Water-Data Report 2012

12212390 BERTRAND CREEK AT INTERNATIONAL BOUNDARY

Undefined Basin

LOCATION.--Lat 49°00′09″, long 122°31′19″ referenced to North American Datum of 1927, Hydrologic Unit is unknown.

DRAINAGE AREA.--17.4 mi^2.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--May 2007 to current year

GAGE.--Water-stage recorder. Elevation of gage is 150 ft above NGVD 1929, from river profile map.

REMARKS.--Records fair, except estimated daily discharges which are poor. No known diversions upstream of gage.

AVERAGE DISCHARGE FOR PERIOD OF RECORD.--6 years of record (water years 2007-2012), 37.9 ft^3/s 29.56 in/yr, 27,430 acre-ft/yr.

EXTREMES FOR PERIOD OF RECORD.--Maximum discharge, 1,960 ft^3/s, Jan. 7, 2009, gage height, 9.09 ft; minimum discharge, 0.31 ft^3/s, Aug. 10, 26, 2010.

EXTREMES FOR CURRENT YEAR.--Maximum discharge, 682 ft^3/s, Nov. 23, gage height, 6.13 ft; minimum discharge, 0.77 ft^3/s, Sept. 4-6, 8, 9, 17, 20, minimum gage height, 2.89 ft, Sept. 17, 20.

12212390 BERTRAND CREEK AT INTERNATIONAL BOUNDARY—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	2.6	13	26	33	172	48	148	44	17	26	2.3	0.94
2	2.3	10	22	27	87	44	79	29	18	17	2.1	0.93
3	6.5	17	19	53	49	82	61	26	11	44	2.1	0.87
4	7.9	14	17	140	36	58	62	33	9.0	42	2.1	0.86
5	4.8	11	15	126	29	279	38	26	9.9	21	1.9	0.85
6	8.1	9.2	14	58	26	120	29	25	9.7	14	1.8	0.85
7	6.0	8.5	14	38	23	57	24	19	13	12	1.8	0.92
8	5.5	13	13	38	21	40	21	16	37	9.2	1.8	0.89
9	4.2	12	12	30	22	42	19	14	31	8.2	1.8	0.89
10	4.0	9.7	11	25	25	304	17	13	16	7.2	1.7	1.1
11	16	23	11	20	24	220	16	12	12	6.6	1.6	2.0
12	16	41	10	18	21	87	21	10	10	5.8	1.5	1.5
13	10	85	9.5	16	23	85	23	9.6	17	5.1	1.4	1.2
14	7.7	38	9.3	18	24	65	17	9.2	15	4.6	1.3	1.1
15	6.6	23	9.4	20	22	200	15	8.7	11	4.2	1.2	0.93
16	6.0	22	12	17	26	328	26	8.0	17	4.1	1.2	0.94
17	5.4	78	13	16	46	143	25	7.7	48	3.7	1.1	0.92
18	5.1	70	27	e17	165	75	24	7.1	24	3.5	1.1	0.94
19	5.1	48	22	e18	122	54	27	6.7	16	3.3	1.1	0.94
20	5.4	29	17	e20	56	49	128	6.8	13	4.1	1.0	0.93
21	7.6	24	15	142	167	37	48	21	11	6.1	1.0	0.98
22	18	52	13	140	166	31	29	26	9.9	4.0	1.0	1.0
23	17	443	12	136	62	26	22	14	50	7.7	1.1	1.0
24	10	159	34	145	163	23	30	11	56	8.0	1.1	1.0
25	7.7	61	45	242	290	21	60	9.6	24	4.8	1.1	1.0
26	6.7	40	26	184	83	20	161	9.3	16	4.0	1.0	1.0
27	6.6	87	68	75	47	21	70	7.8	14	3.5	1.0	1.1
28	7.7	68	203	48	36	19	35	7.0	12	3.4	1.0	1.0
29	17	38	130	182	41	33	27	6.8	11	2.9	0.97	0.94
30	17	33	88	189	---	91	53	6.4	22	2.5	1.0	0.94
31	22	---	48	80	---	81	---	11	---	2.4	0.94	---
Total	272.5	1,579.4	985.2	2,311	2,074	2,783	1,355	460.7	580.5	294.9	43.11	30.46
Mean	8.79	52.6	31.8	74.5	71.5	89.8	45.2	14.9	19.4	9.51	1.39	1.02
Max	22	443	203	242	290	328	161	44	56	44	2.3	2.0
Ac-ft	541	3,130	1,950	4,580	4,110	5,520	2,690	914	1,150	585	86	60
Cfsm	0.51	3.03	1.83	4.28	4.11	5.16	2.60	0.85	1.11	0.55	0.08	0.06
In.	0.58	3.38	2.11	4.94	4.43	5.95	2.90	0.98	1.24	0.63	0.09	0.07

