

06329500 YELLOWSTONE RIVER NEAR SIDNEY, MT

Yellowstone Basin
Lower Yellowstone Subbasin

LOCATION.--Lat 47°40'42", long 104°09'22" referenced to North American Datum of 1927, 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.

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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	7,760	7,240	e4,910	e6,310	e6,740	e4,990	9,840	14,500	82,500	79,000	30,500	11,300
2	7,450	7,200	e5,910	e6,310	e6,500	e5,130	11,300	14,100	79,200	71,400	29,300	11,200
3	7,330	7,190	e6,310	e5,910	e6,100	e5,470	12,100	13,800	69,300	73,100	28,400	11,400
4	7,220	7,240	e6,310	e5,110	e5,620	e5,770	11,800	13,700	61,500	76,100	27,800	11,300
5	7,140	7,220	e6,410	e4,710	e5,580	e6,530	11,300	13,500	57,400	80,600	28,300	11,200
6	7,120	7,110	e6,510	e4,420	e5,660	e6,520	11,100	13,000	57,300	84,000	27,800	11,300
7	7,050	7,100	e6,910	e4,810	e5,870	e6,790	10,900	12,700	55,300	79,500	26,500	11,100
8	7,000	7,050	e6,910	e5,010	e6,210	e6,940	10,700	12,400	53,800	73,700	25,700	10,800
9	7,090	7,100	e6,410	e5,310	e6,360	e7,020	10,200	12,800	57,200	75,500	24,800	10,600
10	7,300	7,210	e5,910	e5,910	e6,300	e7,150	9,890	22,100	64,400	75,000	24,100	10,200
11	7,460	7,100	e6,110	e6,210	e6,090	e7,270	10,700	45,800	70,400	74,800	22,900	9,960
12	7,440	7,180	e6,800	e6,510	e5,990	e7,640	10,600	60,600	74,400	71,300	22,000	9,710
13	7,460	7,450	e7,110	e6,410	e5,880	e8,230	10,300	44,500	76,600	66,100	21,200	9,740
14	7,450	7,390	e7,110	e5,910	e6,040	e12,000	9,760	37,200	76,600	59,300	20,500	9,690
15	7,450	7,200	e6,910	e5,110	e6,570	e19,000	9,460	28,100	75,900	57,900	19,400	9,610
16	7,440	7,090	e6,910	e4,610	e7,210	e20,700	9,350	23,000	71,600	60,100	18,700	9,550
17	7,280	7,030	e6,910	e4,710	e7,820	e22,300	9,900	23,100	70,100	59,200	18,000	9,580
18	7,300	7,270	e7,110	e5,410	e7,990	e26,000	10,000	25,300	73,300	56,000	17,200	9,600
19	7,240	7,320	e7,300	e5,910	e8,140	e29,800	10,000	26,700	77,900	51,900	16,400	9,550
20	7,010	e7,260	e6,910	e6,110	e7,980	e31,600	10,700	29,700	78,200	48,800	15,900	9,500
21	6,950	e7,280	e6,310	e6,800	e7,680	e29,300	11,000	48,500	72,700	46,600	15,300	9,420
22	7,080	e7,170	e5,610	e6,910	e7,120	e25,400	12,400	81,200	63,900	46,200	14,500	9,360
23	7,150	e7,050	e5,310	e6,800	e6,350	e20,300	16,400	104,000	61,900	46,900	14,000	9,390
24	7,140	e6,860	e5,310	e6,410	e5,740	e16,600	20,300	120,000	61,500	44,200	13,600	9,420
25	7,080	e5,480	e5,210	e6,130	e4,680	e13,900	19,300	121,000	62,500	41,100	13,100	9,410
26	6,960	e5,210	e5,410	e6,130	e5,490	e12,200	16,300	111,000	67,700	39,500	12,300	9,280
27	7,000	e4,710	e5,810	e6,130	e5,490	10,900	14,200	89,500	71,800	38,000	11,900	9,100
28	6,970	e4,010	e5,910	e6,020	e5,120	9,680	13,700	78,100	75,800	36,500	11,600	8,960
29	6,980	e3,320	e6,110	e6,210	---	8,870	13,300	84,300	80,500	35,300	11,300	8,940
30	7,130	e4,000	e6,110	e6,440	---	8,640	14,200	91,500	83,500	34,700	11,200	9,040
31	7,300	---	e6,210	e6,620	---	9,030	---	84,600	---	32,400	11,300	---
Total	223,730	199,040	194,990	181,310	178,320	411,670	361,000	1,500,300	2,084,700	1,814,700	605,500	299,210
Mean	7,217	6,635	6,290	5,849	6,369	13,280	12,030	48,400	69,490	58,540	19,530	9,974
Max	7,760	7,450	7,300	6,910	8,140	31,600	20,300	121,000	83,500	84,000	30,500	11,400
Min	6,950	3,320	4,910	4,420	4,680	4,990	9,350	12,400	53,800	32,400	11,200	8,940
Ac-ft	443,800	394,800	386,800	359,600	353,700	816,500	716,000	2,976,000	4,135,000	3,599,000	1,201,000	593,500

