

Water-Data Report 2012

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT

Yellowstone Basin
Lower Yellowstone Subbasin

LOCATION.--Lat 47°40'39", long 104°09'19" referenced to North American Datum of 1983, in SW ¼ NE ¼ SW ¼ sec.9, T.22 N., R.59 E., Richland County, MT, Hydrologic Unit 10100004, on left bank at Montana-Dakota Utilities Company powerplant, 0.2 mi downstream from bridge on State Highway 23, 2.5 mi south of Sidney, 3.0 mi downstream from Fox Creek, and at river mile 29.2.

DRAINAGE AREA.--69,083 mi² of which 691 mi² probably is noncontributing. Area at site 4.5 mi upstream. 68,812 mi².

SURFACE-WATER RECORDS

PERIOD OF RECORD.--October 1910 to September 1931 (published as "at Intake"), October 1933 to current year. If monthly figures of diversions to Lower Yellowstone Canal at Intake are added to records at this site, records equivalent to those published as Yellowstone River at Glendive (1898-1910, 1931-34) can be obtained. Monthly discharge only for some periods, published in Water Supply Paper (WSP) 1309. Monthly figures of diversions into Lower Yellowstone Canal prior to 1951 published in WSP 1309, 1951-60 published in WSP 1729, 1961-65 published in WSP 1916, 1966-70 published in WSP 2116, and 1971 to current year are published in annual reports.

REVISED RECORDS.--Water Data Report MT-04-1: Drainage area.

GAGE.--Water-stage recorder. Elevation of gage is 1,881.3 ft, referenced to National Geodetic Vertical Datum of 1929, levels by U.S. Army Corps of Engineers. Jan. 1, 1911, to Sept. 30, 1931, nonrecording gage at site 32 miles upstream at different elevation. Apr. 9, 1934, water-stage recorder at two sites within 500 ft of highway bridge 0.2 mi upstream and May 17, 1945, to Apr. 3, 1952, nonrecording gage on same bridge at elevation 1.36 ft higher. Apr. 4, 1952, to Nov. 19, 1967, water-stage recorder at site 4.5 mi upstream at different elevation.

REMARKS.--Records are good except for estimated daily discharges, which are poor. Flow is regulated to some extent by Bighorn Lake, usable capacity, 1,312,000 acre-ft, on the Bighorn River and on other tributary streams in Wyoming and Montana. Diversion for irrigation of about 1,250,000 acres occurs upstream from station. Lower Yellowstone Project Main Canal diverts from left bank in NW¼ sec.36, T.18 N., R.56 E., at Lower Yellowstone diversion dam at Intake about 36.6 mi upstream for irrigation of about 52,000 acres of which about one-third lies upstream from station. U.S. Army Corps of Engineers satellite telemeter is located at the station.

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT—Continued

DISCHARGE, CUBIC FEET PER SECOND
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012
DAILY MEAN VALUES

[e, estimated]

