Water-Data Report 2011

06441500 BAD RIVER NEAR FORT PIERRE, SD

Fort Randall Reservoir Basin
Bad Subbasin

LOCATION.--Lat 44°19′36″, long 100°23′02″ referenced to North American Datum of 1927, in NW ¼ NW ¼ sec.10, T.4 N., R.31 E., Stanley County, SD, Hydrologic Unit 10140102, on right bank at downstream side of highway bridge, 2.1 mi southwest of Fort Pierre, 4.3 mi downstream from Willow Creek, and 6.0 mi upstream from mouth.

DRAINAGE AREA.--3,147 mi^2.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--August 1928 to current year. Monthly discharge only for July 1932 to February 1934, published in WSP 1309.

REVISED RECORDS.--WSP 856: 1929(M), 1937. WDR SD-10-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 1,427.83 ft above NGVD of 1929. Prior to Jul. 10, 1951, nonrecording gage at same site and datum.

REMARKS.--Records good except those for Mar. 31 to Jul. 29 and Aug. 2 - 20, which are fair, and those for estimated daily discharges, which are poor. Satellite data-collection platform at station. Water temperature and specific conductance measured with each discharge measurement. Suspended sediment samples collected with each discharge measurement.

EXTREMES OUTSIDE PERIOD OF RECORD.--Flood in April 1927 reached a stage of 30.89 ft, from floodmarks, discharge, about 55,000 ft^3/s. Flood in July 1905 reached a stage about 2 ft higher than that in April 1927.

Suggested citation: U.S. Geological Survey, 2012, Water-resources data for the United States, Water Year 2011: U.S. Geological Survey Water-Data Report WDR-US-2011, site 06441500, accessed at http://wdr.water.usgs.gov/wy2011/pdfs/06441500.2011.pdf

06441500 BAD RIVER NEAR FORT PIERRE, SD—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	e0.94	e1.3	e2.0	e2.1	e3.1	e298	430	229	550	2,300	68	18
2	e0.90	e1.3	e2.0	e2.1	e2.9	e187	458	190	792	1,860	356	19
3	e0.88	e1.3	e2.0	e2.1	e2.4	e157	459	157	590	1,070	156	26
4	e0.86	e1.4	e2.0	e2.2	e2.7	e120	424	130	402	687	93	21
5	e0.85	e1.4	e2.0	e2.3	e3.2	e75	335	110	394	6,360	70	17
6	e0.84	e1.5	e2.0	e2.5	e3.4	e59	259	96	245	4,180	65	17
7	e0.84	e1.5	e2.0	e2.8	e3.9	e32	203	84	106	2,010	59	17
8	e0.84	e1.5	e2.0	e2.8	e3.5	e21	167	77	93	1,080	66	17
9	e0.84	e1.5	e2.1	e2.6	e3.2	e16	146	70	90	3,770	204	17
10	e0.84	e1.6	e2.1	e2.7	e2.8	e10	160	64	84	1,270	366	55
11	e0.84	e1.6	e2.1	e2.3	e2.8	e148	200	57	78	636	232	44
12	e0.87	e1.6	e2.1	e2.2	e3.5	e1,590	150	64	83	384	203	35
13	e0.85	e1.7	e2.1	e2.5	e6.1	e1,790	115	97	79	1,160	371	29
14	e0.85	e1.7	e2.1	e2.5	e720	e2,200	102	91	72	1,910	248	25
15	e0.85	e1.7	e2.1	e2.7	e4,510	e6,480	157	83	64	755	226	23
16	e0.85	e1.8	e2.2	e2.7	e5,920	e8,690	562	91	69	442	190	22
17	e0.85	e1.8	e2.2	e2.6	e5,620	e8,010	1,460	262	87	297	125	21
18	e0.85	e1.8	e2.2	e2.6	e5,370	e8,160	727	198	116	216	91	19
19	e0.85	e1.9	e2.2	e2.8	e3,500	e5,960	1,230	151	165	156	65	18
20	e0.85	e1.9	e2.2	e2.7	e1,490	e2,760	1,850	312	1,920	118	63	18
21	e0.90	e2.0	e2.2	e2.9	e599	e1,560	1,190	1,190	16,300	102	71	17
22	e0.90	e2.0	e2.2	e2.9	e310	e1,010	1,090	895	13,600	123	58	17
23	e0.90	e2.0	e2.2	e2.8	e712	e666	820	1,920	7,440	289	43	17
24	e1.0	e1.9	e2.2	e3.2	e733	e431	739	2,540	2,690	108	33	17
25	e1.1	e1.9	e2.2	e3.4	e585	e289	740	1,300	6,510	75	30	17
26	e1.1	e2.0	e2.2	e3.4	e535	e221	720	1,110	8,990	250	28	17
27	e1.1	e2.0	e2.3	e4.2	e389	e196	570	2,750	5,080	212	29	16
28	e1.2	e2.0	e2.3	e4.4	e314	e186	442	3,410	2,030	93	25	16
29	e1.2	e2.0	e2.3	e4.4	---	e200	352	2,120	1,780	81	23	16
30	e1.2	e2.0	e2.3	e4.0	---	e278	281	968	1,790	68	22	16
31	e1.2	---	e2.2	e3.2	---	426	---	664	---	62	20	---
Total	28.94	51.6	66.3	88.6	31,350.5	52,226	16,538	21,480	72,289	32,124	3,699	644
Mean	0.93	1.72	2.14	2.86	1,120	1,685	551	693	2,410	1,036	119	21.5
Max	1.2	2.0	2.3	4.4	5,920	8,690	1,850	3,410	16,300	6,360	371	55
Min	0.84	1.3	2.0	2.1	2.4	10	102	57	64	62	20	16
Ac-ft	57	102	132	176	62,180	103,600	32,800	42,610	143,400	63,720	7,340	1,280

STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 1929 - 2011, BY WATER YEAR (WY)

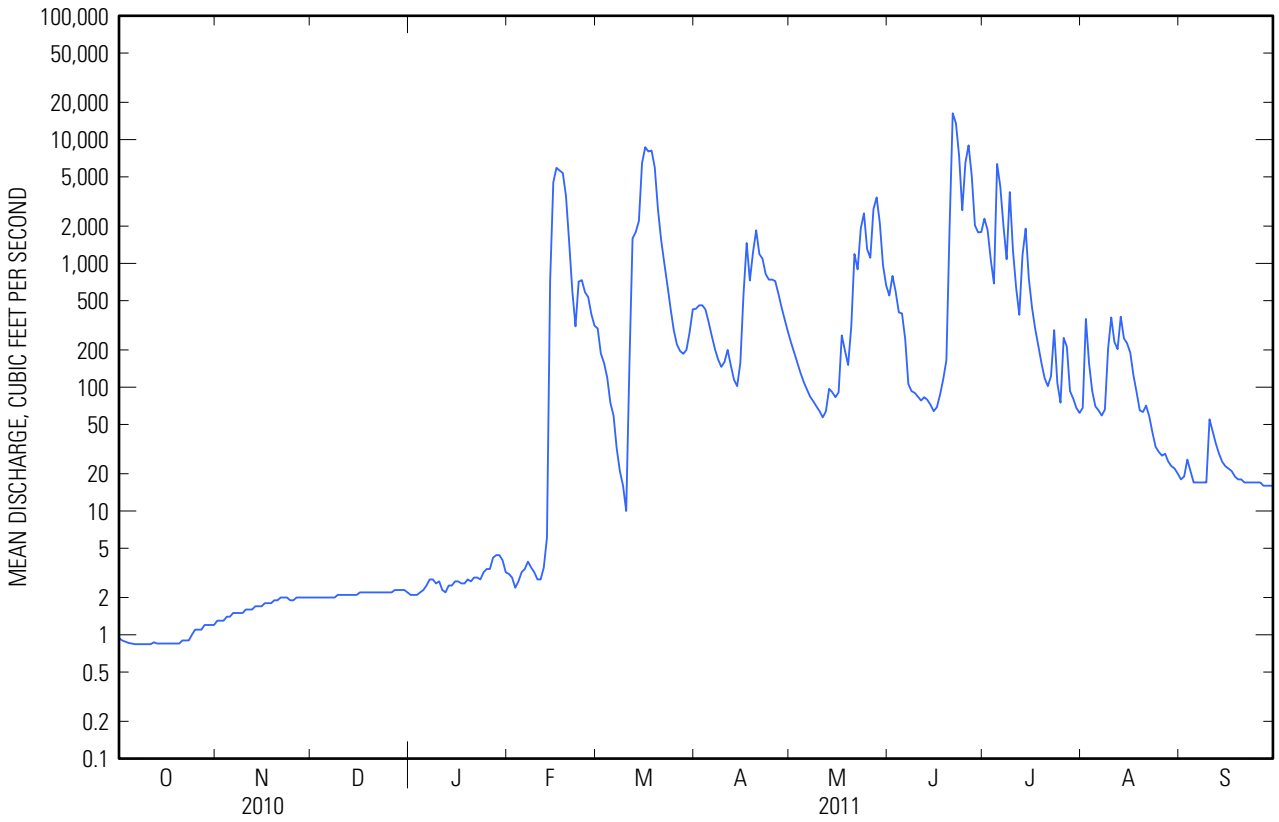
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	18.0	5.49	2.25	10.8	151	550	408	392	374	87.7	46.1	35.7
Max	295	199	51.1	434	3,436	4,591	7,306	6,663	2,567	1,036	706	1,027
(WY)	(1983)	(1999)	(1999)	(1997)	(1997)	(2010)	(1952)	(1942)	(1967)	(2011)	(1930)	(1999)
Min	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
(WY)	(1929)	(1929)	(1929)	(1929)	(1936)	(1934)	(1934)	(1980)	(1930)	(1930)	(1929)	(1929)