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1911 - 2011, BY WATER YEAR (WY)*

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	8,143	7,243	5,892	5,669	6,708	10,600	10,080	18,360	38,400	22,790	8,537	7,019
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.

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SUMMARY STATISTICS

	Calendar Year 2010		Water Year 2011		Water Years 1911 – 2011*	
Annual total	4,300,180		8,054,470			
Annual mean	11,780		22,070		12,470	
Highest annual mean					22,070 2011	
Lowest annual mean					5,673 2004	
Highest daily mean	55,100	Jun 10	121,000	May 25	142,000	Jun 21, 1921
Lowest daily mean	3,320	Nov 29	3,320	Nov 29	570	May 17, 1961
Annual seven-day minimum	4,520	Nov 25	4,520	Nov 25	1,010	Aug 8, 1961
Maximum peak flow			^a 124,000	May 24	^c 159,000	Jun 21, 1921
Maximum peak stage			^b 22.02	Mar 19	^b 24.03	Mar 6, 1994
Instantaneous low flow					^d 470	May 17, 1961
Annual runoff (ac-ft)	8,529,000		15,980,000		9,032,000	
10 percent exceeds	31,100		71,300		28,000	
50 percent exceeds	7,190		9,580		7,880	
90 percent exceeds	5,300		5,880		4,060	

	Water Years 1911 – 1965**		Water Years 1967 - 2011***	
Annual mean	12,890		12,060	
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	^c 159,000	Jun 21, 1921	^a 124,000	May 24, 2011
Maximum peak stage	^b 21.85	Mar 22, 1947	^b 24.03	Mar 6, 1994
Instantaneous low flow	^d 470	May 17, 1961		
Annual runoff (ac-ft)	9,341,000		8,737,000	
10 percent exceeds	29,900		26,300	
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.

