

Water-Data Report 2011

06187915 SODA BUTTE CREEK AT PARK BOUNDARY, AT SILVER GATE, MT

Upper Yellowstone Basin
Yellowstone Headwaters Subbasin

LOCATION.--Lat 45°00'11", long 110°00'04" referenced to North American Datum of 1927, in SW ¼ NW ¼ SW ¼ sec.33, T.9 S., R.14 E., Park County, MT, Hydrologic Unit 10070001, at Yellowstone National Park boundary, 0.25 mi downstream from Silver Creek, 0.75 mi southwest of Silver Gate, and at river mile 17.8.

DRAINAGE AREA.--31.2 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.--October 1998 to current year. October 1998 to September 2002 records collected by the National Park Service and U.S. Department of Agriculture, Forest Service, under the general supervision of the U.S. Geological Survey.

GAGE.--Water-stage recorder. Elevation of gage is 7,340 ft, referenced to the National Geodetic Vertical Datum of 1929.

REMARKS.--Records are fair except for estimated daily discharges, which are poor. No known regulation or diversion upstream from station. U.S. Geological Survey satellite telemeter is located at the station.

06187915 SODA BUTTE CREEK AT PARK BOUNDARY, AT SILVER GATE, MT—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	9.8	8.9	e8.5	e5.0	e2.5	2.5	1.8	1.7	132	956	177	36
2	9.6	9.0	e8.0	e6.0	e1.5	2.3	2.0	1.9	162	876	163	33
3	9.4	9.3	7.5	e7.0	e2.0	e2.5	1.9	2.6	140	786	146	31
4	9.6	8.2	7.5	e6.0	e3.0	e2.0	e1.5	2.8	151	873	133	29
5	9.4	8.8	e7.0	e5.5	e3.5	2.0	e1.5	3.4	246	807	123	28
6	9.5	9.7	6.7	e5.0	e3.0	1.9	1.7	5.3	370	930	119	27
7	9.4	10	6.3	e5.0	e2.5	1.9	e1.5	8.1	410	756	109	26
8	11	10	6.0	e5.0	e2.0	1.9	1.5	12	408	738	101	25
9	12	9.2	6.0	4.7	e1.5	1.8	1.5	13	393	702	94	24
10	11	8.2	6.0	5.1	e2.5	1.7	1.4	13	346	627	89	23
11	14	8.1	6.0	e4.0	e3.5	2.3	1.4	14	338	601	85	22
12	12	8.5	7.1	e4.5	3.4	1.7	1.4	21	348	715	80	22
13	9.6	e8.5	5.9	e5.0	3.1	1.6	1.5	43	401	584	75	21
14	9.1	e8.5	5.6	e5.0	2.9	1.7	1.8	75	465	542	74	21
15	8.8	e8.5	e5.5	4.5	2.8	1.6	1.5	88	478	509	70	20
16	9.2	8.4	e4.5	3.9	2.7	1.7	1.7	104	459	488	65	21
17	11	e8.0	e3.5	3.7	2.6	e1.5	2.3	95	394	470	61	22
18	9.6	7.7	e4.5	e3.5	2.6	1.6	2.3	95	355	479	59	20
19	9.3	7.9	e6.0	e3.0	2.4	1.6	2.0	88	379	473	57	19
20	8.8	e7.5	e7.0	e3.5	2.3	e1.5	1.9	84	390	413	55	18
21	8.5	e8.0	e6.0	e4.0	2.8	1.5	1.8	89	436	345	54	17
22	8.3	e8.0	e6.5	e4.5	2.4	1.6	1.7	104	499	300	53	17
23	8.4	e8.0	e7.0	e4.0	2.3	1.5	1.7	150	547	276	49	16
24	9.3	e6.5	e6.5	e3.5	2.4	1.5	1.7	199	603	259	47	15
25	10	e5.5	e7.0	e4.0	2.4	1.5	2.0	196	602	254	47	15
26	8.4	e7.0	e6.5	3.7	2.5	1.4	1.9	189	556	263	46	14
27	8.5	e8.0	e6.5	3.3	2.6	1.4	1.8	150	523	223	45	14
28	8.3	e9.0	6.9	3.3	2.6	1.4	1.8	126	540	194	45	14
29	8.3	e8.0	6.4	3.3	---	1.4	1.9	110	662	177	52	13
30	8.7	e7.5	e6.0	3.1	---	1.4	1.8	99	1,030	164	43	13
31	9.2	---	e3.5	e3.0	---	1.6	---	95	---	160	40	---
Total	298.0	248.4	193.9	134.6	72.3	53.5	52.2	2,277.8	12,763	15,940	2,456	636
Mean	9.61	8.28	6.25	4.34	2.58	1.73	1.74	73.5	425	514	79.2	21.2
Max	14	10	8.5	7.0	3.5	2.5	2.3	199	1,030	956	177	36
Min	8.3	5.5	3.5	3.0	1.5	1.4	1.4	1.7	132	160	40	13
Ac-ft	591	493	385	267	143	106	104	4,520	25,320	31,620	4,870	1,260
Cfsm	0.31	0.27	0.20	0.14	0.08	0.06	0.06	2.36	13.6	16.5	2.54	0.68
In.	0.36	0.30	0.23	0.16	0.09	0.06	0.06	2.72	15.22	19.01	2.93	0.76

