Section 5C.5.3

Passage, Movement, and Migration Results

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5C.5.3 Passage, Movement, and Migration Results

5C.5.3.1 Flow Summary

Flows relevant to fish movement upstream of the Plan Area are presented in Section 5C.5.4. Summary tables (Table 5C.5.3-1 through Table 5C.5.3-18) of CALSIM flows within the Plan Area are provided below for the evaluated starting operations (ESO) and existing biological conditions (EBC) scenarios. Summary tables for the high outflow scenario (HOS) and low outflow scenario (LOS) (Table 5C.5.3-19 through Table 5C.5.3-32) are then presented.

5C.5.3.2 Evaluated Starting Operations and Existing Biological Conditions Scenarios

Table 5C.5.3-1. Mean Monthly Flows (cfs) in Sacramento River at Freeport under EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	50,800	50,438	51,801	52,716	50,112	51,332
	AN	39,719	38,205	38,821	40,339	37,435	38,336
	BN	23,705	22,806	23,033	22,575	21,281	20,995
	D	17,397	17,175	17,373	17,404	16,716	16,506
	C	14,265	14,509	14,499	15,056	13,855	15,045
	All	31,874	31,371	31,974	32,496	30,698	31,296
Feb	W	57,222	56,685	58,786	59,754	57,253	58,619
	AN	45,570	44,638	46,803	47,678	46,079	46,604
	BN	31,864	30,759	31,635	31,522	30,009	30,339
	D	21,179	21,195	20,994	21,083	20,002	20,283
	C	14,732	14,849	14,442	14,311	14,168	13,878
	All	37,057	36,583	37,612	38,028	36,484	37,070
Mar	W	49,436	49,397	50,217	51,011	48,131	48,787
	AN	44,531	43,842	45,138	45,122	43,458	43,357
	BN	24,520	23,330	23,039	22,944	21,636	21,357
	D	20,684	20,436	20,311	20,677	19,391	19,565
	C	13,300	13,166	13,098	13,190	13,061	13,061
	All	32,865	32,474	32,837	33,164	31,483	31,666
Apr	W	37,854	37,985	37,928	37,588	35,638	35,365
	AN	26,041	26,068	25,455	24,993	24,062	23,884
	BN	17,823	17,516	17,319	17,199	16,873	17,574
	D	13,066	13,114	12,910	12,978	13,097	13,571
	C	10,325	10,293	10,128	10,460	10,365	10,546
	All	23,236	23,234	23,024	22,892	22,094	22,231

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
May	W	32,064	31,813	29,176	24,615	29,078	25,325
	AN	21,138	20,823	19,822	18,772	21,542	20,924
	BN	14,366	13,987	13,139	12,531	13,747	14,728
	D	11,093	10,846	10,737	11,558	11,355	13,027
	C	7,897	7,776	8,281	8,156	8,034	8,218
	All	19,303	19,041	17,964	16,422	18,388	17,669
Jun	W	24,106	23,875	19,961	18,807	22,151	22,530
	AN	16,526	16,666	15,378	16,266	19,159	21,228
	BN	13,793	13,634	13,345	14,112	17,736	18,161
	D	12,451	12,593	12,764	12,882	14,808	14,192
	C	10,133	10,126	10,075	10,369	9,941	10,200
	All	16,633	16,583	15,134	15,098	17,561	17,959
Jul	W	20,096	20,107	20,548	21,644	20,631	20,754
	AN	21,793	22,099	22,403	22,945	22,409	22,447
	BN	21,176	21,480	21,174	20,734	21,156	19,322
	D	19,498	19,300	18,894	19,182	17,370	14,736
	C	15,656	14,435	14,406	14,003	11,456	11,510
	All	19,748	19,626	19,665	20,020	18,922	18,084
Aug	W	15,965	16,060	16,030	16,212	15,134	14,696
	AN	16,021	16,533	16,729	17,635	16,552	15,875
	BN	15,792	15,913	15,393	16,382	15,567	14,334
	D	17,113	16,009	14,651	14,498	11,341	11,232
	C	10,242	10,048	9,445	9,143	9,032	8,621
	All	15,358	15,213	14,757	15,039	13,690	13,157
Sep	W	18,351	27,667	26,940	27,309	24,182	25,642
	AN	13,297	20,646	21,323	21,102	17,981	18,499
	BN	12,522	12,433	12,876	12,399	10,504	10,023
	D	12,250	11,242	9,840	8,713	9,095	9,464
	C	8,580	8,153	7,781	7,386	7,766	8,858
	All	13,847	17,577	17,159	16,857	15,225	15,923
Oct	W	13,583	12,980	12,860	13,355	12,906	13,031
	AN	11,200	10,517	10,507	11,937	10,295	12,179
	BN	11,642	11,136	10,666	12,208	10,922	11,787
	D	10,366	9,984	10,315	10,572	10,678	10,900
	C	10,161	9,624	9,475	10,051	9,454	10,539
	All	11,696	11,156	11,087	11,857	11,191	11,862
Nov	W	19,472	20,795	20,502	19,308	18,906	17,903
	AN	15,357	16,902	16,909	15,972	14,913	13,912
	BN	12,633	13,779	13,603	13,094	11,827	11,833
	D	12,920	12,735	12,549	11,964	11,678	11,226
	C	9,703	9,893	9,518	9,364	9,052	8,788
	All	14,834	15,663	15,445	14,692	14,085	13,483

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Dec	W	39,674	37,430	39,300	36,987	37,293	35,182
	AN	21,658	22,234	22,691	22,622	21,818	21,806
	BN	16,695	16,951	17,187	16,708	17,105	16,645
	D	15,471	15,537	15,411	15,185	15,197	14,923
	C	11,879	11,350	10,901	10,694	11,219	11,565
	All	23,734	23,087	23,694	22,789	22,916	22,156

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-2. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Sacramento River at Freeport

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	-688 (-1.4%)	532 (1%)	-325 (-0.6%)	895 (1.8%)	-1689 (-3.3%)	-1384 (-2.6%)
	AN	-2284 (-5.8%)	-1383 (-3.5%)	-770 (-2%)	131 (0.3%)	-1386 (-3.6%)	-2003 (-5%)
	BN	-2424 (-10.2%)	-2710 (-11.4%)	-1525 (-6.7%)	-1810 (-7.9%)	-1753 (-7.6%)	-1580 (-7%)
	D	-681 (-3.9%)	-891 (-5.1%)	-459 (-2.7%)	-669 (-3.9%)	-656 (-3.8%)	-897 (-5.2%)
	C	-410 (-2.9%)	780 (5.5%)	-655 (-4.5%)	535 (3.7%)	-644 (-4.4%)	-11 (-0.1%)
	All	-1176 (-3.7%)	-578 (-1.8%)	-673 (-2.1%)	-75 (-0.2%)	-1276 (-4%)	-1200 (-3.7%)
Feb	W	32 (0.1%)	1398 (2.4%)	569 (1%)	1935 (3.4%)	-1533 (-2.6%)	-1134 (-1.9%)
	AN	509 (1.1%)	1034 (2.3%)	1441 (3.2%)	1966 (4.4%)	-725 (-1.5%)	-1075 (-2.3%)
	BN	-1855 (-5.8%)	-1525 (-4.8%)	-750 (-2.4%)	-420 (-1.4%)	-1626 (-5.1%)	-1182 (-3.8%)
	D	-1177 (-5.6%)	-897 (-4.2%)	-1193 (-5.6%)	-912 (-4.3%)	-992 (-4.7%)	-800 (-3.8%)
	C	-564 (-3.8%)	-854 (-5.8%)	-681 (-4.6%)	-972 (-6.5%)	-274 (-1.9%)	-434 (-3%)
	All	-573 (-1.5%)	12 (0%)	-98 (-0.3%)	487 (1.3%)	-1127 (-3%)	-958 (-2.5%)
Mar	W	-1305 (-2.6%)	-649 (-1.3%)	-1266 (-2.6%)	-610 (-1.2%)	-2085 (-4.2%)	-2224 (-4.4%)
	AN	-1074 (-2.4%)	-1175 (-2.6%)	-385 (-0.9%)	-486 (-1.1%)	-1681 (-3.7%)	-1766 (-3.9%)
	BN	-2884 (-11.8%)	-3163 (-12.9%)	-1694 (-7.3%)	-1973 (-8.5%)	-1403 (-6.1%)	-1587 (-6.9%)
	D	-1293 (-6.3%)	-1120 (-5.4%)	-1045 (-5.1%)	-872 (-4.3%)	-920 (-4.5%)	-1112 (-5.4%)
	C	-239 (-1.8%)	-239 (-1.8%)	-105 (-0.8%)	-105 (-0.8%)	-37 (-0.3%)	-129 (-1%)
	All	-1382 (-4.2%)	-1198 (-3.6%)	-992 (-3.1%)	-808 (-2.5%)	-1354 (-4.1%)	-1497 (-4.5%)
Apr	W	-2216 (-5.9%)	-2490 (-6.6%)	-2347 (-6.2%)	-2620 (-6.9%)	-2290 (-6%)	-2223 (-5.9%)
	AN	-1979 (-7.6%)	-2157 (-8.3%)	-2006 (-7.7%)	-2184 (-8.4%)	-1393 (-5.5%)	-1109 (-4.4%)
	BN	-950 (-5.3%)	-249 (-1.4%)	-643 (-3.7%)	59 (0.3%)	-446 (-2.6%)	375 (2.2%)
	D	31 (0.2%)	505 (3.9%)	-17 (-0.1%)	456 (3.5%)	187 (1.4%)	592 (4.6%)
	C	40 (0.4%)	222 (2.1%)	72 (0.7%)	253 (2.5%)	237 (2.3%)	86 (0.8%)
	All	-1142 (-4.9%)	-1004 (-4.3%)	-1141 (-4.9%)	-1003 (-4.3%)	-930 (-4%)	-661 (-2.9%)
May	W	-2986 (-9.3%)	-6739 (-21%)	-2735 (-8.6%)	-6488 (-20.4%)	-98 (-0.3%)	711 (2.9%)
	AN	404 (1.9%)	-213 (-1%)	719 (3.5%)	101 (0.5%)	1720 (8.7%)	2153 (11.5%)
	BN	-618 (-4.3%)	363 (2.5%)	-240 (-1.7%)	741 (5.3%)	608 (4.6%)	2198 (17.5%)
	D	262 (2.4%)	1934 (17.4%)	509 (4.7%)	2181 (20.1%)	618 (5.8%)	1469 (12.7%)
	C	137 (1.7%)	321 (4.1%)	259 (3.3%)	442 (5.7%)	-247 (-3%)	62 (0.8%)
	All	-916 (-4.7%)	-1634 (-8.5%)	-654 (-3.4%)	-1372 (-7.2%)	424 (2.4%)	1247 (7.6%)

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jun	W	-1955 (-8.1%)	-1576 (-6.5%)	-1724 (-7.2%)	-1345 (-5.6%)	2190 (11%)	3723 (19.8%)
	AN	2633 (15.9%)	4702 (28.4%)	2493 (15%)	4562 (27.4%)	3781 (24.6%)	4962 (30.5%)
	BN	3943 (28.6%)	4369 (31.7%)	4101 (30.1%)	4527 (33.2%)	4390 (32.9%)	4049 (28.7%)
	D	2357 (18.9%)	1741 (14%)	2215 (17.6%)	1599 (12.7%)	2044 (16%)	1310 (10.2%)
	C	-192 (-1.9%)	67 (0.7%)	-185 (-1.8%)	74 (0.7%)	-133 (-1.3%)	-169 (-1.6%)
	All	928 (5.6%)	1326 (8%)	978 (5.9%)	1376 (8.3%)	2426 (16%)	2861 (18.9%)
Jul	W	535 (2.7%)	658 (3.3%)	524 (2.6%)	647 (3.2%)	82 (0.4%)	-889 (-4.1%)
	AN	616 (2.8%)	654 (3%)	310 (1.4%)	348 (1.6%)	5 (0%)	-498 (-2.2%)
	BN	-21 (-0.1%)	-1855 (-8.8%)	-325 (-1.5%)	-2159 (-10%)	-19 (-0.1%)	-1413 (-6.8%)
	D	-2128 (-10.9%)	-4763 (-24.4%)	-1930 (-10%)	-4565 (-23.7%)	-1524 (-8.1%)	-4446 (-23.2%)
	C	-4200 (-26.8%)	-4146 (-26.5%)	-2979 (-20.6%)	-2925 (-20.3%)	-2950 (-20.5%)	-2493 (-17.8%)
	All	-826 (-4.2%)	-1664 (-8.4%)	-704 (-3.6%)	-1542 (-7.9%)	-742 (-3.8%)	-1937 (-9.7%)
Aug	W	-830 (-5.2%)	-1268 (-7.9%)	-926 (-5.8%)	-1364 (-8.5%)	-896 (-5.6%)	-1516 (-9.4%)
	AN	530 (3.3%)	-146 (-0.9%)	19 (0.1%)	-658 (-4%)	-177 (-1.1%)	-1760 (-10%)
	BN	-225 (-1.4%)	-1458 (-9.2%)	-345 (-2.2%)	-1578 (-9.9%)	174 (1.1%)	-2048 (-12.5%)
	D	-5772 (-33.7%)	-5881 (-34.4%)	-4668 (-29.2%)	-4777 (-29.8%)	-3310 (-22.6%)	-3266 (-22.5%)
	C	-1210 (-11.8%)	-1621 (-15.8%)	-1016 (-10.1%)	-1428 (-14.2%)	-412 (-4.4%)	-523 (-5.7%)
	All	-1668 (-10.9%)	-2201 (-14.3%)	-1523 (-10%)	-2056 (-13.5%)	-1067 (-7.2%)	-1881 (-12.5%)
Sep	W	5831 (31.8%)	7291 (39.7%)	-3485 (-12.6%)	-2024 (-7.3%)	-2758 (-10.2%)	-1666 (-6.1%)
	AN	4685 (35.2%)	5202 (39.1%)	-2665 (-12.9%)	-2147 (-10.4%)	-3342 (-15.7%)	-2604 (-12.3%)
	BN	-2017 (-16.1%)	-2499 (-20%)	-1928 (-15.5%)	-2410 (-19.4%)	-2372 (-18.4%)	-2376 (-19.2%)
	D	-3154 (-25.7%)	-2786 (-22.7%)	-2146 (-19.1%)	-1778 (-15.8%)	-745 (-7.6%)	751 (8.6%)
	C	-814 (-9.5%)	277 (3.2%)	-387 (-4.8%)	704 (8.6%)	-15 (-0.2%)	1471 (19.9%)
	All	1378 (10%)	2076 (15%)	-2352 (-13.4%)	-1655 (-9.4%)	-1934 (-11.3%)	-935 (-5.5%)
Oct	W	-678 (-5%)	-552 (-4.1%)	-75 (-0.6%)	51 (0.4%)	45 (0.4%)	-324 (-2.4%)
	AN	-905 (-8.1%)	979 (8.7%)	-222 (-2.1%)	1662 (15.8%)	-212 (-2%)	242 (2%)
	BN	-720 (-6.2%)	145 (1.2%)	-214 (-1.9%)	651 (5.8%)	256 (2.4%)	-421 (-3.4%)
	D	312 (3%)	534 (5.2%)	694 (7%)	916 (9.2%)	363 (3.5%)	328 (3.1%)
	C	-706 (-7%)	379 (3.7%)	-169 (-1.8%)	916 (9.5%)	-21 (-0.2%)	489 (4.9%)
	All	-505 (-4.3%)	165 (1.4%)	35 (0.3%)	706 (6.3%)	104 (0.9%)	4 (0%)
Nov	W	-566 (-2.9%)	-1570 (-8.1%)	-1889 (-9.1%)	-2892 (-13.9%)	-1596 (-7.8%)	-1405 (-7.3%)
	AN	-444 (-2.9%)	-1445 (-9.4%)	-1989 (-11.8%)	-2991 (-17.7%)	-1996 (-11.8%)	-2060 (-12.9%)
	BN	-806 (-6.4%)	-800 (-6.3%)	-1951 (-14.2%)	-1945 (-14.1%)	-1776 (-13.1%)	-1261 (-9.6%)
	D	-1242 (-9.6%)	-1694 (-13.1%)	-1057 (-8.3%)	-1510 (-11.9%)	-871 (-6.9%)	-738 (-6.2%)
	C	-651 (-6.7%)	-914 (-9.4%)	-841 (-8.5%)	-1104 (-11.2%)	-466 (-4.9%)	-576 (-6.2%)
	All	-750 (-5.1%)	-1351 (-9.1%)	-1578 (-10.1%)	-2180 (-13.9%)	-1361 (-8.8%)	-1209 (-8.2%)
Dec	W	-2381 (-6%)	-4492 (-11.3%)	-136 (-0.4%)	-2248 (-6%)	-2007 (-5.1%)	-1805 (-4.9%)
	AN	160 (0.7%)	148 (0.7%)	-416 (-1.9%)	-428 (-1.9%)	-873 (-3.8%)	-815 (-3.6%)
	BN	410 (2.5%)	-50 (-0.3%)	154 (0.9%)	-306 (-1.8%)	-82 (-0.5%)	-63 (-0.4%)
	D	-274 (-1.8%)	-548 (-3.5%)	-341 (-2.2%)	-614 (-4%)	-214 (-1.4%)	-262 (-1.7%)
	C	-660 (-5.6%)	-314 (-2.6%)	-131 (-1.2%)	214 (1.9%)	318 (2.9%)	871 (8.1%)
	All	-818 (-3.4%)	-1577 (-6.6%)	-172 (-0.7%)	-931 (-4%)	-778 (-3.3%)	-633 (-2.8%)

[a] A positive value indicates higher flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-3. Mean Monthly Flows (cfs) in Sacramento River downstream of North Delta Diversion for EBC and ESO Scenarios

Year	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	50,961	50,599	51,963	52,878	42,922	43,883
	AN	39,863	38,350	38,966	40,484	32,114	33,047
	BN	23,781	22,883	23,111	22,653	18,670	18,431
	D	17,444	17,222	17,420	17,451	15,082	14,939
	C	14,281	14,527	14,516	15,073	12,792	13,966
	All	31,971	31,469	32,073	32,595	26,679	27,220
Feb	W	57,314	56,778	58,879	59,847	48,669	49,932
	AN	45,676	44,745	46,911	47,786	39,319	39,397
	BN	31,934	30,829	31,705	31,592	25,204	25,437
	D	21,202	21,218	21,018	21,107	17,291	17,751
	C	14,708	14,829	14,422	14,291	13,251	12,979
	All	37,116	36,642	37,671	38,087	31,223	31,736
Mar	W	49,416	49,379	50,198	50,993	39,664	40,299
	AN	44,495	43,809	45,105	45,088	35,187	35,162
	BN	24,489	23,300	23,010	22,915	16,848	16,710
	D	20,656	20,409	20,284	20,650	16,052	16,213
	C	13,245	13,113	13,045	13,137	11,959	11,961
	All	32,834	32,445	32,807	33,134	25,876	26,086
Apr	W	37,809	37,941	37,883	37,543	28,473	28,339
	AN	25,979	26,006	25,393	24,931	17,877	17,897
	BN	17,752	17,445	17,248	17,128	13,809	14,235
	D	12,990	13,040	12,836	12,904	11,277	11,826
	C	10,229	10,198	10,033	10,365	9,635	9,808
	All	23,169	23,169	22,959	22,826	17,887	18,066
May	W	31,948	31,699	29,061	24,500	22,219	18,652
	AN	21,021	20,708	19,707	18,657	16,232	15,722
	BN	14,227	13,851	13,003	12,394	11,574	12,134
	D	10,959	10,714	10,606	11,427	10,127	11,633
	C	7,749	7,631	8,136	8,011	7,431	7,608
	All	19,175	18,915	17,837	16,295	14,707	13,953
Jun	W	23,900	23,671	19,758	18,603	15,310	15,070
	AN	16,309	16,451	15,163	16,051	13,017	14,041
	BN	13,576	13,420	13,131	13,898	13,000	13,247
	D	12,222	12,367	12,538	12,656	12,108	12,087
	C	9,884	9,880	9,829	10,123	9,185	9,403
	All	16,412	16,365	14,916	14,880	12,981	13,124
Jul	W	19,876	19,889	20,330	21,425	16,837	18,173
	AN	21,574	21,881	22,186	22,727	18,952	20,291
	BN	20,953	21,258	20,953	20,513	18,277	17,266
	D	19,272	19,076	18,670	18,957	15,479	13,429
	C	15,397	14,178	14,149	13,767	10,084	10,410
	All	19,520	19,400	19,439	19,797	16,106	16,151

Year	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	15,816	15,911	15,882	16,064	10,355	10,427
	AN	15,877	16,389	16,585	17,491	12,652	12,175
	BN	15,643	15,763	15,243	16,232	12,500	12,274
	D	16,965	15,862	14,504	14,351	10,038	10,582
	C	10,095	9,901	9,298	8,996	8,784	8,382
	All	15,210	15,066	14,610	14,891	10,758	10,733
Sep	W	18,254	27,571	26,844	27,212	18,132	19,827
	AN	13,198	20,549	21,227	21,006	12,356	13,210
	BN	12,427	12,340	12,783	12,306	8,377	8,515
	D	12,155	11,149	9,748	8,620	7,712	8,861
	C	8,485	8,059	7,687	7,292	7,461	8,580
	All	13,751	17,483	17,065	16,763	11,772	12,874
Oct	W	13,505	12,903	12,783	13,277	9,109	10,166
	AN	11,118	10,436	10,426	11,864	8,220	10,291
	BN	11,557	11,052	10,582	12,124	8,441	10,197
	D	10,279	9,898	10,230	10,487	8,331	9,011
	C	10,073	9,537	9,389	9,964	8,070	9,452
	All	11,613	11,074	11,005	11,776	8,542	9,831
Nov	W	19,447	20,772	20,479	19,285	14,895	14,622
	AN	15,309	16,856	16,862	15,925	12,301	11,531
	BN	12,574	13,721	13,546	13,037	9,348	9,467
	D	12,868	12,685	12,499	11,914	9,474	9,467
	C	9,633	9,824	9,449	9,295	8,253	8,209
	All	14,788	15,618	15,400	14,647	11,406	11,219
Dec	W	39,708	37,465	39,335	37,022	32,728	31,257
	AN	21,663	22,241	22,698	22,629	20,165	20,348
	BN	16,678	16,935	17,171	16,692	15,568	15,155
	D	15,442	15,511	15,384	15,159	14,065	13,977
	C	11,816	11,289	10,840	10,632	10,659	11,005
	All	23,727	23,082	23,689	22,784	20,633	20,154

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-4. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Sacramento River downstream of North Delta Diversion

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	-8039 (-15.8%)	-7078 (-13.9%)	-7678 (-15.2%)	-6716 (-13.3%)	-9041 (-17.4%)	-8994 (-17%)
	AN	-7749 (-19.4%)	-6816 (-17.1%)	-6236 (-16.3%)	-5304 (-13.8%)	-6852 (-17.6%)	-7438 (-18.4%)
	BN	-5110 (-21.5%)	-5349 (-22.5%)	-4213 (-18.4%)	-4452 (-19.5%)	-4441 (-19.2%)	-4221 (-18.6%)
	D	-2362 (-13.5%)	-2504 (-14.4%)	-2141 (-12.4%)	-2283 (-13.3%)	-2338 (-13.4%)	-2512 (-14.4%)
	C	-1489 (-10.4%)	-315 (-2.2%)	-1734 (-11.9%)	-561 (-3.9%)	-1724 (-11.9%)	-1107 (-7.3%)
	All	-5292 (-16.6%)	-4751 (-14.9%)	-4790 (-15.2%)	-4249 (-13.5%)	-5393 (-16.8%)	-5374 (-16.5%)
Feb	W	-8645 (-15.1%)	-7382 (-12.9%)	-8109 (-14.3%)	-6846 (-12.1%)	-10210 (-17.3%)	-9915 (-16.6%)
	AN	-6358 (-13.9%)	-6280 (-13.7%)	-5427 (-12.1%)	-5349 (-12%)	-7592 (-16.2%)	-8390 (-17.6%)
	BN	-6730 (-21.1%)	-6497 (-20.3%)	-5626 (-18.2%)	-5392 (-17.5%)	-6501 (-20.5%)	-6155 (-19.5%)
	D	-3911 (-18.4%)	-3451 (-16.3%)	-3928 (-18.5%)	-3467 (-16.3%)	-3727 (-17.7%)	-3356 (-15.9%)
	C	-1457 (-9.9%)	-1729 (-11.8%)	-1578 (-10.6%)	-1850 (-12.5%)	-1171 (-8.1%)	-1311 (-9.2%)
	All	-5892 (-15.9%)	-5379 (-14.5%)	-5419 (-14.8%)	-4906 (-13.4%)	-6448 (-17.1%)	-6351 (-16.7%)
Mar	W	-9752 (-19.7%)	-9117 (-18.4%)	-9715 (-19.7%)	-9080 (-18.4%)	-10534 (-21%)	-10694 (-21%)
	AN	-9309 (-20.9%)	-9333 (-21%)	-8622 (-19.7%)	-8646 (-19.7%)	-9918 (-22%)	-9926 (-22%)
	BN	-7641 (-31.2%)	-7779 (-31.8%)	-6452 (-27.7%)	-6591 (-28.3%)	-6162 (-26.8%)	-6205 (-27.1%)
	D	-4605 (-22.3%)	-4443 (-21.5%)	-4357 (-21.4%)	-4196 (-20.6%)	-4232 (-20.9%)	-4437 (-21.5%)
	C	-1286 (-9.7%)	-1285 (-9.7%)	-1154 (-8.8%)	-1153 (-8.8%)	-1086 (-8.3%)	-1176 (-9%)
	All	-6958 (-21.2%)	-6748 (-20.6%)	-6569 (-20.2%)	-6359 (-19.6%)	-6932 (-21.1%)	-7049 (-21.3%)
Apr	W	-9336 (-24.7%)	-9470 (-25%)	-9468 (-25%)	-9602 (-25.3%)	-9411 (-24.8%)	-9205 (-24.5%)
	AN	-8102 (-31.2%)	-8082 (-31.1%)	-8129 (-31.3%)	-8110 (-31.2%)	-7516 (-29.6%)	-7035 (-28.2%)
	BN	-3943 (-22.2%)	-3516 (-19.8%)	-3636 (-20.8%)	-3210 (-18.4%)	-3440 (-19.9%)	-2893 (-16.9%)
	D	-1713 (-13.2%)	-1165 (-9%)	-1763 (-13.5%)	-1214 (-9.3%)	-1559 (-12.1%)	-1078 (-8.4%)
	C	-594 (-5.8%)	-420 (-4.1%)	-563 (-5.5%)	-390 (-3.8%)	-398 (-4%)	-557 (-5.4%)
	All	-5282 (-22.8%)	-5103 (-22%)	-5282 (-22.8%)	-5103 (-22%)	-5071 (-22.1%)	-4760 (-20.9%)
May	W	-9729 (-30.5%)	-13296 (-41.6%)	-9480 (-29.9%)	-13047 (-41.2%)	-6842 (-23.5%)	-5848 (-23.9%)
	AN	-4789 (-22.8%)	-5299 (-25.2%)	-4476 (-21.6%)	-4986 (-24.1%)	-3475 (-17.6%)	-2935 (-15.7%)
	BN	-2653 (-18.6%)	-2093 (-14.7%)	-2277 (-16.4%)	-1717 (-12.4%)	-1429 (-11%)	-261 (-2.1%)
	D	-832 (-7.6%)	673 (6.1%)	-587 (-5.5%)	918 (8.6%)	-478 (-4.5%)	206 (1.8%)
	C	-319 (-4.1%)	-141 (-1.8%)	-200 (-2.6%)	-22 (-0.3%)	-706 (-8.7%)	-403 (-5%)
	All	-4468 (-23.3%)	-5221 (-27.2%)	-4208 (-22.2%)	-4961 (-26.2%)	-3130 (-17.5%)	-2342 (-14.4%)
Jun	W	-8590 (-35.9%)	-8830 (-36.9%)	-8362 (-35.3%)	-8601 (-36.3%)	-4448 (-22.5%)	-3533 (-19%)
	AN	-3291 (-20.2%)	-2268 (-13.9%)	-3434 (-20.9%)	-2410 (-14.7%)	-2146 (-14.2%)	-2010 (-12.5%)
	BN	-576 (-4.2%)	-329 (-2.4%)	-420 (-3.1%)	-173 (-1.3%)	-131 (-1%)	-651 (-4.7%)
	D	-114 (-0.9%)	-135 (-1.1%)	-258 (-2.1%)	-280 (-2.3%)	-430 (-3.4%)	-568 (-4.5%)
	C	-698 (-7.1%)	-480 (-4.9%)	-695 (-7%)	-476 (-4.8%)	-643 (-6.5%)	-719 (-7.1%)
	All	-3431 (-20.9%)	-3288 (-20%)	-3384 (-20.7%)	-3241 (-19.8%)	-1935 (-13%)	-1756 (-11.8%)
Jul	W	-3039 (-15.3%)	-1703 (-8.6%)	-3052 (-15.3%)	-1716 (-8.6%)	-3493 (-17.2%)	-3252 (-15.2%)
	AN	-2622 (-12.2%)	-1282 (-5.9%)	-2929 (-13.4%)	-1590 (-7.3%)	-3234 (-14.6%)	-2436 (-10.7%)
	BN	-2676 (-12.8%)	-3687 (-17.6%)	-2981 (-14%)	-3993 (-18.8%)	-2676 (-12.8%)	-3247 (-15.8%)
	D	-3793 (-19.7%)	-5843 (-30.3%)	-3596 (-18.9%)	-5647 (-29.6%)	-3190 (-17.1%)	-5528 (-29.2%)
	C	-5314 (-34.5%)	-4987 (-32.4%)	-4095 (-28.9%)	-3768 (-26.6%)	-4065 (-28.7%)	-3357 (-24.4%)
	All	-3414 (-17.5%)	-3370 (-17.3%)	-3294 (-17%)	-3249 (-16.7%)	-3333 (-17.1%)	-3647 (-18.4%)

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-5461 (-34.5%)	-5388 (-34.1%)	-5556 (-34.9%)	-5484 (-34.5%)	-5527 (-34.8%)	-5636 (-35.1%)
	AN	-3225 (-20.3%)	-3702 (-23.3%)	-3737 (-22.8%)	-4214 (-25.7%)	-3934 (-23.7%)	-5316 (-30.4%)
	BN	-3142 (-20.1%)	-3369 (-21.5%)	-3263 (-20.7%)	-3489 (-22.1%)	-2743 (-18%)	-3958 (-24.4%)
	D	-6927 (-40.8%)	-6384 (-37.6%)	-5824 (-36.7%)	-5280 (-33.3%)	-4466 (-30.8%)	-3769 (-26.3%)
	C	-1311 (-13%)	-1713 (-17%)	-1118 (-11.3%)	-1519 (-15.3%)	-514 (-5.5%)	-614 (-6.8%)
	All	-4453 (-29.3%)	-4477 (-29.4%)	-4308 (-28.6%)	-4333 (-28.8%)	-3852 (-26.4%)	-4158 (-27.9%)
Sep	W	-122 (-0.7%)	1574 (8.6%)	-9439 (-34.2%)	-7743 (-28.1%)	-8712 (-32.5%)	-7385 (-27.1%)
	AN	-842 (-6.4%)	12 (0.1%)	-8194 (-39.9%)	-7339 (-35.7%)	-8871 (-41.8%)	-7796 (-37.1%)
	BN	-4050 (-32.6%)	-3912 (-31.5%)	-3962 (-32.1%)	-3825 (-31%)	-4406 (-34.5%)	-3791 (-30.8%)
	D	-4443 (-36.6%)	-3294 (-27.1%)	-3437 (-30.8%)	-2288 (-20.5%)	-2036 (-20.9%)	241 (2.8%)
	C	-1024 (-12.1%)	95 (1.1%)	-599 (-7.4%)	520 (6.5%)	-227 (-3%)	1287 (17.7%)
	All	-1979 (-14.4%)	-876 (-6.4%)	-5711 (-32.7%)	-4608 (-26.4%)	-5293 (-31%)	-3888 (-23.2%)
Oct	W	-4396 (-32.5%)	-3339 (-24.7%)	-3794 (-29.4%)	-2737 (-21.2%)	-3674 (-28.7%)	-3112 (-23.4%)
	AN	-2898 (-26.1%)	-827 (-7.4%)	-2216 (-21.2%)	-144 (-1.4%)	-2207 (-21.2%)	-1572 (-13.3%)
	BN	-3116 (-27%)	-1361 (-11.8%)	-2611 (-23.6%)	-855 (-7.7%)	-2141 (-20.2%)	-1927 (-15.9%)
	D	-1948 (-18.9%)	-1268 (-12.3%)	-1567 (-15.8%)	-887 (-9%)	-1898 (-18.6%)	-1476 (-14.1%)
	C	-2003 (-19.9%)	-621 (-6.2%)	-1467 (-15.4%)	-85 (-0.9%)	-1319 (-14%)	-512 (-5.1%)
	All	-3071 (-26.4%)	-1781 (-15.3%)	-2531 (-22.9%)	-1242 (-11.2%)	-2463 (-22.4%)	-1945 (-16.5%)
Nov	W	-4552 (-23.4%)	-4825 (-24.8%)	-5877 (-28.3%)	-6150 (-29.6%)	-5584 (-27.3%)	-4663 (-24.2%)
	AN	-3008 (-19.6%)	-3777 (-24.7%)	-4555 (-27%)	-5324 (-31.6%)	-4562 (-27.1%)	-4394 (-27.6%)
	BN	-3226 (-25.7%)	-3107 (-24.7%)	-4374 (-31.9%)	-4255 (-31%)	-4198 (-31%)	-3570 (-27.4%)
	D	-3394 (-26.4%)	-3402 (-26.4%)	-3211 (-25.3%)	-3219 (-25.4%)	-3025 (-24.2%)	-2448 (-20.5%)
	C	-1380 (-14.3%)	-1423 (-14.8%)	-1571 (-16%)	-1614 (-16.4%)	-1196 (-12.7%)	-1086 (-11.7%)
	All	-3381 (-22.9%)	-3568 (-24.1%)	-4212 (-27%)	-4398 (-28.2%)	-3994 (-25.9%)	-3427 (-23.4%)
Dec	W	-6980 (-17.6%)	-8451 (-21.3%)	-4737 (-12.6%)	-6208 (-16.6%)	-6607 (-16.8%)	-5766 (-15.6%)
	AN	-1498 (-6.9%)	-1315 (-6.1%)	-2076 (-9.3%)	-1893 (-8.5%)	-2533 (-11.2%)	-2280 (-10.1%)
	BN	-1109 (-6.7%)	-1522 (-9.1%)	-1367 (-8.1%)	-1780 (-10.5%)	-1603 (-9.3%)	-1537 (-9.2%)
	D	-1378 (-8.9%)	-1466 (-9.5%)	-1446 (-9.3%)	-1534 (-9.9%)	-1320 (-8.6%)	-1182 (-7.8%)
	C	-1157 (-9.8%)	-811 (-6.9%)	-630 (-5.6%)	-284 (-2.5%)	-181 (-1.7%)	372 (3.5%)
	All	-3094 (-13%)	-3572 (-15.1%)	-2449 (-10.6%)	-2928 (-12.7%)	-3055 (-12.9%)	-2629 (-11.5%)

[a] A positive value indicates higher flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-5. Mean Monthly Flows (cfs) in Yolo Bypass at Delta for EBC and ESO Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	26,963	26,126	30,433	32,670	32,528	33,499
	AN	7,560	7,386	7,727	7,913	9,559	9,471
	BN	1,007	1,046	966	961	2,735	2,589
	D	536	543	633	500	1,262	1,077
	C	299	318	302	306	698	767
	All	9,989	9,709	11,128	11,835	12,559	12,799
Feb	W	31,634	31,023	36,518	38,424	38,663	41,072
	AN	13,234	11,939	13,208	14,188	16,759	17,074
	BN	3,018	2,781	3,232	2,539	5,100	4,650
	D	1,703	1,721	1,797	1,821	2,741	2,729
	C	352	363	363	363	794	820
	All	12,908	12,490	14,511	15,146	16,300	17,034
Mar	W	21,628	21,365	23,472	25,168	25,421	27,087
	AN	9,041	8,378	9,721	10,281	12,270	12,942
	BN	715	693	628	631	1,939	1,798
	D	749	703	722	729	1,809	1,813
	C	279	292	292	292	696	694
	All	8,508	8,315	9,174	9,795	10,686	11,289
Apr	W	6,490	6,535	6,932	6,953	9,252	9,062
	AN	1,400	1,424	1,429	1,450	2,910	2,911
	BN	488	568	569	563	1,101	1,107
	D	306	308	308	308	509	518
	C	104	107	107	107	212	212
	All	2,428	2,461	2,587	2,596	3,690	3,633
May	W	640	631	457	229	556	328
	AN	183	183	183	183	283	283
	BN	64	67	67	67	167	167
	D	76	77	77	77	177	177
	C	65	68	68	68	168	168
	All	267	265	210	138	310	237
Jun	W	240	230	120	118	220	214
	AN	65	66	66	66	166	166
	BN	64	66	66	66	166	166
	D	65	67	67	67	167	167
	C	63	64	64	64	164	164
	All	120	118	83	82	183	181
Jul	W	47	48	48	48	48	48
	AN	47	48	48	48	48	48
	BN	47	48	48	48	48	48
	D	47	48	48	48	48	48
	C	47	48	48	55	48	48
	All	47	48	48	49	48	48

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	149	143	147	143	143	147
	AN	96	95	95	95	95	95
	BN	116	114	114	114	108	114
	D	61	61	62	62	62	62
	C	54	54	54	54	86	54
	All	102	100	101	100	104	101
Sep	W	76	102	103	110	220	261
	AN	68	65	65	65	174	165
	BN	88	86	86	86	185	185
	D	74	73	72	76	165	165
	C	109	78	109	182	176	181
	All	81	84	89	102	189	201
Oct	W	305	166	174	126	227	228
	AN	37	32	39	38	143	141
	BN	52	47	52	50	160	141
	D	125	122	130	121	225	232
	C	39	41	41	44	141	142
	All	144	98	104	87	190	189
Nov	W	1,196	1,094	1,262	876	1,347	954
	AN	132	190	220	159	279	204
	BN	29	37	34	35	138	138
	D	120	133	68	69	169	169
	C	15	27	27	27	127	127
	All	432	414	457	326	547	412
Dec	W	9,767	8,680	11,064	9,209	13,123	11,336
	AN	1,663	1,718	2,150	1,772	2,788	2,249
	BN	1,408	1,443	2,145	1,505	2,278	1,911
	D	353	331	340	343	705	668
	C	78	89	107	98	237	234
	All	3,669	3,336	4,279	3,526	5,147	4,431

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-6. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Yolo Bypass at Delta

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	5565 (20.6%)	6536 (24.2%)	6402 (24.5%)	7373 (28.2%)	2094 (6.9%)	830 (2.5%)
	AN	1999 (26.4%)	1911 (25.3%)	2173 (29.4%)	2086 (28.2%)	1832 (23.7%)	1558 (19.7%)
	BN	1728 (171.6%)	1582 (157.2%)	1689 (161.5%)	1543 (147.5%)	1768 (183%)	1628 (169.4%)
	D	727 (135.6%)	541 (101%)	720 (132.6%)	534 (98.4%)	630 (99.5%)	577 (115.3%)
	C	399 (133.5%)	469 (156.8%)	380 (119.3%)	449 (141.1%)	396 (131.4%)	462 (151%)
	All	2570 (25.7%)	2810 (28.1%)	2850 (29.4%)	3090 (31.8%)	1430 (12.9%)	963 (8.1%)
Feb	W	7028 (22.2%)	9438 (29.8%)	7640 (24.6%)	10049 (32.4%)	2144 (5.9%)	2649 (6.9%)
	AN	3524 (26.6%)	3840 (29%)	4819 (40.4%)	5135 (43%)	3551 (26.9%)	2886 (20.3%)
	BN	2082 (69%)	1631 (54%)	2319 (83.4%)	1869 (67.2%)	1869 (57.8%)	2111 (83.2%)
	D	1038 (60.9%)	1026 (60.2%)	1019 (59.2%)	1007 (58.5%)	944 (52.5%)	908 (49.8%)
	C	442 (125.8%)	468 (133.1%)	431 (118.6%)	457 (125.7%)	431 (118.6%)	457 (125.7%)
	All	3392 (26.3%)	4127 (32%)	3810 (30.5%)	4545 (36.4%)	1789 (12.3%)	1889 (12.5%)
Mar	W	3794 (17.5%)	5459 (25.2%)	4056 (19%)	5722 (26.8%)	1949 (8.3%)	1919 (7.6%)
	AN	3229 (35.7%)	3901 (43.2%)	3892 (46.5%)	4564 (54.5%)	2548 (26.2%)	2661 (25.9%)
	BN	1225 (171.3%)	1083 (151.5%)	1247 (180%)	1105 (159.6%)	1311 (208.8%)	1167 (184.9%)
	D	1059 (141.4%)	1063 (141.9%)	1106 (157.4%)	1110 (157.9%)	1087 (150.6%)	1083 (148.5%)
	C	417 (149.1%)	414 (148.3%)	404 (138.2%)	402 (137.4%)	404 (138.2%)	402 (137.4%)
	All	2178 (25.6%)	2781 (32.7%)	2370 (28.5%)	2973 (35.8%)	1512 (16.5%)	1494 (15.2%)
Apr	W	2762 (42.6%)	2571 (39.6%)	2717 (41.6%)	2527 (38.7%)	2320 (33.5%)	2108 (30.3%)
	AN	1510 (107.8%)	1511 (108%)	1485 (104.3%)	1487 (104.4%)	1481 (103.6%)	1461 (100.7%)
	BN	613 (125.8%)	619 (127%)	532 (93.7%)	538 (94.7%)	532 (93.6%)	543 (96.4%)
	D	203 (66.4%)	213 (69.6%)	201 (65.2%)	210 (68.4%)	201 (65.2%)	210 (68.4%)
	C	108 (103.6%)	108 (103.4%)	106 (99.2%)	106 (99%)	106 (99.2%)	106 (99%)
	All	1262 (52%)	1205 (49.6%)	1229 (50%)	1172 (47.6%)	1103 (42.6%)	1037 (39.9%)
May	W	-84 (-13.2%)	-312 (-48.7%)	-75 (-11.9%)	-303 (-48%)	99 (21.6%)	99 (43.1%)
	AN	100 (54.4%)	100 (54.4%)	100 (54.7%)	100 (54.7%)	100 (54.7%)	100 (54.7%)
	BN	103 (159.7%)	103 (159.7%)	100 (148.7%)	100 (148.7%)	100 (148.7%)	100 (148.7%)
	D	101 (134%)	101 (134%)	100 (129.8%)	100 (129.8%)	100 (129.8%)	100 (129.8%)
	C	103 (158%)	103 (158%)	100 (147.2%)	100 (147.2%)	100 (147.2%)	100 (147.2%)
	All	43 (16%)	-29 (-11%)	44 (16.8%)	-28 (-10.5%)	100 (47.4%)	100 (72.3%)
Jun	W	-20 (-8.3%)	-26 (-10.8%)	-10 (-4.3%)	-16 (-6.8%)	100 (82.9%)	96 (81.6%)
	AN	102 (156.5%)	102 (156.5%)	100 (150.6%)	100 (150.6%)	100 (150.6%)	100 (150.6%)
	BN	102 (157.5%)	102 (157.5%)	100 (151.4%)	100 (151.4%)	100 (151.4%)	100 (151.4%)
	D	102 (156.2%)	102 (156.2%)	100 (150.2%)	100 (150.2%)	100 (150.2%)	100 (150.2%)
	C	102 (161.3%)	102 (161.3%)	100 (155.2%)	100 (155.2%)	100 (155.2%)	100 (155.2%)
	All	63 (52.5%)	61 (50.9%)	65 (55.3%)	63 (53.7%)	100 (120.1%)	99 (119.9%)
Jul	W	1 (1.9%)	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	1 (1.9%)	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	1 (1.9%)	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	1 (1.9%)	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	1 (1.9%)	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	-7 (-13.1%)
	All	1 (1.9%)	1 (1.9%)	0 (0%)	0 (0%)	0 (0%)	-1 (-2.2%)

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-6 (-4.1%)	-2 (-1.6%)	0 (0%)	4 (2.7%)	-4 (-2.6%)	4 (2.7%)
	AN	-1 (-1.3%)	-1 (-1.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	-8 (-6.8%)	-2 (-2.1%)	-5 (-4.8%)	0 (0%)	-5 (-4.8%)	0 (0%)
	D	1 (1.8%)	1 (1.8%)	1 (0.9%)	1 (0.9%)	0 (0%)	0 (0%)
	C	33 (61.1%)	1 (1.3%)	32 (58.9%)	0 (0%)	32 (58.9%)	0 (0%)
	All	2 (1.5%)	-1 (-1%)	4 (3.9%)	1 (1.3%)	3 (2.5%)	1 (1.2%)
Sep	W	145 (190.3%)	185 (243.7%)	118 (116.1%)	159 (155.9%)	117 (113.7%)	151 (137.5%)
	AN	106 (156.1%)	97 (143.8%)	108 (166.2%)	100 (153.4%)	108 (166.2%)	100 (153.4%)
	BN	97 (111.2%)	97 (111.2%)	99 (115.4%)	99 (115.4%)	99 (115.3%)	99 (115.8%)
	D	91 (122.7%)	91 (122.7%)	92 (126.3%)	92 (126.3%)	93 (129.2%)	89 (118.1%)
	C	67 (61%)	71 (65.3%)	98 (124.8%)	103 (130.9%)	67 (61.9%)	-1 (-0.8%)
	All	108 (132.5%)	120 (147.7%)	105 (124.8%)	117 (139.5%)	100 (113.1%)	99 (96.7%)
Oct	W	-79 (-25.8%)	-77 (-25.3%)	60 (36.3%)	62 (37.1%)	53 (30.2%)	102 (80.9%)
	AN	106 (288.1%)	104 (282.8%)	112 (354%)	110 (347.9%)	105 (269.9%)	103 (270.5%)
	BN	108 (208.2%)	89 (171.5%)	114 (244.4%)	95 (203.4%)	108 (207.1%)	91 (182.9%)
	D	101 (80.5%)	108 (86.2%)	104 (85.2%)	111 (91%)	95 (73.4%)	111 (92.1%)
	C	103 (266.8%)	103 (267.5%)	100 (241.6%)	100 (242.3%)	100 (241.6%)	98 (223.2%)
	All	46 (32.1%)	45 (31%)	92 (94.1%)	91 (92.6%)	86 (82.4%)	102 (116.9%)
Nov	W	152 (12.7%)	-242 (-20.2%)	253 (23.1%)	-140 (-12.8%)	86 (6.8%)	78 (8.9%)
	AN	147 (111.6%)	72 (54.4%)	89 (46.8%)	14 (7.1%)	59 (27.1%)	45 (28.3%)
	BN	109 (377.6%)	109 (377.6%)	101 (273.5%)	101 (273.5%)	104 (310.2%)	103 (295.4%)
	D	49 (40.9%)	49 (40.9%)	36 (26.8%)	36 (26.8%)	102 (150.4%)	100 (144.5%)
	C	112 (762.8%)	112 (765.4%)	100 (373.7%)	100 (375.1%)	100 (373.7%)	100 (368.4%)
	All	115 (26.7%)	-20 (-4.7%)	133 (32.1%)	-3 (-0.7%)	91 (19.8%)	86 (26.2%)
Dec	W	3356 (34.4%)	1569 (16.1%)	4443 (51.2%)	2656 (30.6%)	2059 (18.6%)	2127 (23.1%)
	AN	1125 (67.6%)	586 (35.2%)	1069 (62.2%)	531 (30.9%)	638 (29.7%)	477 (26.9%)
	BN	871 (61.8%)	503 (35.7%)	835 (57.8%)	467 (32.4%)	133 (6.2%)	406 (27%)
	D	353 (100%)	315 (89.4%)	375 (113.2%)	337 (101.9%)	366 (107.7%)	326 (95.1%)
	C	159 (204.8%)	156 (200.9%)	148 (167.3%)	145 (163.8%)	130 (121.8%)	136 (138.8%)
	All	1478 (40.3%)	761 (20.7%)	1812 (54.3%)	1095 (32.8%)	868 (20.3%)	905 (25.7%)

[a] A positive value indicates higher flows in the ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-7. Mean Monthly Flows (cfs) in Mokelumne River at Delta for EBC and ESO Scenarios**

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	3,071	3,098	3,389	3,634	3,389	3,634
	AN	1,707	1,691	1,759	1,876	1,759	1,876
	BN	597	598	622	617	622	617
	D	495	497	484	493	484	493
	C	280	301	282	281	282	281
	All	1,460	1,469	1,565	1,660	1,565	1,660
Feb	W	3,290	3,280	3,720	3,781	3,720	3,781
	AN	2,525	2,648	2,894	2,913	2,894	2,913
	BN	1,011	994	1,045	1,035	1,045	1,035
	D	695	697	684	678	684	678
	C	426	447	441	442	441	442
	All	1,809	1,832	2,014	2,033	2,014	2,033
Mar	W	3,179	3,204	3,243	3,336	3,243	3,336
	AN	1,582	1,651	1,633	1,639	1,633	1,639
	BN	1,181	1,175	1,144	1,140	1,144	1,140
	D	754	754	712	691	712	691
	C	595	613	581	580	581	580
	All	1,662	1,685	1,675	1,700	1,675	1,700
Apr	W	2,819	2,803	2,748	2,694	2,748	2,694
	AN	1,619	1,628	1,529	1,424	1,529	1,424
	BN	1,243	1,251	1,164	1,068	1,164	1,068
	D	623	627	577	550	577	550
	C	340	350	322	311	322	311
	All	1,503	1,504	1,442	1,384	1,442	1,384
May	W	3,170	3,137	3,094	2,885	3,094	2,885
	AN	1,439	1,401	1,303	1,179	1,303	1,179
	BN	976	959	886	812	886	812
	D	406	406	360	333	360	333
	C	181	196	179	170	179	170
	All	1,463	1,446	1,392	1,289	1,392	1,289
Jun	W	1,755	1,731	1,605	1,415	1,605	1,415
	AN	851	827	727	631	727	631
	BN	471	458	400	366	400	366
	D	93	93	83	76	83	76
	C	52	52	48	44	48	44
	All	779	766	697	616	697	616
Jul	W	772	748	613	469	613	469
	AN	347	313	228	167	228	167
	BN	123	114	88	70	88	70
	D	7	7	6	6	6	6
	C	3	3	3	3	3	3
	All	315	300	239	183	239	183

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	703	680	476	346	476	346
	AN	328	295	241	216	241	216
	BN	112	103	79	71	79	71
	D	4	4	4	4	4	4
	C	2	2	2	2	2	2
	All	289	274	200	156	200	156
Sep	W	702	679	549	497	549	497
	AN	333	299	271	259	271	259
	BN	114	105	95	91	95	91
	D	9	9	9	9	9	9
	C	5	5	5	5	5	5
	All	291	276	231	213	231	213
Oct	W	161	158	152	147	152	147
	AN	178	183	178	180	178	180
	BN	154	157	148	144	148	144
	D	180	184	169	160	169	160
	C	117	136	125	123	125	123
	All	158	163	154	150	154	150
Nov	W	487	482	502	431	502	431
	AN	912	918	1,009	855	1,009	855
	BN	347	347	347	301	347	301
	D	380	379	371	327	371	327
	C	195	214	202	186	202	186
	All	474	477	497	429	497	429
Dec	W	1,504	1,539	1,766	1,732	1,766	1,732
	AN	1,411	1,412	1,806	1,628	1,806	1,628
	BN	447	449	505	472	505	472
	D	384	385	392	374	392	374
	C	204	224	217	209	217	209
	All	887	902	1,054	999	1,054	999

[a] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-8. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Mokelumne River at Delta

Month	Water-Year Type[b, c]	Scenarios[d]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	318 (10.3%)	563 (18.3%)	291 (9.4%)	536 (17.3%)	0 (0%)	0 (0%)
	AN	52 (3%)	169 (9.9%)	68 (4%)	185 (10.9%)	0 (0%)	0 (0%)
	BN	25 (4.2%)	21 (3.4%)	24 (4%)	19 (3.3%)	0 (0%)	0 (0%)
	D	-11 (-2.3%)	-2 (-0.5%)	-14 (-2.8%)	-5 (-0.9%)	0 (0%)	0 (0%)
	C	2 (0.6%)	1 (0.3%)	-19 (-6.3%)	-20 (-6.6%)	0 (0%)	0 (0%)
	All	106 (7.2%)	201 (13.8%)	96 (6.6%)	192 (13%)	0 (0%)	0 (0%)
Feb	W	430 (13.1%)	491 (14.9%)	440 (13.4%)	501 (15.3%)	0 (0%)	0 (0%)
	AN	369 (14.6%)	388 (15.4%)	246 (9.3%)	265 (10%)	0 (0%)	0 (0%)
	BN	35 (3.4%)	24 (2.4%)	51 (5.1%)	40 (4%)	0 (0%)	0 (0%)
	D	-11 (-1.5%)	-17 (-2.4%)	-13 (-1.9%)	-19 (-2.7%)	0 (0%)	0 (0%)
	C	15 (3.5%)	15 (3.5%)	-6 (-1.3%)	-6 (-1.2%)	0 (0%)	0 (0%)
	All	205 (11.3%)	223 (12.3%)	182 (9.9%)	201 (10.9%)	0 (0%)	0 (0%)
Mar	W	65 (2%)	158 (5%)	40 (1.2%)	133 (4.1%)	0 (0%)	0 (0%)
	AN	50 (3.2%)	57 (3.6%)	-18 (-1.1%)	-12 (-0.7%)	0 (0%)	0 (0%)
	BN	-37 (-3.2%)	-41 (-3.4%)	-31 (-2.6%)	-34 (-2.9%)	0 (0%)	0 (0%)
	D	-43 (-5.6%)	-63 (-8.3%)	-43 (-5.6%)	-63 (-8.3%)	0 (0%)	0 (0%)
	C	-14 (-2.3%)	-15 (-2.5%)	-32 (-5.2%)	-33 (-5.4%)	0 (0%)	0 (0%)
	All	13 (0.8%)	38 (2.3%)	-10 (-0.6%)	15 (0.9%)	0 (0%)	0 (0%)
Apr	W	-71 (-2.5%)	-125 (-4.4%)	-55 (-1.9%)	-109 (-3.9%)	0 (0%)	0 (0%)
	AN	-90 (-5.6%)	-194 (-12%)	-99 (-6.1%)	-203 (-12.5%)	0 (0%)	0 (0%)
	BN	-79 (-6.4%)	-175 (-14.1%)	-87 (-7%)	-183 (-14.6%)	0 (0%)	0 (0%)
	D	-46 (-7.4%)	-73 (-11.7%)	-50 (-7.9%)	-77 (-12.3%)	0 (0%)	0 (0%)
	C	-18 (-5.3%)	-29 (-8.7%)	-27 (-7.9%)	-39 (-11.1%)	0 (0%)	0 (0%)
	All	-62 (-4.1%)	-120 (-8%)	-62 (-4.1%)	-120 (-8%)	0 (0%)	0 (0%)
May	W	-76 (-2.4%)	-284 (-9%)	-43 (-1.4%)	-252 (-8%)	0 (0%)	0 (0%)
	AN	-136 (-9.4%)	-260 (-18.1%)	-98 (-7%)	-223 (-15.9%)	0 (0%)	0 (0%)
	BN	-90 (-9.2%)	-164 (-16.8%)	-73 (-7.6%)	-147 (-15.3%)	0 (0%)	0 (0%)
	D	-46 (-11.2%)	-72 (-17.8%)	-46 (-11.2%)	-72 (-17.8%)	0 (0%)	0 (0%)
	C	-2 (-0.9%)	-11 (-6.1%)	-18 (-8.9%)	-27 (-13.7%)	0 (0%)	0 (0%)
	All	-71 (-4.8%)	-174 (-11.9%)	-54 (-3.7%)	-157 (-10.9%)	0 (0%)	0 (0%)
Jun	W	-149 (-8.5%)	-339 (-19.3%)	-126 (-7.3%)	-316 (-18.3%)	0 (0%)	0 (0%)
	AN	-124 (-14.6%)	-220 (-25.8%)	-100 (-12.1%)	-196 (-23.7%)	0 (0%)	0 (0%)
	BN	-72 (-15.2%)	-105 (-22.3%)	-59 (-12.8%)	-92 (-20.1%)	0 (0%)	0 (0%)
	D	-10 (-11.2%)	-17 (-18.8%)	-10 (-11.2%)	-17 (-18.8%)	0 (0%)	0 (0%)
	C	-4 (-8.1%)	-8 (-14.7%)	-4 (-8.1%)	-8 (-14.7%)	0 (0%)	0 (0%)
	All	-82 (-10.5%)	-163 (-20.9%)	-68 (-8.9%)	-150 (-19.5%)	0 (0%)	0 (0%)
Jul	W	-159 (-20.6%)	-303 (-39.3%)	-136 (-18.1%)	-280 (-37.4%)	0 (0%)	0 (0%)
	AN	-120 (-34.5%)	-180 (-51.8%)	-86 (-27.4%)	-146 (-46.6%)	0 (0%)	0 (0%)
	BN	-36 (-28.9%)	-54 (-43.4%)	-26 (-23.2%)	-44 (-38.9%)	0 (0%)	0 (0%)
	D	0 (-2%)	0 (-3.1%)	0 (-2%)	0 (-3.1%)	0 (0%)	0 (0%)
	C	0 (-2.6%)	0 (-4.4%)	0 (-2.6%)	0 (-4.4%)	0 (0%)	0 (0%)
	All	-76 (-24%)	-132 (-42%)	-61 (-20.2%)	-117 (-39.1%)	0 (0%)	0 (0%)

Month	Water-Year Type[b, c]	Scenarios[d]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-227 (-32.3%)	-357 (-50.8%)	-204 (-30%)	-334 (-49.1%)	0 (0%)	0 (0%)
	AN	-88 (-26.7%)	-113 (-34.3%)	-54 (-18.4%)	-79 (-26.8%)	0 (0%)	0 (0%)
	BN	-34 (-30%)	-41 (-36.5%)	-25 (-23.8%)	-32 (-30.8%)	0 (0%)	0 (0%)
	D	0 (-0.2%)	0 (-0.5%)	0 (-0.2%)	0 (-0.5%)	0 (0%)	0 (0%)
	C	0 (-1.7%)	0 (-3.1%)	0 (-1.7%)	0 (-3.1%)	0 (0%)	0 (0%)
	All	-89 (-30.8%)	-133 (-46.1%)	-74 (-27%)	-118 (-43.2%)	0 (0%)	0 (0%)
Sep	W	-154 (-21.9%)	-205 (-29.3%)	-130 (-19.2%)	-182 (-26.8%)	0 (0%)	0 (0%)
	AN	-61 (-18.4%)	-74 (-22.2%)	-28 (-9.3%)	-40 (-13.5%)	0 (0%)	0 (0%)
	BN	-19 (-16.7%)	-23 (-20.5%)	-10 (-9.4%)	-14 (-13.6%)	0 (0%)	0 (0%)
	D	-1 (-6.6%)	-1 (-5.9%)	-1 (-6.6%)	-1 (-5.9%)	0 (0%)	0 (0%)
	C	0 (5.3%)	0 (4.6%)	0 (-7.5%)	0 (-8.1%)	0 (0%)	0 (0%)
	All	-60 (-20.6%)	-78 (-26.9%)	-45 (-16.4%)	-64 (-23%)	0 (0%)	0 (0%)
Oct	W	-9 (-5.4%)	-14 (-8.7%)	-6 (-3.9%)	-12 (-7.3%)	0 (0%)	0 (0%)
	AN	1 (0.3%)	2 (1.1%)	-5 (-2.7%)	-4 (-2%)	0 (0%)	0 (0%)
	BN	-6 (-4.1%)	-10 (-6.6%)	-9 (-6%)	-13 (-8.5%)	0 (0%)	0 (0%)
	D	-12 (-6.4%)	-20 (-11.1%)	-16 (-8.6%)	-24 (-13.2%)	0 (0%)	0 (0%)
	C	8 (7.1%)	6 (4.7%)	-11 (-7.8%)	-13 (-9.8%)	0 (0%)	0 (0%)
	All	-4 (-2.3%)	-7 (-4.7%)	-9 (-5.4%)	-13 (-7.8%)	0 (0%)	0 (0%)
Nov	W	15 (3%)	-56 (-11.5%)	20 (4.1%)	-51 (-10.6%)	0 (0%)	0 (0%)
	AN	97 (10.6%)	-57 (-6.3%)	91 (9.9%)	-63 (-6.9%)	0 (0%)	0 (0%)
	BN	0 (-0.1%)	-46 (-13.2%)	0 (-0.1%)	-46 (-13.3%)	0 (0%)	0 (0%)
	D	-9 (-2.5%)	-53 (-13.9%)	-8 (-2.1%)	-52 (-13.7%)	0 (0%)	0 (0%)
	C	7 (3.3%)	-9 (-4.6%)	-12 (-5.7%)	-28 (-12.9%)	0 (0%)	0 (0%)
	All	23 (4.9%)	-45 (-9.5%)	20 (4.2%)	-48 (-10.1%)	0 (0%)	0 (0%)
Dec	W	262 (17.4%)	228 (15.2%)	227 (14.7%)	193 (12.5%)	0 (0%)	0 (0%)
	AN	395 (28%)	217 (15.4%)	394 (27.9%)	215 (15.3%)	0 (0%)	0 (0%)
	BN	58 (12.9%)	25 (5.5%)	56 (12.5%)	23 (5.1%)	0 (0%)	0 (0%)
	D	9 (2.2%)	-10 (-2.6%)	7 (1.8%)	-11 (-2.9%)	0 (0%)	0 (0%)
	C	14 (6.8%)	6 (2.9%)	-7 (-3.1%)	-15 (-6.6%)	0 (0%)	0 (0%)
	All	167 (18.8%)	113 (12.7%)	152 (16.8%)	97 (10.8%)	0 (0%)	0 (0%)