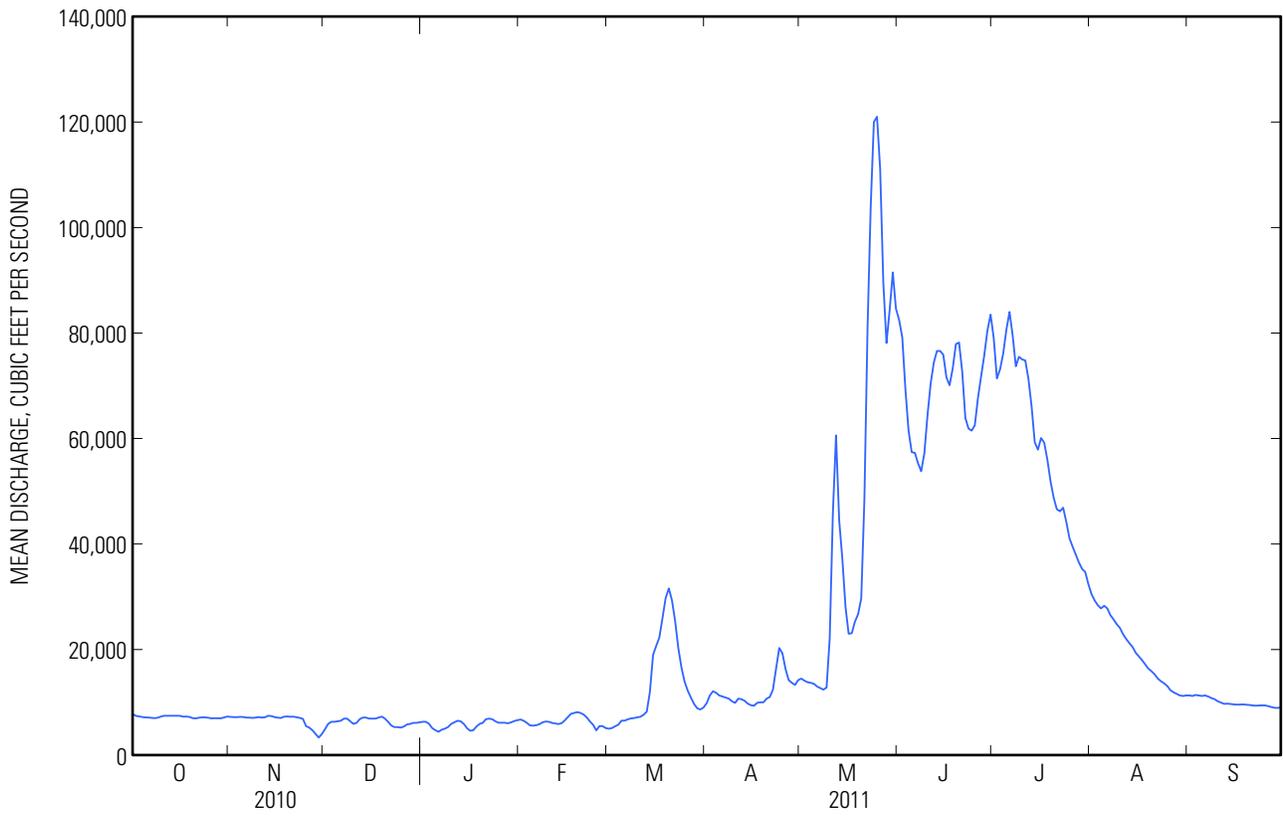
^aGage height, 21.84 ft.

^bBackwater from ice.

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

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

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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 to 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 2010 to November 2010 and March 2011 to September 2011) 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, 11,900 mg/L, May 11; minimum daily mean, 22 mg/L, Oct. 29.

SEDIMENT LOAD: During period of seasonal operation, maximum daily, 1,470,000 tons, May 11 and 22; minimum daily, 323 tons, Mar. 1.

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SUSPENDED-SEDIMENT
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[×10⁶, million]

Day	Mean	Sediment										
	concentration (mg/L)	discharge (tons/day)										
	October		November		December		January		February		March	
1	50	1,050	81	1,580	---	---	---	---	---	---	24	323
2	36	724	67	1,300	---	---	---	---	---	---	29	402
3	33	653	72	1,400	---	---	---	---	---	---	34	502
4	31	604	73	1,430	---	---	---	---	---	---	40	623
5	29	559	55	1,070	---	---	---	---	---	---	45	793
6	28	538	42	806	---	---	---	---	---	---	50	880
7	28	533	35	671	---	---	---	---	---	---	55	1,010
8	29	548	31	590	---	---	---	---	---	---	61	1,140
9	40	766	36	690	---	---	---	---	---	---	66	1,250
10	81	1,600	71	1,380	---	---	---	---	---	---	71	1,370
11	164	3,300	136	2,610	---	---	---	---	---	---	77	1,510
12	162	3,250	189	3,660	---	---	---	---	---	---	82	1,690
13	189	3,810	132	2,660	---	---	---	---	---	---	87	1,930
14	140	2,820	70	1,400	---	---	---	---	---	---	335	10,900
15	99	1,990	48	933	---	---	---	---	---	---	831	42,600
16	82	1,650	46	881	---	---	---	---	---	---	1,230	68,700
17	69	1,360	52	987	---	---	---	---	---	---	1,420	85,500
18	56	1,100	52	1,020	---	---	---	---	---	---	1,540	108,000
19	43	841	46	909	---	---	---	---	---	---	1,680	135,000
20	33	625	50	980	---	---	---	---	---	---	1,650	141,000
21	30	563	53	1,040	---	---	---	---	---	---	1,600	127,000
22	30	573	57	1,100	---	---	---	---	---	---	1,500	103,000
23	30	579	60	1,140	---	---	---	---	---	---	1,250	68,500
24	29	559	64	1,190	---	---	---	---	---	---	1,030	46,200
25	30	573	67	991	---	---	---	---	---	---	994	37,300
26	33	620	71	999	---	---	---	---	---	---	916	30,200
27	35	662	74	941	---	---	---	---	---	---	726	21,400
28	29	546	75	812	---	---	---	---	---	---	577	15,100
29	22	415	75	672	---	---	---	---	---	---	413	9,890
30	30	578	76	821	---	---	---	---	---	---	373	8,700
31	52	1,020	---	---	---	---	---	---	---	---	584	14,200
Total	---	35,009	---	36,663	---	---	---	---	---	---	---	1,086,613