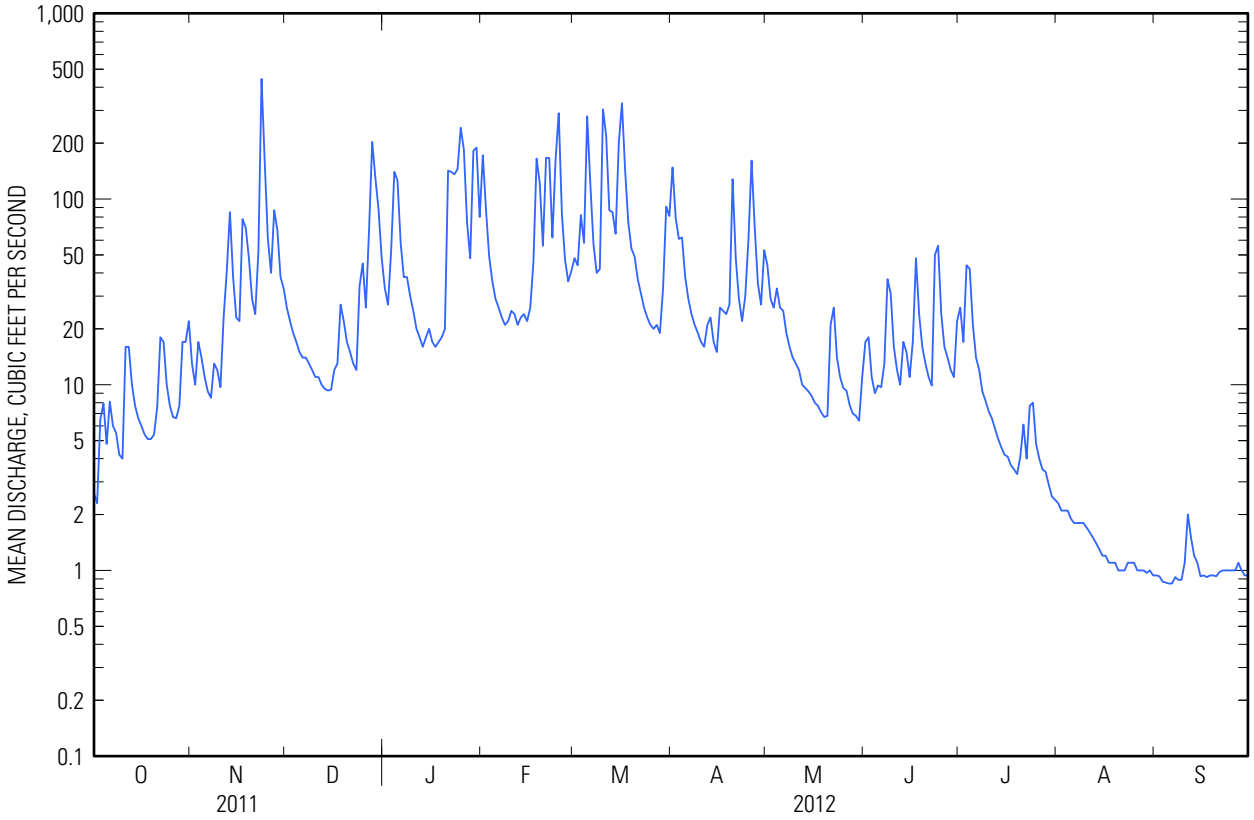
STATISTICS OF MONTHLY MEAN DATA FOR WATER YEARS 2007 - 2012, BY WATER YEAR (WY)

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	16.9	65.2	72.8	109	46.3	52.6	41.4	24.4	12.1	3.80	2.09	4.50
Max	27.5	105	140	160	71.5	89.8	76.9	48.8	19.3	9.51	6.24	17.4
(WY)	(2008)	(2010)	(2011)	(2009)	(2012)	(2012)	(2011)	(2011)	(2012)	(2012)	(2008)	(2010)