[a] A positive value indicates higher flows in ESO than in EBC.
[b] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[d] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-9. Mean Monthly Flows (cfs) in San Joaquin River at Vernalis for EBC and ESO Scenarios**

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	9,089	9,004	9,838	9,681	9,884	9,675
	AN	5,447	5,370	5,781	6,011	5,809	6,037
	BN	2,326	2,252	2,291	2,220	2,298	2,207
	D	2,270	2,214	2,247	2,202	2,219	2,266
	C	1,667	1,607	1,603	1,592	1,597	1,572
	All	4,777	4,705	5,040	5,018	5,054	5,025
Feb	W	12,750	12,605	14,001	13,191	14,000	13,182
	AN	6,965	6,837	7,100	6,721	7,072	6,701
	BN	2,983	2,885	2,965	2,841	2,933	2,841
	D	2,590	2,447	2,312	2,269	2,312	2,245
	C	2,120	1,953	1,942	1,941	1,942	1,942
	All	6,388	6,250	6,699	6,361	6,688	6,351
Mar	W	14,374	14,262	15,127	15,235	15,129	15,236
	AN	6,284	6,180	6,252	6,364	6,252	6,365
	BN	2,949	2,751	2,614	2,476	2,614	2,476
	D	2,479	2,361	2,191	2,146	2,191	2,146
	C	1,813	1,689	1,689	1,688	1,689	1,688
	All	6,648	6,520	6,739	6,763	6,739	6,763
Apr	W	11,955	11,895	12,185	12,457	12,189	12,460
	AN	6,014	5,980	5,970	6,042	5,970	6,042
	BN	4,490	4,445	4,161	3,922	4,162	3,923
	D	3,656	3,624	3,380	3,112	3,380	3,112
	C	1,983	1,932	1,844	1,796	1,844	1,796
	All	6,351	6,305	6,286	6,291	6,288	6,291
May	W	12,109	12,064	13,210	12,632	13,213	12,633
	AN	5,381	5,380	5,278	5,092	5,279	5,092
	BN	4,074	4,024	3,871	3,657	3,874	3,659
	D	3,308	3,265	3,040	2,823	3,041	2,823
	C	1,964	1,896	1,819	1,798	1,819	1,797
	All	6,148	6,106	6,347	6,069	6,348	6,069
Jun	W	11,058	11,046	9,255	6,820	9,252	6,820
	AN	2,965	2,928	2,782	2,678	2,783	2,679
	BN	2,051	2,007	1,960	1,870	1,964	1,873
	D	1,537	1,470	1,361	1,291	1,362	1,292
	C	1,020	980	975	956	976	956
	All	4,583	4,547	3,969	3,206	3,969	3,207
Jul	W	7,654	7,730	5,903	4,345	5,904	4,347
	AN	1,958	1,927	1,806	1,801	1,811	1,804
	BN	1,491	1,436	1,432	1,381	1,439	1,386
	D	1,295	1,205	1,146	1,100	1,147	1,101
	C	898	883	869	858	870	858
	All	3,239	3,229	2,658	2,184	2,661	2,186

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	3,539	3,522	3,051	2,645	3,052	2,646
	AN	2,000	1,989	1,764	1,699	1,768	1,702
	BN	1,460	1,426	1,423	1,375	1,429	1,378
	D	1,375	1,339	1,272	1,225	1,272	1,226
	C	1,007	1,018	993	987	993	987
	All	2,072	2,056	1,858	1,710	1,860	1,712
Sep	W	3,519	3,475	3,306	3,127	3,306	3,128
	AN	2,355	2,338	2,221	2,164	2,223	2,166
	BN	1,829	1,804	1,800	1,748	1,802	1,750
	D	1,796	1,770	1,691	1,643	1,692	1,643
	C	1,402	1,407	1,392	1,378	1,392	1,379
	All	2,338	2,314	2,226	2,144	2,227	2,145
Oct	W	2,760	2,748	2,714	2,726	2,714	2,712
	AN	2,745	2,720	2,638	2,595	2,638	2,595
	BN	2,502	2,481	2,412	2,348	2,412	2,348
	D	2,945	2,942	2,849	2,790	2,849	2,791
	C	2,213	2,190	2,162	2,031	2,163	2,031
	All	2,639	2,622	2,565	2,515	2,565	2,511
Nov	W	2,534	2,495	2,516	2,411	2,516	2,418
	AN	3,182	3,151	3,232	3,193	3,254	3,123
	BN	2,150	2,120	2,180	1,997	2,222	1,997
	D	2,272	2,244	2,244	2,217	2,290	2,253
	C	1,968	1,944	1,911	1,898	1,911	1,898
	All	2,448	2,416	2,441	2,367	2,459	2,361
Dec	W	4,370	4,351	4,835	4,504	4,868	4,492
	AN	4,711	4,604	4,917	4,567	5,001	4,643
	BN	2,182	2,151	2,099	2,065	2,135	2,075
	D	2,129	2,100	2,072	2,166	2,085	2,186
	C	1,729	1,704	1,689	1,694	1,686	1,683
	All	3,219	3,178	3,366	3,211	3,399	3,225

[a] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-10. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in San Joaquin River at Vernalis

Month	Water-Year Type[b,c]	Scenarios[d]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	795 (8.7%)	586 (6.4%)	880 (9.8%)	671 (7.4%)	45 (0.5%)	-7 (-0.1%)
	AN	362 (6.7%)	590 (10.8%)	440 (8.2%)	667 (12.4%)	28 (0.5%)	26 (0.4%)
	BN	-28 (-1.2%)	-119 (-5.1%)	46 (2.1%)	-45 (-2%)	7 (0.3%)	-13 (-0.6%)
	D	-51 (-2.3%)	-4 (-0.2%)	5 (0.2%)	52 (2.3%)	-28 (-1.2%)	65 (2.9%)
	C	-70 (-4.2%)	-95 (-5.7%)	-9 (-0.6%)	-34 (-2.1%)	-5 (-0.3%)	-19 (-1.2%)
	All	277 (5.8%)	249 (5.2%)	350 (7.4%)	321 (6.8%)	15 (0.3%)	8 (0.2%)
Feb	W	1249 (9.8%)	432 (3.4%)	1395 (11.1%)	578 (4.6%)	-2 (0%)	-9 (-0.1%)
	AN	108 (1.5%)	-264 (-3.8%)	235 (3.4%)	-136 (-2%)	-28 (-0.4%)	-20 (-0.3%)
	BN	-50 (-1.7%)	-141 (-4.7%)	48 (1.7%)	-44 (-1.5%)	-32 (-1.1%)	1 (0%)
	D	-278 (-10.8%)	-345 (-13.3%)	-135 (-5.5%)	-201 (-8.2%)	0 (0%)	-24 (-1.1%)
	C	-178 (-8.4%)	-178 (-8.4%)	-11 (-0.6%)	-11 (-0.6%)	0 (0%)	1 (0.1%)
	All	300 (4.7%)	-37 (-0.6%)	438 (7%)	101 (1.6%)	-11 (-0.2%)	-10 (-0.2%)
Mar	W	755 (5.2%)	861 (6%)	867 (6.1%)	973 (6.8%)	2 (0%)	0 (0%)
	AN	-33 (-0.5%)	80 (1.3%)	72 (1.2%)	185 (3%)	0 (0%)	0 (0%)
	BN	-335 (-11.4%)	-473 (-16%)	-137 (-5%)	-275 (-10%)	0 (0%)	0 (0%)
	D	-288 (-11.6%)	-333 (-13.4%)	-170 (-7.2%)	-215 (-9.1%)	0 (0%)	0 (0%)
	C	-124 (-6.8%)	-125 (-6.9%)	-1 (0%)	-2 (-0.1%)	0 (0%)	0 (0%)
	All	92 (1.4%)	116 (1.7%)	219 (3.4%)	243 (3.7%)	1 (0%)	0 (0%)
Apr	W	234 (2%)	505 (4.2%)	294 (2.5%)	565 (4.8%)	4 (0%)	3 (0%)
	AN	-45 (-0.7%)	28 (0.5%)	-10 (-0.2%)	63 (1%)	0 (0%)	0 (0%)
	BN	-329 (-7.3%)	-567 (-12.6%)	-284 (-6.4%)	-523 (-11.8%)	0 (0%)	0 (0%)
	D	-277 (-7.6%)	-545 (-14.9%)	-245 (-6.7%)	-512 (-14.1%)	0 (0%)	0 (0%)
	C	-139 (-7%)	-187 (-9.4%)	-88 (-4.6%)	-136 (-7.1%)	0 (0%)	0 (0%)
	All	-63 (-1%)	-60 (-0.9%)	-17 (-0.3%)	-13 (-0.2%)	1 (0%)	1 (0%)
May	W	1104 (9.1%)	524 (4.3%)	1149 (9.5%)	569 (4.7%)	3 (0%)	1 (0%)
	AN	-103 (-1.9%)	-289 (-5.4%)	-102 (-1.9%)	-288 (-5.4%)	1 (0%)	0 (0%)
	BN	-200 (-4.9%)	-415 (-10.2%)	-150 (-3.7%)	-365 (-9.1%)	3 (0.1%)	2 (0.1%)
	D	-268 (-8.1%)	-485 (-14.7%)	-224 (-6.9%)	-442 (-13.5%)	0 (0%)	1 (0%)
	C	-145 (-7.4%)	-168 (-8.5%)	-77 (-4.1%)	-99 (-5.2%)	0 (0%)	-1 (0%)
	All	201 (3.3%)	-78 (-1.3%)	242 (4%)	-37 (-0.6%)	2 (0%)	1 (0%)
Jun	W	-1805 (-16.3%)	-4238 (-38.3%)	-1794 (-16.2%)	-4226 (-38.3%)	-3 (0%)	0 (0%)
	AN	-181 (-6.1%)	-285 (-9.6%)	-144 (-4.9%)	-248 (-8.5%)	1 (0%)	2 (0.1%)
	BN	-86 (-4.2%)	-178 (-8.7%)	-42 (-2.1%)	-134 (-6.7%)	4 (0.2%)	3 (0.2%)
	D	-176 (-11.4%)	-245 (-16%)	-109 (-7.4%)	-178 (-12.1%)	1 (0.1%)	1 (0.1%)
	C	-45 (-4.4%)	-64 (-6.3%)	-4 (-0.4%)	-24 (-2.4%)	1 (0.1%)	0 (0%)
	All	-614 (-13.4%)	-1376 (-30%)	-578 (-12.7%)	-1340 (-29.5%)	0 (0%)	1 (0%)
Jul	W	-1750 (-22.9%)	-3307 (-43.2%)	-1826 (-23.6%)	-3382 (-43.8%)	1 (0%)	2 (0.1%)
	AN	-147 (-7.5%)	-153 (-7.8%)	-116 (-6%)	-123 (-6.4%)	5 (0.3%)	3 (0.2%)
	BN	-52 (-3.5%)	-105 (-7.1%)	3 (0.2%)	-50 (-3.5%)	8 (0.5%)	5 (0.4%)
	D	-149 (-11.5%)	-194 (-15%)	-58 (-4.8%)	-104 (-8.6%)	1 (0.1%)	1 (0.1%)
	C	-29 (-3.2%)	-40 (-4.4%)	-14 (-1.5%)	-25 (-2.8%)	1 (0.1%)	0 (0.1%)
	All	-578 (-17.9%)	-1053 (-32.5%)	-569 (-17.6%)	-1043 (-32.3%)	3 (0.1%)	2 (0.1%)

Month	Water-Year Type[b,c]	Scenarios[d] EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-487 (-13.8%)	-892 (-25.2%)	-471 (-13.4%)	-876 (-24.9%)	1 (0%)	2 (0.1%)
	AN	-233 (-11.6%)	-299 (-14.9%)	-222 (-11.1%)	-288 (-14.5%)	4 (0.2%)	2 (0.1%)
	BN	-31 (-2.1%)	-81 (-5.6%)	3 (0.2%)	-47 (-3.3%)	6 (0.4%)	4 (0.3%)
	D	-102 (-7.4%)	-149 (-10.8%)	-66 (-5%)	-113 (-8.4%)	1 (0.1%)	1 (0.1%)
	C	-14 (-1.4%)	-20 (-2%)	-25 (-2.4%)	-31 (-3%)	1 (0.1%)	0 (0%)
	All	-212 (-10.2%)	-360 (-17.4%)	-196 (-9.5%)	-344 (-16.7%)	2 (0.1%)	2 (0.1%)
Sep	W	-213 (-6.1%)	-391 (-11.1%)	-169 (-4.9%)	-347 (-10%)	-1 (0%)	1 (0%)
	AN	-131 (-5.6%)	-189 (-8%)	-115 (-4.9%)	-173 (-7.4%)	2 (0.1%)	1 (0.1%)
	BN	-27 (-1.5%)	-79 (-4.3%)	-2 (-0.1%)	-54 (-3%)	3 (0.2%)	2 (0.1%)
	D	-105 (-5.8%)	-153 (-8.5%)	-78 (-4.4%)	-127 (-7.2%)	0 (0%)	0 (0%)
	C	-11 (-0.8%)	-23 (-1.7%)	-15 (-1.1%)	-28 (-2%)	0 (0%)	1 (0.1%)
	All	-111 (-4.7%)	-193 (-8.2%)	-88 (-3.8%)	-169 (-7.3%)	1 (0%)	1 (0%)
Oct	W	-45 (-1.6%)	-47 (-1.7%)	-34 (-1.2%)	-36 (-1.3%)	0 (0%)	-14 (-0.5%)
	AN	-107 (-3.9%)	-150 (-5.4%)	-82 (-3%)	-124 (-4.6%)	0 (0%)	0 (0%)
	BN	-90 (-3.6%)	-154 (-6.1%)	-68 (-2.8%)	-132 (-5.3%)	1 (0%)	0 (0%)
	D	-95 (-3.2%)	-154 (-5.2%)	-93 (-3.2%)	-151 (-5.1%)	0 (0%)	1 (0%)
	C	-50 (-2.3%)	-182 (-8.2%)	-27 (-1.2%)	-159 (-7.2%)	0 (0%)	0 (0%)
	All	-73 (-2.8%)	-127 (-4.8%)	-57 (-2.2%)	-111 (-4.2%)	0 (0%)	-4 (-0.1%)
Nov	W	-18 (-0.7%)	-116 (-4.6%)	21 (0.8%)	-77 (-3.1%)	0 (0%)	6 (0.3%)
	AN	72 (2.3%)	-59 (-1.8%)	103 (3.3%)	-27 (-0.9%)	22 (0.7%)	-70 (-2.2%)
	BN	72 (3.3%)	-154 (-7.1%)	102 (4.8%)	-123 (-5.8%)	42 (1.9%)	0 (0%)
	D	18 (0.8%)	-19 (-0.8%)	46 (2%)	8 (0.4%)	46 (2%)	35 (1.6%)
	C	-57 (-2.9%)	-70 (-3.6%)	-33 (-1.7%)	-46 (-2.4%)	0 (0%)	0 (0%)
	All	12 (0.5%)	-86 (-3.5%)	43 (1.8%)	-55 (-2.3%)	18 (0.7%)	-6 (-0.3%)
Dec	W	498 (11.4%)	122 (2.8%)	517 (11.9%)	141 (3.2%)	33 (0.7%)	-12 (-0.3%)
	AN	290 (6.2%)	-68 (-1.4%)	397 (8.6%)	39 (0.8%)	84 (1.7%)	76 (1.7%)
	BN	-46 (-2.1%)	-107 (-4.9%)	-15 (-0.7%)	-76 (-3.5%)	36 (1.7%)	10 (0.5%)
	D	-44 (-2%)	57 (2.7%)	-15 (-0.7%)	86 (4.1%)	13 (0.6%)	20 (0.9%)
	C	-43 (-2.5%)	-46 (-2.7%)	-17 (-1%)	-21 (-1.2%)	-3 (-0.2%)	-11 (-0.6%)
	All	180 (5.6%)	5 (0.2%)	221 (6.9%)	46 (1.5%)	33 (1%)	14 (0.4%)

[a] A positive value indicates higher flows in ESO than in EBC.
[b] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[d] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-11. Mean Monthly Flows (cfs) in Old and Middle Rivers for EBC and ESO Scenarios

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	-1,869	-2,129	-1,808	-1,476	1,426	1,039
	AN	-3,579	-3,746	-3,465	-3,405	-902	-951
	BN	-3,985	-4,207	-4,349	-4,124	-2,179	-1,771
	D	-4,524	-4,560	-4,312	-4,661	-2,055	-2,484
	C	-4,379	-3,893	-4,076	-3,788	-3,134	-2,773
	All	-3,449	-3,504	-3,373	-3,228	-1,042	-1,097
Feb	W	-1,710	-1,722	-1,256	-1,683	4,516	3,328
	AN	-4,298	-4,305	-4,146	-4,026	-786	-1,036
	BN	-3,658	-3,662	-3,560	-3,564	-2,505	-2,104
	D	-4,116	-4,147	-4,089	-3,490	-3,219	-3,083
	C	-3,004	-3,108	-3,162	-2,909	-2,995	-2,661
	All	-3,158	-3,188	-3,006	-2,964	-323	-570
Mar	W	-898	-1,237	-954	-759	5,414	5,427
	AN	-4,467	-4,328	-4,339	-4,411	-522	-718
	BN	-4,298	-4,298	-4,183	-3,576	-1,907	-2,169
	D	-3,043	-3,002	-3,000	-2,769	-2,585	-2,435
	C	-2,355	-2,518	-2,184	-2,040	-2,221	-1,974
	All	-2,758	-2,855	-2,691	-2,487	337	333
Apr	W	2,686	2,592	2,677	2,740	2,488	2,549
	AN	1,165	1,143	1,104	957	109	169
	BN	393	381	163	-380	-861	-873
	D	-290	-278	-786	-702	-1,197	-1,524
	C	-955	-1,021	-949	-812	-1,492	-1,119
	All	843	799	715	659	132	181
May	W	1,912	1,684	2,066	1,942	2,552	2,564
	AN	542	491	421	317	-165	-180
	BN	33	-44	-214	-607	-979	-924
	D	-522	-535	-980	-1,121	-1,340	-1,199
	C	-1,202	-1,175	-1,207	-1,030	-1,263	-1,182
	All	353	267	262	155	101	148
Jun	W	-4,218	-4,313	-4,289	-4,401	-6	-674
	AN	-4,364	-4,220	-4,049	-3,998	-3,144	-2,757
	BN	-4,286	-4,192	-4,045	-3,547	-3,203	-3,140
	D	-3,102	-3,077	-2,743	-2,572	-2,452	-2,087
	C	-2,679	-2,678	-2,615	-2,384	-2,103	-2,138
	All	-3,780	-3,761	-3,632	-3,504	-1,922	-1,981
Jul	W	-8,526	-8,610	-8,930	-8,906	-6,283	-7,398
	AN	-10,300	-10,362	-9,346	-8,038	-7,831	-6,872
	BN	-10,861	-10,943	-9,824	-9,699	-7,995	-7,795
	D	-10,796	-10,735	-10,122	-8,980	-8,289	-6,136
	C	-9,104	-8,327	-7,738	-6,853	-4,244	-3,377
	All	-9,715	-9,603	-9,110	-8,473	-6,777	-6,373

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	-9,704	-10,044	-10,217	-10,246	-5,664	-5,498
	AN	-9,960	-10,134	-9,984	-9,896	-6,503	-5,369
	BN	-10,725	-10,701	-10,072	-9,957	-6,263	-6,843
	D	-9,996	-9,091	-8,476	-7,773	-5,832	-4,980
	C	-6,225	-5,788	-5,033	-4,423	-3,882	-3,536
	All	-9,283	-9,184	-8,861	-8,604	-5,602	-5,221
Sep	W	-9,226	-8,342	-8,138	-7,345	374	689
	AN	-9,083	-8,780	-9,035	-8,519	-1,434	-1,510
	BN	-8,911	-8,336	-8,291	-8,000	-2,832	-3,147
	D	-7,793	-7,241	-6,296	-5,820	-4,024	-4,145
	C	-5,718	-5,468	-4,952	-4,433	-3,906	-2,921
	All	-8,236	-7,691	-7,423	-6,868	-2,019	-1,819
Oct	W	-7,785	-6,105	-5,229	-4,553	-1,766	-1,433
	AN	-7,786	-6,842	-6,040	-4,872	-1,766	-1,233
	BN	-7,854	-5,806	-4,982	-4,183	-1,355	-1,067
	D	-8,153	-6,024	-4,818	-4,660	-1,398	-1,099
	C	-6,316	-5,234	-5,050	-3,804	-2,061	-1,689
	All	-7,568	-6,019	-5,248	-4,427	-1,700	-1,333
Nov	W	-8,184	-6,824	-6,553	-6,138	-2,053	-1,979
	AN	-8,042	-7,335	-7,107	-6,742	-2,349	-2,105
	BN	-7,723	-5,255	-5,734	-4,855	-1,771	-1,385
	D	-8,128	-5,622	-5,739	-5,582	-1,420	-1,494
	C	-5,712	-4,290	-4,339	-4,453	-2,962	-2,904
	All	-7,592	-5,990	-5,970	-5,636	-2,143	-2,013
Dec	W	-6,295	-6,399	-6,270	-6,110	-4,003	-4,291
	AN	-5,499	-5,991	-5,621	-5,758	-3,453	-3,550
	BN	-7,131	-7,661	-7,173	-6,901	-5,954	-5,888
	D	-7,800	-8,207	-8,371	-7,820	-6,699	-6,151
	C	-6,305	-6,204	-5,472	-4,661	-5,403	-4,648
	All	-6,513	-6,768	-6,464	-6,155	-4,906	-4,764

[a] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-12. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Old and Middle Rivers

Month	Water-Year Type[b,c]	Scenarios[d]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	3295 (176.3%)	2908 (155.6%)	3555 (167%)	3168 (148.8%)	3234 (178.9%)	2515 (170.4%)
	AN	2677 (74.8%)	2628 (73.4%)	2844 (75.9%)	2795 (74.6%)	2563 (74%)	2454 (72.1%)
	BN	1806 (45.3%)	2214 (55.6%)	2029 (48.2%)	2437 (57.9%)	2170 (49.9%)	2353 (57.1%)
	D	2469 (54.6%)	2040 (45.1%)	2505 (54.9%)	2076 (45.5%)	2257 (52.33%)	2177 (46.7%)
	C	1244 (28.4%)	1606 (36.7%)	759 (19.5%)	1120 (28.8%)	942 (23.1%)	1014 (26.8%)
	All	2407 (69.8%)	2352 (68.2%)	2462 (70.3%)	2407 (68.7%)	2332 (69.1%)	2131 (66%)
Feb	W	6226 (364.1%)	5038 (294.6%)	6238 (362.3%)	5050 (293.3%)	5772 (459.5%)	5011 (297.8%)
	AN	3512 (81.7%)	3262 (75.9%)	3520 (81.8%)	3270 (75.9%)	3360 (81%)	2990 (74.3%)
	BN	1153 (31.5%)	1554 (42.5%)	1157 (31.6%)	1558 (42.6%)	1055 (29.6%)	1460 (41%)
	D	898 (21.8%)	1033 (25.1%)	928 (22.4%)	1064 (25.7%)	871 (21.3%)	406 (11.6%)
	C	9 (0.3%)	343 (11.4%)	113 (3.6%)	446 (14.4%)	167 (5.3%)	248 (8.5%)
	All	2834 (89.8%)	2588 (82%)	2865 (89.9%)	2619 (82.1%)	2683 (89.2%)	2394 (80.8%)
Mar	W	6312 (703%)	6325 (704.4%)	6651 (537.7%)	6664 (538.8%)	6368 (667.56%)	6186 (814.7%)
	AN	3945 (88.3%)	3749 (83.9%)	3806 (87.9%)	3610 (83.4%)	3816 (88%)	3693 (83.7%)
	BN	2392 (55.6%)	2129 (49.5%)	2392 (55.6%)	2129 (49.5%)	2276 (54.4%)	1406 (39.3%)
	D	458 (15%)	608 (20%)	416 (13.9%)	567 (18.9%)	415 (13.8%)	334 (12.1%)
	C	134 (5.7%)	381 (16.2%)	297 (11.8%)	544 (21.6%)	-37 (-1.7%)	67 (3.3%)
	All	3095 (112.2%)	3091 (112.1%)	3192 (111.8%)	3188 (111.7%)	3028 (112.5%)	2820 (113.4%)
Apr	W	-198 (-7.4%)	-137 (-5.1%)	-104 (-4%)	-43 (-1.7%)	-188 (-7%)	-191 (-7%)
	AN	-1056 (-90.6%)	-996 (-85.5%)	-1034 (-90.4%)	-974 (-85.2%)	-994 (-90.1%)	-788 (-82.4%)
	BN	-1254 (-319.1%)	-1266 (-322.1%)	-1242 (-326.3%)	-1253 (-329.3%)	-1024 (-628.1%)	-493 (-129.6%)
	D	-907 (-312.7%)	-1234 (-425.3%)	-919 (-330.5%)	-1246 (-447.9%)	-412 (-52.4%)	-822 (-117.2%)
	C	-536 (-56.1%)	-164 (-17.2%)	-470 (-46.1%)	-98 (-9.6%)	-543 (-57.2%)	-307 (-37.9%)
	All	-711 (-84.3%)	-663 (-78.6%)	-666 (-83.4%)	-618 (-77.4%)	-583 (-81.5%)	-478 (-72.6%)
May	W	640 (33.5%)	652 (34.1%)	868 (51.6%)	880 (52.3%)	486 (23.5%)	622 (32%)
	AN	-707 (-130.5%)	-723 (-133.3%)	-656 (-133.6%)	-672 (-136.7%)	-586 (-139.3%)	-498 (-156.9%)
	BN	-1012 (-3059.5%)	-957 (-2893.6%)	-935 (-2109.3%)	-880 (-1985.5%)	-765 (-357.3%)	-318 (-52.3%)
	D	-818 (-156.6%)	-677 (-129.7%)	-805 (-150.3%)	-664 (-124%)	-360 (-36.7%)	-78 (-6.9%)
	C	-61 (-5.1%)	20 (1.7%)	-88 (-7.5%)	-7 (-0.6%)	-56 (-4.6%)	-152 (-14.8%)
	All	-253 (-71.5%)	-205 (-58.1%)	-167 (-62.4%)	-120 (-44.7%)	-161 (-61.6%)	-8 (-4.8%)
Jun	W	4212 (99.9%)	3544 (84%)	4307 (99.9%)	3639 (84.4%)	4282 (99.9%)	3727 (84.7%)
	AN	1219 (27.9%)	1606 (36.8%)	1076 (25.5%)	1463 (34.7%)	905 (22.3%)	1241 (31%)
	BN	1083 (25.3%)	1146 (26.7%)	989 (23.6%)	1053 (25.1%)	842 (20.8%)	408 (11.5%)
	D	650 (20.9%)	1014 (32.7%)	625 (20.3%)	990 (32.2%)	291 (10.6%)	484 (18.8%)
	C	576 (21.5%)	542 (20.2%)	574 (21.5%)	540 (20.2%)	512 (19.6%)	247 (10.3%)
	All	1858 (49.1%)	1799 (47.6%)	1838 (48.9%)	1780 (47.3%)	1709 (47.1%)	1522 (43.5%)
Jul	W	2243 (26.3%)	1128 (13.2%)	2327 (27%)	1212 (14.1%)	2647 (29.6%)	1508 (16.9%)
	AN	2469 (24%)	3429 (33.3%)	2531 (24.4%)	3490 (33.7%)	1515 (16.2%)	1166 (14.5%)
	BN	2866 (26.4%)	3066 (28.2%)	2949 (26.9%)	3149 (28.8%)	1830 (18.6%)	1904 (19.6%)
	D	2507 (23.2%)	4660 (43.2%)	2446 (22.8%)	4599 (42.8%)	1834 (18.1%)	2844 (31.7%)
	C	4860 (53.4%)	5727 (62.9%)	4083 (49%)	4950 (59.4%)	3494 (45.2%)	3476 (50.7%)
	All	2938 (30.2%)	3342 (34.4%)	2827 (29.4%)	3230 (33.6%)	2333 (25.6%)	2100 (24.8%)

Month	Water-Year Type[b,c]	Scenarios[d]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	4041 (41.6%)	4207 (43.3%)	4380 (43.6%)	4546 (45.3%)	4553 (44.6%)	4748 (46.3%)
	AN	3458 (34.7%)	4591 (46.1%)	3632 (35.8%)	4766 (47%)	3481 (34.9%)	4527 (45.7%)
	BN	4462 (41.6%)	3882 (36.2%)	4438 (41.5%)	3858 (36.1%)	3809 (37.8%)	3114 (31.3%)
	D	4164 (41.7%)	5016 (50.2%)	3258 (35.8%)	4111 (45.2%)	2643 (31.2%)	2793 (35.9%)
	C	2343 (37.6%)	2689 (43.2%)	1906 (32.9%)	2253 (38.9%)	1151 (22.9%)	888 (20.1%)
	All	3682 (39.7%)	4062 (43.8%)	3583 (39%)	3963 (43.2%)	3259 (36.8%)	3383 (39.3%)
Sep	W	9600 (104.1%)	9915 (107.5%)	8716 (104.5%)	9031 (108.3%)	8512 (104.6%)	8034 (109.4%)
	AN	7650 (84.2%)	7573 (83.4%)	7346 (83.7%)	7270 (82.8%)	7601 (84.1%)	7009 (82.3%)
	BN	6079 (68.2%)	5764 (64.7%)	5503 (66%)	5189 (62.2%)	5459 (65.8%)	4853 (60.7%)
	D	3769 (48.4%)	3648 (46.8%)	3217 (44.4%)	3095 (42.7%)	2272 (36.1%)	1675 (28.8%)
	C	1812 (31.7%)	2797 (48.9%)	1562 (28.6%)	2547 (46.6%)	1045 (21.1%)	1512 (34.1%)
	All	6217 (75.5%)	6417 (77.9%)	5672 (73.7%)	5872 (76.3%)	5404 (72.8%)	5049 (73.5%)
Oct	W	6019 (77.3%)	6351 (81.6%)	4339 (71.1%)	4672 (76.5%)	3463 (66.2%)	3119 (68.5%)
	AN	6020 (77.3%)	6553 (84.2%)	5076 (74.2%)	5608 (82%)	4274 (70.8%)	3639 (74.7%)
	BN	6499 (82.8%)	6787 (86.4%)	4451 (76.7%)	4739 (81.6%)	3627 (72.8%)	3116 (74.5%)
	D	6755 (82.9%)	7055 (86.5%)	4625 (76.8%)	4925 (81.8%)	3419 (71%)	3561 (76.4%)
	C	4255 (67.4%)	4627 (73.3%)	3173 (60.6%)	3545 (67.7%)	2989 (59.2%)	2115 (55.6%)
	All	5868 (77.5%)	6235 (82.4%)	4319 (71.8%)	4685 (77.9%)	3548 (67.6%)	3094 (69.9%)
Nov	W	6132 (74.9%)	6205 (75.8%)	4772 (69.9%)	4845 (71%)	4500 (68.7%)	4159 (67.8%)
	AN	5693 (70.8%)	5937 (73.8%)	4986 (68%)	5231 (71.3%)	4758 (66.9%)	4637 (68.8%)
	BN	5952 (77.1%)	6339 (82.1%)	3484 (66.3%)	3870 (73.7%)	3963 (69.1%)	3470 (71.5%)
	D	6708 (82.5%)	6634 (81.6%)	4203 (74.8%)	4128 (73.4%)	4319 (75.3%)	4088 (73.2%)
	C	2750 (48.1%)	2807 (49.2%)	1328 (31%)	1386 (32.3%)	1377 (31.7%)	1549 (34.8%)
	All	5449 (71.8%)	5579 (73.5%)	3847 (64.2%)	3977 (66.4%)	3827 (64.1%)	3623 (64.3%)
Dec	W	2291 (36.4%)	2004 (31.8%)	2396 (37.4%)	2108 (32.9%)	2267 (36.2%)	1819 (29.8%)
	AN	2046 (37.2%)	1949 (35.4%)	2538 (42.4%)	2441 (40.7%)	2168 (38.6%)	2208 (38.3%)
	BN	1177 (16.5%)	1243 (17.4%)	1707 (22.3%)	1773 (23.1%)	1220 (17%)	1013 (14.7%)
	D	1101 (14.1%)	1649 (21.1%)	1508 (18.4%)	2056 (25.1%)	1672 (19.97%)	1669 (21.3%)
	C	902 (14.3%)	1657 (26.3%)	802 (12.9%)	1557 (25.1%)	69 (1.3%)	13 (0.3%)
	All	1607 (24.7%)	1749 (26.8%)	1863 (27.5%)	2004 (29.6%)	1558 (24.1%)	1391 (22.6%)

[a] A positive value indicates higher average flows in ESO than in EBC.
[b] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[d] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-13. Mean Monthly Flows (cfs) in Sutter and Steamboat Sloughs for EBC and ESO**
2 **Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	24,208	24,027	24,864	25,538	20,850	21,736
	AN	18,674	17,920	18,350	19,290	15,447	16,257
	BN	10,656	10,208	10,403	10,301	8,725	8,867
	D	7,496	7,386	7,551	7,679	6,930	7,102
	C	5,919	6,042	6,095	6,480	5,786	6,610
	All	14,739	14,489	14,894	15,313	12,729	13,311
Feb	W	27,375	27,108	28,330	29,051	23,724	24,794
	AN	21,573	21,109	22,331	22,971	19,049	19,467
	BN	14,721	14,170	14,710	14,808	11,991	12,409
	D	9,370	9,378	9,354	9,522	8,035	8,523
	C	6,132	6,192	6,048	6,086	6,015	6,111
	All	17,304	17,068	17,700	18,082	15,001	15,594
Mar	W	23,437	23,419	23,979	24,588	19,221	19,924
	AN	20,984	20,641	21,426	21,611	16,983	17,326
	BN	11,009	10,416	10,352	10,433	7,813	7,997
	D	9,098	8,974	8,986	9,292	7,415	7,746
	C	5,403	5,337	5,358	5,505	5,369	5,596
	All	15,169	14,976	15,263	15,585	12,327	12,737
Apr	W	17,650	17,716	17,807	17,808	13,626	13,877
	AN	11,752	11,765	11,547	11,450	8,328	8,597
	BN	7,649	7,497	7,465	7,517	6,294	6,746
	D	5,275	5,300	5,253	5,387	5,028	5,527
	C	3,899	3,883	3,848	4,107	4,207	4,508
	All	10,351	10,351	10,326	10,389	8,333	8,683
May	W	14,728	14,604	13,385	11,233	10,499	8,979
	AN	9,280	9,124	8,697	8,287	7,505	7,497
	BN	5,892	5,705	5,337	5,130	5,176	5,683
	D	4,263	4,141	4,135	4,642	4,453	5,430
	C	2,662	2,603	2,898	2,921	3,105	3,395
	All	8,359	8,229	7,760	7,097	6,743	6,603
Jun	W	9,814	9,709	7,925	7,194	6,380	6,546
	AN	6,153	6,212	5,560	5,983	5,208	6,008
	BN	4,626	4,560	4,491	4,884	5,201	5,668
	D	4,051	4,113	4,237	4,349	4,827	5,172
	C	3,058	3,056	3,079	3,257	3,600	4,023
	All	6,139	6,116	5,474	5,422	5,260	5,646
Jul	W	7,167	7,091	7,347	7,971	6,733	7,767
	AN	7,788	7,915	8,119	8,436	7,519	8,511
	BN	7,531	7,657	7,606	7,506	7,244	7,252
	D	6,836	6,755	6,656	6,853	6,212	5,751
	C	5,234	4,730	4,774	4,675	3,907	4,399
	All	6,964	6,889	6,976	7,232	6,407	6,853

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	5,407	5,447	5,496	5,639	4,018	4,406
	AN	5,433	5,644	5,788	6,238	4,953	5,133
	BN	5,336	5,386	5,230	5,710	4,892	5,174
	D	5,883	5,426	4,922	4,920	3,889	4,470
	C	3,042	2,962	2,755	2,673	3,378	3,554
	All	5,157	5,097	4,966	5,147	4,182	4,533
Sep	W	6,582	12,186	11,779	12,150	7,185	8,318
	AN	4,325	7,364	7,915	7,926	4,833	5,564
	BN	4,006	3,970	4,206	4,062	3,213	3,610
	D	3,894	3,478	2,943	2,515	2,942	3,754
	C	2,377	2,201	2,085	1,958	2,839	3,637
	All	4,607	6,705	6,562	6,544	4,595	5,424
Oct	W	4,924	4,629	4,595	4,897	3,655	4,473
	AN	3,684	3,272	3,382	4,285	3,161	4,535
	BN	3,813	3,597	3,395	4,260	3,266	4,490
	D	3,240	3,029	3,229	3,502	3,208	3,898
	C	3,190	2,934	2,906	3,175	3,127	4,101
	All	3,929	3,655	3,665	4,140	3,341	4,304
Nov	W	8,146	8,907	8,842	8,393	6,690	6,842
	AN	6,160	7,008	7,088	6,687	5,412	5,299
	BN	4,596	5,238	5,253	5,109	3,852	4,201
	D	4,821	4,732	4,731	4,531	3,929	4,205
	C	3,137	3,290	3,148	3,173	3,296	3,575
	All	5,786	6,264	6,237	5,971	4,916	5,109
Dec	W	18,568	17,438	18,494	17,503	15,725	15,327
	AN	9,442	9,722	10,022	10,107	9,370	9,758
	BN	6,840	6,948	7,143	7,002	6,981	7,080
	D	6,275	6,289	6,289	6,275	6,263	6,502
	C	4,386	4,140	3,975	3,964	4,554	4,972
	All	10,456	10,124	10,512	10,182	9,590	9,651

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-14. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Sutter and Steamboat Sloughs[1]

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	-3357 (-13.9%)	-2472 (-10.2%)	-3177 (-13.2%)	-2291 (-9.5%)	-4013 (-16.1%)	-3802 (-14.9%)
	AN	-3228 (-17.3%)	-2417 (-12.9%)	-2473 (-13.8%)	-1663 (-9.3%)	-2903 (-15.8%)	-3034 (-15.7%)
	BN	-1931 (-18.1%)	-1788 (-16.8%)	-1484 (-14.5%)	-1341 (-13.1%)	-1678 (-16.1%)	-1434 (-13.9%)
	D	-566 (-7.5%)	-394 (-5.3%)	-456 (-6.2%)	-284 (-3.8%)	-620 (-8.2%)	-577 (-7.5%)
	C	-134 (-2.3%)	691 (11.7%)	-256 (-4.2%)	568 (9.4%)	-310 (-5.1%)	129 (2%)
	All	-2010 (-13.6%)	-1428 (-9.7%)	-1760 (-12.1%)	-1178 (-8.1%)	-2165 (-14.5%)	-2002 (-13.1%)
Feb	W	-3652 (-13.3%)	-2581 (-9.4%)	-3384 (-12.5%)	-2314 (-8.5%)	-4606 (-16.3%)	-4257 (-14.7%)
	AN	-2524 (-11.7%)	-2105 (-9.8%)	-2060 (-9.8%)	-1641 (-7.8%)	-3283 (-14.7%)	-3504 (-15.3%)
	BN	-2729 (-18.5%)	-2311 (-15.7%)	-2179 (-15.4%)	-1761 (-12.4%)	-2719 (-18.5%)	-2398 (-16.2%)
	D	-1335 (-14.2%)	-846 (-9%)	-1343 (-14.3%)	-855 (-9.1%)	-1319 (-14.1%)	-999 (-10.5%)
	C	-117 (-1.9%)	-21 (-0.3%)	-177 (-2.9%)	-82 (-1.3%)	-33 (-0.5%)	25 (0.4%)
	All	-2303 (-13.3%)	-1710 (-9.9%)	-2067 (-12.1%)	-1474 (-8.6%)	-2699 (-15.3%)	-2488 (-13.8%)
Mar	W	-4216 (-18%)	-3514 (-15%)	-4197 (-17.9%)	-3495 (-14.9%)	-4758 (-19.8%)	-4664 (-19%)
	AN	-4001 (-19.1%)	-3658 (-17.4%)	-3659 (-17.7%)	-3315 (-16.1%)	-4443 (-20.7%)	-4285 (-19.8%)
	BN	-3195 (-29%)	-3012 (-27.4%)	-2603 (-25%)	-2419 (-23.2%)	-2539 (-24.5%)	-2437 (-23.4%)
	D	-1683 (-18.5%)	-1352 (-14.9%)	-1559 (-17.4%)	-1229 (-13.7%)	-1571 (-17.5%)	-1546 (-16.6%)
	C	-34 (-0.6%)	193 (3.6%)	32 (0.6%)	259 (4.8%)	11 (0.2%)	91 (1.7%)
	All	-2842 (-18.7%)	-2432 (-16%)	-2648 (-17.7%)	-2238 (-14.9%)	-2935 (-19.2%)	-2848 (-18.3%)
Apr	W	-4024 (-22.8%)	-3773 (-21.4%)	-4090 (-23.1%)	-3839 (-21.7%)	-4181 (-23.5%)	-3931 (-22.1%)
	AN	-3424 (-29.1%)	-3155 (-26.8%)	-3437 (-29.2%)	-3168 (-26.9%)	-3219 (-27.9%)	-2853 (-24.9%)
	BN	-1356 (-17.7%)	-904 (-11.8%)	-1203 (-16%)	-751 (-10%)	-1171 (-15.7%)	-771 (-10.3%)
	D	-248 (-4.7%)	252 (4.8%)	-272 (-5.1%)	227 (4.3%)	-225 (-4.3%)	140 (2.6%)
	C	308 (7.9%)	609 (15.6%)	324 (8.3%)	624 (16.1%)	359 (9.3%)	400 (9.7%)
	All	-2018 (-19.5%)	-1668 (-16.1%)	-2018 (-19.5%)	-1668 (-16.1%)	-1994 (-19.3%)	-1706 (-16.4%)
May	W	-4229 (-28.7%)	-5749 (-39%)	-4105 (-28.1%)	-5625 (-38.5%)	-2886 (-21.6%)	-2254 (-20.1%)
	AN	-1774 (-19.1%)	-1782 (-19.2%)	-1618 (-17.7%)	-1626 (-17.8%)	-1191 (-13.7%)	-790 (-9.5%)
	BN	-716 (-12.1%)	-209 (-3.5%)	-528 (-9.3%)	-21 (-0.4%)	-160 (-3%)	553 (10.8%)
	D	190 (4.5%)	1167 (27.4%)	312 (7.5%)	1289 (31.1%)	318 (7.7%)	788 (17%)
	C	442 (16.6%)	733 (27.5%)	502 (19.3%)	792 (30.4%)	207 (7.1%)	475 (16.3%)
	All	-1616 (-19.3%)	-1756 (-21%)	-1487 (-18.1%)	-1626 (-19.8%)	-1017 (-13.1%)	-493 (-7%)
Jun	W	-3433 (-35%)	-3268 (-33.3%)	-3329 (-34.3%)	-3163 (-32.6%)	-1545 (-19.5%)	-649 (-9%)
	AN	-945 (-15.4%)	-145 (-2.4%)	-1004 (-16.2%)	-204 (-3.3%)	-352 (-6.3%)	25 (0.4%)
	BN	575 (12.4%)	1042 (22.5%)	641 (14.1%)	1108 (24.3%)	710 (15.8%)	784 (16%)
	D	776 (19.1%)	1120 (27.7%)	714 (17.4%)	1059 (25.7%)	590 (13.9%)	823 (18.9%)
	C	542 (17.7%)	965 (31.6%)	544 (17.8%)	966 (31.6%)	521 (16.9%)	765 (23.5%)
	All	-879 (-14.3%)	-492 (-8%)	-856 (-14%)	-470 (-7.7%)	-214 (-3.9%)	224 (4.1%)
Jul	W	-434 (-6.1%)	601 (8.4%)	-358 (-5.1%)	676 (9.5%)	-614 (-8.4%)	-203 (-2.6%)
	AN	-269 (-3.5%)	724 (9.3%)	-396 (-5%)	596 (7.5%)	-601 (-7.4%)	75 (0.9%)
	BN	-287 (-3.8%)	-279 (-3.7%)	-413 (-5.4%)	-405 (-5.3%)	-362 (-4.8%)	-254 (-3.4%)
	D	-625 (-9.1%)	-1085 (-15.9%)	-544 (-8%)	-1004 (-14.9%)	-444 (-6.7%)	-1102 (-16.1%)
	C	-1327 (-25.3%)	-836 (-16%)	-823 (-17.4%)	-332 (-7%)	-867 (-18.2%)	-276 (-5.9%)
	All	-557 (-8%)	-112 (-1.6%)	-482 (-7%)	-36 (-0.5%)	-569 (-8.2%)	-379 (-5.2%)

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	**EBC1 vs. ESO_LLT**	**EBC2 vs. ESO_ELT**	**EBC2 vs. ESO_LLT**	**EBC2_ELT vs. ESO_ELT**	**EBC2_LLT vs. ESO_LLT**
Aug	W	-1389 (-25.7%)	-1002 (-18.5%)	-1429 (-26.2%)	-1041 (-19.1%)	-1478 (-26.9%)	-1233 (-21.9%)
	AN	-479 (-8.8%)	-300 (-5.5%)	-691 (-12.2%)	-511 (-9.1%)	-835 (-14.4%)	-1105 (-17.7%)
	BN	-444 (-8.3%)	-161 (-3%)	-494 (-9.2%)	-211 (-3.9%)	-338 (-6.5%)	-536 (-9.4%)
	D	-1994 (-33.9%)	-1413 (-24%)	-1537 (-28.3%)	-956 (-17.6%)	-1033 (-21%)	-450 (-9.2%)
	C	336 (11%)	512 (16.8%)	416 (14%)	592 (20%)	623 (22.6%)	882 (33%)
	All	-975 (-18.9%)	-624 (-12.1%)	-915 (-18%)	-564 (-11.1%)	-784 (-15.8%)	-614 (-11.9%)
Sep	W	603 (9.2%)	1736 (26.4%)	-5001 (-41%)	-3868 (-31.7%)	-4594 (-39%)	-3832 (-31.5%)
	AN	508 (11.7%)	1239 (28.6%)	-2531 (-34.4%)	-1800 (-24.4%)	-3082 (-38.9%)	-2362 (-29.8%)
	BN	-794 (-19.8%)	-397 (-9.9%)	-758 (-19.1%)	-361 (-9.1%)	-993 (-23.6%)	-452 (-11.1%)
	D	-952 (-24.5%)	-140 (-3.6%)	-536 (-15.4%)	276 (7.9%)	-1 (0%)	1239 (49.3%)
	C	463 (19.5%)	1260 (53%)	638 (29%)	1436 (65.2%)	754 (36.2%)	1679 (85.8%)
	All	-11 (-0.2%)	818 (17.8%)	-2110 (-31.5%)	-1281 (-19.1%)	-1967 (-30%)	-1120 (-17.1%)
Oct	W	-1269 (-25.8%)	-451 (-9.2%)	-973 (-21%)	-156 (-3.4%)	-939 (-20.4%)	-424 (-8.7%)
	AN	-522 (-14.2%)	852 (23.1%)	-110 (-3.4%)	1264 (38.6%)	-221 (-6.5%)	250 (5.8%)
	BN	-546 (-14.3%)	678 (17.8%)	-331 (-9.2%)	893 (24.8%)	-128 (-3.8%)	230 (5.4%)
	D	-32 (-1%)	658 (20.3%)	178 (5.9%)	869 (28.7%)	-21 (-0.7%)	396 (11.3%)
	C	-63 (-2%)	911 (28.6%)	193 (6.6%)	1167 (39.8%)	221 (7.6%)	926 (29.2%)
	All	-588 (-15%)	375 (9.5%)	-314 (-8.6%)	650 (17.8%)	-324 (-8.9%)	164 (4%)
Nov	W	-1456 (-17.9%)	-1304 (-16%)	-2216 (-24.9%)	-2064 (-23.2%)	-2151 (-24.3%)	-1550 (-18.5%)
	AN	-748 (-12.1%)	-861 (-14%)	-1596 (-22.8%)	-1709 (-24.4%)	-1676 (-23.6%)	-1389 (-20.8%)
	BN	-744 (-16.2%)	-395 (-8.6%)	-1386 (-26.5%)	-1037 (-19.8%)	-1401 (-26.7%)	-907 (-17.8%)
	D	-891 (-18.5%)	-615 (-12.8%)	-803 (-17%)	-527 (-11.1%)	-802 (-17%)	-326 (-7.2%)
	C	159 (5.1%)	438 (14%)	7 (0.2%)	286 (8.7%)	149 (4.7%)	402 (12.7%)
	All	-870 (-15%)	-678 (-11.7%)	-1348 (-21.5%)	-1156 (-18.4%)	-1321 (-21.2%)	-862 (-14.4%)
Dec	W	-2842 (-15.3%)	-3240 (-17.5%)	-1713 (-9.8%)	-2111 (-12.1%)	-2769 (-15%)	-2176 (-12.4%)
	AN	-72 (-0.8%)	316 (3.4%)	-352 (-3.6%)	36 (0.4%)	-652 (-6.5%)	-349 (-3.4%)
	BN	141 (2.1%)	239 (3.5%)	33 (0.5%)	131 (1.9%)	-162 (-2.3%)	78 (1.1%)
	D	-12 (-0.2%)	227 (3.6%)	-27 (-0.4%)	213 (3.4%)	-26 (-0.4%)	227 (3.6%)
	C	168 (3.8%)	586 (13.4%)	415 (10%)	833 (20.1%)	579 (14.6%)	1008 (25.4%)
	All	-866 (-8.3%)	-805 (-7.7%)	-534 (-5.3%)	-473 (-4.7%)	-922 (-8.8%)	-530 (-5.2%)

[a] A positive value indicates higher average flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-15. Mean Monthly Flows (cfs) in Delta Cross Channel and Georgiana Slough for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	7,607	7,559	7,740	7,862	6,538	6,665
	AN	6,131	5,930	6,012	6,213	5,100	5,224
	BN	3,992	3,872	3,903	3,842	3,312	3,280
	D	3,149	3,120	3,146	3,150	2,835	2,816
	C	2,728	2,761	2,760	2,834	2,530	2,687
	All	5,081	5,014	5,095	5,164	4,377	4,449
Feb	W	8,452	8,380	8,660	8,789	7,302	7,470
	AN	6,904	6,780	7,068	7,185	6,058	6,069
	BN	5,076	4,929	5,046	5,031	4,181	4,212
	D	3,649	3,651	3,624	3,636	3,129	3,190
	C	2,785	2,801	2,747	2,730	2,591	2,555
	All	5,765	5,702	5,839	5,895	4,982	5,050
Mar	W	7,401	7,396	7,505	7,611	6,104	6,189
	AN	6,747	6,656	6,828	6,826	5,509	5,506
	BN	4,086	3,928	3,889	3,877	3,070	3,051
	D	3,576	3,543	3,527	3,575	2,964	2,985
	C	2,591	2,573	2,564	2,576	2,420	2,420
	All	5,196	5,144	5,192	5,236	4,270	4,298
Apr	W	5,858	5,875	5,868	5,822	4,616	4,598
	AN	4,284	4,288	4,206	4,145	3,207	3,209
	BN	3,190	3,149	3,123	3,107	2,666	2,722
	D	2,557	2,563	2,536	2,545	2,329	2,402
	C	2,189	2,185	2,163	2,208	2,110	2,134
	All	3,910	3,910	3,882	3,865	3,208	3,232
May	W	5,078	5,045	4,694	4,088	3,784	3,310
	AN	3,625	3,583	3,450	3,310	2,988	2,920
	BN	2,721	2,671	2,558	2,477	2,368	2,443
	D	2,287	2,254	2,240	2,349	2,176	2,376
	C	1,860	1,844	1,911	1,894	1,817	1,841
	All	3,379	3,345	3,201	2,996	2,785	2,685
Jun	W	6,583	6,536	5,880	6,312	5,587	5,769
	AN	5,463	5,505	5,564	5,866	5,458	5,736
	BN	5,610	5,568	5,489	5,697	5,454	5,521
	D	5,242	5,282	5,328	5,360	5,211	5,206
	C	4,607	4,606	4,592	4,672	4,417	4,476
	All	5,670	5,662	5,457	5,693	5,292	5,409
Jul	W	7,708	7,917	8,047	8,164	6,818	7,000
	AN	8,411	8,501	8,590	8,749	7,643	8,035
	BN	8,229	8,319	8,229	8,100	7,445	7,149
	D	7,737	7,679	7,560	7,644	6,332	5,731
	C	6,601	6,244	6,236	6,124	5,044	5,140
	All	7,744	7,774	7,786	7,826	6,679	6,626

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	6,724	6,752	6,743	6,797	5,124	5,145
	AN	6,742	6,892	6,949	7,215	5,797	5,657
	BN	6,673	6,709	6,556	6,846	5,753	5,686
	D	7,061	6,737	6,340	6,295	5,031	5,190
	C	5,048	4,991	4,814	4,726	4,664	4,546
	All	6,547	6,504	6,371	6,453	5,242	5,235
Sep	W	7,018	5,439	5,704	5,599	7,403	7,899
	AN	5,957	8,111	7,828	7,734	5,710	5,961
	BN	5,731	5,706	5,835	5,696	4,545	4,585
	D	5,651	5,357	4,946	4,616	4,350	4,686
	C	4,576	4,451	4,342	4,227	4,276	4,604
	All	5,986	5,713	5,672	5,511	5,539	5,862
Oct	W	4,727	4,663	4,718	4,750	4,030	4,116
	AN	4,616	4,836	4,630	4,371	4,407	4,149
	BN	4,966	4,824	4,843	4,819	4,329	4,024
	D	4,699	4,755	4,782	4,504	4,405	4,184
	C	4,545	4,483	4,445	4,696	4,143	4,285
	All	4,719	4,709	4,701	4,644	4,235	4,145
Nov	W	4,550	4,380	4,323	4,055	3,687	3,601
	AN	3,863	3,797	3,766	3,720	3,397	3,283
	BN	4,101	3,972	3,834	3,712	3,427	3,363
	D	3,959	3,898	3,753	3,647	3,440	3,425
	C	3,853	3,713	3,669	3,558	3,554	3,515
	All	4,141	4,022	3,937	3,785	3,526	3,463
Dec	W	6,196	5,932	6,180	5,873	5,289	5,098
	AN	4,242	4,327	4,409	4,399	3,989	4,004
	BN	3,963	4,045	4,054	3,989	3,809	3,674
	D	3,624	3,690	3,670	3,631	3,447	3,349
	C	3,466	3,376	3,295	3,231	3,214	3,343
	All	4,565	4,509	4,585	4,457	4,138	4,054

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-16. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Delta Cross Channel and Georgiana Slough[1]

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	-1069 (-14.1%)	-941 (-12.4%)	-1021 (-13.5%)	-893 (-11.8%)	-1203 (-15.5%)	-1196 (-15.2%)
	AN	-1031 (-16.8%)	-907 (-14.8%)	-829 (-14%)	-705 (-11.9%)	-911 (-15.2%)	-989 (-15.9%)
	BN	-680 (-17%)	-711 (-17.8%)	-560 (-14.5%)	-592 (-15.3%)	-591 (-15.1%)	-561 (-14.6%)
	D	-314 (-10%)	-333 (-10.6%)	-285 (-9.1%)	-304 (-9.7%)	-311 (-9.9%)	-334 (-10.6%)
	C	-198 (-7.3%)	-42 (-1.5%)	-231 (-8.4%)	-75 (-2.7%)	-229 (-8.3%)	-147 (-5.2%)
	All	-704 (-13.9%)	-632 (-12.4%)	-637 (-12.7%)	-565 (-11.3%)	-717 (-14.1%)	-715 (-13.8%)
Feb	W	-1150 (-13.6%)	-982 (-11.6%)	-1078 (-12.9%)	-910 (-10.9%)	-1358 (-15.7%)	-1319 (-15%)
	AN	-846 (-12.2%)	-835 (-12.1%)	-722 (-10.6%)	-711 (-10.5%)	-1010 (-14.3%)	-1116 (-15.5%)
	BN	-895 (-17.6%)	-864 (-17%)	-748 (-15.2%)	-717 (-14.5%)	-865 (-17.1%)	-819 (-16.3%)
	D	-520 (-14.3%)	-459 (-12.6%)	-522 (-14.3%)	-461 (-12.6%)	-496 (-13.7%)	-446 (-12.3%)
	C	-194 (-7%)	-230 (-8.3%)	-210 (-7.5%)	-246 (-8.8%)	-156 (-5.7%)	-174 (-6.4%)
	All	-784 (-13.6%)	-715 (-12.4%)	-721 (-12.6%)	-652 (-11.4%)	-858 (-14.7%)	-845 (-14.3%)
Mar	W	-1297 (-17.5%)	-1213 (-16.4%)	-1292 (-17.5%)	-1208 (-16.3%)	-1401 (-18.7%)	-1422 (-18.7%)
	AN	-1238 (-18.4%)	-1241 (-18.4%)	-1147 (-17.2%)	-1150 (-17.3%)	-1319 (-19.3%)	-1320 (-19.3%)
	BN	-1016 (-24.9%)	-1035 (-25.3%)	-858 (-21.8%)	-877 (-22.3%)	-820 (-21.1%)	-825 (-21.3%)
	D	-612 (-17.1%)	-591 (-16.5%)	-580 (-16.4%)	-558 (-15.7%)	-563 (-16%)	-590 (-16.5%)
	C	-171 (-6.6%)	-171 (-6.6%)	-153 (-6%)	-153 (-6%)	-144 (-5.6%)	-156 (-6.1%)
	All	-925 (-17.8%)	-897 (-17.3%)	-874 (-17%)	-846 (-16.4%)	-922 (-17.8%)	-937 (-17.9%)
Apr	W	-1242 (-21.2%)	-1259 (-21.5%)	-1259 (-21.4%)	-1277 (-21.7%)	-1252 (-21.3%)	-1224 (-21%)
	AN	-1078 (-25.2%)	-1075 (-25.1%)	-1081 (-25.2%)	-1079 (-25.2%)	-1000 (-23.8%)	-936 (-22.6%)
	BN	-524 (-16.4%)	-468 (-14.7%)	-484 (-15.4%)	-427 (-13.6%)	-457 (-14.6%)	-385 (-12.4%)
	D	-228 (-8.9%)	-155 (-6.1%)	-234 (-9.1%)	-161 (-6.3%)	-207 (-8.2%)	-143 (-5.6%)
	C	-79 (-3.6%)	-56 (-2.6%)	-75 (-3.4%)	-52 (-2.4%)	-53 (-2.4%)	-74 (-3.4%)
	All	-702 (-18%)	-679 (-17.4%)	-702 (-18%)	-679 (-17.4%)	-675 (-17.4%)	-633 (-16.4%)
May	W	-1294 (-25.5%)	-1768 (-34.8%)	-1261 (-25%)	-1735 (-34.4%)	-910 (-19.4%)	-778 (-19%)
	AN	-637 (-17.6%)	-705 (-19.4%)	-595 (-16.6%)	-663 (-18.5%)	-462 (-13.4%)	-390 (-11.8%)
	BN	-353 (-13%)	-278 (-10.2%)	-303 (-11.3%)	-228 (-8.5%)	-190 (-7.4%)	-35 (-1.4%)
	D	-111 (-4.8%)	90 (3.9%)	-78 (-3.5%)	122 (5.4%)	-64 (-2.8%)	27 (1.2%)
	C	-42 (-2.3%)	-19 (-1%)	-27 (-1.4%)	-3 (-0.2%)	-94 (-4.9%)	-54 (-2.8%)
	All	-594 (-17.6%)	-694 (-20.6%)	-560 (-16.7%)	-660 (-19.7%)	-416 (-13%)	-311 (-10.4%)
Jun	W	-996 (-15.1%)	-813 (-12.4%)	-949 (-14.5%)	-766 (-11.7%)	-293 (-5%)	-543 (-8.6%)
	AN	-5 (-0.1%)	273 (5%)	-47 (-0.9%)	231 (4.2%)	-106 (-1.9%)	-130 (-2.2%)
	BN	-156 (-2.8%)	-89 (-1.6%)	-114 (-2%)	-47 (-0.8%)	-36 (-0.6%)	-177 (-3.1%)
	D	-31 (-0.6%)	-37 (-0.7%)	-70 (-1.3%)	-76 (-1.4%)	-117 (-2.2%)	-154 (-2.9%)
	C	-190 (-4.1%)	-130 (-2.8%)	-189 (-4.1%)	-129 (-2.8%)	-175 (-3.8%)	-195 (-4.2%)
	All	-378 (-6.7%)	-260 (-4.6%)	-370 (-6.5%)	-253 (-4.5%)	-166 (-3%)	-284 (-5%)
Jul	W	-891 (-11.6%)	-708 (-9.2%)	-1100 (-13.9%)	-917 (-11.6%)	-1229 (-15.3%)	-1164 (-14.3%)
	AN	-768 (-9.1%)	-376 (-4.5%)	-858 (-10.1%)	-466 (-5.5%)	-947 (-11%)	-714 (-8.2%)
	BN	-784 (-9.5%)	-1080 (-13.1%)	-874 (-10.5%)	-1170 (-14.1%)	-784 (-9.5%)	-951 (-11.7%)
	D	-1405 (-18.2%)	-2005 (-25.9%)	-1348 (-17.5%)	-1948 (-25.4%)	-1229 (-16.3%)	-1913 (-25%)
	C	-1557 (-23.6%)	-1461 (-22.1%)	-1200 (-19.2%)	-1104 (-17.7%)	-1191 (-19.1%)	-983 (-16.1%)
	All	-1065 (-13.8%)	-1118 (-14.4%)	-1095 (-14.1%)	-1148 (-14.8%)	-1106 (-14.2%)	-1200 (-15.3%)