06441500 BAD RIVER NEAR FORT PIERRE, SD—Continued

SUMMARY STATISTICS

	Calendar Year 2010		Water Year 2011		Water Years 1929 - 2011	
Annual total	194,740.96		230,585.94			
Annual mean	534		632		[a]173	
Highest annual mean					1,203	1997
Lowest annual mean					6.07	1980
Highest daily mean	11,800	Mar 10	16,300	Jun 21	27,200	May 1, 1942
Lowest daily mean	0.84	Oct 6	0.84	Oct 6	[b]0.00	Oct 1, 1928
Annual seven-day minimum	0.84	Oct 5	0.84	Oct 5	0.00	Oct 1, 1928
Maximum peak flow			23,300	Jun 21	43,800	Jun 18, 1967
Maximum peak stage			27.27	Jun 21	29.55	Jun 18, 1967
Annual runoff (ac-ft)	386,300		457,400		125,500	
10 percent exceeds	1,000		1,780		232	
50 percent exceeds	2.9		59		0.90	
90 percent exceeds	1.1		1.5		0.00	

[a] Median of annual mean discharges, 110 ft^3/s.
[b] No flow for long periods in most years.



06441500 BAD RIVER NEAR FORT PIERRE, SD—Continued

WATER-QUALITY RECORDS

PERIOD OF RECORD.--October 1945 to September 1953, October 1971 to current year.

PERIOD OF DAILY RECORD.--
SUSPENDED-SEDIMENT DISCHARGE: October 1971 to current year.
WATER TEMPERATURE: October 1972 to June 1983.

REVISED RECORDS.--WDR SD-81-1: 1979-80.

REMARKS.--Sediment discharge records fair except those for estimated daily concentrations and/or discharges, which are poor. Observer collects samples on a daily basis during most periods of moderate and higher open-water flows. Size analyses for suspended-sediment samples collected for low flows may be affected by dissolved solids. Sediment-discharge records prior to Oct. 1, 1971, on file in the District office, U.S. Army Corps of Engineers, Omaha, NE.

EXTREMES FOR PERIOD OF DAILY RECORD.--
SEDIMENT CONCENTRATION: Maximum daily mean, 124,000 mg/L, July 17, 1981; minimum daily mean, 0 mg/L, estimated, on many days most years.
SEDIMENT LOAD: Maximum daily, 949,000 tons, May 14, 1982; minimum daily, 0 ton on many days most years.

EXTREMES FOR CURRENT YEAR.--
SEDIMENT CONCENTRATION: Maximum daily mean, 13200 mg/L, July 5; minimum daily mean, 20 mg/L, Oct. 8 - 10.
SEDIMENT LOAD: Maximum daily, 504,000 tons, June 21; minimum daily, 0.5 ton, many days.