Day	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1	9,030	10,500	e9,190	e8,540	e8,270	e7,990	8,950	20,400	17,700	20,100	5,770	1,790
2	8,890	10,500	e9,180	e8,670	e8,280	e8,010	8,850	18,300	16,800	17,500	5,910	1,800
3	8,770	10,500	e9,160	e8,630	e8,410	e7,720	8,690	16,300	17,000	16,500	5,870	1,860
4	8,790	10,100	e9,150	e8,600	e8,480	e7,540	8,460	14,900	17,200	15,800	5,710	1,960
5	8,730	10,000	e7,950	e8,330	e8,480	e7,580	8,270	13,700	20,400	15,100	5,360	2,030
6	8,730	10,200	e6,390	e8,330	e8,410	e7,740	8,570	13,000	26,500	15,700	4,960	2,160
7	8,880	10,200	e6,750	e8,380	e8,340	e7,920	8,930	12,100	32,300	15,200	4,800	2,240
8	8,980	9,820	e6,230	e8,290	e8,230	e8,090	8,690	11,300	36,500	14,200	4,510	2,340
9	8,960	9,790	e5,640	e8,190	e8,110	e8,910	8,490	10,900	39,600	13,400	4,220	2,490
10	9,600	9,800	e5,510	e8,050	e7,970	e9,090	8,700	10,900	35,500	12,100	3,700	2,490
11	9,950	9,710	e6,110	e7,920	e7,920	e9,160	8,950	10,100	29,400	11,100	3,380	2,620
12	10,100	9,630	e6,880	e7,100	e7,180	e9,300	8,780	9,360	29,200	10,500	3,330	2,660
13	9,910	9,590	e7,310	e5,840	e6,770	e10,100	10,400	8,760	30,000	9,970	3,100	2,570
14	9,740	9,630	e7,590	e6,510	e6,820	e10,400	12,100	10,200	25,700	9,440	3,290	2,580
15	9,950	9,610	e7,830	e6,880	e7,110	e10,600	10,200	12,300	22,500	9,260	3,470	2,690
16	10,400	9,600	e7,800	e6,980	e7,510	10,700	9,140	11,200	20,900	9,100	3,420	2,900
17	10,600	9,610	e7,790	e5,850	e7,890	10,300	9,430	10,800	21,200	8,820	3,390	3,070
18	10,900	e9,390	e8,770	e4,260	e8,360	9,890	9,660	11,600	21,900	8,980	3,250	3,080
19	11,000	e9,110	e8,700	e6,230	e8,130	9,550	9,390	14,800	21,500	9,160	3,270	2,990
20	11,000	e8,000	e8,540	e6,190	e7,930	9,400	9,010	18,700	21,000	9,320	3,280	2,990
21	11,200	e6,400	e8,540	e4,020	e7,800	9,220	8,560	21,400	22,700	9,490	3,080	3,110
22	11,500	e6,810	e8,680	e2,460	e7,860	9,540	8,300	21,900	23,600	8,060	2,780	3,180
23	11,500	e7,600	e8,600	e1,480	e7,700	9,710	8,290	19,300	22,000	7,340	2,480	3,060
24	11,400	e7,880	e8,240	e941	e7,300	9,560	7,990	17,100	19,500	8,280	2,200	3,070
25	11,400	e8,290	e8,300	e1,480	e7,370	9,140	7,590	17,600	18,600	8,970	1,970	3,070
26	11,400	e9,410	e7,910	e5,050	e7,810	8,700	7,250	23,900	19,600	7,910	1,830	3,110
27	11,500	e9,980	e7,920	e8,050	e8,350	8,620	8,050	24,500	21,200	7,170	1,920	3,110
28	11,200	e9,890	e7,530	e8,150	e9,510	8,570	10,900	22,000	22,900	6,750	1,970	3,090
29	11,100	e9,510	e7,880	e8,170	e8,950	8,580	16,700	19,900	23,200	6,480	1,960	3,050
30	11,200	e9,290	e8,300	e8,400	---	8,710	19,600	19,100	22,600	6,120	1,850	3,500
31	10,800	---	e8,490	e8,330	---	8,830	---	18,600	---	5,780	1,810	---
Total	317,110	280,350	242,860	204,301	231,250	279,170	286,890	484,920	718,700	333,600	107,840	80,660
Mean	10,230	9,345	7,834	6,590	7,974	9,005	9,563	15,640	23,960	10,760	3,479	2,689
Max	11,500	10,500	9,190	8,670	9,510	10,700	19,600	24,500	39,600	20,100	5,910	3,500
Min	8,730	6,400	5,510	941	6,770	7,540	7,250	8,760	16,800	5,780	1,810	1,790
Ac-ft	629,000	556,100	481,700	405,200	458,700	553,700	569,000	961,800	1,426,000	661,700	213,900	160,000

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 2012, BY WATER YEAR (WY)*

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	8,193	7,297	5,918	5,678	6,721	10,580	10,080	18,330	38,250	22,670	8,486	6,975
Max	29,130	12,150	9,594	13,110	17,750	25,980	39,160	48,400	77,280	58,540	20,470	16,000
(WY)	(1924)	(1924)	(1976)	(1925)	(1971)	(1972)	(1924)	(2011)	(1918)	(2011)	(1912)	(1941)
Min	3,726	3,700	3,019	2,087	2,702	3,235	2,821	5,409	11,580	3,311	1,602	2,389
(WY)	(1922)	(1922)	(1961)	(1937)	(1936)	(2002)	(1961)	(1961)	(1919)	(1919)	(1961)	(1934)

*During periods of operation 1911-31, 1934 to current year. Published as "at Intake" 1911-31.