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1999 - 2011, BY WATER YEAR (WY)

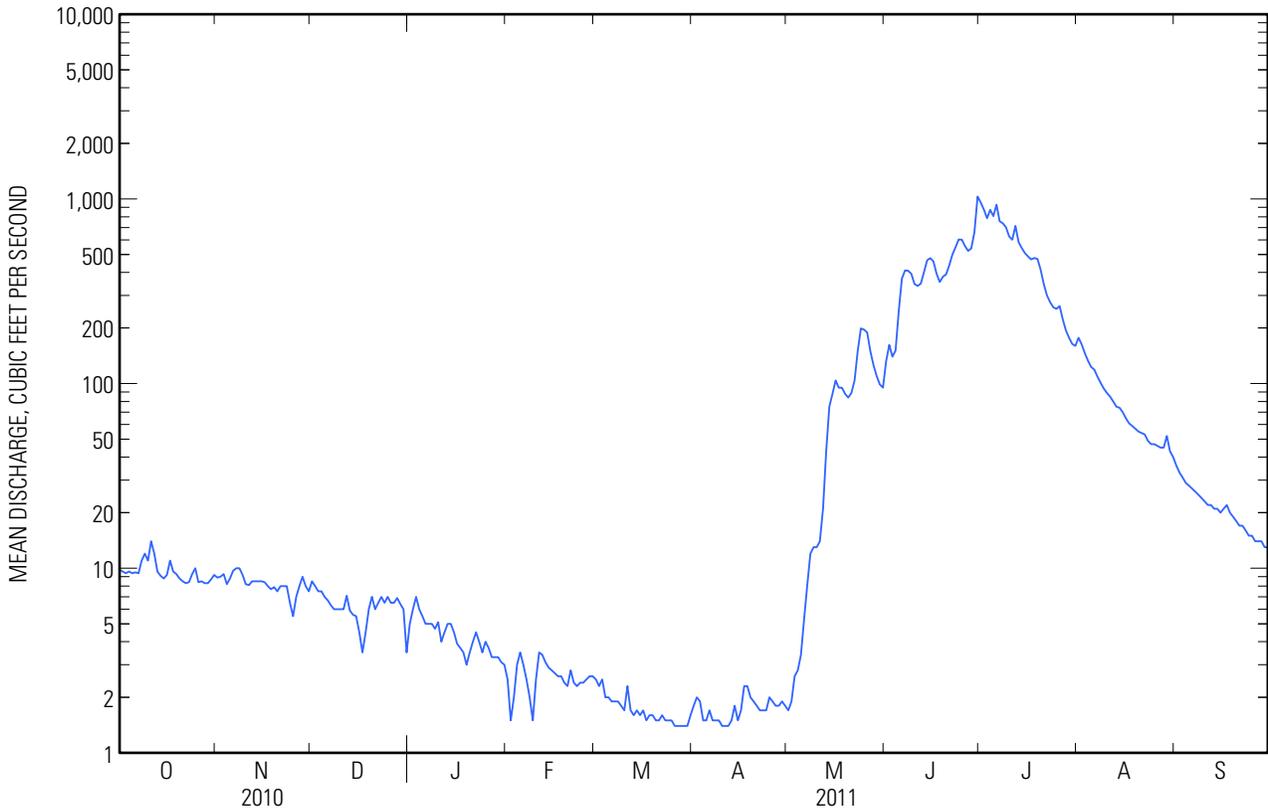
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	10.8	7.48	4.45	3.26	2.23	1.93	9.27	136	327	173	32.9	14.9
Max	20.4	15.4	7.71	5.66	3.22	4.17	20.9	212	425	514	79.2	27.9
(WY)	(2005)	(2007)	(2005)	(2005)	(2005)	(2007)	(2007)	(2007)	(2011)	(2011)	(2011)	(2004)
Min	5.14	4.30	2.85	2.01	1.57	1.13	1.74	51.9	176	61.6	15.5	8.27
(WY)	(2002)	(2003)	(2001)	(2000)	(2004)	(2003)	(2011)	(2010)	(2001)	(2001)	(2001)	(2001)