12212390 BERTRAND CREEK AT INTERNATIONAL BOUNDARY—Continued

SUMMARY STATISTICS

	Calendar Year 2011		Water Year 2012		Water Years 2007 - 2012	
Annual total	14,841.12		12,769.77			
Annual mean	40.7		34.9		37.9	
Highest annual mean					51.0	2011
Highest daily mean	522	Jan 14	443	Nov 23	1,700	Jan 7, 2009
Lowest daily mean	0.37	Sep 13	0.85	Sep 5	0.37	Sep 13, 2011
Annual seven-day minimum	0.39	Sep 7	0.88	Sep 3	0.39	Sep 7, 2011
Annual runoff (ac-ft)	29,440		25,330		27,430	
Annual runoff (cfsm)	2.34		2.01		2.18	
Annual runoff (inches)	31.73		27.30		29.56	
10 percent exceeds	90		86		87	
50 percent exceeds	17		17		18	
90 percent exceeds	1.4		1.1		1.1	



12212390 BERTRAND CREEK AT INTERNATIONAL BOUNDARY—Continued

WATER-QUALITY RECORDS

PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: May 2007 to current year

INSTRUMENTATION.--Design Analysis H-377 temperature sensor interfaced with a Design Analysis H-500XL data logger which in turn is also interfaced with a Design Analysis H-222DASE (HDR) GOES radio for satellite telemetry. A 12 volt deep cycle battery with solar charging provides power.

REMARKS.--Records good.

EXTREMES FOR PERIOD OF DAILY RECORD.--
WATER TEMPERATURE: Maximum, 22.5°C, July 27, 2009; minimum, 0.0°C, on many days during winter.

EXTREMES FOR CURRENT YEAR.--
WATER TEMPERATURE: Maximum, 21.6° C, Aug. 5; minimum, 0.0°C, Jan 17, 18.

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		October			November			December			January	
1	12.8	12.3	12.5	7.8	6.6	7.1	4.8	4.1	4.4	4.8	4.2	4.5
2	13.0	11.8	12.5	7.0	6.3	6.7	5.0	4.4	4.7	5.7	4.4	4.8
3	13.0	12.5	12.7	7.3	6.3	6.8	5.2	4.7	4.9	6.3	5.7	6.0
4	12.9	12.2	12.6	6.4	5.3	5.7	5.1	3.6	4.2	7.3	6.2	6.7
5	12.6	12.2	12.3	5.8	5.0	5.4	3.8	3.2	3.5	7.1	5.8	6.4
6	12.4	11.8	12.1	5.2	4.3	4.8	3.9	2.8	3.3	5.8	5.1	5.4
7	12.8	11.9	12.3	5.7	4.8	5.1	4.8	3.9	4.4	5.2	4.8	5.0
8	12.4	11.3	11.9	6.8	5.7	6.3	4.3	2.9	3.5	5.9	5.1	5.5
9	12.8	11.9	12.3	7.6	6.6	7.1	2.9	2.0	2.3	6.6	5.9	6.3
10	12.1	11.5	11.7	8.1	7.2	7.7	2.8	1.6	2.2	6.2	4.2	5.1
11	12.2	11.6	11.9	7.2	6.6	7.0	3.7	2.6	3.1	4.2	2.9	3.6
12	12.5	11.6	12.0	6.6	5.8	6.1	2.6	1.5	1.9	3.2	2.5	2.9
13	11.6	10.0	10.7	6.5	5.9	6.2	2.9	1.6	2.3	3.0	1.8	2.5
14	10.7	9.8	10.2	6.4	5.5	6.2	3.5	2.9	3.2	2.5	1.2	1.8
15	9.9	8.5	9.2	5.5	4.5	5.0	4.4	3.5	3.9	2.0	0.8	1.4
16	9.0	7.6	8.4	4.8	4.2	4.4	5.2	4.4	4.8	1.0	0.0	0.5
17	9.3	7.9	8.5	4.9	3.9	4.6	5.6	5.1	5.3	1.1	0.0	0.7
18	9.5	8.1	8.8	4.3	3.7	4.0	6.1	5.6	5.9	0.1	0.0	0.0
19	9.9	8.6	9.3	3.8	2.5	3.1	6.3	5.9	6.1	0.1	0.0	0.0
20	10.9	9.9	10.4	2.8	1.8	2.4	6.2	4.9	5.9	0.2	0.0	0.1
21	10.7	10.3	10.5	4.5	2.6	3.4	4.9	3.0	3.8	0.4	0.0	0.1
22	10.8	10.3	10.5	5.9	4.5	5.4	3.0	2.1	2.4	1.8	0.3	1.1
23	10.6	9.4	9.9	5.8	5.0	5.5	3.8	2.3	3.1	2.5	1.5	2.0
24	9.7	8.8	9.3	5.0	4.4	4.7	4.8	3.8	4.4	2.8	2.1	2.4
25	8.8	7.9	8.3	5.0	4.4	4.8	5.1	4.4	4.7	3.4	2.5	2.9
26	8.0	7.0	7.4	6.0	5.0	5.4	4.6	3.9	4.3	3.9	3.1	3.5
27	7.9	7.1	7.6	7.2	6.0	6.8	5.5	4.5	4.9	3.5	2.5	3.0
28	7.7	7.2	7.4	6.8	5.4	5.9	6.9	5.5	6.3	3.5	3.1	3.2
29	7.9	6.7	7.3	5.8	5.4	5.6	6.8	5.9	6.3	5.1	3.5	4.3
30	8.5	7.9	8.1	5.7	4.8	5.5	5.9	5.0	5.6	5.7	5.0	5.4
31	8.5	7.8	8.1	---	---	---	5.0	4.2	4.5	5.9	5.4	5.7
Month	13.0	6.7	10.2	8.1	1.8	5.5	6.9	1.5	4.2	7.3	0.0	3.3