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT—Continued

SUMMARY STATISTICS

	Calendar Year 2011		Water Year 2012		Water Years 1911 – 2012*	
Annual total	8,277,030		3,567,651			
Annual mean	22,680		9,748		12,440	
Highest annual mean					22,070 2011	
Lowest annual mean					5,673 2004	
Highest daily mean	121,000	May 25	39,600	Jun 9	142,000	Jun 21, 1921
Lowest daily mean	4,420	Jan 6	941	Jan 24	570	May 17, 1961
Annual seven-day minimum	5,040	Jan 3	1,860	Aug 29	1,010	Aug 8, 1961
Maximum peak flow			40,300	Jun 9	^a 159,000	Jun 21, 1921
Maximum peak stage			12.16	Jun 9	^b 24.03	Mar 6, 1994
Instantaneous low flow					^c 470	May 17, 1961
Annual runoff (ac-ft)	16,420,000		7,076,000		9,012,000	
10 percent exceeds	71,300		18,800		27,900	
50 percent exceeds	10,500		8,700		7,900	
90 percent exceeds	6,110		3,070		4,050	

	Water Years 1911 – 1965**		Water Years 1967 – 2012***	
Annual mean	12,890		12,010	
Highest annual mean	21,250 1924		22,070 2011	
Lowest annual mean	5,814 1934		5,673 2004	
Highest daily mean	142,000	Jun 21, 1921	121,000	May 25, 2011
Lowest daily mean	570	May 17, 1961	800	Jan 2, 1989
Annual seven-day minimum	1,010	Aug 8, 1961	1,060	Aug 23, 2001
Maximum peak flow	^a 159,000	Jun 21, 1921	^d 124,000	May 24, 2011
Maximum peak stage	^b 21.85	Mar 22, 1947	^b 24.03	Mar 6, 1994
Instantaneous low flow	^c 470	May 17, 1961		
Annual runoff (ac-ft)	9,341,000		8,701,000	
10 percent exceeds	29,900		26,000	
50 percent exceeds	7,690		8,200	
90 percent exceeds	3,820		4,500	

*During periods of operation 1911-31, 1934 to current year. Published as "at Intake" 1911-31.

**Prior to Bighorn Lake reaching operational level.

***After Bighorn Lake reached operational level.

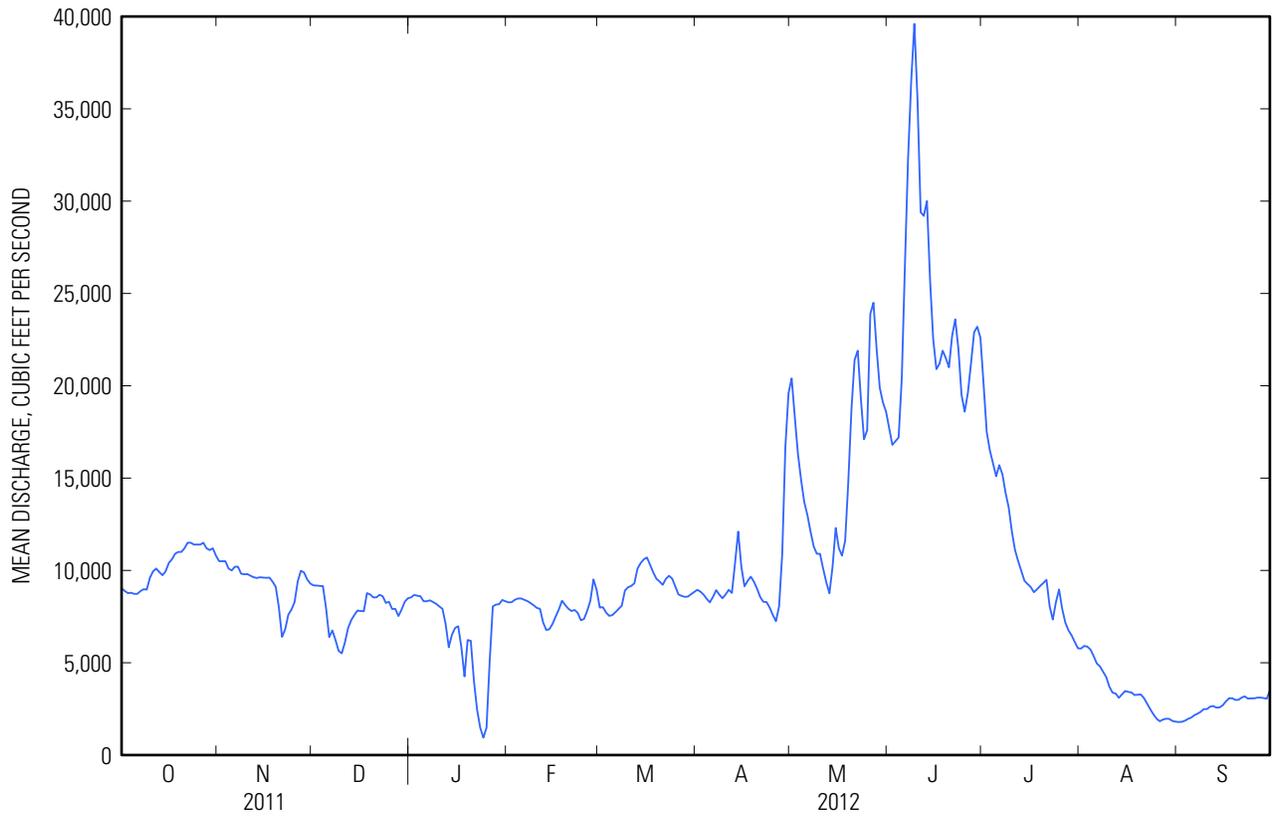
^aGage height, 12.60 ft, site and datum then in use.