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SUSPENDED-SEDIMENT
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[×10⁶, million]

Day	Mean	Sediment										
	concentration (mg/L)	discharge (tons/day)										
	April		May		June		July		August		September	
1	705	18,700	4,860	190,000	2,000	446,000	624	133,000	369	30,400	124	3,780
2	758	23,100	1,300	49,500	1,370	293,000	638	123,000	363	28,700	125	3,780
3	780	25,500	760	28,300	1,130	211,000	653	129,000	357	27,400	114	3,510
4	676	21,500	493	18,200	1,150	191,000	734	151,000	353	26,500	90	2,750
5	495	15,100	407	14,800	1,100	170,000	791	172,000	357	27,300	74	2,240
6	458	13,700	321	11,300	1,000	155,000	805	183,000	369	27,700	61	1,860
7	399	11,700	295	10,100	916	137,000	676	145,000	450	32,200	52	1,560
8	392	11,300	220	7,370	859	125,000	692	138,000	351	24,400	45	1,310
9	379	10,400	298	10,300	862	133,000	649	132,000	298	20,000	40	1,140
10	345	9,210	4,220	252,000	1,000	174,000	674	136,000	274	17,800	40	1,100
11	420	12,100	11,900	1,470,000	1,060	201,000	635	128,000	260	16,100	42	1,130
12	531	15,200	6,880	1,130,000	870	175,000	593	114,000	246	14,600	45	1,180
13	559	15,500	3,370	405,000	768	159,000	657	117,000	234	13,400	48	1,260
14	329	8,670	2,180	219,000	907	188,000	620	99,300	226	12,500	51	1,330
15	293	7,480	1,850	140,000	1,360	279,000	636	99,400	219	11,500	52	1,350
16	297	7,500	1,330	82,600	1,560	302,000	925	150,000	211	10,700	47	1,210
17	287	7,670	927	57,800	948	179,000	684	109,000	203	9,870	42	1,090
18	278	7,510	838	57,200	912	180,000	611	92,400	194	9,010	38	985
19	214	5,780	956	68,900	989	208,000	543	76,100	183	8,100	36	928
20	314	9,070	1,650	132,000	701	148,000	546	71,900	163	7,000	34	872
21	323	9,590	6,140	804,000	609	120,000	555	69,800	142	5,870	29	738
22	740	24,800	6,690	1,470,000	633	109,000	580	72,300	125	4,890	28	708
23	2,310	102,000	3,550	997,000	624	104,000	713	90,300	118	4,460	31	786
24	4,830	265,000	2,340	758,000	618	103,000	559	66,700	112	4,110	32	814
25	3,070	160,000	1,910	624,000	579	97,700	477	52,900	106	3,750	31	788
26	1,850	81,400	1,530	459,000	662	121,000	455	48,500	101	3,350	29	727
27	1,100	42,200	1,210	292,000	768	149,000	449	46,100	95	3,050	27	663
28	596	22,000	1,330	280,000	857	175,000	496	48,900	90	2,820	26	629
29	600	21,500	1,330	303,000	918	200,000	426	40,600	85	2,590	25	603
30	952	36,500	1,230	304,000	742	167,000	403	37,800	89	2,690	24	586
31	---	---	1,970	450,000	---	---	384	33,600	114	3,480	---	---
Total	---	1,021,680	---	11.09×10 ⁶	---	5,399,700	---	3,106,600	---	416,240	---	41,407