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-1600 (-23.8%)	-1579 (-23.5%)	-1628 (-24.1%)	-1607 (-23.8%)	-1619 (-24%)	-1651 (-24.3%)
	AN	-945 (-14%)	-1085 (-16.1%)	-1095 (-15.9%)	-1235 (-17.9%)	-1153 (-16.6%)	-1558 (-21.6%)
	BN	-921 (-13.8%)	-987 (-14.8%)	-956 (-14.3%)	-1022 (-15.2%)	-804 (-12.3%)	-1160 (-16.9%)
	D	-2030 (-28.7%)	-1870 (-26.5%)	-1706 (-25.3%)	-1547 (-23%)	-1308 (-20.6%)	-1104 (-17.5%)
	C	-384 (-7.6%)	-502 (-9.9%)	-328 (-6.6%)	-445 (-8.9%)	-151 (-3.1%)	-180 (-3.8%)
	All	-1305 (-19.9%)	-1312 (-20%)	-1262 (-19.4%)	-1269 (-19.5%)	-1129 (-17.7%)	-1218 (-18.9%)
Sep	W	384 (5.5%)	881 (12.6%)	1964 (36.1%)	2461 (45.2%)	1699 (29.8%)	2300 (41.1%)
	AN	-247 (-4.1%)	4 (0.1%)	-2401 (-29.6%)	-2150 (-26.5%)	-2117 (-27%)	-1774 (-22.9%)
	BN	-1187 (-20.7%)	-1146 (-20%)	-1161 (-20.3%)	-1121 (-19.6%)	-1291 (-22.1%)	-1111 (-19.5%)
	D	-1302 (-23%)	-965 (-17.1%)	-1007 (-18.8%)	-670 (-12.5%)	-596 (-12.1%)	71 (1.5%)
	C	-300 (-6.6%)	28 (0.6%)	-175 (-3.9%)	152 (3.4%)	-66 (-1.5%)	377 (8.9%)
	All	-447 (-7.5%)	-124 (-2.1%)	-174 (-3%)	149 (2.6%)	-132 (-2.3%)	351 (6.4%)
Oct	W	-696 (-14.7%)	-611 (-12.9%)	-633 (-13.6%)	-547 (-11.7%)	-688 (-14.6%)	-634 (-13.3%)
	AN	-208 (-4.5%)	-467 (-10.1%)	-428 (-8.9%)	-687 (-14.2%)	-223 (-4.8%)	-222 (-5.1%)
	BN	-637 (-12.8%)	-942 (-19%)	-494 (-10.2%)	-800 (-16.6%)	-514 (-10.6%)	-795 (-16.5%)
	D	-294 (-6.3%)	-515 (-11%)	-349 (-7.4%)	-570 (-12%)	-377 (-7.9%)	-320 (-7.1%)
	C	-402 (-8.9%)	-261 (-5.7%)	-340 (-7.6%)	-198 (-4.4%)	-302 (-6.8%)	-412 (-8.8%)
	All	-483 (-10.2%)	-574 (-12.2%)	-474 (-10.1%)	-565 (-12%)	-466 (-9.9%)	-500 (-10.8%)
Nov	W	-863 (-19%)	-949 (-20.9%)	-693 (-15.8%)	-779 (-17.8%)	-636 (-14.7%)	-454 (-11.2%)
	AN	-466 (-12.1%)	-579 (-15%)	-400 (-10.5%)	-513 (-13.5%)	-369 (-9.8%)	-437 (-11.7%)
	BN	-674 (-16.4%)	-737 (-18%)	-546 (-13.7%)	-609 (-15.3%)	-408 (-10.6%)	-349 (-9.4%)
	D	-519 (-13.1%)	-534 (-13.5%)	-458 (-11.8%)	-473 (-12.1%)	-313 (-8.3%)	-222 (-6.1%)
	C	-299 (-7.8%)	-338 (-8.8%)	-159 (-4.3%)	-198 (-5.3%)	-115 (-3.1%)	-43 (-1.2%)
	All	-615 (-14.8%)	-678 (-16.4%)	-495 (-12.3%)	-559 (-13.9%)	-411 (-10.4%)	-322 (-8.5%)
Dec	W	-907 (-14.6%)	-1098 (-17.7%)	-642 (-10.8%)	-833 (-14%)	-891 (-14.4%)	-775 (-13.2%)
	AN	-254 (-6%)	-238 (-5.6%)	-338 (-7.8%)	-323 (-7.5%)	-420 (-9.5%)	-394 (-9%)
	BN	-154 (-3.9%)	-288 (-7.3%)	-236 (-5.8%)	-371 (-9.2%)	-246 (-6.1%)	-314 (-7.9%)
	D	-177 (-4.9%)	-276 (-7.6%)	-243 (-6.6%)	-341 (-9.3%)	-222 (-6.1%)	-282 (-7.8%)
	C	-252 (-7.3%)	-123 (-3.5%)	-162 (-4.8%)	-33 (-1%)	-82 (-2.5%)	112 (3.5%)
	All	-427 (-9.4%)	-511 (-11.2%)	-371 (-8.2%)	-455 (-10.1%)	-447 (-9.7%)	-403 (-9%)

[a] A positive value indicates higher flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-17. Mean Monthly Flows (cfs) over Fremont Weir for EBC and ESO Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	20,528	19,687	23,036	24,758	25,157	25,795
	AN	4,359	4,207	4,495	4,602	6,335	6,176
	BN	0	0	0	0	1,689	1,630
	D	103	96	184	45	812	637
	C	0	0	0	0	380	457
	All	7,170	6,879	8,003	8,533	9,426	9,568
Feb	W	23,869	23,256	28,177	29,796	30,301	32,418
	AN	9,430	8,130	9,202	10,011	12,721	12,875
	BN	1,179	1,015	1,279	691	3,190	2,838
	D	542	544	623	641	1,571	1,552
	C	0	0	0	0	430	452
	All	9,269	8,856	10,636	11,171	12,422	13,055
Mar	W	15,897	15,576	17,336	18,802	19,288	20,724
	AN	6,058	5,386	6,631	7,175	9,187	9,851
	BN	1	2	2	5	1,313	1,171
	D	86	78	93	111	1,181	1,188
	C	0	0	0	0	404	402
	All	5,946	5,744	6,488	7,037	8,003	8,532
Apr	W	3,122	3,144	3,515	3,513	5,841	5,692
	AN	124	149	145	158	1,633	1,636
	BN	36	39	37	28	578	580
	D	0	0	0	0	206	216
	C	0	0	0	0	106	106
	All	1,014	1,025	1,142	1,142	2,251	2,206
May	W	345	343	184	43	283	141
	AN	0	0	0	0	100	100
	BN	0	0	0	0	100	100
	D	0	0	0	0	100	100
	C	0	0	0	0	100	100
	All	110	109	58	14	158	113
Jun	W	82	77	6	0	105	100
	AN	0	0	0	0	100	100
	BN	0	0	0	0	100	100
	D	0	0	0	0	100	100
	C	0	0	0	0	100	100
	All	26	24	2	0	102	100
Jul	W	0	0	0	0	0	0
	AN	0	0	0	0	0	0
	BN	0	0	0	0	0	0
	D	0	0	0	0	0	0
	C	0	0	0	0	0	0
	All	0	0	0	0	0	0

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	0	0	0	0	0	0
	AN	0	0	0	0	0	0
	BN	0	0	0	0	0	0
	D	0	0	0	0	0	0
	C	0	0	0	0	0	0
	All	0	0	0	0	0	0
Sep	W	0	0	0	0	100	100
	AN	0	0	0	0	100	100
	BN	0	0	0	0	100	100
	D	0	0	0	0	100	100
	C	0	0	0	0	100	100
	All	0	0	0	0	100	100
Oct	W	53	77	85	39	139	141
	AN	0	0	0	0	100	100
	BN	0	0	0	0	100	100
	D	0	0	0	0	100	100
	C	0	0	0	0	100	100
	All	17	25	27	12	113	113
Nov	W	828	709	844	502	937	581
	AN	0	0	0	0	100	100
	BN	0	0	0	0	100	100
	D	0	0	0	0	100	100
	C	0	0	0	0	100	100
	All	263	225	268	159	366	253
Dec	W	6,724	5,628	7,511	5,906	9,575	8,075
	AN	823	834	1,220	926	1,854	1,421
	BN	793	800	1,403	839	1,557	1,241
	D	0	0	0	0	375	337
	C	0	0	0	0	139	144
	All	2,388	2,043	2,800	2,151	3,676	3,075

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-18. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) over**
2 **Fremont Weir**

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	4629 (22.5%)	5266 (25.7%)	5470 (27.8%)	6108 (31%)	2121 (9.2%)	1037 (4.2%)
	AN	1976 (45.3%)	1817 (41.7%)	2128 (50.6%)	1969 (46.8%)	1840 (40.9%)	1575 (34.2%)
	BN	1689 (NA)	1630 (NA)	1689 (NA)	1630 (NA)	1689 (NA)	1630 (NA)
	D	709 (688.7%)	534 (518.8%)	716 (742%)	541 (560.7%)	628 (341.2%)	592 (1317.2%)
	C	380 (NA)	457 (NA)	380 (NA)	457 (NA)	380 (NA)	457 (NA)
	All	2256 (31.5%)	2398 (33.4%)	2547 (37%)	2689 (39.1%)	1423 (17.8%)	1034 (12.1%)
Feb	W	6432 (26.9%)	8549 (35.8%)	7044 (30.3%)	9162 (39.4%)	2124 (7.5%)	2622 (8.8%)
	AN	3291 (34.9%)	3445 (36.5%)	4591 (56.5%)	4745 (58.4%)	3518 (38.2%)	2864 (28.6%)
	BN	2011 (170.6%)	1659 (140.7%)	2175 (214.4%)	1823 (179.7%)	1911 (149.4%)	2147 (310.8%)
	D	1029 (189.9%)	1010 (186.4%)	1027 (188.8%)	1008 (185.3%)	948 (152.2%)	911 (142%)
	C	430 (NA)	452 (NA)	430 (NA)	452 (NA)	430 (NA)	452 (NA)
	All	3153 (34%)	3786 (40.8%)	3565 (40.3%)	4198 (47.4%)	1786 (16.8%)	1883 (16.9%)
Mar	W	3390 (21.3%)	4827 (30.4%)	3711 (23.8%)	5148 (33.1%)	1951 (11.3%)	1922 (10.2%)
	AN	3129 (51.6%)	3793 (62.6%)	3801 (70.6%)	4465 (82.9%)	2556 (38.5%)	2677 (37.3%)
	BN	1312 (194848.5%)	1171 (173805.9%)	1311 (59605.1%)	1169 (53160.6%)	1311 (82091.8%)	1167 (24639.3%)
	D	1096 (1280.4%)	1103 (1288.6%)	1104 (1419.4%)	1111 (1428.4%)	1089 (1177%)	1077 (967.4%)
	C	404 (NA)	402 (NA)	404 (NA)	402 (NA)	404 (NA)	402 (NA)
	All	2057 (34.6%)	2586 (43.5%)	2258 (39.3%)	2788 (48.5%)	1515 (23.3%)	1495 (21.3%)
Apr	W	2720 (87.1%)	2570 (82.3%)	2697 (85.8%)	2547 (81%)	2327 (66.2%)	2179 (62%)
	AN	1510 (1221%)	1513 (1223.3%)	1485 (998.7%)	1488 (1000.6%)	1488 (1027.2%)	1478 (936.5%)
	BN	541 (1484.8%)	544 (1490.5%)	539 (1392.5%)	541 (1397.9%)	541 (1449.7%)	552 (1956.1%)
	D	206 (NA)	216 (NA)	206 (NA)	216 (NA)	206 (NA)	216 (NA)
	C	106 (NA)	106 (NA)	106 (NA)	106 (NA)	106 (NA)	106 (NA)
	All	1236 (121.9%)	1192 (117.5%)	1225 (119.5%)	1181 (115.1%)	1109 (97.1%)	1064 (93.2%)
May	W	-63 (-18.2%)	-204 (-59.1%)	-60 (-17.6%)	-201 (-58.8%)	99 (53.7%)	99 (232%)
	AN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	BN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	D	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	C	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	All	48 (44.2%)	4 (3.3%)	49 (45.2%)	4 (4.1%)	100 (170.8%)	100 (737.7%)
Jun	W	23 (28.2%)	18 (21.7%)	28 (37%)	23 (30%)	100 (1767.8%)	100 (NA)
	AN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	BN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	D	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	C	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	All	76 (290.2%)	74 (283.8%)	77 (317%)	76 (310.1%)	100 (5587.7%)	100 (NA)
Jul	W	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	AN	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	BN	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	D	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	C	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	All	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	AN	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	BN	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	D	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	C	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
	All	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)	0 (NA)
Sep	W	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	AN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	BN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	D	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	C	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	All	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
Oct	W	87 (164.7%)	88 (167.8%)	62 (80.4%)	64 (82.4%)	54 (63.6%)	102 (262.4%)
	AN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	BN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	D	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	C	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	All	96 (573.6%)	96 (576.7%)	88 (358.9%)	89 (361%)	85 (316.2%)	101 (815.6%)
Nov	W	109 (13.2%)	-247 (-29.8%)	229 (32.3%)	-128 (-18%)	93 (11%)	80 (15.9%)
	AN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	BN	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	D	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	C	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)	100 (NA)
	All	103 (39.2%)	-10 (-3.8%)	141 (62.6%)	28 (12.4%)	98 (36.5%)	94 (58.8%)
Dec	W	2852 (42.4%)	1352 (20.1%)	3947 (70.1%)	2447 (43.5%)	2065 (27.5%)	2169 (36.7%)
	AN	1031 (125.2%)	597 (72.6%)	1020 (122.4%)	587 (70.5%)	634 (52%)	495 (53.4%)
	BN	764 (96.3%)	448 (56.4%)	756 (94.5%)	440 (55%)	153 (10.9%)	402 (47.9%)
	D	375 (NA)	337 (NA)	375 (NA)	337 (NA)	375 (NA)	337 (NA)
	C	139 (NA)	144 (NA)	139 (NA)	144 (NA)	139 (NA)	144 (NA)
	All	1288 (53.9%)	688 (28.8%)	1632 (79.9%)	1032 (50.5%)	876 (31.3%)	924 (42.9%)

[a] A positive value indicates higher average flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.
NA = Could not calculate because dividing by 0.

5C.5.3.3 High Outflow and Low Outflow Scenarios

Table 5C.5.3-19. Mean Monthly Flows (cfs) in Yolo Bypass at Delta for EBC2, HOS, and LOS Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	30,433	32,670	32,548	35,046	33,424	36,226
	AN	7,727	7,913	10,236	9,867	9,801	10,537
	BN	966	961	2,746	2,718	2,798	2,832
	D	633	500	1,266	1,071	1,267	1,133
	C	302	306	698	703	736	768
	All	11,128	11,835	12,667	13,358	12,896	13,873
Feb	W	36,518	38,424	38,215	40,379	38,663	41,250
	AN	13,208	14,188	15,966	17,535	17,705	18,263
	BN	3,232	2,539	5,598	4,974	5,640	5,364
	D	1,797	1,821	2,699	2,728	2,678	2,724
	C	363	363	794	825	791	792
	All	14,511	15,146	16,118	16,938	16,517	17,381
Mar	W	23,472	25,168	25,475	27,368	25,624	27,374
	AN	9,721	10,281	12,601	12,930	12,533	13,315
	BN	628	631	2,112	1,901	2,268	2,151
	D	722	729	1,796	1,830	1,782	1,802
	C	292	292	720	697	696	694
	All	9,174	9,795	10,782	11,398	10,839	11,493
Apr	W	6,932	6,953	9,893	9,703	9,246	9,093
	AN	1,429	1,450	3,667	3,929	2,909	2,921
	BN	569	563	2,088	1,911	1,102	1,095
	D	308	308	690	692	507	518
	C	107	107	213	213	212	212
	All	2,587	2,596	4,213	4,161	3,688	3,642
May	W	457	229	556	329	556	328
	AN	183	183	283	283	283	283
	BN	67	67	167	167	167	167
	D	77	77	177	177	177	177
	C	68	68	168	168	168	168
	All	210	138	310	238	310	237
Jun	W	120	118	220	214	220	214
	AN	66	66	166	166	166	166
	BN	66	66	166	166	166	166
	D	67	67	167	167	167	167
	C	64	64	164	164	164	164
	All	83	82	183	181	183	181
Jul	W	48	48	48	48	48	48
	AN	48	48	48	48	48	48
	BN	48	48	48	48	48	48
	D	48	48	48	48	48	48
	C	48	55	48	48	48	48
	All	48	49	48	48	48	48

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	147	143	143	147	143	147
	AN	95	95	95	95	95	95
	BN	114	114	106	114	114	106
	D	62	62	62	62	61	61
	C	54	54	54	54	86	54
	All	101	100	99	101	105	100
Sep	W	103	110	244	263	173	173
	AN	65	65	198	198	174	165
	BN	86	86	185	185	185	185
	D	72	76	165	165	165	165
	C	109	182	175	167	174	167
	All	89	102	200	205	173	171
Oct	W	174	126	252	225	227	228
	AN	39	38	141	141	147	139
	BN	52	50	153	147	163	141
	D	130	121	225	225	226	230
	C	41	44	141	141	141	142
	All	104	87	197	187	191	188
Nov	W	1,262	876	1,270	966	1,311	1,215
	AN	220	159	286	206	232	204
	BN	34	35	133	133	137	138
	D	68	69	171	169	235	169
	C	27	27	127	127	127	127
	All	457	326	523	415	543	494
Dec	W	11,064	9,209	13,793	11,882	14,263	12,304
	AN	2,150	1,772	2,835	2,034	2,740	2,390
	BN	2,145	1,505	2,429	1,863	2,225	1,988
	D	340	343	685	675	725	689
	C	107	98	228	229	229	233
	All	4,279	3,526	5,387	4,565	5,496	4,776

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-20. Differences[a] between EBC2 Scenarios and Hos and LOS Scenarios in Mean Monthly**
2 **Flows (cfs) in Yolo Bypass at Delta**

Month	Water-Year Type[b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	2115 (6.9%)	2377 (7.3%)	2990 (9.8%)	3556 (10.9%)
	AN	2509 (32.5%)	1954 (24.7%)	2074 (26.8%)	2624 (33.2%)
	BN	1780 (184.2%)	1757 (182.8%)	1832 (189.6%)	1871 (194.6%)
	D	633 (100%)	571 (114.2%)	634 (100.2%)	633 (126.6%)
	C	397 (131.6%)	397 (129.8%)	435 (144.2%)	463 (151.4%)
	All	1539 (13.8%)	1523 (12.9%)	1767 (15.9%)	2038 (17.2%)
Feb	W	1697 (4.6%)	1955 (5.1%)	2145 (5.9%)	2826 (7.4%)
	AN	2759 (20.9%)	3346 (23.6%)	4497 (34%)	4075 (28.7%)
	BN	2366 (73.2%)	2435 (95.9%)	2408 (74.5%)	2825 (111.3%)
	D	902 (50.2%)	907 (49.8%)	882 (49.1%)	903 (49.6%)
	C	430 (118.5%)	462 (127.1%)	428 (117.8%)	429 (118.1%)
	All	1607 (11.1%)	1792 (11.8%)	2006 (13.8%)	2236 (14.8%)
Mar	W	2003 (8.5%)	2200 (8.7%)	2151 (9.2%)	2206 (8.8%)
	AN	2880 (29.6%)	2649 (25.8%)	2812 (28.9%)	3035 (29.5%)
	BN	1484 (236.3%)	1270 (201.2%)	1640 (261.1%)	1520 (240.9%)
	D	1075 (148.9%)	1101 (151%)	1061 (147%)	1073 (147.1%)
	C	428 (146.3%)	404 (138.3%)	404 (138.2%)	402 (137.5%)
	All	1608 (17.5%)	1603 (16.4%)	1665 (18.2%)	1697 (17.3%)
Apr	W	2961 (42.7%)	2750 (39.6%)	2314 (33.4%)	2140 (30.8%)
	AN	2238 (156.6%)	2479 (170.9%)	1480 (103.6%)	1471 (101.4%)
	BN	1520 (267.3%)	1348 (239.2%)	533 (93.8%)	531 (94.3%)
	D	382 (124.2%)	384 (124.6%)	199 (64.8%)	210 (68.1%)
	C	106 (99.6%)	106 (99.5%)	106 (99.3%)	106 (99.2%)
	All	1625 (62.8%)	1565 (60.3%)	1100 (42.5%)	1046 (40.3%)
May	W	99 (21.7%)	100 (43.7%)	99 (21.6%)	99 (43.2%)
	AN	100 (54.7%)	100 (54.7%)	100 (54.7%)	100 (54.7%)
	BN	100 (148.7%)	100 (148.7%)	100 (148.7%)	100 (148.7%)
	D	100 (129.8%)	100 (129.8%)	100 (129.8%)	100 (129.8%)
	C	100 (147.2%)	100 (147.2%)	100 (147.2%)	100 (147.2%)
	All	100 (47.5%)	100 (72.6%)	100 (47.4%)	100 (72.4%)
Jun	W	100 (82.9%)	96 (81.6%)	100 (82.9%)	96 (81.6%)
	AN	100 (150.6%)	100 (150.6%)	100 (150.6%)	100 (150.6%)
	BN	100 (151.4%)	100 (151.4%)	100 (151.4%)	100 (151.4%)
	D	100 (150.2%)	100 (150.2%)	100 (150.2%)	100 (150.2%)
	C	100 (155.2%)	100 (155.2%)	100 (155.2%)	100 (155.2%)
	All	100 (120.1%)	99 (119.9%)	100 (120.1%)	99 (119.9%)
Jul	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	-7 (-13.1%)	0 (0%)	-7 (-13.1%)
	All	0 (0%)	-1 (-2.2%)	0 (0%)	-1 (-2.2%)

Month	Water-Year Type[b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	-4 (-2.6%)	4 (2.7%)	-4 (-2.6%)	4 (2.7%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	-7 (-6.3%)	0 (0%)	0 (0%)	-7 (-6.3%)
	D	0 (0%)	0 (0%)	-1 (-1%)	-1 (-1.3%)
	C	0 (0%)	0 (0%)	32 (58.9%)	0 (0%)
	All	-2 (-2.4%)	1 (1.2%)	3 (3.3%)	-0.2 (-0.2%)
Sep	W	141 (136.9%)	153 (139%)	69 (67.3%)	63 (57.1%)
	AN	133 (204.1%)	133 (204.1%)	108 (166.2%)	100 (153.4%)
	BN	99 (115.3%)	99 (115.8%)	99 (115.3%)	99 (115.8%)
	D	93 (128.7%)	89 (117.8%)	93 (129.2%)	89 (118.1%)
	C	66 (60.9%)	-15 (-8.5%)	66 (60.4%)	-15 (-8.5%)
	All	111 (125.4%)	102 (99.9%)	85 (95.7%)	69 (67.3%)
Oct	W	78 (44.9%)	99 (78.6%)	53 (30.2%)	102 (81%)
	AN	102 (263.4%)	103 (270.5%)	108 (279.6%)	101 (263.6%)
	BN	101 (192.9%)	98 (195.6%)	110 (211.8%)	91 (182.9%)
	D	95 (73.4%)	104 (85.7%)	96 (73.6%)	109 (90.3%)
	C	100 (241.6%)	98 (222.6%)	100 (241.6%)	98 (223.2%)
	All	92 (88.6%)	100 (115.1%)	87 (83.4%)	101 (116%)
Nov	W	8 (0.7%)	90 (10.3%)	49 (3.9%)	339 (38.7%)
	AN	67 (30.3%)	47 (29.7%)	13 (5.8%)	45 (28.2%)
	BN	100 (296.6%)	99 (282.3%)	103 (306.6%)	103 (295.4%)
	D	103 (152.8%)	100 (144.6%)	168 (248.1%)	100 (144.5%)
	C	100 (373.7%)	100 (367.6%)	100 (373.7%)	100 (368.4%)
	All	67 (14.6%)	89 (27.3%)	86 (18.9%)	168 (51.6%)
Dec	W	2729 (24.7%)	2673 (29%)	3199 (28.9%)	3095 (33.6%)
	AN	685 (31.9%)	262 (14.8%)	590 (27.4%)	617 (34.8%)
	BN	284 (13.2%)	359 (23.8%)	80 (3.7%)	484 (32.2%)
	D	345 (101.6%)	333 (97.2%)	386 (113.5%)	346 (101.1%)
	C	121 (113.6%)	131 (133.7%)	122 (114.4%)	136 (138.5%)
	All	1108 (25.9%)	1039 (29.5%)	1217 (28.4%)	1250 (35.5%)

[a] A positive value indicates higher flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-21. Mean Monthly Flows (cfs) in the Mokelumne River at Delta for EBC2, HOS, and LOS Scenarios

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	3,389	3,634	3,389	3,634	3,389	3,634
	AN	1,759	1,876	1,759	1,876	1,759	1,876
	BN	622	617	622	617	622	617
	D	484	493	484	493	484	493
	C	282	281	282	281	282	281
	All	1,565	1,660	1,565	1,660	1,565	1,660
Feb	W	3,720	3,781	3,720	3,781	3,720	3,781
	AN	2,894	2,913	2,894	2,913	2,894	2,913
	BN	1,045	1,035	1,045	1,035	1,045	1,035
	D	684	678	684	678	684	678
	C	441	442	441	442	441	442
	All	2,014	2,033	2,014	2,033	2,014	2,033
Mar	W	3,243	3,336	3,243	3,336	3,243	3,336
	AN	1,633	1,639	1,633	1,639	1,633	1,639
	BN	1,144	1,140	1,144	1,140	1,144	1,140
	D	712	691	712	691	712	691
	C	581	580	581	580	581	580
	All	1,675	1,700	1,675	1,700	1,675	1,700
Apr	W	2,748	2,694	2,748	2,694	2,748	2,694
	AN	1,529	1,424	1,529	1,424	1,529	1,424
	BN	1,164	1,068	1,164	1,068	1,164	1,068
	D	577	550	577	550	577	550
	C	322	311	322	311	322	311
	All	1,442	1,384	1,442	1,384	1,442	1,384
May	W	3,094	2,885	3,094	2,885	3,094	2,885
	AN	1,303	1,179	1,303	1,179	1,303	1,179
	BN	886	812	886	812	886	812
	D	360	333	360	333	360	333
	C	179	170	179	170	179	170
	All	1,392	1,289	1,392	1,289	1,392	1,289
Jun	W	1,605	1,415	1,605	1,415	1,605	1,415
	AN	727	631	727	631	727	631
	BN	400	366	400	366	400	366
	D	83	76	83	76	83	76
	C	48	44	48	44	48	44
	All	697	616	697	616	697	616
Jul	W	613	469	613	469	613	469
	AN	228	167	228	167	228	167
	BN	88	70	88	70	88	70
	D	6	6	6	6	6	6
	C	3	3	3	3	3	3
	All	239	183	239	183	239	183

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	476	346	476	346	476	346
	AN	241	216	241	216	241	216
	BN	79	71	79	71	79	71
	D	4	4	4	4	4	4
	C	2	2	2	2	2	2
	All	200	156	200	156	200	156
Sep	W	549	497	549	497	549	497
	AN	271	259	271	259	271	259
	BN	95	91	95	91	95	91
	D	9	9	9	9	9	9
	C	5	5	5	5	5	5
	All	231	213	231	213	231	213
Oct	W	152	147	152	147	152	147
	AN	178	180	178	180	178	180
	BN	148	144	148	144	148	144
	D	169	160	169	160	169	160
	C	125	123	125	123	125	123
	All	154	150	154	150	154	150
Nov	W	502	431	502	431	502	431
	AN	1,009	855	1,009	855	1,009	855
	BN	347	301	347	301	347	301
	D	371	327	371	327	371	327
	C	202	186	202	186	202	186
	All	497	429	497	429	497	429
Dec	W	1,766	1,732	1,766	1,732	1,766	1,732
	AN	1,806	1,628	1,806	1,628	1,806	1,628
	BN	505	472	505	472	505	472
	D	392	374	392	374	392	374
	C	217	209	217	209	217	209
	All	1,054	999	1,054	999	1,054	999

[a] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-22. Differences between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly**
2 **Flows (cfs) in the Mokelumne River at Delta**

Month	Water-Year Type[a, b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Feb	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Mar	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Apr	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
May	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Jun	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Jul	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Month	Water-Year Type[a, b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Sep	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Oct	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Nov	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Dec	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)

[a] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-23. Mean Monthly Flows (cfs) in San Joaquin River at Vernalis for EBC2, HOS, and LOS**
2 **Scenarios**

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	9,838	9,681	9,838	9,733	9,874	9,714
	AN	5,781	6,011	5,786	6,058	5,809	5,997
	BN	2,291	2,220	2,310	2,294	2,289	2,195
	D	2,247	2,202	2,219	2,212	2,248	2,222
	C	1,603	1,592	1,599	1,592	1,603	1,592
	All	5,040	5,018	5,038	5,056	5,055	5,024
Feb	W	14,001	13,191	14,001	13,196	13,997	13,178
	AN	7,100	6,721	7,047	6,731	7,039	6,677
	BN	2,965	2,841	2,979	2,803	2,963	2,795
	D	2,312	2,269	2,312	2,245	2,312	2,245
	C	1,942	1,941	1,943	1,942	1,943	1,942
	All	6,699	6,361	6,691	6,355	6,685	6,338
Mar	W	15,127	15,235	15,126	15,242	15,129	15,246
	AN	6,252	6,364	6,252	6,365	6,252	6,365
	BN	2,614	2,476	2,614	2,476	2,614	2,476
	D	2,191	2,146	2,191	2,146	2,192	2,147
	C	1,689	1,688	1,688	1,687	1,689	1,688
	All	6,739	6,763	6,738	6,765	6,739	6,766
Apr	W	12,185	12,457	12,185	12,448	12,190	12,450
	AN	5,970	6,042	5,970	6,043	5,970	6,043
	BN	4,161	3,922	4,161	3,923	4,162	3,924
	D	3,380	3,112	3,379	3,110	3,380	3,113
	C	1,844	1,796	1,843	1,794	1,845	1,796
	All	6,286	6,291	6,286	6,287	6,288	6,289
May	W	13,210	12,632	13,215	12,637	13,212	12,634
	AN	5,278	5,092	5,279	5,093	5,279	5,093
	BN	3,871	3,657	3,873	3,658	3,876	3,661
	D	3,040	2,823	3,039	2,821	3,044	2,825
	C	1,819	1,798	1,817	1,796	1,820	1,799
	All	6,347	6,069	6,348	6,070	6,349	6,071
Jun	W	9,255	6,820	9,256	6,824	9,253	6,822
	AN	2,782	2,678	2,785	2,680	2,784	2,680
	BN	1,960	1,870	1,962	1,871	1,967	1,876
	D	1,361	1,291	1,361	1,290	1,365	1,295
	C	975	956	973	952	977	957
	All	3,969	3,206	3,969	3,207	3,970	3,209
Jul	W	5,903	4,345	5,903	4,347	5,905	4,350
	AN	1,806	1,801	1,810	1,805	1,812	1,806
	BN	1,432	1,381	1,436	1,384	1,445	1,392
	D	1,146	1,100	1,146	1,097	1,151	1,107
	C	869	858	867	854	868	861
	All	2,658	2,184	2,659	2,184	2,663	2,190

Month	Water-Year Type[a, b]	Scenario[c]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	3,051	2,645	3,052	2,646	3,053	2,648
	AN	1,764	1,699	1,767	1,702	1,768	1,703
	BN	1,423	1,375	1,426	1,377	1,433	1,383
	D	1,272	1,225	1,272	1,224	1,276	1,230
	C	993	987	990	984	994	988
	All	1,858	1,710	1,859	1,711	1,862	1,714
Sep	W	3,306	3,127	3,307	3,128	3,307	3,129
	AN	2,221	2,164	2,223	2,166	2,224	2,166
	BN	1,800	1,748	1,801	1,749	1,804	1,752
	D	1,691	1,643	1,691	1,642	1,693	1,645
	C	1,392	1,378	1,391	1,380	1,392	1,380
	All	2,226	2,144	2,227	2,145	2,228	2,146
Oct	W	2,714	2,726	2,709	2,743	2,710	2,682
	AN	2,638	2,595	2,638	2,595	2,638	2,596
	BN	2,412	2,348	2,412	2,348	2,413	2,349
	D	2,849	2,790	2,849	2,791	2,850	2,791
	C	2,162	2,031	2,163	2,031	2,163	2,032
	All	2,565	2,515	2,564	2,520	2,564	2,503
Nov	W	2,516	2,411	2,516	2,404	2,515	2,416
	AN	3,232	3,193	3,240	3,203	3,238	3,170
	BN	2,180	1,997	2,222	1,997	2,222	1,997
	D	2,244	2,217	2,244	2,250	2,290	2,253
	C	1,911	1,898	1,911	1,898	1,911	1,898
	All	2,441	2,367	2,450	2,372	2,456	2,370
Dec	W	4,835	4,504	4,875	4,510	4,862	4,555
	AN	4,917	4,567	4,950	4,582	5,002	4,642
	BN	2,099	2,065	2,100	2,083	2,134	2,083
	D	2,072	2,166	2,086	2,168	2,103	2,168
	C	1,689	1,694	1,684	1,681	1,696	1,681
	All	3,366	3,211	3,385	3,216	3,401	3,241

[a] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-24. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly**
2 **Flows (cfs) in San Joaquin River at Vernalis[1]**

Month	Water-Year Type[b, c]	Scenarios[d]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	0 (0%)	52 (0.5%)	35 (0.4%)	33 (0.3%)
	AN	4 (0.1%)	47 (0.8%)	28 (0.5%)	-14 (-0.2%)
	BN	19 (0.8%)	74 (3.3%)	-2 (-0.1%)	-25 (-1.1%)
	D	-28 (-1.2%)	10 (0.5%)	2 (0.1%)	20 (0.9%)
	C	-3 (-0.2%)	0 (0%)	0 (0%)	0 (0%)
	All	-1 (-0.02%)	38 (0.8%)	16 (0.3%)	6 (0.1%)
Feb	W	-1 (-0.01%)	5 (0.04%)	-5 (0%)	-13 (-0.1%)
	AN	-53 (-0.7%)	10 (0.1%)	-62 (-0.9%)	-44 (-0.7%)
	BN	14 (0.5%)	-37 (-1.3%)	-2 (-0.1%)	-46 (-1.6%)
	D	0 (0%)	-24 (-1.1%)	0 (0%)	-24 (-1.1%)
	C	1 (0.04%)	1 (0.1%)	0 (0%)	1 (0.1%)
	All	-8 (-0.1%)	-6 (-0.1%)	-14 (-0.2%)	-23 (-0.4%)
Mar	W	-1 (0%)	7 (0.05%)	2 (0.02%)	10 (0.1%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	1 (0.02%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	-1 (-0.04%)	-1 (-0.04%)	0 (0%)	0 (0%)
	All	0 (0%)	2 (0.03%)	1 (0.01%)	3 (0%)
Apr	W	0 (0%)	-9 (-0.1%)	5 (0%)	-7 (-0.1%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	1 (0.03%)	1 (0.04%)
	D	-1 (-0.03%)	-1 (-0.04%)	1 (0.03%)	1 (0.03%)
	C	-1 (-0.1%)	-2 (-0.1%)	1 (0.05%)	0 (0%)
	All	0 (0%)	-3 (-0.1%)	2 (0.03%)	-2 (-0.02%)
May	W	5 (0.04%)	5 (0.04%)	2 (0.02%)	2 (0.01%)
	AN	1 (0.02%)	1 (0.01%)	2 (0.03%)	1 (0.02%)
	BN	2 (0.04%)	1 (0.03%)	5 (0.1%)	5 (0.1%)
	D	-1 (-0.03%)	-1 (-0.05%)	3 (0.1%)	3 (0.1%)
	C	-2 (-0.1%)	-2 (-0.1%)	1 (0.1%)	1 (0.1%)
	All	1 (0.02%)	1 (0.02%)	2 (0.04%)	2 (0.03%)
Jun	W	1 (0.01%)	4 (0.1%)	-2 (-0.03%)	1 (0.02%)
	AN	3 (0.1%)	2 (0.1%)	1 (0.05%)	2 (0.1%)
	BN	2 (0.1%)	1 (0.1%)	7 (0.3%)	6 (0.3%)
	D	0 (0%)	-1 (-0.1%)	4 (0.3%)	4 (0.3%)
	C	-2 (-0.2%)	-3 (-0.3%)	2 (0.2%)	1 (0.1%)
	All	1 (0.02%)	1 (0.03%)	2 (0.04%)	3 (0.1%)
Jul	W	0 (0%)	1 (0.03%)	2 (0.03%)	5 (0.1%)
	AN	4 (0.2%)	4 (0.2%)	6 (0.3%)	5 (0.3%)
	BN	4 (0.3%)	3 (0.2%)	13 (0.9%)	11 (0.8%)
	D	0 (0%)	-3 (-0.2%)	6 (0.5%)	7 (0.6%)
	C	-2 (-0.2%)	-4 (-0.5%)	0 (0%)	3 (0.3%)
	All	1 (0.05%)	0 (0%)	5 (0.2%)	6 (0.3%)

Month	Water-Year Type[b, c]	Scenarios[d]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	1 (0.02%)	1 (0.04%)	2 (0.1%)	3 (0.1%)
	AN	3 (0.2%)	3 (0.2%)	4 (0.2%)	3 (0.2%)
	BN	3 (0.2%)	2 (0.2%)	10 (0.7%)	8 (0.6%)
	D	0 (0%)	-1 (-0.1%)	4 (0.3%)	4 (0.4%)
	C	-3 (-0.3%)	-4 (-0.4%)	1 (0.1%)	1 (0.1%)
	All	1 (0.05%)	0 (0%)	4 (0.2%)	4 (0.2%)
Sep	W	0 (0%)	1 (0.02%)	1 (0.03%)	2 (0.1%)
	AN	2 (0.1%)	2 (0.1%)	2 (0.1%)	2 (0.1%)
	BN	1 (0.1%)	1 (0.1%)	5 (0.3%)	4 (0.2%)
	D	0 (0%)	0 (0%)	2 (0.1%)	2 (0.1%)
	C	0 (0%)	2 (0.1%)	0 (0%)	3 (0.2%)
	All	1 (0.03%)	1 (0.04%)	2 (0.1%)	2 (0.1%)
Oct	W	-5 (-0.2%)	17 (0.6%)	-4 (-0.2%)	-44 (-1.6%)
	AN	0 (0%)	0 (0%)	1 (0.02%)	1 (0.02%)
	BN	0 (0%)	0 (0%)	1 (0.04%)	1 (0.04%)
	D	0 (0%)	1 (0.02%)	1 (0.02%)	1 (0.04%)
	C	0 (0%)	0 (0%)	1 (0.03%)	1 (0.04%)
	All	-1 (-0.05%)	5 (0.2%)	-1 (-0.03%)	-12 (-0.5%)
Nov	W	0 (0%)	-7 (-0.3%)	-1 (-0.03%)	4 (0.2%)
	AN	8 (0.3%)	10 (0.3%)	5 (0.2%)	-23 (-0.7%)
	BN	42 (1.9%)	0 (0%)	42 (1.9%)	0 (0%)
	D	0 (0%)	33 (1.5%)	46 (2%)	36 (1.6%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	8 (0.3%)	5 (0.2%)	15 (0.6%)	2 (0.1%)
Dec	W	40 (0.8%)	6 (0.1%)	26 (0.5%)	51 (1.1%)
	AN	33 (0.7%)	15 (0.3%)	84 (1.7%)	75 (1.6%)
	BN	1 (0.1%)	19 (0.9%)	35 (1.7%)	18 (0.9%)
	D	14 (0.7%)	2 (0.1%)	31 (1.5%)	2 (0.1%)
	C	-6 (-0.3%)	-13 (-0.8%)	6 (0.4%)	-13 (-0.8%)
	All	19 (0.6%)	6 (0.2%)	36 (1.1%)	30 (0.9%)

[a] A positive value indicates higher flows in HOS or LOS than in EBC2.
[b] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[d] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-25. Mean Monthly Flows (cfs) for Delta Outflow for EBC2, HOS, and LOS Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	91,158	94,620	89,015	91,842	90,675	94,197
	AN	48,959	51,100	47,452	48,071	47,539	50,632
	BN	22,263	22,301	22,361	22,124	22,647	22,233
	D	14,754	14,732	15,787	15,064	15,961	15,634
	C	12,173	12,651	11,936	12,262	13,954	13,503
	All	44,889	46,372	44,198	45,034	45,120	46,481
Feb	W	104,533	107,085	102,939	105,863	104,037	107,182
	AN	64,163	65,873	63,145	64,680	66,071	65,940
	BN	37,266	36,084	35,907	35,059	35,719	35,174
	D	20,936	21,461	19,539	20,350	19,536	20,148
	C	12,553	12,798	12,659	12,818	12,458	12,593
	All	55,330	56,338	54,152	55,360	54,866	55,905
Mar	W	81,693	84,471	82,847	85,415	81,609	83,959
	AN	55,754	56,737	55,977	56,124	55,130	56,524
	BN	22,522	22,467	24,431	23,915	21,049	20,300
	D	19,388	19,985	18,765	19,249	17,177	17,546
	C	11,948	12,215	11,781	11,957	11,610	11,883
	All	43,911	45,097	44,475	45,354	43,007	43,949
Apr	W	54,860	54,562	54,228	54,124	49,439	49,209
	AN	31,183	30,576	31,254	32,730	25,453	25,334
	BN	21,218	20,641	26,090	24,384	18,727	18,543
	D	13,450	13,413	13,248	13,822	11,977	12,706
	C	8,881	9,294	8,830	9,029	8,701	8,949
	All	29,833	29,603	30,423	30,470	26,501	26,575
May	W	38,276	32,880	38,482	33,155	33,703	29,306
	AN	23,131	21,709	24,691	22,438	19,940	19,292
	BN	14,740	13,596	16,550	15,221	13,668	13,706
	D	9,737	10,375	10,089	10,955	9,496	11,003
	C	6,341	6,286	6,159	6,414	6,086	6,323
	All	21,103	19,121	21,757	19,738	18,913	17,796
Jun	W	18,080	15,640	17,471	15,400	17,883	15,779
	AN	10,177	10,676	10,686	10,508	10,834	10,996
	BN	8,067	8,943	8,336	9,927	8,533	9,885
	D	7,123	7,689	7,468	7,772	7,561	7,896
	C	5,345	5,632	5,332	5,333	5,342	5,356
	All	10,945	10,560	10,946	10,602	11,154	10,817
Jul	W	10,817	11,407	9,206	9,458	9,555	9,497
	AN	10,657	12,225	8,517	9,138	9,154	9,673
	BN	7,613	7,668	6,704	6,748	6,813	6,619
	D	5,548	6,448	5,327	5,608	5,454	5,574
	C	4,953	5,832	4,422	5,313	4,379	5,177
	All	8,232	8,984	7,126	7,497	7,370	7,538

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	4,412	4,308	4,197	4,000	4,201	4,000
	AN	4,009	4,713	4,028	4,000	4,015	4,143
	BN	4,120	5,129	4,033	4,363	4,001	4,429
	D	4,617	5,348	4,015	4,729	3,697	4,566
	C	4,141	4,433	3,441	4,034	3,521	4,182
	All	4,308	4,754	3,993	4,227	3,929	4,245
Sep	W	18,873	20,078	19,858	21,406	5,118	4,246
	AN	11,810	11,581	12,031	12,895	3,743	3,279
	BN	3,795	3,428	3,612	3,717	3,039	3,289
	D	3,067	3,021	3,026	4,651	3,000	4,263
	C	3,000	3,036	3,130	6,200	3,000	5,585
	All	9,473	9,754	9,796	11,237	3,787	4,141
Oct	W	8,133	9,520	9,012	10,486	8,568	9,519
	AN	6,500	8,982	7,348	10,114	6,744	9,189
	BN	6,206	8,054	7,872	9,244	7,156	9,393
	D	6,017	7,294	7,486	8,199	7,236	8,223
	C	4,969	6,607	6,912	8,359	6,747	8,594
	All	6,638	8,276	7,931	9,406	7,501	9,029
Nov	W	17,346	15,987	16,913	15,936	13,494	12,651
	AN	12,410	11,529	11,403	11,214	8,078	7,298
	BN	8,694	8,681	8,247	8,673	5,088	4,588
	D	8,375	8,052	7,961	8,097	5,633	5,347
	C	5,988	5,725	5,763	6,031	4,167	4,346
	All	11,515	10,844	11,030	10,834	8,176	7,672
Dec	W	49,759	45,191	49,377	44,930	50,875	46,927
	AN	19,384	19,119	19,447	18,426	19,616	19,935
	BN	13,284	12,231	13,264	11,990	13,122	13,154
	D	8,467	8,828	8,919	9,506	9,123	9,800
	C	5,505	6,560	5,211	5,989	5,319	6,848
	All	23,546	22,113	23,487	21,953	24,023	23,196

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-26. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly Flows (cfs) for Delta Outflow[1]

Month	Water-Year Type[b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	-2143 (-2.4%)	-2778 (-2.9%)	-483 (-0.5%)	-423 (-0.4%)
	AN	-1507 (-3.1%)	-3029 (-5.9%)	-1420 (-2.9%)	-468 (-0.9%)
	BN	98 (0.4%)	-177 (-0.8%)	384 (1.7%)	-68 (-0.3%)
	D	1033 (7%)	332 (2.3%)	1207 (8.2%)	901 (6.1%)
	C	-237 (-2%)	-388 (-3.1%)	1781 (14.6%)	852 (6.7%)
	All	-691 (-1.5%)	-1338 (-2.9%)	230 (0.5%)	108 (0.2%)
Feb	W	-1595 (-1.5%)	-1222 (-1.1%)	-496 (-0.5%)	97 (0.1%)
	AN	-1018 (-1.6%)	-1193 (-1.8%)	1908 (3%)	66 (0.1%)
	BN	-1359 (-3.6%)	-1026 (-2.8%)	-1547 (-4.2%)	-911 (-2.5%)
	D	-1397 (-6.7%)	-1111 (-5.2%)	-1399 (-6.7%)	-1313 (-6.1%)
	C	107 (0.8%)	20 (0.2%)	-94 (-0.8%)	-205 (-1.6%)
	All	-1178 (-2.1%)	-978 (-1.7%)	-463 (-0.8%)	-433 (-0.8%)
Mar	W	1155 (1.4%)	944 (1.1%)	-84 (-0.1%)	-512 (-0.6%)
	AN	222 (0.4%)	-613 (-1.1%)	-625 (-1.1%)	-213 (-0.4%)
	BN	1909 (8.5%)	1447 (6.4%)	-1473 (-6.5%)	-2167 (-9.6%)
	D	-623 (-3.2%)	-737 (-3.7%)	-2210 (-11.4%)	-2440 (-12.2%)
	C	-167 (-1.4%)	-258 (-2.1%)	-338 (-2.8%)	-332 (-2.7%)
	All	563 (1.3%)	257 (0.6%)	-904 (-2.1%)	-1148 (-2.5%)
Apr	W	-633 (-1.2%)	-438 (-0.8%)	-5421 (-9.88%)	-5353 (-9.81%)
	AN	71 (0.2%)	2154 (7%)	-5730 (-18.4%)	-5242 (-17.1%)
	BN	4872 (23%)	3743 (18.1%)	-2492 (-11.7%)	-2098 (-10.2%)
	D	-202 (-1.5%)	409 (3%)	-1472 (-10.9%)	-707 (-5.3%)
	C	-51 (-0.6%)	-264 (-2.8%)	-180 (-2%)	-344 (-3.7%)
	All	590 (2%)	867 (2.9%)	-3332 (-11.2%)	-3028 (-10.2%)
May	W	206 (0.54%)	274 (0.8%)	-4573 (-11.95%)	-3574 (-10.9%)
	AN	1560 (6.7%)	728 (3.4%)	-3191 (-13.8%)	-2417 (-11.1%)
	BN	1810 (12.3%)	1625 (12%)	-1072 (-7.3%)	110 (0.8%)
	D	352 (3.6%)	580 (5.6%)	-241 (-2.5%)	628 (6.1%)
	C	-182 (-2.9%)	128 (2%)	-256 (-4%)	38 (0.6%)
	All	653 (3.1%)	617 (3.2%)	-2190 (-10.4%)	-1325 (-6.9%)
Jun	W	-609 (-3.4%)	-240 (-1.5%)	-197 (-1.1%)	139 (0.9%)
	AN	509 (5%)	-168 (-1.6%)	657 (6.5%)	320 (3%)
	BN	269 (3.3%)	984 (11%)	466 (5.8%)	942 (10.5%)
	D	345 (4.8%)	83 (1.1%)	438 (6.1%)	207 (2.7%)
	C	-13 (-0.2%)	-298 (-5.3%)	-4 (-0.1%)	-276 (-4.9%)
	All	1 (0%)	42 (0.4%)	209 (1.9%)	257 (2.4%)
Jul	W	-1611 (-14.9%)	-1949 (-17.1%)	-1262 (-11.7%)	-1909 (-16.7%)
	AN	-2141 (-20.1%)	-3086 (-25.2%)	-1503 (-14.1%)	-2552 (-20.9%)
	BN	-909 (-11.9%)	-920 (-12%)	-800 (-10.5%)	-1049 (-13.7%)
	D	-221 (-4%)	-840 (-13%)	-94 (-1.7%)	-875 (-13.6%)
	C	-531 (-10.7%)	-519 (-8.9%)	-573 (-11.6%)	-655 (-11.2%)
	All	-1105 (-13.4%)	-1487 (-16.6%)	-861 (-10.5%)	-1446 (-16.1%)

Month	Water-Year Type[b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	-215 (-4.9%)	-308 (-7.2%)	-210 (-4.8%)	-308 (-7.2%)
	AN	19 (0.5%)	-713 (-15.1%)	5 (0.1%)	-570 (-12.1%)
	BN	-87 (-2.1%)	-766 (-14.9%)	-119 (-2.9%)	-700 (-13.6%)
	D	-602 (-13%)	-618 (-11.6%)	-921 (-19.9%)	-782 (-14.6%)
	C	-701 (-16.9%)	-399 (-9%)	-620 (-15%)	-251 (-5.7%)
	All	-315 (-7.3%)	-527 (-11.1%)	-379 (-8.8%)	-509 (-10.7%)
Sep	W	985 (5.2%)	1328 (6.6%)	-13755 (-72.9%)	-15832 (-78.9%)
	AN	221 (1.9%)	1314 (11.3%)	-8067 (-68.3%)	-8302 (-71.7%)
	BN	-184 (-4.8%)	289 (8.4%)	-756 (-19.9%)	-138 (-4%)
	D	-42 (-1.4%)	1630 (53.9%)	-67 (-2.2%)	1242 (41.1%)
	C	130 (4.3%)	3164 (104.2%)	0 (0%)	2549 (84%)
	All	323 (3.4%)	1484 (15.2%)	-5686 (-60%)	-5613 (-57.5%)
Oct	W	879 (10.8%)	966 (10.1%)	435 (5.3%)	-1 (0%)
	AN	848 (13%)	1132 (12.6%)	244 (3.8%)	207 (2.3%)
	BN	1666 (26.8%)	1190 (14.8%)	949 (15.3%)	1339 (16.6%)
	D	1468 (24.4%)	905 (12.4%)	1219 (20.3%)	929 (12.7%)
	C	1943 (39.1%)	1752 (26.5%)	1778 (35.8%)	1987 (30.1%)
	All	1294 (19.5%)	1130 (13.7%)	863 (13%)	753 (9.1%)
Nov	W	-433 (-2.5%)	-51 (-0.3%)	-3852 (-22.2%)	-3336 (-20.9%)
	AN	-1007 (-8.1%)	-315 (-2.7%)	-4333 (-34.9%)	-4231 (-36.7%)
	BN	-447 (-5.1%)	-9 (-0.1%)	-3606 (-41.5%)	-4093 (-47.1%)
	D	-414 (-4.9%)	44 (0.6%)	-2742 (-32.7%)	-2706 (-33.6%)
	C	-225 (-3.8%)	306 (5.3%)	-1821 (-30.4%)	-1379 (-24.1%)
	All	-485 (-4.2%)	-9 (-0.1%)	-3339 (-29%)	-3171 (-29.2%)
Dec	W	-382 (-0.8%)	-261 (-0.6%)	1116 (2.2%)	1737 (3.8%)
	AN	63 (0.3%)	-693 (-3.6%)	231 (1.2%)	817 (4.3%)
	BN	-20 (-0.2%)	-241 (-2%)	-163 (-1.2%)	923 (7.5%)
	D	452 (5.3%)	678 (7.7%)	656 (7.7%)	972 (11%)
	C	-295 (-5.3%)	-572 (-8.7%)	-186 (-3.4%)	288 (4.4%)
	All	-59 (-0.3%)	-160 (-0.7%)	477 (2%)	1083 (4.9%)

[a] A positive value indicates higher flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-27. Mean Monthly Flows (cfs) in Old and Middle Rivers for EBC2, HOS, and LOS Scenarios

Month	Water-Year Type[a,b]	Scenario[c]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	-1,808	-1,476	1,121	1,077	1,447	947
	AN	-3,465	-3,405	-1,274	-1,319	-730	-801
	BN	-4,349	-4,124	-2,047	-1,857	-2,186	-1,905
	D	-4,312	-4,661	-2,053	-2,540	-1,948	-2,596
	C	-4,076	-3,788	-3,056	-2,587	-2,985	-2,945
	All	-3,373	-3,228	-1,167	-1,144	-957	-1,167
Feb	W	-1,256	-1,683	4,446	3,696	4,928	3,716
	AN	-4,146	-4,026	-749	-975	-636	-839
	BN	-3,560	-3,564	-2,260	-2,104	-2,454	-2,299
	D	-4,089	-3,490	-3,164	-2,954	-3,203	-3,040
	C	-3,162	-2,909	-2,963	-2,558	-2,959	-2,598
	All	-3,006	-2,964	-283	-410	-156	-430
Mar	W	-954	-759	5,885	5,777	6,019	5,752
	AN	-4,339	-4,411	438	683	-623	-505
	BN	-4,183	-3,576	-881	-992	-1,952	-2,125
	D	-3,000	-2,769	-1,562	-1,293	-2,353	-2,463
	C	-2,184	-2,040	-1,747	-1,566	-2,097	-2,110
	All	-2,691	-2,487	1,080	1,156	548	446
Apr	W	2,677	2,740	2,806	2,952	2,481	2,565
	AN	1,104	957	612	512	129	169
	BN	163	-380	-69	278	-861	-764
	D	-786	-702	-751	-593	-1,197	-1,301
	C	-949	-812	-935	-664	-1,519	-1,286
	All	715	659	628	784	128	205
May	W	2,066	1,942	2,772	2,705	2,540	2,549
	AN	421	317	239	272	-165	-180
	BN	-214	-607	-365	-168	-922	-841
	D	-980	-1,121	-752	-924	-1,404	-1,355
	C	-1,207	-1,030	-1,026	-1,051	-1,215	-1,177
	All	262	155	480	467	106	133
Jun	W	-4,289	-4,401	342	132	73	-553
	AN	-4,049	-3,998	-1,952	-998	-3,185	-2,664
	BN	-4,045	-3,547	-2,534	-2,434	-3,320	-3,015
	D	-2,743	-2,572	-1,887	-1,611	-2,573	-2,264
	C	-2,615	-2,384	-1,632	-1,974	-2,136	-2,091
	All	-3,632	-3,504	-1,300	-1,182	-1,951	-1,926
Jul	W	-8,930	-8,906	-4,908	-4,992	-5,990	-7,337
	AN	-9,346	-8,038	-6,063	-5,360	-7,807	-6,733
	BN	-9,824	-9,699	-7,598	-6,862	-7,640	-7,974
	D	-10,122	-8,980	-7,241	-6,060	-8,776	-6,364
	C	-7,738	-6,853	-4,041	-3,667	-4,752	-3,309
	All	-9,110	-8,473	-5,760	-5,271	-6,806	-6,380

Month	Water-Year Type[a,b]	Scenario[c]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	-10,217	-10,246	-4,237	-4,637	-5,347	-5,184
	AN	-9,984	-9,896	-6,820	-6,229	-6,716	-5,292
	BN	-10,072	-9,957	-6,625	-6,493	-6,117	-6,465
	D	-8,476	-7,773	-6,543	-6,429	-5,598	-5,024
	C	-5,033	-4,423	-4,604	-4,052	-3,763	-3,587
	All	-8,861	-8,604	-5,557	-5,412	-5,467	-5,071
Sep	W	-8,138	-7,345	710	744	-3,907	-4,297
	AN	-9,035	-8,519	-1,248	-1,472	-4,655	-4,378
	BN	-8,291	-8,000	-1,990	-3,252	-4,949	-4,410
	D	-6,296	-5,820	-4,012	-4,651	-4,159	-4,279
	C	-4,952	-4,433	-4,123	-3,114	-3,903	-3,186
	All	-7,423	-6,868	-1,792	-1,930	-4,257	-4,111
Oct	W	-5,229	-4,553	-1,873	-1,351	-2,011	-2,117
	AN	-6,040	-4,872	-1,761	-1,229	-2,091	-1,989
	BN	-4,982	-4,183	-1,315	-1,101	-2,225	-2,267
	D	-4,818	-4,660	-1,251	-1,088	-2,169	-2,152
	C	-5,050	-3,804	-1,952	-1,901	-2,175	-2,071
	All	-5,248	-4,427	-1,679	-1,353	-2,118	-2,112
Nov	W	-6,553	-6,138	-2,251	-1,990	-4,111	-4,063
	AN	-7,107	-6,742	-2,202	-2,097	-3,632	-3,509
	BN	-5,734	-4,855	-1,683	-1,312	-4,408	-4,409
	D	-5,739	-5,582	-1,291	-1,393	-4,538	-4,591
	C	-4,339	-4,453	-2,796	-2,726	-4,225	-3,859
	All	-5,970	-5,636	-2,106	-1,953	-4,155	-4,054
Dec	W	-6,270	-6,110	-3,893	-4,371	-3,858	-4,007
	AN	-5,621	-5,758	-3,414	-3,719	-3,123	-3,555
	BN	-7,173	-6,901	-5,940	-5,564	-6,018	-5,680
	D	-8,371	-7,820	-6,330	-5,795	-6,563	-5,717
	C	-5,472	-4,661	-5,274	-4,353	-5,888	-4,787
	All	-6,464	-6,155	-4,780	-4,655	-4,882	-4,607

[a] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-28. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly Flows (cfs) in Old and Middle Rivers