^bBackwater from ice.

^cGage height, 2.73 ft, site and datum then in use.

^dGage height, 21.84 ft.

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT—Continued



06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT—Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--Water years 1948 to current year.

PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: October 1964 to September 1981.

WATER TEMPERATURE: January 1951 to September 1985.

SUSPENDED-SEDIMENT DISCHARGE: October 1971 to September 1981, October 1982 to September 1991, seasonal records (March (or ice breakup) through November) from October 1991 to current year.

REMARKS.--Daily sediment records are rated good except for several periods of storm runoff, which are rated fair to poor. Daily sediment data collected seasonally (October 2011 through November 2011 and April 2012 through September 2012) during open water. Hydrologic events during summer months, when sampling frequency is reduced, were not sampled at an ideal frequency. All sample results were used in the construction of the sediment concentration curve. Suspended and bed sediment samples plus the seasonal daily sediment record were obtained as part of the Corps of Engineers program.

EXTREMES FOR PERIOD OF DAILY RECORD.--

SPECIFIC CONDUCTANCE: Maximum daily, 1,220 microsiemens per centimeter ($\mu\text{S}/\text{cm}$) at 25.0°C, Apr. 6, 1979; minimum daily, 261 $\mu\text{S}/\text{cm}$ at 25.0°C, June 4, 1966.

WATER TEMPERATURE: Maximum, 29.0°C July 23, 1960; minimum, 0.0°C on many days during winter.

SEDIMENT CONCENTRATION: Maximum daily mean, 26,800 mg/L May 8, 1975; minimum daily mean, 8 mg/L Jan. 9, 1973.

SEDIMENT LOAD: Maximum daily, 3,030,000 tons May 8, 1975; minimum daily, 63 tons Jan. 2, 1989.

EXTREMES FOR CURRENT YEAR.--

SEDIMENT CONCENTRATION: During period of seasonal operation, maximum daily mean, 2,370 mg/L, June 8; minimum daily mean, 23 mg/L, Nov. 8 and Sep. 25-29.

SEDIMENT LOAD: During period of seasonal operation, maximum daily, 233,000 tons, June 8-9; minimum daily, 136 tons, Sep. 3.

