, R 2017. USGS Station Document for (15200280) Gulkana River at Sourdough, AK. (Sent by mail by R Murray).
- Parks, Bruce and Madison, Robert J. 1985. Estimation of selected flow and water-quality characteristics of Alaskan streams. Water- Resources Investigations Report 84-4247. U.S. Department of the Interior, U.S. Geological Survey. 50 p.
- Rantz, S.E. and others. 1982. Measurement and Computation of Streamflow: Volume 1&2. USGS Water-Supply Paper 2175. U.S. Department of the Interior, U.S. Geological Survey. 631 p.
- Risley, J., A. Stonewall and T. Haluska. 2008, Estimating flow-duration and low-flow frequency statistics for unregulated streams in Oregon: U.S. Geological Survey Scientific Investigations Report 2008-5126, 20 p.
- Rogers, J. D. and J.T.Armbruster. 1990. Low flows and hydrologic droughts. In: Wolman, M. G. and, H.C.Riggs, ed., *Surface water hydrology. The Geology of North America, Vol. O-1. The Geological Society of America.* 374 p.

U.S. Department of the Interior, Bureau of Land Management (BLM). 1983. River Management Plan, Gulkana River, a Component of the National Wild and Scenic Rivers System. Anchorage District, Alaska. 43 p.

U.S. Geological Survey, 2017. Water resources data - Alaska. Water years 1972 to 2016. Site #15200280 Gulkana River at Sourdough, <http://waterdata.usgs.gov/ak/nwis/sw>

Van Haveren, Bruce P., Jackson, William L., Martinez, Tony, Shelby, Bo, and Carufel, Lou. 1987. Water rights assessment for Beaver Creek National Wild River, Alaska. U.S. Department of the Interior, Bureau of Land Management. 113 p.

Wahrhaftig, Clyde. 1965. Physiographic divisions of Alaska. Geological Survey professional paper #482. U.S. Department of the Interior, Geological Survey. 52 p.

Acknowledgements

Many people worked on this project for more than a decade. BLM staff and former staff who participated in the fieldwork for this report include: Dave Mushovic, Elijah Waters, Denton Hamby, Tim Sundlov, John Jangala, Marcia Butorac, Joe Hart, Leif Sorlie, Lori Nelson, Bunny Sterin, Lee Koss, Larry Standley, Mike Coffeen, Debbie Muenster, Chris Martinez, Kari Rogers, Travis Calderwood, and Kurt Sorenson.

Appendix A

Instantaneous Discharge Measurements

Gulkana River Paxson Lake Outlet, Middle Fork, and West Fork Gage Sites

Streamflow Data from June 1997 thru December 2016
(All Rev.11/17)

(Refer to **Figure 1** in Open File Report for gage site locations)

Table A1. Instantaneous Discharge Measurements for the Paxson Outlet Gage Site, Gulkana River (1997-2016)

Date	Stage (ft)	Discharge (cfs)	Width (ft)	Area (sq ft)	Avg. Velocity (fps)	Avg.Depth (ft)
6/18/97	2.87	435	118	191	2.28	1.62
7/28/97	ND	171	113	125	1.37	1.11
9/3/97	2.01	222	112	137	1.62	1.22
10/2/97	1.89	167	115	112	1.49	0.97
3/9/98	ND	91	108	114	0.80	1.06
6/18/98	2.01	296	78	97	3.05	1.24
7/21/98	1.80	206	115	127	1.62	1.11
8/18/98	1.93	264	118	155	1.70	1.31
9/9/98	1.88	226	117	142	1.59	1.21
10/1/98	1.97	252	109	154	1.64	1.41
3/17/99	ND	83	73	56	1.48	0.77
6/16/99	2.63	399	95	154	2.59	1.62
8/2/99	2.20	230	84	139	1.65	1.65
8/31/99	2.12	212	84	142	1.49	1.69
9/29/99	2.24	195	85	135	1.44	1.59
12/7/99	2.08	142	76	119	1.19	1.57
3/2/00	2.02	127	68	104	1.22	1.53
4/6/00	1.86	115	79	92	1.25	1.16
4/28/00	1.86	122	81	89	1.37	1.10
6/22/00	3.01	504	96	184	2.74	1.92
7/19/00	2.71	361	93	158	2.28	1.70
8/10/00	2.37	252	91	117	2.15	1.29
10/3/00	2.74	369	93	126	2.93	1.35
11/14/00	2.34	238	91	100	2.38	1.10
1/9/01	2.07	189	85	96	1.97	1.13
3/7/01	1.94	154	83	89	1.73	1.07
4/13/01	1.54	137	82	87	1.57	1.06
7/5/01	2.64	342	93	134	2.55	1.44
8/7/01	2.62	313	90	108	2.90	1.20
10/2/01	2.39	200	90	81	2.47	0.90
1/24/02	1.92	125	80	63	1.98	0.79
3/20/02	1.86	111	80	56	1.98	0.70
6/18/02	2.47	279	91	101	2.76	1.11
7/16/02	2.24	189	89	78	2.42	0.88
10/3/02	3.09	499	99	160	3.12	1.62
3/11/03	ND	203	90	91	2.23	1.01
4/23/03	ND	162	79	115	1.41	1.46
6/11/03	2.89	412	93	173	2.38	1.86

continued

Table A1. (continued)

Date	Stage (ft)	Discharge (cfs)	Width (ft)	Area (sq ft)	Avg. Velocity (fps)	Avg.Depth (ft)
7/1/03	2.7	339	90	165	2.05	1.83
7/14/03	2.59	298	89	151	1.97	1.70
8/14/03	2.45	232	89	155	1.50	1.74
9/4/03	2.75	322	91	178	1.81	1.96
10/5/03	2.62	271	91	166	1.63	1.82
1/22/04	ND	124	82	123	1.01	1.50
4/13/04	ND	131	81	125	1.05	1.54
6/21/04	2.61	288	90	166	1.73	1.84
7/14/04	2.18	137	81	125	1.10	1.54
8/13/04	2.17	127	81	129	0.98	1.59
9/29/04	2.32	169	84	139	1.22	1.65
3/23/05	1.96	121	77	141	0.86	1.83
4/14/05	1.94	121	77	141	0.86	1.83
7/14/05	2.76	324	90	193	1.68	2.14
8/09/05	2.57	219	85	166	1.32	1.95
9/29/05	3.1	432	91	220	1.96	2.42
11/2/05	2.5	169	83	153	1.10	1.84
4/5/06	ND	139	81	138	1.01	1.70
6/13/06	2.76	362	89	206	1.76	2.31
8/16/06	2.6	247	89	178	1.39	2.00
10/5/06	3.04	430	92	218	1.97	2.37
4/12/07	ND	117	81	129	0.91	1.59
6/5/07	3.2	557	100	229	2.43	2.29
7/11/07	2.45	236	88	170	1.39	1.93
8/14/07	2.35	189	88	157	1.20	1.78
6/11/08	2.67	293	88.5	187	1.57	2.11
9/24/08	2.86	343	91	179	1.92	1.97
4/14/09	ND	99	73	92	1.08	1.26
6/3/09	3.17	511	93	218	2.34	2.34
7/22/09	2.27	164	82.5	111	1.48	1.35
10/1/09	2.52	232	84	130	1.78	1.55
6/7/10	2.61	258	86	137	1.88	1.59
9/27/10	2.42	252	84	127	1.98	1.51
6/1/11	3.47	542	108	214	2.53	1.98
10/3/11	2.4	192	82	131	1.47	1.60
03/15/12	ND	128	77	107	1.20	1.39
7/13/12	2.9	311	86	159	1.96	1.84
9/25/12	2.74	293	85	162	1.80	1.91

continued

Table A1. (continued)

Date	Stage (ft)	Discharge (cfs)	Width (ft)	Area (sq ft)	Avg. Velocity (fps)	Avg.Depth (ft)
2/28/13	ND	170	81	125	1.36	1.54
7/23/13	2.5	230	80	125	1.84	1.56
10/23/13	2.68	290	83	149	1.94	1.80
2/26/14	ND	146	77	110	1.33	1.43
6/12/14	2.74	333	84	152	2.19	1.81
7/21/14	3.01	432	86	169	2.56	1.97
9/24/14	2.69	286	84	150	1.91	1.79
2/20/15	2.11	140	72	111	1.26	1.54
6/23/15	2.49	244	83	152	1.61	1.83
8/4/15	2.57	227	60	121	1.88	2.02
9/18/15	2.74	295	84	158	1.86	1.89
2/19/16	2.11	145	77	113	1.28	1.47
7/15/16	2.51	239	82	141	1.69	1.73
8/11/16	2.73	307	84	160	1.91	1.91
9/23/16	2.81	345	86	171	2.02	1.99

ND Not Determined (Ice cover)

Table A2. Instantaneous Discharge Measurements for the Middle Fork Gage Site, Gulkana River (1997-2005)

Date	Stage (ft)	Discharge (cfs)	Width (ft)	Area (sq ft)	Avg. Velocity (fps)	Avg.Depth (ft)
6/17/97	3.42	284	85	191	1.5	2.2
7/2/97	ND	164	97	125	1.3	1.3
7/27/97	ND	168	84	137	1.2	1.6
3/9/98	ND	110	80	112	1.0	1.4
6/11/98	3.28	235	81	114	2.1	1.4
7/1/98	3.06	167	75	97	1.7	1.3
7/24/98	3.24	162	85	127	1.3	1.5
8/26/98	3.42	231	79	155	1.5	2.0
10/2/98	3.29	200	79	142	1.4	1.8
3/17/99	ND	96	75	154	0.6	2.1
6/9/99	3.74	425	84	56	7.6	0.7
8/4/99	3.27	204	78	154	1.3	2.0
10/6/99	3.53	258	86	139	1.9	1.6
4/5/00	ND	157	99	127	1.2	1.3
6/21/00	3.87	429	80	135	3.2	1.7
6/28/00	3.76	382	80	119	3.2	1.5
7/24/00	3.56	278	78	104	2.7	1.3
8/14/00	3.28	181	80	92	2.0	1.2
10/3/00	3.44	231	90	89	2.6	1.0
3/6/01	ND	199	97	153	1.3	1.6
6/22/01	3.31	252	84	158	1.6	1.9
7/11/01	3.40	264	84	117	2.3	1.4
8/8/01	3.39	243	85	126	1.9	1.5
9/27/01	3.22	168	84	100	1.7	1.2
4/2/02	ND	127	85	96	1.3	1.1
6/12/02	3.22	220	83	121	1.8	1.5
7/22/02	2.91	127	83	91	1.4	1.1
9/30/02	3.85	381	84	175	2.2	2.1
4/23/03	ND	199	80	217	0.9	2.7
5/30/03	4.27	607	90	268	2.3	3.0
7/10/03	3.24	223	84	131	1.7	1.6
8/4/03	3.42	249	84	141	1.8	1.7
9/30/03	3.52	263	84	143	1.8	1.7
4/16/04	ND	149	85	201	0.7	2.4
5/18/04	4.64	800	143	355	2.3	2.5
6/22/04	3.07	188	83	123	1.5	1.5
7/20/04	2.83	131	80	79	1.7	1.0
3/23/05	ND	123	80	157	0.8	2.0
6/7/05	3.77	407	84	186	2.2	2.2
7/28/05	3.21	202	84	137	1.5	1.6
8/10/05	3.13	173	85	135	1.3	1.6
9/27/05	3.89	397	85	194	2.0	2.3
4/5/06	ND	135	80	142	1.0	1.8

ND = Not Determined (Ice Cover)

Table A3. Instantaneous Discharge Measurements for the West Fork Gage Site, Gulkana River (1997-2005)

Date	Stage (ft)	Discharge (cfs)	Width (ft)	Area (sq ft)	Avg. Velocity (fps)	Avg. Depth (ft)
6/17/97	2.91	1,210	136	342	3.5	2.5
6/26/97	2.60	987	135	299	3.3	2.2
7/28/97	1.82	425	130	196	2.2	1.5
8/26/97	2.21	644	134	240	2.7	1.8
9/19/97	1.92	326	126	159	2.1	1.3
3/10/98	ND	30	85	48	0.6	0.6
5/22/98	1.80	335	128	171	2.0	1.3
6/18/98	1.85	364	127	173	2.1	1.4
7/21/98	2.17	479	128	198	2.4	1.5
8/18/98	2.50	624	134	231	2.7	1.7
9/9/98	1.99	356	124	168	2.1	1.4
10/01/98	2.17	430	129	188	2.3	1.5
3/16/98	ND	9.2	50	13	0.7	0.3
5/26/99	2.65	849	134	292	2.9	2.2
6/23/99	2.89	1,012	141	325	3.1	2.3
8/2/99	2.96	925	133	294	3.1	2.2
9/28/99	2.06	397	127	176	2.3	1.4
4/6/00	ND	76	80	55	1.4	0.7
5/24/00	4.57	2,665	145	570	4.7	3.9
6/23/00	3.01	1,171	134	336	3.5	2.5
7/19/00	2.75	899	134	291	3.1	2.2
8/10/00	1.92	357	126	174	2.1	1.4
9/27/00	3.71	1,600	135	438	3.7	3.2
3/6/01	ND	106	115	95	1.1	0.8
6/20/01	2.31	679	131	239	2.8	1.8
7/11/01	2.72	852	136	276	3.1	2.0
8/7/01	2.49	639	133	236	2.7	1.8
9/28/01	2.31	519	128	207	2.5	1.6
9/28/01	2.03	519	128	207	2.5	1.6
4/2/02	ND	45	90	39	1.2	0.4
5/22/02	4.43	2,022	145	543	3.7	3.7
7/16/02	2.37	570	127	203	2.8	1.6
8/7/02	1.72	264	122	129	2.0	1.1
10/3/02	4.22	1,904	141	460	4.1	3.3
10/31/02	ND	759	131	248	3.1	1.9
5/23/03	2.67	857	130	278	3.1	2.1
6/25/03	2.55	790	129	260	3.0	2.0
7/25/03	1.61	205	116	120	1.7	1.0
8/14/03	1.5	178	114	105	1.7	0.9
9/8/03	2.36	528	127	208	2.5	1.6
9/25/03	1.78	257	118	133	1.9	1.1
04/14/04	ND	60	80	43	1.4	0.5
05/12/04	4.29	1,629	138	492	3.3	3.6

continued

Table A3. continued

Date	Stage (ft)	Discharge (cfs)	Width (ft)	Area (sq ft)	Avg. Velocity (fps)	Avg.Depth (ft)
6/18/04	2.73	928	128	278	3.3	2.2
7/14/04	1.47	204	115	114	1.8	1.0
8/13/04	1.29	116	108	84	1.4	0.8
9/28/04	1.73	243	115	127	1.9	1.1
3/24/05	ND	83	95	66	1.3	0.7
5/19/05	4.23	1,869	135	471	4.0	3.5
7/25/05	2.26	567	125	212	2.7	1.7
8/9/05	2.63	727	129	243	3.0	1.9
9/28/05	3.30	1,081	131	324	3.3	2.5
4/6/06	ND	50	100	46	1.1	0.5

