

Appendix D. Flood Frequency Results

Appendix Contents

1. Unimpaired Flood Frequency
2. Scenario D1 Flood Frequency for 5% Maximum Cumulative Vol. Depletion
3. Scenario D1 Flood Frequency for 10% Maximum Cumulative Vol. Depletion
4. Scenario D3 Flood Frequency for 5% Maximum Cumulative Vol. Depletion
5. Scenario D3 Flood Frequency for 10% Maximum Cumulative Vol. Depletion
6. Scenario A1 Flood Frequency for 5% Maximum Cumulative Vol. Depletion
7. Scenario A2 Flood Frequency for 5% Maximum Cumulative Vol. Depletion
8. Scenario A3 Flood Frequency for 5% Maximum Cumulative Vol. Depletion
9. Scenario A3 Flood Frequency for 10% Maximum Cumulative Vol. Depletion
10. Scenario A4 Flood Frequency for 5% Maximum Cumulative Vol. Depletion
11. Scenario A4 Flood Frequency for 10% Maximum Cumulative Vol. Depletion
12. Scenario A5 Flood Frequency for 5% Maximum Cumulative Vol. Depletion
13. Scenario A5 Flood Frequency for 10% Maximum Cumulative Vol. Depletion

Summary of Scenarios and Policy Elements

Scenario	Policy Element			
	Diversions	Diversion Season	MBF	MCD
Scenario D1	Distributed	None	Feb Median ¹	None
Scenario D3	Lumped	None	Feb Median	None
Scenario A1	Lumped	Dec 15-Mar 31	Feb Median	None
Scenario A2	Lumped	None	Regional Eqn in Policy §2.2.1.2	None
Scenario A3	Lumped	None	Feb Median	Feb Median
Scenario A4	Lumped	Dec 15-Mar 31	Feb Median	Feb Median
Scenario A5	Lumped	None	Regional Eqn in Policy §2.2.1.2	Feb Median

¹ For Class III PODs, February median unimpaired flow MBF applies if maximum cumulative volume depletion is greater than 5%; otherwise, there is no MBF at Class III PODs.

Unimpaired Flood Frequency Results

Unimpaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	342	658	2800	123	74	285	91	1684	243
2005	168	318	1370	99	79	254	94	952	262
2006	341	662	2840	266	181	657	235	7733	568
2007	203	423	1710	19	29	63	68	525	187
2008	382	681	3270	297	68	455	53	1304	107
2009	127	184	765	34	48	105	44	510	205
2010	144	293	1070	171	88	396	46	1684	101
2011	237	430	2120	119	90	288	113	1874	395
2012	241	434	1890	106	55	229	44	530	228
2013	477	908	3400	323	133	630	140	2226	456

Unimpaired Flood Frequency at POIs

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	74	115	447	7	18	29	19	165	50
99	83	134	526	10	21	37	22	200	59
95	116	198	805	23	31	73	32	341	91
90	138	242	997	34	39	102	39	455	114
80	169	305	1,277	55	49	150	50	649	149
66.7	204	376	1,591	83	61	209	62	910	191
50	247	464	1,980	125	77	291	79	1,302	244
43	267	505	2,161	146	84	331	88	1,513	270
20	355	682	2,938	254	116	517	128	2,663	388
10	427	823	3,550	354	144	677	164	3,903	489
4	517	996	4,289	489	178	881	216	5,903	620
2	584	1,120	4,815	594	204	1,032	258	7,737	720
1	650	1,241	5,320	700	230	1,180	303	9,892	821
0.5	716	1,359	5,807	807	256	1,325	351	12,410	923
0.2	804	1,512	6,428	948	290	1,512	420	16,370	1,062

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in *red*.

Unimpaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario D1, 5% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4*	WC6
2004	334	647	2792	119	73	281	88		227
2005	160	318	1358	95	76	248	94		258
2006	337	656	2825	264	177	651	228		549
2007	198	410	1699	18	26	59	66		174
2008	376	673	3264	297	68	455	51		103
2009	120	171	754	32	46	102	42		191
2010	140	285	1065	170	86	392	45		101
2011	234	425	2114	119	89	288	110		395
2012	232	423	1871	101	53	225	43		213
2013	459	879	3379	308	127	613	136		425