06441500 BAD RIVER NEAR FORT PIERRE, SD—Continued

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY)
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
[e, estimated]

Day	Mean discharge (ft^3/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)	Mean discharge (ft^3/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)	Mean discharge (ft^3/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)
		October			November			December	
1	e0.94	e25	0.06	e1.3	e24	0.09	e2.0	e28	0.15
2	e0.90	e24	0.06	e1.3	e24	0.09	e2.0	e28	0.15
3	e0.88	e23	0.06	e1.3	e25	0.09	e2.0	e29	0.15
4	e0.86	e23	0.05	e1.4	e25	0.09	e2.0	e29	0.15
5	e0.85	e22	0.05	e1.4	e25	0.09	e2.0	e29	0.15
6	e0.84	e21	0.05	e1.5	e25	0.10	e2.0	e29	0.15
7	e0.84	e21	0.05	e1.5	e25	0.10	e2.0	e29	0.15
8	e0.84	20	0.05	e1.5	e26	0.10	e2.0	e29	0.16
9	e0.84	e20	0.05	e1.5	e26	0.10	e2.1	e29	0.16
10	e0.84	e20	0.05	e1.6	e26	0.11	e2.1	e29	0.16
11	e0.84	e21	0.05	e1.6	e26	0.11	e2.1	e29	0.16
12	e0.87	e21	0.05	e1.6	e26	0.11	e2.1	e29	0.16
13	e0.85	e21	0.05	e1.7	e26	0.12	e2.1	e29	0.16
14	e0.85	e21	0.05	e1.7	e27	0.12	e2.1	e29	0.16
15	e0.85	e21	0.05	e1.7	e27	0.12	e2.1	e29	0.16
16	e0.85	e21	0.05	e1.8	e27	0.13	e2.2	e29	0.17
17	e0.85	e22	0.05	e1.8	e27	0.13	e2.2	e29	0.17
18	e0.85	e22	0.05	e1.8	e27	0.13	e2.2	e29	0.17
19	e0.85	e22	0.05	e1.9	e27	0.14	e2.2	e29	0.17
20	e0.85	e22	0.05	e1.9	e28	0.14	e2.2	e29	0.17
21	e0.90	e22	0.05	e2.0	e28	0.15	e2.2	e29	0.17
22	e0.90	e22	0.05	e2.0	28	0.15	e2.2	e29	0.17
23	e0.90	e23	0.06	e2.0	e28	0.15	e2.2	e29	0.17
24	e1.0	e23	0.06	e1.9	e28	0.14	e2.2	e29	0.18
25	e1.1	e23	0.07	e1.9	e28	0.14	e2.2	e30	0.18
26	e1.1	e23	0.07	e2.0	e28	0.15	e2.2	e30	0.18
27	e1.1	e23	0.07	e2.0	e28	0.15	e2.3	e30	0.18
28	e1.2	e24	0.08	e2.0	e28	0.15	e2.3	e30	0.18
29	e1.2	e24	0.08	e2.0	e28	0.15	e2.3	e30	0.18
30	e1.2	e24	0.08	e2.0	e28	0.15	e2.3	e30	0.18
31	e1.2	e24	0.08	---	---	---	e2.2	e30	0.18
Total	28.94	---	1.78	51.6	---	3.69	66.3	---	5.13

06441500 BAD RIVER NEAR FORT PIERRE, SD—Continued

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY)
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
[e, estimated]

