

APPENDIX B11: SHORTS CREEK

Discharge Records

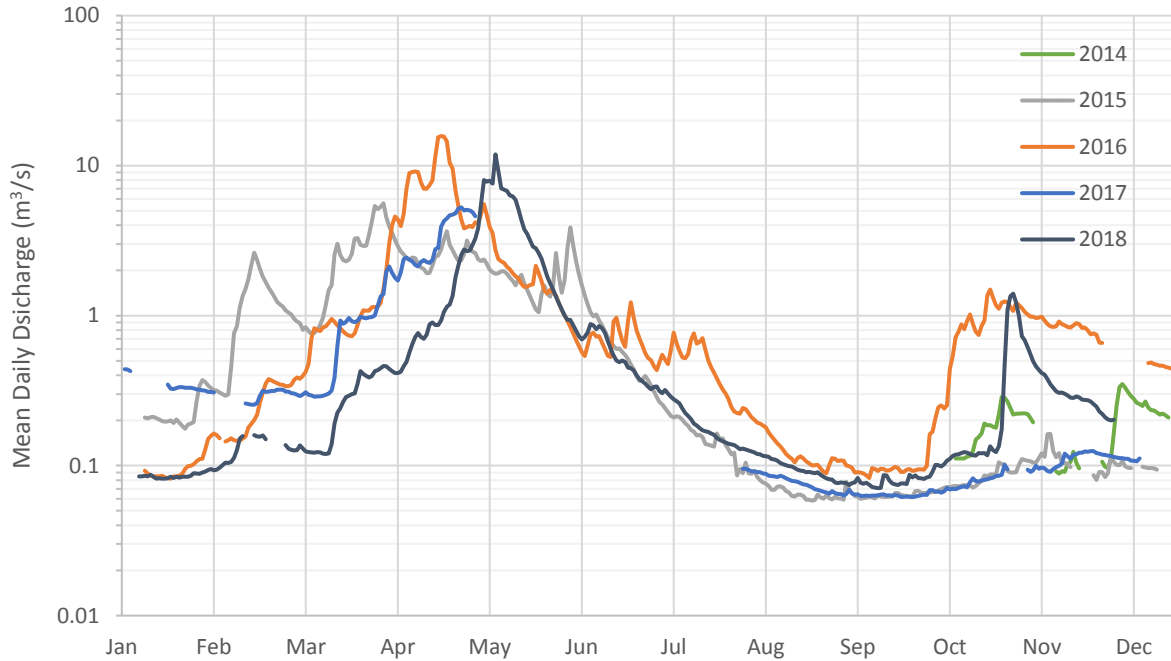


Figure B11-1: Mean daily discharge recorded at the ONA Shorts Creek hydrometric station (08NM151) from 2014-2018