Impaired Flood Frequency at POIs

Scenario D1, 5% maximum cumulative volume depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4*	WC6
99.5	69	107	440	7	16	27	19		49
99	79	125	519	9	19	35	21		57
95	111	189	796	22	29	70	31		88
90	132	233	987	33	36	99	38		110
80	163	296	1,266	53	47	145	48		143
66.7	197	367	1,580	80	59	205	60		182
50	240	455	1,968	121	75	286	77		233
43	260	496	2,149	143	82	326	85		257
20	347	672	2,926	250	114	513	124		370
10	418	812	3,538	350	141	675	160		468
4	507	982	4,279	486	175	881	210		596
2	573	1,104	4,806	592	200	1,033	251		694
1	638	1,221	5,312	699	225	1,182	295		794
0.5	703	1,336	5,800	807	249	1,329	342		897
0.2	788	1,482	6,423	951	281	1,518	409		1,037

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	197	367	1,580	80	59	205	60		182
% Reduction	3.1%	2.5%	0.7%	3.5%	3.6%	2.3%	2.9%	<2.9%*	4.5%
Average reduction									2.9%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in **red**.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

*Impaired flood frequency not computed at WC4 since hourly impaired flows not available; since WC4 is downstream of WC2, the reduction in 1.5-year flood at WC4 is less than 2.9%.

Impaired Flood Frequency Results for Scenario D1, 10% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4*	WC6
2004	329	638	2785	118	70	278	88		227
2005	160	314	1358	93	76	246	91		250
2006	329	641	2814	255	170	635	229		530
2007	198	410	1700	18	26	59	66		174
2008	366	656	3247	288	68	448	51		100
2009	121	171	754	31	43	98	42		192
2010	140	285	1065	164	86	387	45		97
2011	227	415	2103	117	88	284	110		374
2012	232	418	1871	101	53	221	43		213
2013	459	870	3373	309	127	613	136		425

Impaired Flood Frequency at POIs

Scenario D1, 10% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4*	WC6
99.5	71	108	441	7	16	27	19		47
99	80	126	520	9	19	35	21		56
95	112	189	797	21	29	69	31		86
90	133	232	988	32	36	97	38		108
80	163	294	1,266	52	46	143	48		141
66.7	196	363	1,578	79	58	201	60		179
50	238	449	1,965	119	73	281	77		229
43	257	489	2,144	140	81	321	85		253
20	342	661	2,917	245	112	506	124		363
10	411	797	3,525	342	139	666	160		457
4	498	962	4,260	475	172	870	210		580
2	561	1,080	4,783	578	196	1,021	251		673
1	625	1,194	5,284	683	220	1,170	295		767
0.5	688	1,305	5,767	788	244	1,315	342		863
0.2	772	1,447	6,384	929	275	1,504	410		992

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	196	363	1,578	79	58	201	60		179
% Reduction	3.8%	3.5%	0.8%	5.0%	5.1%	3.8%	3.2%	<3.2%*	5.9%
Average reduction									3.9%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in *red*.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

*Impaired flood frequency not computed at WC4 since hourly impaired flows not available; since WC4

is downstream of WC2, the reduction in 1.5-year flood at WC4 is less than 3.2%.

Impaired Flood Frequency Results for Scenario D3, 5% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	342	658	2800	123	74	285	62	1684	138
2005	140	318	1170	99	79	254	94	952	262
2006	341	662	2840	266	181	657	235	7733	568
2007	66	110	1295	13	17	44	68	525	187
2008	382	681	3270	297	68	455	53	1304	107
2009	72	121	635	34	48	105	44	510	71
2010	144	293	1070	171	88	396	46	1684	101
2011	237	430	2120	119	90	288	113	1874	395
2012	171	345	1464	62	55	229	38	530	85
2013	477	908	3400	261	129	588	140	2226	456

Impaired Flood Frequency at POIs

Scenario D3, 5% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	27	44	350	5	10	21	18	165	26
99	34	57	418	7	13	28	20	200	31
95	59	105	663	18	23	61	29	341	53
90	79	144	839	28	31	89	36	455	70
80	111	206	1,103	46	43	136	46	649	98
66.7	150	284	1,411	73	57	197	58	910	134
50	203	389	1,808	113	75	283	75	1,302	186
43	229	442	1,998	134	84	326	83	1,513	212
20	353	687	2,848	243	122	529	123	2,663	347
10	463	902	3,556	347	153	704	160	3,903	479
4	611	1,182	4,456	491	191	929	214	5,903	674
2	724	1,393	5,124	603	217	1,093	258	7,737	838
1	841	1,605	5,786	717	243	1,254	306	9,892	1,020
0.5	959	1,817	6,446	833	267	1,410	359	12,410	1,219
0.2	1,120	2,097	7,316	988	297	1,610	435	16,370	1,511