ND = Not Determined (Ice cover)

Appendix B

Daily Mean Gaged Discharge Values

Gulkana River Paxson Lake Outlet, Middle Fork, and West Fork Gage Sites

Continuous Streamflow Data from June 1997 thru December 2016
(All Rev.11/17)

(Refer to **Figure 1** in Open File Report for gage site locations)

Table B1. 1997 Paxson Lake Outlet--Daily Mean Discharge cubic feet per second (cfs)

Day	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	572	320	355	241	173	149	133
2	523	318	374	238	169	148	132
3	474	313	331	225	166	148	132
4	433	310	302	222	166	147	131
5	412	272	278	218	165	147	131
6	412	252	264	216	164	146	130
7	419	239	274	215	164	145	130
8	488	218	288	212	163	145	129
9	628	210	283	211	163	144	129
10	684	205	274	208	162	144	128
11	634	202	265	207	161	143	128
12	567	199	265	202	161	143	127
13	514	194	275	201	160	142	127
14	469	193	305	195	159	142	126
15	435	196	320	184	159	141	126
16	409	204	309	189	158	140	125
17	418	208	315	182	158	140	125
18	427	204	321	177	157	139	124
19	416	195	306	176	156	139	124
20	408	194	288	173	156	138	123
21	400	196	278	173	155	138	123
22	400	207	281	174	155	137	122
23	389	229	306	177	154	137	122
24	367	227	303	178	153	136	121
25	361	222	285	178	153	136	121
26	355	229	275	176	152	135	120
27	347	200	272	175	152	135	120
28	339	171	267	175	151	134	120
29	333	198	262	176	151	134	119
30	326	209	251	174	150	133	119
31		250	246		149		118
MEAN	445	225	291	195	159	141	125
MAX.	684	320	374	241	173	149	133
MIN.	326	171	246	173	149	133	118

*Gage operated Jun 18-Oct 2. Estimated: Oct 3-Dec 31 (measurements at gage),
Jun 1-17, Jul 5-Sep 2 (estimated based on regression with USGS Sourdough 15200280).*

Table B2. 1998 Paxson Lake Outlet--Daily Mean Discharge cubic feet per second (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	118	105	94	83	185	329	220	186	266	250	205	168
2	117	104	93	83	175	316	211	179	265	250	204	167
3	117	104	93	83	192	299	204	180	260	249	202	166
4	116	103	93	82	207	283	197	180	253	247	201	165
5	116	103	92	82	236	275	191	179	250	245	200	164
6	115	103	92	82	255	278	190	179	246	244	198	162
7	115	102	92	81	246	273	186	193	240	242	197	161
8	115	102	91	81	244	265	187	209	237	241	196	160
9	114	101	91	81	237	262	190	239	233	239	194	159
10	114	101	91	80	224	258	187	261	231	237	193	158
11	113	101	90	80	221	250	187	271	226	236	192	157
12	113	100	90	80	222	241	186	272	228	234	191	156
13	112	100	90	80	222	234	182	269	232	233	189	155
14	112	99	89	79	223	228	182	265	232	231	188	154
15	112	99	89	79	225	232	176	259	231	230	187	153
16	111	99	89	79	237	244	174	249	235	228	186	152
17	111	98	88	78	245	265	198	250	237	227	184	151
18	110	98	88	78	248	288	214	252	233	225	183	150
19	110	98	88	78	253	280	214	248	226	224	182	149
20	109	97	87	77	253	275	211	241	227	222	181	148
21	109	97	87	96	248	287	204	243	232	221	180	147
22	109	96	87	102	244	294	202	245	233	219	178	146
23	108	96	86	114	259	296	203	248	232	218	177	145
24	108	96	86	126	297	290	205	252	238	216	176	144
25	107	95	86	128	354	278	198	252	243	215	175	143
26	107	95	85	133	357	267	198	257	257	213	174	142
27	107	95	85	139	353	257	197	263	261	212	172	141
28	106	94	85	149	344	248	196	268	265	211	171	140
29	106		84	158	347	237	197	268	268	209	170	139
30	105		84	175	340	229	196	274	259	208	169	139
31	105		84		330		193	278		206		138
MEAN	111	99	89	98	259	269	196	239	243	229	187	152
MAX.	118	105	94	175	357	329	220	278	268	250	205	168
MIN.	105	94	84	77	175	228	174	179	226	206	169	138

Gage operated Jun 18-Oct 1. Estimated Jan 1-Apr 20, Oct 2-Dec 31 (measurements at gage),
April 21-Jun 17 (estimated based on regression with USGS Sourdough 15200280).

Table B3. 1999 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	137	111	92	76	167	362	320	249	217	204	207	154
2	136	110	92	75	175	347	293	231	220	211	206	153
3	135	110	91	75	184	354	269	221	218	236	201	153
4	134	109	90	74	200	402	241	210	224	247	197	153
5	133	108	90	74	214	425	219	208	225	251	194	152
6	132	108	89	73	229	399	205	205	224	253	192	152
7	131	107	89	73	249	376	190	206	222	253	191	149
8	130	106	88	72	262	363	182	202	220	241	186	150
9	130	105	88	72	286	350	180	201	211	222	184	147
10	129	105	87	71	309	336	176	197	209	216	182	146
11	128	104	86	71	341	320	173	190	205	208	178	144
12	127	103	86	70	371	307	168	193	201	203	176	159
13	126	103	85	70	403	293	166	239	195	198	175	158
14	125	102	85	69	500	284	164	259	195	189	174	156
15	125	101	84	69	568	320	160	295	195	190	174	155
16	124	101	84	68	586	392	157	334	198	200	172	153
17	123	100	83	68	583	426	157	342	198	197	172	152
18	122	99	82	84	575	506	159	344	197	205	170	150
19	121	99	82	89	523	535	157	338	195	235	169	148
20	120	98	81	100	461	550	154	322	195	259	169	126
21	120	97	81	111	416	545	164	310	192	272	167	130
22	119	97	80	115	388	523	171	292	199	262	166	134
23	118	96	80	118	371	497	173	265	190	249	164	141
24	117	95	79	122	364	456	173	254	188	236	162	142
25	117	95	79	126	370	425	177	256	186	228	161	144
26	116	94	78	131	388	399	187	250	184	223	160	147
27	115	94	78	139	459	405	206	255	185	216	158	147
28	114	93	77	143	495	399	221	253	198	211	155	147
29	113		77	150	465	379	223	232	194	206	153	147
30	113		76	158	421	353	240	219	193	203	154	143
31	112		76		385		246	215		199		142
MEAN	124	102	84	93	378	401	196	251	203	223	176	148
MAX.	137	111	92	158	586	550	320	344	225	272	207	159
MIN.	112	93	76	68	167	284	154	190	184	189	153	126

Gage operated Jan. 1–Dec. 31. Estimated Jan 1-Apr 17, Dec 12-19 (measurements at gage), April 18-Jun 15 (estimated based on regression with USGS Sourdough 15200280).

Table B4. 2000 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	142	142	128	120	124	449	551	283	363	387	250	209
2	142	139	127	120	125	448	540	274	364	371	248	207
3	142	138	127	121	127	449	526	266	366	357	243	203
4	142	137	127	122	130	447	508	267	373	343	239	200
5	142	137	126	123	133	447	505	264	374	346	235	201
6	142	138	126	123	136	463	528	266	375	357	230	203
7	142	137	125	122	142	472	526	264	367	359	226	204
8	142	137	124	121	149	479	507	260	361	353	221	205
9	142	137	124	121	160	479	481	251	347	343	219	206
10	142	137	123	120	171	487	456	244	339	335	222	206
11	142	137	121	120	179	493	437	238	340	331	224	206
12	142	137	121	120	192	494	424	236	343	322	226	206
13	142	137	121	119	205	495	407	235	357	326	226	204
14	142	136	121	119	217	501	412	237	358	319	224	202
15	142	135	121	117	220	521	405	240	365	308	224	199
16	142	135	120	118	226	539	391	230	364	303	222	196
17	142	136	120	120	249	541	382	223	354	299	223	194
18	142	136	120	124	285	546	374	224	343	292	222	192
19	142	136	120	124	318	538	363	230	335	286	221	192
20	142	136	121	123	352	524	351	232	326	281	220	193
21	142	135	120	122	369	508	339	232	317	273	219	192
22	142	132	122	121	381	496	335	241	319	268	215	192
23	142	131	121	121	409	475	343	243	321	269	211	191
24	142	130	122	121	422	456	340	245	337	262	212	190
25	142	130	123	120	424	446	333	248	360	260	213	188
26	143	130	123	120	420	440	339	246	405	263	212	187
27	143	128	124	119	417	445	332	255	430	259	206	186
28	143	128	123	119	419	469	321	262	429	251	202	187
29	143	128	122	120	421	521	312	279	414	246	205	187
30	144		121	123	432	552	303	338	400	243	206	187
31	142		121		444		291	363		243		188
MEAN	142	135	123	121	271	487	408	255	362	305	222	197
MAX.	144	142	128	124	444	552	551	363	430	387	250	209
MIN.	142	128	120	117	124	440	291	223	317	243	202	186

Gage operated Jan 24-Dec 31. Estimated Jan. 1-24 (measurements at gage)..

Table B5. 2001 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	185	185	150	148	249	482	254	357	249	198	151	132
2	185	179	149	147	249	473	254	356	249	199	151	129
3	186	178	148	147	262	466	286	351	253	198	152	126
4	186	177	146	146	262	448	309	345	246	198	154	125
5	187	177	145	146	274	431	345	332	254	198	155	122
6	187	175	145	146	286	411	357	325	263	197	154	122
7	188	175	146	146	298	403	360	315	264	198	150	121
8	188	175	146	149	309	402	365	307	263	198	149	120
9	189	173	148	151	320	400	366	301	262	198	146	120
10	188	171	149	149	331	385	362	295	255	196	145	121
11	186	173	150	137	341	373	357	292	252	194	144	122
12	184	177	149	136	341	365	353	288	250	191	144	124
13	185	177	149	138	348	360	345	285	244	184	143	127
14	186	175	150	140	374	362	339	277	244	183	142	128
15	187	173	150	142	421	357	341	274	239	183	142	129
16	185	171	150	142	478	347	337	271	235	180	142	129
17	185	167	149	143	500	336	328	270	235	177	142	129
18	184	162	149	142	514	324	326	269	233	177	142	130
19	183	160	149	140	523	317	319	265	231	177	141	130
20	182	160	149	166	527	315	313	261	231	174	141	128
21	181	159	148	183	519	319	310	260	230	174	141	127
22	181	158	148	192	502	311	306	256	226	174	141	125
23	186	157	146	200	494	302	299	250	222	171	143	124
24	186	155	146	200	527	293	303	259	221	166	143	125
25	186	154	145	207	571	281	317	268	219	162	143	125
26	187	153	146	214	563	273	324	265	218	159	140	125
27	186	151	147	214	535	264	333	263	215	155	139	124
28	187	150	147	222	518	260	341	261	213	153	138	126
29	186		148	229	516	253	339	257	211	153	136	125
30	186		148	236	506	250	342	254	203	152	134	125
31	186		146		491		352	254		151		125
MEAN	186	168	148	167	418	352	328	287	238	180	144	125
MAX.	189	185	150	236	571	482	366	357	264	199	155	132
MIN.	181	150	145	136	249	250	254	250	203	151	134	120

Gage operated Jan 24-Dec 31. Estimated Apr 20-Jul 4 estimated based on regression with USGS Sourdough 15200280)..