Historic WSC Discharge (1969-1982) 08NM151 - Shorts Creek

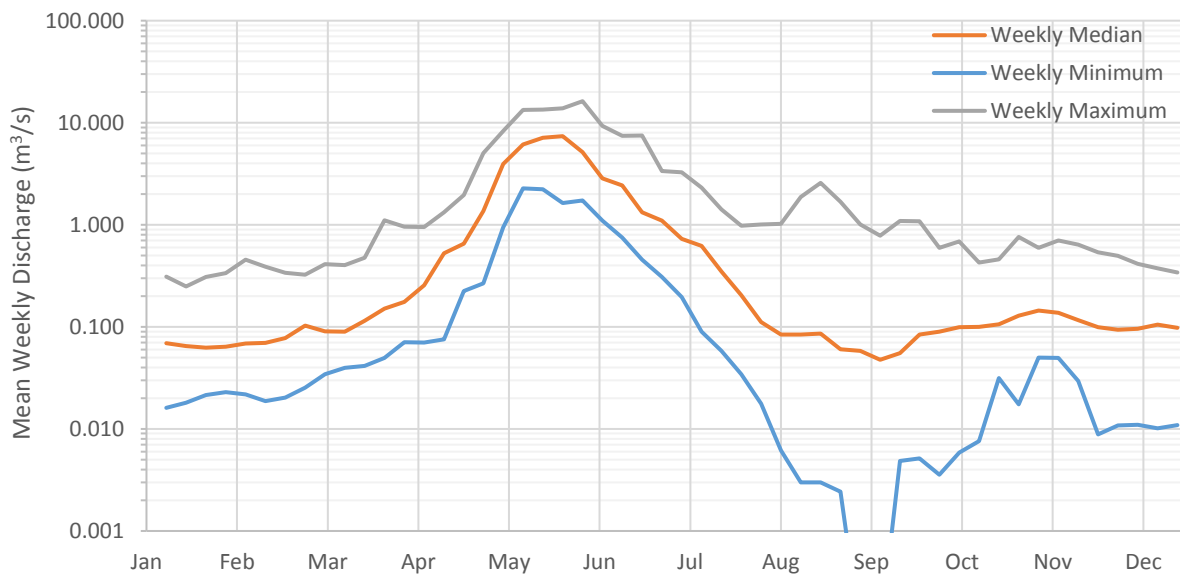


Figure B11-2: Historical discharge recorded at WSC station 08NM151 (Shorts Creek at the mouth) from 1969-1982

Water Temperature Records

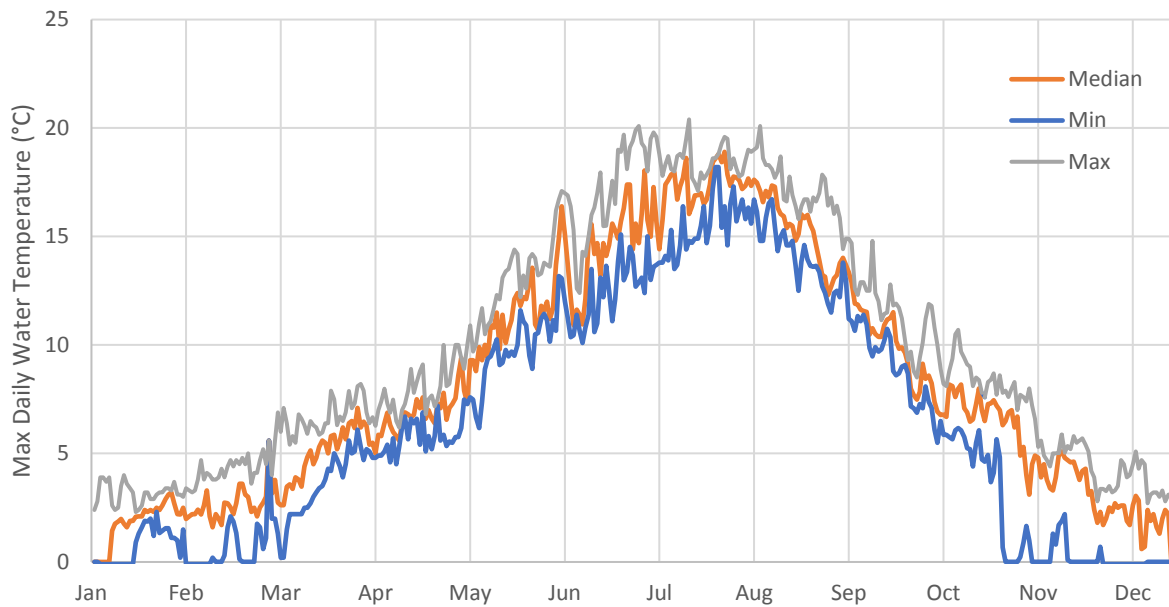


Figure B11-3: Maximum daily water temperatures recorded at the ONA Shorts Creek hydrometric station from 2015-2019