Month	Water-Year Type[b,c]	Scenarios[d]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	2928 (162%)	2553 (173%)	3255 (180.1%)	2423 (164.1%)
	AN	2191 (63.2%)	2086 (61.3%)	2735 (78.9%)	2604 (76.5%)
	BN	2301 (52.9%)	2267 (55%)	2163 (49.7%)	2220 (53.8%)
	D	2259 (52.4%)	2121 (45.5%)	2364 (54.8%)	2065 (44.3%)
	C	1020 (25%)	1201 (31.7%)	1091 (26.8%)	842 (22.2%)
	All	2207 (65.4%)	2084 (64.6%)	2417 (71.6%)	2061 (63.8%)
Feb	W	5702 (453.9%)	5378 (319.6%)	6184 (492.3%)	5398 (320.8%)
	AN	3397 (81.9%)	3050 (75.8%)	3510 (84.7%)	3186 (79.2%)
	BN	1300 (36.5%)	1460 (41%)	1106 (31.1%)	1265 (35.5%)
	D	925 (22.6%)	536 (15.4%)	886 (21.7%)	450 (12.9%)
	C	199 (6.3%)	351 (12.1%)	204 (6.4%)	311 (10.7%)
	All	2723 (90.6%)	2554 (86.2%)	2851 (94.8%)	2534 (85.5%)
Mar	W	6839 (716.9%)	6537 (860.9%)	6973 (730.9%)	6511 (857.5%)
	AN	4777 (110.1%)	5094 (115.5%)	3716 (85.6%)	3906 (88.6%)
	BN	3302 (78.9%)	2583 (72.2%)	2231 (53.3%)	1450 (40.6%)
	D	1439 (48%)	1476 (53.3%)	647 (21.6%)	306 (11.1%)
	C	437 (20%)	474 (23.2%)	87 (4%)	-70 (-3.4%)
	All	3771 (140.1%)	3643 (146.5%)	3239 (120.4%)	2933 (117.9%)
Apr	W	129 (4.8%)	211 (7.7%)	-196 (-7.3%)	-175 (-6.4%)
	AN	-492 (-44.5%)	-445 (-46.5%)	-975 (-88.3%)	-788 (-82.4%)
	BN	-232 (-142.6%)	659 (173.2%)	-1024 (-628.1%)	-384 (-101%)
	D	34 (4.4%)	108 (15.4%)	-412 (-52.4%)	-599 (-85.3%)
	C	14 (1.5%)	148 (18.3%)	-570 (-60.1%)	-474 (-58.4%)
	All	-87 (-12.1%)	126 (19.1%)	-587 (-82%)	-453 (-68.8%)
May	W	706 (34.2%)	763 (39.3%)	475 (23%)	607 (31.2%)
	AN	-182 (-43.2%)	-45 (-14.1%)	-586 (-139.2%)	-497 (-156.6%)
	BN	-151 (-70.6%)	438 (72.2%)	-708 (-330.7%)	-234 (-38.6%)
	D	228 (23.3%)	197 (17.6%)	-424 (-43.2%)	-234 (-20.8%)
	C	181 (15%)	-21 (-2%)	-7 (-0.6%)	-146 (-14.2%)
	All	219 (83.5%)	311 (200.1%)	-156 (-59.7%)	-22 (-14.2%)
Jun	W	4631 (108%)	4533 (103%)	4362 (101.7%)	3848 (87.4%)
	AN	2097 (51.8%)	3001 (75.1%)	864 (21.3%)	1335 (33.4%)
	BN	1511 (37.3%)	1113 (31.4%)	725 (17.9%)	532 (15%)
	D	856 (31.2%)	961 (37.4%)	170 (6.2%)	307 (12%)
	C	983 (37.6%)	410 (17.2%)	480 (18.3%)	293 (12.3%)
	All	2332 (64.2%)	2321 (66.2%)	1681 (46.3%)	1577 (45%)
Jul	W	4022 (45%)	3913 (43.9%)	2941 (32.9%)	1568 (17.6%)
	AN	3283 (35.1%)	2678 (33.3%)	1539 (16.5%)	1305 (16.2%)
	BN	2227 (22.7%)	2837 (29.2%)	2184 (22.2%)	1724 (17.8%)
	D	2882 (28.5%)	2920 (32.5%)	1346 (13.3%)	2617 (29.1%)
	C	3697 (47.8%)	3186 (46.5%)	2986 (38.6%)	3544 (51.7%)
	All	3349 (36.8%)	3202 (37.8%)	2303 (25.3%)	2093 (24.7%)

Month	Water-Year Type[b,c]	Scenarios[d]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	5979 (58.5%)	5609 (54.7%)	4869 (47.7%)	5062 (49.4%)
	AN	3164 (31.7%)	3667 (37.1%)	3268 (32.7%)	4604 (46.5%)
	BN	3447 (34.2%)	3464 (34.8%)	3955 (39.3%)	3492 (35.1%)
	D	1932 (22.8%)	1343 (17.3%)	2878 (34%)	2749 (35.4%)
	C	429 (8.5%)	372 (8.4%)	1270 (25.2%)	837 (18.9%)
	All	3304 (37.3%)	3192 (37.1%)	3394 (38.3%)	3533 (41.1%)
Sep	W	8848 (108.7%)	8089 (110.1%)	4231 (52%)	3047 (41.5%)
	AN	7786 (86.2%)	7047 (82.7%)	4380 (48.5%)	4141 (48.6%)
	BN	6301 (76%)	4747 (59.3%)	3342 (40.3%)	3590 (44.9%)
	D	2284 (36.3%)	1169 (20.1%)	2136 (33.9%)	1541 (26.5%)
	C	828 (16.7%)	1319 (29.8%)	1048 (21.2%)	1247 (28.1%)
	All	5632 (75.9%)	4938 (71.9%)	3166 (42.7%)	2757 (40.1%)
Oct	W	3356 (64.2%)	3202 (70.3%)	3217 (61.5%)	2436 (53.5%)
	AN	4279 (70.9%)	3643 (74.8%)	3949 (65.4%)	2883 (59.2%)
	BN	3667 (73.6%)	3082 (73.7%)	2756 (55.3%)	1916 (45.8%)
	D	3566 (74%)	3572 (76.7%)	2649 (55%)	2508 (53.8%)
	C	3098 (61.4%)	1903 (50%)	2874 (56.9%)	1733 (45.5%)
	All	3568 (68%)	3074 (69.4%)	3130 (59.6%)	2315 (52.3%)
Nov	W	4301 (65.6%)	4148 (67.6%)	2442 (37.3%)	2076 (33.8%)
	AN	4905 (69%)	4645 (68.9%)	3475 (48.9%)	3233 (47.9%)
	BN	4050 (70.6%)	3543 (73%)	1326 (23.1%)	445 (9.2%)
	D	4448 (77.5%)	4189 (75%)	1201 (20.9%)	992 (17.8%)
	C	1542 (35.5%)	1727 (38.8%)	113 (2.6%)	595 (13.4%)
	All	3864 (64.7%)	3683 (65.4%)	1815 (30.4%)	1582 (28.1%)
Dec	W	2377 (37.9%)	1739 (28.5%)	2412 (38.5%)	2103 (34.4%)
	AN	2207 (39.3%)	2039 (35.4%)	2498 (44.4%)	2204 (38.3%)
	BN	1233 (17.2%)	1337 (19.4%)	1155 (16.1%)	1221 (17.7%)
	D	2041 (24.4%)	2025 (25.9%)	1808 (21.6%)	2102 (26.9%)
	C	197 (3.6%)	308 (6.6%)	-416 (-7.6%)	-126 (-2.7%)
	All	1684 (26%)	1500 (24.37%)	1582 (24.5%)	1548 (25.1%)

[a] A positive value indicates improved flow conditions under HOS or LOS than EBC2.
[b] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[d] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-29. Mean Monthly Flows (cfs) in Sutter and Steamboat Sloughs for EBC2, HOS, and LOS Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	24,864	25,538	20,985	21,507	21,163	22,117
	AN	18,350	19,290	15,608	16,233	15,787	17,028
	BN	10,403	10,301	8,839	9,047	8,799	9,023
	D	7,551	7,679	6,976	6,961	7,050	7,306
	C	6,095	6,480	5,739	5,960	6,702	6,697
	All	14,894	15,313	12,818	13,140	13,051	13,629
Feb	W	28,330	29,051	23,649	24,735	23,749	24,947
	AN	22,331	22,971	18,761	19,494	19,432	19,821
	BN	14,710	14,808	12,320	12,742	12,162	12,640
	D	9,354	9,522	8,033	8,530	8,056	8,473
	C	6,048	6,086	5,994	6,171	5,928	6,119
	All	17,700	18,082	14,988	15,647	15,086	15,724
Mar	W	23,979	24,588	19,995	20,735	19,308	20,063
	AN	21,426	21,611	17,337	17,518	17,114	17,789
	BN	10,352	10,433	8,797	8,894	7,835	8,089
	D	8,986	9,292	7,708	8,121	7,442	7,849
	C	5,358	5,505	5,294	5,557	5,325	5,657
	All	15,263	15,585	12,846	13,253	12,377	12,897
Apr	W	17,807	17,808	15,610	15,950	13,734	13,971
	AN	11,547	11,450	10,551	11,288	8,361	8,565
	BN	7,465	7,517	9,279	8,803	6,448	6,743
	D	5,253	5,387	5,236	5,627	5,040	5,578
	C	3,848	4,107	4,118	4,445	4,255	4,550
	All	10,326	10,389	9,830	10,098	8,408	8,725
May	W	13,385	11,233	12,734	10,792	10,506	8,991
	AN	8,697	8,287	9,474	8,678	7,397	7,411
	BN	5,337	5,130	6,352	6,098	5,266	5,648
	D	4,135	4,642	4,503	5,231	4,483	5,457
	C	2,898	2,921	3,069	3,378	3,098	3,414
	All	7,760	7,097	7,946	7,376	6,750	6,597
Jun	W	7,925	7,194	5,926	5,818	6,400	6,515
	AN	5,560	5,983	4,712	5,089	5,212	5,983
	BN	4,491	4,884	4,741	5,571	5,188	5,740
	D	4,237	4,349	4,456	4,932	4,906	5,185
	C	3,079	3,257	3,515	3,914	3,622	4,036
	All	5,474	5,422	4,871	5,196	5,285	5,650
Jul	W	7,347	7,971	5,942	6,916	6,605	7,580
	AN	8,119	8,436	6,663	6,863	7,440	8,781
	BN	7,606	7,506	6,631	6,785	6,908	7,004
	D	6,656	6,853	5,537	5,708	6,685	6,132
	C	4,774	4,675	4,018	4,490	4,023	4,253
	All	6,976	7,232	5,795	6,266	6,419	6,853

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	5,496	5,639	3,832	4,245	3,803	4,175
	AN	5,788	6,238	4,262	4,733	4,985	5,145
	BN	5,230	5,710	4,865	5,341	4,884	5,020
	D	4,922	4,920	4,603	5,109	3,995	4,584
	C	2,755	2,673	3,511	3,809	3,246	3,698
	All	4,966	5,147	4,194	4,630	4,121	4,481
Sep	W	11,779	12,150	7,175	8,269	3,254	3,453
	AN	7,915	7,926	4,387	5,537	3,718	3,786
	BN	4,206	4,062	3,007	3,804	3,131	3,413
	D	2,943	2,515	2,988	4,201	2,988	3,873
	C	2,085	1,958	2,965	3,856	2,842	3,684
	All	6,562	6,544	4,520	5,568	3,182	3,621
Oct	W	4,595	4,897	3,705	4,449	3,693	4,570
	AN	3,382	4,285	3,163	4,778	3,084	4,694
	BN	3,395	4,260	3,235	4,031	3,230	4,638
	D	3,229	3,502	3,199	3,818	3,182	4,100
	C	2,906	3,175	3,130	4,139	3,156	4,409
	All	3,665	4,140	3,350	4,242	3,334	4,473
Nov	W	8,842	8,393	6,660	6,823	6,242	6,276
	AN	7,088	6,687	5,512	5,402	4,720	4,657
	BN	5,253	5,109	3,828	4,257	3,540	3,669
	D	4,731	4,531	3,831	4,149	3,799	3,885
	C	3,148	3,173	3,223	3,626	3,159	3,311
	All	6,237	5,971	4,884	5,122	4,570	4,635
Dec	W	18,494	17,503	16,041	15,577	16,434	16,090
	AN	10,022	10,107	9,454	9,458	9,451	9,887
	BN	7,143	7,002	6,843	6,947	6,963	7,480
	D	6,289	6,275	6,120	6,277	6,384	6,612
	C	3,975	3,964	4,382	4,646	4,706	5,119
	All	10,512	10,182	9,623	9,567	9,873	10,026

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-30. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly**
2 **Flows (cfs) in Sutter and Steamboat Sloughs**

Month	Water-Year Type[b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	-3879 (-15.6%)	-4030 (-15.8%)	-3700 (-14.9%)	-3421 (-13.4%)
	AN	-2742 (-14.9%)	-3058 (-15.9%)	-2562 (-14%)	-2262 (-11.7%)
	BN	-1564 (-15%)	-1255 (-12.2%)	-1604 (-15.4%)	-1278 (-12.4%)
	D	-575 (-7.6%)	-718 (-9.3%)	-501 (-6.6%)	-373 (-4.9%)
	C	-357 (-5.9%)	-520 (-8%)	607 (10%)	217 (3.3%)
	All	-2076 (-13.9%)	-2173 (-14.2%)	-1843 (-12.4%)	-1684 (-11%)
Feb	W	-4680 (-16.5%)	-4316 (-14.9%)	-4580 (-16.2%)	-4104 (-14.1%)
	AN	-3570 (-16%)	-3477 (-15.1%)	-2900 (-13%)	-3151 (-13.7%)
	BN	-2390 (-16.2%)	-2065 (-13.9%)	-2548 (-17.3%)	-2168 (-14.6%)
	D	-1321 (-14.1%)	-992 (-10.4%)	-1297 (-13.9%)	-1049 (-11%)
	C	-54 (-0.9%)	85 (1.4%)	-120 (-2%)	32 (0.5%)
	All	-2712 (-15.3%)	-2435 (-13.5%)	-2614 (-14.8%)	-2358 (-13%)
Mar	W	-3984 (-16.6%)	-3852 (-15.7%)	-4671 (-19.48%)	-4525 (-18.4%)
	AN	-4089 (-19.08%)	-4093 (-18.9%)	-4312 (-20.1%)	-3822 (-17.7%)
	BN	-1555 (-15%)	-1540 (-14.8%)	-2517 (-24.3%)	-2345 (-22.5%)
	D	-1278 (-14.2%)	-1170 (-12.6%)	-1544 (-17.2%)	-1442 (-15.5%)
	C	-64 (-1.2%)	52 (1%)	-33 (-0.6%)	152 (2.8%)
	All	-2417 (-15.8%)	-2333 (-15%)	-2885 (-18.9%)	-2689 (-17.3%)
Apr	W	-2197 (-12.3%)	-1858 (-10.4%)	-4072 (-22.87%)	-3837 (-21.55%)
	AN	-996 (-8.6%)	-162 (-1.4%)	-3186 (-27.6%)	-2885 (-25.2%)
	BN	1815 (24.3%)	1286 (17.1%)	-1017 (-13.6%)	-773 (-10.3%)
	D	-16 (-0.3%)	240 (4.5%)	-212 (-4%)	191 (3.5%)
	C	270 (7%)	338 (8.2%)	407 (10.6%)	443 (10.8%)
	All	-497 (-4.8%)	-291 (-2.8%)	-1918 (-18.6%)	-1664 (-16%)
May	W	-651 (-4.87%)	-441 (-3.9%)	-2879 (-21.51%)	-2242 (-20%)
	AN	777 (8.9%)	391 (4.7%)	-1300 (-15%)	-876 (-10.6%)
	BN	1016 (19%)	968 (18.9%)	-70 (-1.3%)	518 (10.1%)
	D	367 (8.9%)	589 (12.7%)	348 (8.4%)	814 (17.5%)
	C	171 (5.9%)	458 (15.7%)	201 (6.9%)	493 (16.9%)
	All	186 (2.4%)	279 (3.9%)	-1009 (-13%)	-500 (-7%)
Jun	W	-1999 (-25.2%)	-1376 (-19.1%)	-1525 (-19.2%)	-679 (-9.4%)
	AN	-848 (-15.2%)	-894 (-14.9%)	-348 (-6.3%)	0 (0%)
	BN	250 (5.6%)	687 (14.1%)	697 (15.5%)	856 (17.5%)
	D	219 (5.2%)	583 (13.4%)	668 (15.8%)	836 (19.2%)
	C	436 (14.2%)	657 (20.2%)	543 (17.6%)	779 (23.9%)
	All	-603 (-11%)	-226 (-4.2%)	-189 (-3.5%)	228 (4.2%)
Jul	W	-1405 (-19.1%)	-1054 (-13.2%)	-742 (-10.1%)	-391 (-4.9%)
	AN	-1456 (-17.9%)	-1573 (-18.6%)	-680 (-8.4%)	345 (4.1%)
	BN	-975 (-12.8%)	-722 (-9.6%)	-698 (-9.2%)	-502 (-6.7%)
	D	-1119 (-16.8%)	-1145 (-16.7%)	29 (0.4%)	-722 (-10.5%)
	C	-756 (-15.8%)	-185 (-4%)	-751 (-15.7%)	-422 (-9%)
	All	-1181 (-16.9%)	-966 (-13.4%)	-558 (-8%)	-379 (-5.2%)

Month	Water-Year Type[b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	-1664 (-30.3%)	-1394 (-24.7%)	-1693 (-30.8%)	-1464 (-26%)
	AN	-1526 (-26.4%)	-1505 (-24.1%)	-804 (-13.9%)	-1093 (-17.5%)
	BN	-365 (-7%)	-369 (-6.5%)	-346 (-6.6%)	-690 (-12.1%)
	D	-319 (-6.5%)	189 (3.8%)	-927 (-18.8%)	-337 (-6.8%)
	C	755 (27.4%)	1136 (42.5%)	490 (17.8%)	1025 (38.4%)
	All	-773 (-15.6%)	-517 (-10.1%)	-845 (-17%)	-666 (-12.9%)
Sep	W	-4604 (-39.1%)	-3880 (-31.9%)	-8525 (-72.4%)	-8697 (-71.6%)
	AN	-3528 (-44.6%)	-2389 (-30.1%)	-4197 (-53%)	-4140 (-52.2%)
	BN	-1199 (-28.5%)	-258 (-6.3%)	-1075 (-25.6%)	-649 (-16%)
	D	45 (1.5%)	1686 (67%)	45 (1.5%)	1358 (54%)
	C	880 (42.2%)	1898 (97%)	757 (36.3%)	1726 (88.2%)
	All	-2042 (-31.1%)	-976 (-14.9%)	-3380 (-51.5%)	-2924 (-44.7%)
Oct	W	-890 (-19.4%)	-447 (-9.1%)	-902 (-19.6%)	-326 (-6.7%)
	AN	-219 (-6.5%)	492 (11.5%)	-298 (-8.8%)	409 (9.5%)
	BN	-160 (-4.7%)	-229 (-5.4%)	-165 (-4.9%)	378 (8.9%)
	D	-30 (-0.9%)	316 (9%)	-47 (-1.4%)	599 (17.1%)
	C	224 (7.7%)	965 (30.4%)	250 (8.6%)	1235 (38.9%)
	All	-315 (-8.6%)	102 (2.5%)	-331 (-9%)	333 (8%)
Nov	W	-2182 (-24.7%)	-1570 (-18.7%)	-2600 (-29.4%)	-2117 (-25.2%)
	AN	-1576 (-22.2%)	-1286 (-19.2%)	-2368 (-33.4%)	-2031 (-30.4%)
	BN	-1425 (-27.1%)	-851 (-16.7%)	-1713 (-32.6%)	-1439 (-28.2%)
	D	-900 (-19%)	-382 (-8.4%)	-933 (-19.7%)	-646 (-14.3%)
	C	75 (2.4%)	453 (14.3%)	11 (0.4%)	137 (4.3%)
	All	-1352 (-21.7%)	-849 (-14.2%)	-1666 (-26.7%)	-1336 (-22.4%)
Dec	W	-2453 (-13.3%)	-1926 (-11%)	-2059 (-11.1%)	-1413 (-8.1%)
	AN	-569 (-5.7%)	-649 (-6.4%)	-572 (-5.7%)	-220 (-2.2%)
	BN	-300 (-4.2%)	-55 (-0.8%)	-179 (-2.5%)	478 (6.8%)
	D	-168 (-2.7%)	2 (0%)	95 (1.5%)	338 (5.4%)
	C	407 (10.2%)	682 (17.2%)	731 (18.4%)	1155 (29.1%)
	All	-890 (-8.5%)	-615 (-6%)	-639 (-6.1%)	-155 (-1.5%)

[a] A positive value indicates higher flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

1 **Table 5C.5.3-31. Mean Monthly Flows (cfs) in Georgiana Slough and Delta Cross Channel for EBC2,**
2 **HOS, and LOS Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	7,740	7,862	6,573	6,605	6,621	6,766
	AN	6,012	6,213	5,143	5,218	5,191	5,427
	BN	3,903	3,842	3,343	3,328	3,332	3,321
	D	3,146	3,150	2,847	2,779	2,867	2,870
	C	2,760	2,834	2,518	2,516	2,774	2,709
	All	5,095	5,164	4,401	4,404	4,463	4,533
Feb	W	8,660	8,789	7,282	7,454	7,309	7,510
	AN	7,068	7,185	5,982	6,076	6,160	6,162
	BN	5,046	5,031	4,269	4,300	4,227	4,273
	D	3,624	3,636	3,128	3,192	3,134	3,177
	C	2,747	2,730	2,586	2,571	2,568	2,557
	All	5,839	5,895	4,978	5,064	5,004	5,084
Mar	W	7,505	7,611	6,310	6,402	6,127	6,225
	AN	6,828	6,826	5,603	5,556	5,544	5,627
	BN	3,889	3,877	3,331	3,287	3,076	3,076
	D	3,527	3,575	3,042	3,084	2,971	3,013
	C	2,564	2,576	2,400	2,410	2,408	2,436
	All	5,192	5,236	4,408	4,434	4,284	4,340
Apr	W	5,868	5,822	5,144	5,144	4,645	4,623
	AN	4,206	4,145	3,798	3,917	3,215	3,201
	BN	3,123	3,107	3,460	3,263	2,707	2,722
	D	2,536	2,545	2,384	2,428	2,332	2,415
	C	2,163	2,208	2,087	2,117	2,123	2,145
	All	3,882	3,865	3,606	3,604	3,228	3,243
May	W	4,694	4,088	4,379	3,787	3,786	3,313
	AN	3,450	3,310	3,511	3,231	2,959	2,897
	BN	2,558	2,477	2,681	2,552	2,392	2,433
	D	2,240	2,349	2,189	2,324	2,184	2,383
	C	1,911	1,894	1,808	1,837	1,816	1,846
	All	3,201	2,996	3,105	2,888	2,787	2,683
Jun	W	5,880	6,312	5,298	5,308	5,600	5,750
	AN	5,564	5,866	5,137	5,153	5,461	5,720
	BN	5,489	5,697	5,156	5,459	5,445	5,566
	D	5,328	5,360	4,971	5,054	5,262	5,214
	C	4,592	4,672	4,362	4,408	4,431	4,485
	All	5,457	5,693	5,041	5,123	5,308	5,412
Jul	W	8,047	8,164	6,508	6,637	6,726	7,122
	AN	8,590	8,749	7,027	6,875	7,586	7,137
	BN	8,229	8,100	7,004	6,820	7,203	6,974
	D	7,560	7,644	6,217	6,062	6,671	5,997
	C	6,236	6,124	5,124	5,205	5,128	5,037
	All	7,786	7,826	6,403	6,367	6,687	6,547

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	6,743	6,797	4,990	5,032	4,969	4,983
	AN	6,949	7,215	5,300	5,376	5,820	5,665
	BN	6,556	6,846	5,733	5,804	5,747	5,577
	D	6,340	6,295	5,545	5,640	5,107	5,270
	C	4,814	4,726	4,759	4,725	4,568	4,647
	All	6,371	6,453	5,250	5,303	5,198	5,198
Sep	W	5,704	5,599	7,395	7,865	4,574	4,474
	AN	7,828	7,734	5,390	5,942	4,908	4,709
	BN	5,835	5,696	4,397	4,722	4,485	4,446
	D	4,946	4,616	4,383	5,001	4,383	4,770
	C	4,342	4,227	4,367	4,758	4,278	4,637
	All	5,672	5,511	5,485	5,964	4,523	4,593
Oct	W	4,718	4,750	4,029	4,110	3,935	3,709
	AN	4,630	4,371	4,272	3,803	4,184	3,923
	BN	4,843	4,819	4,351	4,274	4,326	3,911
	D	4,782	4,504	4,289	4,274	4,359	4,090
	C	4,445	4,696	4,216	4,446	4,047	4,079
	All	4,701	4,644	4,204	4,178	4,148	3,913
Nov	W	4,323	4,055	3,668	3,535	3,617	3,593
	AN	3,766	3,720	3,309	3,174	3,333	3,374
	BN	3,834	3,712	3,333	3,403	3,416	3,390
	D	3,753	3,647	3,386	3,396	3,383	3,338
	C	3,669	3,558	3,571	3,539	3,408	3,461
	All	3,937	3,785	3,482	3,430	3,459	3,451
Dec	W	6,180	5,873	5,374	5,165	5,444	5,277
	AN	4,409	4,399	4,060	3,965	4,037	4,226
	BN	4,054	3,989	3,731	3,699	3,789	3,777
	D	3,670	3,631	3,438	3,394	3,462	3,402
	C	3,295	3,231	3,192	3,196	3,252	3,277
	All	4,585	4,457	4,157	4,062	4,200	4,163

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-32. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly Flows (cfs) in Georgiana Slough and Delta Cross Channel

Month	Water-Year Type[b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	-1167 (-15.1%)	-1256 (-16%)	-1119 (-14.5%)	-1096 (-13.9%)
	AN	-868 (-14.4%)	-996 (-16%)	-821 (-13.7%)	-786 (-12.7%)
	BN	-560 (-14.4%)	-514 (-13.4%)	-571 (-14.6%)	-521 (-13.5%)
	D	-299 (-9.5%)	-371 (-11.8%)	-279 (-8.9%)	-280 (-8.9%)
	C	-242 (-8.8%)	-318 (-11.2%)	15 (0.5%)	-124 (-4.4%)
	All	-694 (-13.6%)	-760 (-14.7%)	-632 (-12.4%)	-631 (-12.2%)
Feb	W	-1378 (-15.9%)	-1334 (-15.2%)	-1351 (-15.6%)	-1279 (-14.5%)
	AN	-1086 (-15.4%)	-1109 (-15.4%)	-908 (-12.8%)	-1023 (-14.2%)
	BN	-777 (-15.4%)	-731 (-14.5%)	-819 (-16.2%)	-758 (-15.1%)
	D	-496 (-13.7%)	-444 (-12.2%)	-490 (-13.5%)	-460 (-12.6%)
	C	-161 (-5.9%)	-159 (-5.8%)	-179 (-6.5%)	-172 (-6.3%)
	All	-861 (-14.7%)	-831 (-14.1%)	-835 (-14.3%)	-811 (-13.8%)
Mar	W	-1195 (-15.9%)	-1209 (-15.9%)	-1378 (-18.36%)	-1386 (-18.2%)
	AN	-1225 (-17.94%)	-1270 (-18.6%)	-1284 (-18.8%)	-1198 (-17.6%)
	BN	-558 (-14.3%)	-589 (-15.2%)	-814 (-20.9%)	-801 (-20.7%)
	D	-485 (-13.8%)	-491 (-13.7%)	-556 (-15.8%)	-563 (-15.7%)
	C	-165 (-6.4%)	-167 (-6.5%)	-156 (-6.1%)	-140 (-5.4%)
	All	-784 (-15.1%)	-802 (-15.3%)	-909 (-17.5%)	-896 (-17.1%)
Apr	W	-724 (-12.3%)	-679 (-11.7%)	-1223 (-20.84%)	-1199 (-20.6%)
	AN	-408 (-9.7%)	-228 (-5.5%)	-991 (-23.6%)	-944 (-22.8%)
	BN	337 (10.8%)	156 (5%)	-416 (-13.3%)	-385 (-12.4%)
	D	-152 (-6%)	-117 (-4.6%)	-204 (-8%)	-130 (-5.1%)
	C	-77 (-3.5%)	-90 (-4.1%)	-40 (-1.9%)	-63 (-2.8%)
	All	-276 (-7.1%)	-261 (-6.7%)	-654 (-16.9%)	-622 (-16.1%)
May	W	-316 (-6.72%)	-301 (-7.4%)	-908 (-19.35%)	-775 (-19%)
	AN	61 (1.8%)	-80 (-2.4%)	-491 (-14.2%)	-413 (-12.5%)
	BN	123 (4.8%)	75 (3%)	-166 (-6.5%)	-44 (-1.8%)
	D	-50 (-2.3%)	-25 (-1.1%)	-56 (-2.5%)	34 (1.5%)
	C	-103 (-5.4%)	-58 (-3.1%)	-96 (-5%)	-49 (-2.6%)
	All	-96 (-3%)	-108 (-3.6%)	-414 (-12.9%)	-313 (-10.5%)
Jun	W	-582 (-9.9%)	-1004 (-15.9%)	-280 (-4.8%)	-562 (-8.9%)
	AN	-427 (-7.7%)	-713 (-12.2%)	-103 (-1.9%)	-146 (-2.5%)
	BN	-334 (-6.1%)	-239 (-4.2%)	-44 (-0.8%)	-131 (-2.3%)
	D	-357 (-6.7%)	-306 (-5.7%)	-66 (-1.2%)	-146 (-2.7%)
	C	-230 (-5%)	-264 (-5.7%)	-161 (-3.5%)	-187 (-4%)
	All	-416 (-7.6%)	-569 (-10%)	-149 (-2.7%)	-281 (-4.9%)
Jul	W	-1538 (-19.1%)	-1527 (-18.7%)	-1321 (-16.4%)	-1042 (-12.8%)
	AN	-1563 (-18.2%)	-1874 (-21.4%)	-1004 (-11.7%)	-1612 (-18.4%)
	BN	-1225 (-14.9%)	-1280 (-15.8%)	-1026 (-12.5%)	-1126 (-13.9%)
	D	-1343 (-17.8%)	-1582 (-20.7%)	-889 (-11.8%)	-1648 (-21.6%)
	C	-1111 (-17.8%)	-919 (-15%)	-1108 (-17.8%)	-1086 (-17.7%)
	All	-1383 (-17.8%)	-1459 (-18.6%)	-1098 (-14.1%)	-1279 (-16.3%)

Month	Water-Year Type[b]	Scenarios[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	-1753 (-26%)	-1765 (-26%)	-1774 (-26.3%)	-1814 (-26.7%)
	AN	-1650 (-23.7%)	-1839 (-25.5%)	-1130 (-16.3%)	-1550 (-21.5%)
	BN	-823 (-12.6%)	-1042 (-15.2%)	-810 (-12.3%)	-1269 (-18.5%)
	D	-794 (-12.5%)	-655 (-10.4%)	-1232 (-19.4%)	-1024 (-16.3%)
	C	-55 (-1.1%)	-1 (0%)	-246 (-5.1%)	-79 (-1.7%)
	All	-1120 (-17.6%)	-1150 (-17.8%)	-1173 (-18.4%)	-1255 (-19.4%)
Sep	W	1691 (29.7%)	2266 (40.5%)	-1130 (-19.8%)	-1125 (-20.1%)
	AN	-2438 (-31.1%)	-1792 (-23.2%)	-2919 (-37.3%)	-3025 (-39.1%)
	BN	-1439 (-24.7%)	-974 (-17.1%)	-1350 (-23.1%)	-1250 (-21.9%)
	D	-563 (-11.4%)	386 (8.4%)	-563 (-11.4%)	155 (3.3%)
	C	24 (0.6%)	531 (12.6%)	-64 (-1.5%)	410 (9.7%)
	All	-186 (-3.3%)	452 (8.2%)	-1149 (-20.3%)	-919 (-16.7%)
Oct	W	-689 (-14.6%)	-640 (-13.5%)	-783 (-16.6%)	-1040 (-21.9%)
	AN	-358 (-7.7%)	-568 (-13%)	-446 (-9.6%)	-448 (-10.3%)
	BN	-493 (-10.2%)	-544 (-11.3%)	-518 (-10.7%)	-907 (-18.8%)
	D	-493 (-10.3%)	-230 (-5.1%)	-423 (-8.9%)	-414 (-9.2%)
	C	-229 (-5.2%)	-250 (-5.3%)	-398 (-9%)	-618 (-13.2%)
	All	-497 (-10.6%)	-466 (-10%)	-553 (-11.8%)	-732 (-15.8%)
Nov	W	-656 (-15.2%)	-520 (-12.8%)	-706 (-16.3%)	-462 (-11.4%)
	AN	-457 (-12.1%)	-546 (-14.7%)	-434 (-11.5%)	-347 (-9.3%)
	BN	-501 (-13.1%)	-309 (-8.3%)	-418 (-10.9%)	-322 (-8.7%)
	D	-367 (-9.8%)	-251 (-6.9%)	-370 (-9.9%)	-309 (-8.5%)
	C	-98 (-2.7%)	-19 (-0.5%)	-262 (-7.1%)	-97 (-2.7%)
	All	-455 (-11.6%)	-355 (-9.4%)	-478 (-12.1%)	-334 (-8.8%)
Dec	W	-806 (-13%)	-708 (-12.1%)	-736 (-11.9%)	-596 (-10.1%)
	AN	-349 (-7.9%)	-433 (-9.9%)	-372 (-8.4%)	-173 (-3.9%)
	BN	-324 (-8%)	-290 (-7.3%)	-265 (-6.5%)	-212 (-5.3%)
	D	-232 (-6.3%)	-237 (-6.5%)	-207 (-5.6%)	-229 (-6.3%)
	C	-104 (-3.2%)	-34 (-1.1%)	-44 (-1.3%)	47 (1.4%)
	All	-428 (-9.3%)	-394 (-8.9%)	-385 (-8.4%)	-294 (-6.6%)

[a] A negative value indicates lower flows under HOS or LOS than under EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

5C.5.3.4 Juvenile Chinook Salmon through-Delta Survival (Delta Passage Model)

The results of the Delta Passage Model (DPM) are presented below for the smolts of each run of Chinook salmon modeled (i.e., winter-run, spring-run, fall-run, and late fall–run from the Sacramento River watershed; fall-run from the Mokelumne River; and fall-run from the San Joaquin River watershed). For each run, overall through-Delta survival is presented, followed by percentages of the run using different through-Delta survival pathways and survival down each pathway. River flows and south Delta export flows weighted by the proportion of the population are also provided to facilitate interpretation of the DPM results. Consideration of these additional components provides useful information as to the main mechanisms driving overall survival. Also presented are the results of the additional analyses examining the potential effects of nonphysical barriers at the Sacramento River-Georgiana Slough channel split and lower survival in the reach containing the proposed north Delta intakes (i.e., Sac1 in the DPM). As described in the methods, the DPM considers only actively migrating smolts and is not intended to represent migrating or rearing Chinook salmon fry or parr, and does not include growth benefits related to floodplain and tidal wetland restoration, and is therefore not indicative of overall juvenile Chinook salmon survival through the Delta. These life stages are considered with the Yolo Bypass Chinook Salmon Fry Growth Model and the Particle Tracking Modeling Nonlinear Regression Analysis. Additionally, the overall changes to each Chinook run as a result of all of the BDCP conservation measures are analyzed in Chapter 5, Section 5.5, *Effects on Covered Fish*. Following the analysis of the ESO for all species is an analysis of the HOS and LOS operations for all species.

5C.5.3.4.1 Winter-Run Chinook Salmon

5C.5.3.4.1.1 Overall Survival through the Delta

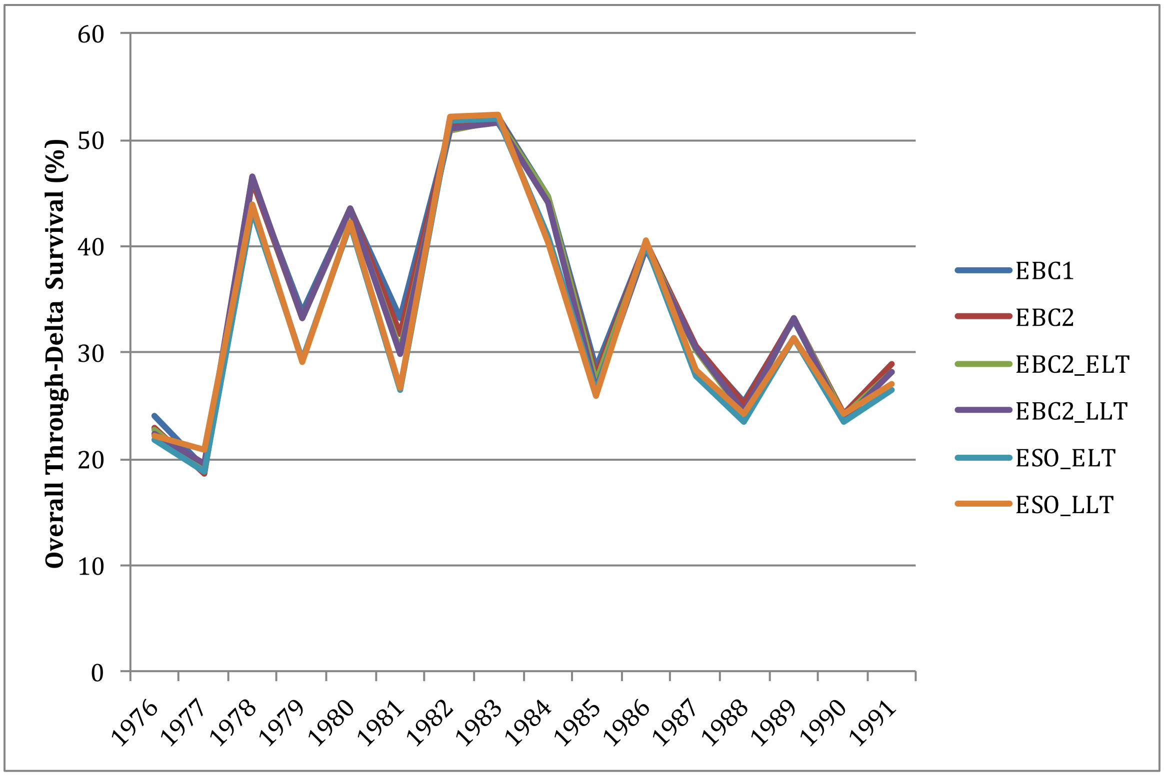
Overall through-Delta survival for winter-run Chinook salmon was similar among the four EBC scenarios, ranging from around 19% in 1977, a critically dry year, to around 52% in 1983, a wet year, for overall averages of 34–35% and medians of 32% (Table 5C.5.3-33, Figure 5C.5.3-1). The range in survival for ESO scenarios was similar to that of EBC scenarios. Within individual years there generally was little difference in survival between EBC and ESO scenarios, with the largest difference being ~11–16% relatively lower survival under ESO scenarios compared to EBC2 scenarios in 1979 and 1981 (Table 5C.5.3-34). The average and median differences in smolt survival between EBC and ESO scenarios were around 1–2% absolute difference (3–6% relative difference).

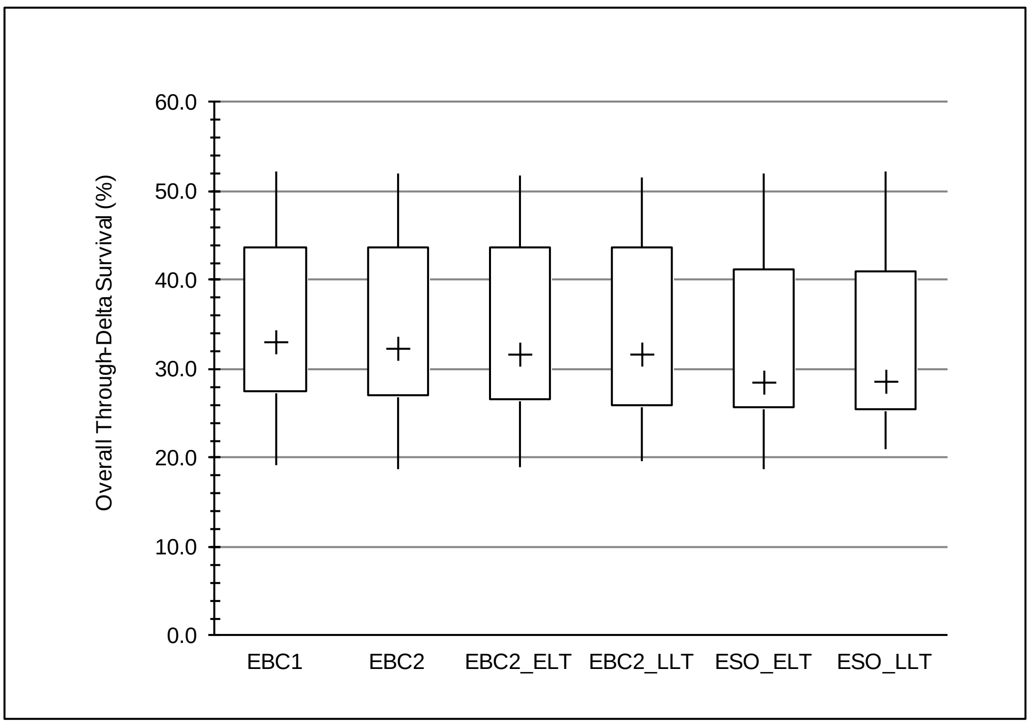
Interpretation of the survival results is aided by consideration of the differences between scenarios in migration pathways and flow conditions. Under ESO scenarios winter-run Chinook salmon entered the Yolo Bypass in every year of the 16-year simulation, whereas under EBC scenarios entry of >0.1% of the population occurred in 7 years (Table 5C.5.3-35). Therefore under the ESO scenarios a portion of the population always migrated down this pathway, and benefitted from the relatively high survival in the Yolo Bypass (~47–48% on average). Survival down the mainstem Sacramento River and Sutter/Steamboat Sloughs pathways was lower under ESO scenarios compared to EBC scenarios (Table 5C.5.3-35) because of the lower flows in the Sacramento River under ESO scenarios (Figure 5C.5.3-2), whereas survival through the interior Delta generally was similar under the ESO and EBC scenarios because of lower south Delta exports under ESO scenarios coupled with lower Sacramento River flows under ESO scenarios (Figure 5C.5.3-3). As described in the DPM methods, exports affect survival by changing the ratio of interior Delta survival to Sacramento River survival in reach Sac3. Flows in reach Sac3 are lower under ESO scenarios because of the north Delta intakes. This, coupled with the lower Sacramento River flows in the earlier stages of the Interior Delta migration pathway under ESO scenarios, resulted in the lowered south Delta exports balancing the lowered Sacramento River flows for winter-run Chinook salmon smolts for fish that took this pathway. There is a strong positive relationship between through-Delta survival and Sacramento River flows from the DPM results (Figure 5C.5.3-4), as would be expected given the flow-survival relationships that form the basis for the model, and the relationship is reasonably linear over the range of flows examined. The regression lines on Figure 5C.5.3-4 are for each scenario, with the ESO scenario lines above the EBC scenarios lines. For a given level of flow into reach Sac2 (Sacramento River below Sutter/Steamboat sloughs), through-Delta survival is greater under the ESO scenarios than EBC scenarios because of the greater percentage of fish that would have entered the Yolo Bypass under the ESO scenarios and because of lower south Delta exports. In contrast, the relationship between overall survival and south Delta exports is less clear because export-related survival is only one aspect of overall survival and applies only to the minority of smolts entering the interior Delta (Figure 5C.5.3-5). In summary, the DPM results for winter-run Chinook salmon demonstrate that survival under the ESO scenarios generally was similar to, or slightly lower than, that of the EBC scenarios because there was a balance between elements contributing to higher survival (greater use of the Yolo Bypass and lower south Delta exports under ESO scenarios) and elements contributing to lower survival (lower survival in the Sacramento River mainstem and Sutter-Steamboat Sloughs because of the north Delta diversions under ESO scenarios).

Table 5C.5.3-33. Percentage of Winter-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976 (C)	24.0	23.0	22.8	22.5	21.8	22.1
1977 (C)	19.1	18.7	19.0	19.6	18.8	20.9
1978 (AN)	46.1	46.2	46.6	46.6	43.4	43.9
1979 (BN)	33.7	33.2	33.2	33.2	29.4	29.1
1980 (AN)	43.5	43.6	43.4	43.5	42.0	42.3
1981 (D)	33.2	31.7	30.2	29.9	26.5	26.7
1982 (W)	51.2	51.2	50.9	51.0	51.7	52.1
1983 (W)	52.2	52.1	51.8	51.6	51.9	52.3
1984 (W)	44.6	44.5	44.7	44.0	41.0	40.4
1985 (D)	28.6	27.8	27.3	26.5	26.3	26.0
1986 (W)	40.4	40.4	40.2	39.9	40.2	40.6
1987 (D)	30.4	30.6	30.3	30.4	27.8	28.3
1988 (C)	25.3	25.2	24.2	24.4	23.5	24.3
1989 (D)	33.1	33.3	33.3	33.2	31.3	31.4
1990 (C)	24.1	24.3	24.0	23.6	23.5	24.3
1991 (C)	28.3	29.0	28.2	28.3	26.5	27.0
Average	34.9	34.7	34.4	34.2	32.8	33.2
Median	33.1	32.4	31.8	31.8	28.6	28.7

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-1. Winter-Run Chinook Salmon through-Delta Smolt Survival, Based on Delta Passage Model Results

Table 5C.5.3-34. Differences[a] between EBC and ESO Scenarios in Percentage of Winter-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model

Water Year[b]	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
1976 (C)	-2.3 (-9%)	-1.9 (-8%)	-1.2 (-5%)	-0.9 (-4%)	-1.0 (-4%)	-0.3 (-2%)
1977 (C)	-0.3 (-2%)	1.8 (10%)	0.1 (0%)	2.3 (12%)	-0.2 (-1%)	1.4 (7%)
1978 (AN)	-2.8 (-6%)	-2.2 (-5%)	-2.9 (-6%)	-2.3 (-5%)	-3.2 (-7%)	-2.6 (-6%)
1979 (BN)	-4.4 (-13%)	-4.6 (-14%)	-3.8 (-11%)	-4.1 (-12%)	-3.8 (-12%)	-4.1 (-12%)
1980 (AN)	-1.5 (-3%)	-1.3 (-3%)	-1.5 (-4%)	-1.3 (-3%)	-1.4 (-3%)	-1.2 (-3%)
1981 (D)	-6.7 (-20%)	-6.5 (-20%)	-5.2 (-16%)	-5.0 (-16%)	-3.7 (-12%)	-3.2 (-11%)
1982 (W)	0.5 (1%)	0.9 (2%)	0.5 (1%)	0.9 (2%)	0.9 (2%)	1.1 (2%)
1983 (W)	-0.2 (0%)	0.2 (0%)	-0.1 (0%)	0.3 (1%)	0.1 (0%)	0.8 (1%)
1984 (W)	-3.6 (-8%)	-4.1 (-9%)	-3.6 (-8%)	-4.1 (-9%)	-3.7 (-8%)	-3.6 (-8%)
1985 (D)	-2.3 (-8%)	-2.6 (-9%)	-1.5 (-5%)	-1.8 (-6%)	-1.0 (-4%)	-0.5 (-2%)
1986 (W)	-0.1 (0%)	0.2 (1%)	-0.2 (-1%)	0.1 (0%)	0.0 (0%)	0.7 (2%)
1987 (D)	-2.6 (-9%)	-2.1 (-7%)	-2.7 (-9%)	-2.3 (-7%)	-2.5 (-8%)	-2.1 (-7%)
1988 (C)	-1.9 (-7%)	-1.0 (-4%)	-1.7 (-7%)	-0.8 (-3%)	-0.7 (-3%)	-0.1 (0%)
1989 (D)	-1.8 (-5%)	-1.7 (-5%)	-2.0 (-6%)	-1.9 (-6%)	-2.0 (-6%)	-1.8 (-5%)
1990 (C)	-0.6 (-3%)	0.1 (0%)	-0.7 (-3%)	0.0 (0%)	-0.5 (-2%)	0.6 (3%)
1991 (C)	-1.8 (-6%)	-1.3 (-5%)	-2.5 (-9%)	-2.0 (-7%)	-1.7 (-6%)	-1.3 (-5%)
Average	-2.0 (-6%)	-1.6 (-5%)	-1.8 (-5%)	-1.4 (-4%)	-1.5 (-4%)	-1.0 (-3%)
Median	-1.8 (-6%)	-1.5 (-5%)	-1.6 (-5%)	-1.5 (-5%)	-1.2 (-4%)	-0.8 (-3%)

[a] Negative values indicate lower survival under ESO scenarios than under EBC scenarios.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-35. Percentage Use and Survival of Winter-Run Chinook Salmon Smolts Migrating Down Different Through-Delta Pathways under EBC and ESO Scenarios[a], from Delta Passage Model

	Yolo Bypass Pathway (Yolo-Sac4)												Mainstem Sacramento River Pathway (Verona-Sac1-Sac2-Sac3-Sac4)											
Water Year	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway						Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	0.0	0.0	0.0	0.0	1.9	1.8					45.1	45.2	42.4	42.2	41.7	40.7	41.9	41.9	28.7	27.3	27.1	26.7	24.6	24.7
1977	0.0	0.0	0.0	0.0	1.8	2.4					45.0	44.7	40.8	40.4	40.0	39.2	41.1	41.7	21.0	19.7	19.7	20.3	19.5	20.7
1978	3.6	3.9	5.7	7.1	19.6	21.6	42.9	42.7	43.6	44.2	44.1	44.2	42.3	42.1	41.1	40.0	35.8	34.3	50.9	51.1	51.5	51.5	46.3	47.3
1979	0.5	0.0	0.0	0.0	7.4	7.2	47.9	45.5	49.5	47.1	48.3	48.5	43.1	43.4	43.1	42.4	40.8	40.5	36.2	36.1	36.1	36.0	29.9	29.2
1980	7.9	7.8	8.3	8.0	22.7	21.7	51.0	51.1	51.1	51.5	49.5	49.4	40.5	40.5	40.0	39.8	34.4	34.3	48.6	48.6	48.4	48.3	44.1	44.5
1981	0.0	0.0	0.0	0.0	5.1	5.2	61.8				52.8	52.8	43.8	43.7	43.3	42.5	41.7	41.4	38.2	36.5	34.9	34.6	28.9	28.8
1982	13.2	12.9	14.5	14.4	25.0	24.0	44.7	44.7	44.6	44.6	45.1	45.4	37.6	37.7	36.9	36.7	33.0	32.9	57.6	57.6	57.1	57.1	58.1	58.3
1983	22.5	22.5	24.5	24.9	31.3	31.8	48.1	48.1	47.9	47.9	47.5	47.5	33.4	33.4	32.3	32.0	30.0	29.3	58.3	58.2	58.0	57.8	56.7	57.4
1984	6.6	6.6	7.8	7.6	29.1	28.7	45.4	45.4	45.3	45.2	47.0	47.0	41.5	41.5	40.7	40.4	31.9	31.6	49.0	48.9	49.1	48.2	40.6	39.7
1985	0.0	0.0	0.0	0.0	1.6	1.6					48.5	48.6	44.2	44.1	43.6	42.6	43.9	43.4	32.3	31.5	31.0	30.1	28.8	28.2
1986	18.8	18.3	19.1	19.6	21.5	21.8	47.0	47.0	47.0	47.0	46.9	46.9	34.8	35.0	34.4	33.9	34.3	33.7	41.6	41.6	41.5	41.1	40.4	40.3
1987	0.0	0.0	0.0	0.0	4.7	4.8					50.5	50.5	42.8	42.9	42.5	41.8	41.5	41.3	33.0	33.2	32.9	32.7	28.5	28.6
1988	0.0	0.0	0.0	0.0	3.2	3.2					50.5	50.5	42.9	42.9	42.1	41.4	41.9	42.1	28.9	28.7	27.8	27.6	25.6	26.0
1989	0.2	0.2	0.2	0.2	8.4	9.3	48.6	48.4	47.0	47.5	48.7	48.6	43.4	43.4	42.9	42.3	40.2	39.5	36.2	36.5	36.5	36.2	32.1	31.5
1990	0.0	0.0	0.0	0.0	2.0	2.2					44.8	45.3	42.2	42.2	41.8	40.8	42.5	41.7	27.7	27.8	27.6	26.7	26.3	26.8
1991	0.0	0.0	0.0	0.0	5.4	5.6					47.1	47.0	42.5	42.6	42.0	41.4	40.9	41.0	32.8	33.4	32.6	32.3	29.1	28.4
Average	4.6	4.5	5.0	5.1	11.9	12.1	48.6	46.6	47.0	46.9	47.6	47.6	41.1	41.1	40.5	39.9	38.5	38.2	38.8	38.5	38.2	38.0	35.0	35.0
Median	0.1	0.0	0.0	0.0	6.4	6.4	47.9	46.2	47.0	47.0	47.3	47.3	42.4	42.2	41.7	40.8	40.8	40.8	36.2	36.3	35.5	35.3	29.5	29.0

	Sutter/Steamboat Sloughs Pathway (Verona-Sac1-Sac2-SS-Sac4)												Interior Delta via Georgiana Slough and Delta Cross Channel Pathway (Sac1-Sac2-Geo/DCC-Interior Delta)											
Water Year	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway						Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	29.9	29.5	29.9	30.6	28.7	30.8	29.2	28.3	28.0	27.7	26.0	26.1	27.6	28.3	28.5	28.7	27.6	25.5	11.3	11.0	11.0	11.0	11.4	11.4
1977	27.0	26.6	27.3	28.5	26.9	29.8	26.4	26.7	26.9	27.3	24.9	27.6	32.2	33.0	32.7	32.4	30.2	26.1	10.6	11.0	11.4	11.9	10.8	11.5
1978	35.0	34.9	34.7	34.9	28.4	29.0	55.1	55.1	55.4	55.3	49.7	50.0	19.1	19.0	18.5	18.0	16.2	15.0	19.8	19.9	19.8	19.7	24.8	24.3
1979	32.8	33.0	33.3	34.0	29.5	31.0	44.4	43.4	43.3	43.2	36.0	35.1	23.6	23.6	23.6	23.6	22.4	21.3	14.1	13.5	13.6	13.6	13.4	13.5
1980	33.5	33.6	33.7	34.3	27.2	28.7	50.1	50.1	49.9	49.8	45.6	46.0	18.1	18.2	18.0	17.9	15.8	15.2	16.9	17.0	16.6	16.9	20.6	20.2
1981	33.0	32.6	32.6	33.3	29.5	31.3	40.3	38.6	36.8	36.5	30.3	30.1	23.1	23.6	24.1	24.2	23.7	22.1	13.7	13.2	12.6	12.5	11.8	11.9
1982	33.9	33.9	33.7	34.1	28.5	29.8	61.8	61.8	61.4	61.4	62.3	62.4	15.4	15.4	15.0	14.8	13.4	13.3	18.0	18.1	17.7	18.3	25.8	25.7
1983	30.6	30.6	30.1	30.3	26.6	27.2	61.2	61.2	61.0	60.8	60.4	61.1	13.5	13.5	13.0	12.9	12.1	11.8	23.5	22.9	22.4	21.3	32.8	32.5
1984	33.9	33.9	33.9	34.4	24.9	26.0	52.8	52.7	52.9	52.0	44.5	43.4	18.0	18.0	17.6	17.5	14.1	13.7	18.6	18.6	18.5	18.2	23.3	22.9
1985	31.8	31.5	31.8	32.2	30.7	32.4	35.5	34.7	34.1	33.2	32.1	31.4	24.0	24.4	24.7	25.2	23.8	22.6	12.6	12.3	12.1	11.8	12.9	12.5
1986	29.3	29.5	29.4	29.6	27.7	28.7	49.0	49.1	48.8	48.3	48.1	47.8	17.1	17.2	17.1	17.0	16.5	15.8	15.7	16.2	14.9	14.8	17.7	19.2
1987	31.3	31.4	31.8	32.6	29.5	31.4	39.3	39.5	39.2	39.1	34.6	34.4	25.9	25.7	25.8	25.6	24.2	22.4	15.4	15.3	15.1	15.5	14.1	14.5
1988	30.0	30.0	30.1	31.1	28.7	31.1	31.1	31.0	30.2	30.3	27.9	28.2	27.2	27.2	27.8	27.5	26.1	23.6	13.3	13.1	12.3	12.8	12.0	12.6
1989	32.3	32.4	32.8	33.5	28.9	30.3	41.1	41.3	41.3	40.9	37.4	36.5	24.2	24.1	24.1	24.0	22.4	20.8	16.6	16.6	16.4	16.9	15.3	16.0
1990	29.7	29.6	29.9	30.4	29.3	31.2	29.6	29.8	29.3	28.9	27.6	28.3	28.1	28.2	28.3	28.8	26.3	24.8	12.9	13.2	13.2	13.7	12.9	13.0
1991	30.8	31.0	31.2	32.1	28.8	31.0	33.1	33.8	32.8	32.9	29.2	29.8	26.8	26.4	26.8	26.6	24.8	22.4	15.7	16.3	15.7	16.3	14.5	15.4
Average	31.6	31.5	31.6	32.2	28.4	30.0	42.5	42.3	42.0	41.7	38.5	38.6	22.7	22.9	22.8	22.8	21.2	19.8	15.6	15.5	15.2	15.3	17.1	17.3
Median	31.5	31.5	31.8	32.4	28.7	30.6	40.7	40.4	40.3	40.0	35.3	34.7	23.8	23.9	24.1	24.1	23.0	21.7	15.6	15.7	15.0	15.1	14.3	15.0

[a] See Table 5C.0-1 for definitions of the scenarios. Survival down the Yolo Bypass Pathway is blank if no fish took that pathway.