Table B6. 2002 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	125	129	121	107	124	644	234	157	380	384	282	275
2	122	128	122	106	129	617	242	155	371	499	281	271
3	122	128	122	105	131	577	248	151	360	490	289	270
4	120	128	123	105	134	541	256	149	344	483	306	268
5	119	128	122	104	134	529	250	145	335	454	315	265
6	119	127	124	103	135	507	246	148	332	432	315	264
7	117	127	122	103	137	485	241	161	385	417	321	262
8	118	127	122	103	140	457	235	171	441	413	322	261
9	119	127	123	102	146	426	227	187	429	403	322	257
10	119	126	156	102	159	404	222	209	409	395	317	251
11	118	128	120	103	178	385	215	243	391	381	304	244
12	118	128	118	104	202	364	207	309	380	360	302	239
13	119	127	117	103	240	346	202	426	369	357	298	237
14	118	127	116	102	292	333	197	485	358	352	297	233
15	119	126	115	102	353	321	194	467	347	338	295	227
16	121	128	114	102	407	307	191	405	337	350	284	223
17	122	127	113	102	457	293	187	368	330	352	275	223
18	125	127	112	101	509	278	179	342	325	366	267	218
19	125	126	111	101	550	273	175	325	321	370	268	214
20	124	125	110	105	581	293	166	365	325	371	269	213
21	125	125	110	107	602	308	160	573	327	369	273	211
22	123	124	108	107	626	310	155	676	319	366	268	208
23	122	123	107	107	655	302	153	661	314	360	266	208
24	122	123	107	107	696	293	149	618	307	354	266	207
25	121	122	105	107	703	280	148	580	321	335	263	208
26	122	121	105	107	704	269	157	539	381	317	266	207
27	122	122	106	107	710	261	160	503	404	308	275	207
28	124	121	106	107	704	254	161	464	397	304	280	206
29	127		105	109	684	244	159	432	385	295	280	207
30	127		114	116	663	236	160	407	369	290	280	209
31	128		108		658		160	391		285		214
MEAN	122	126	116	105	405	371	195	362	360	373	288	232
MAX.	128	129	156	116	710	644	256	676	441	499	322	275
MIN.	117	121	105	101	124	236	148	145	307	285	263	206

Gage operated Jan 1-Dec 31. Estimated Aug 15-Oct 2 (estimated based on regression with USGS Sourdough 15200280)..

Table B7. 2003 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	209	194	204	171	239	424	331	251	273	256	221	179
2	207	196	204	170	249	449	328	251	283	259	219	178
3	205	198	205	168	258	427	351	251	302	263	218	176
4	205	198	201	168	259	398	365	251	313	268	216	175
5	210	197	198	166	262	376	367	251	307	264	215	174
6	220	197	201	166	261	366	362	250	308	265	213	173
7	219	202	200	166	267	366	356	245	301	263	212	171
8	214	203	200	165	281	358	347	244	296	261	210	170
9	214	202	199	165	301	343	328	239	296	260	209	169
10	213	201	199	164	316	377	317	235	292	258	207	168
11	213	206	193	164	337	411	310	230	286	256	206	167
12	212	207	181	164	360	412	301	226	286	254	204	165
13	210	206	185	164	367	415	289	223	293	252	203	164
14	210	205	181	164	367	420	281	226	287	251	202	163
15	209	199	169	166	381	436	278	226	279	249	200	162
16	206	197	161	166	387	448	266	225	275	247	199	161
17	205	196	167	166	400	454	256	225	269	245	197	160
18	207	195	172	165	409	446	256	223	259	244	196	159
19	206	187	173	165	411	446	250	233	247	242	195	158
20	208	182	173	165	409	449	244	231	243	240	193	156
21	207	191	174	165	402	449	232	231	236	239	192	155
22	206	195	172	164	395	443	230	231	233	237	190	154
23	205	198	172	164	388	437	225	227	228	235	189	153
24	203	198	171	165	378	427	218	227	229	234	188	152
25	199	201	173	167	386	413	214	228	227	232	186	151
26	195	204	173	170	404	402	209	230	242	230	185	150
27	193	203	172	178	422	387	204	233	243	229	184	149
28	191	203	174	190	416	374	214	237	243	227	183	148
29	190		173	208	402	358	218	238	245	226	181	147
30	191		171	224	396	347	230	238	249	224	180	146
31	194		171		398		242	255		222		145
MEAN	206	199	183	170	352	409	278	236	269	246	200	161
MAX.	220	207	205	224	422	454	367	255	313	268	221	179
MIN.	190	182	161	164	239	343	204	223	227	222	180	145

Gage operated Jan 1-Dec 31. Estimated: Jan 1-May 21, Oct 6 Dec 31 (measurements at gage); May 24-Jun 10 (estimated based on regression with USGS Sourdough 15200280)..

Table B8. 2004 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	144	125	127	130	262	411	205	127	138	205	189	177
2	143	125	127	130	298	417	193	134	140	227	185	172
3	142	125	127	130	376	519	189	134	145	234	171	173
4	141	125	127	130	444	536	184	133	157	242	185	173
5	140	125	128	130	518	491	180	130	154	239	179	174
6	139	125	128	130	619	443	176	129	153	243	177	175
7	138	125	128	130	635	413	173	127	150	255	169	175
8	137	125	128	130	670	433	168	128	147	247	168	176
9	136	126	128	131	677	507	163	128	145	246	171	177
10	135	126	128	131	684	531	157	129	142	244	166	178
11	134	126	128	131	632	519	149	130	139	244	168	178
12	133	126	128	131	592	488	144	129	137	239	165	179
13	132	126	128	131	577	449	137	131	132	249	167	180
14	131	126	128	131	553	418	132	131	133	269	170	180
15	130	126	128	133	530	394	128	130	133	268	170	181
16	129	126	128	134	511	371	123	130	134	264	169	182
17	129	126	129	135	489	352	120	129	131	260	168	182
18	128	126	129	137	463	335	115	128	128	256	163	183
19	127	126	129	139	430	321	113	129	126	240	165	184
20	126	126	129	141	409	306	113	129	130	245	167	185
21	125	127	129	143	382	292	112	129	130	237	168	185
22	124	127	129	149	365	279	111	127	131	235	165	186
23	124	127	129	158	352	267	111	125	136	221	162	187
24	124	127	129	167	354	257	112	123	141	217	162	187
25	124	127	129	174	384	246	113	125	148	221	168	188
26	124	127	129	182	430	238	118	126	154	208	171	189
27	124	127	129	192	430	231	120	132	159	208	171	186
28	124	127	130	206	451	224	122	138	167	204	170	197
29	125	127	130	219	465	215	121	143	170	197	178	196
30	125		130	236	445	205	125	141	174	203	177	189
31	125		130		426		127	140		198		185
MEAN	131	126	128	149	479	370	140	130	143	234	171	182
MAX.	144	127	130	236	684	536	205	143	174	269	189	197
MIN.	124	125	127	130	262	205	111	123	126	197	162	172

Gage operated Jan 1-Dec 31. Estimated: Jan 1-Apr 14, Dec 3-24 (measurements at gage); Apr 15-Jun 29 (estimated based on regression with USGS Sourdough 15200280)..

Table B9. 2005 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	185	133	120	117	317	398	370	240	261	410	170	206
2	180	132	120	116	346	400	373	241	275	395	168	204
3	178	131	122	115	359	399	381	245	279	381	167	199
4	178	128	120	116	374	391	393	244	279	368	168	195
5	187	126	123	114	386	375	396	243	287	352	170	191
6	186	124	123	115	395	359	387	239	291	338	173	191
7	180	120	121	114	404	369	377	237	299	326	175	191
8	178	111	118	115	415	366	363	230	309	315	177	191
9	178	115	124	114	429	361	346	229	312	305	179	191
10	177	113	118	115	444	355	340	224	319	296	181	193
11	174	112	122	115	454	347	337	222	340	284	184	198
12	168	111	124	116	453	343	336	219	354	276	188	198
13	163	114	122	117	444	343	331	218	368	269	189	201
14	157	111	124	118	440	343	322	215	389	263	189	200
15	154	110	124	117	458	323	311	217	395	260	185	201
16	149	111	124	118	555	319	300	217	396	251	182	203
17	146	110	127	118	590	333	286	215	398	244	191	204
18	149	111	125	119	583	318	281	213	397	235	199	205
19	144	111	123	120	547	314	277	217	390	230	200	205
20	140	112	121	122	502	308	269	215	391	224	199	204
21	132	114	126	121	462	311	258	220	386	217	203	202
22	129	115	120	125	471	308	250	228	385	210	209	202
23	128	118	121	127	478	314	239	231	386	203	211	203
24	128	116	119	131	475	325	236	237	395	198	213	202
25	130	118	118	136	473	338	238	240	428	195	213	200
26	129	117	116	142	464	349	235	242	445	192	211	198
27	131	118	116	151	451	357	231	242	445	190	212	194
28	134	117	119	170	431	365	229	241	435	186	211	191
29	136		118	206	418	368	226	239	427	182	208	188
30	131		117	255	403	362	232	240	422	177	206	185
31	132		115		394		239	245		173		182
MEAN	155	117	121	130	446	349	303	230	363	263	191	197
MAX.	187	133	127	255	590	400	396	245	445	410	213	206
MIN.	128	110	115	114	317	308	226	213	261	173	167	182

Gage operated Jan 1-Dec 31. Estimated: Jan 12-13, Feb 4-5, Apr 12, Nov 29, Dec 4 (measurements at gage).

Table B10. 2006 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	181	166	153	141	145	604	479	251	686	365	357	290
2	181	166	153	140	147	592	453	250	645	365	355	288
3	180	165	153	140	151	577	428	242	626	366	352	286
4	180	165	152	139	157	551	410	240	593	436	350	284
5	179	164	152	139	162	531	389	238	566	428	347	283
6	179	164	151	139	166	502	369	238	530	427	345	281
7	178	163	151	138	166	472	370	236	503	424	343	279
8	178	163	150	138	167	449	362	232	481	421	340	277
9	177	162	150	137	171	424	354	231	474	418	338	275
10	177	162	150	137	166	401	341	231	468	415	336	273
11	176	161	149	137	171	388	331	232	458	413	333	271
12	176	161	149	137	181	376	321	240	444	410	331	269
13	175	161	148	138	197	365	312	251	431	407	329	267
14	175	160	148	138	224	354	333	260	414	404	326	266
15	174	160	148	138	264	348	320	268	405	401	324	264
16	174	159	147	138	313	355	350	269	398	399	322	262
17	173	159	147	138	382	375	323	273	388	396	320	260
18	173	158	146	138	435	425	320	290	377	393	318	258
19	172	158	146	138	482	427	313	322	362	390	315	257
20	172	157	145	138	534	423	303	377	363	388	313	255
21	171	157	145	138	578	406	298	673	353	385	311	253
22	171	157	145	138	631	492	286	787	344	382	309	251
23	170	156	144	138	692	457	276	960	336	380	307	250
24	170	156	144	141	718	535	268	1,001	335	377	305	248
25	169	155	143	142	715	565	264	1,023	331	375	303	246
26	169	155	143	141	703	586	259	1,031	322	372	301	244
27	168	154	143	144	692	584	255	978	330	370	299	243
28	168	154	142	144	685	571	245	918	333	367	296	241
29	168		142	142	664	545	240	850	345	364	294	239
30	167		141	142	635	515	247	776	365	362	292	238
31	167		141		618		247	722		360		236
MEAN	174	160	147	139	391	473	325	480	433	392	324	262
MAX.	181	166	153	144	718	604	479	1,031	686	436	357	290
MIN.	167	154	141	137	145	348	240	231	322	360	292	236

Gage operated Jan 1-Dec 31. Estimated: Jan 1-Apr 12, Oct 6-Dec 31 (measurements at gage); Apr 13-May 9 (estimated based on regression with USGS Sourdough 15200280)

Table B11. 2007 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	235	189	156	126	238	631	263	179	173	246	184	151
2	233	188	155	125	281	580	261	182	175	244	186	152
3	231	187	154	124	396	546	267	183	174	238	185	153
4	230	186	153	124	533	523	263	188	172	233	185	154
5	228	184	152	123	658	578	262	196	171	231	185	154
6	227	183	151	122	746	540	257	201	173	227	185	155
7	225	182	150	121	978	543	254	201	174	218	186	157
8	224	181	149	120	1,106	497	249	200	181	213	182	159
9	222	179	148	119	1,124	438	242	198	212	208	179	159
10	220	178	147	119	1,017	459	238	197	229	203	176	159
11	219	177	146	118	978	458	234	196	236	201	173	159
12	217	176	145	117	960	424	235	194	237	201	172	157
13	216	174	144	116	876	401	229	191	239	199	173	156
14	214	173	143	115	792	383	222	191	240	200	171	154
15	213	172	142	115	752	369	218	191	233	202	170	152
16	212	171	141	115	781	337	213	187	234	201	169	150
17	210	170	140	115	824	356	205	184	232	199	168	152
18	209	169	139	115	816	354	199	182	245	200	168	152
19	207	167	138	115	752	348	193	180	263	200	168	153
20	206	166	137	115	707	333	193	180	271	198	169	155
21	204	165	136	117	667	338	189	178	270	194	168	152
22	203	164	135	120	644	307	185	178	265	194	169	150
23	202	163	134	123	622	287	181	183	261	192	168	150
24	200	162	133	127	600	274	176	185	263	193	167	150
25	199	161	132	130	589	284	171	183	265	192	168	150
26	197	160	132	136	575	276	168	182	265	191	167	150
27	196	158	131	143	576	248	167	180	260	190	163	149
28	195	157	130	150	629	222	164	179	254	189	159	149
29	193		129	165	765	267	162	176	251	188	158	149
30	192		128	198	781	263	163	173	246	187	152	149
31	191		127		689		172	173		185		149
MEAN	212	173	141	126	724	395	213	186	229	205	172	153
MAX.	235	189	156	198	1,124	631	267	201	271	246	186	159
MIN.	191	157	127	115	238	222	162	173	171	185	152	149

Gage operated: Jun 5-Dec 31. Estimated: Jan 1-Apr 30, Dec 24-31 (measurements at gage); May 1-Jun 4 (estimated based on regression with USGS Sourdough 15200280).