Flow standards and periodicity – Okanagan Tennant analysis for Shorts Creek

Week Ending	Life Stage/ Week	Rainbow						Kokanee				Ecological Flows	
		Adult migration	Spawning	Incubation	Rearing	Juvenile migration	Over-wintering	Adult migration	Spawning	Incubation	Juvenile migration	Wetland, side channel linkage, flushing and channel maintenance flow	Cottonwood ecosystems
Jan							20%			20%			
Feb							20%			20%			
Mar							20%			20%			
1-Apr	13				20%						50%	<input checked="" type="checkbox"/>	
8-Apr	14				20%						50%	<input checked="" type="checkbox"/>	
15-Apr	15	148%			20%						50%	<input checked="" type="checkbox"/>	
22-Apr	16	148%			20%						50%	<input checked="" type="checkbox"/>	
29-Apr	17	148%			20%						50%	<input checked="" type="checkbox"/>	
6-May	18	148%			20%	50%					50%	<input checked="" type="checkbox"/>	
13-May	19	148%	40%		20%	50%					50%	<input checked="" type="checkbox"/>	
20-May	20	148%	40%		20%	50%					50%	700%	100%
27-May	21	148%	40%	20%	20%	50%					50%	700%	100%
3-Jun	22	148%	40%	20%	20%	50%						<input checked="" type="checkbox"/>	100%
10-Jun	23	148%	40%	20%	20%	50%						<input checked="" type="checkbox"/>	100%
17-Jun	24	148%	40%	20%	20%	50%						<input checked="" type="checkbox"/>	100%
24-Jun	25	148%	40%	20%	20%	50%							100%
1-Jul	26	148%	40%	20%	20%	50%							100%
8-Jul	27	148%	40%	20%	20%	50%							100%
15-Jul	28			20%	20%	50%							100%
22-Jul	29			20%	20%								100%
29-Jul	30			20%	20%								100%
5-Aug	31				20%								
12-Aug	32				20%								
19-Aug	33				20%								
26-Aug	34				20%								
2-Sep	35				20%								
9-Sep	36				20%			20%					
16-Sep	37				20%			20%					
23-Sep	38				20%			20%	20%	20%			
30-Sep	39				20%			20%	20%	20%			
7-Oct	40				20%			20%	20%	20%			
14-Oct	41				20%				20%	20%			
21-Oct	42				20%				20%	20%			
28-Oct	43				20%				20%	20%			
Nov							20%			20%			
Dec							20%			20%			

EFNs and critical low flows for Shorts Creek

Week Ending	Life Stage / Week	Okanagan Tennant EFN					FINAL EFN		CRITICAL FLOWS (m ³ /s)			
		EFN - all factors (%LTMAD)	EFN based on flow standards (m ³ /s)	Nat. median weekly Q (m ³ /s)	Discharge m ³ /s	%LTMAD	Value (m ³ /s)	Dominant Species / Life Stage	Rainbow trout rearing & over wintering	Kokanee spawning	Rainbow trout migration & spawning	FINAL
Jan		20%	0.201	0.057	0.057	6%	0.057	overwintering egg incubation	0.050			0.050
Feb		20%	0.201	0.057	0.057	6%	0.057	overwintering egg incubation	0.050			0.050
Mar		20%	0.201	0.082	0.082	8%	0.082	overwintering egg incubation	0.050			0.050
1-Apr	13	50%	0.503	0.371	0.371	37%	0.371	KO juvenile migration	0.050			0.050
8-Apr	14	50%	0.503	0.452	0.452	45%	0.452	KO juvenile migration	0.050			0.050
15-Apr	15	148%	1.490	0.689	0.689	68%	0.689	RB adult migration	0.050		0.503	0.503
22-Apr	16	148%	1.490	1.367	1.367	136%	1.367	RB adult migration	0.050		0.503	0.503
29-Apr	17	148%	1.490	3.378	1.490	148%	1.490	RB adult migration	0.050		0.503	0.503
6-May	18	148%	1.490	4.031	1.490	148%	1.490	RB adult migration	0.050		0.503	0.503
13-May	19	148%	1.490	4.382	1.490	148%	1.490	RB Spawning	0.050		0.503	0.503
20-May	20	700%	7.048	5.778	5.778	574%	5.778	Ecosystem	0.050		0.503	0.503
27-May	21	700%	7.048	5.320	5.320	528%	5.320	Ecosystem	0.050		0.503	0.503
3-Jun	22	148%	1.490	3.248	1.490	148%	1.490	RB Spawning	0.050		0.503	0.503
10-Jun	23	148%	1.490	3.004	1.490	148%	1.490	RB Spawning	0.050		0.503	0.503
17-Jun	24	148%	1.490	2.153	1.490	148%	1.490	RB Spawning	0.050		0.503	0.503
24-Jun	25	148%	1.490	1.329	1.329	132%	1.329	RB Spawning	0.050		0.503	0.503
1-Jul	26	148%	1.490	1.036	1.036	103%	1.036	RB Spawning	0.050		0.503	0.503
8-Jul	27	148%	1.490	0.667	0.667	66%	0.667	RB Spawning	0.050		0.503	0.503
15-Jul	28	100%	1.007	0.419	0.419	42%	0.419	RB incubation	0.050			0.050
22-Jul	29	100%	1.007	0.259	0.259	26%	0.259	RB incubation	0.050			0.050
29-Jul	30	100%	1.007	0.196	0.196	19%	0.196	RB incubation	0.050			0.050
5-Aug	31	20%	0.201	0.098	0.098	10%	0.100	RB parr rearing	0.050			0.050
12-Aug	32	20%	0.201	0.105	0.105	10%	0.100	RB parr rearing	0.050			0.050
19-Aug	33	20%	0.201	0.060	0.060	6%	0.100	RB parr rearing	0.050			0.050
26-Aug	34	20%	0.201	0.059	0.059	6%	0.100	RB parr rearing	0.050			0.050
2-Sep	35	20%	0.201	0.060	0.060	6%	0.100	RB parr rearing	0.050			0.050
9-Sep	36	20%	0.201	0.035	0.035	3%	0.100	RB parr rearing	0.050	0.101		0.101
16-Sep	37	20%	0.201	0.051	0.051	5%	0.100	RB parr rearing	0.050	0.101		0.101
23-Sep	38	20%	0.201	0.052	0.052	5%	0.140	KO Spawning	0.050	0.101		0.101
30-Sep	39	20%	0.201	0.055	0.055	5%	0.140	KO Spawning	0.050	0.101		0.101
7-Oct	40	20%	0.201	0.057	0.057	6%	0.140	KO Spawning	0.050	0.101		0.101
14-Oct	41	20%	0.201	0.054	0.054	5%	0.140	KO Spawning	0.050	0.101		0.101
21-Oct	42	20%	0.201	0.090	0.090	9%	0.140	KO Spawning	0.050	0.101		0.101
28-Oct	43	20%	0.201	0.074	0.074	7%	0.140	KO Spawning	0.050	0.101		0.101
Nov		20%	0.201	0.081	0.081	8%	0.081	overwintering egg incubation	0.050			0.050
Dec		20%	0.201	0.046	0.046	5%	0.046	overwintering egg incubation	0.050			0.050