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	150	284	1,411	73	57	197	58	910	134
% Reduction	26.6%	24.6%	11.3%	12.8%	7.2%	5.9%	6.4%	0.0%	29.6%
Average reduction									14%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in **red**.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario D3, 10% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	342	658	2800	123	74	285	51	1684	138
2005	140	318	1170	99	79	254	94	952	262
2006	341	662	2840	266	181	657	235	7733	568
2007	66	110	1295	13	17	44	40	358	187
2008	382	681	3270	297	68	455	53	1304	107
2009	72	121	635	29	48	105	44	510	71
2010	144	279	919	171	88	396	46	1684	101
2011	237	430	2120	119	90	288	113	1874	395
2012	171	345	1464	62	55	229	38	530	85
2013	477	908	3400	150	113	333	140	2226	456

Impaired Flood Frequency at POIs

Scenario D3, 10% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	27	44	331	5	10	22	15	130	26
99	34	56	396	7	13	30	18	161	31
95	59	105	635	17	23	62	26	294	53
90	79	143	809	26	31	89	32	406	70
80	111	205	1,072	44	43	133	41	599	98
66.7	150	282	1,380	68	56	189	53	863	134
50	203	387	1,781	105	74	267	69	1,267	186
43	229	439	1,973	124	83	305	77	1,486	212
20	353	685	2,845	222	119	481	118	2,691	347
10	463	900	3,579	315	149	630	158	3,997	479
4	611	1,183	4,520	441	184	816	216	6,100	674
2	724	1,397	5,224	539	209	951	265	8,022	838
1	841	1,611	5,927	639	233	1,080	320	10,270	1,020
0.5	959	1,827	6,631	740	255	1,205	381	12,870	1,219
0.2	1,120	2,114	7,565	873	283	1,362	471	16,940	1,511

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	150	282	1,380	68	56	189	53	863	134
% Reduction	26.6%	25.1%	13.3%	18.2%	7.8%	9.6%	14.8%	5.1%	29.6%
Average reduction									17%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in *red*.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario A1, 5% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	342	658	2800	123	74	285	62	1684	138
2005	168	318	1370	88	79	245	94	952	262
2006	341	662	2840	266	181	657	235	7733	568
2007	66	110	1295	19	17	44	40	358	87
2008	382	681	3270	297	68	455	53	1304	107
2009	72	121	635	34	48	105	44	510	71
2010	144	279	919	171	88	396	46	1684	101
2011	237	430	2120	119	90	288	113	1874	395
2012	171	345	1464	62	55	229	38	530	85
2013	477	908	3400	323	133	630	140	2226	456

Impaired Flood Frequency at POIs

Scenario A1, 5% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	28	44	340	7	10	20	16	130	23
99	34	56	407	9	13	28	18	161	28
95	61	105	653	21	23	60	27	294	47
90	81	143	831	31	31	87	33	406	63
80	114	205	1,099	50	43	134	42	599	88
66.7	153	282	1,411	76	57	195	54	863	122
50	207	387	1,814	116	75	280	71	1,267	170
43	233	439	2,006	136	84	324	79	1,486	196
20	357	685	2,867	243	123	529	120	2,691	330
10	466	900	3,583	346	154	709	159	3,997	467
4	609	1,183	4,488	491	193	942	216	6,100	678
2	717	1,397	5,157	609	220	1,114	264	8,022	862
1	827	1,611	5,818	731	245	1,283	317	10,270	1,070
0.5	939	1,827	6,474	859	270	1,449	376	12,870	1,304
0.2	1,088	2,114	7,335	1,035	301	1,662	462	16,940	1,660

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	153	282	1,411	76	57	195	54	863	122
% Reduction	24.8%	25.1%	11.3%	8.4%	7.0%	7.1%	12.7%	5.1%	36.2%
Average reduction									15%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in **red**.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario A2, 5% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	342	658	2800	92	74	181	61	1684	138
2005	62	318	1177	99	79	254	94	952	262
2006	341	662	2840	266	181	657	235	5848	568
2007	42	423	1344	19	29	63	40	358	87
2008	382	681	3270	297	68	455	48	1304	107
2009	72	121	684	31	48	105	33	498	71
2010	54	101	834	171	88	396	46	1554	101
2011	237	108	1785	119	90	288	41	1874	395
2012	122	272	1513	62	55	229	32	506	85
2013	477	908	3400	197	113	411	137	2226	456