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT—Continued

SUSPENDED-SEDIMENT
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Mean concen-	Sediment discharge										
	tration (mg/L)	(tons/day)										
	October		November		December		January		February		March	
1	24	578	29	806	---	---	---	---	---	---	---	---
2	25	592	26	748	---	---	---	---	---	---	---	---
3	26	608	27	772	---	---	---	---	---	---	---	---
4	29	678	24	663	---	---	---	---	---	---	---	---
5	32	744	24	654	---	---	---	---	---	---	---	---
6	36	848	26	709	---	---	---	---	---	---	---	---
7	46	1,120	27	747	---	---	---	---	---	---	---	---
8	72	1,740	23	623	---	---	---	---	---	---	---	---
9	100	2,430	24	644	---	---	---	---	---	---	---	---
10	49	1,260	27	724	---	---	---	---	---	---	---	---
11	55	1,490	31	804	---	---	---	---	---	---	---	---
12	62	1,700	28	733	---	---	---	---	---	---	---	---
13	58	1,560	26	676	---	---	---	---	---	---	---	---
14	48	1,260	25	652	---	---	---	---	---	---	---	---
15	50	1,350	25	640	---	---	---	---	---	---	---	---
16	69	1,920	24	631	---	---	---	---	---	---	---	---
17	85	2,440	25	647	---	---	---	---	---	---	---	---
18	98	2,880	32	817	---	---	---	---	---	---	---	---
19	89	2,640	40	1,000	---	---	---	---	---	---	---	---
20	82	2,420	48	1,120	---	---	---	---	---	---	---	---
21	78	2,360	76	1,490	---	---	---	---	---	---	---	---
22	75	2,320	297	5,290	---	---	---	---	---	---	---	---
23	72	2,240	538	10,500	---	---	---	---	---	---	---	---
24	70	2,160	467	9,770	---	---	---	---	---	---	---	---
25	69	2,140	334	7,300	---	---	---	---	---	---	---	---
26	69	2,120	304	7,270	---	---	---	---	---	---	---	---
27	67	2,090	281	7,370	---	---	---	---	---	---	---	---
28	60	1,820	262	7,030	---	---	---	---	---	---	---	---
29	55	1,640	244	6,380	---	---	---	---	---	---	---	---
30	56	1,700	228	5,770	---	---	---	---	---	---	---	---
31	39	1,130	---	---	---	---	---	---	---	---	---	---
Total	---	51,978	---	82,980	---	---	---	---	---	---	---	---

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT—Continued

SUSPENDED-SEDIMENT
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Mean concentration (mg/L)	Sediment discharge (tons/day)										
	April		May		June		July		August		September	
1	130	3,140	993	54,800	401	19,200	265	14,400	116	1,810	30	146
2	119	2,850	758	37,500	294	13,300	223	10,600	153	2,450	28	138
3	103	2,410	557	24,600	356	16,400	193	8,560	64	1,010	27	136
4	87	2,000	332	13,300	293	13,600	171	7,280	104	1,600	28	146
5	78	1,750	265	9,810	499	28,100	153	6,250	109	1,580	29	158
6	93	2,140	215	7,570	1,090	78,500	244	10,600	93	1,250	30	174
7	88	2,110	249	8,150	1,470	129,000	243	10,100	81	1,050	31	187
8	77	1,800	209	6,410	2,370	233,000	167	6,410	72	877	32	202
9	75	1,710	140	4,110	2,180	233,000	146	5,270	63	717	34	226
10	75	1,750	103	3,050	1,570	152,000	126	4,120	53	535	35	238
11	77	1,870	112	3,050	964	76,600	114	3,400	46	419	37	259
12	68	1,620	102	2,580	1,070	84,500	103	2,930	49	438	37	265
13	136	4,040	71	1,670	917	74,400	93	2,500	32	267	36	247
14	250	8,180	115	3,260	771	53,600	84	2,140	74	666	34	235
15	135	3,780	151	5,020	564	34,300	76	1,890	53	499	32	233
16	77	1,900	109	3,300	379	21,400	70	1,730	46	420	34	265
17	80	2,040	101	2,950	458	26,200	71	1,680	41	378	37	304
18	88	2,300	130	4,100	407	24,100	69	1,670	38	336	35	288
19	65	1,650	221	9,010	293	17,000	66	1,640	37	325	31	249
20	58	1,420	615	31,300	268	15,100	65	1,640	36	319	28	222
21	52	1,200	681	39,400	310	19,000	80	2,060	36	299	27	223
22	57	1,290	863	51,000	312	19,800	81	1,920	36	269	28	239
23	58	1,290	761	39,900	277	16,400	60	1,250	35	237	26	216
24	51	1,100	483	22,300	242	12,700	53	1,180	35	207	24	196
25	51	1,040	401	19,100	247	12,400	720	17,800	34	183	23	190
26	57	1,120	741	47,900	219	11,600	1,230	26,300	34	169	23	193
27	79	1,730	1,170	77,000	304	17,300	1,020	19,800	36	185	23	193
28	304	9,560	2,010	120,000	372	23,400	490	8,950	37	200	23	192
29	1,020	46,300	1,040	56,100	439	27,500	230	4,040	36	190	23	192
30	1,280	67,900	554	28,600	379	23,100	114	1,880	34	169	77	731
31	---	---	562	28,200	---	---	99	1,540	32	157	---	---
Total	---	182,990	---	765,040	---	1,526,500	---	191,530	---	19,211	---	6,883