Percentile Flows for Shorts Creek

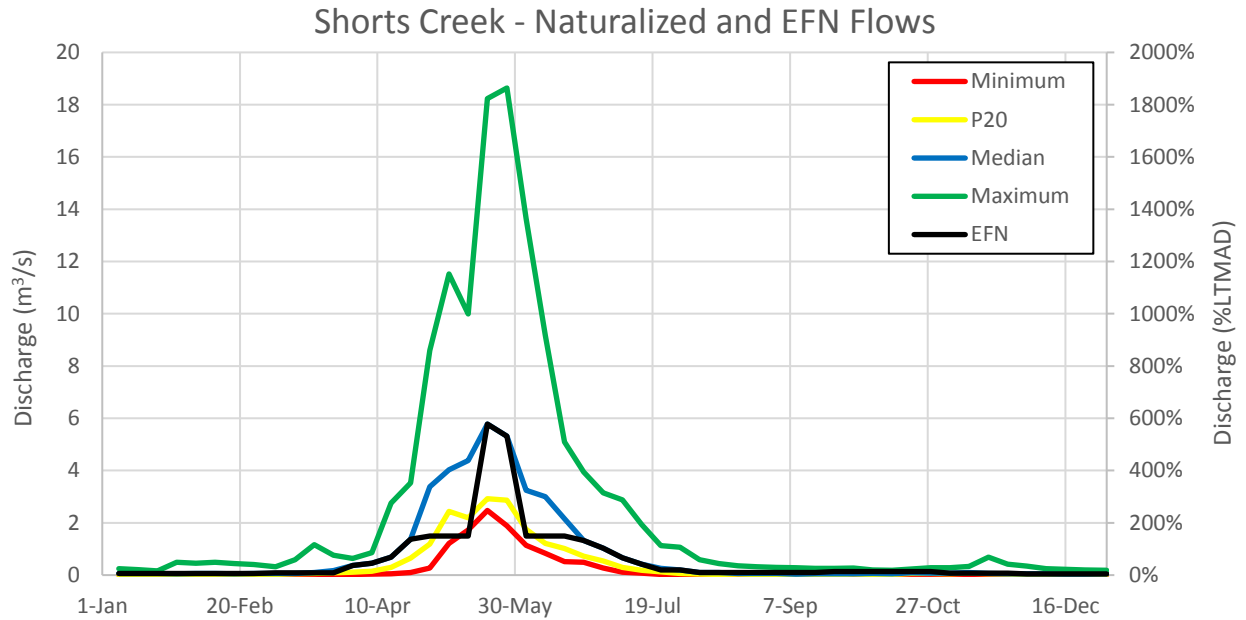


Figure B11-4: Okanagan Tennant EFNs compared to naturalized flow percentiles for Shorts Creek (Discharge & %LTMAD)