Impaired Flood Frequency at POIs

Scenario A2, 5% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	12	30	343	7	19	30	12	132	23
99	15	39	407	9	22	38	14	165	28
95	31	77	641	21	32	72	21	301	47
90	45	109	810	31	39	98	27	413	63
80	70	163	1,064	48	49	141	35	604	88
66.7	104	235	1,363	72	61	193	45	857	122
50	156	338	1,752	107	75	264	60	1,232	170
43	184	391	1,938	125	82	299	67	1,429	196
20	333	661	2,789	217	113	460	106	2,471	330
10	488	919	3,511	303	138	597	144	3,533	467
4	724	1,284	4,446	423	170	773	201	5,148	678
2	929	1,579	5,153	517	193	903	251	6,548	862
1	1,156	1,892	5,863	614	217	1,031	307	8,115	1,070
0.5	1,407	2,222	6,580	713	240	1,157	370	9,862	1,304
0.2	1,778	2,684	7,541	848	271	1,321	466	12,470	1,660

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	104	235	1,363	72	61	193	45	857	122
% Reduction	49.1%	37.7%	14.3%	13.4%	0.8%	7.7%	27.3%	5.8%	36.2%
Average reduction									21%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in **red**.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario A3, 5% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	342	658	2800	123	74	285	90	1683	239
2005	163	318	1362	95	76	248	94	952	262
2006	341	662	2840	266	181	657	235	7733	568
2007	198	415	1702	15	26	57	67	524	187
2008	382	681	3270	297	68	455	53	1304	107
2009	122	176	757	30	45	99	43	509	201
2010	144	285	1062	167	85	390	45	1683	101
2011	237	430	2120	119	90	288	113	1874	395
2012	236	426	1882	102	55	229	43	529	224
2013	477	900	3392	319	130	624	139	2226	452

Impaired Flood Frequency at POIs

Scenario A3, 5% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	71	109	441	5	16	26	19	164	50
99	80	128	520	8	19	34	21	199	59
95	113	192	797	19	29	68	31	340	91
90	134	235	989	30	36	97	38	454	114
80	166	299	1,269	50	47	144	49	649	148
66.7	201	371	1,584	78	59	203	61	909	189
50	244	460	1,974	120	75	286	78	1,301	242
43	265	501	2,155	143	83	327	87	1,512	268
20	354	681	2,936	257	116	519	127	2,663	385
10	428	824	3,552	366	144	685	164	3,904	486
4	520	999	4,297	515	179	899	216	5,905	617
2	589	1,125	4,827	632	205	1,057	259	7,740	718
1	657	1,248	5,335	750	231	1,211	304	9,896	819
0.5	726	1,367	5,827	870	256	1,364	353	12,420	923
0.2	817	1,521	6,454	1,029	290	1,560	423	16,380	1,063

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	201	371	1,584	78	59	203	61	909	189
% Reduction	1.6%	1.5%	0.4%	6.7%	3.3%	2.9%	1.3%	0.1%	0.7%
Average reduction									2%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in *red*.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario A3, 10% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	342	658	2800	119	74	279	90	1683	239
2005	163	318	1362	95	76	248	93	952	262
2006	341	662	2840	266	181	657	234	7731	564
2007	198	415	1702	15	26	57	67	524	183
2008	382	681	3270	297	68	455	52	1302	103
2009	122	176	757	30	45	99	43	509	201
2010	139	285	1062	167	85	390	45	1683	101
2011	237	430	2120	119	90	288	112	1874	395
2012	236	426	1882	102	52	223	43	529	224
2013	472	900	3392	319	130	624	139	2224	452