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SUMMARY STATISTICS

	Calendar Year 2010		Water Year 2011		Water Years 1999 - 2011	
Annual total	20,974.6		35,125.7			
Annual mean	57.5		96.2		60.4	
Highest annual mean					96.2	2011
Lowest annual mean					38.5	2001
Highest daily mean	664	Jun 5	1,030	Jun 30	1,030	Jun 30, 2011
Lowest daily mean	1.2	Feb 22	1.4	Mar 26	0.80	Feb 23, 2003
Annual seven-day minimum	1.2	Mar 9	1.4	Mar 24	0.99	Mar 23, 2003
Maximum peak flow			1,230	Jun 30	^a 1,250	Jun 5, 2010
Maximum peak stage			3.85	Jun 30	3.85	Jun 30, 2011
Annual runoff (ac-ft)	41,600		69,670		43,750	
Annual runoff (cfsm)	1.84		3.08		1.94	
Annual runoff (inches)	25.01		41.88		26.30	
10 percent exceeds	213		397		220	
50 percent exceeds	9.4		8.5		9.0	
90 percent exceeds	1.5		1.7		1.8	

^a Gage height, 3.83 ft.



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WATER-QUALITY RECORDS

PERIOD OF RECORD.--January 1999 to 2001, April 2003 to current year.

PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: April 2003 to September 2010.

SPECIFIC CONDUCTANCE: October 8, 2008 to September 2010.

TURBIDITY: May 28, 2009 to current year.

INSTRUMENTATION.--Water temperature recorder was installed April 23, 2003. Specific conductance recorder was installed October 8 2008. Turbidity recorder was installed May 28, 2009.

REMARKS.--For the 2011 water year, the record was rated as good to excellent (corrections <10%) except for the days when the turbidity exceeded the maximum threshold of the probe or days with missing record due to negative readings. Peaks above 1000 FNU are listed as >1000 FNU in the daily value tables. Peaks from 150 to 1000 FNU for the period are rated fair to poor due to lack of probe calibration at these concentrations.

EXTREMES FOR PERIOD OF DAILY RECORD.--

WATER TEMPERATURE: Maximum, 18.0°C, July 22 and 30, 2007; minimum, 0.0°C, many days October through May.

SPECIFIC CONDUCTANCE: Maximum, 269 $\mu\text{S}/\text{cm}@25^\circ\text{C}$ on May 13, 2009; Minimum 71 $\mu\text{S}/\text{cm}@25^\circ\text{C}$ on June 28, 2009.

TURBIDITY: Maximum >1000 FNU on Aug. 1, 28, 2011. Minimum <0.5 FNU many days in 2010 and 2011.

EXTREMES FOR CURRENT YEAR.--

TURBIDITY: Maximum >1000 FNU, August 1, 28. Minimum <0.5 FNU many days.

06187915 SODA BUTTE CREEK AT PARK BOUNDARY, AT SILVER GATE, MT—Continued

TURBIDITY, WATER, UNFILT, NEAR IR LED LIGHT, 780-900 NM, DETECT ANG. 90 DEG, FORMAZIN NEPHELOMETRIC UNITS
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[<, less than; >, greater than]