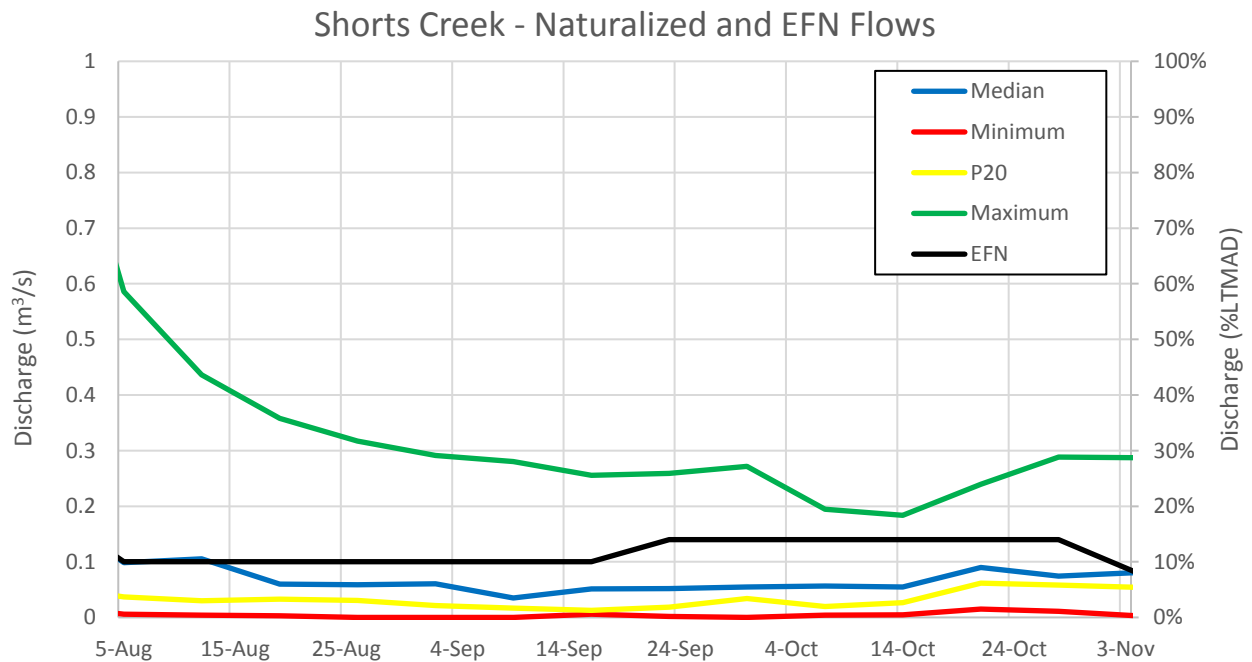


Figure B11-5: Okanagan Tennant EFNs compared to naturalized flow percentiles for Shorts Creek Aug – Nov (Discharge & %LTMAD)