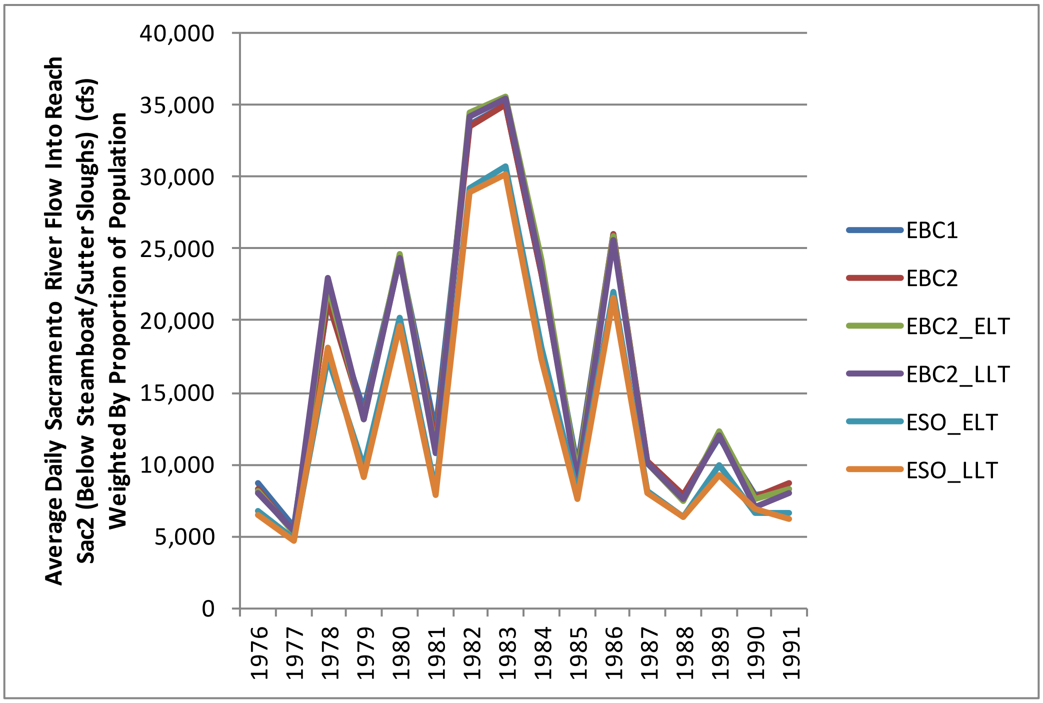


Figure 5C.5.3-2. Daily Average Flow into Reach Sac2 (Sacramento River below Sutter/Steamboat Sloughs), Weighted by Daily Proportion of Winter-Run Chinook Salmon Smolts Entering Reach Sac2, By Water Year and Scenario From Delta Passage Model Results

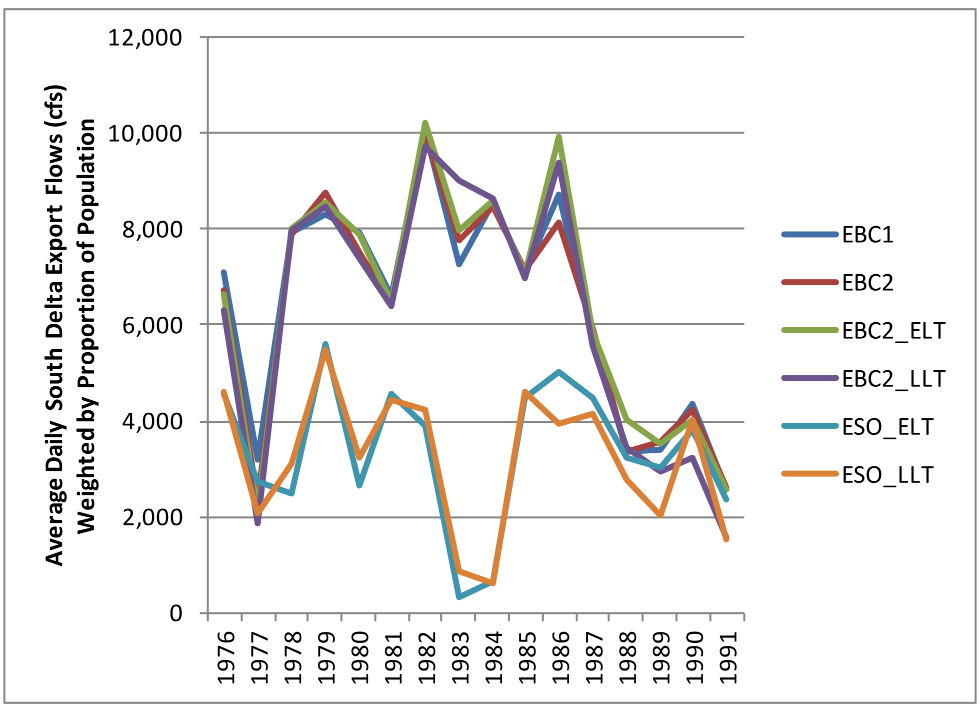


Figure 5C.5.3-3. Daily Average South Delta Export Flow, Weighted by Daily Proportion of Winter-Run Chinook Salmon Smolts Entering the Interior Delta, By Water Year and Scenario From Delta Passage Model Results

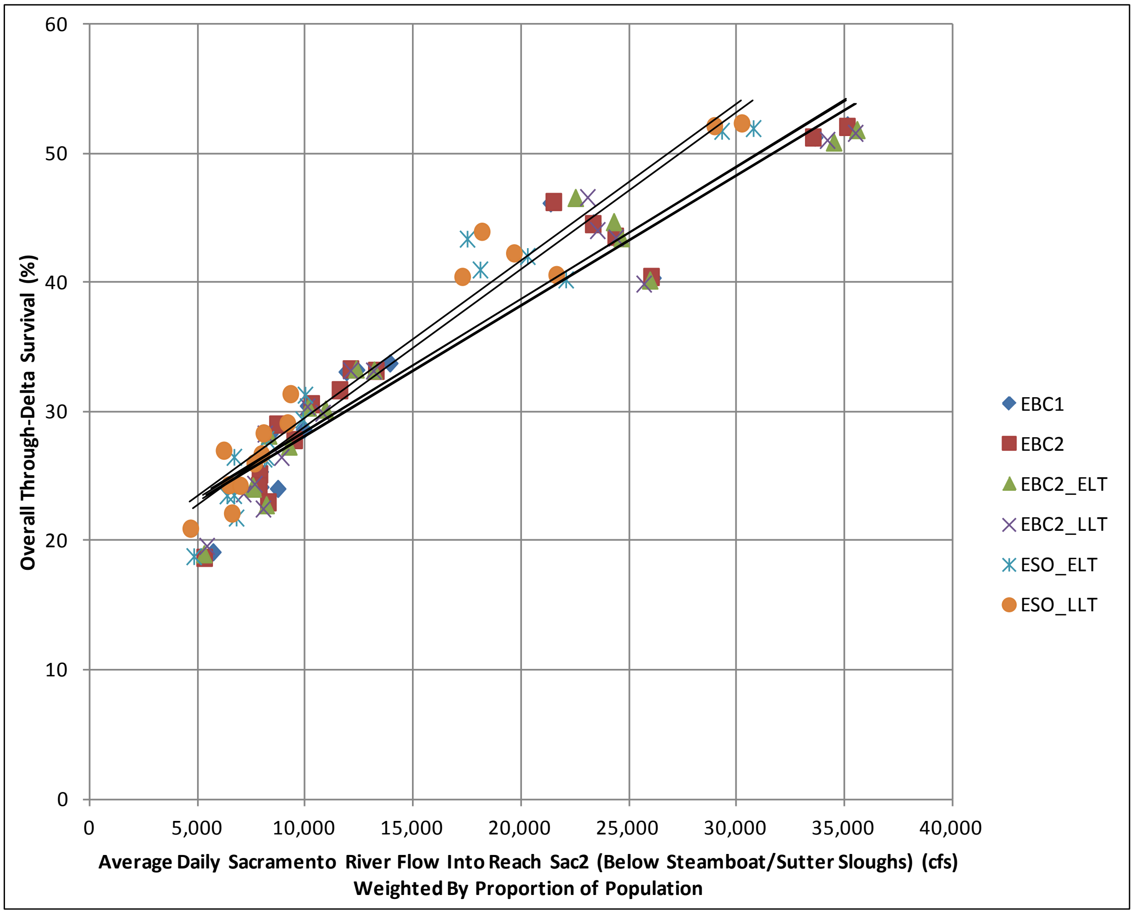


Figure 5C.5.3-4. Relationship between Weighted-Average Flow into Reach Sac2 and Overall Through-Delta Survival of Winter-Run Chinook Salmon, From Delta Passage Model Results

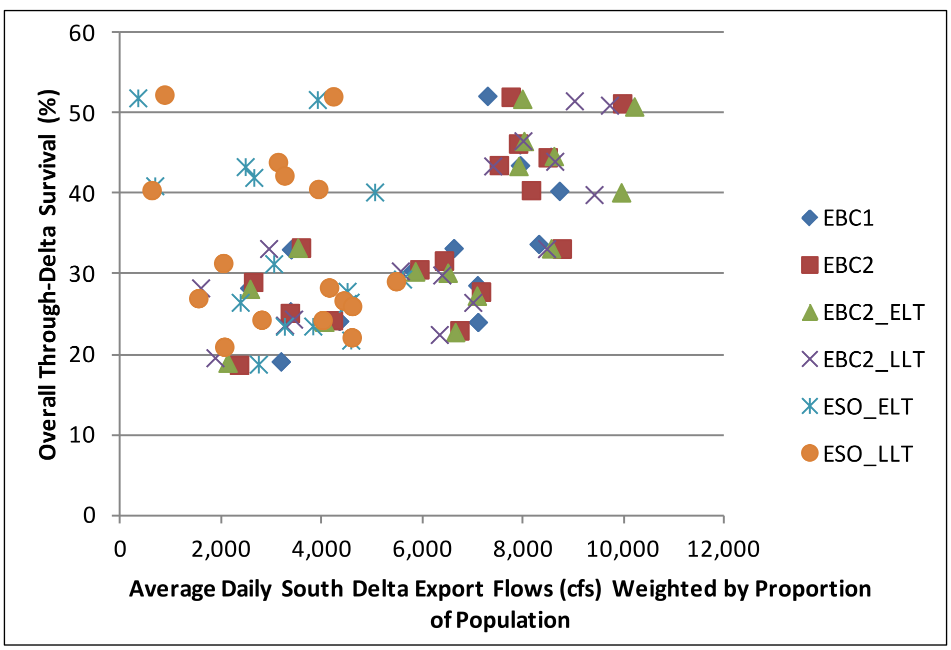


Figure 5C.5.3-5. Relationship between Weighted-Average South Delta Exports and Overall Through-Delta Survival of Winter-Run Chinook Salmon, From Delta Passage Model Results

5C.5.3.4.1.2 Effects of Nonphysical Fish Barriers and Predation

Postprocessing of the DPM results to examine the potential effect of a 67% proportional reduction in the number of winter-run Chinook salmon smolts entering the Interior Delta through Georgiana Slough showed that the average or median survival was ~2–2.5% greater than the original ESO_ELT and ESO_LLT, or 7–8% in relative terms (Table 5C.5.3-36, Figure 5C.5.3-6).

Table 5C.5.3-36. Percentage of Winter-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios and Considering Nonphysical Barrier Deterrence from Georgiana Slough, Based on Delta Passage Model

	Scenario[b]							
Water Year[a]	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**	**ESO_ELT 67%[c]**	**ESO_LLT 67%[c]**
1976 (C)	24.0	23.0	22.8	22.5	21.8	22.1	24.2	24.4
1977 (C)	19.1	18.7	19.0	19.6	18.8	20.9	20.5	22.6
1978 (AN)	46.1	46.2	46.6	46.6	43.4	43.9	45.7	46.3
1979 (BN)	33.7	33.2	33.2	33.2	29.4	29.1	31.8	31.3
1980 (AN)	43.5	43.6	43.4	43.5	42.0	42.3	44.5	44.7
1981 (D)	33.2	31.7	30.2	29.9	26.5	26.7	29.2	29.2
1982 (W)	51.2	51.2	50.9	51.0	51.7	52.1	54.6	55.0
1983 (W)	52.2	52.1	51.8	51.6	51.9	52.3	53.9	54.3
1984 (W)	44.6	44.5	44.7	44.0	41.0	40.4	42.6	42.0
1985 (D)	28.6	27.8	27.3	26.5	26.3	26.0	28.9	28.4
1986 (W)	40.4	40.4	40.2	39.9	40.2	40.6	42.7	42.8
1987 (D)	30.4	30.6	30.3	30.4	27.8	28.3	30.2	30.4
1988 (C)	25.3	25.2	24.2	24.4	23.5	24.3	25.9	26.4
1989 (D)	33.1	33.3	33.3	33.2	31.3	31.4	33.8	33.5
1990 (C)	24.1	24.3	24.0	23.6	23.5	24.3	25.9	26.6
1991 (C)	28.3	29.0	28.2	28.3	26.5	27.0	28.9	28.9
Average	34.9	34.7	34.4	34.2	32.8	33.2	35.2	35.4
Median	33.1	32.4	31.8	31.8	28.6	28.7	31.0	30.9

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] ESO_ELT 67% and ESO_LLT 67% represent effects of a 67% decrease in proportional entry into Georgiana Slough.

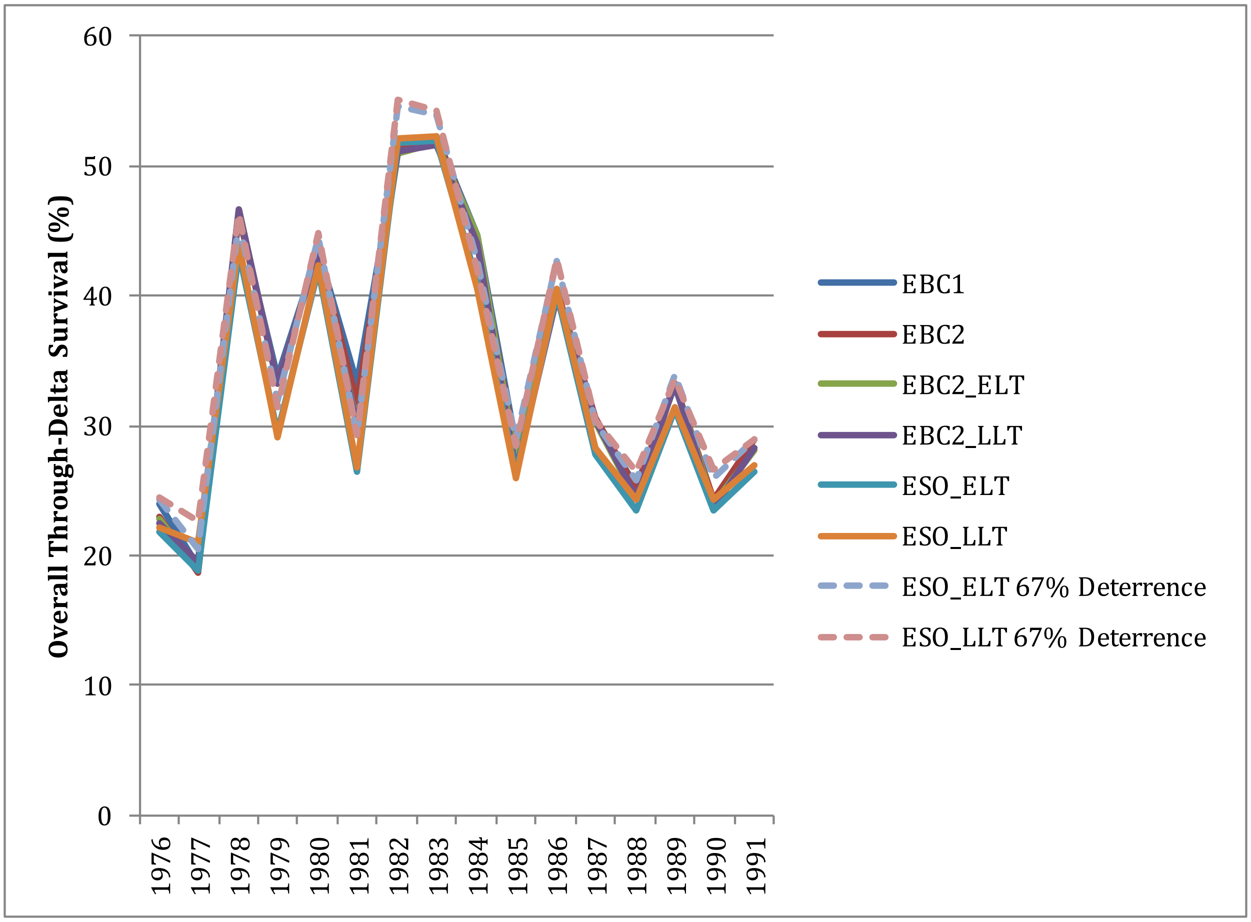


Figure 5C.5.3-6. Percentage of Winter-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results, Including Additional Runs to Assess Effect of 67% Proportional Reduction in Entry into Georgiana Slough from Nonphysical Barrier Deterrence

The analysis to examine the effect of a survival reduction of 5% because of additional predation mortality in the Sacramento River reach containing the proposed north Delta intakes showed that overall average and median through-Delta survival was 1.3–1.4% less in absolute terms (4% relative difference) than the original results for the ESO scenarios (Table 5C.5.3-37, Figure 5C.5.3-7).

Table 5C.5.3-37. Percentage of Winter-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios and Considering Additional Mortality at North Delta Intakes, Based on Delta Passage Model

Water Year[a]	Scenario[b]							
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	ESO_ELT 5%[c]	ESO_LLT 5%[c]
1976 (C)	24.0	23.0	22.8	22.5	21.8	22.1	20.7	21.1
1977 (C)	19.1	18.7	19.0	19.6	18.8	20.9	17.9	20.0
1978 (AN)	46.1	46.2	46.6	46.6	43.4	43.9	41.6	42.2
1979 (BN)	33.7	33.2	33.2	33.2	29.4	29.1	28.1	27.8
1980 (AN)	43.5	43.6	43.4	43.5	42.0	42.3	40.5	40.7
1981 (D)	33.2	31.7	30.2	29.9	26.5	26.7	25.3	25.5
1982 (W)	51.2	51.2	50.9	51.0	51.7	52.1	49.7	50.1
1983 (W)	52.2	52.1	51.8	51.6	51.9	52.3	50.1	50.5
1984 (W)	44.6	44.5	44.7	44.0	41.0	40.4	39.6	39.1
1985 (D)	28.6	27.8	27.3	26.5	26.3	26.0	25.1	24.7
1986 (W)	40.4	40.4	40.2	39.9	40.2	40.6	38.7	39.1
1987 (D)	30.4	30.6	30.3	30.4	27.8	28.3	26.6	27.0
1988 (C)	25.3	25.2	24.2	24.4	23.5	24.3	22.4	23.2
1989 (D)	33.1	33.3	33.3	33.2	31.3	31.4	29.9	30.0
1990 (C)	24.1	24.3	24.0	23.6	23.5	24.3	22.4	23.1
1991 (C)	28.3	29.0	28.2	28.3	26.5	27.0	25.3	25.8
Average	34.9	34.7	34.4	34.2	32.8	33.2	31.5	31.9
Median	33.1	32.4	31.8	31.8	28.6	28.7	27.3	27.4

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] ESO_ELT 5% and ESO_LLT 5% represent effects of 5% additional mortality in the north Delta intakes' reach.

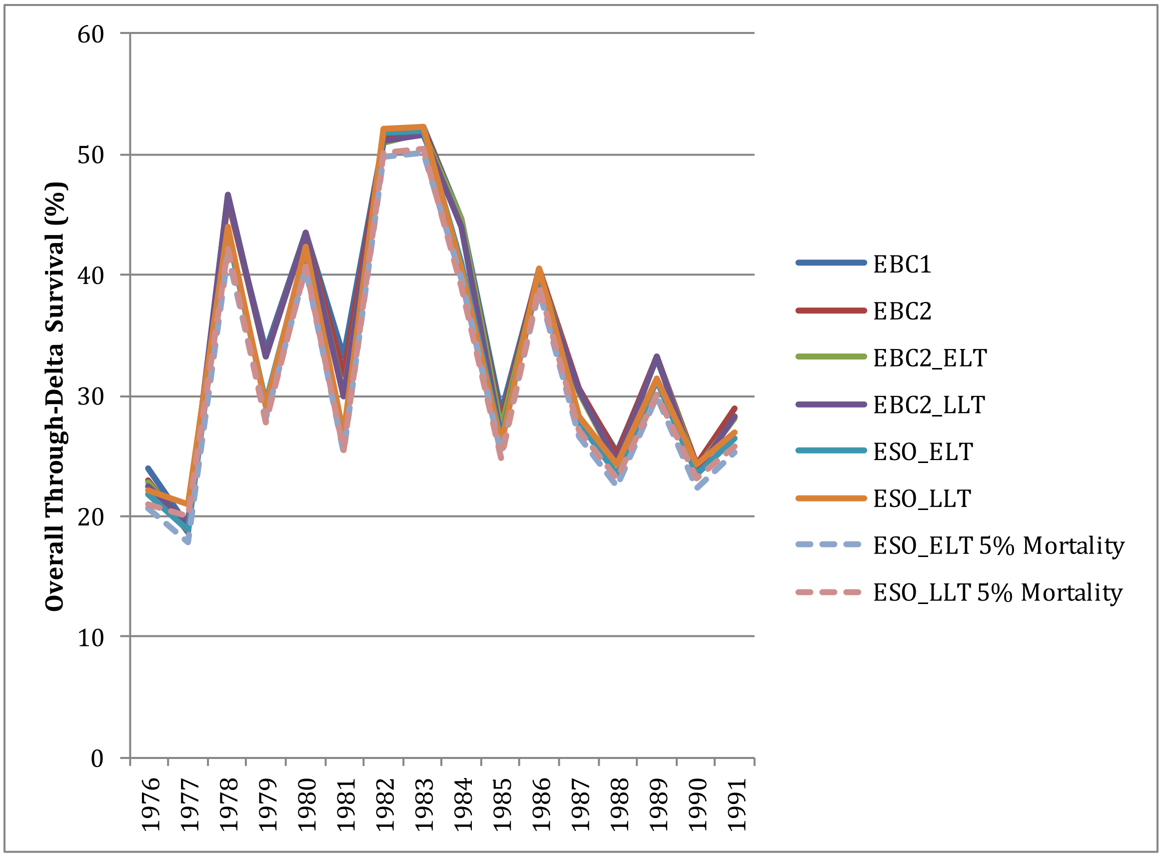


Figure 5C.5.3-7. Percentage of Winter-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results, Including Additional Runs to Assess Effect of 5% Additional Mortality in the North Delta Intakes Reach (Sac1)

5C.5.3.4.2 Spring-Run Chinook Salmon

5C.5.3.4.2.1 Overall Survival through the Delta

Overall through-Delta survival for spring-run Chinook salmon was similar among the four EBC scenarios, ranging from around 17–18% in 1977, a critically dry year, to 53–54% in 1983, a wet year, for overall averages of just under 21% and medians of 17–17.5% (Table 5C.5.3-38, Figure 5C.5.3-8). The range in survival for ESO scenarios was similar to that of EBC scenarios. Within individual years survival under ESO scenarios generally was similar to or slightly lower than that under EBC, with the largest difference being a 24% relatively lower survival under ESO_LLT compared to EBC2 in 1978 (Table 5C.5.3-39). The average and median differences in smolt survival between EBC and ESO scenarios were ~0.5–2.5% absolute difference (2–7% or less relative difference).

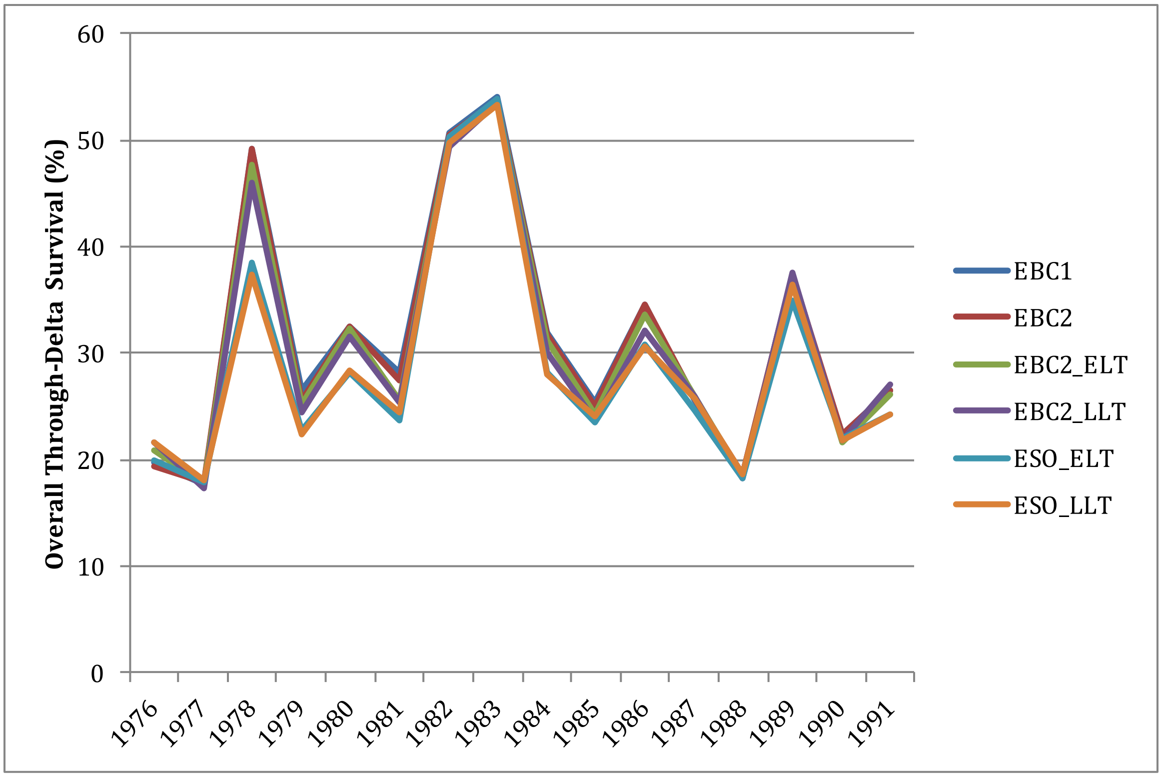
As with winter-run Chinook salmon, interpretation of the survival results is aided by consideration of the differences between scenarios in migration pathways and flow conditions. Under ESO scenarios spring-run Chinook salmon entered the Yolo Bypass in every year of the 16-year simulation, whereas under EBC scenarios entry of >0.1% of smolts occurred in 6 years (Table 5C.5.3-40). Survival down the mainstem Sacramento River and Sutter/Steamboat Sloughs pathways was lower under ESO scenarios compared to EBC scenarios (Table 5C.5.3-40) because of the lower flows in the Sacramento River under the ESO scenarios (Figure 5C.5.3-9). Survival along the interior

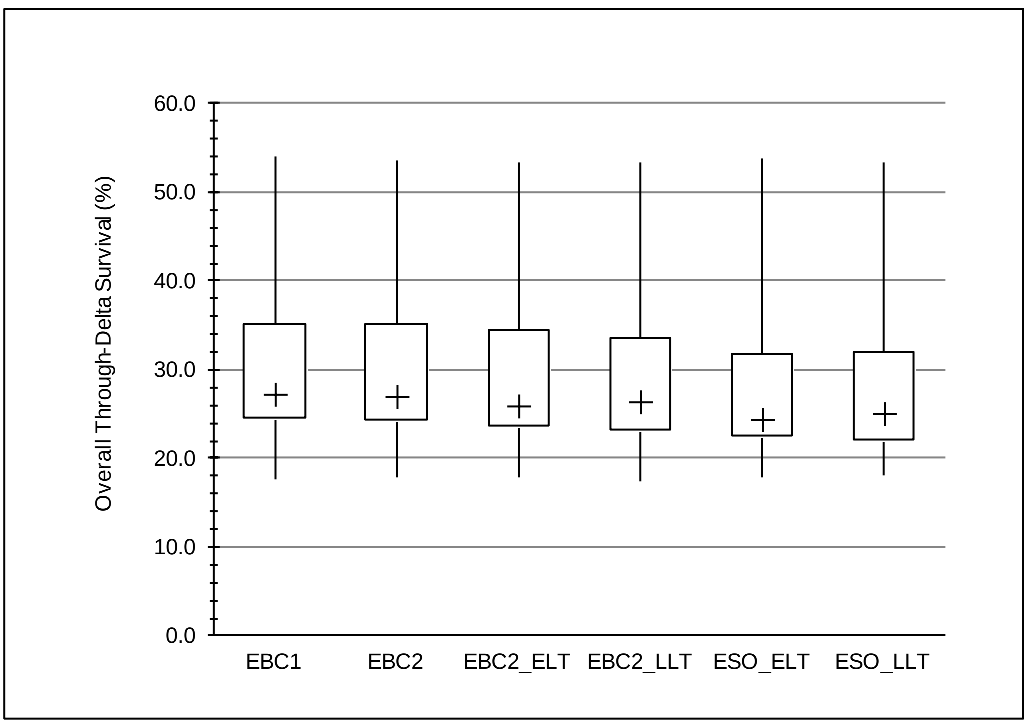
Delta pathway generally was similar between ESO and EBC scenarios. Although generally there were lower south Delta exports under ESO scenarios (Figure 5C.5.3-10), the lower Sacramento River flows in the earlier stages of the pathway counteracted this change. As noted for winter-run Chinook salmon, there is a strong linear relationship between through-Delta survival and Sacramento River flows from the DPM results (Figure 5C.5.3-11), as would be expected given the flow-survival relationships that form the basis for the model. The regression lines on Figure 5C.5.3-11 are for each scenario, with the ESO scenario lines above the EBC scenarios lines. For a given level of flow into reach Sac2 (Sacramento River below Sutter/Steamboat sloughs), survival is greater under the ESO scenarios than EBC scenarios because of the greater percentage of fish that would have entered the Yolo Bypass under the ESO scenarios and because of lower south Delta exports. In contrast and as noted for winter-run Chinook in the DPM results above, the relationship between overall survival and south Delta exports is less clear because export-related survival is only one aspect of overall survival and applies only to the minority of smolts entering the interior Delta (Figure 5C.5.3-12). As with winter-run Chinook salmon, the DPM results for spring-run Chinook salmon demonstrate that survival under the ESO scenarios generally was similar to or slightly lower than that of the EBC scenarios reflecting the contribution of elements that gave higher survival (greater use of the Yolo Bypass and lower south Delta exports under ESO scenarios) and elements contributing to lower survival (lower survival in the Sacramento River mainstem and Sutter-Steamboat Sloughs because of the north Delta diversions under ESO scenarios).

Table 5C.5.3-38. Percentage of Spring-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976 (C)	19.7	19.3	20.8	21.6	19.9	21.6
1977 (C)	17.7	17.8	17.8	17.4	17.9	18.0
1978 (AN)	49.1	49.1	47.6	45.9	38.5	37.4
1979 (BN)	26.5	25.6	25.1	24.4	22.7	22.3
1980 (AN)	32.5	32.5	32.2	31.6	28.2	28.4
1981 (D)	28.1	27.5	25.7	25.4	23.6	24.5
1982 (W)	50.6	50.6	50.1	49.4	50.3	49.8
1983 (W)	54.1	53.7	53.4	53.4	53.8	53.4
1984 (W)	32.0	31.7	31.2	30.1	28.2	28.1
1985 (D)	25.4	25.1	24.3	23.7	23.5	24.0
1986 (W)	34.5	34.6	33.7	32.2	30.9	30.7
1987 (D)	25.6	25.7	25.9	25.8	24.6	25.7
1988 (C)	18.6	18.6	18.4	18.2	18.3	18.6
1989 (D)	37.1	37.3	36.9	37.6	34.9	36.5
1990 (C)	22.4	22.3	21.7	21.8	22.0	21.9
1991 (C)	26.5	26.6	26.1	27.0	24.3	24.3
Average	31.3	31.1	30.7	30.3	28.8	29.1
Median	27.3	27.0	26.0	26.4	24.4	25.1

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-8. Spring-Run Chinook Salmon through-Delta Smolt Survival, Based on Delta Passage Model Results

Table 5C.5.3-39. Differences[a] between EBC and ESO Scenarios in Percentage of Spring-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model

	Scenarios[c]					
Water Year[b]	**EBC1 vs. ESO_ELT**	**EBC1 vs. ESO_LLT**	**EBC2 vs. ESO_ELT**	**EBC2 vs. ESO_LLT**	**EBC2_ELT vs. ESO_ELT**	**EBC2_LLT vs. ESO_LLT**
1976 (C)	0.2 (1%)	1.9 (10%)	0.6 (3%)	2.3 (12%)	-1.0 (-5%)	0.1 (0%)
1977 (C)	0.2 (1%)	0.3 (2%)	0.1 (0%)	0.2 (1%)	0.1 (1%)	0.6 (3%)
1978 (AN)	-10.6 (-22%)	-11.7 (-24%)	-10.7 (-22%)	-11.7 (-24%)	-9.2 (-19%)	-8.5 (-19%)
1979 (BN)	-3.7 (-14%)	-4.2 (-16%)	-2.8 (-11%)	-3.2 (-13%)	-2.4 (-9%)	-2.1 (-9%)
1980 (AN)	-4.4 (-13%)	-4.2 (-13%)	-4.3 (-13%)	-4.2 (-13%)	-4.0 (-13%)	-3.2 (-10%)
1981 (D)	-4.5 (-16%)	-3.7 (-13%)	-3.8 (-14%)	-3.0 (-11%)	-2.0 (-8%)	-0.9 (-4%)
1982 (W)	-0.2 (0%)	-0.8 (-2%)	-0.2 (0%)	-0.8 (-2%)	0.3 (1%)	0.4 (1%)
1983 (W)	-0.3 (0%)	-0.7 (-1%)	0.1 (0%)	-0.3 (-1%)	0.4 (1%)	0.0 (0%)
1984 (W)	-3.8 (-12%)	-3.9 (-12%)	-3.5 (-11%)	-3.7 (-12%)	-3.0 (-10%)	-2.0 (-7%)
1985 (D)	-1.9 (-8%)	-1.4 (-5%)	-1.6 (-6%)	-1.0 (-4%)	-0.8 (-3%)	0.3 (1%)
1986 (W)	-3.6 (-10%)	-3.8 (-11%)	-3.7 (-11%)	-3.9 (-11%)	-2.8 (-8%)	-1.5 (-5%)
1987 (D)	-1.0 (-4%)	0.1 (0%)	-1.1 (-4%)	0.0 (0%)	-1.3 (-5%)	-0.1 (0%)
1988 (C)	-0.3 (-2%)	0.0 (0%)	-0.3 (-2%)	0.0 (0%)	-0.1 (0%)	0.5 (3%)
1989 (D)	-2.2 (-6%)	-0.6 (-2%)	-2.4 (-6%)	-0.9 (-2%)	-2.0 (-5%)	-1.2 (-3%)
1990 (C)	-0.4 (-2%)	-0.5 (-2%)	-0.3 (-1%)	-0.4 (-2%)	0.3 (1%)	0.1 (1%)
1991 (C)	-2.2 (-8%)	-2.2 (-8%)	-2.3 (-9%)	-2.3 (-9%)	-1.8 (-7%)	-2.7 (-10%)
Average	-2.4 (-8%)	-2.2 (-7%)	-2.3 (-7%)	-2.0 (-7%)	-1.8 (-6%)	-1.3 (-4%)
Median	-2.0 (-7%)	-1.1 (-4%)	-2.0 (-7%)	-0.9 (-4%)	-1.5 (-6%)	-0.5 (-2%)

[a] Negative values indicate lower survival under ESO scenarios than under EBC scenarios.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-40. Percentage Use and Survival of Spring-Run Chinook Salmon Smolts Migrating Down Different Through-Delta Pathways under EBC and ESO Scenarios[a], based on Delta Passage Model

Yolo Bypass Pathway (Yolo-Sac4)

	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	0.0	0.0	0.0	0.0	2.3	1.9					46.3	46.3
1977	0.0	0.0	0.0	0.0	1.8	1.9					47.2	47.1
1978	1.3	1.4	1.9	2.2	20.6	18.6	39.8	40.0	40.4	40.5	43.2	42.8
1979	0.0	0.0	0.0	0.0	2.7	2.7	47.1		49.4	46.8	46.4	46.3
1980	0.3	0.3	0.3	0.3	9.3	9.3	53.0	53.0	52.8	52.8	46.3	46.2
1981	0.0	0.0	0.0	0.0	6.1	6.0					50.6	50.6
1982	17.8	17.8	18.7	18.9	24.3	24.0	49.3	49.3	49.3	49.2	49.1	49.2
1983	11.5	11.6	15.4	15.4	24.2	24.0	46.3	46.3	45.7	45.7	44.6	44.6
1984	0.0	0.0	0.0	0.0	10.7	10.9					49.6	49.7
1985	0.0	0.0	0.0	0.0	2.1	2.0					50.3	50.5
1986	7.2	6.7	7.1	7.4	10.5	10.3	44.3	44.2	44.3	44.3	43.2	43.4
1987	0.0	0.0	0.0	0.0	3.3	3.1					47.7	48.0
1988	0.0	0.0	0.0	0.0	2.3	2.3					45.6	45.6
1989	0.3	0.3	0.4	0.4	13.8	17.6	48.7	48.5	47.2	47.8	49.2	49.6
1990	0.0	0.0	0.0	0.0	2.6	2.6					46.6	46.6
1991	0.0	0.0	0.0	0.0	6.4	6.5					49.4	49.4
Average	2.4	2.4	2.7	2.8	8.9	9.0	46.9	46.9	47.0	46.7	47.2	47.2
Median	0.0	0.0	0.0	0.0	6.2	6.2	47.1	47.4	47.2	46.8	46.9	46.9

Mainstem Sacramento River Pathway (Verona-Sac1-Sac2-Sac3-Sac4)

	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	41.9	41.7	42.2	41.7	42.4	42.9	22.1	21.5	23.1	24.0	20.9	23.0
1977	40.8	40.8	40.2	39.0	41.4	41.8	18.9	19.1	19.0	18.0	18.3	17.4
1978	44.3	44.2	43.9	43.2	36.3	36.8	53.1	53.1	51.5	49.5	39.1	37.6
1979	44.4	44.3	43.7	42.7	43.7	43.5	27.9	27.0	26.8	26.4	23.6	23.2
1980	44.8	44.8	44.3	43.5	41.0	40.8	35.6	35.6	35.4	34.8	28.9	28.9
1981	43.3	43.3	42.6	41.7	41.1	41.3	33.4	32.6	30.6	30.5	26.1	27.1
1982	35.7	35.7	35.2	34.9	33.5	33.1	55.7	55.7	55.0	54.0	53.8	52.7
1983	38.5	38.5	36.6	36.5	33.5	33.1	60.6	60.6	60.6	60.6	60.9	60.0
1984	44.4	44.3	43.8	42.8	40.1	39.7	35.3	35.0	34.5	33.2	27.8	27.1
1985	43.6	43.5	42.9	41.6	43.3	43.0	28.8	28.5	27.8	27.1	25.9	26.0
1986	41.3	41.5	40.9	39.9	40.5	40.2	34.5	34.6	33.9	32.3	29.8	28.8
1987	42.9	42.9	42.6	41.6	42.5	42.7	25.8	26.0	26.1	25.6	24.0	25.1
1988	42.5	42.4	41.8	40.8	42.2	42.4	19.0	19.0	19.0	18.5	18.2	18.2
1989	44.2	44.2	43.8	43.2	38.8	36.8	41.1	41.3	40.9	41.7	35.5	36.0
1990	42.5	42.4	41.7	40.8	42.2	42.3	27.4	27.3	26.5	26.7	25.9	25.3
1991	42.9	42.9	42.3	41.6	40.8	40.9	29.8	29.9	29.3	30.4	25.2	24.8
Average	42.4	42.4	41.8	41.0	40.2	40.1	34.3	34.2	33.7	33.3	30.2	30.1
Median	42.9	42.9	42.4	41.6	41.0	41.1	31.6	31.3	29.9	30.4	26.0	26.6

Sutter/Steamboat Sloughs Pathway (Verona-Sac1-Sac2-SS-Sac4)

	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	28.0	27.8	29.1	30.5	27.9	30.7	27.6	27.4	28.0	28.3	26.5	27.3
1977	26.2	26.3	26.7	27.3	26.4	28.7	22.6	22.9	22.9	22.8	22.1	22.8
1978	35.4	35.4	35.4	35.8	27.0	28.8	57.9	58.0	56.5	54.7	44.0	42.7
1979	31.4	31.2	31.4	32.0	29.8	31.5	33.8	32.6	31.9	30.6	27.5	26.3
1980	32.7	32.7	32.9	33.5	28.3	30.0	38.5	38.5	38.2	37.3	30.7	30.5
1981	30.8	30.6	30.5	31.3	27.6	29.8	31.1	30.1	28.2	27.6	23.0	23.1
1982	31.9	31.9	31.8	32.0	28.6	29.5	60.1	60.1	59.3	58.3	59.2	58.2
1983	34.4	34.4	33.2	33.5	28.8	29.6	61.7	61.7	62.0	62.0	62.1	61.4
1984	31.7	31.6	31.8	32.2	27.0	28.5	39.4	39.3	38.8	37.7	31.4	31.0
1985	29.8	29.7	29.8	30.2	28.7	30.8	30.7	30.4	29.7	29.3	27.9	28.7
1986	31.1	31.2	31.2	31.4	29.0	30.5	44.6	44.8	43.5	41.5	38.8	38.3
1987	29.4	29.4	30.1	30.8	28.8	31.4	33.4	33.5	33.8	33.6	31.4	31.7
1988	28.8	28.8	29.1	29.9	28.3	30.5	26.6	26.7	25.9	25.8	24.4	24.3
1989	33.5	33.6	33.9	34.8	28.3	28.7	42.1	42.4	41.9	42.5	37.7	38.3
1990	28.9	28.8	29.0	29.9	28.4	30.5	23.6	23.6	23.5	23.1	22.2	21.8
1991	29.9	29.9	30.2	31.2	27.4	29.3	32.2	32.4	31.9	33.1	27.7	27.3
Average	30.9	30.8	31.0	31.6	28.1	29.9	37.9	37.8	37.2	36.8	33.5	33.3
Median	30.9	30.9	30.8	31.4	28.3	29.9	33.6	33.0	32.8	33.4	29.3	29.6

Interior Delta via Georgiana Slough and Delta Cross Channel Pathway (Sac1-Sac2-Geo/DCC-Interior Delta)

	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	30.2	30.5	28.6	27.8	27.5	24.4	9.1	9.0	10.2	10.7	9.5	10.3
1977	33.0	32.9	33.0	33.7	30.4	27.7	12.2	12.2	12.1	12.3	11.9	11.9
1978	19.0	19.0	18.9	18.8	16.1	15.8	23.9	23.9	22.8	21.6	21.7	20.9
1979	24.1	24.4	24.8	25.3	23.8	22.3	14.4	14.0	13.7	13.2	12.6	12.1
1980	22.3	22.3	22.5	22.7	21.4	19.9	17.4	17.3	17.0	16.6	15.7	15.7
1981	25.9	26.1	27.0	27.0	25.2	22.9	15.8	15.7	15.0	15.0	13.7	14.5
1982	14.6	14.6	14.3	14.2	13.6	13.4	18.6	18.7	18.2	18.1	25.6	24.9
1983	15.6	15.6	14.8	14.6	13.5	13.3	26.8	24.4	24.2	24.0	35.3	34.9
1984	23.9	24.1	24.4	25.0	22.2	20.9	16.0	15.8	15.6	14.9	14.8	14.6
1985	26.6	26.8	27.3	28.1	25.9	24.2	13.9	13.6	13.0	12.8	12.4	12.3
1986	20.4	20.5	20.7	21.3	19.9	18.9	15.5	15.8	14.7	13.9	15.0	15.6
1987	27.8	27.6	27.3	27.5	25.4	22.7	17.3	17.0	16.9	17.5	15.0	15.7
1988	28.7	28.7	29.1	29.3	27.2	24.8	9.9	9.9	9.9	9.9	9.8	9.9
1989	22.0	21.9	21.9	21.6	19.1	16.9	21.1	21.3	21.1	21.6	19.2	20.7
1990	28.7	28.8	29.3	29.3	26.8	24.6	13.7	13.6	13.2	13.5	13.2	13.6
1991	27.2	27.2	27.5	27.2	25.5	23.3	14.8	14.9	14.8	14.9	12.6	12.7
Average	24.4	24.4	24.5	24.6	22.7	21.0	16.3	16.1	15.8	15.7	16.1	16.3
Median	25.0	25.3	25.9	26.2	24.5	22.5	15.6	15.8	14.9	14.9	14.3	14.6

[a] See Table 5C.0-1 for definitions of the scenarios. Survival down the Yolo Bypass Pathway is blank if no fish took that pathway.

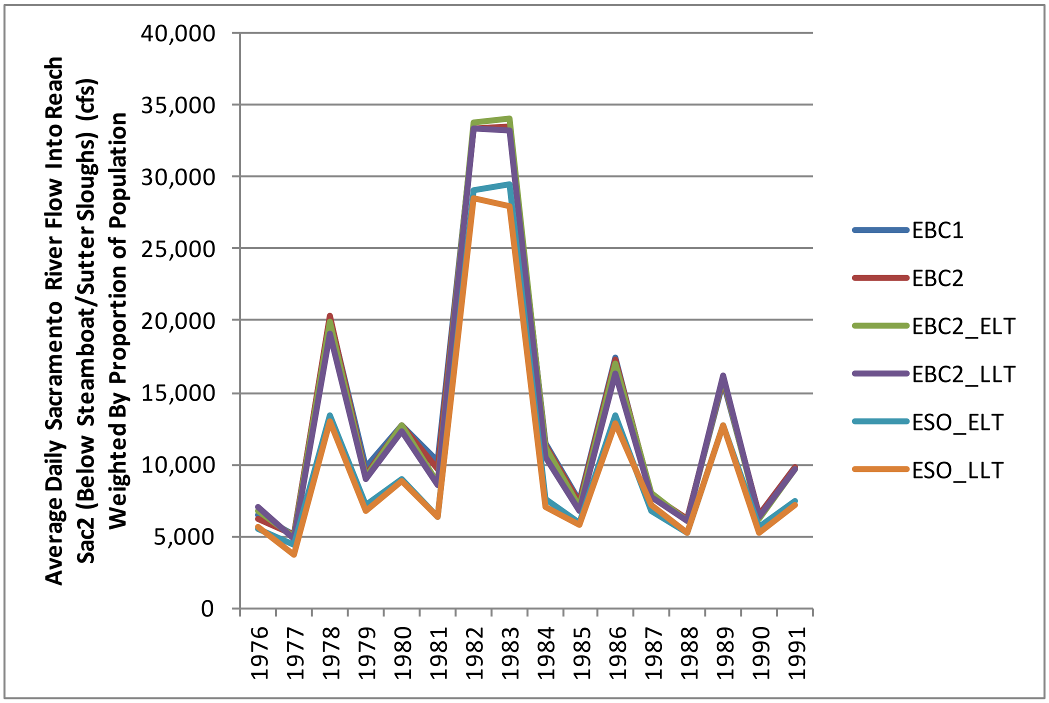


Figure 5C.5.3-9. Daily Average Flow into Reach Sac2 (Sacramento River below Sutter/Steamboat Sloughs), Weighted by Daily Proportion of Spring-Run Chinook Salmon Smolts Entering Reach Sac2, By Water Year and Scenario From Delta Passage Model Results

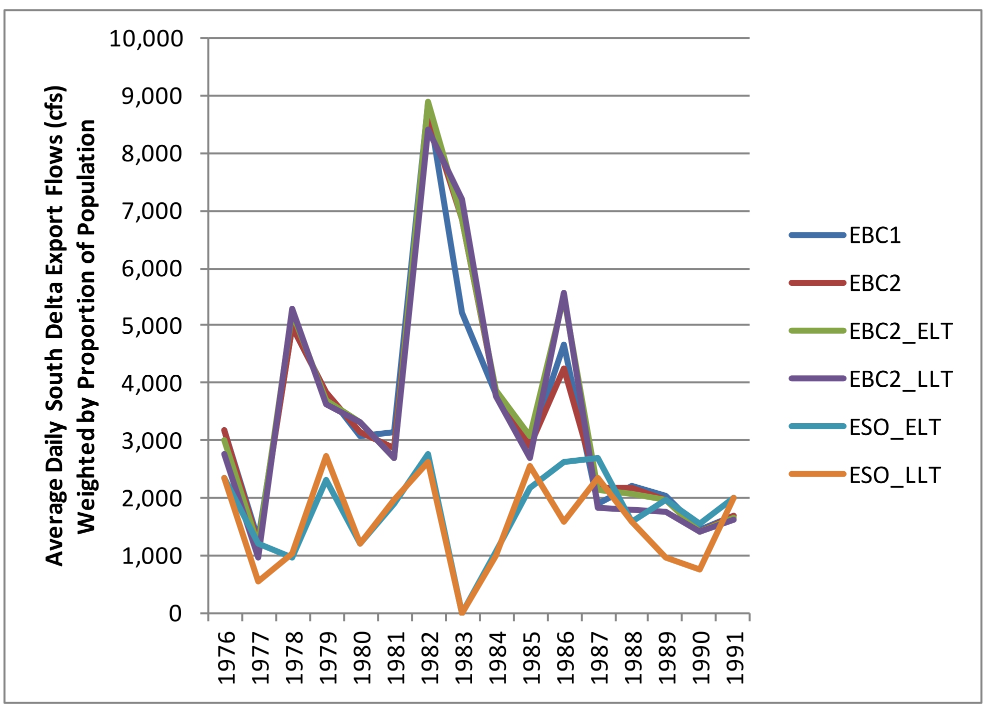


Figure 5C.5.3-10. Daily Average South Delta Export Flow, Weighted by Daily Proportion of Spring-Run Chinook Salmon Smolts Entering the Interior Delta, By Water Year and Scenario From Delta Passage Model Results

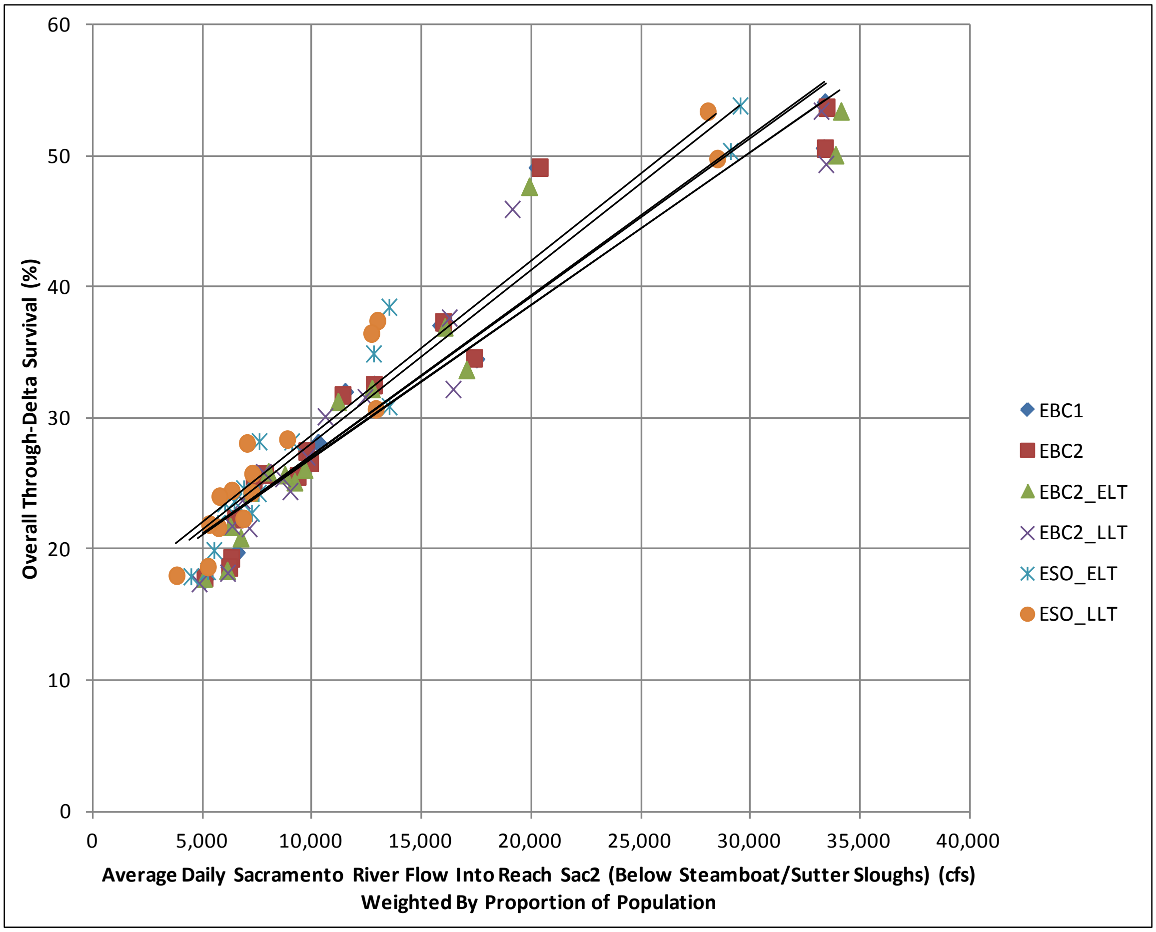


Figure 5C.5.3-11. Relationship between Weighted-Average Flow into Reach Sac2 and Overall Through-Delta Survival of Spring-Run Chinook Salmon, From Delta Passage Model Results

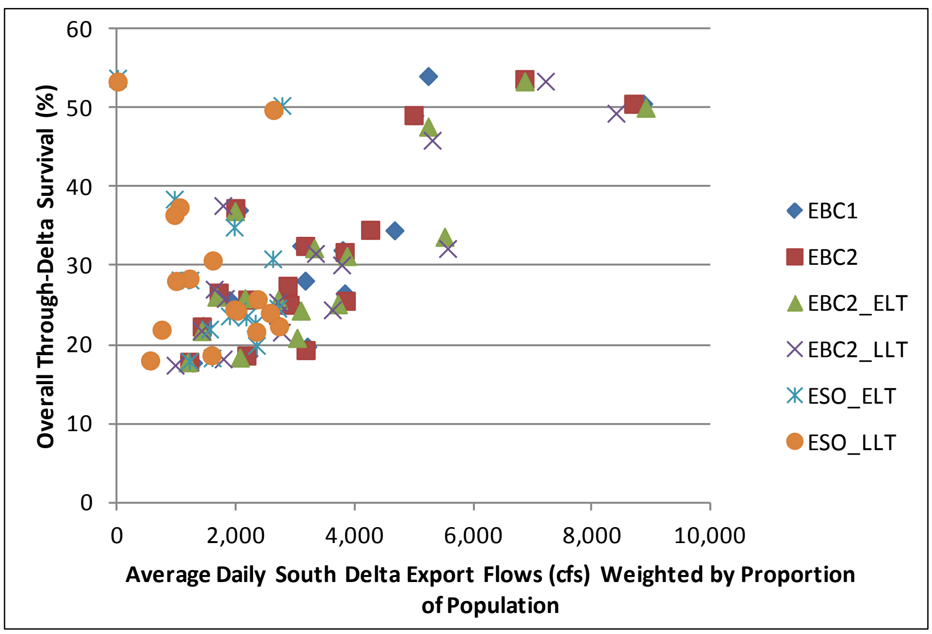


Figure 5C.5.3-12. Relationship between Weighted-Average South Delta Exports and Overall Through-Delta Survival of Spring-Run Chinook Salmon, From Delta Passage Model Results

5C.5.3.4.2.2 Effects of Nonphysical Fish Barriers and Predation

Postprocessing of the DPM results to examine the potential effect of a 67% proportional reduction of spring-run Chinook salmon smolts entering the Interior Delta through Georgiana Slough showed that the average and median survival was 1.7–2% greater than the original ESO_ELT and ESO_LLT, or 6–8% in relative terms (Table 5C.5.3-41, Figure 5C.5.3-13).

Table 5C.5.3-41. Percentage of Spring-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios and Considering Nonphysical Barrier Deterrence from Georgiana Slough, Based on Delta Passage Model

Water Year[a]	Scenario[b]							
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	ESO_ELT 67%[c]	ESO_LLT 67%[c]
1976 (C)	19.7	19.3	20.8	21.6	19.9	21.6	22.0	23.7
1977 (C)	17.7	17.8	17.8	17.4	17.9	18.0	19.2	19.0
1978 (AN)	49.1	49.1	47.6	45.9	38.5	37.4	40.3	39.2
1979 (BN)	26.5	25.6	25.1	24.4	22.7	22.3	24.5	24.0
1980 (AN)	32.5	32.5	32.2	31.6	28.2	28.4	30.1	30.1
1981 (D)	28.1	27.5	25.7	25.4	23.6	24.5	25.7	26.4
1982 (W)	50.6	50.6	50.1	49.4	50.3	49.8	52.9	52.3
1983 (W)	54.1	53.7	53.4	53.4	53.8	53.4	56.1	55.6
1984 (W)	32.0	31.7	31.2	30.1	28.2	28.1	30.1	29.8
1985 (D)	25.4	25.1	24.3	23.7	23.5	24.0	25.8	26.2
1986 (W)	34.5	34.6	33.7	32.2	30.9	30.7	32.9	32.3
1987 (D)	25.6	25.7	25.9	25.8	24.6	25.7	26.1	27.2
1988 (C)	18.6	18.6	18.4	18.2	18.3	18.6	19.8	20.0
1989 (D)	37.1	37.3	36.9	37.6	34.9	36.5	37.0	38.2
1990 (C)	22.4	22.3	21.7	21.8	22.0	21.9	24.2	23.8
1991 (C)	26.5	26.6	26.1	27.0	24.3	24.3	26.4	26.2
Average	31.3	31.1	30.7	30.3	28.8	29.1	30.8	30.9
Median	27.3	27.0	26.0	26.4	24.4	25.1	26.3	26.8

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] ESO_ELT 67% and ESO_LLT 67% represent effects of a 67% proportional reduction in entry into Georgiana Slough due to nonphysical barrier deterrence.

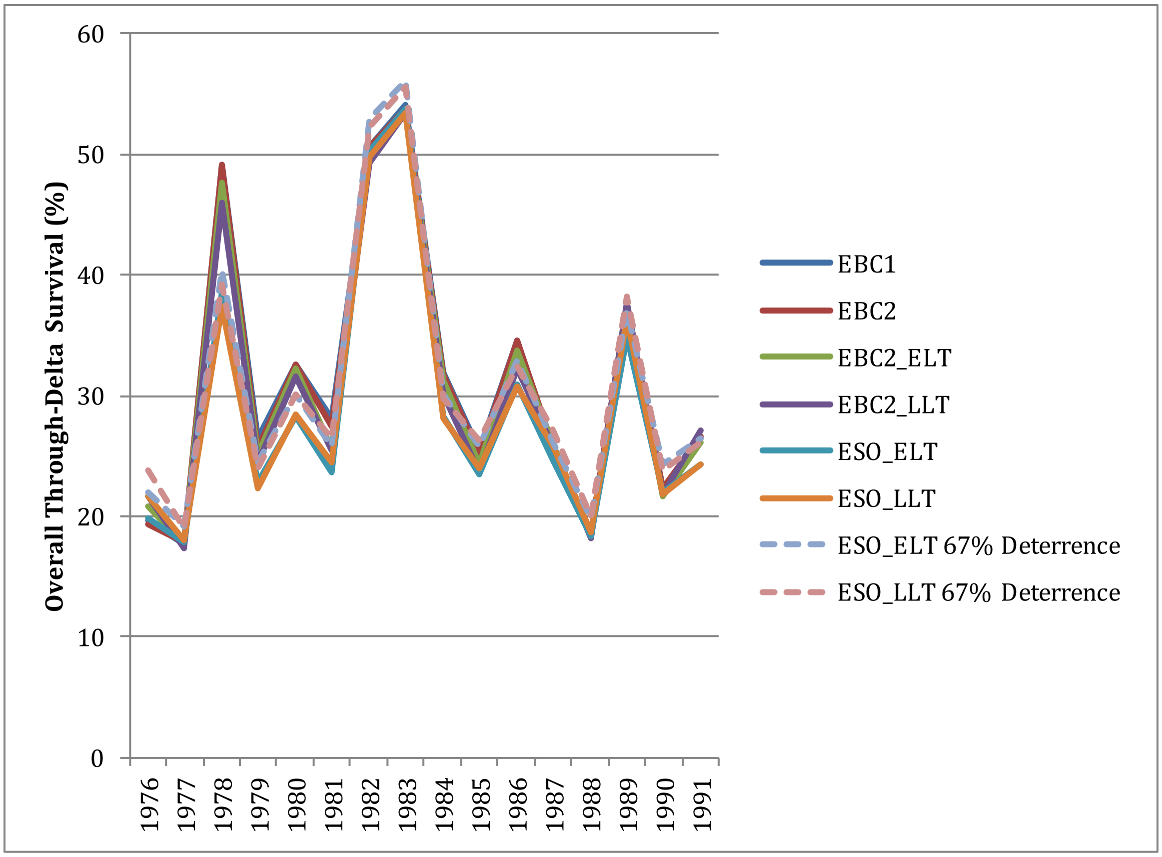


Figure 5C.5.3-13. Percentage of Spring-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results, Including Additional Runs to Assess Effect of a 67% Proportional Reduction of Entry into Georgiana Slough Due to Nonphysical Barrier Deterrence

The analysis to examine the effect of a survival reduction of 5% because of additional predation mortality in the Sacramento River reach containing the proposed north Delta intakes showed that overall average and median through-Delta survival was just over 1% less in absolute terms (4–5% relative difference) than the original results for the ESO scenarios (Table 5C.5.3-42, Figure 5C.5.3-14).

Table 5C.5.3-42. Percentage of Spring-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios and Considering Additional Mortality at North Delta Intakes, Based on Delta Passage Model

Water Year[a]	Scenario[b]							
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	ESO_ELT 5%	ESO_LLT 5%
1976 (C)	19.7	19.3	20.8	21.6	19.9	21.6	19.0	20.6
1977 (C)	17.7	17.8	17.8	17.4	17.9	18.0	17.1	17.1
1978 (AN)	49.1	49.1	47.6	45.9	38.5	37.4	37.0	35.9
1979 (BN)	26.5	25.6	25.1	24.4	22.7	22.3	21.7	21.3
1980 (AN)	32.5	32.5	32.2	31.6	28.2	28.4	27.0	27.2
1981 (D)	28.1	27.5	25.7	25.4	23.6	24.5	22.6	23.4
1982 (W)	50.6	50.6	50.1	49.4	50.3	49.8	48.4	47.9
1983 (W)	54.1	53.7	53.4	53.4	53.8	53.4	51.7	51.2
1984 (W)	32.0	31.7	31.2	30.1	28.2	28.1	27.1	26.9
1985 (D)	25.4	25.1	24.3	23.7	23.5	24.0	22.4	22.9
1986 (W)	34.5	34.6	33.7	32.2	30.9	30.7	29.6	29.4
1987 (D)	25.6	25.7	25.9	25.8	24.6	25.7	23.5	24.5
1988 (C)	18.6	18.6	18.4	18.2	18.3	18.6	17.4	17.8
1989 (D)	37.1	37.3	36.9	37.6	34.9	36.5	33.5	35.1
1990 (C)	22.4	22.3	21.7	21.8	22.0	21.9	20.9	20.9
1991 (C)	26.5	26.6	26.1	27.0	24.3	24.3	23.2	23.2
Average	31.3	31.1	30.7	30.3	28.8	29.1	27.6	27.8
Median	27.3	27.0	26.0	26.4	24.4	25.1	23.3	24.0

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] ESO_ELT 5% and ESO_LLT 5% represent effects of 5% additional mortality in the north Delta intakes' reach.