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	October			November			December			January		
1	4.7	<0.5	0.6	5.8	1.6	1.8	---	---	---	7.0	<0.5	<0.5
2	1.1	<0.5	0.5	7.1	1.5	2.1	---	---	---	<0.5	<0.5	<0.5
3	0.8	<0.5	<0.5	7.4	1.8	3.0	---	---	---	1.0	<0.5	<0.5
4	1.2	<0.5	<0.5	5.2	2.0	2.8	---	---	---	2.4	<0.5	<0.5
5	1.0	<0.5	<0.5	5.8	2.0	3.0	---	---	---	0.5	<0.5	<0.5
6	3.4	<0.5	<0.5	13	2.0	4.0	---	---	---	3.3	<0.5	<0.5
7	2.0	<0.5	0.5	14	2.8	4.4	---	---	---	---	---	---
8	3.8	<0.5	0.8	4.1	2.4	2.8	0.6	<0.5	<0.5	---	---	---
9	4.7	1.2	2.1	3.1	1.5	2.3	0.6	<0.5	<0.5	3.4	<0.5	<0.5
10	3.6	1.0	1.7	1.8	1.0	1.4	1.9	<0.5	0.4	---	---	---
11	790	1.6	64	2.9	0.9	1.2	55	<0.5	2.4	---	---	---
12	81	3.1	13	4.2	0.7	1.0	0.5	<0.5	<0.5	---	---	---
13	3.6	1.6	2.2	1.6	0.6	0.8	1.1	<0.5	<0.5	---	---	---
14	4.8	0.9	1.4	5.5	0.5	0.7	1.0	<0.5	<0.5	---	---	---
15	1.4	0.6	0.8	0.8	<0.5	0.6	0.9	<0.5	<0.5	---	---	---
16	5.6	<0.5	1.1	0.9	<0.5	0.5	1.1	<0.5	0.6	---	---	---
17	13	2.4	4.5	1.3	<0.5	0.6	1.4	<0.5	0.5	---	---	---
18	2.6	1.0	1.5	0.9	<0.5	0.6	9.7	<0.5	0.5	---	---	---
19	1.8	0.6	0.8	1.0	<0.5	0.6	16	<0.5	0.9	---	---	---
20	1.2	0.5	0.6	4.8	<0.5	1.2	0.8	<0.5	<0.5	---	---	---
21	23	<0.5	4.0	2.2	0.5	0.9	16	<0.5	0.6	---	---	---
22	8.6	<0.5	1.7	0.9	0.4	0.6	21	<0.5	0.6	---	---	---
23	21	<0.5	3.5	0.9	<0.5	0.6	98	<0.5	4.0	---	---	---
24	7.9	<0.5	1.4	21	<0.5	1.1	15	<0.5	0.4	---	---	---
25	8.7	<0.5	1.7	1.5	0.6	0.7	7.8	<0.5	0.5	---	---	---
26	17	0.8	2.8	11	0.6	1.2	0.8	<0.5	<0.5	---	---	---
27	18	1.1	2.5	2.1	0.5	0.7	0.9	<0.5	<0.5	---	---	---
28	3.9	1.1	1.7	1.3	0.5	0.5	1.5	<0.5	<0.5	---	---	---
29	2.3	1.2	1.7	---	---	---	1.1	<0.5	<0.5	---	---	---
30	2.4	1.2	1.7	0.6	0.5	0.5	<0.5	<0.5	<0.5	---	---	---
31	3.4	1.7	2.0	---	---	---	1.2	<0.5	<0.5	---	---	---
Month	790	0.5	4.0	---	---	---	---	---	---	---	---	---

06187915 SODA BUTTE CREEK AT PARK BOUNDARY, AT SILVER GATE, MT—Continued

TURBIDITY, WATER, UNFILT, NEAR IR LED LIGHT, 780-900 NM, DETECT ANG. 90 DEG, FORMAZIN NEPHELOMETRIC UNITS
 WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[<, less than; >, greater than]