Day	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)
		January			**February**			**March**	
1	e2.1	e30	0.17	e3.1	e280	2.3	e298	e445	358
2	e2.1	e30	0.17	e2.9	e275	2.2	e187	e409	207
3	e2.1	e30	0.17	e2.4	e270	1.7	e157	e372	158
4	e2.2	e30	0.18	e2.7	266	1.9	e120	e336	109
5	e2.3	e32	0.20	e3.2	e266	2.3	e75	e299	61
6	e2.5	e35	0.23	e3.4	e266	2.4	e59	e263	42
7	e2.8	e37	0.29	e3.9	e267	2.8	e32	e227	20
8	e2.8	e40	0.30	e3.5	e268	2.5	e21	e190	11
9	e2.6	e42	0.30	e3.2	e268	2.3	e16	e154	6.7
10	e2.7	e45	0.33	e2.8	e269	2.0	e10	e118	3.4
11	e2.3	e47	0.29	e2.8	e270	2.0	e148	e1,790	714
12	e2.2	e52	0.31	e3.5	e270	2.6	e1,590	e4,630	19,800
13	e2.5	e66	0.44	e6.1	e271	4.4	e1,790	e5,250	25,300
14	e2.5	e81	0.56	e720	e1,440	2,800	e2,200	e5,500	32,600
15	e2.7	e97	0.72	e4,510	e3,680	44,500	e6,480	e5,750	99,900
16	e2.7	e112	0.83	e5,920	e5,550	88,500	e8,690	e5,970	140,000
17	e2.6	e128	0.90	e5,620	e5,090	77,200	e8,010	e5,970	129,000
18	e2.6	e144	1.0	e5,370	e4,210	61,100	e8,160	e5,950	131,000
19	e2.8	e159	1.2	e3,500	e3,330	31,700	e5,960	5,890	95,100
20	e2.7	e175	1.3	e1,490	e2,450	10,000	e2,760	e5,270	39,800
21	e2.9	e191	1.5	e599	e1,580	2,600	e1,560	e4,450	18,900
22	e2.9	e206	1.6	e310	e805	682	e1,010	e3,630	9,960
23	e2.8	e222	1.7	e712	e664	1,270	e666	e2,820	5,090
24	e3.2	e237	2.0	e733	e627	1,240	e431	e2,060	2,410
25	e3.4	e253	2.3	e585	e591	936	e289	e1,670	1,310
26	e3.4	e269	2.5	e535	e554	801	e221	e1,350	809
27	e4.2	e284	3.2	e389	e518	546	e196	e1,020	544
28	e4.4	e297	3.5	e314	e481	409	e186	e746	374
29	e4.4	e295	3.5	---	---	---	e200	e775	418
30	e4.0	e290	3.1	---	---	---	e278	e1,420	1,060
31	e3.2	e285	2.5	---	---	---	426	3,340	3,840
Total	88.6	---	37.29	31,350.5	---	324,315.4	52,226	---	758,905.1

06441500 BAD RIVER NEAR FORT PIERRE, SD—Continued

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY)
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
[e, estimated]

Day	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)
		April			May			June	
1	430	3,280	3,810	229	602	374	550	2,070	3,080
2	458	2,820	3,470	190	413	213	792	e1,820	3,910
3	459	1,750	2,160	157	315	134	590	e1,530	2,450
4	424	1,210	1,390	130	259	91	402	e1,240	1,360
5	335	881	801	110	192	57	394	e955	1,020
6	259	690	486	96	181	47	245	671	455
7	203	600	330	84	163	37	106	e538	154
8	167	473	214	77	132	28	93	e483	122
9	146	365	144	70	105	20	90	e428	105
10	160	438	191	64	83	14	84	e374	84
11	200	652	351	57	64	9.9	78	e319	67
12	150	472	195	64	74	13	83	264	59
13	115	333	103	97	135	35	79	203	43
14	102	326	90	91	184	45	72	173	34
15	157	588	275	83	197	44	64	165	29
16	562	3,180	7,430	91	206	51	69	168	31
17	1,460	11,200	45,000	262	e978	746	87	286	68
18	727	5,510	11,000	198	e685	373	116	434	139
19	1,230	4,250	14,400	151	e480	196	165	578	258
20	1,850	6,970	35,000	312	e1,180	1,340	1,920	9,930	93,000
21	1,190	4,920	15,800	1,190	e6,130	20,300	16,300	12,600	504,000
22	1,090	4,170	12,400	895	6,000	14,600	13,600	4,760	184,000
23	820	2,990	6,640	1,920	6,680	35,600	7,440	e2,980	61,100
24	739	1,800	3,600	2,540	6,090	41,800	2,690	e2,180	16,200
25	740	1,620	3,230	1,300	3,950	14,300	6,510	e5,960	113,000
26	720	1,970	3,810	1,110	3,710	11,200	8,990	e7,480	182,000
27	570	2,490	3,820	2,750	e4,090	30,400	5,080	e4,860	72,700
28	442	2,260	2,710	3,410	e4,380	40,200	2,030	e3,570	19,700
29	352	2,200	2,100	2,120	e3,700	21,900	1,780	3,090	14,900
30	281	1,140	882	968	e2,620	6,940	1,790	e2,750	13,300
31	---	---	---	664	e2,290	4,120	---	---	---
Total	16,538	---	181,832	21,480	---	245,227.9	72,289	---	1,287,368