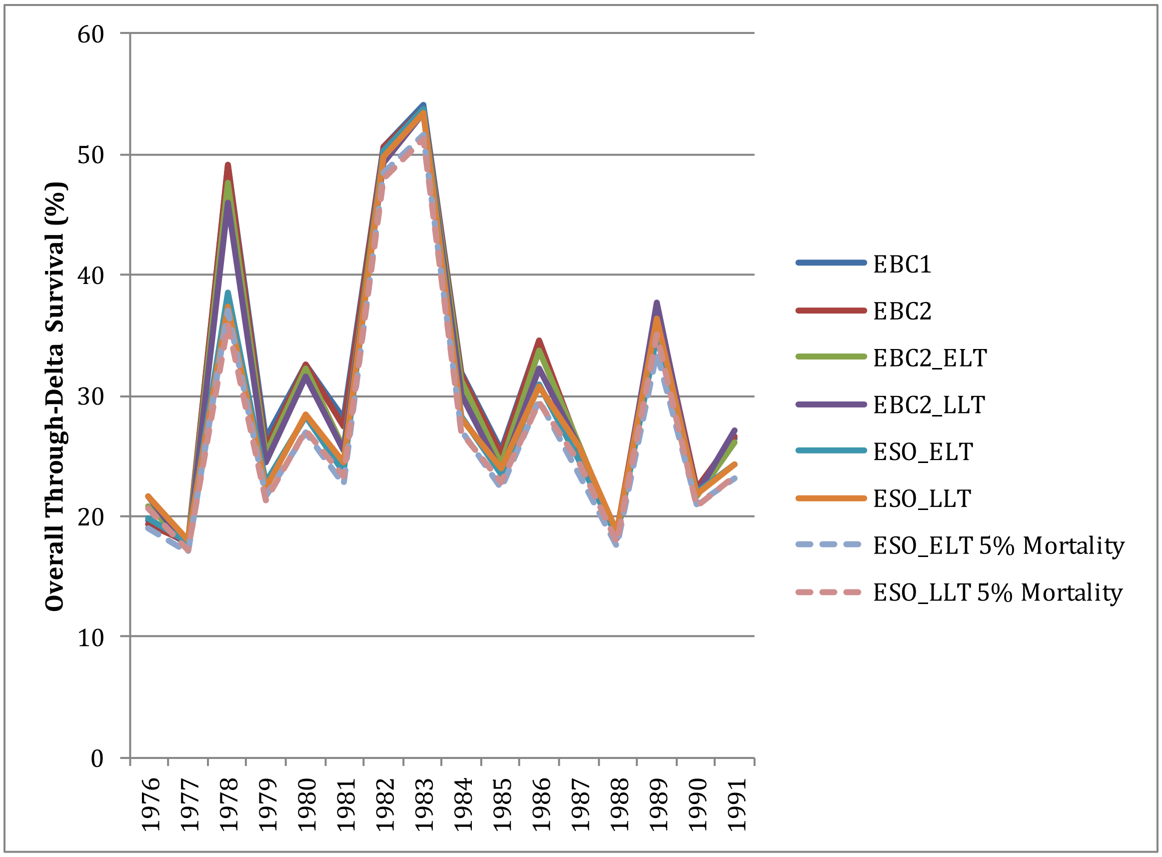


Figure 5C.5.3-14. Percentage of Spring-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results, Including Additional Runs to Assess Effect of 5% Additional Mortality in the North Delta Intakes Reach (Sac1)

5C.5.3.4.3 Sacramento River Fall-Run Chinook Salmon

5C.5.3.4.3.1 Overall Survival through the Delta

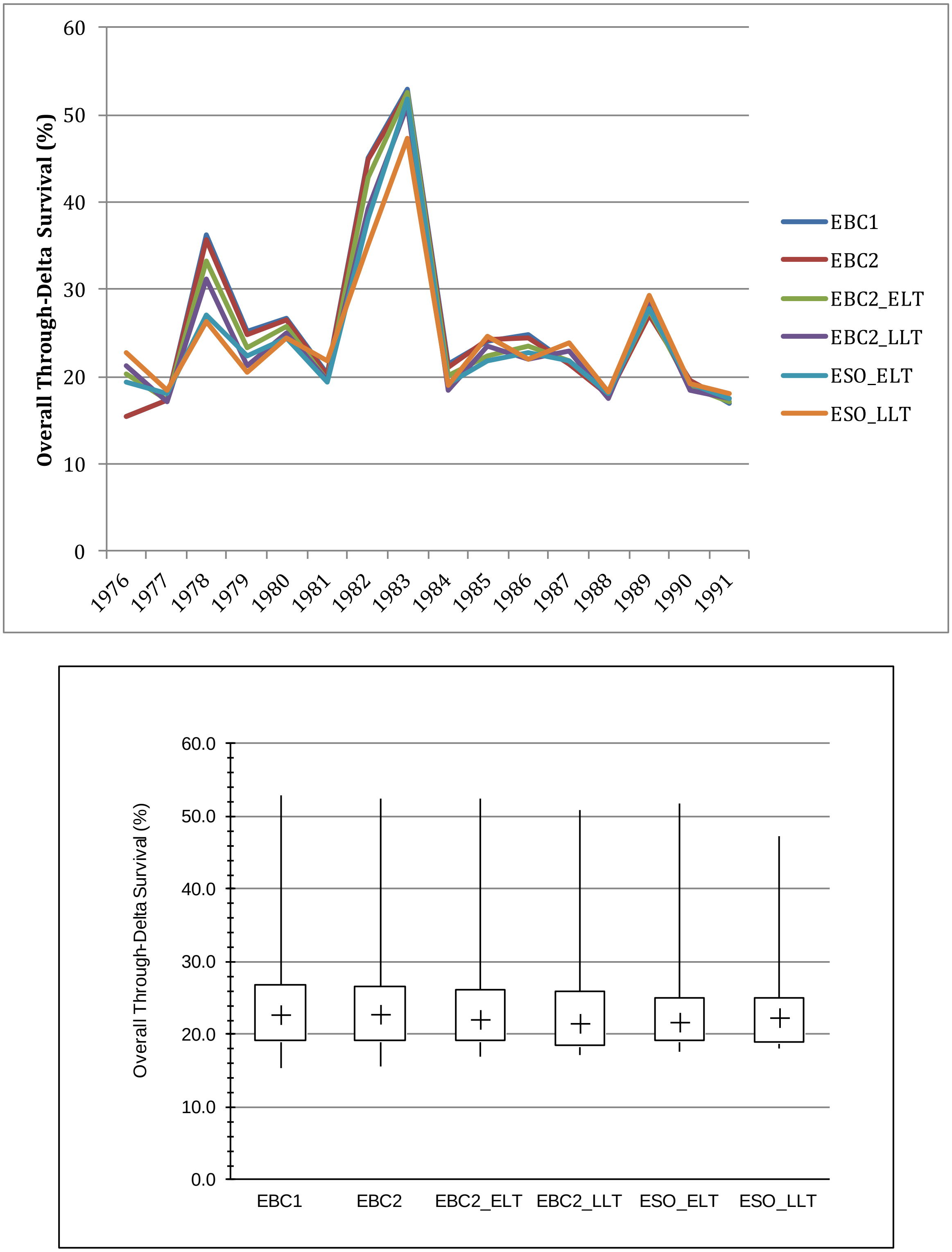
Overall through-Delta survival for Sacramento River fall-run Chinook salmon was similar among the four EBC scenarios, ranging from just over 17% in 1977and 1991, critically dry years, to ~52% in 1983, a wet year, for overall averages of 24.7–25.8% and medians of ~22–23% (Table 5C.5.3-43, Figure 5C.5.3-15). The range in survival for ESO scenarios was similar to that of EBC scenarios. Within individual years differences in survival between EBC and ESO scenarios were variable, with the largest differences being a 25% relatively lower survival under ESO scenarios compared to EBC2 in 1978 and a 11% relatively higher survival under ESO_LLT compared to EBC2_LLT in 1981 (Table 5C.5.3-44). The average and median differences in smolt survival between EBC and ESO scenarios generally ranged from ~1.5% less under ESO scenarios to 0.6% more under ESO scenarios in terms of absolute absolute difference; these differences were generally 5% or less in relative terms.

As with winter-run and spring-run Chinook salmon, interpretation of the survival results is aided by consideration of the differences between scenarios in migration pathways and flow conditions. Under ESO scenarios Sacramento River fall-run Chinook salmon entered the Yolo Bypass in every year of the 16-year simulation, whereas under EBC scenarios entry of >0.1% of smolts occurred in 3 years (Table 5C.5.3-45). Because the migration timing of fall-run Chinook salmon is later than winter-run and spring-run and is generally outside the main period of Yolo Bypass inundation, the percentage of fall-run smolts entering Yolo Bypass was lower than for winter-run and spring-run. Survival down the mainstem Sacramento River and Sutter/Steamboat Sloughs pathways was lower under ESO scenarios compared to EBC scenarios (Table 5C.5.3-45) because of the lower flows in the Sacramento River under the ESO scenarios (Figure 5C.5.3-16). Survival along the interior Delta pathway generally was similar between ESO and EBC scenarios, although generally there were lower south Delta exports under ESO scenarios (Figure 5C.5.3-17), which reflects the balance in Sacramento River flows and south Delta exports shown for winter-run and spring-run Chinook salmon smolts that take the interior Delta pathway. As noted for winter-run and spring-run Chinook salmon, there is a strong linear relationship between through-Delta survival and Sacramento River flows from the DPM results (Figure 5C.5.3-18), as would be expected given the flow-survival relationships that form the basis for the model. The regression lines on Figure 5C.5.3-18 are for each scenario, with the ESO scenario lines above the EBC scenarios lines. For a given level of flow into reach Sac2 (Sacramento River below Sutter/Steamboat sloughs), through-Delta survival is greater under the ESO scenarios than EBC scenarios because of the greater percentage of fish that would have entered the Yolo Bypass under the ESO scenarios and because of lower south Delta exports. In contrast and as noted for winter-run and spring-run Chinook in the DPM results above, the relationship between overall survival and south Delta exports is less clear because export-related survival is only one aspect of overall survival and applies only to the minority of smolts entering the interior Delta (Figure 5C.5.3-19). Overall, the DPM results for Sacramento River fall-run Chinook salmon suggested that survival under the ESO scenarios generally was similar to or slightly lower than survival under the EBC scenarios.

Table 5C.5.3-43. Percentage of Sacramento River Fall-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976 (C)	15.5	15.5	20.4	21.2	19.3	22.7
1977 (C)	17.2	17.4	17.4	17.2	18.1	18.4
1978 (AN)	36.3	35.7	33.2	31.1	27.1	26.4
1979 (BN)	25.2	24.8	23.3	21.2	22.4	20.5
1980 (AN)	26.6	26.5	25.8	25.1	24.4	24.4
1981 (D)	20.2	20.2	19.5	19.6	19.4	21.8
1982 (W)	45.1	44.9	42.9	39.2	38.0	35.0
1983 (W)	53.0	52.5	52.5	51.0	51.8	47.2
1984 (W)	21.4	21.1	20.1	18.4	19.1	18.9
1985 (D)	24.1	24.2	22.4	23.5	21.8	24.7
1986 (W)	24.7	24.4	23.6	22.0	22.7	22.0
1987 (D)	21.5	21.5	21.9	22.9	21.8	24.0
1988 (C)	18.2	17.9	18.1	17.6	18.1	18.3
1989 (D)	27.2	27.1	27.7	28.5	27.9	29.2
1990 (C)	19.6	19.6	18.8	18.5	19.2	19.2
1991 (C)	17.0	17.1	17.0	17.5	17.6	18.0
Average	25.8	25.7	25.3	24.7	24.3	24.4
Median	22.8	22.8	22.1	21.6	21.8	22.4

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.



Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-15. Sacramento River Fall-Run Chinook Salmon through-Delta Smolt Survival, Based on Delta Passage Model Results

Table 5C.5.3-44. Differences[a] between EBC and ESO Scenarios in Percentage of Sacramento River Fall-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results

Water Year[b]	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
1976 (C)	3.9 (25%)	7.3 (47%)	3.8 (24%)	7.2 (46%)	-1.0 (-5%)	1.6 (7%)
1977 (C)	0.9 (5%)	1.1 (7%)	0.7 (4%)	1.0 (6%)	0.7 (4%)	1.2 (7%)
1978 (AN)	-9.2 (-25%)	-9.9 (-27%)	-8.7 (-24%)	-9.4 (-26%)	-6.1 (-18%)	-4.7 (-15%)
1979 (BN)	-2.8 (-11%)	-4.7 (-19%)	-2.4 (-10%)	-4.3 (-17%)	-0.9 (-4%)	-0.8 (-4%)
1980 (AN)	-2.2 (-8%)	-2.2 (-8%)	-2.1 (-8%)	-2.1 (-8%)	-1.4 (-6%)	-0.6 (-3%)
1981 (D)	-0.8 (-4%)	1.6 (8%)	-0.8 (-4%)	1.6 (8%)	-0.1 (-1%)	2.2 (11%)
1982 (W)	-7.0 (-16%)	-10.0 (-22%)	-6.9 (-15%)	-9.9 (-22%)	-4.8 (-11%)	-4.1 (-11%)
1983 (W)	-1.1 (-2%)	-5.7 (-11%)	-0.7 (-1%)	-5.3 (-10%)	-0.7 (-1%)	-3.8 (-7%)
1984 (W)	-2.3 (-11%)	-2.5 (-11%)	-2.0 (-9%)	-2.2 (-10%)	-1.0 (-5%)	0.5 (3%)
1985 (D)	-2.4 (-10%)	0.6 (2%)	-2.4 (-10%)	0.5 (2%)	-0.6 (-3%)	1.2 (5%)
1986 (W)	-2.0 (-8%)	-2.7 (-11%)	-1.7 (-7%)	-2.4 (-10%)	-0.8 (-3%)	0.1 (0%)
1987 (D)	0.3 (1%)	2.5 (12%)	0.3 (1%)	2.5 (11%)	-0.1 (-1%)	1.0 (4%)
1988 (C)	-0.1 (-1%)	0.1 (0%)	0.2 (1%)	0.4 (2%)	0.0 (0%)	0.7 (4%)
1989 (D)	0.7 (3%)	2.1 (8%)	0.8 (3%)	2.1 (8%)	0.2 (1%)	0.7 (2%)
1990 (C)	-0.4 (-2%)	-0.5 (-2%)	-0.4 (-2%)	-0.4 (-2%)	0.4 (2%)	0.7 (4%)
1991 (C)	0.6 (3%)	1.0 (6%)	0.5 (3%)	0.9 (5%)	0.5 (3%)	0.5 (3%)
Average	-1.5 (-6%)	-1.4 (-5%)	-1.4 (-5%)	-1.2 (-5%)	-1.0 (-4%)	-0.2 (-1%)
Median	-1.0 (-4%)	-0.2 (-1%)	-0.7 (-3%)	0.0 (0%)	-0.7 (-3%)	0.6 (3%)

[a] Negative values indicate lower survival under ESO scenarios than under EBC scenarios.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-45. Percentage Use and Survival of Sacramento River Fall-Run Chinook Salmon Smolts Migrating Down Different Through-Delta Pathways under EBC and ESO Scenarios[a], based on Delta Passage Model

	Yolo Bypass Pathway (Yolo-Sac4)												Mainstem Sacramento River Pathway (Verona-Sac1-Sac2-Sac3-Sac4)											
	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway						Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	0.0	0.0	0.0	0.0	2.0	1.6					46.4	46.3	38.6	38.6	41.3	40.8	41.7	42.8	16.7	16.8	22.1	23.1	19.7	24.3
1977	0.0	0.0	0.0	0.0	2.2	2.2					49.3	49.3	36.1	36.2	35.8	34.9	38.1	39.3	17.2	17.7	17.7	16.3	16.9	16.3
1978	0.0	0.0	0.0	0.0	7.1	5.8	46.9	46.8	46.6	45.9	45.8	45.4	44.2	44.1	43.7	42.7	41.9	42.2	39.7	38.9	35.9	33.1	26.3	25.0
1979	0.0	0.0	0.0	0.0	2.3	2.5					44.0	43.9	43.4	43.2	42.3	40.7	42.8	42.3	26.5	25.9	24.9	23.4	23.3	21.5
1980	0.0	0.0	0.0	0.0	2.2	2.2					45.9	45.8	43.5	43.5	42.7	41.5	43.2	43.2	32.9	32.8	32.0	31.3	29.2	29.0
1981	0.0	0.0	0.0	0.0	2.6	2.2					47.6	47.4	40.4	40.3	39.4	38.7	40.2	41.5	25.4	25.3	23.7	24.6	22.5	26.0
1982	8.6	8.6	9.1	9.0	10.6	10.4	48.7	48.7	48.7	48.7	48.5	48.5	40.5	40.5	39.8	39.3	40.3	39.8	48.6	48.5	46.1	41.7	38.8	35.0
1983	0.6	0.6	1.8	1.6	9.6	9.4	44.8	44.9	44.7	44.7	42.8	42.8	43.7	43.6	43.2	43.3	40.7	40.3	58.0	58.0	58.1	56.3	55.9	50.4
1984	0.0	0.0	0.0	0.0	2.4	2.6					46.8	46.8	42.6	42.5	41.7	40.0	42.3	42.0	24.6	24.2	22.8	20.4	20.4	19.1
1985	0.0	0.0	0.0	0.0	2.4	2.1					48.0	48.2	41.8	41.8	40.8	40.1	41.3	42.0	25.8	25.9	24.3	24.9	22.4	24.9
1986	0.2	0.2	0.2	0.2	2.6	2.7	43.6	43.2	43.5	43.7	45.6	45.6	43.4	43.3	42.3	40.4	43.5	42.7	26.7	26.3	25.7	24.5	24.0	22.5
1987	0.0	0.0	0.0	0.0	1.9	1.5					44.5	44.4	40.8	40.7	40.5	40.3	41.4	42.3	22.6	22.7	22.9	23.1	22.2	23.8
1988	0.0	0.0	0.0	0.0	2.5	2.4					46.5	46.4	39.5	39.3	39.0	37.7	39.9	40.3	20.3	19.7	20.3	19.4	18.9	18.8
1989	0.0	0.0	0.0	0.0	2.6	3.2	48.7	48.5	47.0	47.6	47.4	47.8	42.9	42.9	42.6	41.9	43.1	42.5	28.1	28.0	28.6	29.3	28.0	29.0
1990	0.0	0.0	0.0	0.0	2.9	2.9					48.5	48.4	40.6	40.6	39.7	38.8	40.4	40.9	24.2	24.2	22.9	22.6	22.1	21.7
1991	0.0	0.0	0.0	0.0	3.1	3.1					46.9	46.9	39.4	39.3	38.5	37.5	39.6	40.4	17.4	17.4	17.3	17.9	16.8	16.9
Average	0.6	0.6	0.7	0.7	3.7	3.6	46.5	46.4	46.1	46.1	46.5	46.5	41.3	41.3	40.8	39.9	41.3	41.5	28.4	28.3	27.8	27.0	25.5	25.3
Median	0.0	0.0	0.0	0.0	2.5	2.6	46.9	46.8	46.6	45.9	46.6	46.6	41.3	41.3	41.0	40.2	41.3	42.0	25.6	25.6	24.0	23.9	22.5	24.0

	Sutter/Steamboat Sloughs Pathway (Verona-Sac1-Sac2-SS-Sac4)												Interior Delta via Georgiana Slough and Delta Cross Channel Pathway (Sac1-Sac2-Geo/DCC-Interior Delta)											
	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway						Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	25.4	25.4	28.7	30.0	27.5	31.2	24.1	24.3	27.5	27.8	26.3	28.1	36.0	36.0	30.0	29.3	28.8	24.4	8.1	8.0	11.2	11.7	10.2	11.6
1977	23.8	24.0	24.5	25.0	24.3	27.0	25.2	24.7	24.6	25.4	25.6	25.8	40.1	39.8	39.7	40.1	35.5	31.5	12.6	12.7	12.7	12.8	12.4	12.5
1978	33.3	33.1	32.9	33.1	28.8	30.8	44.9	44.5	42.6	41.1	34.1	33.8	22.5	22.7	23.4	24.2	22.3	21.2	17.0	16.7	14.9	13.9	13.5	13.1
1979	30.5	30.3	30.0	30.2	29.1	30.6	31.5	31.1	29.0	25.3	26.9	22.4	26.1	26.5	27.7	29.1	25.8	24.7	15.6	15.7	14.7	14.0	13.9	13.9
1980	30.5	30.5	30.3	30.6	28.9	30.9	26.9	26.8	26.4	25.8	23.7	23.7	26.0	26.1	26.9	27.9	25.7	23.7	15.8	15.8	15.4	15.0	15.1	15.0
1981	27.9	27.9	27.9	28.9	27.1	30.3	20.4	20.3	21.0	19.9	20.2	20.7	31.7	31.8	32.8	32.4	30.0	26.0	13.5	13.5	13.2	13.4	12.1	14.2
1982	33.2	33.2	33.0	33.1	30.9	31.9	53.5	53.3	51.0	46.4	44.2	40.4	17.7	17.7	18.1	18.6	18.2	17.8	19.3	19.2	18.2	16.5	19.8	17.7
1983	38.1	38.1	37.7	37.7	33.4	33.9	61.0	61.0	61.2	59.3	59.1	53.6	17.6	17.7	17.4	17.4	16.3	16.5	23.5	20.8	20.7	20.1	32.0	28.9
1984	29.1	29.0	29.0	29.2	27.9	29.7	26.3	26.1	25.4	24.7	23.5	24.2	28.3	28.5	29.3	30.9	27.3	25.7	11.6	11.4	10.9	9.9	10.1	9.8
1985	28.5	28.6	28.4	29.5	27.6	30.6	32.5	32.5	30.4	31.9	28.6	31.9	29.7	29.6	30.9	30.5	28.6	25.4	13.8	13.8	12.5	13.4	12.0	13.7
1986	30.1	29.8	29.7	29.8	28.8	30.6	31.9	31.9	30.4	27.8	27.2	26.8	26.3	26.7	27.8	29.6	25.1	24.0	13.2	12.9	12.7	12.5	13.2	12.5
1987	28.2	28.2	28.8	30.3	28.2	31.4	29.1	29.1	29.5	30.9	28.4	30.7	31.0	31.1	30.7	29.5	28.5	24.8	13.0	13.0	13.4	14.5	13.0	14.5
1988	27.3	27.0	27.6	28.1	26.9	29.1	24.2	24.1	23.8	23.3	22.6	22.5	33.2	33.7	33.4	34.2	30.7	28.2	10.8	10.9	10.9	11.0	11.0	10.9
1989	30.6	30.6	31.1	32.1	30.3	32.3	33.8	33.8	34.3	35.2	33.7	34.6	26.5	26.5	26.3	25.9	23.9	21.9	18.0	18.1	18.4	19.0	18.2	19.1
1990	27.7	27.7	27.9	28.7	27.3	29.6	20.6	20.6	20.5	20.2	19.8	19.4	31.6	31.7	32.4	32.6	29.4	26.6	12.9	12.9	12.2	12.0	11.8	11.7
1991	25.7	25.7	25.9	26.7	25.2	27.6	25.7	25.9	26.0	26.7	25.2	25.2	34.9	35.1	35.5	35.7	32.1	28.9	10.2	10.3	10.2	10.3	9.7	9.6
Average	29.4	29.3	29.6	30.2	28.3	30.5	32.0	31.9	31.5	30.7	29.3	29.0	28.7	28.8	28.9	29.2	26.8	24.5	14.3	14.1	13.9	13.8	14.2	14.3
Median	28.8	28.8	28.9	29.9	28.1	30.6	28.0	27.9	28.2	27.2	26.6	26.3	29.0	29.0	29.7	29.5	27.9	24.7	13.4	13.3	13.0	13.4	12.7	13.4

[a] See Table 5C.0-1 for definitions of the scenarios. Survival down the Yolo Bypass Pathway is blank if no fish took that pathway.

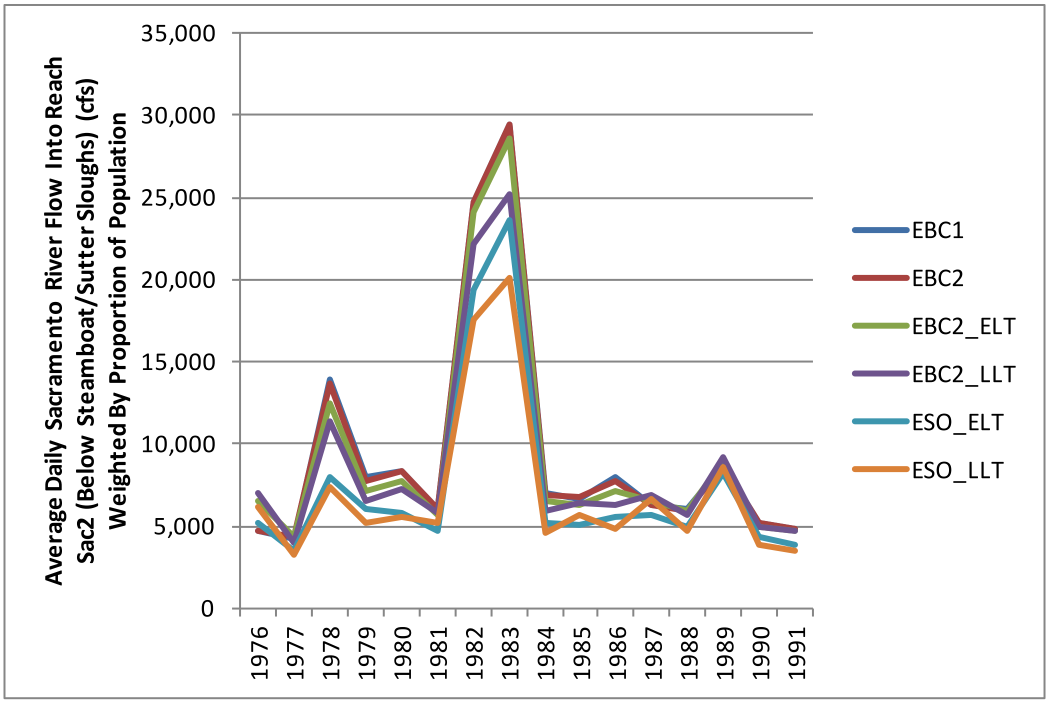


Figure 5C.5.3-16. Daily Average Flow into Reach Sac2 (Sacramento River below Sutter/Steamboat Sloughs), Weighted by Daily Proportion of Sacramento River Fall-Run Chinook Salmon Smolts Entering Reach Sac2, By Water Year and Scenario From Delta Passage Model Results

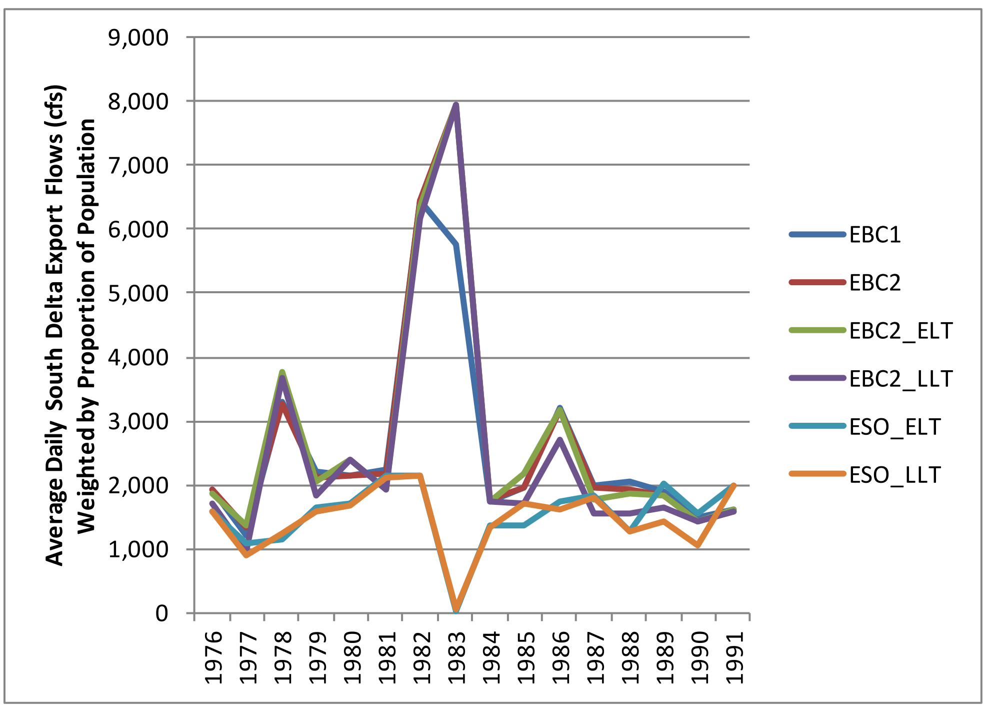


Figure 5C.5.3-17. Daily Average South Delta Export Flow, Weighted by Daily Proportion of Sacramento River Fall-Run Chinook Salmon Smolts Entering the Interior Delta, By Water Year and Scenario From Delta Passage Model Results

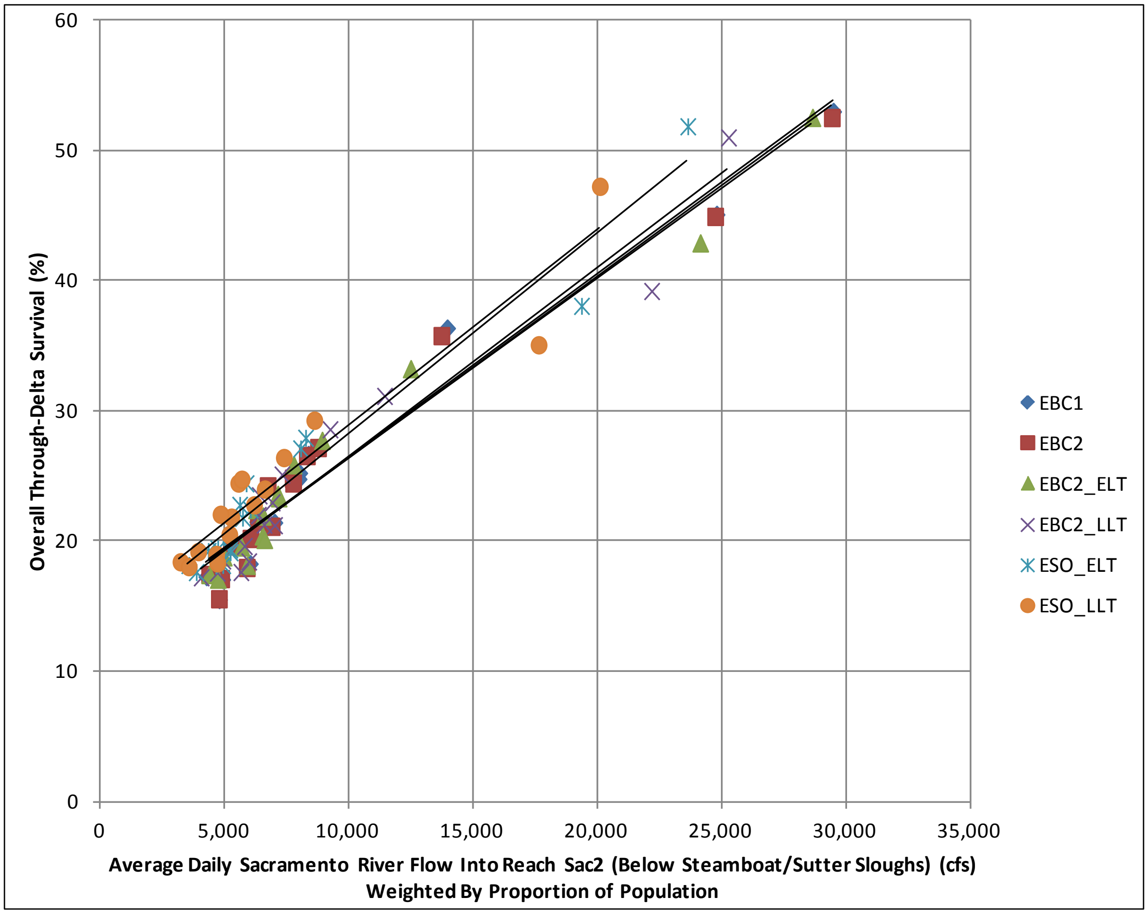


Figure 5C.5.3-18. Relationship between Weighted-Average Flow into Reach Sac2 and Overall Through-Delta Survival of Sacramento River Fall-Run Chinook Salmon, From Delta Passage Model Results

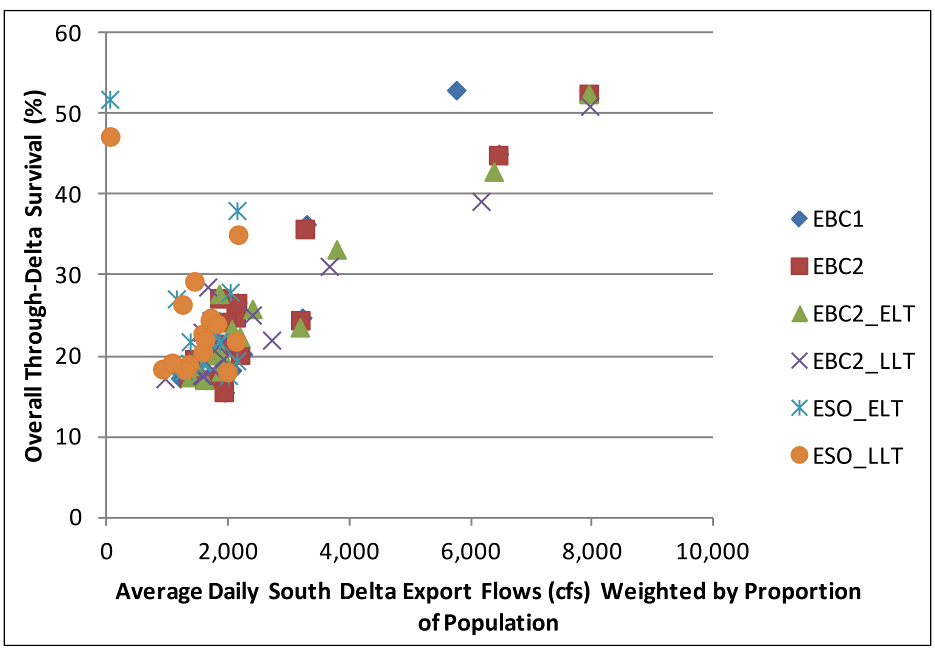


Figure 5C.5.3-19. Relationship between Weighted-Average South Delta Exports and Overall Through-Delta Survival of Sacramento River Fall-Run Chinook Salmon, From Delta Passage Model Results

5C.5.3.4.3.2 Effects of Nonphysical Fish Barriers and Predation

Postprocessing of the DPM results to examine the potential effect of a 67% proportional reduction in fall-run Chinook salmon smolts entering the Interior Delta through Georgiana Slough, showed that the average or median survival was around 2% greater than the original ESO_ELT and ESO_LLT, or 7–8% in relative terms (Table 5C.5.3-46, Figure 5C.5.3-20). Relative differences between median values were slightly greater (9%).

Table 5C.5.3-46. Percentage of Sacramento River Fall-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios and Considering Nonphysical Barrier Deterrence from Entering Georgiana Slough, Based on Delta Passage Model

Water Year[a]	Scenario[b]							
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	ESO_ELT 67%[c]	ESO_LLT 67%[c]
1976 (C)	15.5	15.5	20.4	21.2	19.3	22.7	21.2	24.8
1977 (C)	17.2	17.4	17.4	17.2	18.1	18.4	19.2	19.2
1978 (AN)	36.3	35.7	33.2	31.1	27.1	26.4	29.0	28.1
1979 (BN)	25.2	24.8	23.3	21.2	22.4	20.5	24.0	21.7
1980 (AN)	26.6	26.5	25.8	25.1	24.4	24.4	26.8	26.6
1981 (D)	20.2	20.2	19.5	19.6	19.4	21.8	21.5	23.9
1982 (W)	45.1	44.9	42.9	39.2	38.0	35.0	40.4	37.1
1983 (W)	53.0	52.5	52.5	51.0	51.8	47.2	54.4	49.6
1984 (W)	21.4	21.1	20.1	18.4	19.1	18.9	21.0	20.5
1985 (D)	24.1	24.2	22.4	23.5	21.8	24.7	23.8	26.6
1986 (W)	24.7	24.4	23.6	22.0	22.7	22.0	24.6	23.6
1987 (D)	21.5	21.5	21.9	22.9	21.8	24.0	23.5	25.5
1988 (C)	18.2	17.9	18.1	17.6	18.1	18.3	19.8	19.8
1989 (D)	27.2	27.1	27.7	28.5	27.9	29.2	29.5	30.7
1990 (C)	19.6	19.6	18.8	18.5	19.2	19.2	21.2	20.9
1991 (C)	17.0	17.1	17.0	17.5	17.6	18.0	19.1	19.4
Average	25.8	25.7	25.3	24.7	24.3	24.4	26.2	26.1
Median	22.8	22.8	22.1	21.6	21.8	22.4	23.6	24.3

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] ESO_ELT 67% and ESO_LLT 67% represent effects of a 67% proportional reduction in entry into Georgiana Slough due to nonphysical barrier deterrence.

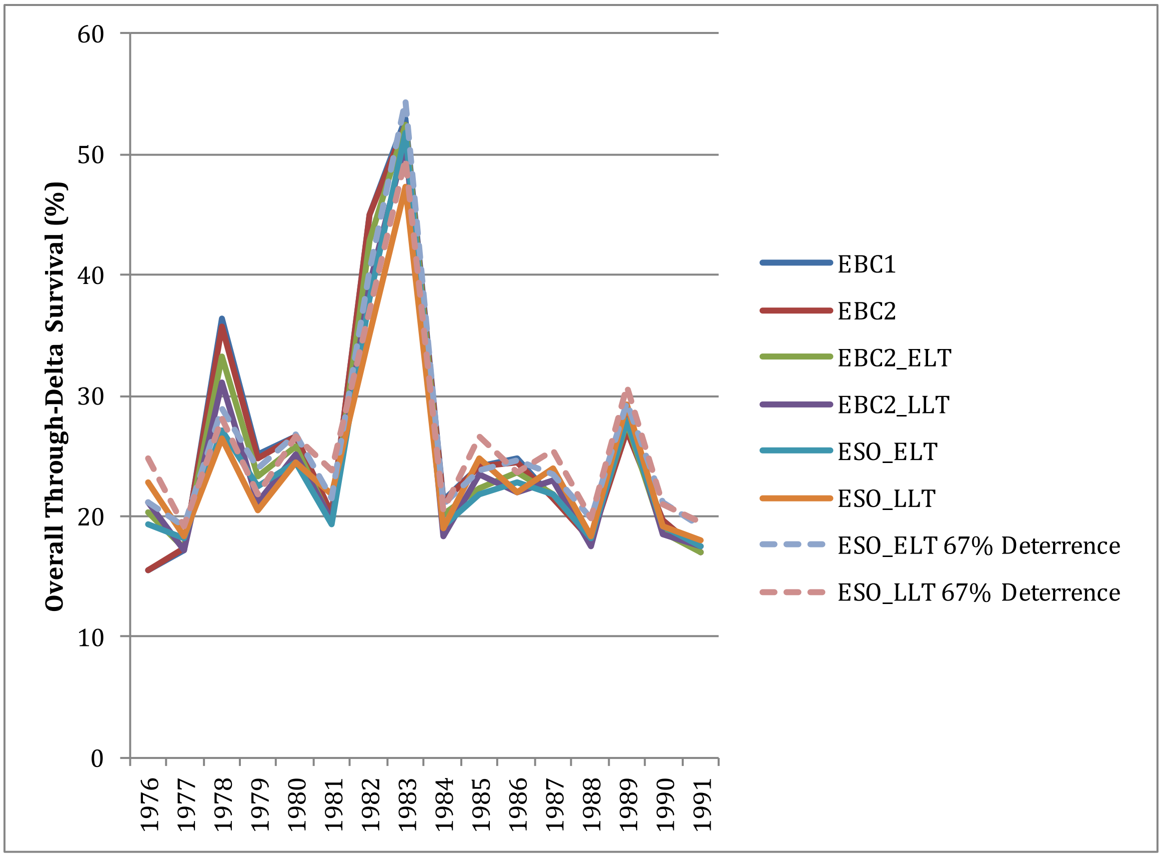


Figure 5C.5.3-20. Percentage of Sacramento River Fall-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results, Including Additional Runs to Assess Effects of a 67% Proportional Reduction in Georgiana Slough Entry Due to Nonphysical Barrier Deterrence

The analysis to examine the effect of a survival reduction of 5% because of additional predation mortality in the Sacramento River reach containing the proposed north Delta intakes showed that overall average and median through-Delta survival was under 1% less in absolute terms (5% relative difference) than the original results for the ESO scenarios (Table 5C.5.3-47, Figure 5C.5.3-21).

Table 5C.5.3-47. Percentage of Sacramento River Fall-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios and Considering Additional Mortality at North Delta Intakes, Based on Delta Passage Model

Water Year[a]	Scenario[b]							
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	ESO_ELT 5%	ESO_LLT 5%
1976 (C)	15.5	15.5	20.4	21.2	19.3	22.7	18.4	21.6
1977 (C)	17.2	17.4	17.4	17.2	18.1	18.4	17.3	17.5
1978 (AN)	36.3	35.7	33.2	31.1	27.1	26.4	25.9	25.2
1979 (BN)	25.2	24.8	23.3	21.2	22.4	20.5	21.3	19.5
1980 (AN)	26.6	26.5	25.8	25.1	24.4	24.4	23.2	23.3
1981 (D)	20.2	20.2	19.5	19.6	19.4	21.8	18.5	20.8
1982 (W)	45.1	44.9	42.9	39.2	38.0	35.0	36.4	33.5
1983 (W)	53.0	52.5	52.5	51.0	51.8	47.2	49.4	45.0
1984 (W)	21.4	21.1	20.1	18.4	19.1	18.9	18.2	18.1
1985 (D)	24.1	24.2	22.4	23.5	21.8	24.7	20.7	23.5
1986 (W)	24.7	24.4	23.6	22.0	22.7	22.0	21.7	21.0
1987 (D)	21.5	21.5	21.9	22.9	21.8	24.0	20.7	22.8
1988 (C)	18.2	17.9	18.1	17.6	18.1	18.3	17.3	17.4
1989 (D)	27.2	27.1	27.7	28.5	27.9	29.2	26.6	27.9
1990 (C)	19.6	19.6	18.8	18.5	19.2	19.2	18.3	18.3
1991 (C)	17.0	17.1	17.0	17.5	17.6	18.0	16.8	17.2
Average	25.8	25.7	25.3	24.7	24.3	24.4	23.2	23.3
Median	22.8	22.8	22.1	21.6	21.8	22.4	20.7	21.3

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] ESO_ELT 5% and ESO_LLT 5% represent effects of 5% additional mortality in the north Delta intakes' reach.

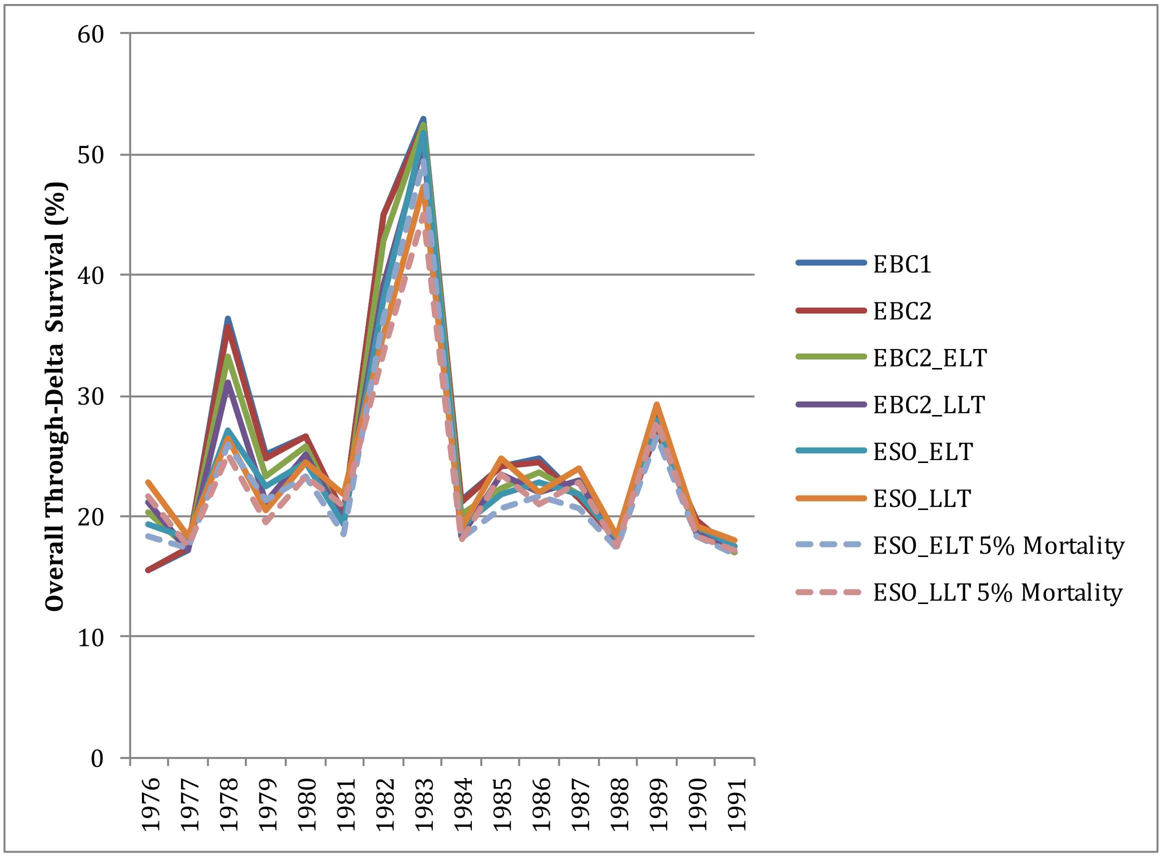


Figure 5C.5.3-21. Percentage of Sacramento River Fall-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results, Including Additional Runs to Assess Effect of 5% Additional Mortality in the North Delta Intakes Reach (Sac1)

5C.5.3.4.4 Late Fall–Run Chinook Salmon

5C.5.3.4.4.1 Overall Survival through the Delta

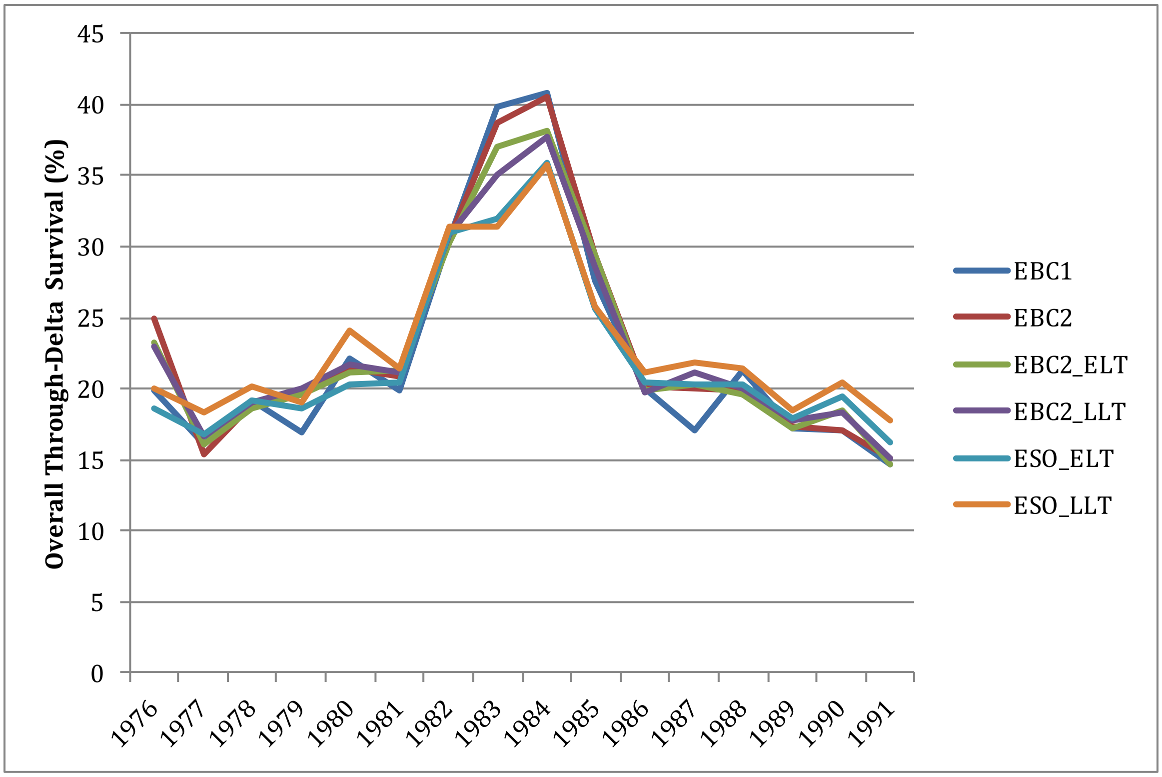
Overall through-Delta survival for late fall–run Chinook salmon was similar among the four EBC scenarios, ranging from around 15% in 1991, a critically dry year, to ~40% in 1984, a wet year, for overall averages of ~23% and medians of ~20% (Table 5C.5.3-48, Figure 5C.5.3-22). The range in survival for ESO scenarios, (~16–36%) was less than that of EBC scenarios. Survival under ESO scenarios averaged 22–23% (medians 20.2–21.3%) and the average and median survival under ESO scenarios were similar or slightly greater than under EBC scenarios (Table 5C.5.3-49).

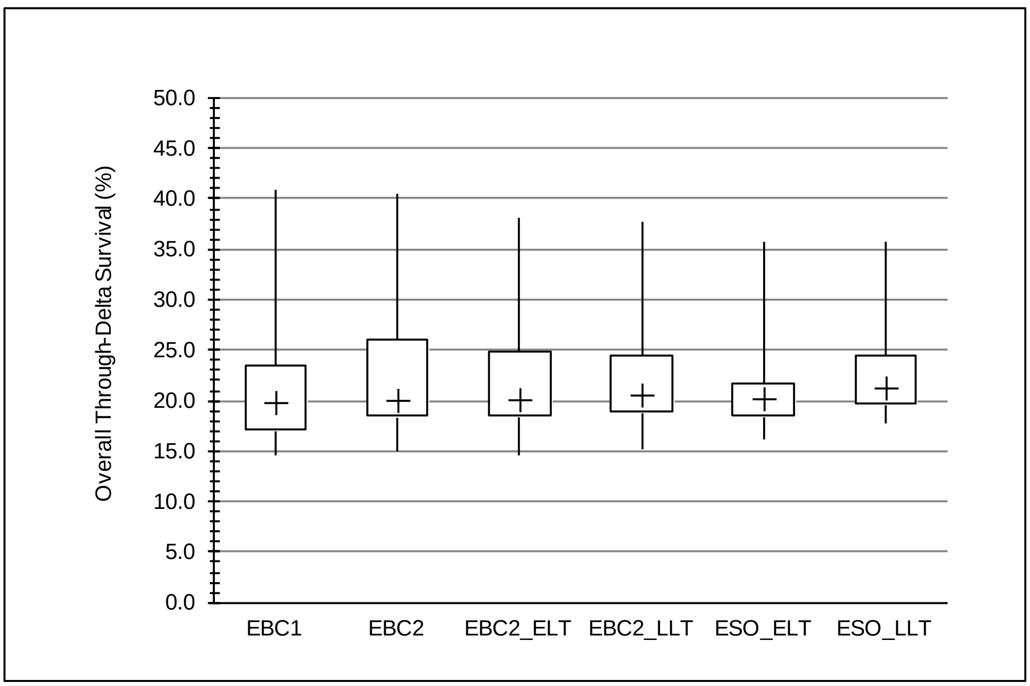
As with other Chinook salmon runs analyzed with the DPM, interpretation of the survival results is aided by consideration of the differences between scenarios in migration pathways and flow conditions. Under ESO scenarios late fall–run Chinook salmon entered the Yolo Bypass in every year of the 16-year simulation, whereas under EBC scenarios entry of >0.1% of smolts occurred in 6 years (Table 5C.5.3-50). However, because the late fall–run migration period assumed in the DPM (August–February, with a peak in November; see DPM methods) has less overlap with the period of Fremont Weir gate operation (i.e., December–April for the BDCP effects analysis modeling), the difference in percentage of smolts entering the Yolo Bypass between EBC and ESO scenarios was the least of any of the Chinook runs. As with other runs, survival down the mainstem Sacramento River and Sutter/Steamboat Sloughs pathways was lower under ESO scenarios compared to EBC scenarios (Table 5C.5.3-50) because of the lower flows in the Sacramento River under the ESO scenarios (Figure 5C.5.3-23). South Delta export flows under the EBC scenarios were considerable and lower under ESO scenarios (Figure 5C.5.3-24, Figure 5C.5.3-26). Because a large proportion of the late fall–run smolt population was assumed to migrate outside the main period of Delta Cross Channel closure (December–June), a relatively high proportion of the run took the interior Delta pathway under all scenarios (30–40%) (Table 5C.5.3-50), in contrast to winter-run, spring-run, and fall-run Chinook salmon (Table 5C.5.3-35, Table 5C.5.3-40, and Table 5C.5.3-45). Thus a greater proportion of the run experienced relatively higher survival under ESO scenarios through the interior Delta because of lower south Delta export flows under ESO scenarios compared to EBC scenarios. As noted for other Chinook salmon runs, there is a strong positive relationship between through-Delta survival and Sacramento River flows from the DPM results (Figure 5C.5.3-25), as would be expected given the flow-survival relationships that form the basis for the model. The regression lines on Figure 5C.5.3-25 are for each scenario, with the ESO scenario lines above the EBC scenarios lines. Overall, the DPM results for late fall–run Chinook salmon demonstrated that survival under the ESO scenarios generally was similar to or slightly higher than that of the EBC scenarios.

Table 5C.5.3-48. Percentage of Late Fall–Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976 (C)	19.8	25.0	23.3	23.0	18.6	20.0
1977 (C)	16.1	15.3	16.0	16.7	16.7	18.3
1978 (AN)	19.1	18.9	18.7	19.1	19.1	20.1
1979 (BN)	16.9	19.6	19.6	20.0	18.5	19.0
1980 (AN)	22.2	21.5	21.1	21.7	20.2	24.1
1981 (D)	19.9	20.9	21.3	21.2	20.5	21.5
1982 (W)	30.5	30.6	30.3	30.8	31.0	31.4
1983 (W)	39.8	38.7	37.0	35.0	32.0	31.4
1984 (W)	40.9	40.6	38.1	37.7	35.8	35.8
1985 (D)	27.7	29.4	29.5	28.6	25.6	25.8
1986 (W)	20.1	20.1	19.9	19.8	20.4	21.2
1987 (D)	17.1	20.1	20.3	21.1	20.2	21.9
1988 (C)	21.2	19.9	19.7	20.1	20.3	21.5
1989 (D)	17.2	17.3	17.3	17.8	17.9	18.4
1990 (C)	17.0	17.1	18.5	18.4	19.5	20.4
1991 (C)	14.6	15.0	14.6	15.1	16.2	17.7
Average	22.5	23.1	22.8	22.9	22.0	23.0
Median	19.9	20.1	20.1	20.6	20.2	21.3

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-22. Late Fall–Run Chinook Salmon through-Delta Smolt Survival, Based on Delta Passage Model Results

Table 5C.5.3-49. Differences[a] between EBC and ESO Scenarios in Percentage of Late Fall–Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model

Water Year[b]	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
1976 (C)	-1.3 (-6%)	0.2 (1%)	-6.4 (-26%)	-5.0 (-20%)	-4.7 (-20%)	-3.0 (-13%)
1977 (C)	0.6 (4%)	2.2 (14%)	1.4 (9%)	3.0 (20%)	0.7 (4%)	1.7 (10%)
1978 (AN)	0.0 (0%)	1.0 (5%)	0.2 (1%)	1.2 (7%)	0.4 (2%)	1.0 (5%)
1979 (BN)	1.7 (10%)	2.2 (13%)	-1.0 (-5%)	-0.5 (-3%)	-1.1 (-5%)	-1.0 (-5%)
1980 (AN)	-1.9 (-9%)	1.9 (9%)	-1.2 (-6%)	2.6 (12%)	-0.9 (-4%)	2.4 (11%)
1981 (D)	0.6 (3%)	1.6 (8%)	-0.4 (-2%)	0.6 (3%)	-0.8 (-4%)	0.3 (1%)
1982 (W)	0.5 (2%)	0.8 (3%)	0.4 (1%)	0.8 (3%)	0.7 (2%)	0.6 (2%)
1983 (W)	-7.8 (-20%)	-8.4 (-21%)	-6.7 (-17%)	-7.3 (-19%)	-4.9 (-13%)	-3.6 (-10%)
1984 (W)	-5.0 (-12%)	-5.1 (-12%)	-4.8 (-12%)	-4.8 (-12%)	-2.3 (-6%)	-1.9 (-5%)
1985 (D)	-2.1 (-7%)	-1.9 (-7%)	-3.8 (-13%)	-3.7 (-12%)	-3.9 (-13%)	-2.9 (-10%)
1986 (W)	0.3 (2%)	1.1 (6%)	0.3 (1%)	1.1 (5%)	0.4 (2%)	1.4 (7%)
1987 (D)	3.1 (18%)	4.8 (28%)	0.2 (1%)	1.8 (9%)	-0.1 (-1%)	0.7 (3%)
1988 (C)	-1.0 (-4%)	0.2 (1%)	0.4 (2%)	1.6 (8%)	0.6 (3%)	1.4 (7%)
1989 (D)	0.7 (4%)	1.2 (7%)	0.7 (4%)	1.1 (7%)	0.7 (4%)	0.6 (3%)
1990 (C)	2.4 (14%)	3.4 (20%)	2.3 (14%)	3.3 (19%)	0.9 (5%)	2.0 (11%)
1991 (C)	1.6 (11%)	3.1 (21%)	1.2 (8%)	2.7 (18%)	1.6 (11%)	2.7 (18%)
Average	-0.5 (-2%)	0.5 (2%)	-1.1 (-5%)	-0.1 (0%)	-0.8 (-3%)	0.2 (1%)
Median	0.4 (2%)	1.2 (6%)	0.2 (1%)	1.1 (5%)	0.2 (1%)	0.7 (3%)

[a] Negative values indicate lower survival under ESO scenarios than under EBC scenarios.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-50. Percentage Use and Survival of Late Fall–Run Chinook Salmon Smolts Migrating Down Different Through-Delta Pathways under EBC and ESO Scenarios[a], based on Delta Passage Model

	Yolo Bypass Pathway (Yolo-Sac4)												Mainstem Sacramento River Pathway (Verona-Sac1-Sac2-Sac3-Sac4)											
	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway						Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	0.0	0.0	0.0	0.0	1.5	1.5					46.6	46.6	36.7	40.9	38.2	36.6	35.0	36.9	24.1	28.5	27.4	27.1	20.3	21.1
1977	0.0	0.0	0.0	0.0	1.8	1.9					44.7	44.1	30.4	30.1	33.0	30.3	34.2	37.4	20.4	18.5	19.1	20.2	19.1	19.9
1978	0.4	0.4	0.5	0.6	3.6	4.4	51.3	51.3	51.5	52.1	47.7	47.6	33.9	33.3	32.8	32.3	34.8	36.1	25.2	25.2	24.7	25.1	23.0	23.2
1979	0.0	0.0	0.0	0.0	2.2	2.0					47.6	47.8	31.3	33.1	32.8	33.2	34.1	35.7	22.3	25.4	25.4	25.6	21.2	20.6
1980	0.9	0.8	0.9	0.7	4.5	4.3	48.0	47.9	48.0	48.4	45.0	44.9	35.8	35.3	34.4	35.1	35.4	39.7	28.9	28.2	27.9	27.5	24.0	26.5
1981	0.0	0.0	0.0	0.0	2.0	1.9	61.8				47.7	47.6	32.6	33.0	33.3	32.8	35.2	36.5	26.2	26.4	26.7	26.1	24.2	24.5
1982	4.0	3.5	4.4	3.5	7.8	7.5	44.9	44.3	44.1	43.9	44.7	45.0	36.0	36.4	35.8	36.9	37.1	37.4	34.2	34.4	33.7	33.6	32.0	32.0
1983	1.7	1.7	2.1	1.8	7.3	7.7	49.2	49.2	48.9	49.0	47.3	47.2	41.5	41.4	40.4	39.1	38.8	37.4	44.0	42.8	41.1	39.7	32.3	32.1
1984	8.0	8.0	9.5	8.7	11.6	10.7	44.9	44.9	44.8	44.6	45.3	45.3	39.9	39.9	37.2	37.2	37.3	37.3	46.2	45.9	43.7	43.2	38.0	37.8
1985	0.0	0.0	0.0	0.0	1.3	1.1					48.0	48.5	40.3	40.6	41.3	41.5	39.5	40.4	32.8	34.4	34.1	32.3	28.6	27.9
1986	0.2	0.2	0.3	0.3	2.9	2.7	43.6	43.6	43.6	43.6	46.9	47.0	32.9	32.8	32.2	31.7	34.8	35.6	26.5	26.5	26.1	25.5	23.5	23.7
1987	0.0	0.0	0.0	0.0	1.8	2.0					45.2	45.1	31.0	33.2	33.1	34.3	34.8	36.7	22.9	24.9	25.1	25.3	22.9	24.0
1988	0.0	0.0	0.0	0.0	2.9	2.8					50.5	50.6	35.4	35.2	34.8	34.5	36.6	37.4	27.5	25.5	25.3	25.3	23.8	23.9
1989	0.0	0.0	0.0	0.0	1.9	1.6					45.6	45.5	32.9	32.9	32.3	32.7	34.7	35.9	21.5	21.7	21.7	21.4	20.7	20.8
1990	0.0	0.0	0.0	0.0	2.0	2.0					46.9	47.1	31.9	31.6	33.6	32.6	37.8	35.2	23.1	22.7	24.3	22.8	22.7	23.7
1991	0.0	0.0	0.0	0.0	2.1	2.6					46.9	46.9	29.7	30.0	29.2	29.0	33.2	35.6	18.4	19.2	18.8	18.7	19.1	19.2
Average	1.0	0.9	1.1	1.0	3.6	3.5	49.1	46.9	46.8	46.9	46.7	46.7	34.5	35.0	34.7	34.4	35.8	36.9	27.8	28.1	27.8	27.5	24.7	25.1
Median	0.0	0.0	0.0	0.0	2.1	2.3	48.0	46.4	46.4	46.5	46.9	46.9	33.4	33.2	33.5	33.8	35.1	36.8	25.7	26.0	25.7	25.5	23.3	23.8

	Sutter/Steamboat Sloughs Pathway (Verona-Sac1-Sac2-SS-Sac4)												Interior Delta via Georgiana Slough and Delta Cross Channel Pathway (Sac1-Sac2-Geo/DCC-Interior Delta)											
	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway						Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	27.9	30.4	29.4	29.5	25.6	28.7	29.4	34.3	33.0	32.8	25.9	26.8	35.4	28.7	32.4	33.9	37.9	32.9	7.9	10.1	9.6	10.1	10.9	11.6
1977	22.4	22.0	23.8	24.3	23.4	27.1	23.9	23.2	23.5	24.3	22.4	24.0	47.1	47.9	43.2	45.4	40.7	33.6	9.7	9.7	9.5	10.2	10.2	10.6
1978	24.7	24.4	24.7	25.7	24.2	26.7	27.2	27.1	26.7	26.5	25.6	24.7	40.9	41.9	42.1	41.4	37.5	32.9	8.9	8.8	8.8	9.2	8.6	9.3
1979	24.0	26.1	26.4	27.4	24.6	27.0	25.7	27.7	27.7	27.9	24.8	24.0	44.8	40.7	40.8	39.3	39.2	35.3	8.4	9.6	9.7	9.8	10.7	12.1
1980	27.4	27.0	26.9	28.3	25.2	30.4	30.6	30.3	29.7	29.8	26.3	29.5	35.9	36.9	37.8	35.8	35.0	25.5	8.3	8.0	8.3	8.9	9.0	10.4
1981	24.5	25.2	26.1	26.5	24.7	27.7	29.2	29.8	30.3	29.9	26.0	26.2	42.9	41.8	40.6	40.7	38.1	34.0	9.8	11.1	11.0	11.5	12.1	12.8
1982	29.5	29.8	29.8	31.3	29.0	30.9	44.3	44.0	43.6	43.1	42.1	41.2	30.5	30.2	30.0	28.3	26.2	24.1	11.0	11.0	10.9	11.9	13.2	13.6
1983	34.4	34.2	33.9	33.7	30.0	31.0	50.4	49.5	47.8	46.4	40.1	39.6	22.3	22.6	23.6	25.5	23.9	24.0	15.2	14.1	13.4	12.1	16.7	14.7
1984	33.3	33.2	32.2	32.9	29.7	31.6	48.4	48.2	46.3	45.6	42.2	41.3	18.8	18.9	21.1	21.3	21.4	20.4	14.6	14.0	12.9	13.1	18.0	18.6
1985	30.5	30.8	31.9	32.8	29.1	31.9	37.9	39.8	39.2	37.5	33.3	32.6	29.2	28.6	26.8	25.6	30.1	26.6	9.8	11.2	10.8	11.3	13.2	13.4
1986	25.4	25.4	25.3	26.0	24.8	27.6	29.4	29.3	29.2	29.0	28.0	28.4	41.5	41.5	42.2	42.0	37.5	34.0	9.1	9.2	9.5	9.5	10.3	10.5
1987	23.9	25.6	25.9	27.7	25.3	28.3	27.4	29.6	29.6	30.1	27.9	28.8	45.1	41.2	41.0	38.0	38.1	33.0	7.6	10.3	10.7	10.9	11.6	12.2
1988	26.2	25.7	26.0	27.1	25.6	28.5	29.0	27.3	27.1	27.2	25.6	27.2	38.4	39.1	39.2	38.4	34.9	31.3	10.1	9.9	9.8	10.4	10.2	10.8
1989	23.5	23.6	23.9	25.3	24.0	27.0	26.4	26.4	26.5	26.8	25.8	25.2	43.6	43.5	43.8	42.0	39.3	35.5	9.0	9.0	9.0	9.6	9.3	9.6
1990	23.7	23.4	25.4	25.4	26.0	27.5	26.1	26.7	27.1	27.8	26.0	28.6	44.4	45.0	40.9	42.1	34.2	35.3	7.9	8.2	8.5	9.3	9.3	9.3
1991	21.4	21.7	21.7	22.8	22.4	25.4	22.0	22.2	21.6	21.3	21.6	22.8	48.9	48.3	49.0	48.1	42.3	36.4	9.1	9.2	9.1	9.9	9.6	10.6
Average	26.4	26.8	27.1	27.9	25.9	28.6	31.7	32.2	31.8	31.6	29.0	29.4	38.1	37.3	37.2	36.7	34.8	30.9	9.8	10.2	10.1	10.5	11.4	11.9
Median	25.0	25.6	26.1	27.3	25.2	28.0	29.1	29.4	29.4	29.4	26.0	27.8	41.2	41.0	40.7	38.9	37.5	33.0	9.1	9.8	9.6	10.1	10.5	11.2

[a] See Table 5C.0-1 for definitions of the scenarios. Survival down the Yolo Bypass Pathway is blank if no fish took that pathway.