Table B12. 2008 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	146	109	80	79	105	339	277	422	259	319	206	206
2	145	108	79	78	107	328	274	417	253	313	204	204
3	143	105	80	78	113	318	263	410	252	316	204	202
4	141	103	80	78	124	312	257	405	250	311	204	208
5	138	101	78	77	139	302	249	402	247	304	202	209
6	134	99	78	78	159	291	250	404	244	297	202	211
7	131	99	77	78	180	287	263	405	244	291	202	213
8	128	98	78	78	198	287	271	403	241	282	203	212
9	126	96	78	79	213	283	283	402	243	278	203	210
10	124	96	78	80	232	282	287	408	254	273	202	209
11	121	90	77	80	264	285	286	416	266	270	203	208
12	118	87	78	79	306	283	283	413	280	268	203	211
13	115	85	78	80	343	285	277	401	293	263	203	210
14	113	85	79	82	368	286	268	392	303	263	204	207
15	111	85	78	84	382	283	261	380	311	267	206	204
16	113	84	77	87	389	281	251	368	315	264	206	203
17	112	84	78	88	397	275	246	358	325	256	206	201
18	113	84	77	88	408	270	250	350	334	252	206	198
19	115	83	78	87	417	266	249	343	334	247	204	197
20	116	84	77	87	423	259	250	327	340	245	203	197
21	117	83	77	87	431	253	249	318	348	242	202	196
22	116	83	76	87	445	249	251	317	354	239	201	195
23	118	83	76	87	448	248	250	312	352	235	202	192
24	119	83	76	88	437	271	279	303	351	229	202	191
25	119	83	76	88	437	288	288	296	345	226	203	192
26	120	83	75	89	430	285	291	291	342	222	207	193
27	118	82	75	90	421	280	298	287	341	220	209	193
28	114	81	76	95	404	277	319	281	336	217	208	191
29	112	80	76	97	387	280	374	278	327	213	209	189
30	110		76	102	351	281	403	270	322	211	208	187
31	110		78		354		418	264		208		183
MEAN	122	90	78	84	317	284	281	356	300	259	204	201
MAX.	146	109	80	102	448	339	418	422	354	319	209	213
MIN.	110	80	75	77	105	248	246	264	241	208	201	183

Gage operated: Jan 1- Dec 31. No estimated data..

Table B13. 2009 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	176	120	114	109	138	557	359	154	274	235	185	182
2	171	121	113	109	145	531	347	156	271	239	186	172
3	165	120	113	109	176	510	332	158	267	244	188	169
4	159	118	113	109	226	504	319	158	264	245	189	172
5	155	117	115	109	291	499	308	159	259	247	190	169
6	149	118	118	111	373	497	296	165	254	253	188	169
7	145	117	120	111	399	496	288	169	250	258	190	167
8	143	116	118	111	409	491	277	172	245	261	190	164
9	141	116	117	111	426	487	265	175	240	260	192	163
10	140	116	117	112	454	486	258	179	238	259	194	164
11	139	115	117	111	483	481	248	180	233	258	196	164
12	136	114	116	112	527	466	240	180	229	257	196	165
13	126	113	115	112	577	481	232	181	227	253	190	166
14	120	113	114	112	632	491	218	187	225	250	187	165
15	120	112	113	112	663	493	207	195	223	244	188	164
16	117	113	112	113	672	483	202	214	221	241	190	163
17	120	114	111	113	671	476	196	244	221	237	194	162
18	124	114	110	114	656	475	193	268	220	235	195	161
19	128	114	110	114	645	474	187	298	220	229	196	160
20	124	113	109	115	640	463	182	305	222	226	197	159
21	129	113	109	115	626	451	176	300	222	225	199	158
22	128	112	108	116	600	435	170	296	216	220	199	157
23	127	112	108	117	577	444	165	290	217	217	198	156
24	126	111	108	118	558	444	160	282	217	218	198	155
25	126	111	108	119	532	433	159	278	220	216	197	154
26	124	110	108	120	529	419	160	274	226	215	196	153
27	123	112	109	121	529	411	157	279	229	212	196	152
28	122	112	109	125	547	398	157	277	229	205	195	151
29	123		109	129	560	385	157	280	229	196	193	150
30	122		108	134	578	371	157	276	234	188	188	149
31	121		109		580		153	277		185		148
MEAN	134	115	112	115	497	468	223	226	235	233	193	161
MAX.	176	121	120	134	672	557	359	305	274	261	199	182
MIN.	117	110	108	109	138	371	153	154	216	185	185	148

Gage operated: Jan 1- Dec 31. Estimated: Dec16-31 (measurements at gage)

APPENDIX B: BLM Stream Gage Data
Paxson Lake Outlet

Table B14. 2010 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	147	120	101	79	113	296	268	340	374	243	183	163
2	146	119	101	79	123	294	266	330	382	241	182	162
3	146	117	99	79	140	287	258	320	385	239	181	161
4	145	116	99	78	172	281	258	311	372	241	181	161
5	144	115	99	78	217	280	256	303	371	234	180	160
6	143	113	99	78	239	275	248	299	370	232	179	159
7	142	113	98	77	245	269	245	296	367	231	178	159
8	141	112	97	77	247	268	239	296	369	228	178	158
9	140	111	97	77	245	275	232	290	372	226	177	158
10	139	110	96	77	243	277	226	284	372	221	176	157
11	138	110	95	77	242	273	222	287	368	217	176	156
12	138	109	93	77	245	282	225	288	367	215	175	156
13	137	108	93	76	248	306	228	284	364	209	174	155
14	136	107	92	78	247	318	226	287	350	203	174	155
15	135	106	91	78	246	317	238	285	344	199	173	154
16	134	105	90	79	246	311	263	278	336	202	172	153
17	133	106	89	79	242	309	274	277	328	202	172	153
18	133	106	88	79	239	306	276	281	322	195	171	152
19	132	105	87	80	239	301	274	286	314	193	170	152
20	131	104	87	81	255	293	285	284	307	192	170	151
21	130	104	86	81	268	288	299	280	301	191	169	150
22	129	103	85	82	275	285	323	278	293	190	168	150
23	129	103	84	83	278	280	349	285	291	189	168	149
24	128	102	83	84	278	277	363	282	277	188	167	149
25	127	102	82	85	284	270	361	280	263	188	166	148
26	126	103	81	86	290	262	356	277	257	187	166	148
27	124	102	81	89	299	254	359	282	248	186	165	147
28	123	101	81	93	300	247	366	303	235	185	164	146
29	123		80	99	300	259	362	336	238	185	164	146
30	122		80	106	303	264	358	362	238	184	163	145
31	121		79		300		348	370		183		145
MEAN	134	108	90	82	245	283	285	298	326	207	173	154
MAX.	147	120	101	106	303	318	366	370	385	243	183	163
MIN.	121	101	79	76	113	247	222	277	235	183	163	145

Gage operated: Jan 1- Dec 31. Estimated: Oct 22-Dec 31 (measurements at gage)

Table B15. 2011 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	144	128	115	102	331	531	269	284	294	215	179	166
2	144	127	114	101	367	524	286	329	290	204	178	166
3	143	127	114	101	413	511	311	323	287	192	178	165
4	143	126	113	101	445	499	316	301	286	192	177	165
5	142	126	113	100	476	477	303	284	280	191	177	164
6	141	125	113	100	505	462	298	276	279	191	177	164
7	141	125	112	99	534	445	303	274	271	190	176	163
8	140	124	112	99	552	439	307	274	264	190	176	163
9	140	124	111	99	571	437	323	274	258	189	175	163
10	139	124	111	98	551	434	310	294	255	189	175	162
11	139	123	110	100	579	401	288	305	254	188	174	162
12	138	123	110	102	553	368	273	294	251	188	174	161
13	138	122	110	104	530	335	264	280	249	187	173	161
14	137	122	109	108	508	302	261	286	249	187	173	161
15	137	121	109	112	491	295	257	333	248	186	173	160
16	136	121	108	116	512	295	252	370	247	186	172	160
17	136	120	108	119	537	303	258	353	245	185	172	160
18	135	120	107	119	568	305	273	346	242	185	171	159
19	134	119	107	121	624	301	322	353	238	185	171	159
20	134	119	107	126	615	295	366	386	238	184	171	158
21	133	118	106	133	607	337	344	431	235	184	170	158
22	133	118	106	135	624	373	316	422	234	183	170	158
23	132	117	105	137	646	355	294	402	237	183	169	157
24	132	117	105	141	634	338	280	396	238	182	169	157
25	131	117	105	152	617	316	273	381	236	182	168	156
26	131	116	104	181	601	299	267	360	237	181	168	156
27	130	116	104	216	569	284	264	343	234	181	168	156
28	130	115	103	248	537	274	261	329	232	180	167	155
29	129		103	277	502	266	257	318	229	180	167	155
30	129		103	305	509	261	257	307	226	180	166	154
31	128		102		515		260	299		179		154
MEAN	136	121	108	135	536	369	288	329	252	187	172	160
MAX.	144	128	115	305	646	531	366	431	294	215	179	166
MIN.	128	115	102	98	331	261	252	274	226	179	166	154

Gage operated: Jan 1-Oct 3. Estimated: Jan 1-Apr 14, Oct 4-Dec 31 (measurements at gage); Apr15-Jun 10 (estimated based on regression with USGS Sourdough 15200280).

Table B16. 2012 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	154	142	133	123	571	585	447	214	243	287	260	164
2	153	142	132	122	552	544	429	216	252	286	254	164
3	153	142	132	122	516	511	419	225	255	281	249	164
4	153	141	132	122	472	501	402	228	252	282	241	164
5	152	141	131	122	442	502	384	229	243	292	236	163
6	152	141	131	121	427	514	366	226	245	364	233	161
7	151	140	131	121	424	531	354	223	249	447	232	160
8	151	140	130	121	434	523	347	221	247	494	227	158
9	151	140	130	120	464	528	336	217	243	515	215	157
10	150	139	130	120	504	550	324	214	240	514	216	139
11	150	139	129	120	500	571	324	209	235	497	216	138
12	150	139	129	122	478	608	320	206	233	479	216	137
13	149	138	129	123	470	712	313	202	236	460	216	141
14	149	138	128	127	468	793	306	200	235	440	218	148
15	148	138	128	129	452	791	292	197	229	422	222	148
16	148	137	128	134	443	779	285	195	232	409	221	147
17	148	137	127	140	453	734	278	197	231	388	220	146
18	147	136	127	148	474	691	275	196	234	366	221	146
19	147	136	127	158	488	649	266	194	236	353	221	145
20	147	136	126	168	496	610	259	197	247	340	220	145
21	146	135	126	181	497	586	255	200	266	328	217	144
22	146	135	126	200	512	565	253	199	282	316	216	144
23	146	135	125	221	540	545	249	200	290	303	208	143
24	145	134	125	242	572	524	247	200	296	297	200	142
25	145	134	125	267	623	501	247	205	302	290	193	141
26	144	134	125	297	663	495	249	208	303	285	193	124
27	144	133	124	328	692	492	245	224	302	279	193	122
28	144	133	124	373	755	486	238	238	299	275	193	120
29	143	133	124	416	754	470	230	238	298	271	193	119
30	143		123	500	692	455	224	237	293	270	181	118
31	143		123		635		218	235		266		118
MEAN	148	138	128	187	531	578	303	213	258	358	218	144
MAX.	154	142	133	500	755	793	447	238	303	515	260	164
MIN.	143	133	123	120	424	455	218	194	229	266	181	118

Gage operated: Jun 11-Dec 31. Estimated: Jan 1-Apr11 (measurements at gage); Apr 12-Jun 10 (estimated based on regression with USGS Sourdough 15200280)

Table B17. 2013 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	118	116	125	130	143	1,499	452	178	334	318	285	181
2	118	116	126	130	145	1,891	417	172	341	309	290	170
3	118	115	127	130	153	2,139	390	165	354	301	285	160
4	117	116	126	130	155	2,153	368	159	358	297	280	153
5	117	116	126	131	162	2,024	345	158	366	294	275	150
6	117	115	126	130	163	1,856	331	156	363	292	270	150
7	116	116	126	131	163	1,741	317	153	369	288	262	153
8	115	118	127	131	163	1,693	307	149	368	290	253	154
9	115	117	127	133	164	1,688	308	146	396	303	247	158
10	114	118	127	132	164	1,681	302	150	411	307	235	160
11	114	118	126	132	166	1,674	298	151	412	308	262	163
12	114	121	126	132	168	1,667	291	151	428	304	266	163
13	116	121	127	131	178	1,617	281	151	437	304	264	155
14	122	121	127	130	188	1,515	270	149	431	299	261	153
15	125	121	125	130	195	1,398	262	147	424	295	262	152
16	124	126	125	130	199	1,292	251	149	408	292	258	147
17	126	126	125	131	202	1,212	246	149	392	293	255	142
18	127	127	124	131	210	1,162	238	156	405	302	250	134
19	125	127	124	131	215	1,109	232	165	431	304	241	128
20	124	126	123	131	217	1,028	231	170	430	302	224	125
21	126	126	123	131	220	942	235	189	419	302	208	122
22	125	126	123	132	221	854	231	234	406	299	194	124
23	125	125	123	132	224	765	225	266	386	292	186	129
24	125	126	127	133	229	685	220	303	368	287	186	131
25	125	126	130	133	243	616	216	319	350	284	186	129
26	125	125	130	135	277	560	214	320	339	277	189	124
27	122	125	129	137	325	509	207	317	342	273	192	118
28	120	125	128	138	398	483	200	313	340	280	196	115
29	118		128	138	544	469	194	322	339	276	198	114
30	117		129	139	821	480	188	318	331	282	193	113
31	116		130		1,162		183	320		281		112
MEAN	120	121	126	132	264	1,280	273	205	383	295	238	141
MAX.	127	127	130	139	1,162	2,153	452	322	437	318	290	181
MIN.	114	115	123	130	143	469	183	146	331	273	186	112

Gage operated: Jan 1-Dec 31. No estimated data.