Naturalized percentile flows in Shorts Creek

NATURALIZED FLOW		as m ³ /s				as %LTMD			
Week	Ending	Min	P20	Median	Max	Min	P20	Median	Max
01	7-Jan	0.016	0.018	0.059	0.242	2%	2%	6%	24%
02	14-Jan	0.007	0.016	0.057	0.214	1%	2%	6%	21%
03	21-Jan	0.006	0.013	0.059	0.162	1%	1%	6%	16%
04	28-Jan	0.005	0.014	0.055	0.490	0%	1%	5%	49%
05	4-Feb	0.004	0.015	0.058	0.458	0%	1%	6%	45%
06	11-Feb	0.002	0.010	0.057	0.493	0%	1%	6%	49%
07	18-Feb	0.008	0.014	0.052	0.441	1%	1%	5%	44%
08	25-Feb	0.010	0.019	0.058	0.402	1%	2%	6%	40%
09	4-Mar	0.007	0.022	0.065	0.320	1%	2%	6%	32%
10	11-Mar	0.010	0.048	0.061	0.584	1%	5%	6%	58%
11	18-Mar	0.011	0.066	0.093	1.159	1%	7%	9%	115%
12	25-Mar	0.016	0.081	0.170	0.763	2%	8%	17%	76%
13	1-Apr	0.022	0.112	0.371	0.636	2%	11%	37%	63%
14	8-Apr	0.035	0.149	0.452	0.864	3%	15%	45%	86%
15	15-Apr	0.047	0.294	0.689	2.761	5%	29%	68%	274%
16	22-Apr	0.101	0.645	1.367	3.528	10%	64%	136%	350%
17	29-Apr	0.273	1.184	3.378	8.594	27%	118%	336%	854%
18	6-May	1.210	2.438	4.031	11.519	120%	242%	400%	1144%
19	13-May	1.730	2.193	4.382	9.998	172%	218%	435%	993%
20	20-May	2.473	2.923	5.778	18.228	246%	290%	574%	1810%
21	27-May	1.882	2.864	5.320	18.640	187%	284%	528%	1851%
22	3-Jun	1.144	1.749	3.248	13.645	114%	174%	323%	1355%
23	10-Jun	0.835	1.209	3.004	9.169	83%	120%	298%	911%
24	17-Jun	0.520	1.019	2.153	5.093	52%	101%	214%	506%
25	24-Jun	0.494	0.725	1.329	3.948	49%	72%	132%	392%
26	1-Jul	0.269	0.539	1.036	3.148	27%	54%	103%	313%
27	8-Jul	0.113	0.299	0.667	2.884	11%	30%	66%	286%
28	15-Jul	0.072	0.190	0.419	1.930	7%	19%	42%	192%
29	22-Jul	0.028	0.127	0.259	1.129	3%	13%	26%	112%
30	29-Jul	0.022	0.058	0.196	1.066	2%	6%	19%	106%
31	5-Aug	0.006	0.037	0.098	0.586	1%	4%	10%	58%
32	12-Aug	0.004	0.030	0.105	0.436	0%	3%	10%	43%
33	19-Aug	0.003	0.033	0.060	0.358	0%	3%	6%	36%
34	26-Aug	0.000	0.030	0.059	0.317	0%	3%	6%	31%
35	2-Sep	0.000	0.022	0.060	0.291	0%	2%	6%	29%
36	9-Sep	0.000	0.017	0.035	0.280	0%	2%	3%	28%
37	16-Sep	0.006	0.013	0.051	0.256	1%	1%	5%	25%
38	23-Sep	0.002	0.019	0.052	0.259	0%	2%	5%	26%
39	30-Sep	0.000	0.034	0.055	0.271	0%	3%	5%	27%
40	7-Oct	0.004	0.020	0.057	0.194	0%	2%	6%	19%
41	14-Oct	0.005	0.027	0.054	0.184	0%	3%	5%	18%
42	21-Oct	0.015	0.061	0.090	0.239	1%	6%	9%	24%
43	28-Oct	0.011	0.058	0.074	0.288	1%	6%	7%	29%
44	4-Nov	0.003	0.054	0.081	0.287	0%	5%	8%	29%
45	11-Nov	0.017	0.070	0.097	0.327	2%	7%	10%	32%
46	18-Nov	0.030	0.046	0.068	0.687	3%	5%	7%	68%
47	25-Nov	0.028	0.033	0.045	0.419	3%	3%	4%	42%
48	2-Dec	0.011	0.029	0.055	0.345	1%	3%	5%	34%
49	9-Dec	0.016	0.030	0.046	0.240	2%	3%	5%	24%
50	16-Dec	0.013	0.029	0.042	0.219	1%	3%	4%	22%
51	23-Dec	0.019	0.027	0.043	0.202	2%	3%	4%	20%
52	31-Dec	0.017	0.030	0.049	0.185	2%	3%	5%	18%