12212390 BERTRAND CREEK AT INTERNATIONAL BOUNDARY—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		February			March			April			May	
1	5.9	5.0	5.5	4.8	3.2	3.9	8.4	5.3	6.7	11.8	10.2	10.9
2	5.6	4.4	5.0	5.1	4.3	4.7	8.5	6.9	7.6	11.7	9.4	10.6
3	5.2	4.1	4.7	6.9	5.0	5.9	8.2	7.4	7.9	11.2	10.0	10.6
4	5.1	3.9	4.5	6.9	6.6	6.8	8.8	6.1	7.3	11.3	9.8	10.4
5	5.3	3.7	4.5	6.6	5.5	6.2	9.0	6.4	7.7	10.9	9.5	10.2
6	5.2	3.7	4.5	5.7	3.9	4.9	8.9	6.5	7.7	12.7	8.6	10.7
7	5.4	3.8	4.6	5.6	3.8	4.7	10.4	5.6	7.9	14.1	10.0	12.1
8	5.9	4.8	5.4	6.3	4.3	5.3	11.0	7.0	9.0	13.6	11.5	12.6
9	6.3	5.5	5.9	6.5	5.8	6.1	12.6	8.5	10.4	13.4	10.4	11.8
10	7.4	6.3	6.8	6.3	5.8	6.0	12.6	10.0	11.3	13.5	9.8	11.4
11	7.9	6.7	7.3	7.0	5.8	6.2	11.7	10.0	10.5	14.0	9.2	11.6
12	7.6	7.0	7.3	6.3	5.5	5.9	12.7	9.5	10.8	15.5	9.9	12.7
13	7.9	6.4	7.1	5.9	4.8	5.1	12.9	9.5	11.0	16.8	11.3	13.9
14	7.0	5.6	6.3	4.8	4.3	4.5	12.2	9.1	10.5	17.5	12.1	14.7
15	6.4	5.1	5.7	6.9	4.5	5.5	12.0	9.4	10.7	17.4	12.9	15.1
16	5.9	5.4	5.7	6.9	5.4	6.1	11.2	9.6	10.4	16.8	12.9	14.7
17	6.4	5.6	5.9	6.8	5.5	6.1	9.9	8.2	9.2	16.0	12.1	13.9
18	5.8	5.2	5.5	6.3	5.1	5.7	10.6	8.3	9.3	14.4	11.7	12.8
19	5.7	5.0	5.3	6.9	4.7	5.8	10.2	8.2	9.3	15.9	10.9	13.2
20	6.0	4.7	5.4	7.1	5.7	6.4	12.3	8.9	10.4	13.5	12.5	12.9
21	6.6	5.6	6.0	7.1	5.2	6.2	12.6	9.2	11.0	13.0	12.3	12.6
22	7.3	6.0	6.7	7.9	5.2	6.5	13.9	10.6	12.1	14.0	12.2	13.0
23	7.1	5.8	6.5	9.0	5.7	7.2	14.9	11.2	13.0	13.9	12.2	13.0
24	6.5	4.5	5.5	9.2	5.7	7.4	13.8	11.7	12.3	14.8	11.2	12.9
25	5.1	4.4	4.7	10.0	6.4	8.2	11.7	11.3	11.5	16.6	11.7	14.1
26	4.8	3.6	4.2	9.1	7.7	8.4	11.9	11.0	11.4	17.8	12.7	15.2
27	4.0	2.4	3.3	8.9	7.1	8.0	12.5	9.9	11.2	16.8	13.8	15.1
28	4.5	3.0	3.8	8.9	7.9	8.4	12.5	10.6	11.6	15.5	13.7	14.5
29	4.3	3.3	3.9	8.2	7.3	7.8	12.9	11.0	11.9	15.6	12.8	13.9
30	---	---	---	8.6	6.9	7.7	12.1	10.9	11.5	14.9	12.7	13.7
31	---	---	---	7.6	6.2	6.8	---	---	---	14.4	13.2	13.7
Month	7.9	2.4	5.4	10.0	3.2	6.3	14.9	5.3	10.1	17.8	8.6	12.9