06441500 BAD RIVER NEAR FORT PIERRE, SD—Continued

SEDIMENT DISCHARGE, SUSPENDED (TONS/DAY)
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011
[e, estimated]

Day	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)	Mean discharge (ft³/s)	Mean concen-tration (mg/L)	Sediment discharge (tons/day)
		July			August			September	
1	2,300	e2,880	17,900	68	e188	35	18	e41	2.0
2	1,860	e2,670	13,500	356	e715	723	19	e41	2.0
3	1,070	e2,400	6,970	156	e400	174	26	e74	5.3
4	687	e2,260	4,370	93	209	53	21	e86	4.9
5	6,360	13,200	229,000	70	e177	33	17	e68	3.2
6	4,180	10,400	119,000	65	e169	30	17	e52	2.4
7	2,010	9,220	52,600	59	e161	26	17	e47	2.2
8	1,080	5,150	15,400	66	e158	28	17	e44	2.0
9	3,770	12,400	146,000	204	e452	258	17	e42	2.0
10	1,270	3,000	10,900	366	e693	693	55	e88	13
11	636	1,640	2,860	232	e543	349	44	e79	9.4
12	384	1,220	1,270	203	e491	281	35	e62	5.8
13	1,160	e2,100	11,100	371	e802	809	29	e58	4.6
14	1,910	e3,130	17,500	248	e540	368	25	e57	3.8
15	755	e1,520	3,180	226	e362	221	23	e55	3.5
16	442	e875	1,070	190	e297	154	22	e53	3.2
17	297	e678	546	125	e232	79	21	e52	2.9
18	216	e556	327	91	e168	41	19	e50	2.5
19	156	e434	184	65	e137	24	18	e49	2.4
20	118	e312	100	63	e119	20	18	e48	2.4
21	102	206	57	71	e101	19	17	e48	2.2
22	123	e258	91	58	e84	13	17	e47	2.1
23	289	e674	559	43	e66	7.6	17	e46	2.1
24	108	e322	99	33	51	4.6	17	e45	2.1
25	75	e233	48	30	e48	3.9	17	e44	2.1
26	250	e644	537	28	e47	3.6	17	e44	2.0
27	212	e508	315	29	e46	3.6	16	e43	1.8
28	93	e269	68	25	e45	3.1	16	e42	1.8
29	81	e234	51	23	e44	2.8	16	e41	1.8
30	68	e219	40	22	e43	2.6	16	e40	1.7
31	62	e203	34	20	e42	2.3	---	---	---
Total	32,124	---	655,676	3,699	---	4,465.1	644	---	99.2

	Total discharge (ft³/s)	Total suspended sediment discharge (tons)
Year	230,585.94	3,457,936.59

06441500 BAD RIVER NEAR FORT PIERRE, SD—Continued

WATER-QUALITY DATA
WATER YEAR OCTOBER 2010 TO SEPTEMBER 2011

[ft^3/s, cubic feet per second; °C, degrees Celsius; µS/cm, microsiemens per centimeter]

Date	Sample start time	Discharge, instantaneous, ft^3/s (00061)	Specific conductance, water, unfiltered, µS/cm at 25 °C (00095)	Temperature, air, °C (00020)	Temperature, water, °C (00010)
10-08-2010	**1045**	.84	2,590	25.0	18.0
11-22-2010	**1000**	2.0	3,600	-8.5	1.0
02-04-2011	**1100**	2.6	4,630	4.0	.0
03-31-2011	**1015**	438	2,100	8.5	5.0
04-29-2011	**0935**	361	1,970	19.0	12.5
05-24-2011	**1010**	2,550	1,090	14.0	16.8
05-24-2011	**1430**	2,630	1,040	16.7	14.0
06-16-2011	**1415**	71	2,310	31.0	25.2
06-21-2011	**1430**	16,400	917	17.0	17.0
06-21-2011	**1950**	23,200	913	17.0	17.0
06-22-2011	**1450**	11,600	1,120	25.0	19.0
06-29-2011	**0910**	1,760	1,520	27.5	23.5
07-21-2011	**0845**	98	2,380	25.1	26.5
08-04-2011	**1145**	89	2,860	31.0	28.5
08-24-2011	**1035**	34	2,220	27.5	26.5