Residual percentile flows in Shorts Creek

RESIDUAL FLOW		as m ³ /s				as %LTMAD			
Week	Ending	Min	P20	Median	Max	Min	P20	Median	Max
01	7-Jan	0.016	0.018	0.059	0.242	2%	2%	6%	24%
02	14-Jan	0.007	0.015	0.057	0.214	1%	2%	6%	21%
03	21-Jan	0.006	0.013	0.059	0.161	1%	1%	6%	16%
04	28-Jan	0.005	0.014	0.054	0.490	0%	1%	5%	49%
05	4-Feb	0.004	0.015	0.058	0.457	0%	1%	6%	45%
06	11-Feb	0.002	0.010	0.056	0.493	0%	1%	6%	49%
07	18-Feb	0.007	0.014	0.052	0.441	1%	1%	5%	44%
08	25-Feb	0.010	0.019	0.057	0.401	1%	2%	6%	40%
09	4-Mar	0.007	0.022	0.064	0.319	1%	2%	6%	32%
10	11-Mar	0.010	0.048	0.060	0.583	1%	5%	6%	58%
11	18-Mar	0.011	0.066	0.093	1.158	1%	7%	9%	115%
12	25-Mar	0.016	0.081	0.170	0.763	2%	8%	17%	76%
13	1-Apr	0.022	0.111	0.371	0.636	2%	11%	37%	63%
14	8-Apr	0.034	0.149	0.452	0.864	3%	15%	45%	86%
15	15-Apr	0.047	0.293	0.689	2.761	5%	29%	68%	274%
16	22-Apr	0.101	0.644	1.366	3.527	10%	64%	136%	350%
17	29-Apr	0.273	1.184	3.377	8.592	27%	118%	335%	853%
18	6-May	1.210	2.437	4.030	11.517	120%	242%	400%	1144%
19	13-May	1.729	2.191	4.380	9.996	172%	218%	435%	993%
20	20-May	2.472	2.922	5.777	18.227	245%	290%	574%	1810%
21	27-May	1.697	2.679	5.135	18.455	169%	266%	510%	1833%
22	3-Jun	0.959	1.564	3.063	13.461	95%	155%	304%	1337%
23	10-Jun	0.650	1.025	2.819	8.985	65%	102%	280%	892%
24	17-Jun	0.335	0.834	1.968	4.908	33%	83%	195%	487%
25	24-Jun	0.308	0.540	1.145	3.763	31%	54%	114%	374%
26	1-Jul	0.084	0.354	0.850	2.963	8%	35%	84%	294%
27	8-Jul	0.111	0.297	0.665	2.883	11%	29%	66%	286%
28	15-Jul	0.070	0.189	0.418	1.929	7%	19%	42%	192%
29	22-Jul	0.026	0.125	0.257	1.128	3%	12%	26%	112%
30	29-Jul	0.020	0.056	0.194	1.065	2%	6%	19%	106%
31	5-Aug	0.004	0.035	0.096	0.584	0%	3%	10%	58%
32	12-Aug	0.003	0.029	0.104	0.435	0%	3%	10%	43%
33	19-Aug	0.001	0.031	0.058	0.357	0%	3%	6%	35%
34	26-Aug	0.000	0.029	0.057	0.316	0%	3%	6%	31%
35	2-Sep	0.000	0.020	0.059	0.290	0%	2%	6%	29%
36	9-Sep	0.000	0.015	0.034	0.279	0%	1%	3%	28%
37	16-Sep	0.005	0.011	0.050	0.255	0%	1%	5%	25%
38	23-Sep	0.001	0.018	0.051	0.258	0%	2%	5%	26%
39	30-Sep	0.000	0.033	0.054	0.271	0%	3%	5%	27%
40	7-Oct	0.003	0.019	0.056	0.194	0%	2%	6%	19%
41	14-Oct	0.004	0.026	0.054	0.183	0%	3%	5%	18%
42	21-Oct	0.014	0.061	0.090	0.239	1%	6%	9%	24%
43	28-Oct	0.011	0.058	0.074	0.288	1%	6%	7%	29%
44	4-Nov	0.003	0.054	0.080	0.287	0%	5%	8%	29%
45	11-Nov	0.017	0.070	0.096	0.326	2%	7%	10%	32%
46	18-Nov	0.030	0.046	0.068	0.687	3%	5%	7%	68%
47	25-Nov	0.027	0.033	0.045	0.419	3%	3%	4%	42%
48	2-Dec	0.010	0.029	0.055	0.345	1%	3%	5%	34%
49	9-Dec	0.016	0.030	0.046	0.240	2%	3%	5%	24%
50	16-Dec	0.012	0.029	0.042	0.219	1%	3%	4%	22%
51	23-Dec	0.019	0.027	0.042	0.202	2%	3%	4%	20%
52	31-Dec	0.016	0.030	0.049	0.185	2%	3%	5%	18%