Table B18. 2014 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	113	170	135	90	89	338	595	345	300	257	178	85
2	116	167	133	89	96	341	633	334	295	253	171	87
3	116	166	131	88	113	339	659	328	301	253	166	91
4	116	163	129	87	142	333	649	326	303	257	160	92
5	118	159	127	86	187	329	621	331	303	264	154	92
6	120	157	127	86	240	326	593	327	314	260	150	92
7	120	155	125	86	303	324	579	321	320	259	143	93
8	121	154	122	86	370	324	563	312	317	255	138	94
9	123	152	119	86	447	330	542	305	313	252	134	94
10	126	151	117	85	527	333	527	299	314	252	133	96
11	126	148	115	84	566	333	521	290	316	251	132	97
12	126	145	114	83	577	334	542	283	315	255	131	96
13	124	143	112	82	588	333	541	276	314	264	132	95
14	123	141	111	82	590	330	545	274	312	266	130	95
15	123	140	111	81	582	330	544	272	313	260	125	97
16	127	141	109	81	559	332	526	270	310	255	119	98
17	132	141	108	81	544	332	502	272	307	252	116	99
18	134	142	107	80	538	349	476	291	304	251	114	99
19	135	143	106	80	529	398	454	303	300	249	114	98
20	136	144	105	80	511	438	443	319	299	247	112	96
21	136	145	104	79	486	468	428	321	302	246	110	97
22	138	145	103	79	467	483	410	318	304	243	108	96
23	143	145	101	79	446	483	394	314	296	241	106	97
24	153	144	100	79	426	484	375	308	293	237	103	97
25	163	144	99	80	411	486	369	309	287	236	101	97
26	168	143	97	79	395	543	365	306	281	233	101	98
27	170	140	96	79	380	606	366	304	276	225	98	98
28	170	138	95	81	368	621	373	302	272	212	95	97
29	171		94	83	356	605	378	298	268	200	90	97
30	171		92	85	348	585	374	305	262	189	88	97
31	170		91		339		361	304		183		97
MEAN	136	149	111	83	404	406	492	305	300	244	125	95
MAX.	171	170	135	90	590	621	659	345	320	266	178	99
MIN.	113	138	91	79	89	324	361	270	262	183	88	85

Gage operated: Jan 1-Dec 31. No estimated data.

Table B19. 2015 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	98	112	155	149	154	420	233	247	261	457	324	270
2	101	112	155	149	157	396	236	244	251	466	322	270
3	101	112	155	147	162	365	239	238	244	465	322	272
4	101	112	157	147	168	363	240	232	246	467	320	274
5	100	114	158	148	178	357	236	230	259	443	317	276
6	98	115	158	148	193	343	234	245	269	427	320	275
7	96	115	162	148	211	336	228	240	267	416	322	271
8	94	115	165	147	232	322	237	233	260	406	318	261
9	92	114	164	146	271	305	253	226	262	398	319	250
10	94	113	162	145	329	298	259	227	259	396	324	243
11	97	116	161	147	384	293	262	244	259	388	315	235
12	101	118	158	149	452	288	274	253	267	378	310	226
13	103	121	156	149	562	285	287	255	273	370	305	219
14	106	124	154	148	676	281	292	254	276	368	293	213
15	108	126	151	148	770	276	289	253	282	362	279	213
16	111	129	149	148	815	271	293	249	293	359	267	216
17	113	133	150	148	826	267	284	251	305	360	240	218
18	115	135	151	147	805	265	286	267	316	363	232	221
19	116	137	151	145	769	261	285	284	319	364	224	221
20	116	140	152	146	735	251	282	294	319	362	219	220
21	116	139	153	146	692	251	272	293	316	360	223	216
22	116	142	153	146	655	248	260	291	312	356	228	211
23	118	144	152	146	618	245	248	283	305	352	231	206
24	121	147	152	146	587	255	241	275	295	350	235	199
25	122	157	151	146	564	257	235	269	290	348	235	190
26	121	157	151	145	542	249	235	265	297	342	240	184
27	119	155	151	146	518	239	237	275	299	339	248	178
28	118	155	151	148	497	240	245	287	312	337	257	175
29	116		150	149	480	237	246	293	343	338	263	175
30	114		150	151	459	236	252	283	424	341	268	175
31	112		150		440		251	271		336		176
MEAN	108	129	154	147	481	290	256	260	289	381	277	224
MAX.	122	157	165	151	826	420	293	294	424	467	324	276
MIN.	92	112	149	145	154	236	228	226	244	336	219	175

Gage operated: Jan 1-Dec 31. Estimated:Feb 22-23, Aug 29-Sep 8 (estimated based on regression with USGS Sourdough 15200280).

Table B20. 2016 Paxson Lake Outlet--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	158	141	118	111	351	472	303	295	291	327	239	126
2	161	140	116	117	354	464	301	293	286	324	238	130
3	162	138	115	125	363	460	298	291	279	321	235	131
4	163	138	113	131	369	466	297	291	273	318	231	131
5	164	138	111	134	370	472	299	289	267	313	225	129
6	164	138	108	137	368	477	307	294	269	307	223	126
7	162	138	106	143	382	497	313	292	289	304	223	124
8	160	139	104	147	398	504	309	292	302	300	219	124
9	158	139	102	151	417	505	301	287	309	297	217	121
10	155	138	98	164	443	495	287	295	305	296	214	118
11	155	140	96	173	456	482	280	302	299	295	214	116
12	156	139	95	187	466	469	268	313	294	291	215	113
13	158	140	93	189	471	460	252	327	301	288	216	110
14	159	140	90	196	478	449	242	330	316	285	217	108
15	160	141	88	200	481	432	238	334	319	282	215	105
16	160	143	87	205	485	412	238	333	326	282	208	103
17	159	142	85	208	494	400	242	328	332	279	200	104
18	156	143	84	211	504	382	235	319	334	266	191	107
19	152	143	84	217	509	362	228	312	329	263	181	109
20	150	140	84	231	505	360	221	312	323	262	172	111
21	146	136	83	240	512	357	218	308	313	262	165	113
22	143	135	81	252	520	350	219	298	321	259	157	117
23	142	131	79	262	531	342	236	296	326	253	149	119
24	142	130	76	296	536	333	248	288	334	249	140	119
25	141	128	75	312	538	324	279	290	338	246	134	119
26	140	127	74	326	535	315	298	315	342	244	128	119
27	141	126	78	337	527	318	302	329	340	241	125	119
28	140	124	77	344	519	313	300	329	338	237	126	121
29	142		81	347	508	307	296	326	334	236	126	124
30	141		88	351	494	302	297	325	331	239	126	121
31	142		92		482		298	306		239		137
MEAN	153	136	92	215	463	409	273	308	312	278	189	119
MAX.	164	143	118	351	538	505	313	334	342	327	239	137
MIN.	140	124	74	111	351	302	218	287	267	236	125	103

Gage operated: Jan 1-Dec 31.No estimated data.

Table B21. 1997 Middle Fork--Daily Mean Discharge cubic feet per second (cfs)

Day	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	699	186	338	196	157	129	123
2	598	164	365	193	155	129	123
3	510	181	307	185	153	129	123
4	449	181	270	182	148	128	122
5	418	186	239	181	146	128	122
6	418	184	223	178	143	128	122
7	428	181	235	177	142	128	122
8	530	177	253	176	141	128	122
9	825	172	245	175	139	127	121
10	959	169	235	174	138	127	121
11	838	167	225	173	137	127	121
12	689	165	225	171	136	127	121
13	581	162	236	170	136	127	121
14	503	162	273	168	135	126	120
15	451	164	293	167	135	126	120
16	368	168	278	165	134	126	120
17	284	170	286	163	134	126	120
18	306	168	294	162	133	126	120
19	329	163	274	161	133	125	119
20	316	163	253	159	133	125	119
21	334	163	239	159	133	125	119
22	353	170	244	159	132	125	119
23	331	182	274	161	132	125	119
24	307	182	271	161	132	124	118
25	298	179	248	161	132	124	118
26	293	182	236	158	131	124	118
27	278	168	232	156	131	124	118
28	263	182	226	156	130	124	118
29	248	180	220	156	130	123	118
30	232	171	208	159	130	123	117
31		207	202		130		117
MEAN	448	174	256	169	137	126	120
MAX.	959	207	365	196	157	129	123
MIN.	232	162	202	156	130	123	117

Gage operated: Jun 17--Oct 1, but no useful data recorded. Estimated from measurements at gage and estimated based on regression with USGS Sourdough 15200280.

Table B22. 1998 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	117	111	106	103	157	304	171	150	267	235	156	129
2	117	111	106	103	151	287	169	149	250	214	156	128
3	117	111	106	104	161	266	162	158	242	185	156	128
4	116	111	106	104	170	245	156	158	232	182	156	128
5	116	111	106	105	186	236	150	154	225	181	156	127
6	116	110	106	105	213	239	152	166	221	182	156	127
7	116	110	105	106	202	234	162	216	224	177	156	127
8	116	110	105	106	199	225	159	253	219	168	151	126
9	115	110	105	107	191	220	168	404	217	160	151	126
10	115	110	105	108	180	216	162	510	213	153	151	125
11	115	109	105	109	178	237	158	461	209	154	151	125
12	115	109	104	109	179	229	158	392	210	156	151	125
13	115	109	104	109	179	220	157	341	224	157	151	124
14	115	109	104	109	179	209	151	299	235	158	151	124
15	114	109	103	110	180	205	145	267	235	164	146	124
16	114	109	103	111	191	222	142	252	239	167	146	123
17	114	108	103	112	200	227	155	253	253	167	146	123
18	114	108	103	113	204	213	203	242	248	163	146	123
19	114	108	103	113	210	191	197	228	240	166	146	122
20	113	108	103	114	210	183	182	216	242	166	146	122
21	113	108	103	116	204	212	170	212	242	167	146	122
22	113	108	103	117	199	284	160	220	248	166	141	121
23	113	107	103	119	217	263	154	230	246	166	141	121
24	113	107	103	120	263	240	159	234	249	166	141	121
25	113	107	103	122	337	221	159	235	273	161	141	120
26	112	107	103	124	341	212	154	230	307	161	138	120
27	112	107	103	128	335	200	155	244	300	161	136	120
28	112	107	103	135	325	191	156	240	286	161	133	119
29	112		103	141	329	183	156	257	273	161	131	119
30	112		103	151	319	176	157	283	258	161	128	119
31	111		103		305		154	273		161		118
MEAN	114	109	104	115	222	226	161	256	244	169	147	123
MAX.	117	111	106	151	341	304	203	510	307	235	156	129
MIN.	111	107	103	103	151	176	142	149	209	153	128	118

Gage operated: Jun 11--Oct 2. Estimated from measurements at gage (Jan 1-Mar 14, Dec 1-31) and estimated based on regression with USGS Sourdough 15200280(Mar 15-Jun 10, Oct 3-Nov 30)

Table B23. 1999 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	118	108	100	99	146	348	288	300	230	205	165	163
2	118	108	100	99	151	329	255	262	240	226	165	162
3	117	108	100	99	156	337	230	236	259	266	165	162
4	117	108	100	99	166	404	209	215	278	268	165	162
5	117	107	99	99	174	437	193	201	289	259	165	162
6	116	107	99	99	182	400	183	192	283	255	165	162
7	116	107	99	99	205	368	173	190	269	241	165	162
8	116	106	98	99	220	349	168	196	255	239	164	162
9	116	106	98	99	250	422	168	195	242	235	164	162
10	115	106	98	99	278	395	167	193	229	250	164	162
11	115	105	98	99	320	361	165	185	219	226	164	162
12	115	105	97	101	361	332	168	186	213	216	164	162
13	114	105	97	101	405	307	166	305	208	217	164	162
14	114	105	97	101	554	295	159	333	203	211	164	161
15	114	104	97	101	691	273	154	314	205	186	164	161
16	113	104	96	101	730	263	151	363	232	184	164	161
17	113	104	96	101	725	306	163	344	232	185	164	161
18	113	103	96	103	707	560	176	303	230	196	164	161
19	112	103	95	104	598	476	172	270	222	229	164	161
20	112	103	95	108	491	404	166	250	215	260	163	161
21	112	103	95	109	424	389	178	243	213	236	163	161
22	111	102	95	113	384	352	211	229	214	222	163	161
23	111	102	94	114	361	334	196	217	212	210	163	161
24	111	102	94	117	350	304	186	209	206	184	163	161
25	111	101	94	120	360	281	192	242	201	166	163	161
26	110	101	94	123	384	273	225	268	194	166	163	160
27	110	101	93	128	487	391	262	249	193	165	163	160
28	110	101	93	131	544	423	360	235	202	165	163	160
29	109	101	93	136	497	352	329	223	199	165	163	160
30	109		93	141	431	326	328	212	194	165	163	160
31	109		92		380		346	215		165		160
MEAN	113	104	96	108	391	360	209	244	226	212	164	161
MAX.	118	108	100	141	730	560	360	363	289	268	165	163
MIN.	109	101	92	99	146	263	151	185	193	165	163	160

Gage operated: Jun 9--Oct 6. Estimated from measurements at gage (Jan 1-Mar 17, Oct 25-Dec 31) and estimated based on regression with USGS Sourdough 15200280 (Mar 18-Jun 8, Oct 7-25).