Impaired Flood Frequency at POIs

Scenario A3, 10% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	69	109	441	5	16	26	19	164	48
99	79	128	520	8	19	34	21	199	57
95	111	192	797	19	29	68	31	340	89
90	133	235	989	30	36	96	38	454	112
80	165	299	1,269	50	47	143	49	648	147
66.7	200	371	1,584	78	59	202	61	909	188
50	243	460	1,974	120	75	284	78	1,301	241
43	264	501	2,155	142	82	325	86	1,512	267
20	354	681	2,936	256	116	517	127	2,662	385
10	427	824	3,552	365	144	683	163	3,902	486
4	520	999	4,297	514	179	897	215	5,902	618
2	588	1,125	4,827	630	206	1,055	257	7,737	719
1	656	1,248	5,335	748	232	1,211	303	9,892	821
0.5	724	1,367	5,827	868	258	1,364	351	12,410	925
0.2	815	1,521	6,454	1,028	293	1,562	421	16,380	1,066

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	200	371	1,584	78	59	202	61	909	188
% Reduction	2.1%	1.5%	0.4%	7.0%	3.9%	3.4%	1.8%	0.1%	1.5%
Average reduction									2%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in **red**.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario A4, 5% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	342	658	2800	119	74	279	90	1683	239
2005	168	318	1370	95	76	248	93	952	258
2006	341	662	2840	266	181	657	235	7733	568
2007	198	415	1702	19	26	57	67	524	183
2008	382	681	3270	297	68	455	53	1304	107
2009	122	176	757	30	45	99	43	509	201
2010	139	285	1062	167	85	390	45	1683	101
2011	237	430	2120	119	90	288	113	1874	395
2012	236	426	1882	102	55	229	43	529	224
2013	477	908	3400	323	133	630	140	2224	456

Impaired Flood Frequency at POIs

Scenario A4, 5% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	70	109	441	7	16	26	19	164	50
99	80	127	520	9	19	34	21	199	58
95	112	191	798	22	29	68	31	340	90
90	134	235	990	33	36	96	38	454	113
80	165	299	1,271	53	47	143	49	649	148
66.7	201	371	1,585	80	59	203	61	909	188
50	244	460	1,976	122	75	285	78	1,301	241
43	265	502	2,157	143	83	326	87	1,512	267
20	355	682	2,938	252	116	519	127	2,663	385
10	428	826	3,554	354	144	686	164	3,903	486
4	521	1,003	4,299	493	180	900	216	5,904	619
2	590	1,131	4,829	602	206	1,059	259	7,739	720
1	658	1,255	5,337	713	233	1,215	304	9,895	824
0.5	726	1,376	5,828	826	259	1,369	353	12,410	929
0.2	817	1,532	6,454	977	294	1,567	424	16,380	1,073

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	201	371	1,585	80	59	203	61	909	188
% Reduction	1.6%	1.5%	0.4%	3.5%	3.1%	3.1%	1.4%	0.1%	1.2%
Average reduction									2%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in **red**.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario A4, 10% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	337	650	2792	119	74	279	90	1683	239
2005	168	318	1370	95	76	248	93	952	258
2006	336	654	2832	266	178	651	234	7731	564
2007	198	415	1702	19	26	57	67	524	183
2008	382	681	3270	297	68	455	52	1302	103
2009	122	176	757	30	45	99	43	509	201
2010	139	285	1062	167	85	390	45	1683	101
2011	237	430	2120	119	90	288	112	1874	395
2012	236	426	1882	102	52	223	43	529	224
2013	477	908	3400	323	133	630	140	2224	456

Impaired Flood Frequency at POIs

Scenario A4, 10% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	70	110	441	7	16	26	19	164	48
99	80	128	520	9	19	34	21	199	57
95	112	192	798	22	29	68	31	340	89
90	134	235	990	33	36	96	38	454	112
80	165	299	1,270	53	47	143	49	648	147
66.7	200	370	1,585	80	59	202	61	909	187
50	244	459	1,975	122	75	284	78	1,301	241
43	264	500	2,156	143	82	325	87	1,512	266
20	353	679	2,935	252	116	517	127	2,662	385
10	426	822	3,550	354	143	683	164	3,902	486
4	518	997	4,293	493	179	897	216	5,902	619
2	586	1,123	4,821	602	205	1,055	258	7,737	721
1	653	1,246	5,328	713	231	1,211	303	9,892	824
0.5	721	1,366	5,818	826	257	1,364	352	12,410	929
0.2	810	1,520	6,443	977	292	1,562	422	16,380	1,071