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	February			March			April			May		
1	---	---	---	---	---	---	---	---	---	---	---	---
2	---	---	---	---	---	---	---	---	---	---	---	---
3	5.5	<0.5	0.5	---	---	---	---	---	---	20	<0.5	1.9
4	---	---	---	---	---	---	---	---	---	11	<0.5	2.5
5	---	---	---	---	---	---	---	---	---	7.5	<0.5	0.9
6	---	---	---	---	---	---	---	---	---	9.4	0.9	1.5
7	---	---	---	---	---	---	---	---	---	16	0.6	3.5
8	---	---	---	---	---	---	---	---	---	19	1.8	5.9
9	---	---	---	---	---	---	---	---	---	130	1.5	7.9
10	---	---	---	---	---	---	---	---	---	2.6	0.6	1.3
11	---	---	---	---	---	---	---	---	---	8.0	0.4	1.5
12	---	---	---	---	---	---	---	---	---	19	0.9	6.0
13	---	---	---	---	---	---	---	---	---	61	3.7	19
14	---	---	---	---	---	---	<0.5	<0.5	<0.5	34	7.4	15
15	---	---	---	---	---	---	---	---	---	69	4.0	20
16	---	---	---	---	---	---	---	---	---	28	6.9	11
17	---	---	---	---	---	---	---	---	---	18	4.3	8.1
18	---	---	---	---	---	---	---	---	---	10	4.1	5.8
19	---	---	---	---	---	---	---	---	---	4.5	2.4	3.1
20	---	---	---	---	---	---	---	---	---	5.9	1.9	3.0
21	---	---	---	---	---	---	---	---	---	4.0	1.8	2.8
22	---	---	---	---	---	---	---	---	---	29	1.9	9.0
23	---	---	---	---	---	---	---	---	---	74	4.5	24
24	---	---	---	---	---	---	---	---	---	40	10	21
25	---	---	---	---	---	---	---	---	---	19	6.0	10
26	---	---	---	---	---	---	---	---	---	14	4.1	7.1
27	---	---	---	---	---	---	---	---	---	5.6	2.3	3.3
28	---	---	---	---	---	---	---	---	---	2.8	1.7	2.1
29	---	---	---	---	---	---	---	---	---	2.7	1.2	1.6
30	---	---	---	---	---	---	---	---	---	1.8	0.9	1.3
31	---	---	---	---	---	---	---	---	---	2.1	0.8	1.3
Month	---	---	---	---	---	---	---	---	---	---	---	---

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WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[<, less than; >, greater than]

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
	June			July			August			September		
1	32	1.3	7.4	170	69	95	>1,000	<0.5	90	4.9	2.4	2.8
2	9.0	2.3	3.9	140	41	60	27	3.7	7.9	3.8	2.5	2.8
3	2.5	1.4	1.8	470	29	95	11	2.4	4.0	3.4	2.7	3.0
4	14	1.1	4.3	680	42	160	9.5	2.0	4.5	52	2.7	6.9
5	290	3.0	63	320	51	110	10	<0.5	1.9	5.8	3.9	4.8
6	230	13	74	270	49	85	1.7	<0.5	0.7	7.0	4.1	5.0
7	320	33	110	130	38	63	1.3	<0.5	0.5	7.0	3.7	5.3
8	480	20	59	690	22	79	1.0	<0.5	<0.5	8.2	2.7	4.6
9	130	12	29	91	26	44	0.9	<0.5	<0.5	6.6	1.8	3.0
10	38	8.1	12	88	17	32	1.0	<0.5	<0.5	3.1	1.7	2.2
11	210	6.3	21	490	14	63	---	---	---	2.8	1.9	2.3
12	75	7.0	19	170	34	68	---	---	---	3.1	<0.5	1.4
13	200	11	49	58	22	36	---	---	---	---	---	---
14	160	17	43	40	17	26	---	---	---	---	---	---
15	89	15	34	31	10	17	---	---	---	---	---	---
16	33	8.7	14	24	9.4	14	---	---	---	---	---	---
17	13	5.3	7.3	24	7.0	12	---	---	---	---	---	---
18	23	5.2	7.3	27	5.3	12	---	---	---	---	---	---
19	250	4.3	21	16	5.4	10	---	---	---	---	---	---
20	30	7.1	15	9.5	4.7	6.3	1.8	<0.5	<0.5	---	---	---
21	92	7.5	37	6.8	3.7	4.9	0.7	<0.5	<0.5	---	---	---
22	160	17	58	5.6	2.5	3.3	0.6	<0.5	<0.5	---	---	---
23	160	29	73	4.8	1.6	2.7	---	---	---	---	---	---
24	110	42	72	4.8	1.0	2.2	---	---	---	---	---	---
25	90	41	55	6.6	0.8	2.0	0.5	<0.5	<0.5	---	---	---
26	100	27	39	9.8	0.8	3.1	2.7	<0.5	<0.5	---	---	---
27	150	22	34	5.8	0.9	1.7	0.7	<0.5	<0.5	---	---	---
28	130	17	50	3.5	0.6	1.5	>1,000	<0.5	62	---	---	---
29	310	40	130	3.0	<0.5	1.5	690	7.5	90	---	---	---
30	240	120	160	3.2	<0.5	1.3	8.0	4.0	5.4	---	---	---
31	---	---	---	5.5	<0.5	1.4	4.8	3.2	3.9	---	---	---
Month	480	1.1	43	690	0.5	36	---	---	---	---	---	---