Table B24. 2000 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	160	141	130	123	126	617	432	213	323	283	221	188
2	160	138	129	123	127	602	379	205	303	240	220	186
3	160	138	129	124	129	583	341	204	292	259	217	184
4	160	137	128	125	131	579	313	199	288	285	214	181
5	160	137	128	126	133	598	306	200	288	288	211	182
6	160	137	128	125	136	620	461	202	275	295	208	183
7	159	136	127	125	141	646	442	211	286	296	204	184
8	159	137	127	124	146	669	375	200	279	292	201	185
9	159	137	126	123	155	653	330	189	266	285	199	185
10	159	137	125	123	163	574	303	182	252	280	201	186
11	159	137	124	123	170	532	288	179	268	277	203	185
12	159	137	124	123	179	519	275	175	283	271	204	186
13	159	137	124	123	189	486	269	175	324	274	204	184
14	159	136	124	122	198	466	307	184	330	269	203	182
15	159	136	123	121	200	461	312	178	323	262	203	181
16	159	135	123	122	205	461	291	167	312	259	202	179
17	159	136	123	123	221	451	284	159	296	256	202	176
18	159	136	123	126	246	451	281	160	274	251	201	176
19	158	136	123	126	269	478	279	179	256	247	201	176
20	158	136	123	126	291	465	273	187	244	243	200	176
21	158	135	123	124	303	427	265	181	235	238	199	175
22	158	133	124	124	311	389	266	192	244	234	196	175
23	158	132	124	124	329	367	286	203	266	235	192	175
24	158	131	125	124	337	357	277	198	283	230	193	174
25	141	131	126	123	338	342	259	197	370	229	193	172
26	141	131	125	123	336	326	273	199	476	231	193	172
27	142	130	126	123	334	332	276	202	476	228	189	171
28	142	130	126	122	335	374	269	232	393	222	186	172
29	141	130	125	123	398	440	250	224	304	219	188	171
30	142		124	125	622	469	233	352	347	216	189	172
31	140		124		630		223	385		216		172
MEAN	155	135	125	124	252	491	304	204	305	255	201	179
MAX.	160	141	130	126	630	669	461	385	476	296	221	188
MIN.	140	130	123	121	126	326	223	159	235	216	186	171

Gage operated: Jun 21--Oct 3. Estimated from measurements at gage (Jan 1- Mar 28, Oct 4-Dec 31) and estimated based on regression with USGS Sourdough 15200280 (Mar 29-Jun 20).

Table B25. 2001 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	178	179	153	151	202	520	197	341	184	168	149	137
2	179	175	153	151	202	506	215	317	190	168	149	137
3	179	173	152	151	217	495	218	294	212	167	149	137
4	179	173	150	150	217	469	218	306	202	167	147	137
5	180	173	149	150	232	443	251	298	208	167	147	137
6	180	172	149	150	247	414	331	273	255	166	147	137
7	181	172	150	150	261	402	295	257	250	166	147	136
8	181	171	150	153	275	401	286	244	232	166	147	136
9	181	170	152	154	290	398	285	236	218	166	145	136
10	181	169	153	152	304	377	273	226	210	165	145	136
11	179	170	153	144	317	361	269	217	201	165	145	136
12	178	173	153	143	317	349	274	211	196	165	145	136
13	178	173	152	144	327	342	251	204	194	165	145	136
14	179	172	153	145	362	345	245	198	192	164	145	136
15	180	170	153	147	428	338	250	196	186	161	145	136
16	179	169	153	147	514	326	261	196	182	159	143	136
17	178	166	153	148	551	310	242	202	180	159	143	136
18	178	162	153	147	578	295	233	205	176	157	143	136
19	177	161	152	145	596	285	218	201	174	157	143	135
20	176	160	152	156	604	283	211	206	174	155	141	135
21	176	160	152	161	587	288	219	195	181	155	141	135
22	176	159	152	161	555	254	215	190	178	153	141	135
23	179	158	151	166	540	243	210	184	175	153	139	135
24	179	157	150	166	604	230	223	189	171	151	139	135
25	179	156	149	170	696	220	220	196	170	151	138	135
26	180	155	150	174	679	213	231	192	169	151	138	135
27	179	154	151	174	620	204	260	189	165	151	138	135
28	180	153	151	178	586	198	271	193	169	151	138	135
29	179		151	182	581	190	267	192	168	151	138	135
30	179		152	186	562	190	264	189	168	151	137	135
31	179		151		534		309	188		149		134
MEAN	179	166	152	157	438	330	249	223	191	160	143	136
MAX.	181	179	153	186	696	520	331	341	255	168	149	137
MIN.	176	153	149	143	202	190	197	184	165	149	137	134

Gage operated: Jun 22--Sep 27. Estimated based on regression with Paxson Lake Outlet (Jan 1- Apr 19, Oct 4-Dec 31) and estimated based on regression with USGS Sourdough 15200280 (Apr 20-Jun 21, Sep 28-Dec 31).

Table B26. 2002 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	134	132	130	127	125	669	166	135	412	377	239	234
2	134	132	129	127	125	597	297	131	384	373	238	231
3	134	132	129	127	125	528	307	131	347	373	243	230
4	134	132	129	127	125	464	280	131	317	369	254	228
5	134	131	129	127	124	429	257	130	302	351	261	227
6	134	131	129	127	124	466	225	134	330	337	261	226
7	134	131	129	127	124	427	208	200	477	328	265	225
8	134	131	129	127	124	424	194	215	462	325	266	224
9	134	131	129	126	124	365	179	281	421	318	265	221
10	134	131	129	126	124	317	174	352	392	313	262	217
11	133	131	129	126	124	283	167	431	365	304	254	212
12	133	131	129	126	124	215	162	884	360	291	252	208
13	133	131	129	126	124	209	167	1,376	342	289	249	207
14	133	131	128	126	124	199	163	1,259	323	285	248	204
15	133	131	128	126	124	192	161	802	308	276	248	200
16	133	131	128	126	126	181	156	580	295	284	240	197
17	133	130	128	126	128	172	151	468	284	285	234	197
18	133	130	128	126	133	166	145	403	281	295	228	193
19	133	130	128	126	138	171	142	375	278	297	229	191
20	133	130	128	126	145	315	137	652	283	298	230	190
21	133	130	128	126	151	324	132	1,608	274	296	232	188
22	133	130	128	125	157	274	130	2,044	262	295	229	186
23	133	130	128	125	165	232	129	2,015	256	291	227	186
24	132	130	128	125	178	209	130	1,424	256	286	227	186
25	132	130	128	125	217	195	146	1,040	328	274	225	186
26	132	130	128	125	261	186	175	821	453	262	227	186
27	132	130	127	125	304	177	177	672	443	256	234	185
28	132	130	127	125	345	169	170	563	432	253	237	185
29	132		127	125	385	162	159	494	407	247	237	185
30	132		127	125	406	158	149	449	384	244	237	187
31	132		127		654		140	430		241		191
MEAN	133	131	128	126	186	296	177	665	349	300	243	204
MAX.	134	132	130	127	654	669	307	2,044	477	377	266	234
MIN.	132	130	127	125	124	158	129	130	256	241	225	185

Gage operated: Jun 12--Sep 30. Estimated from measurements at gage (Apr 2-May 14, Oct 1-Dec 31) and estimated based on regression with USGS Sourdough 15200280 (Jan 1-Apr 1, May 15-Jun 11).

Table B27. 2003 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	186	174	164	154	208	898	223	298	307	229	147	139
2	186	174	164	154	224	831	223	272	311	231	147	139
3	186	174	164	153	248	636	357	250	337	229	147	139
4	185	173	163	153	272	522	428	244	367	219	147	139
5	185	173	163	153	296	478	351	229	353	215	147	139
6	184	173	163	152	327	491	302	220	325	210	147	139
7	184	172	162	152	350	497	276	213	295	206	147	139
8	184	172	162	152	388	452	259	205	270	200	146	139
9	183	172	162	151	410	397	242	198	263	198	146	139
10	183	171	161	151	416	369	231	191	256	202	146	139
11	182	171	161	154	416	364	225	187	242	195	146	139
12	182	170	161	158	433	365	223	187	233	185	146	139
13	182	170	160	161	454	348	218	189	251	184	145	138
14	181	170	160	164	483	321	216	188	243	181	144	138
15	181	169	160	168	469	325	212	192	223	172	143	138
16	180	169	159	172	446	317	217	191	210	165	143	137
17	180	169	159	175	448	301	210	185	207	160	142	137
18	180	168	159	179	524	287	206	186	197	157	142	136
19	179	168	158	183	532	303	202	193	184	155	142	136
20	179	168	158	187	485	384	196	187	192	154	142	136
21	179	167	158	191	439	440	192	182	190	153	141	135
22	178	167	157	195	410	401	202	178	182	152	141	135
23	178	167	157	199	392	357	202	175	177	151	141	133
24	177	166	157	200	383	326	195	176	187	151	141	133
25	177	166	156	201	395	301	190	187	188	151	141	132
26	177	165	156	202	424	279	192	187	197	151	141	132
27	176	165	156	203	454	263	211	195	201	151	141	131
28	176	165	155	205	445	250	232	195	201	151	141	131
29	176		155	206	421	240	235	191	211	150	139	130
30	175		155	207	591	232	271	190	243	149	139	130
31	175		154		715		300	240		148		128
MEAN	181	170	159	174	416	399	240	203	241	178	143	136
MAX.	186	174	164	207	715	898	428	298	367	231	147	139
MIN.	175	165	154	151	208	232	190	175	177	148	139	128

Gage operated: May 30-Sep 30. Estimated from measurements at gage (Jan 1-Apr 10), and estimated based on regression with USGS Sourdough 15200280 (Apr 11-May 29, Oct 1-Dec 31).

Table B28. 2004 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	127	108	111	123	213	423	151	143	144	189	177	168
2	127	108	111	123	264	521	154	145	148	206	174	168
3	126	108	111	124	392	742	153	141	156	210	164	167
4	124	108	111	124	518	616	152	137	166	216	175	167
5	123	108	111	124	686	499	164	136	154	214	170	166
6	122	108	111	124	994	423	169	135	148	217	169	166
7	122	108	111	124	1,048	378	162	133	148	225	162	165
8	120	108	111	124	1,172	438	156	132	146	220	161	165
9	120	108	111	126	1,200	501	154	131	144	219	164	164
10	119	108	111	127	1,226	562	151	130	141	217	160	164
11	119	109	113	128	1,038	476	149	129	139	217	162	164
12	117	109	114	130	905	398	145	129	137	214	159	163
13	117	109	116	131	858	348	142	131	133	221	177	163
14	116	109	117	135	785	315	140	130	134	235	176	162
15	116	109	117	137	721	286	139	129	134	234	176	162
16	114	109	117	145	666	261	137	130	135	232	175	161
17	114	109	117	144	721	243	136	131	133	229	175	161
18	114	109	117	143	776	228	136	131	130	226	174	160
19	113	109	117	144	696	216	138	132	128	214	174	160
20	113	109	117	145	581	203	137	138	131	218	173	159
21	113	109	117	145	502	192	138	140	132	213	173	159
22	113	111	117	145	445	183	138	140	132	211	172	159
23	111	111	119	145	420	176	135	140	137	201	172	158
24	111	111	120	146	458	170	136	140	141	198	172	158
25	111	111	120	150	563	165	136	141	146	201	171	157
26	111	111	120	155	579	161	135	142	151	192	171	157
27	111	111	120	161	529	157	136	148	154	192	170	156
28	109	111	120	169	584	154	139	151	161	188	170	156
29	109	111	122	177	550	153	140	153	163	183	169	156
30	109		122	186	476	152	144	148	166	188	169	155
31	109		123		429		146	145		184		155
MEAN	116	109	116	140	677	325	145	138	144	211	170	161
MAX.	127	111	123	186	1,226	742	169	153	166	235	177	168
MIN.	109	108	111	123	213	152	135	129	128	183	159	155

Gage operated: May 18-Oct 1. Estimated from Paxson Lake Outlet (Sep 7-Dec 31), and estimated based on regression with USGS Sourdough 15200280 (Jan 1-May 17).