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	200	370	1,585	80	59	202	61	909	187
% Reduction	1.9%	1.6%	0.4%	3.5%	3.8%	3.4%	1.8%	0.1%	1.7%
Average reduction									2%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in **red**.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario A5, 5% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	337	650	2792	119	71	279	90	1683	239
2005	163	310	1362	95	76	248	93	952	258
2006	341	654	2832	262	178	651	234	7731	564
2007	198	415	1702	19	29	63	67	524	183
2008	377	673	3262	293	65	449	52	1302	103
2009	122	176	757	30	45	99	43	509	201
2010	139	285	1062	167	85	390	45	1683	101
2011	232	422	2112	119	87	282	112	1873	395
2012	236	426	1882	102	52	223	43	529	224
2013	472	900	3392	319	130	624	139	2224	452

Impaired Flood Frequency at POIs

Scenario A5, 5% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	70	109	441	7	18	28	19	164	48
99	79	127	520	9	21	37	21	199	57
95	111	191	798	22	30	71	31	340	89
90	133	234	989	33	37	100	38	454	112
80	164	297	1,269	53	47	146	49	648	147
66.7	199	368	1,582	80	59	205	61	909	187
50	242	456	1,972	121	74	285	78	1,301	241
43	262	497	2,152	142	81	324	86	1,511	266
20	351	675	2,931	250	113	509	127	2,662	384
10	424	817	3,544	350	139	669	163	3,902	485
4	515	991	4,286	487	174	874	215	5,902	617
2	583	1,117	4,813	593	201	1,026	257	7,736	718
1	651	1,239	5,320	702	227	1,177	303	9,892	820
0.5	718	1,359	5,809	811	254	1,325	351	12,410	925
0.2	808	1,514	6,433	958	291	1,517	421	16,380	1,066

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	199	368	1,582	80	59	205	61	909	187
% Reduction	2.5%	2.3%	0.6%	3.6%	3.9%	2.3%	1.8%	0.1%	1.7%
Average reduction									2%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in *red*.
 Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.

Impaired Flood Frequency Results for Scenario A5, 10% Maximum Cumulative Volume Depletion

Impaired Peak Annual Flows

Water Year	Peak Annual Flows (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
2004	337	650	2792	119	71	279	90	1683	239
2005	163	310	1362	95	76	248	93	950	258
2006	336	654	2832	262	178	651	234	7731	564
2007	198	415	1702	19	29	63	67	524	183
2008	377	673	3262	293	65	449	52	1302	103
2009	122	176	757	30	45	99	43	509	201
2010	139	285	1062	167	85	390	45	1683	97
2011	232	422	2112	115	87	282	112	1873	391
2012	236	426	1882	102	52	223	43	529	224
2013	472	900	3392	319	130	624	139	2224	452

Impaired Flood Frequency at POIs

Scenario A5, 10% Maximum Cumulative Volume Depletion

Percent Exceedance	Peak Discharge (cfs)								
	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
99.5	70	109	441	7	18	28	19	164	47
99	79	127	520	9	21	37	21	199	56
95	112	191	798	22	30	71	31	340	88
90	133	234	989	33	37	100	38	454	110
80	164	297	1,269	53	47	146	49	648	145
66.7	199	368	1,582	80	59	205	61	908	186
50	242	456	1,972	121	74	285	78	1,300	240
43	262	497	2,152	142	81	324	86	1,511	266
20	350	675	2,931	249	113	509	127	2,662	384
10	423	817	3,544	349	139	669	163	3,901	485
4	514	991	4,286	486	174	874	215	5,902	618
2	581	1,117	4,813	592	201	1,026	257	7,737	719
1	648	1,239	5,320	701	227	1,177	303	9,893	822
0.5	716	1,359	5,809	811	254	1,325	351	12,410	926
0.2	805	1,514	6,433	958	291	1,517	421	16,380	1,066

Percent Reduction in 1.5-year Flood Magnitude due to Impairments

	MC2	MC3	MC5	SC4	SC5	SC6	WC2	WC4	WC6
Unimp. (cfs)	204	376	1,591	83	61	209	62	910	191
Impaired (cfs)	199	368	1,582	80	59	205	61	908	186
% Reduction	2.6%	2.3%	0.6%	4.0%	3.9%	2.3%	1.8%	0.2%	2.3%
Average reduction									2%

Notes:

A 1.5 year return interval corresponds to a percent exceedance of 66.7%; 1.5-year peak discharges shown in **red**.

Unimpaired and impaired flood frequency values reflect Bulletin 17B frequency computed using PeakFQ program.