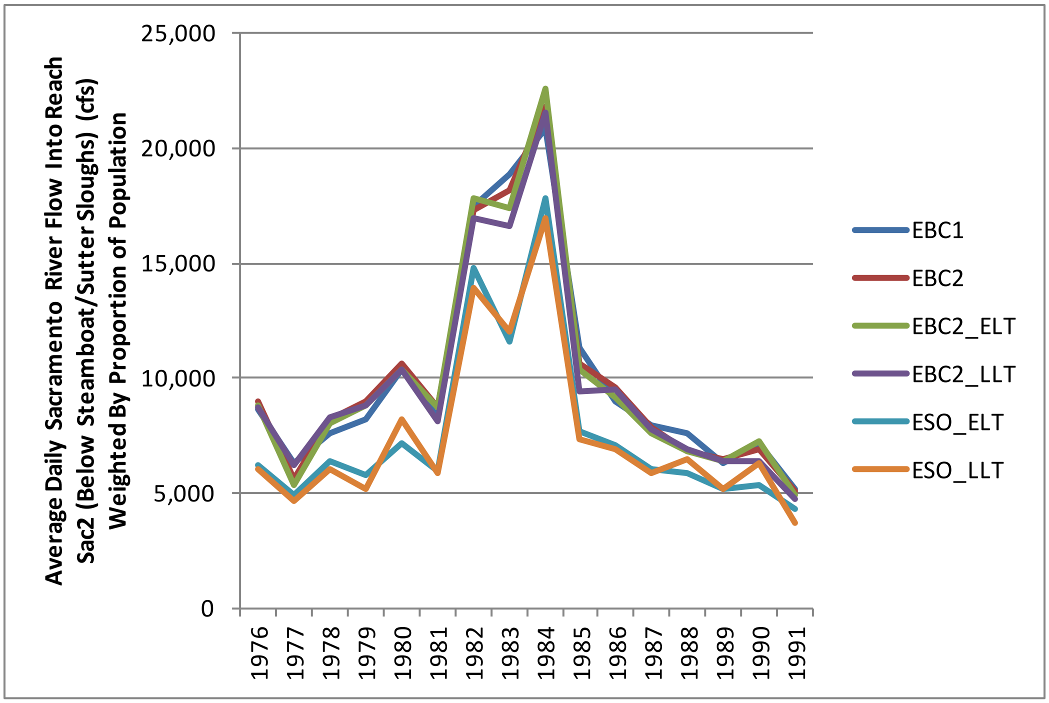


Figure 5C.5.3-23. Daily Average Flow into Reach Sac2 (Sacramento River below Sutter/Steamboat Sloughs), Weighted by Daily Proportion of Late Fall–Run Chinook Salmon Smolts Entering Reach Sac2, By Water Year and Scenario From Delta Passage Model Results

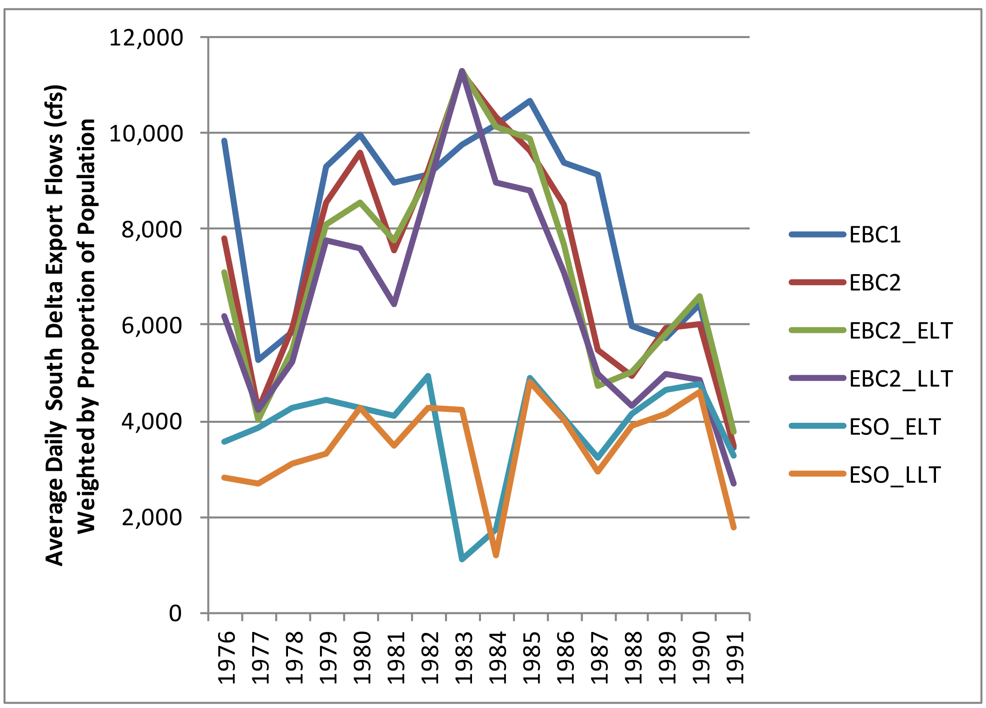


Figure 5C.5.3-24. Daily Average South Delta Export Flow, Weighted by Daily Proportion of Late Fall–Run Chinook Salmon Smolts Entering the Interior Delta, By Water Year and Scenario From Delta Passage Model Results

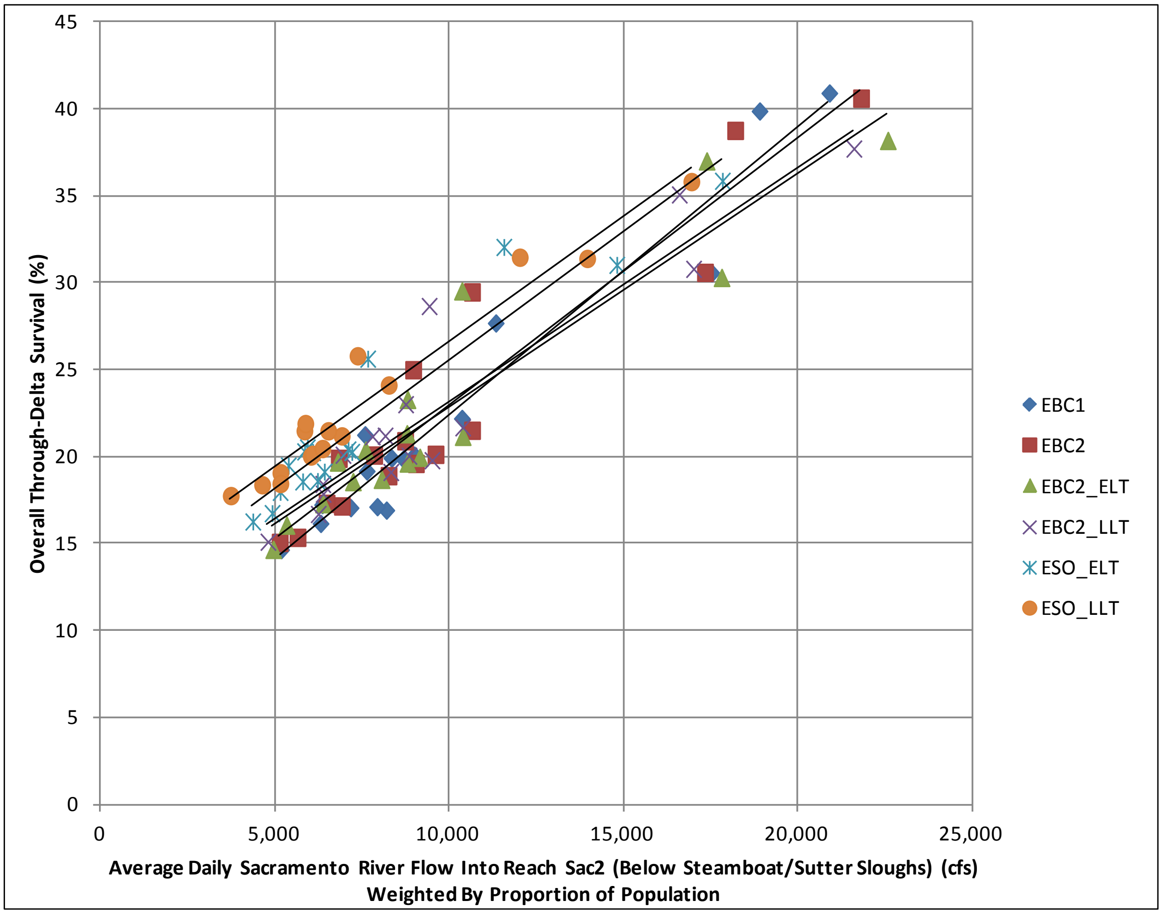


Figure 5C.5.3-25. Relationship between Weighted-Average Flow into Reach Sac2 and Overall Through-Delta Survival of Late Fall–Run Chinook Salmon, From Delta Passage Model Results

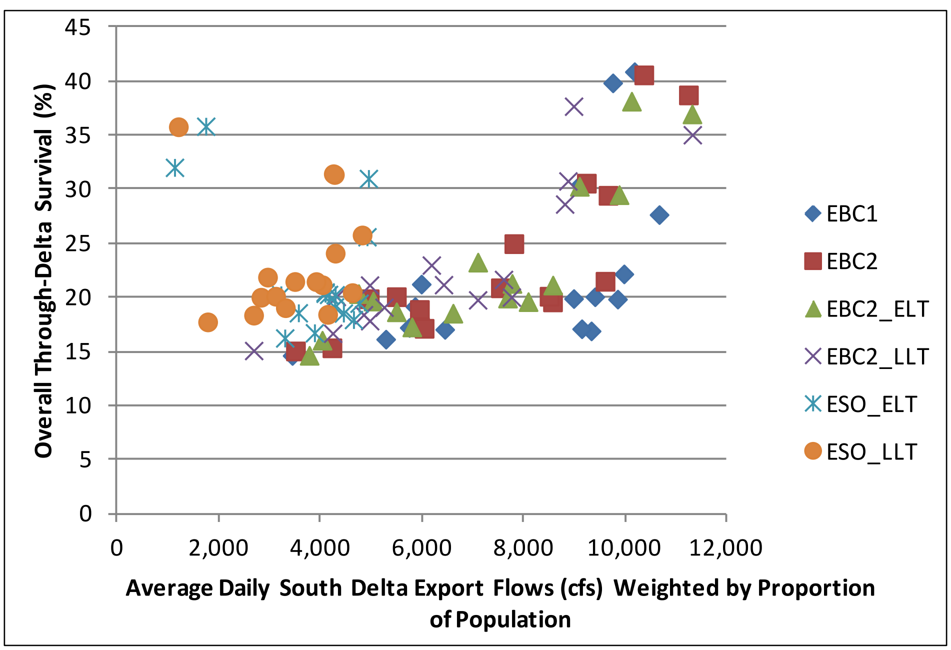


Figure 5C.5.3-26. Relationship between Weighted-Average South Delta Exports and Overall Through-Delta Survival of Late Fall–Run Chinook Salmon, From Delta Passage Model Results

5C.5.3.4.4.2 Effects of Nonphysical Fish Barriers and Predation

Postprocessing of the DPM results to examine the potential effect of a 67% proportional reduction in late fall–run Chinook salmon smolts entering the Interior Delta through Georgiana Slough, showed that the average survival was around 2.6–3.0% greater than the original ESO_ELT and ESO_LLT, or 11–14% in relative terms (Table 5C.5.3-51, Figure 5C.5.3-27). Relative differences between median values were similar (13–15%). As noted in the DPM methods, the assumption of a 67% proportional reduction in entry into the Interior Delta for late fall–run Chinook salmon actually involves assuming that there would be deterrence not only from entering Georgiana Slough but also the Delta Cross Channel, as the latter is largely open during the assumed late fall–run August-February migration period.

Table 5C.5.3-51. Percentage of Late Fall–Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios and Considering Nonphysical Barrier Deterrence from Georgiana Slough, Based on Delta Passage Model

Water Year[a]	Scenario[b]							
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	ESO_ELT 67%	ESO_LLT 67%[c]
1976 (C)	19.8	25.0	23.3	23.0	18.6	20.0	20.9	22.1
1977 (C)	16.1	15.3	16.0	16.7	16.7	18.3	19.1	20.4
1978 (AN)	19.1	18.9	18.7	19.1	19.1	20.1	22.7	23.2
1979 (BN)	16.9	19.6	19.6	20.0	18.5	19.0	21.3	21.0
1980 (AN)	22.2	21.5	21.1	21.7	20.2	24.1	23.8	26.8
1981 (D)	19.9	20.9	21.3	21.2	20.5	21.5	23.6	24.1
1982 (W)	30.5	30.6	30.3	30.8	31.0	31.4	34.3	34.3
1983 (W)	39.8	38.7	37.0	35.0	32.0	31.4	34.5	34.2
1984 (W)	40.9	40.6	38.1	37.7	35.8	35.8	38.7	38.4
1985 (D)	27.7	29.4	29.5	28.6	25.6	25.8	28.7	28.3
1986 (W)	20.1	20.1	19.9	19.8	20.4	21.2	23.7	24.2
1987 (D)	17.1	20.1	20.3	21.1	20.2	21.9	23.1	24.5
1988 (C)	21.2	19.9	19.7	20.1	20.3	21.5	23.5	24.2
1989 (D)	17.2	17.3	17.3	17.8	17.9	18.4	20.9	21.1
1990 (C)	17.0	17.1	18.5	18.4	19.5	20.4	22.5	23.8
1991 (C)	14.6	15.0	14.6	15.1	16.2	17.7	18.9	19.8
Average	22.5	23.1	22.8	22.9	22.0	23.0	25.0	25.7
Median	19.9	20.1	20.1	20.6	20.2	21.3	23.3	24.1

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] ESO_ELT 67% and ESO_LLT 67% represent effects of a 67% proportional reduction in entry into Georgiana Slough due to nonphysical barrier deterrence.

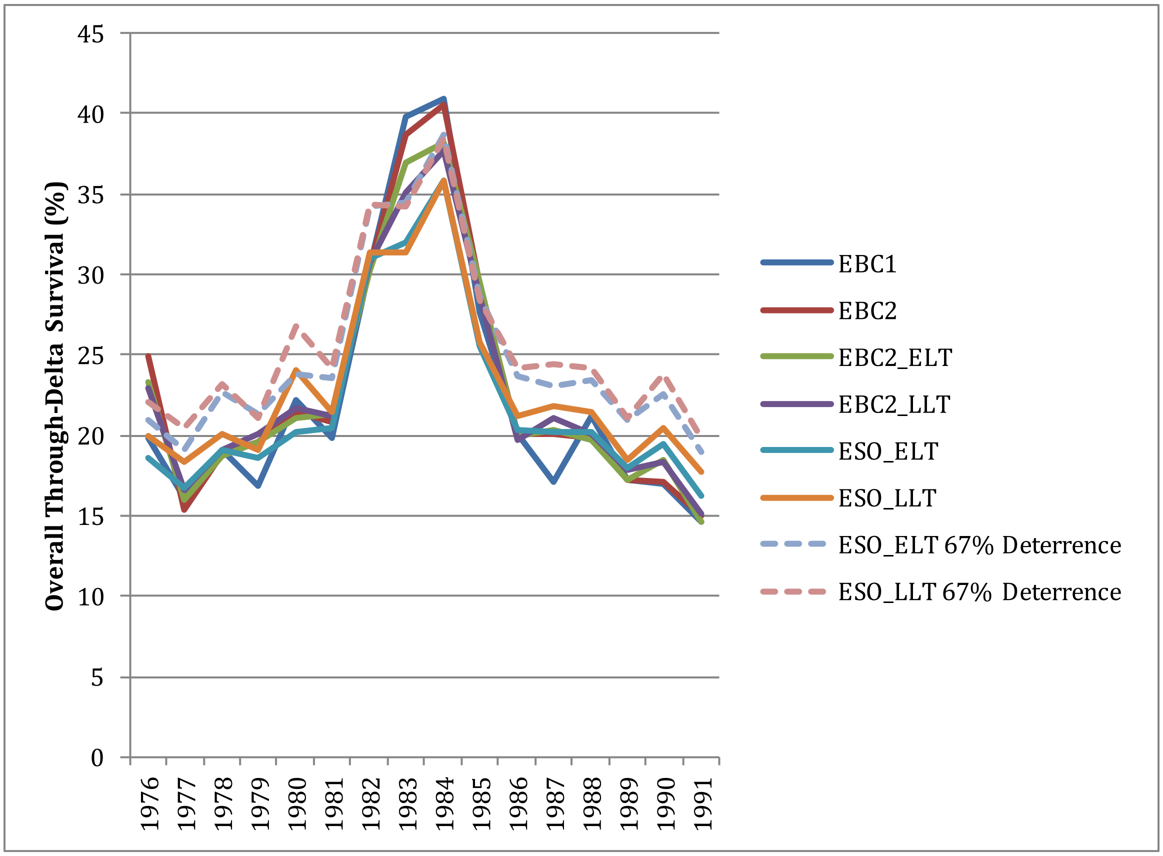


Figure 5C.5.3-27. Percentage of Late Fall–Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results, Including Additional Runs to Assess Effect of a 67% Proportional Reduction in Entry into Georgiana Slough Due to Nonphysical Barrier Deterrence

The analysis to examine the effect of a survival reduction of 5% because of additional predation mortality in the Sacramento River reach containing the proposed north Delta intakes showed that overall average and median through-Delta survival was ~1% less in absolute terms (5% relative difference) than the original results for the ESO scenarios (Table 5C.5.3-52, Figure 5C.5.3-28).

Table 5C.5.3-52. Percentage of Late Fall–Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios and Considering Additional Mortality at North Delta Intakes, Based on Delta Passage Model

Water Year[a]	Scenario[b]							
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	ESO_ELT 5%[c]	ESO_LLT 5%[c]
1976 (C)	19.8	25.0	23.3	23.0	18.6	20.0	17.7	19.0
1977 (C)	16.1	15.3	16.0	16.7	16.7	18.3	15.9	17.5
1978 (AN)	19.1	18.9	18.7	19.1	19.1	20.1	18.2	19.2
1979 (BN)	16.9	19.6	19.6	20.0	18.5	19.0	17.7	18.1
1980 (AN)	22.2	21.5	21.1	21.7	20.2	24.1	19.3	23.0
1981 (D)	19.9	20.9	21.3	21.2	20.5	21.5	19.5	20.4
1982 (W)	30.5	30.6	30.3	30.8	31.0	31.4	29.6	30.0
1983 (W)	39.8	38.7	37.0	35.0	32.0	31.4	30.6	30.0
1984 (W)	40.9	40.6	38.1	37.7	35.8	35.8	34.3	34.2
1985 (D)	27.7	29.4	29.5	28.6	25.6	25.8	24.4	24.5
1986 (W)	20.1	20.1	19.9	19.8	20.4	21.2	19.4	20.2
1987 (D)	17.1	20.1	20.3	21.1	20.2	21.9	19.3	20.8
1988 (C)	21.2	19.9	19.7	20.1	20.3	21.5	19.3	20.5
1989 (D)	17.2	17.3	17.3	17.8	17.9	18.4	17.1	17.5
1990 (C)	17.0	17.1	18.5	18.4	19.5	20.4	18.5	19.5
1991 (C)	14.6	15.0	14.6	15.1	16.2	17.7	15.5	16.9
Average	22.5	23.1	22.8	22.9	22.0	23.0	21.0	22.0
Median	19.9	20.1	20.1	20.6	20.2	21.3	19.3	20.3

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] ESO_ELT 5% and ESO_LLT 5% represent effects of 5% additional mortality in the north Delta intakes' reach.

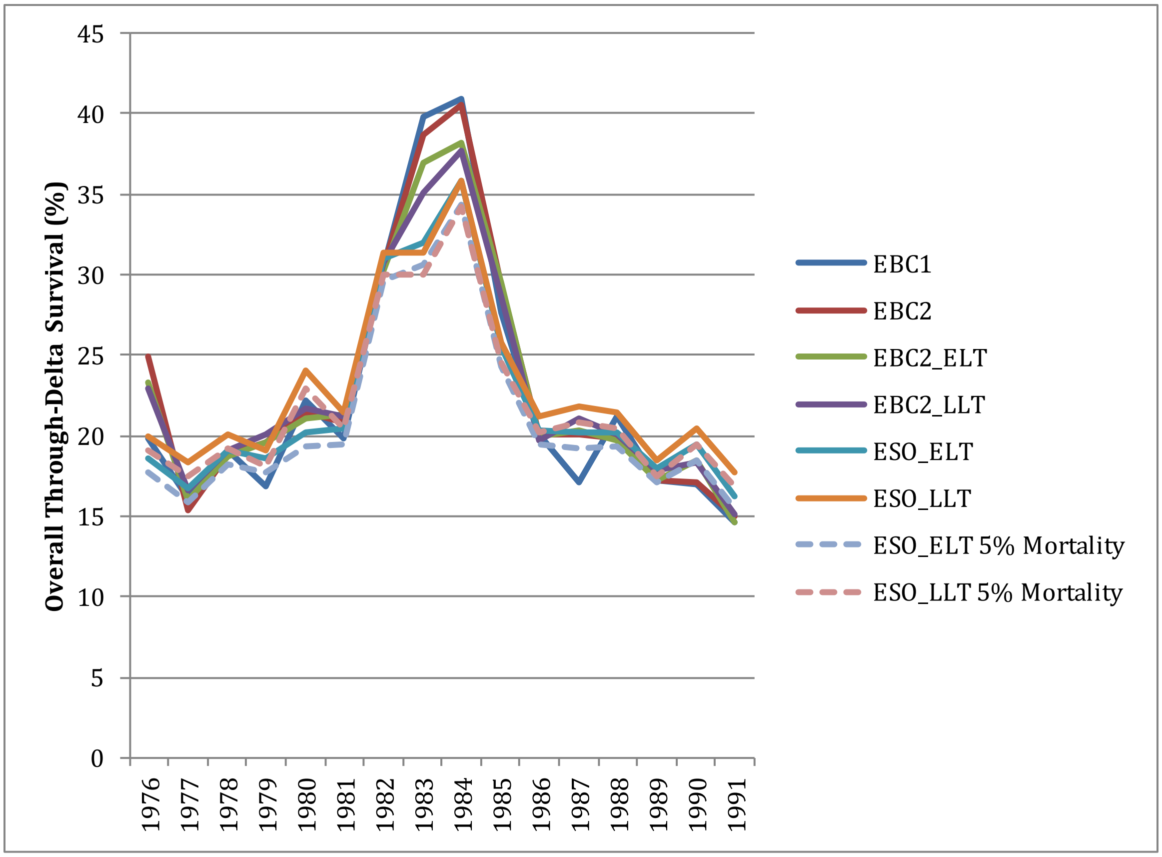


Figure 5C.5.3-28. Percentage of Late Fall–Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model Results, Including Additional Runs to Assess Effect of 5% Additional Mortality in the North Delta Intakes Reach (Sac1)

5C.5.3.4.5 San Joaquin River Fall-Run Chinook Salmon

Overall through-Delta survival of San Joaquin River Chinook salmon smolts from DPM modeling under EBC scenarios ranged from ~9% (1977, 1987, and 1989) to ~35% (1983) (Table 5C.5.3-53, Figure 5C.5.3-29). There was considerable skew in the data caused by the very high survival estimated for the wet years of 1982 and 1983. The skew was less pronounced in results for ESO scenarios, which ranged in survival from ~10% (1977, 1988–1990) to ~23% in 1982. The skew in the data led to survival averaging 0.3–0.7% (2–5% in relative terms) less under ESO scenarios compared to EBC scenarios, whereas comparison of median differences gave 0.9–1.3% (8–11%) greater survival under ESO scenarios (Table 5C.5.3-54).

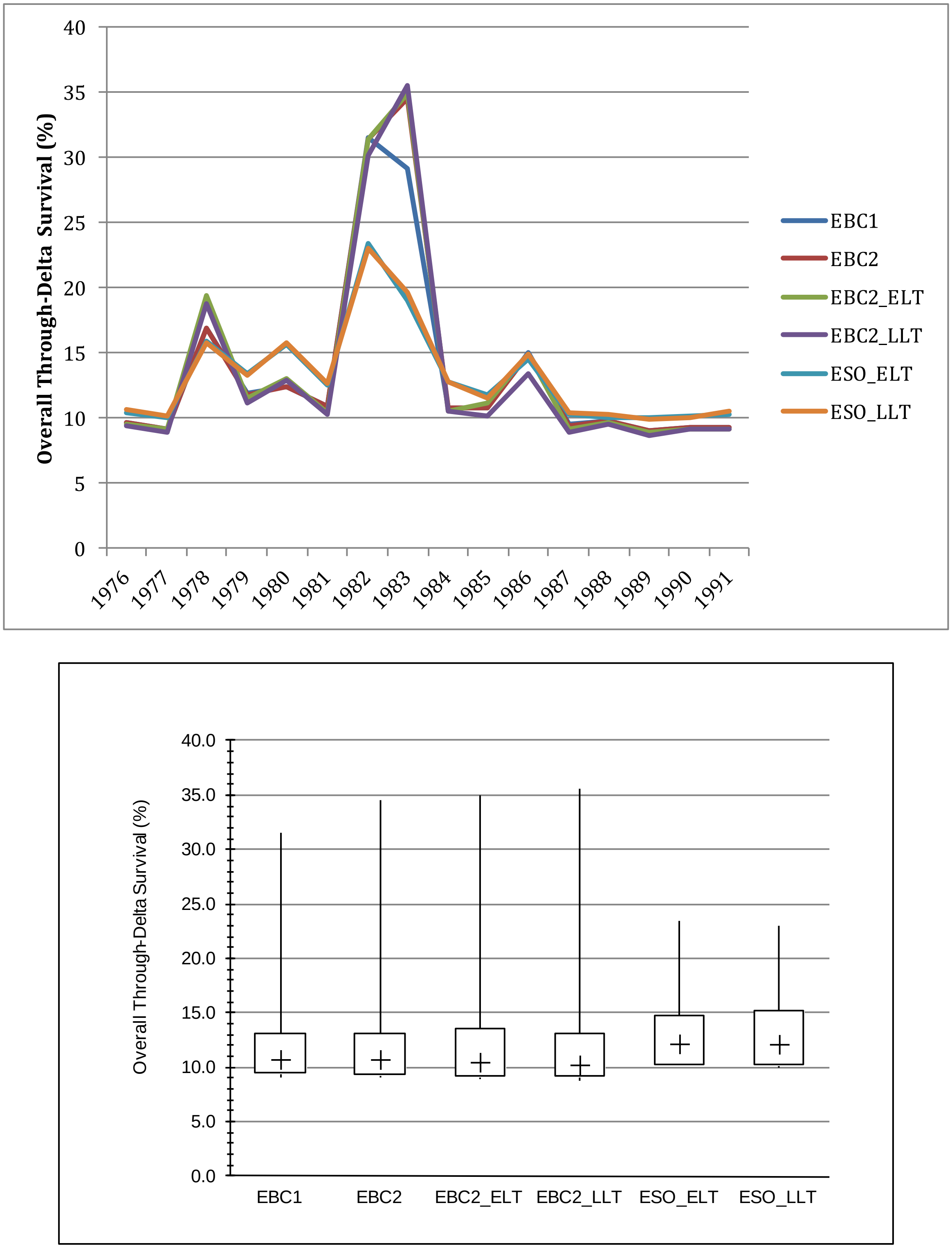
The results for San Joaquin River fall-run Chinook salmon smolts can be explained by considering some of the outputs of the modeling, as well as the inputs to the DPM and the model assumptions. Because the ESO scenarios include an operable gate at the Head of Old River that was assumed generally to be operated ~50% of the time during the migration period for this population, the DPM results for pathway-specific migration show appreciably less smolts using the lower-survival Old River pathway under ESO scenarios (average 30–33%, compared to 54–56% under EBC scenarios; Table 5C.5.3-55). However, in 1982 and 1983 the percentage of smolts using the Old River pathway was very similar between ESO and EBC scenarios because flows were very high in this wet year (Figure 5C.5.3-30) and exceeded the 10,000-cfs Vernalis criterion for the Head of Old River gate to be allowed to be closed. In addition, in 1982 and 1983 there was considerably greater average south

Delta export flows under EBC scenarios (~6,000–8,000 cfs) than under ESO scenarios (40–2,000 cfs) (Figure 5C.5.3-31) which led to appreciably lower survival under ESO scenarios because, as noted in the DPM methods, the DPM assumes a positive relationship between south Delta exports and survival based on Newman's (2010) modeling. There is some uncertainty regarding the effects that the very low south Delta exports modeled for ESO scenarios in 1983 (i.e., 40–50 cfs) might have on San Joaquin River Chinook salmon smolt survival because this level of exports is considerably lower than the minimum exports during the periods modeled by Newman (2010; i.e., ~800 cfs). The other year in which similar percentages of smolts took the Old River pathway under ESO and EBC scenarios was 1978, for which overall survival was lower under the ESO scenarios than under the EBC scenarios, but not to the same extent as observed for 1982 and 1983 because there was a less pronounced difference in exports between ESO and EBC scenarios in 1978. In the remaining 13 years of the DPM modeling, there generally was greater survival under the ESO scenarios because the operable gate at the Head of Old River kept an appreciable portion of smolts in the higher-survival San Joaquin River pathway (Table 5C.5.3-54). Thus in contrast to other runs, higher levels of river flow (in this case flows in the San Joaquin River in the interior Delta) are associated with lower through-Delta survival under ESO scenarios compared to EBC scenarios—this is shown with the regression lines for survival against flow for ESO scenarios in Figure 5C.5.3-32 being below the regression lines for EBC scenarios at higher flows. There is a more linear relationship between EBC through-Delta survival and south Delta export flows from the DPM results (Figure 5C.5.3-33). Overall, the DPM results suggested that San Joaquin River fall-run Chinook salmon survival generally would be higher under ESO scenarios than EBC scenarios, although there was high modeled survival under EBC scenarios in wet years because of the positive relationship between survival and exports that is assumed in DPM.

Table 5C.5.3-53. Percentage of San Joaquin River Fall-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976 (C)	9.7	9.7	9.6	9.4	10.5	10.6
1977 (C)	9.1	9.2	9.2	8.9	10.0	10.2
1978 (AN)	17.0	16.9	19.4	18.7	15.9	15.8
1979 (BN)	11.9	11.8	11.6	11.2	13.4	13.3
1980 (AN)	12.5	12.4	13.1	13.0	15.6	15.8
1981 (D)	11.0	10.9	10.4	10.3	12.6	12.7
1982 (W)	31.5	31.4	31.4	30.2	23.4	23.0
1983 (W)	29.2	34.5	34.9	35.6	19.1	19.7
1984 (W)	10.8	10.8	10.6	10.5	12.8	12.8
1985 (D)	10.7	10.7	11.2	10.2	11.8	11.6
1986 (W)	15.0	15.0	14.9	13.4	14.5	15.0
1987 (D)	9.5	9.4	9.2	8.9	10.3	10.4
1988 (C)	9.8	9.7	9.7	9.5	10.1	10.2
1989 (D)	9.1	9.0	9.0	8.7	10.1	9.9
1990 (C)	9.3	9.3	9.2	9.2	10.1	10.1
1991 (C)	9.3	9.3	9.2	9.2	10.3	10.6
Average	13.5	13.7	13.9	13.5	13.2	13.2
Median	10.8	10.7	10.5	10.3	12.2	12.1

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.



Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-29. San Joaquin River Fall-Run Chinook Salmon through-Delta Smolt Survival, Based on Delta Passage Model Results

Table 5C.5.3-54. Differences[a] between EBC and ESO Scenarios in Percentage of San Joaquin River Fall-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model

Water Year[b]	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
1976 (C)	0.8 (8%)	0.9 (10%)	0.8 (8%)	1.0 (10%)	0.9 (9%)	1.2 (13%)
1977 (C)	0.9 (10%)	1.1 (12%)	0.9 (9%)	1.0 (11%)	0.9 (10%)	1.3 (15%)
1978 (AN)	-1.0 (-6%)	-1.2 (-7%)	-0.9 (-5%)	-1.1 (-6%)	-3.5 (-18%)	-3.0 (-16%)
1979 (BN)	1.5 (12%)	1.3 (11%)	1.6 (13%)	1.5 (13%)	1.8 (15%)	2.1 (19%)
1980 (AN)	3.2 (26%)	3.3 (27%)	3.2 (26%)	3.3 (27%)	2.6 (20%)	2.8 (22%)
1981 (D)	1.6 (14%)	1.7 (16%)	1.7 (16%)	1.8 (17%)	2.1 (21%)	2.4 (23%)
1982 (W)	-8.0 (-25%)	-8.5 (-27%)	-8.0 (-25%)	-8.4 (-27%)	-7.9 (-25%)	-7.2 (-24%)
1983 (W)	-10.1 (-35%)	-9.5 (-33%)	-15.4 (-45%)	-14.8 (-43%)	-15.8 (-45%)	-15.9 (-45%)
1984 (W)	2.1 (19%)	2.0 (19%)	2.1 (19%)	2.0 (19%)	2.3 (21%)	2.2 (21%)
1985 (D)	1.1 (10%)	0.9 (8%)	1.1 (10%)	0.9 (8%)	0.6 (5%)	1.4 (13%)
1986 (W)	-0.5 (-3%)	-0.1 (0%)	-0.5 (-3%)	0.0 (0%)	-0.4 (-2%)	1.6 (12%)
1987 (D)	0.8 (8%)	0.9 (9%)	0.8 (9%)	0.9 (10%)	1.1 (12%)	1.5 (17%)
1988 (C)	0.2 (3%)	0.4 (4%)	0.3 (4%)	0.5 (5%)	0.4 (4%)	0.7 (8%)
1989 (D)	1.0 (11%)	0.8 (9%)	1.1 (12%)	0.9 (10%)	1.1 (13%)	1.2 (14%)
1990 (C)	0.8 (9%)	0.8 (9%)	0.9 (9%)	0.9 (9%)	0.9 (10%)	0.9 (10%)
1991 (C)	1.0 (11%)	1.3 (14%)	1.0 (11%)	1.3 (15%)	1.1 (12%)	1.4 (16%)
Average	-0.3 (-2%)	-0.2 (-2%)	-0.6 (-4%)	-0.5 (-4%)	-0.7 (-5%)	-0.3 (-2%)
Median	0.9 (8%)	0.9 (8%)	0.9 (8%)	0.9 (8%)	0.9 (8%)	1.3 (11%)

[a] Negative values indicate lower survival under ESO scenarios than under EBC scenarios.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-55. Percentage Use and Survival of San Joaquin River Fall-Run Chinook Salmon Smolts Migrating Down Different Through-Delta Pathways under EBC and ESO Scenarios[a], based on Delta Passage Model

	San Joaquin River Pathway												Old River Pathway											
	Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway						Percentage of All Individuals Taking Pathway						Percentage Survival Down the Pathway					
Water Year	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**
1976	42.2	42.6	41.0	38.4	70.8	73.9	11.2	11.2	11.2	11.0	11.3	11.4	57.8	57.4	59.0	61.6	29.2	26.1	8.6	8.5	8.5	8.4	8.3	8.3
1977	40.8	40.0	38.5	37.9	66.3	72.6	11.1	11.1	11.2	10.8	11.3	11.2	59.2	60.0	61.5	62.1	33.7	27.4	7.8	7.9	7.9	7.8	7.6	7.6
1978	47.6	47.6	49.0	48.5	51.0	50.9	21.4	21.2	24.4	23.5	20.1	19.7	52.4	52.4	51.0	51.5	49.0	49.1	13.0	12.9	14.7	14.2	11.6	11.7
1979	48.8	48.8	48.6	48.3	72.5	74.6	14.2	14.1	13.9	13.3	15.3	15.0	51.2	51.2	51.4	51.7	27.5	25.4	9.7	9.6	9.5	9.2	8.3	8.1
1980	48.6	48.6	48.4	48.2	73.4	73.8	15.4	15.4	16.2	16.1	18.2	18.3	51.4	51.4	51.6	51.8	26.6	26.2	9.7	9.7	10.1	10.1	8.6	8.5
1981	48.0	47.9	45.7	43.2	73.8	74.8	13.5	13.3	12.7	12.6	14.1	14.2	52.0	52.1	54.3	56.8	26.2	25.2	8.7	8.6	8.5	8.5	8.3	8.3
1982	57.0	56.9	57.3	56.5	58.8	58.3	37.3	37.3	37.1	35.8	27.6	27.0	43.0	43.1	42.7	43.5	41.2	41.7	23.7	23.7	23.6	22.8	17.6	17.4
1983	59.1	59.0	59.7	60.4	60.0	60.5	34.8	40.5	40.9	41.7	23.0	23.8	40.9	41.0	40.3	39.6	40.0	39.5	21.1	25.9	26.0	26.2	13.3	13.4
1984	48.9	48.9	48.6	47.8	75.1	74.9	13.5	13.5	13.3	13.2	14.7	14.6	51.1	51.1	51.4	52.2	24.9	25.1	8.1	8.1	8.0	8.1	7.3	7.3
1985	47.8	47.7	47.8	42.9	74.9	75.1	12.1	12.1	12.7	11.4	12.8	12.4	52.2	52.3	52.2	57.1	25.1	24.9	9.5	9.5	9.8	9.4	8.9	9.1
1986	48.0	48.0	47.9	47.9	56.3	69.0	18.6	18.5	18.4	16.4	17.5	17.5	52.0	52.0	52.1	52.1	43.7	31.0	11.7	11.7	11.7	10.6	10.7	9.4
1987	42.1	41.7	40.4	38.4	70.5	74.0	11.0	10.9	10.6	10.3	11.2	11.2	57.9	58.3	59.6	61.6	29.5	26.0	8.4	8.4	8.2	8.0	7.9	7.9
1988	42.7	42.4	40.8	38.9	70.8	74.1	11.0	10.8	10.7	10.4	10.6	10.7	57.3	57.6	59.2	61.1	29.2	25.9	9.0	8.9	8.9	8.9	8.8	8.8
1989	38.7	38.4	37.0	35.2	65.3	71.3	10.9	10.8	10.8	10.6	11.2	10.9	61.3	61.6	63.0	64.8	34.7	28.7	8.0	7.9	7.9	7.7	8.0	7.3
1990	38.4	37.9	37.0	35.6	63.6	72.0	10.8	10.7	10.7	10.7	11.1	10.8	61.6	62.1	63.0	64.4	36.4	28.0	8.4	8.4	8.4	8.4	8.4	8.2
1991	38.2	37.8	36.1	34.5	62.4	68.9	11.1	11.0	11.0	11.0	11.5	11.6	61.8	62.2	63.9	65.5	37.6	31.1	8.2	8.2	8.2	8.2	8.3	8.4
Average	46.1	45.9	45.2	43.9	66.6	69.9	16.1	16.4	16.6	16.2	15.1	15.0	53.9	54.1	54.8	56.1	33.4	30.1	10.8	11.1	11.2	11.0	9.5	9.4
Median	47.7	47.7	46.8	43.1	68.4	73.2	12.8	12.7	12.7	12.0	13.4	13.3	52.3	52.3	53.2	56.9	31.6	26.8	8.8	8.8	8.7	8.7	8.4	8.4

[a] See Table 5C.0-1 for definitions of the scenarios.

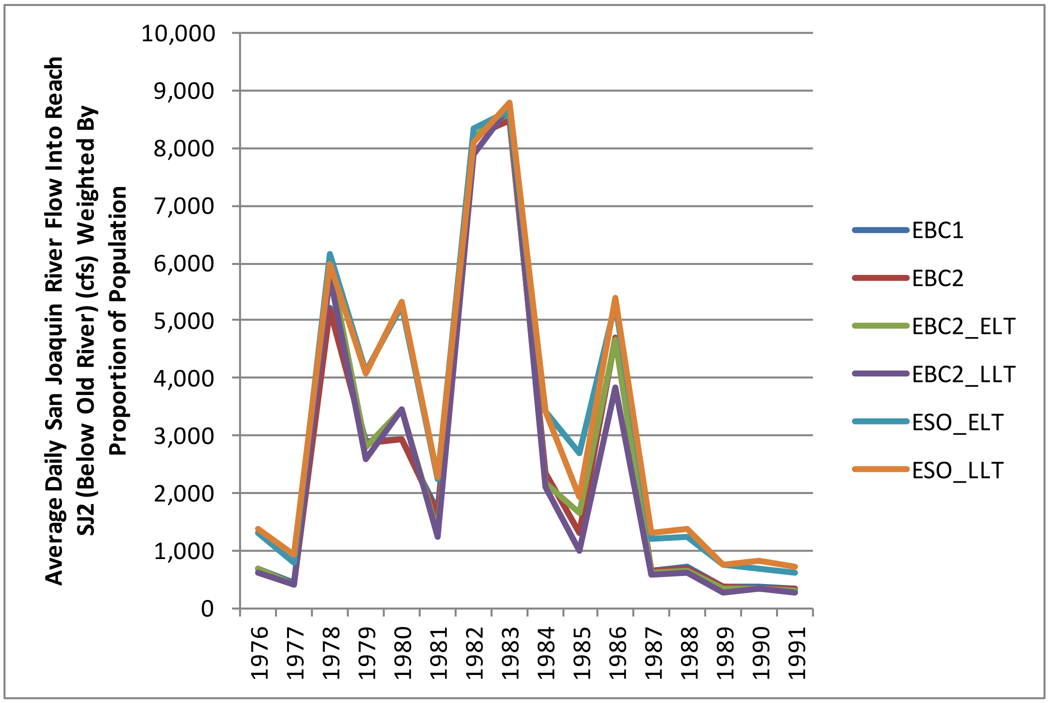


Figure 5C.5.3-30. Daily Average San Joaquin River Flow into the Interior Delta, Weighted by Daily Proportion of San Joaquin River Fall-Run Chinook Salmon Smolts Entering the Interior Delta via the San Joaquin River, By Water Year and Scenario From Delta Passage Model Results

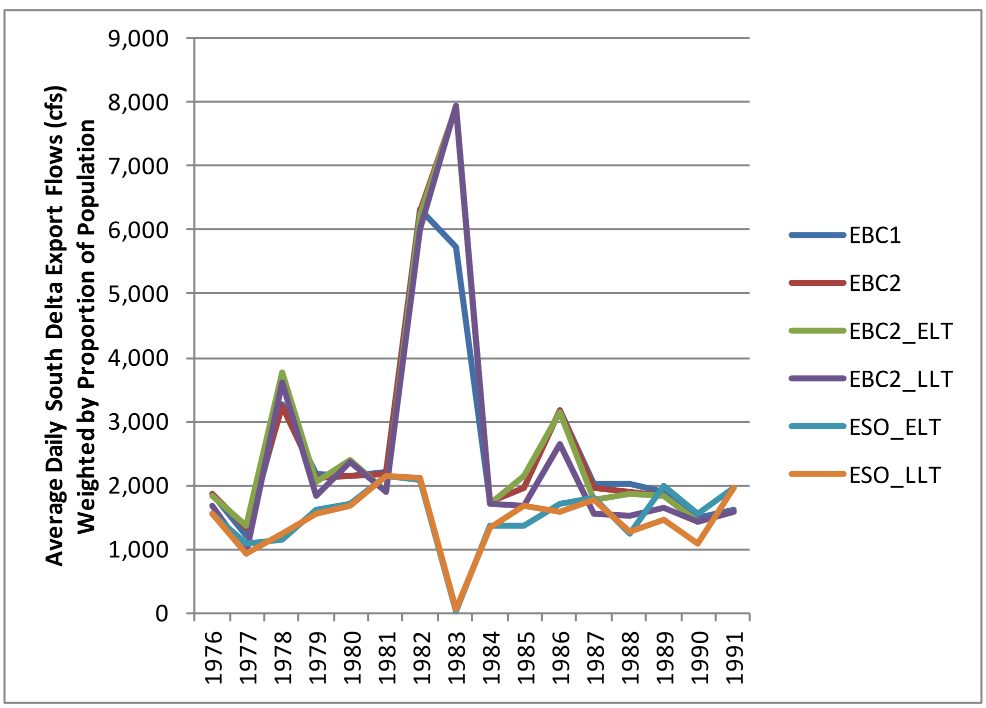


Figure 5C.5.3-31. Daily Average South Delta Export Flow, Weighted by Daily Proportion of San Joaquin River Fall-Run Chinook Salmon Smolts Entering the Interior Delta, By Water Year and Scenario From Delta Passage Model Results

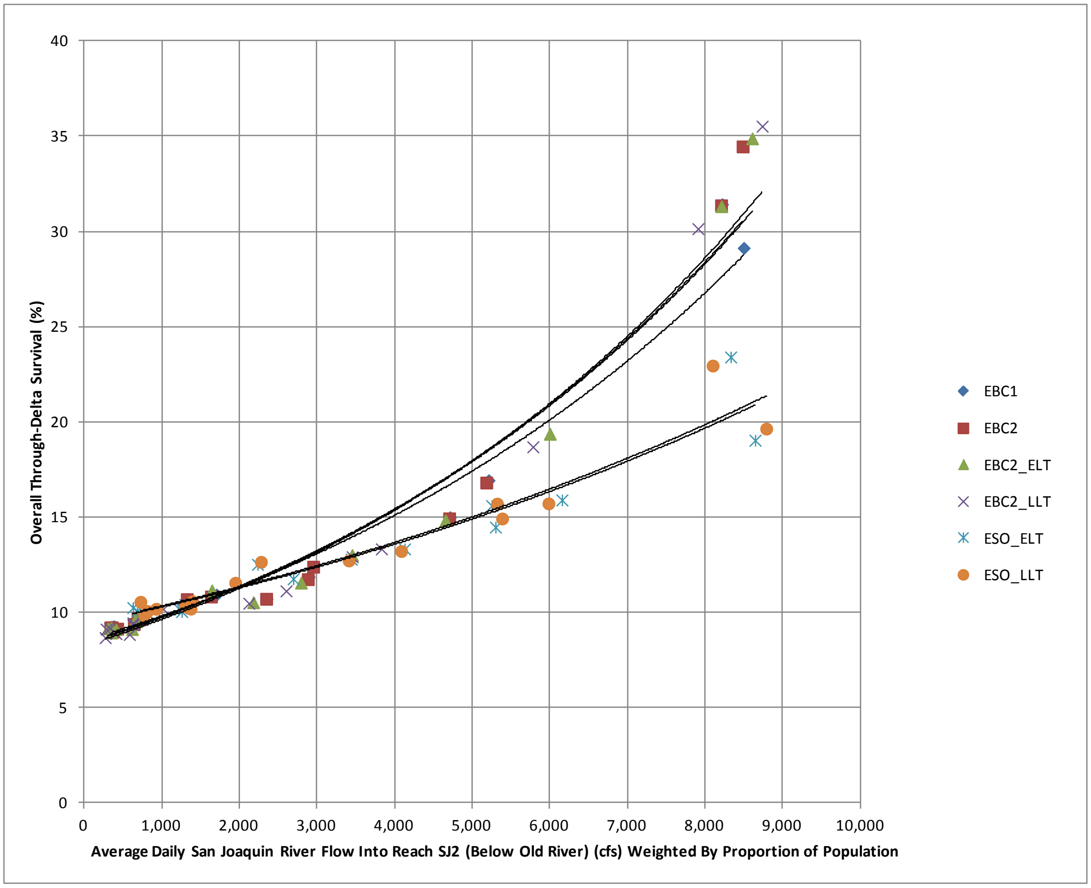


Figure 5C.5.3-32. Relationship between Weighted-Average San Joaquin River Flow into the Interior Delta and Overall Through-Delta Survival of San Joaquin River Fall-Run Chinook Salmon, From Delta Passage Model Results

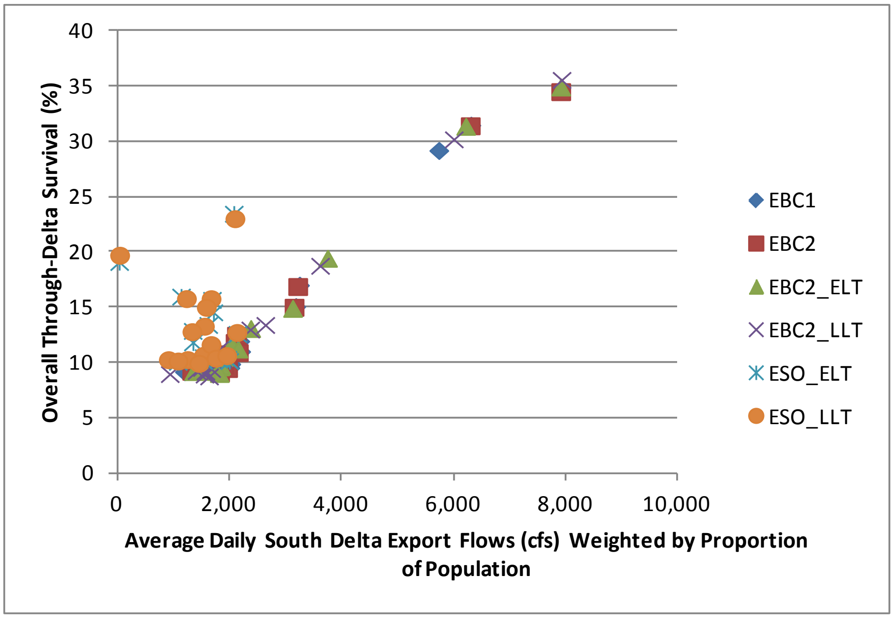


Figure 5C.5.3-33. Relationship between Weighted-Average South Delta Exports and Overall Through-Delta Survival of San Joaquin River Fall-Run Chinook Salmon, From Delta Passage Model Results

5C.5.3.4.6 Mokelumne River Fall-Run Chinook Salmon

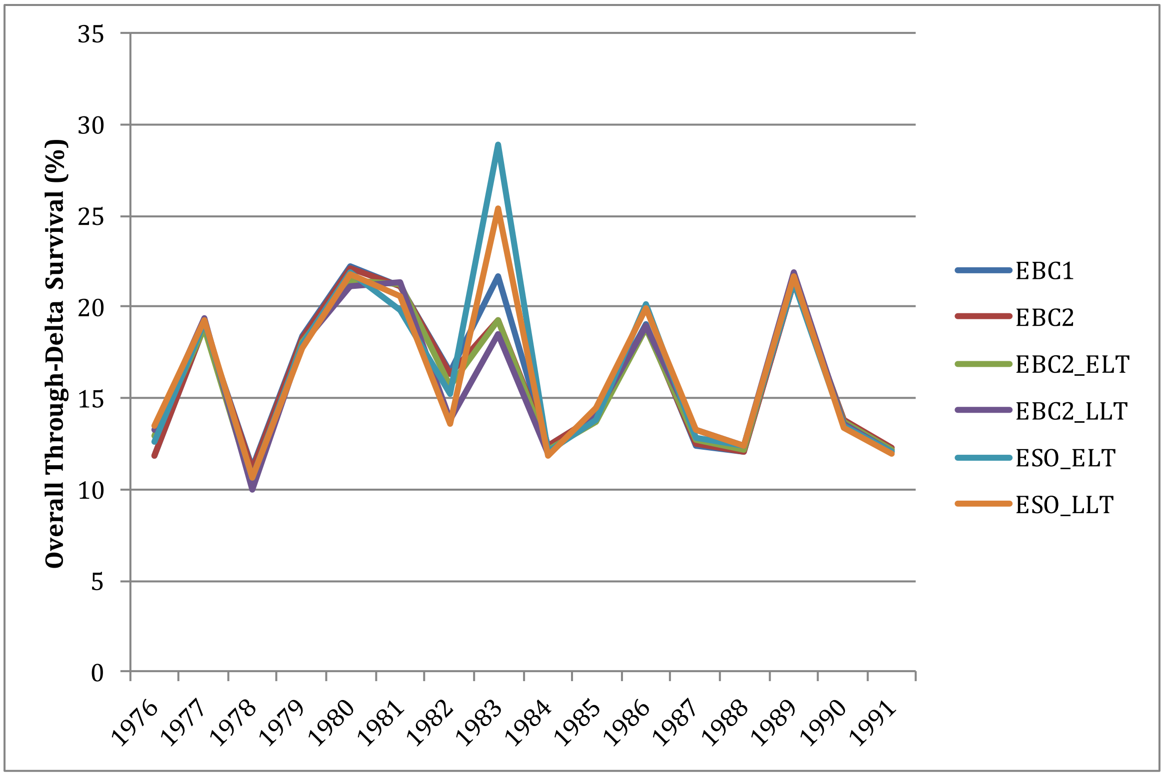
Through-Delta survival of Mokelumne River fall-run Chinook salmon estimated by the Delta Passage Model under EBC scenarios ranged from 10–11% in the above normal water year of 1978 to 21–22% in the dry years of 1981 and 1989 and the above normal year of 1980 (Table 5C.5.3-56, Figure 5C.5.3-34). Through-Delta survival under ESO scenarios ranged from under 11% in 1978 to 26–29% in 1983. The high survival in 1983 skewed the average survival upwards, although the average and median survival under all scenarios were similar and the differences between them were minor when examining individual years (Table 5C.5.3-57).

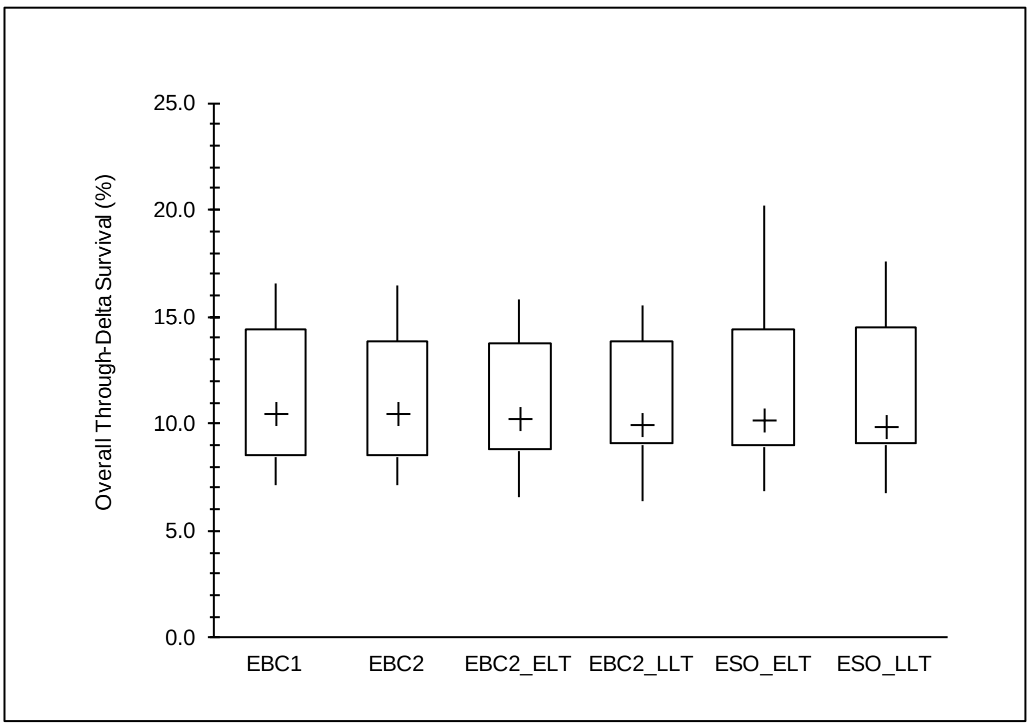
Survival in the Mokelumne River (i.e., the Geo/DCC reach of the DPM) did not differ between scenarios because entry timing into the reach was the same for all scenarios (Table 5C.5.3-58). Differences in survival therefore are solely a reflection of differences in interior Delta survival, which are a function of south Delta exports and survival in Sac3 (because the DPM calculates the ratio of survival in the interior Delta to survival in Sac3). This suggests that, except for 1983, the relatively lower flows in reach Sac3 under ESO scenarios generally balanced the lower south Delta exports in terms of survival effects (Table 5C.5.3-58).