Table B29. 2005 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	154	141	131	120	268	321	295	246	230	330	165	157
2	154	141	130	120	287	323	364	233	239	320	163	157
3	153	141	130	119	296	322	435	234	242	311	163	157
4	153	140	130	120	306	317	401	227	242	303	163	157
5	152	140	129	119	314	306	359	218	248	292	163	157
6	152	139	129	120	320	353	322	210	250	283	162	156
7	151	139	129	119	325	400	290	201	256	275	162	156
8	151	139	128	119	333	370	267	191	262	268	162	156
9	151	138	128	119	341	339	277	183	265	261	162	156
10	150	138	128	119	351	316	286	177	269	254	162	156
11	150	137	127	120	357	301	277	173	283	246	161	155
12	149	137	127	120	356	305	259	169	292	241	161	155
13	149	137	126	121	351	351	241	167	302	236	161	155
14	149	136	126	122	348	339	228	164	316	232	161	155
15	148	136	126	121	359	318	219	162	319	229	161	155
16	148	136	125	122	419	304	211	177	320	224	160	155
17	147	135	125	122	440	286	214	206	322	219	160	154
18	147	135	125	123	435	297	216	205	321	212	160	154
19	147	134	124	124	414	341	212	206	316	208	160	154
20	146	134	124	125	387	383	201	197	316	204	160	154
21	146	134	124	125	362	336	189	203	313	199	159	154
22	145	133	123	128	368	361	185	236	313	194	159	153
23	145	133	123	129	372	356	187	233	313	188	159	153
24	145	133	123	133	370	330	202	236	320	186	159	153
25	144	132	122	136	368	311	198	231	341	183	159	153
26	144	132	122	141	363	304	190	232	351	181	158	153
27	143	131	122	148	355	308	192	229	397	180	158	152
28	143	131	121	163	343	291	198	216	368	177	158	152
29	143		121	190	334	269	209	213	340	174	158	152
30	142		121	225	324	273	251	224	337	170	158	152
31	142		120		319		266	241		167		152
MEAN	148	136	125	131	351	324	253	208	300	231	161	155
MAX.	154	141	131	225	440	400	435	246	397	330	165	157
MIN.	142	131	120	119	268	269	185	162	230	167	158	152

Gage operated: Jun 7-Sep 27. Estimated based on regression with Paxson Lake Outlet (Jan 1-Jun 6, Sep 1-Nov 2), measurements at gage (Nov 3-Dec 31).

Table B30. 2006 Middle Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR
1	152	146	141	136
2	151	146	141	136
3	151	146	141	135
4	151	145	140	135
5	151	145	140	135
6	151	145	140	135
7	151	145	140	135
8	150	145	140	134
9	150	145	140	134
10	150	144	139	134
11	150	144	139	134
12	150	144	139	134
13	149	144	139	134
14	149	144	139	134
15	149	143	139	133
16	149	143	138	133
17	149	143	138	133
18	149	143	138	133
19	148	143	138	133
20	148	143	138	133
21	148	142	138	135
22	148	142	137	138
23	148	142	137	138
24	147	142	137	140
25	147	142	137	142
26	147	142	137	140
27	147	141	137	143
28	147	141	136	143
29	147		136	142
30	146		136	142
31	146		136	
MEAN	149	144	138	136
MAX.	152	146	141	143
MIN.	146	141	136	133

Estimated from measurements at gage (Jan 1-Apr 5), Estimated based on regression with Paxson L. Outlet: (Apr 6-30). Gage Discontinued Apr 30, 2006..

Table B31. 1997 West Fork--Daily Mean Discharge cubic feet per second (cfs)

Day	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	2392	624	1417	520	219	94	72
2	1978	573	1531	498	206	94	72
3	1630	558	1152	481	197	93	71
4	1393	536	927	466	171	92	70
5	1277	498	787	453	161	91	70
6	1277	472	707	444	146	90	69
7	1316	446	707	436	141	90	69
8	1707	422	766	429	136	89	68
9	2927	390	743	419	131	88	67
10	3515	369	692	405	127	87	67
11	2980	361	657	392	122	86	66
12	2349	344	638	382	120	86	66
13	1910	327	643	372	118	85	65
14	1601	320	759	361	116	84	64
15	1403	327	863	352	113	83	64
16	1263	331	780	342	111	83	63
17	1187	342	789	339	111	82	63
18	1114	341	835	335	109	81	62
19	1042	310	759	326	109	80	62
20	977	309	693	277	107	80	61
21	1127	312	648	228	107	79	61
22	1280	339	656	232	105	78	60
23	1130	510	800	241	105	78	59
24	1012	511	808	241	103	77	59
25	949	453	717	241	103	76	58
26	951	479	671	227	101	76	58
27	891	502	646	210	101	75	57
28	817	434	629	211	99	74	57
29	751	406	602	211	99	74	56
30	685	411	565	228	97	73	56
31		589	542		97		55
MEAN	1,495	424	778	343	125	83	64
MAX.	3,515	624	1,531	520	219	94	72
MIN.	685	309	542	210	97	73	55

Gage operated June 17-Sep 19. Estimated based on regression with USGS Sourdough 15200280 (Jun 1-16, Sep 20-Nov 1). Estimated from measurements at gage (Nov 2-Dec 31)

Table B32. 1998 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	55	42	32	36	204	647	320	341	526	451	210	105
2	54	41	32	36	173	605	305	323	494	420	205	102
3	54	41	32	37	225	526	294	318	469	411	200	100
4	53	41	32	37	282	483	283	345	445	401	196	98
5	53	40	31	38	411	458	269	359	429	392	191	95
6	53	40	31	38	521	461	278	352	414	383	187	93
7	52	40	31	39	468	449	328	442	404	374	183	91
8	52	39	31	39	454	435	523	759	398	366	178	89
9	51	39	30	41	418	438	581	970	388	357	174	87
10	51	38	30	42	356	426	564	1,417	377	349	170	85
11	50	38	30	44	341	396	520	1,406	369	341	166	83
12	50	38	34	44	345	374	478	1,127	363	333	163	81
13	49	37	34	45	345	357	458	946	363	326	159	79
14	49	37	34	45	353	345	430	831	401	318	155	77
15	48	37	36	46	359	343	398	741	439	311	152	76
16	48	36	36	48	418	352	369	679	468	304	148	74
17	48	36	36	49	461	364	381	636	525	297	145	72
18	47	36	36	51	476	362	458	601	570	290	141	71
19	47	36	36	52	505	379	583	558	560	283	138	69
20	46	35	36	54	505	357	553	522	533	277	135	67
21	46	35	36	57	476	348	479	495	509	271	132	66
22	46	35	36	60	328	387	423	487	491	264	129	64
23	45	34	36	63	343	553	382	487	477	258	126	63
24	45	34	36	66	472	551	358	489	468	252	123	61
25	44	34	36	70	768	481	347	477	479	247	120	60
26	44	33	36	77	757	438	334	467	526	241	118	59
27	44	33	36	87	676	412	320	453	553	235	115	57
28	43	33	36	107	636	388	325	461	527	230	112	56
29	43		36	127	642	363	328	465	497	225	110	55
30	42		36	173	650	341	333	504	475	220	107	53
31	42		36		617		346	545		215		52
MEAN	48	37	34	58	451	427	398	613	465	311	153	76
MAX.	55	42	36	173	768	647	583	1,417	570	451	210	105
MIN.	42	33	30	36	173	341	269	318	363	215	107	52

Gage operated: May 22-Oct 1. Estimated from measurements at gage (Jan 1-Mar 11. Oct 2-Dec 31). Estimated based on regression with USGS Sourdough 15200280 (Mar 12-May21).

Table B33. 1999 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	51	25	13	10	150	730	1,307	989	492	454	173	148
2	50	24	13	10	173	677	1,148	816	526	513	172	147
3	49	24	12	10	199	744	1,003	660	553	676	172	147
4	48	23	12	10	253	1,249	820	588	624	834	171	146
5	47	23	12	10	312	1,420	730	528	742	844	170	145
6	45	22	12	10	377	1,230	661	484	704	844	169	144
7	44	22	11	10	483	1,073	613	460	643	849	168	144
8	43	21	11	10	560	974	609	442	589	820	167	143
9	42	21	11	10	690	852	605	434	554	767	166	142
10	41	20	11	10	786	761	614	437	530	690	165	141
11	41	20	10	10	930	672	593	423	501	591	165	141
12	40	19	10	10	1,073	596	644	404	484	536	164	140
13	39	19	10	10	1,230	537	752	448	467	544	163	139
14	38	18	10	10	1,788	489	600	637	452	513	162	138
15	37	18	9	18	2,332	462	571	659	458	411	161	138
16	36	18	9	27	2,491	437	545	765	484	389	160	137
17	35	17	9	32	2,467	429	551	976	525	399	159	136
18	34	17	9	34	2,397	921	625	857	531	439	159	135
19	34	16	9	37	1,962	1,422	627	694	515	608	158	135
20	33	16	9	42	1,547	1,243	555	618	496	724	157	134
21	32	16	9	45	1,301	1,316	508	559	481	647	156	133
22	31	15	9	51	1,154	1,277	485	530	466	567	155	133
23	31	15	9	54	1,073	1,067	482	491	461	505	154	132
24	30	15	9	60	1,035	845	435	466	455	395	154	131
25	29	14	9	66	964	729	409	503	441	253	153	131
26	29	14	9	73	894	821	455	579	425	225	152	130
27	28	14	9	87	1,313	1,171	697	622	414	225	151	129
28	27	13	9	95	1,564	1,437	1,028	590	410	199	150	129
29	27		9	111	1,417	1,314	1,025	552	432	199	150	128
30	26		9	127	1,140	1,265	950	513	439	173	149	127
31	25		9		860		1,048	498		173		127
MEAN	37	18	10	37	1,126	939	700	588	510	516	161	137
MAX.	51	25	13	127	2,491	1,437	1,307	989	742	849	173	148
MIN.	25	0	9	10	150	429	409	404	410	173	149	127

Gage operated: May 26-Sep 28. Estimated from measurements at gage (Jan 1-Apr 16. Nov 2-Dec 31). Estimated based on regression with USGS Sourdough 15200280 (Apr 17-May25, Sep 29-Nov 1).

Table B34. 2000 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	126	107	92	78	67	2,026	1,493	475	1,244	1,192	397	289
2	125	106	91	78	67	1,911	1,278	442	1,060	1,068	393	286
3	125	106	91	77	67	1,784	1,115	419	993	954	389	283
4	124	105	90	77	68	1,753	1,003	406	963	925	385	280
5	123	105	90	76	71	1,794	939	393	960	911	381	277
6	123	104	89	76	75	1,864	1,065	387	913	920	377	274
7	122	104	89	76	78	1,980	1,279	382	900	959	373	271
8	121	103	89	75	85	2,095	1,122	387	902	978	369	269
9	121	103	88	75	93	2,057	985	366	888	911	365	266
10	120	102	88	74	100	1,692	895	348	884	819	361	263
11	119	101	87	74	108	1,503	843	330	909	813	357	260
12	119	101	87	74	115	1,482	839	322	1,072	813	353	257
13	118	100	86	73	127	1,362	857	318	1,199	806	350	255
14	118	100	86	73	199	1,292	857	328	1,228	787	346	252
15	117	99	85	72	258	1,256	908	329	1,145	787	342	249
16	116	99	85	72	334	1,251	885	326	1,056	711	339	247
17	116	98	84	72	433	1,221	831	309	991	643	335	244
18	115	98	84	71	560	1,195	838	310	936	607	332	242
19	114	97	84	71	726	1,387	881	319	882	566	328	239
20	114	97	83	71	939	1,373	868	336	841	566	325	237
21	113	96	83	70	1,216	1,230	802	350	807	508	321	234
22	113	96	82	70	1,575	1,141	735	354	798	508	318	232
23	112	95	82	70	2,039	1,133	699	383	826	452	315	229
24	112	95	81	69	2,582	1,103	661	440	898	452	311	227
25	111	94	81	69	2,485	1,037	624	432	1,131	452	308	224
26	110	94	81	68	2,326	947	596	419	1,503	452	305	222
27	110	93	80	68	2,177	894	563	428	1,641	452	302	220
28	109	93	80	68	2,055	969	542	444	1,623	452	299	217
29	109	92	79	67	1,963	1,170	566	493	1,434	397	295	215
30	108		79	67	2,084	1,581	556	644	1,273	397	292	213
31	107		78		2,148		511	1,380		397		211
MEAN	116	99	85	72	878	1,449	859	419	1,063	698	342	248
MAX.	126	107	92	78	2,582	2,095	1,493	1,380	1,641	1,192	397	289
MIN.	107	92	78	67	67	894	511	309	798	397	292	211

Gage operated: May 24-Sep 27. Estimated from measurements at gage (Jan 1-May 3. Nov 2-Dec 31). Estimated based on regression with USGS Sourdough 15200280 (May 4-May 23, Sep 28-Nov 1).