12212390 BERTRAND CREEK AT INTERNATIONAL BOUNDARY—Continued

TEMPERATURE, WATER, DEGREES CELSIUS
WATER YEAR OCTOBER 2011 TO SEPTEMBER 2012

Day	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean
		June			July			August			September	
1	14.2	13.6	13.8	17.1	15.0	15.9	19.0	15.0	17.0	15.4	12.9	14.2
2	15.6	13.0	14.1	15.9	14.5	15.0	18.3	15.8	16.9	15.4	13.1	14.3
3	14.6	13.0	13.7	14.7	13.5	14.1	19.7	15.0	17.2	15.2	12.9	14.0
4	13.0	11.8	12.3	16.0	13.3	14.6	20.8	16.3	18.4	15.4	13.0	14.2
5	12.6	11.8	12.2	17.1	13.2	15.1	21.6	17.4	19.4	15.6	13.4	14.5
6	13.7	11.3	12.4	18.0	14.1	16.0	20.2	17.9	18.8	16.2	13.9	15.0
7	12.9	11.6	12.0	18.5	14.8	16.6	19.2	17.1	18.1	16.3	13.9	15.1
8	13.4	11.3	12.2	19.7	15.4	17.5	18.8	17.0	17.8	16.4	14.3	15.3
9	13.0	11.6	12.2	20.0	16.4	18.1	18.8	15.5	17.2	16.3	15.1	15.5
10	13.3	11.6	12.3	19.5	15.6	17.5	18.7	15.2	17.0	15.4	13.9	14.7
11	15.9	11.2	13.5	20.1	15.8	17.8	19.1	15.2	17.1	14.3	12.0	13.2
12	15.2	14.1	14.6	20.4	16.4	18.2	19.8	15.8	17.7	13.8	10.7	12.2
13	14.2	13.3	13.7	19.8	17.0	18.3	19.2	16.1	17.7	14.1	11.4	12.7
14	13.3	12.1	12.7	20.5	16.9	18.5	19.2	16.0	17.6	14.2	12.0	13.1
15	14.9	10.9	13.0	18.6	16.5	17.4	19.9	16.6	18.1	14.4	12.2	13.3
16	14.5	13.5	13.9	19.7	15.6	17.3	20.0	16.8	18.3	14.6	12.3	13.4
17	15.6	14.2	14.7	21.1	16.7	18.6	20.4	17.0	18.6	14.8	12.5	13.6
18	14.9	13.4	14.1	19.1	16.9	17.6	19.8	17.3	18.4	14.7	12.7	13.7
19	14.0	12.8	13.4	20.6	16.2	18.1	18.3	16.8	17.3	14.6	12.5	13.6
20	16.2	11.9	14.0	18.7	16.7	17.4	18.5	15.9	17.0	14.6	12.6	13.6
21	16.8	14.2	15.5	19.5	16.5	17.7	17.7	15.6	16.6	14.4	13.4	13.7
22	15.9	13.9	14.7	17.6	15.5	16.3	17.5	15.4	16.4	14.1	13.4	13.7
23	15.6	13.6	14.5	15.5	14.4	14.8	16.4	14.9	15.6	14.5	13.3	13.8
24	14.9	13.2	14.0	17.2	14.5	15.6	15.7	13.6	14.7	13.9	12.0	13.0
25	16.1	12.5	14.3	18.9	14.6	16.5	16.7	13.1	14.7	14.2	12.8	13.5
26	14.9	13.2	13.7	20.1	16.1	17.8	16.2	14.2	15.3	13.5	11.6	12.6
27	16.2	12.3	14.1	18.0	16.4	17.1	16.5	14.7	15.6	13.2	11.2	12.2
28	16.1	13.7	15.0	18.8	15.6	16.9	16.0	14.2	15.1	14.1	12.5	13.2
29	17.8	14.8	16.1	19.3	14.9	16.9	16.3	14.6	15.3	14.2	13.3	13.9
30	16.9	15.7	16.1	18.4	15.2	16.7	16.7	15.0	15.8	13.3	10.9	11.9
31	---	---	---	19.2	15.7	17.2	16.0	13.6	14.8	---	---	---
Month	17.8	10.9	13.8	21.1	13.2	16.9	21.6	13.1	17.0	16.4	10.7	13.7

	Max	Min	Mean
Year	21.6	0.0	9.9