Maximum licensed percentile flows in Shorts Creek

MAX LICENSED FLOW		as m ³ /s				as %LTMAD			
Week	Ending	Min	P20	Median	Max	Min	P20	Median	Max
01	7-Jan	0.016	0.018	0.059	0.242	2%	2%	6%	24%
02	14-Jan	0.007	0.015	0.057	0.214	1%	2%	6%	21%
03	21-Jan	0.006	0.013	0.059	0.161	1%	1%	6%	16%
04	28-Jan	0.005	0.014	0.054	0.490	0%	1%	5%	49%
05	4-Feb	0.004	0.015	0.058	0.457	0%	1%	6%	45%
06	11-Feb	0.002	0.010	0.056	0.493	0%	1%	6%	49%
07	18-Feb	0.007	0.014	0.052	0.441	1%	1%	5%	44%
08	25-Feb	0.010	0.019	0.058	0.401	1%	2%	6%	40%
09	4-Mar	0.007	0.022	0.065	0.319	1%	2%	6%	32%
10	11-Mar	0.010	0.048	0.060	0.583	1%	5%	6%	58%
11	18-Mar	0.011	0.066	0.093	1.158	1%	7%	9%	115%
12	25-Mar	0.016	0.081	0.170	0.763	2%	8%	17%	76%
13	1-Apr	0.022	0.111	0.371	0.636	2%	11%	37%	63%
14	8-Apr	0.034	0.149	0.452	0.864	3%	15%	45%	86%
15	15-Apr	0.047	0.293	0.689	2.761	5%	29%	68%	274%
16	22-Apr	0.101	0.644	1.364	3.524	10%	64%	135%	350%
17	29-Apr	0.273	1.184	3.377	8.583	27%	118%	335%	852%
18	6-May	1.208	2.437	4.030	11.506	120%	242%	400%	1143%
19	13-May	1.728	2.182	4.357	9.983	172%	217%	433%	992%
20	20-May	2.453	2.905	5.754	18.214	244%	289%	572%	1809%
21	27-May	1.669	2.649	5.103	18.426	166%	263%	507%	1830%
22	3-Jun	0.930	1.532	3.028	13.439	92%	152%	301%	1335%
23	10-Jun	0.619	0.998	2.786	8.946	61%	99%	277%	889%
24	17-Jun	0.303	0.796	1.932	4.871	30%	79%	192%	484%
25	24-Jun	0.277	0.505	1.119	3.730	27%	50%	111%	371%
26	1-Jul	0.043	0.321	0.809	2.924	4%	32%	80%	290%
27	8-Jul	0.067	0.252	0.621	2.841	7%	25%	62%	282%
28	15-Jul	0.024	0.151	0.379	1.888	2%	15%	38%	188%
29	22-Jul	0.000	0.076	0.208	1.094	0%	8%	21%	109%
30	29-Jul	0.000	0.007	0.150	1.016	0%	1%	15%	101%
31	5-Aug	0.000	0.000	0.049	0.535	0%	0%	5%	53%
32	12-Aug	0.000	0.000	0.063	0.384	0%	0%	6%	38%
33	19-Aug	0.000	0.003	0.021	0.318	0%	0%	2%	32%
34	26-Aug	0.000	0.000	0.023	0.270	0%	0%	2%	27%
35	2-Sep	0.000	0.000	0.034	0.252	0%	0%	3%	25%
36	9-Sep	0.000	0.000	0.003	0.253	0%	0%	0%	25%
37	16-Sep	0.000	0.000	0.019	0.239	0%	0%	2%	24%
38	23-Sep	0.000	0.000	0.027	0.250	0%	0%	3%	25%
39	30-Sep	0.000	0.019	0.044	0.267	0%	2%	4%	26%
40	7-Oct	0.000	0.012	0.052	0.191	0%	1%	5%	19%
41	14-Oct	0.002	0.022	0.054	0.181	0%	2%	5%	18%
42	21-Oct	0.014	0.061	0.090	0.239	1%	6%	9%	24%
43	28-Oct	0.011	0.058	0.074	0.288	1%	6%	7%	29%
44	4-Nov	0.003	0.054	0.080	0.287	0%	5%	8%	29%
45	11-Nov	0.017	0.070	0.096	0.326	2%	7%	10%	32%
46	18-Nov	0.030	0.046	0.068	0.687	3%	5%	7%	68%
47	25-Nov	0.028	0.033	0.045	0.419	3%	3%	4%	42%
48	2-Dec	0.010	0.029	0.055	0.345	1%	3%	5%	34%
49	9-Dec	0.016	0.030	0.046	0.240	2%	3%	5%	24%
50	16-Dec	0.012	0.029	0.042	0.219	1%	3%	4%	22%
51	23-Dec	0.019	0.027	0.042	0.202	2%	3%	4%	20%
52	31-Dec	0.016	0.030	0.049	0.185	2%	3%	5%	18%