Table B35. 2001 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	209	150	112	93	452	1,413	489	1,100	340	430	205	152
2	206	149	111	100	452	1,336	464	1,151	378	424	203	150
3	204	147	109	100	508	1,317	449	963	559	402	201	149
4	202	146	108	100	508	1,227	435	827	942	402	199	147
5	200	144	107	108	566	1,145	445	795	986	396	197	146
6	198	143	106	115	625	1,055	640	735	1,205	402	195	145
7	196	141	105	123	686	1,003	966	655	1,349	397	193	143
8	194	140	104	123	749	1,025	945	588	1,204	391	191	142
9	192	138	103	131	813	1,048	985	540	1,061	382	189	140
10	190	137	102	131	878	961	967	504	958	379	187	139
11	188	135	101	139	930	895	816	474	884	375	186	138
12	186	134	99	147	930	843	736	449	819	357	184	136
13	184	132	98	156	963	825	681	425	787	294	182	135
14	182	131	97	156	1,087	829	610	401	790	245	180	133
15	180	130	96	177	1,325	802	572	383	769	243	178	132
16	178	128	95	177	1,646	768	575	367	733	240	176	131
17	176	127	94	199	1,788	735	535	368	704	238	175	130
18	174	126	93	199	1,891	707	483	379	680	236	173	128
19	172	124	92	222	1,962	685	442	375	659	233	171	127
20	171	123	91	222	1,994	705	411	367	646	231	170	126
21	169	122	90	245	1,736	752	394	353	644	229	168	124
22	167	120	90	245	1,572	704	391	339	660	226	166	123
23	165	119	89	269	1,493	649	383	328	680	224	165	122
24	164	118	88	269	1,854	600	374	338	668	222	163	121
25	162	117	87	294	2,280	556	391	369	643	220	161	120
26	160	115	86	319	2,114	519	424	384	622	218	160	118
27	158	114	85	319	1,789	492	468	379	597	215	158	117
28	157	113	85	344	1,626	475	593	366	580	213	157	116
29	155		85	370	1,600	459	732	361	474	211	155	115
30	153		93	397	1,534	457	826	358	452	209	153	114
31	152		93		1,452		897	350		207		113
MEAN	179	131	97	200	1,284	833	597	509	749	293	178	131
MAX.	209	150	112	397	2,280	1,413	985	1,151	1,349	430	205	152
MIN.	152	113	85	93	452	457	374	328	340	207	153	113

Gage operated: May 21-Sep 28. Estimated from measurements at gage (Jan 1-Mar 27. Oct 15-Dec 31). Estimated based on regression with USGS Sourdough 15200280 (Mar 28-May 20, Sep 29-Oct 14).

Table B36. 2002 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	111	82	62	45	34	2,009	711	333	1,067	1,047	767	508
2	110	81	61	45	33	1,720	1,050	312	1,040	1,690	774	479
3	109	80	61	45	33	1,483	1,514	296	994	1,977	787	479
4	108	79	60	44	33	1,287	1,340	280	942	1,677	845	479
5	107	79	59	44	32	1,186	1,290	267	903	1,462	852	452
6	106	78	59	43	32	1,374	1,148	256	899	1,335	793	452
7	105	77	58	43	32	1,550	1,029	259	1,197	1,255	730	452
8	104	76	58	42	78	1,376	939	306	1,569	1,250	717	424
9	103	76	57	42	132	1,230	849	364	1,504	1,213	686	424
10	102	75	57	42	185	1,120	751	545	1,374	1,071	625	424
11	101	74	56	41	289	1,046	699	641	1,269	1,029	625	424
12	100	73	55	41	393	1,006	679	789	1,190	1,000	625	397
13	99	73	55	40	496	963	693	1,420	1,128	967	625	397
14	98	72	54	40	600	929	688	1,903	1,057	944	566	397
15	97	71	54	40	604	889	643	1,535	1,000	915	566	397
16	96	70	53	39	608	805	593	1,182	955	939	566	392
17	95	70	53	39	715	753	550	992	922	1,010	566	392
18	94	69	52	38	731	702	514	876	907	1,052	508	392
19	93	68	52	38	847	696	483	767	886	1,081	508	381
20	92	68	51	38	1,173	906	464	933	876	1,142	452	376
21	91	67	51	37	1,699	1,450	437	2,306	883	1,250	452	370
22	90	66	50	37	2,035	1,429	412	3,225	873	1,269	452	370
23	90	66	50	37	1,833	1,287	391	2,895	813	1,203	508	370
24	89	65	49	36	1,615	1,120	372	2,431	777	1,142	508	360
25	88	64	49	36	1,411	1,011	372	2,204	818	1,067	508	360
26	87	64	48	35	1,284	930	402	1,893	1,049	1,010	508	355
27	86	63	48	35	1,162	850	438	1,651	1,182	958	508	344
28	85	63	47	35	1,068	753	446	1,439	1,137	832	508	339
29	84		47	34	987	701	427	1,294	1,067	882	508	339
30	83		46	34	1,066	652	403	1,183	1,001	820	508	339
31	83		46		1,956		366	1,107		759		339
MEAN	96	72	54	39	748	1,107	680	1,157	1,043	1,137	605	400
MAX.	111	82	62	45	2,035	2,009	1,514	3,225	1,569	1,977	852	508
MIN.	83	63	46	34	32	652	366	256	777	759	452	339

Gage operated: May 22-Oct 3. Estimated from measurements at gage (Jan 1-May 6). Estimated based on regression with USGS Sourdough 15200280 (May 7-21, Oct 4-Dec 31)..

Table B37. 2003 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	334	255	208	168	479	1,049	357	469	541	554	182	148
2	329	255	208	164	537	1,159	334	479	933	560	180	147
3	329	255	208	164	625	1,071	372	412	899	554	179	146
4	329	255	204	164	717	943	607	360	1,041	519	178	145
5	329	255	195	164	813	852	815	327	982	502	177	144
6	324	250	190	164	925	808	659	301	859	485	176	144
7	319	245	190	164	996	799	572	269	687	474	174	143
8	314	241	190	164	1,114	683	535	242	566	452	173	142
9	314	241	186	164	1,185	601	496	217	508	446	172	141
10	309	236	186	164	1,203	552	440	200	489	457	171	140
11	304	236	186	164	1,203	526	395	187	464	435	170	139
12	304	236	186	164	1,255	514	357	180	435	391	169	138
13	304	236	186	164	1,321	493	330	175	430	382	167	137
14	304	231	182	164	1,415	447	309	179	437	362	166	136
15	299	227	182	166	1,368	418	282	177	418	306	165	135
16	294	227	182	168	1,297	504	257	178	386	268	164	134
17	294	222	182	171	1,302	512	236	182	359	241	163	133
18	294	222	182	173	1,546	478	220	174	337	223	162	132
19	294	217	177	175	1,569	454	210	170	311	217	161	132
20	294	217	177	179	1,419	457	195	163	300	213	160	131
21	289	217	177	184	1,274	599	182	164	287	208	159	130
22	284	217	177	197	1,185	828	170	179	277	204	158	129
23	274	217	173	213	853	865	186	181	262	199	157	128
24	269	217	173	236	834	856	221	177	255	199	156	127
25	264	213	173	255	870	805	210	179	263	199	155	126
26	260	213	173	279	977	643	196	214	294	199	153	125
27	255	213	168	309	1,039	550	188	231	374	199	152	125
28	255	213	168	344	997	484	232	247	384	199	151	124
29	255		168	386	931	433	346	245	408	195	150	123
30	255		168	424	911	392	375	239	474	190	149	122
31	255		168		918		412	264		186		121
MEAN	294	231	183	205	1,067	659	345	237	489	330	165	134
MAX.	334	255	208	424	1,569	1,159	815	479	1,041	560	182	148
MIN.	255	213	168	164	479	392	170	163	255	186	149	121

Gage operated: May 22-Sep 25. Estimated from measurements at gage (Nov 2-Dec 31). Estimated based on regression with USGS Sourdough 15200280 (Jan 1-May 22, Sep 26-Nov 1).

Table B38. 2004 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	121	98	81	65	508	1,072	311	162	138	239	198	165
2	120	97	80	65	686	1,081	305	159	139	237	196	164
3	119	97	80	65	1,090	1,560	295	149	153	236	195	163
4	118	96	79	64	1,443	1,640	294	140	166	234	194	162
5	117	95	78	64	1,910	1,391	313	134	179	233	193	161
6	117	95	78	63	2,770	1,206	330	126	176	231	192	160
7	116	94	77	63	2,922	1,103	329	121	166	230	191	159
8	115	93	77	62	3,266	1,236	310	118	156	229	189	158
9	114	93	76	62	3,344	1,594	296	117	150	227	188	157
10	113	92	76	62	3,418	1,622	275	115	145	226	187	156
11	113	92	75	61	2,789	1,542	253	115	140	225	186	155
12	112	91	75	61	1,664	1,411	236	116	137	223	185	154
13	111	90	74	60	1,614	1,271	222	119	134	222	184	153
14	110	90	74	60	1,513	1,169	206	120	131	221	183	152
15	110	89	73	60	1,410	1,100	194	120	131	219	182	151
16	109	89	73	60	1,324	1,025	184	124	128	218	180	150
17	108	88	72	61	1,215	956	174	125	124	217	179	150
18	108	87	72	78	1,117	902	169	125	123	215	178	149
19	107	87	71	96	1,035	825	164	125	122	214	177	148
20	106	86	71	119	970	742	157	129	127	213	176	147
21	105	86	70	123	908	669	157	132	132	211	175	146
22	105	85	70	135	838	602	156	134	141	210	174	145
23	104	84	70	156	766	542	149	132	160	209	173	144
24	103	84	69	177	768	493	144	130	172	208	172	143
25	103	83	69	195	913	450	142	131	194	206	171	142
26	102	83	68	217	1,115	407	141	138	193	205	170	142
27	101	82	68	245	1,123	373	140	147	205	204	169	141
28	101	82	67	289	1,148	350	140	149	229	203	168	140
29	100	81	67	334	1,191	332	151	152	242	201	167	139
30	99		66	397	1,152	318	164	146	240	200	166	138
31	99		66		1,107		163	142		199		137
MEAN	109	89	73	121	1,517	966	215	132	159	218	181	151
MAX.	121	98	81	397	3,418	1,640	330	162	242	239	198	165
MIN.	99	81	66	60	508	318	140	115	122	199	166	137

Gage operated: May 12-Sep 28. Estimated from measurements at gage (Jan 1-Apr 16, Sep 29-Dec 31). Estimated based on regression with USGS Sourdough 15200280 (Apr 17-May 11).

Table B39. 2005 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	136	113	95	48	744	1,399	735	1,068	1,007	1,229	245	180
2	135	112	94	46	878	1,724	802	1,123	1,152	1,149	242	178
3	134	111	94	44	942	1,890	973	1,083	1,113	1,081	240	177
4	134	111	93	47	1,021	1,738	1,188	1,047	1,016	1,015	237	175
5	133	110	93	44	1,083	1,549	1,202	966	976	941	235	173
6	132	109	92	46	1,133	1,417	1,122	891	992	878	232	171
7	131	109	92	44	1,181	1,361	979	822	976	828	230	170
8	130	108	91	45	1,244	1,337	853	763	972	778	228	168
9	130	107	90	44	1,325	1,228	773	713	929	739	226	166
10	129	107	90	45	1,415	1,127	739	674	923	700	223	164
11	128	106	89	46	1,475	1,047	767	643	1,070	654	221	163
12	127	105	89	47	1,467	985	761	613	1,122	626	219	161
13	126	105	88	48	1,413	949	713	595	1,195	598	217	160
14	126	104	88	50	1,388	977	654	567	1,562	578	214	158
15	125	103	87	49	1,497	1,127	610	542	1,408	568	212	156
16	124	103	87	49	2,156	1,112	600	519	1,257	539	210	155
17	123	102	86	51	2,428	1,041	579	497	1,174	515	208	153
18	123	102	86	52	2,367	947	577	488	1,148	483	206	152
19	122	101	85	54	1,797	878	605	485	1,091	466	204	150
20	121	100	85	58	1,596	886	608	492	1,043	448	202	149
21	120	100	84	56	1,476	983	614	492	998	427	200	147
22	120	99	84	64	2,015	968	611	534	983	405	198	146
23	119	98	83	67	2,423	890	577	614	1,032	382	196	144
24	118	98	82	77	2,248	875	563	609	1,212	363	194	143
25	118	97	82	88	2,324	852	596	600	1,340	347	192	141
26	117	97	81	105	2,196	858	622	587	1,351	331	190	140
27	116	96	81	136	2,021	847	563	570	1,219	318	188	138
28	115	96	81	219	1,878	846	532	539	1,147	303	186	137
29	115		80	328	1,694	815	552	521	1,312	285	184	136
30	114		72	493	1,514	750	606	568	1,285	266	182	134
31	113		64		1,399		835	692		252		133
MEAN	124	104	86	86	1,604	1,113	726	675	1,133	597	212	155
MAX.	136	113	95	493	2,428	1,890	1,202	1,123	1,562	1,229	245	180
MIN.	113	96	64	44	744	750	532	485	923	252	182	133

Gage operated: May 19-Sep 28. Estimated from measurements at gage (Jan 1-Mar 31, Sep 29-Dec 31).
Estimated based on regression with USGS Sourdough 15200280 (Apr 1-May 18).

APPENDIX B: BLM Stream Gage Data
West Fork

Table B40. 2006 West Fork--Daily Mean Discharge (cfs)

Day	JAN	FEB	MAR	APR
1	131	96	72	53
2	130	95	71	52
3	129	94	71	52
4	128	93	70	51
5	126	92	69	51
6	125	91	69	50
7	124	90	68	49
8	122	89	67	49
9	121	88	66	48
10	120	88	66	48
11	119	87	65	48
12	118	86	64	47
13	116	85	64	47
14	115	84	63	46
15	114	83	63	46
16	113	82	62	45
17	112	81	61	45
18	111	81	61	44
19	109	80	60	44
20	108	79	59	43
21	107	78	59	43
22	106	77	58	42
23	105	77	58	42
24	104	76	57	42
25	103	75	56	43
26	102	74	56	42
27	101	74	55	45
28	100	73	55	45
29	99		54	43
30	98		54	43
31	97		53	
MEAN	113	84	62	46
MAX.	131	96	72	53
MIN.	97	73	53	42

Estimated from measurements at gage (Jan 1-Apr 5), Estimated based on regression with Paxson L. Outlet: (Apr 6-30). Gage Discontinued Apr 30, 2006