Table 5C.5.3-56. Percentage of Mokelumne River Fall-Run Chinook Salmon Smolts Surviving through the Delta under EBC and ESO Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC1	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**
1976 (C)	11.9	11.9	13.0	13.2	12.6	13.4
1977 (C)	19.0	18.9	18.8	19.4	19.1	19.2
1978 (AN)	11.2	11.1	10.2	10.0	10.7	10.7
1979 (BN)	18.4	18.3	18.1	17.9	18.0	17.8
1980 (AN)	22.2	22.2	21.5	21.2	21.9	21.8
1981 (D)	21.1	21.1	21.2	21.4	19.8	20.5
1982 (W)	16.5	16.4	15.6	13.8	15.2	13.6
1983 (W)	21.7	19.2	19.3	18.5	28.9	25.5
1984 (W)	12.4	12.4	12.2	11.9	12.0	11.9
1985 (D)	14.0	14.0	13.7	14.2	13.9	14.5
1986 (W)	19.1	18.9	18.8	19.0	20.2	20.0
1987 (D)	12.4	12.5	12.7	13.3	12.9	13.3
1988 (C)	12.0	12.1	12.2	12.4	12.4	12.4
1989 (D)	21.4	21.4	21.6	21.9	21.4	21.6
1990 (C)	13.8	13.9	13.7	13.6	13.4	13.4
1991 (C)	12.2	12.2	12.2	12.1	12.0	11.9
Average	16.2	16.0	15.9	15.9	16.5	16.3
Median	15.2	15.2	14.7	14.0	14.5	14.1

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-34. Mokelumne River Fall-Run Chinook Salmon through-Delta Smolt Survival, Based on Delta Passage Model Results

Table 5C.5.3-57. Differences[a] between EBC and ESO Scenarios in Percentage of Mokelumne River Fall-Run Chinook Salmon Smolts Surviving through the Delta, Based on Delta Passage Model

Water Year[b]	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
1976 (C)	0.6 (7%)	1.3 (15%)	0.6 (7%)	1.2 (15%)	-0.2 (-2%)	0.3 (3%)
1977 (C)	0.1 (1%)	0.2 (1%)	0.1 (1%)	0.2 (2%)	0.2 (1%)	-0.1 (-1%)
1978 (AN)	-0.3 (-4%)	-0.4 (-5%)	-0.3 (-4%)	-0.3 (-4%)	0.2 (4%)	0.4 (6%)
1979 (BN)	-0.4 (-3%)	-0.6 (-4%)	-0.2 (-2%)	-0.4 (-3%)	-0.1 (-1%)	-0.2 (-1%)
1980 (AN)	-0.5 (-3%)	-0.5 (-3%)	-0.5 (-3%)	-0.5 (-3%)	0.3 (2%)	0.5 (3%)
1981 (D)	-1.0 (-6%)	-0.4 (-3%)	-1.0 (-6%)	-0.4 (-3%)	-1.0 (-7%)	-0.6 (-4%)
1982 (W)	-0.3 (-3%)	-1.4 (-13%)	-0.3 (-3%)	-1.3 (-12%)	0.1 (1%)	0.0 (0%)
1983 (W)	5.5 (38%)	2.9 (19%)	7.3 (56%)	4.6 (35%)	7.2 (56%)	5.1 (41%)
1984 (W)	-0.3 (-3%)	-0.4 (-4%)	-0.2 (-2%)	-0.3 (-4%)	-0.1 (-1%)	0.0 (0%)
1985 (D)	0.0 (0%)	0.4 (4%)	0.0 (0%)	0.4 (4%)	0.2 (2%)	0.2 (3%)
1986 (W)	0.8 (6%)	0.7 (5%)	0.9 (7%)	0.8 (6%)	1.0 (7%)	0.7 (5%)
1987 (D)	0.3 (3%)	0.7 (7%)	0.3 (3%)	0.6 (7%)	0.1 (1%)	0.0 (0%)
1988 (C)	0.2 (3%)	0.2 (3%)	0.2 (2%)	0.2 (2%)	0.1 (2%)	0.0 (0%)
1989 (D)	0.0 (0%)	0.2 (1%)	-0.1 (0%)	0.1 (1%)	-0.3 (-2%)	-0.3 (-2%)
1990 (C)	-0.3 (-3%)	-0.3 (-3%)	-0.3 (-3%)	-0.4 (-4%)	-0.2 (-2%)	-0.2 (-2%)
1991 (C)	-0.1 (-2%)	-0.2 (-3%)	-0.1 (-2%)	-0.2 (-3%)	-0.1 (-1%)	-0.1 (-1%)
Average	0.3 (2%)	0.1 (1%)	0.4 (4%)	0.3 (2%)	0.5 (4%)	0.4 (3%)
Median	-0.1 (-1%)	0.0 (0%)	-0.1 (-1%)	0.0 (0%)	0.1 (1%)	0.0 (0%)

[a] Negative values indicate lower survival under ESO scenarios than under EBC scenarios.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-58. Survival of Mokelumne River Fall-Run Chinook Salmon Smolts In the Mokelumne River and Interior Delta under EBC and ESO Scenarios, from Delta Passage Model

Water Year	Mokelumne River Survival by Scenario[a]						Interior Delta Survival by Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976	39.0	39.0	39.0	39.0	39.0	39.0	30.4	30.4	33.2	33.9	32.2	34.4
1977	46.2	46.2	46.2	46.2	46.2	46.2	41.0	41.0	40.8	42.0	41.4	41.6
1978	34.3	34.3	34.3	34.3	34.3	34.3	32.7	32.4	29.8	29.2	31.2	31.1
1979	38.7	38.7	38.7	38.7	38.7	38.7	47.6	47.2	46.8	46.3	46.6	46.0
1980	44.0	44.0	44.0	44.0	44.0	44.0	50.5	50.4	48.8	48.2	49.7	49.7
1981	48.8	48.8	48.8	48.8	48.8	48.8	43.3	43.3	43.5	43.8	40.6	42.1
1982	42.2	42.2	42.2	42.2	42.2	42.2	39.0	38.8	37.1	32.7	36.1	32.3
1983	45.8	45.8	45.8	45.8	45.8	45.8	47.4	42.0	42.1	40.3	63.0	55.6
1984	36.8	36.8	36.8	36.8	36.8	36.8	33.7	33.6	33.1	32.3	32.7	32.3
1985	37.7	37.7	37.7	37.7	37.7	37.7	37.1	37.2	36.3	37.6	36.8	38.5
1986	41.3	41.3	41.3	41.3	41.3	41.3	46.1	45.8	45.5	45.9	48.8	48.3
1987	33.2	33.2	33.2	33.2	33.2	33.2	37.5	37.6	38.3	40.0	38.7	40.1
1988	36.4	36.4	36.4	36.4	36.4	36.4	33.1	33.3	33.6	34.1	34.0	34.0
1989	39.4	39.4	39.4	39.4	39.4	39.4	54.2	54.3	54.9	55.6	54.2	54.9
1990	35.0	35.0	35.0	35.0	35.0	35.0	39.5	39.6	39.2	39.0	38.4	38.2
1991	37.0	37.0	37.0	37.0	37.0	37.0	33.0	33.1	32.9	32.6	32.5	32.3
Average	39.7	39.7	39.7	39.7	39.7	39.7	40.4	40.0	39.7	39.6	41.1	40.7
Median	38.8	38.8	38.8	38.8	38.8	38.8	39.2	39.2	38.8	39.5	38.6	39.3

[a] See Table 5C.0-1 for definitions of the scenarios.

5C.5.3.4.7 HOS-LOS Scenarios

5C.5.3.4.7.1 Winter-Run Chinook Salmon

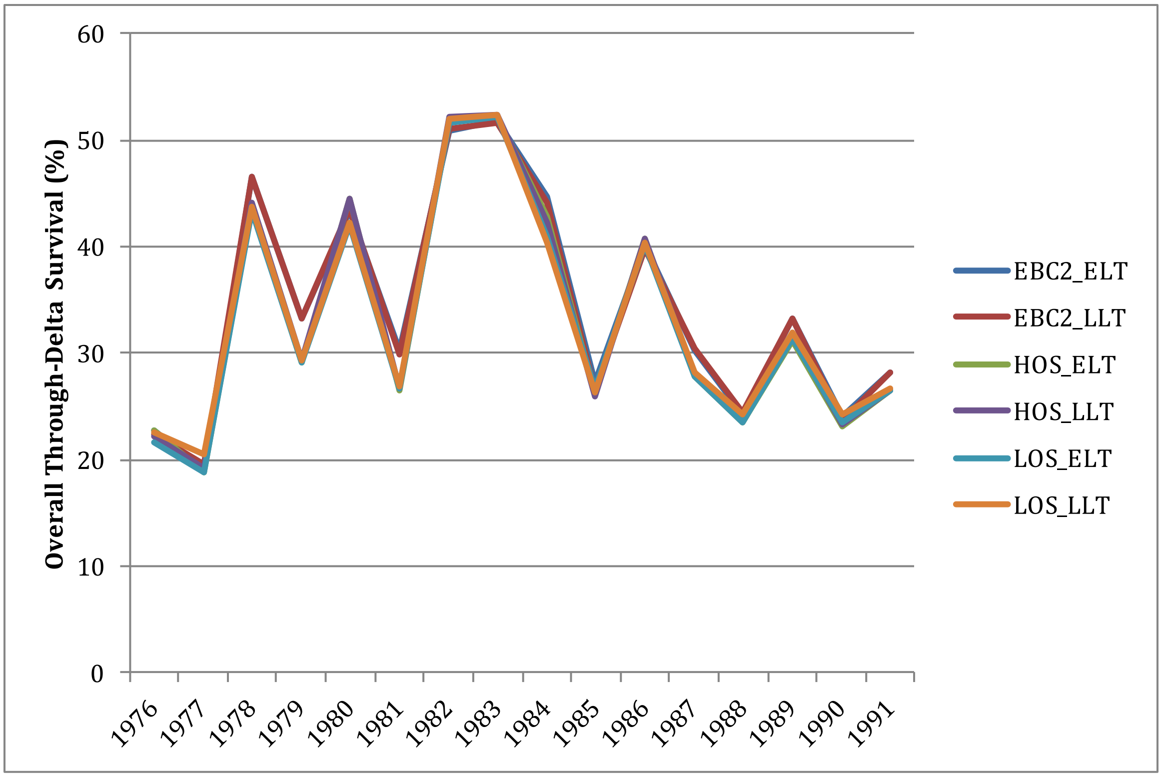
Through-Delta survival for HOS-LOS scenarios (Table 5C.5.3-59; Figure 5C.5.3-35) with averages of around 33% and medians of 28–29% was similar to those for the ESO scenarios (Table 5C.5.3-33; Figure 5C.5.3-1), and therefore was similar to or slightly lower than the EBC2_ELT and EBC_LLT scenarios (average ~34%, median ~32%). The similarity of ESO/LOS and HOS scenarios is explained by the relatively low overlap of the winter-run Delta entry distribution with the spring period that has differing outflows for the HOS, LOS, and ESO scenarios. In addition, the DPM has less representation of intermediate-outflow years where the differences between HOS and ESO/LOS scenarios may be more pronounced than wetter or drier years.

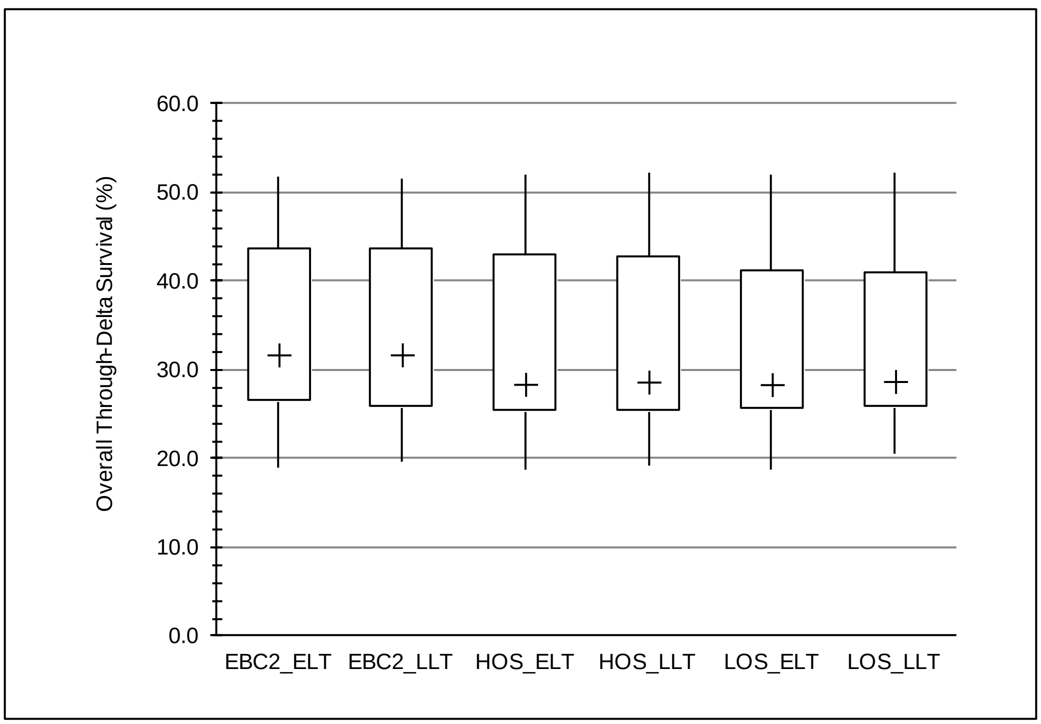
The sensitivity analysis of a deterrence in entry into Georgiana Slough by nonphysical barriers (67% proportional reduction) gave median and average through-Delta survival that was 6–9% greater (in relative terms) than EBC2_ELT and EBC2_LLT for HOS scenarios and 7–9% greater than EBC2_ELT and EBC2_LLT for LOS scenarios. The sensitivity analysis of 5% lowering of survival in reach Sac1 by predation at the north Delta intakes gave median and average through-Delta survival that was 4% lower (in relative terms) than EBC2_ELT and EBC2_LLT for HOS and LOS scenarios.

Table 5C.5.3-59. Percentage of Winter-Run Chinook Salmon Smolts Surviving through the Delta under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	22.8	22.5	22.8	22.1	21.7	22.6
1977 (C)	19.0	19.6	18.8	19.2	18.8	20.5
1978 (AN)	46.6	46.6	43.6	44.2	43.4	43.7
1979 (BN)	33.2	33.2	29.1	29.4	29.0	29.4
1980 (AN)	43.4	43.5	44.6	44.5	42.1	42.3
1981 (D)	30.2	29.9	26.5	26.7	26.7	26.9
1982 (W)	50.9	51.0	51.8	52.1	51.7	52.0
1983 (W)	51.8	51.6	52.1	52.3	52.1	52.3
1984 (W)	44.7	44.0	42.9	42.2	41.0	40.4
1985 (D)	27.3	26.5	26.2	25.9	26.8	26.4
1986 (W)	40.2	39.9	40.7	40.6	40.2	40.4
1987 (D)	30.3	30.4	27.8	28.0	27.8	28.1
1988 (C)	24.2	24.4	23.4	24.1	23.5	24.2
1989 (D)	33.3	33.2	31.3	31.6	31.3	31.9
1990 (C)	24.0	23.6	23.2	23.3	23.6	24.2
1991 (C)	28.2	28.3	26.5	26.5	26.5	26.6
Average	34.4	34.2	33.2	33.3	32.9	33.3
Median	31.8	31.8	28.4	28.7	28.4	28.8

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with “+,” upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-35. Winter-Run Chinook Salmon through-Delta Smolt Survival under EBC2, HOS and LOS Scenarios, Based on Delta Passage Model

5C.5.3.4.7.2 Spring-Run Chinook Salmon

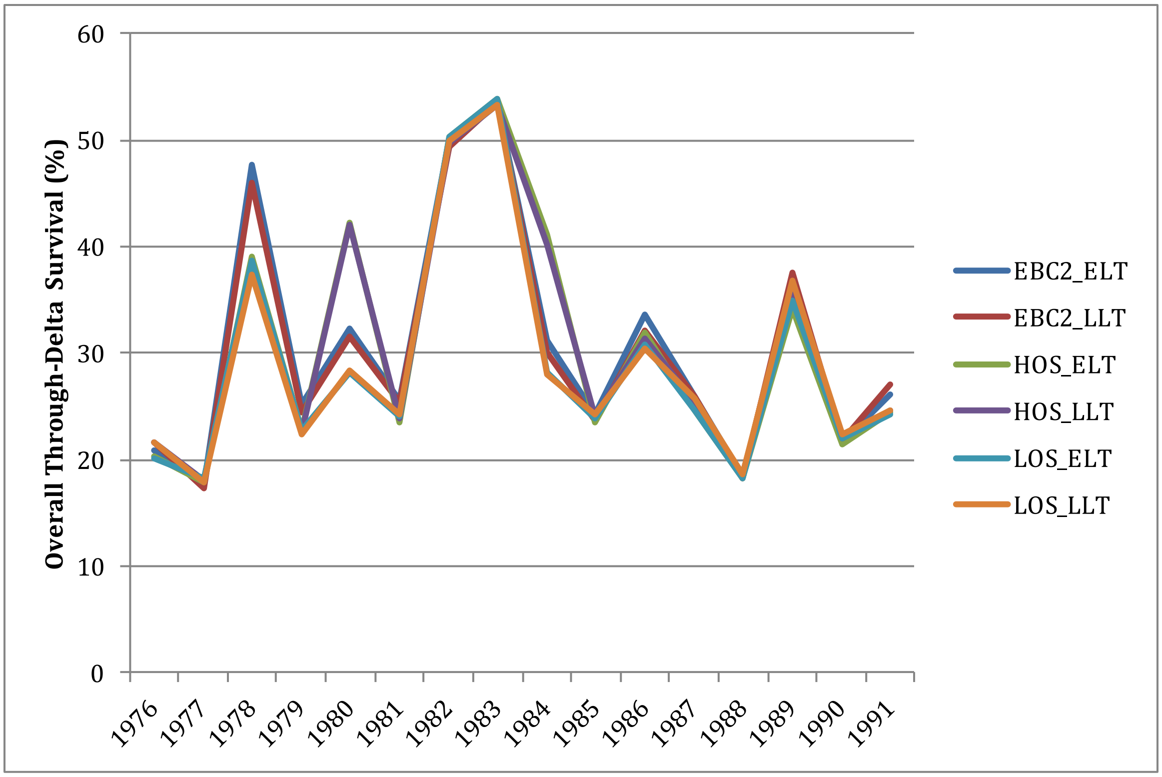
Median through-Delta survival for spring-run Chinook salmon smolts was similar for HOS, LOS, and ESO scenarios at 24.5–25.2%, which was slightly lower than for EBC2_ELT and EBC2_LLT scenarios (Table 5C.5.3-60; Figure 5C.5.3-36; Table 5C.5.3-38; Figure 5C.5.3-8). Average survival under the HOS scenarios was 30.6–30.7%, compared to 28.9–29.1% for the ESO and LOS scenarios, and 30.3–30.7% for EBC2_ELT and EBC2_LLT. This difference was driven by appreciably higher survival in the above-normal year of 1980 and the wet year of 1984 (Table 5C.5.3-60; Figure 5C.5.3-36) as a result of greater outflow under the HOS scenarios.

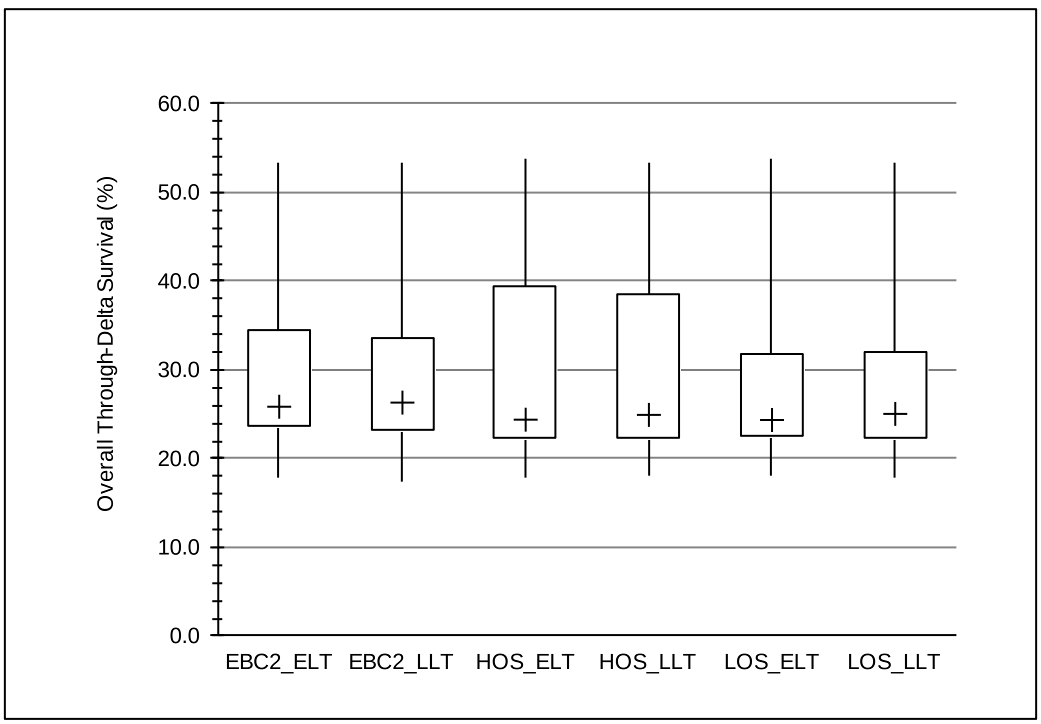
The sensitivity analysis of the deterrence of entry into Georgiana Slough by nonphysical barriers (67% proportional reduction) gave median and average through-Delta survival for HOS/LOS scenarios that was 6–8% greater (in relative terms) than survival with no deterrence assumed. For LOS scenarios, deterrence resulted in average and median survival survival that was similar to the corresponding EBC2 scenarios, whereas for HOS scenarios average/median survival was similar to or slightly greater than EBC2_ELT and EBC2_LLT scenarios (averages: 32.4–32.5% vs. 30.3–30.7%; medians: 26.4–26.6% vs. 26.0–26.4%) . The sensitivity analysis of 5% lowering of survival in reach Sac1 by predation at the north Delta intakes gave median and average through-Delta survival that was 4–5% lower than survival without predation assumed. For HOS, this resulted in average and median survival being similar to or slightly lower than EBC2_ELT and EBC2_LLT scenarios (averages: 30.6–30.7% vs. 30.3–30.7%; medians: 24.5–25.1% vs. 26.0–26.4%). For LOS, this resulted in average and median survival being somewhat lower than EBC2_ELT and EBC2_LLT scenarios (averages: 27.7–27.9% vs. 30.3–30.7%; medians: 23.4–24.0% vs. 26.0–26.4%).

Table 5C.5.3-60. Percentage of Spring-Run Chinook Salmon Smolts Surviving through the Delta under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	20.8	21.6	20.3	21.6	20.1	21.5
1977 (C)	17.8	17.4	17.9	18.0	18.2	17.9
1978 (AN)	47.6	45.9	39.0	37.9	38.6	37.4
1979 (BN)	25.1	24.4	22.7	22.5	22.7	22.4
1980 (AN)	32.2	31.6	42.3	42.1	28.2	28.3
1981 (D)	25.7	25.4	23.5	23.8	24.1	24.2
1982 (W)	50.1	49.4	50.3	49.8	50.3	49.8
1983 (W)	53.4	53.4	53.8	53.4	53.8	53.3
1984 (W)	31.2	30.1	41.0	40.1	28.2	28.1
1985 (D)	24.3	23.7	23.5	24.0	23.9	24.2
1986 (W)	33.7	32.2	31.9	31.4	30.9	30.5
1987 (D)	25.9	25.8	24.6	25.4	24.6	25.8
1988 (C)	18.4	18.2	18.3	18.6	18.3	18.6
1989 (D)	36.9	37.6	34.2	35.8	34.9	36.7
1990 (C)	21.7	21.8	21.5	22.0	22.0	22.4
1991 (C)	26.1	27.0	24.4	24.7	24.3	24.6
Average	30.7	30.3	30.6	30.7	28.9	29.1
Median	26.0	26.4	24.5	25.1	24.5	25.2

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with “+,” upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-36. Spring-Run Chinook Salmon through-Delta Smolt Survival under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

5C.5.3.4.7.3 Sacramento River Fall-Run Chinook Salmon

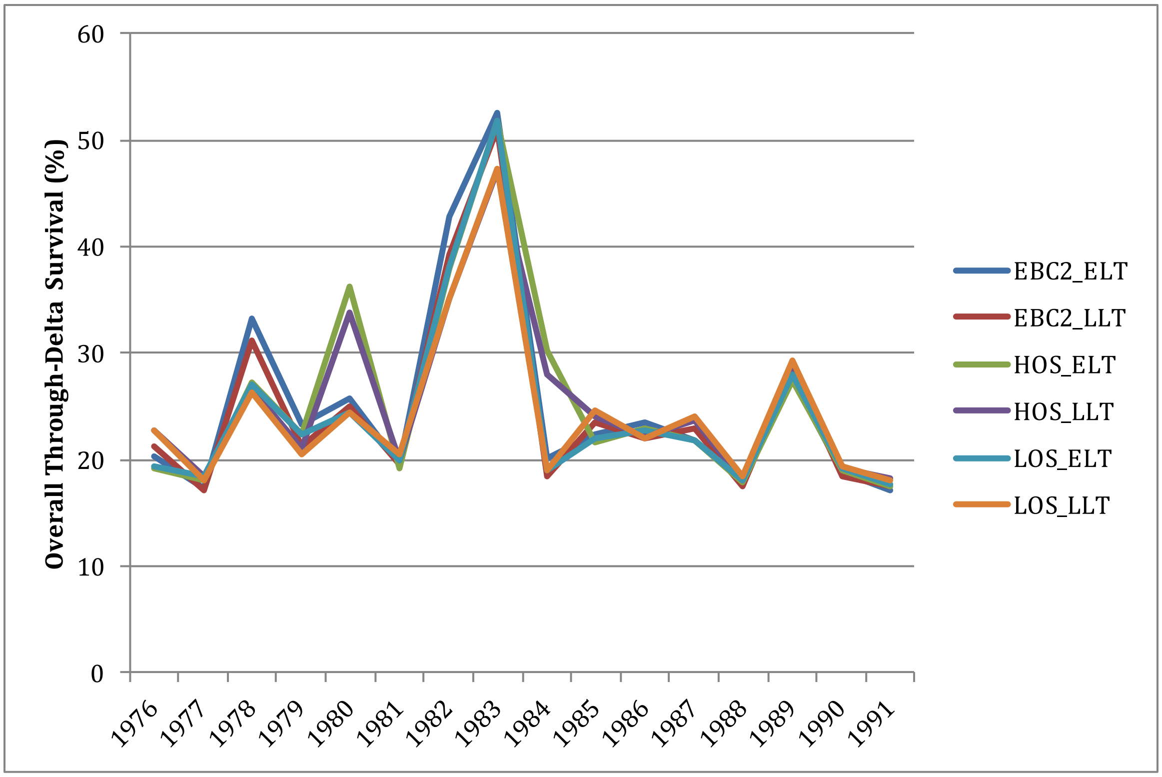
Median survival under the HOS scenarios was 22.1–23.2% , which was similar to or slightly greater than ESO scenarios, and median survival under the LOS scenarios was similar to ESO scenarios at 21.9–22.4%; median survival for HOS and LOS scenarios therefore was similar to or slightly greater than for EBC2_ELT and EBC2_LLT (Table 5C.5.3-61; Figure 5C.5.3-37; Table 5C.5.3-43; Figure 5C.5.3-15). Average survival under the HOS scenarios was around 0.4–0.8% greater than under the EBC2_ELT and EBC2_LLT. As with spring-run, the greater average under HOS scenarios was due in larger part to appreciably higher survival under the HOS scenarios in 1980 and 1984 (Table 5C.5.3-61; Figure 5C.5.3-37).

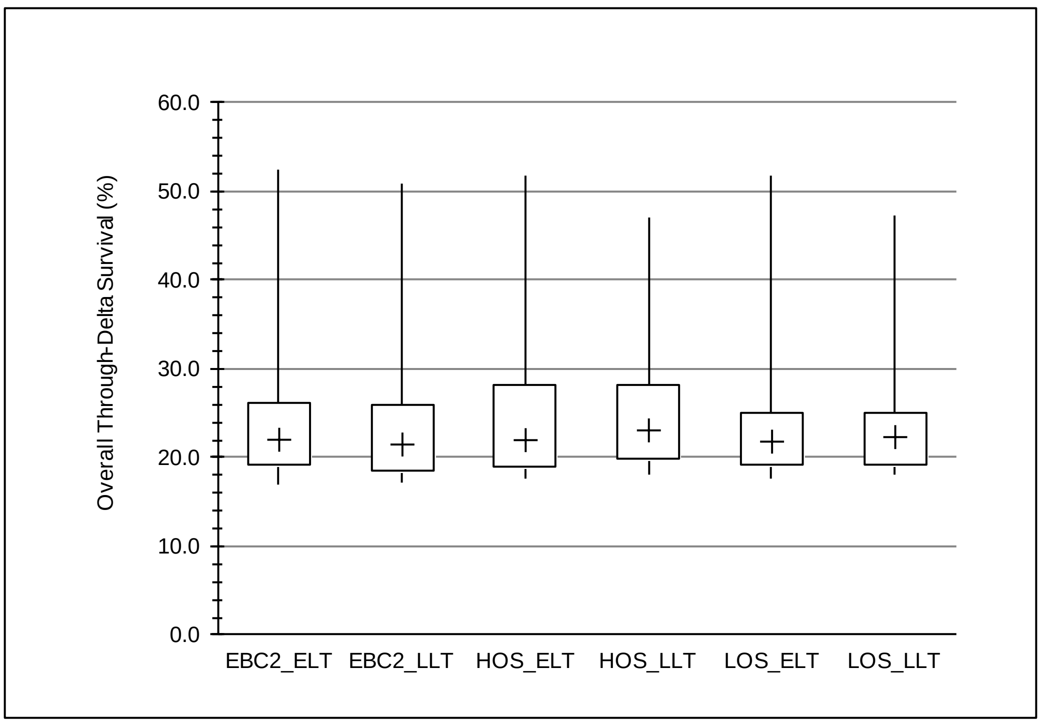
The sensitivity analysis of the deterrence of entry into Georgiana Slough by nonphysical barriers (67% proportional reduction) gave median and average through-Delta survival for HOS/LOS scenarios that was 7–9% greater (in relative terms) than survival with no deterrence assumed. For LOS scenarios, deterrence resulted in average and median survival survival that was 4–12% greater than corresponding EBC2 scenarios in relative terms, whereas for HOS scenarios average/median survival was 8–15% greater when assuming deterrence than under EBC2_ELT/EBC2_LLT. The sensitivity analysis of 5% lowering of survival in reach Sac1 by predation at the north Delta intakes gave median and average through-Delta survival that was 4–5% lower in relative terms than survival without predation assumed for HOS and LOS scenarios. For HOS, this resulted in average and median survival being similar to or slightly lower than EBC2_ELT and EBC2_LLT scenarios (averages: 24.3–24.5% vs. 24.7–25.3%; medians: 21.0–22.1% vs. 21.6–22.1%). For LOS, this resulted in average and median survival being somewhat lower than EBC2_ELT and EBC2_LLT scenarios (averages: 23.2% vs. 24.7–25.3%; medians: 20.9–21.4% vs. 21.6–22.1%).

Table 5C.5.3-61. Percentage of Sacramento River Fall-Run Chinook Salmon Smolts Surviving through the Delta under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	20.4	21.2	19.3	22.7	19.4	22.8
1977 (C)	17.4	17.2	18.1	18.4	18.5	18.2
1978 (AN)	33.2	31.1	27.3	26.6	27.1	26.4
1979 (BN)	23.3	21.2	22.4	21.0	22.4	20.4
1980 (AN)	25.8	25.1	36.3	33.9	24.4	24.4
1981 (D)	19.5	19.6	19.1	20.0	19.9	20.5
1982 (W)	42.9	39.2	38.0	35.0	38.0	35.1
1983 (W)	52.5	51.0	51.8	47.2	51.8	47.2
1984 (W)	20.1	18.4	30.3	28.0	19.1	18.9
1985 (D)	22.4	23.5	21.6	24.0	22.1	24.7
1986 (W)	23.6	22.0	22.9	22.3	22.7	22.1
1987 (D)	21.9	22.9	21.8	23.6	21.8	24.0
1988 (C)	18.1	17.6	17.9	18.1	18.1	18.4
1989 (D)	27.7	28.5	27.5	28.9	27.9	29.3
1990 (C)	18.8	18.5	19.0	19.3	19.2	19.4
1991 (C)	17.0	17.5	17.6	18.3	17.6	18.1
Average	25.3	24.7	25.7	25.5	24.4	24.4
Median	22.1	21.6	22.1	23.2	21.9	22.4

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-37. Sacramento River Fall-Run Chinook Salmon through-Delta Smolt Survival under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

5C.5.3.4.7.4 Late Fall–Run Chinook Salmon

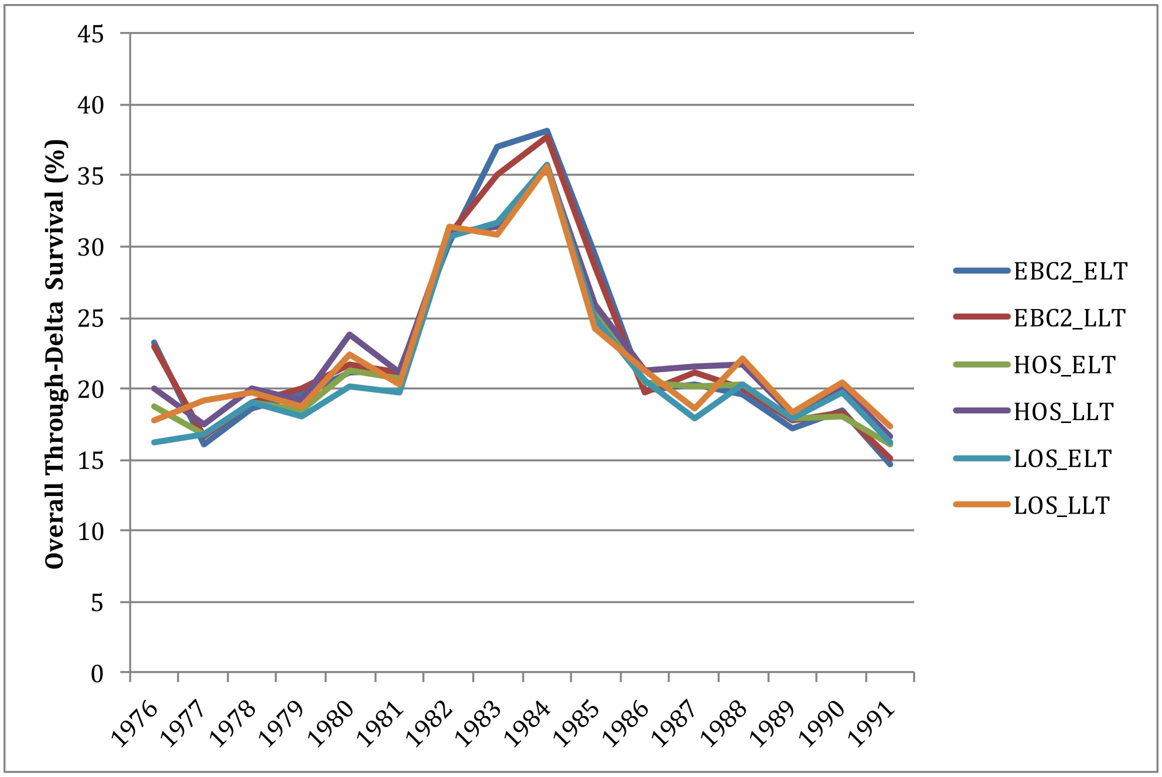
Late fall–run Chinook salmon are assumed to have a broad Delta entry distribution in the DPM, beginning in mid-late August and ending in mid-February, with a peak in early November (see Figure C.4-2 of Methods). This entry distribution coincides with the Fall X2 management period from the USFWS (2008) OCAP BiOp RPA and resulted in slightly lower average and median through-Delta survival for the LOS scenarios (which exclude Fall X2) compared to the HOS and ESO scenarios (which include Fall X2 and for which average and median survival was virtually identical) (Table 5C.5.3-62; Figure 5C.5.3-38; Table 5C.5.3-48; Figure 5C.5.3-22). The HOS scenarios therefore had average and median through-Delta survival that was similar to, or slightly greater than, the EBC2_ELT and EBC2_LLT scenarios, whereas the average/median survival under the LOS scenarios was slightly lower than under the EBC2_ELT and EBC2_LLT scenarios.

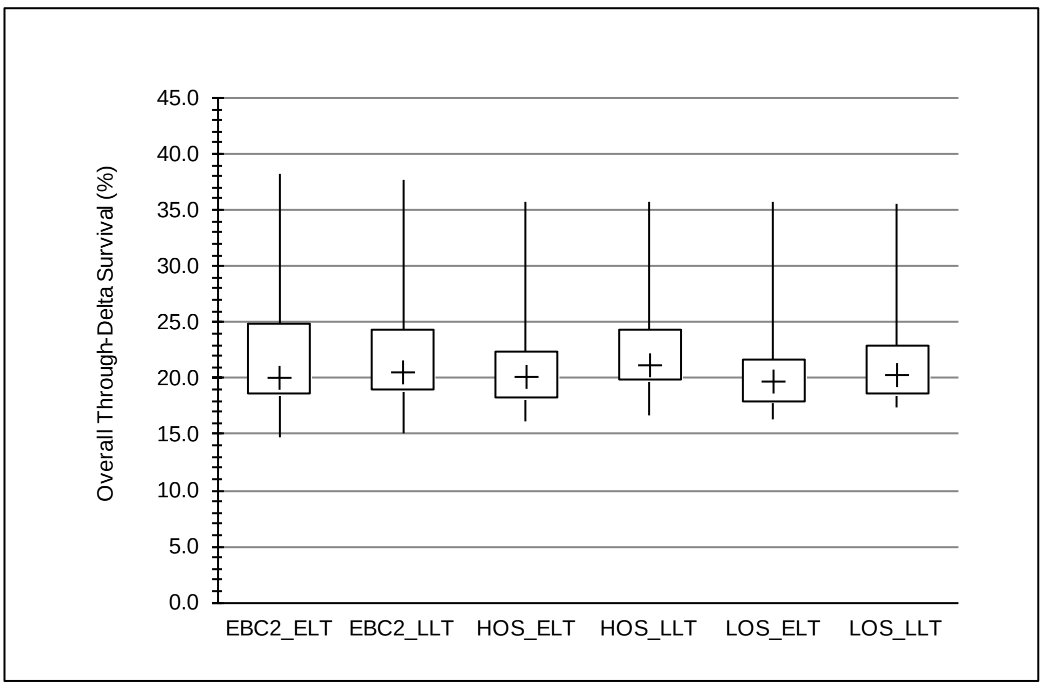
The sensitivity analysis of the deterrence of entry into Georgiana Slough by nonphysical barriers (67% proportional reduction) gave median and average through-Delta survival for HOS/LOS scenarios that was 12–16% greater (in relative terms) than survival with no deterrence assumed. As noted above for ESO scenarios, the DPM late fall–run migration period overlaps periods of DCC being open, so that the sensitivity analysis essentially assumed that deterrence was occurring not only from Georgiana Slough but also from the DCC. For LOS scenarios, deterrence resulted in average and median survival survival that was 8–14% greater than corresponding EBC2 scenarios in relative terms, whereas for HOS scenarios average/median survival was 9–16% greater when assuming deterrence than survival under EBC2_ELT/EBC2_LLT. The sensitivity analysis of 5% lowering of survival in reach Sac1 by predation at the north Delta intakes gave median and average through-Delta survival that was 5% lower in relative terms than survival without predation assumed for HOS and LOS scenarios. For HOS, this resulted in average and median survival being similar to or slightly lower than EBC2_ELT and EBC2_LLT scenarios (averages: 21–21.8% vs. 22.8–22.9%; medians: 19.3–20.2% vs. 20.1–20.6%). For LOS, this resulted in average and median survival being somewhat lower than EBC2_ELT and EBC2_LLT scenarios (averages: 20.6–21.4% vs. 22.8–22.9%; medians: 18.8–19.4% vs. 20.1–20.6%).

Table 5C.5.3-62. Percentage of Late Fall–Run Chinook Salmon Smolts Surviving through the Delta under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	23.3	23.0	18.7	20.0	16.3	17.7
1977 (C)	16.0	16.7	16.8	17.4	16.8	19.2
1978 (AN)	18.7	19.1	19.0	20.1	19.1	19.8
1979 (BN)	19.6	20.0	18.4	19.2	18.1	18.7
1980 (AN)	21.1	21.7	21.3	23.9	20.1	22.4
1981 (D)	21.3	21.2	20.7	21.2	19.8	20.3
1982 (W)	30.3	30.8	30.9	31.0	30.7	31.3
1983 (W)	37.0	35.0	31.6	31.4	31.7	30.9
1984 (W)	38.1	37.7	35.8	35.7	35.8	35.6
1985 (D)	29.5	28.6	25.5	25.9	25.0	24.3
1986 (W)	19.9	19.8	20.4	21.3	20.6	21.3
1987 (D)	20.3	21.1	20.1	21.6	17.9	18.6
1988 (C)	19.7	20.1	20.3	21.8	20.3	22.2
1989 (D)	17.3	17.8	17.9	18.1	18.0	18.4
1990 (C)	18.5	18.4	18.1	20.1	19.8	20.4
1991 (C)	14.6	15.1	16.1	16.7	16.3	17.3
Average	22.8	22.9	22.0	22.8	21.6	22.4
Median	20.1	20.6	20.2	21.2	19.8	20.4

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-38. Late Fall–Run Chinook Salmon through-Delta Smolt Survival under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

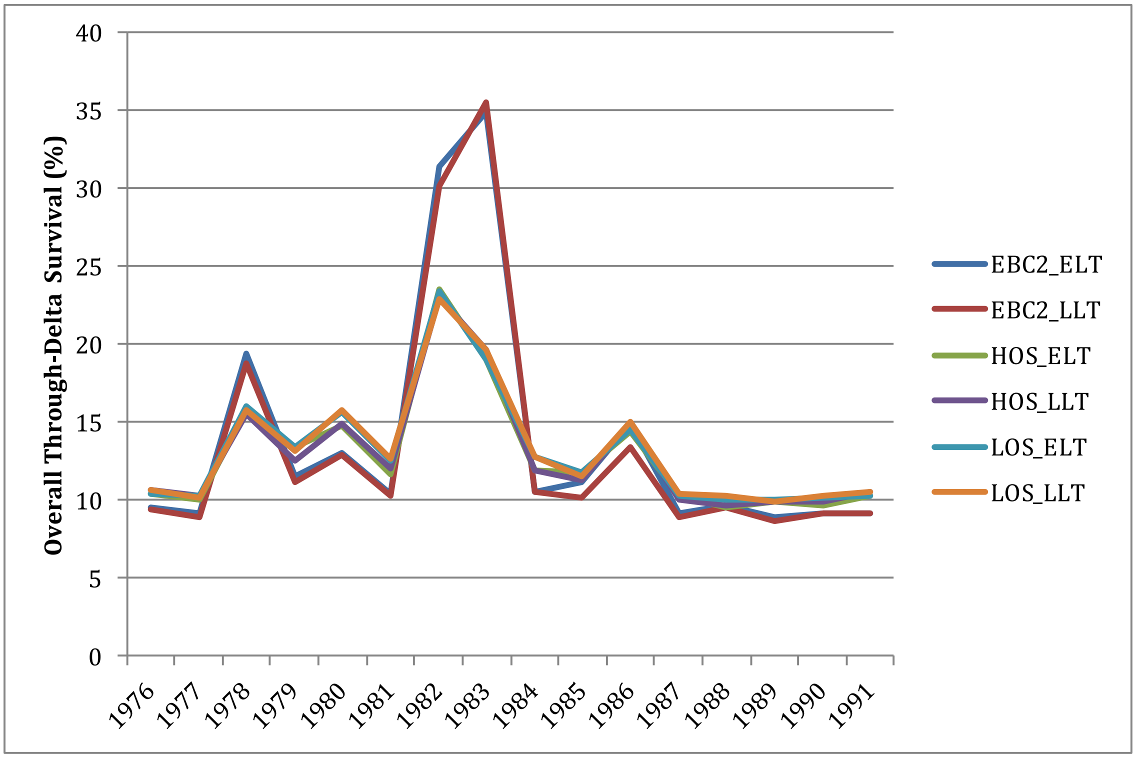
5C.5.3.4.7.5 San Joaquin River Fall-Run Chinook Salmon

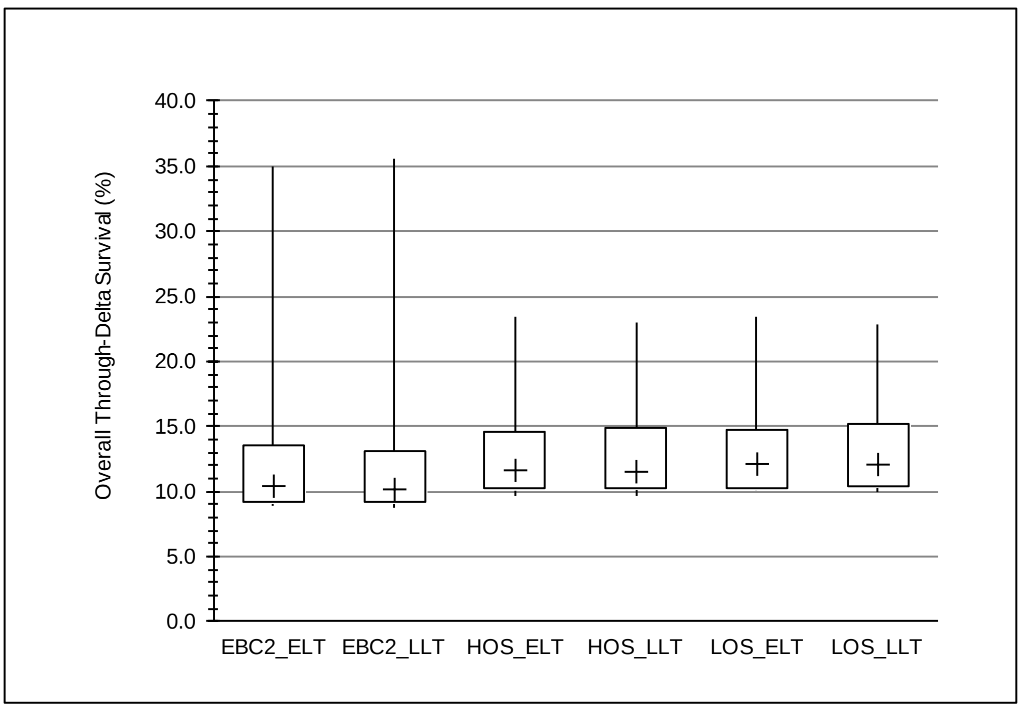
Through-Delta survival of San Joaquin River fall-run Chinook salmon was virtually identical for LOS and ESO scenarios (Table 5C.5.3-63; Figure 5C.5.3-39; Table 5C.5.3-53; Figure 5C.5.3-29), reflecting very similar water operations during the spring migration period for these scenarios. HOS scenarios had slightly lower average and median survival than ESO and LOS scenarios. This is because higher Delta outflows under the HOS scenarios are partly achieved by limiting south Delta exports; as described in the Methods, the DPM assumes a positive relationship between south Delta exports and survival in the mainstem San Joaquin River or Old River based on the work of Newman (2010). The HOS/LOS/ESO scenarios had median survival that was greater than the EBC2_ELT and EBC2_LLT scenarios but average survival that was slightly lower. As described above in the detailed comparison of EBC and ESO scenarios (San Joaquin River fall-run Chinook salmon, Overall Survival through the Delta), this was because the high-flow years of 1982 and 1983 assumed nonoperation of the barrier at the Head of Old River under all scenarios. Similar proportions of fish entered Old River or remained in the San Joaquin River under all scenarios. Lower export pumping under the HOS/LOS/ESO scenarios combined with the assumed positive relationship between export pumping and survival in both the San Joaquin and Old Rivers resulted in appreciably lower survival under the HOS/LOS/ESO scenarios compared to EBC2_ELT and EBC2_LLT scenarios in those years.

Table 5C.5.3-63. Percentage of San Joaquin River Fall-Run Chinook Salmon Smolts Surviving through the Delta under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	9.6	9.4	10.5	10.6	10.5	10.6
1977 (C)	9.2	8.9	10.0	10.3	10.3	10.2
1978 (AN)	19.4	18.7	15.8	15.5	16.1	15.8
1979 (BN)	11.6	11.2	13.4	12.6	13.4	13.2
1980 (AN)	13.1	13.0	14.9	15.0	15.6	15.8
1981 (D)	10.4	10.3	11.6	12.0	12.6	12.7
1982 (W)	31.4	30.2	23.5	23.0	23.5	22.9
1983 (W)	34.9	35.6	19.1	19.7	19.1	19.7
1984 (W)	10.6	10.5	12.0	12.0	12.8	12.8
1985 (D)	11.2	10.2	11.8	11.2	11.8	11.6
1986 (W)	14.9	13.4	14.5	14.9	14.5	15.0
1987 (D)	9.2	8.9	10.2	10.0	10.2	10.4
1988 (C)	9.7	9.5	9.6	9.7	10.1	10.2
1989 (D)	9.0	8.7	9.9	9.9	10.1	9.9
1990 (C)	9.2	9.2	9.7	9.9	10.1	10.4
1991 (C)	9.2	9.2	10.2	10.5	10.3	10.6
Average	13.9	13.5	12.9	12.9	13.2	13.2
Median	10.5	10.3	11.7	11.6	12.2	12.2

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-39. San Joaquin River Fall-Run Chinook Salmon through-Delta Smolt Survival under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

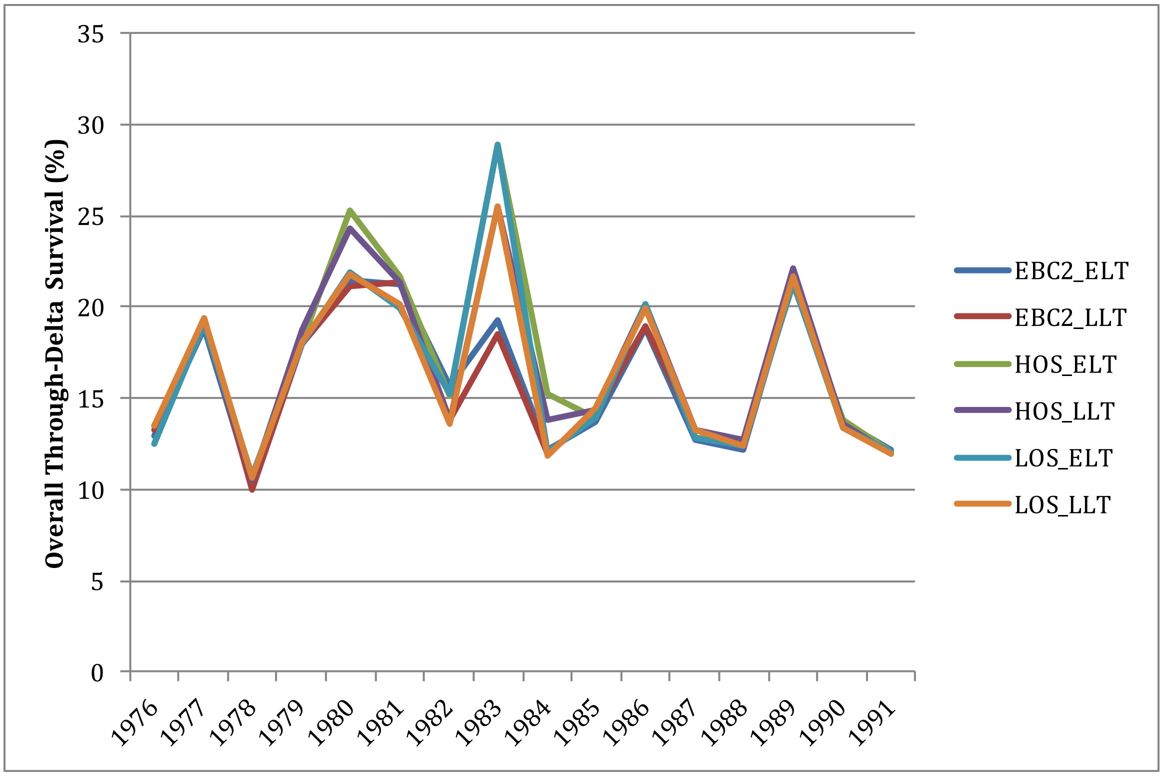
5C.5.3.4.7.6 Mokelumne River Fall-Run Chinook Salmon

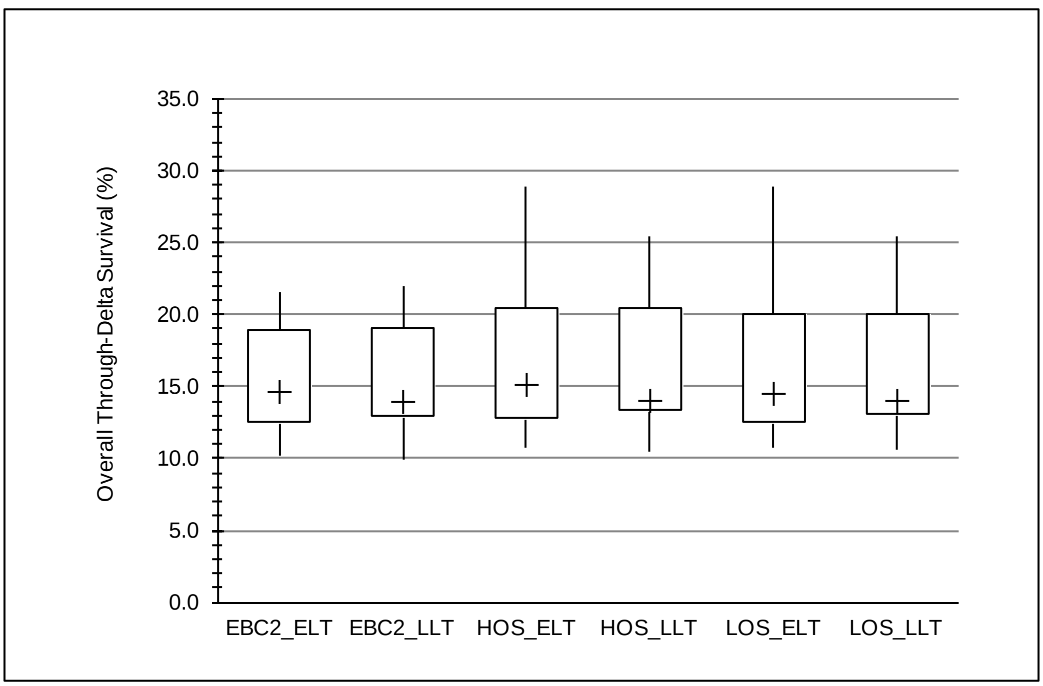
The patterns of relative difference in through-Delta survival between scenarios for Mokelumne River fall-run Chinook smolts generally were similar to those of Sacramento River fall-run and spring-run Chinook (discussed above) because the Mokelumne River fall-run Chinook Delta entry distribution peak lies between the peaks for these other runs. There was little difference in average and median through-Delta survival for the LOS and ESO scenarios because of the similarity of water operations during spring (Table 5C.5.3-64; Figure 5C.5.3-40;Table 5C.5.3-56; Figure 5C.5.3-34), when the bulk of Delta entry is assumed to occur. Median through-Delta survival under the HOS scenarios was similar to or slightly greater than the ESO/LOS scenarios, whereas average survival was slightly greater, with the HOS average survival largely being driven up by higher noticeably higher survival in 1980 and 1984. Median and average survival under the HOS/LOS/ESO scenarios was similar to or slightly greater than the EBC2_ELT and EBC2_LLT scenarios (Table 5C.5.3-64; Figure 5C.5.3-40; Table 5C.5.3-56; Figure 5C.5.3-34).

Table 5C.5.3-64. Percentage of Mokelumne River Fall-Run Chinook Salmon Smolts Surviving through the Delta under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

Water Year[a]	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	13.0	13.2	12.5	13.4	12.5	13.5
1977 (C)	18.9	19.4	19.1	19.1	19.1	19.4
1978 (AN)	10.2	10.0	10.7	10.5	10.8	10.6
1979 (BN)	18.1	17.9	18.0	18.7	18.0	18.0
1980 (AN)	21.5	21.2	25.3	24.3	21.9	21.8
1981 (D)	21.2	21.4	21.6	21.4	20.0	20.1
1982 (W)	15.6	13.8	15.1	13.7	15.2	13.6
1983 (W)	19.3	18.5	28.9	25.5	28.9	25.5
1984 (W)	12.2	11.9	15.2	13.8	12.1	11.9
1985 (D)	13.7	14.2	13.9	14.4	13.9	14.5
1986 (W)	18.8	19.0	20.2	20.2	20.1	20.0
1987 (D)	12.7	13.3	12.9	13.3	12.9	13.3
1988 (C)	12.2	12.4	12.7	12.7	12.4	12.4
1989 (D)	21.6	21.9	21.3	22.1	21.4	21.7
1990 (C)	13.7	13.6	13.8	13.6	13.4	13.4
1991 (C)	12.2	12.1	12.1	12.0	12.0	11.9
Average	15.9	15.9	17.1	16.8	16.5	16.4
Median	14.7	14.0	15.2	14.1	14.6	14.1

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.





Box and whisker plot in lower panel shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival.

Figure 5C.5.3-40. Mokelumne River Fall-Run Chinook Salmon through-Delta Smolt Survival under EBC2, HOS, and LOS Scenarios, Based on Delta Passage Model

5C.5.3.5 Juvenile Spring-Run and Fall-Run Chinook Salmon Smolt through-Delta Survival (Newman 2003)

5C.5.3.5.1 Spring-Run Chinook Salmon

Through-Delta proportional survival of spring-run Chinook salmon smolts estimated using model coefficients from Newman (2003) averaged 0.65–0.74 and ranged from 0.46 (EBC2_ELT in 1977, a critical year) to 0.99 (EBC2 in 1983, a wet year) for EBC scenarios (Figure 5C.5.3-41, Figure 5C.5.3-42, Table 5C.5.3-65). Through-Delta survival under ESO scenarios averaged 0.64–0.70 and had a similar range to the EBC scenarios. ESO scenarios averaged 0.01–0.10 lower survival than EBC scenarios, with the greatest differences occurring in comparisons across time periods (particularly EBC2 vs. ESO_LLT) (Table 5C.5.3-66). Differences between time periods were driven by modeled temperature differences: lower survival under the EBC2_LLT scenario compared to the EBC2 and EBC2_ELT scenarios was caused by higher temperatures in the LLT, as shown in Figure 5C.5.3-43 where the release temperature coefficient is multiplied by the mean standardized temperature covariate value weighted by the proportion of the population (i.e., an integrated indicator of the effects of this covariate on survival). Accounting for differences due to climate change, the proportional survival averaged 0.02 (3%) lower under ESO_ELT compared to EBC2_ELT and 0.01 (2%) lower under ESO_LLT compared to EBC2_LLT (Table 5C.5.3-66). The largest differences between ESO and EBC2 scenarios in the ELT and LLT came in the above-normal water year of 1980 (0.05–0.06 [7–8%] lower under ESO scenarios). In this year Sacramento River flows were appreciably lower under the ESO scenarios than under EBC2 scenarios (Figure 5C.5.3-44) and this gave a noticeably greater effect on survival than the lower south Delta exports under the ESO scenarios in the same year (Figure 5C.5.3-45). In contrast, the scenario comparison for which an ESO scenario had the greatest positive difference compared to an EBC scenario was 1987 wherein ESO_LLT had 0.04 (8%) greater survival than EBC2_LLT (Table 5C.5.3-65 and Table 5C.5.3-66). This difference is explained by ESO_LLT Sacramento River flow being relatively high (Figure 5C.5.3-44) and south Delta exports being relatively low (Figure 5C.5.3-45) compared to EBC2_LLT flows and exports. The results therefore in large part reflect the interplay of changes in Sacramento River flows and south Delta exports.

The aforementioned results for ESO scenarios were based on the first turbidity hypothesis, i.e., that turbidity would not differ between ESO and EBC scenarios. A comparison of the results from this hypothesis with a second hypothesis—turbidity may be lower because of north Delta intake operations and would be a function of lower river flow downstream of the north Delta intakes—showed very little difference in estimates of through-Delta survival (Figure 5C.5.3-46).

A number of potential effects of the BDCP were not accounted for the modeling based on the analysis of Newman (2003). The analysis focused solely on the Sacramento River-migrating component of the population and did not account for smolts that could use the alternative Yolo Bypass migratory pathway that would become more available under *CM2 Yolo Bypass Fisheries Enhancement*. Riverbank habitat improvements under *CM6 Channel Margin Enhancement* may enhance holding habitat for Chinook salmon smolts (Zajanc et al. 2012) and therefore could increase survival through the Plan Area. *CM15 Localized Reduction of Predatory Fishes* may also improve survival under the BDCP relative to existing biological conditions. Deterrence of smolts from entering Georgiana Slough under *CM16 Nonphysical Fish Barriers* would reduce the proportion of the population that would be subject to lower survival during migration through the interior Delta. Construction and operation of the north Delta intakes under *CM1 Water Facilities and Operation* could lead to additional predation in the vicinity of the intake structures, as described in Appendix 5.F, *Biological Stressors on Covered Fish*, and as reflected in Chapter 3, Section 3.3, *Biological Goals and Objectives.* Some of the aforementioned potential effects on survival are explored quantitatively with the DPM (see above).

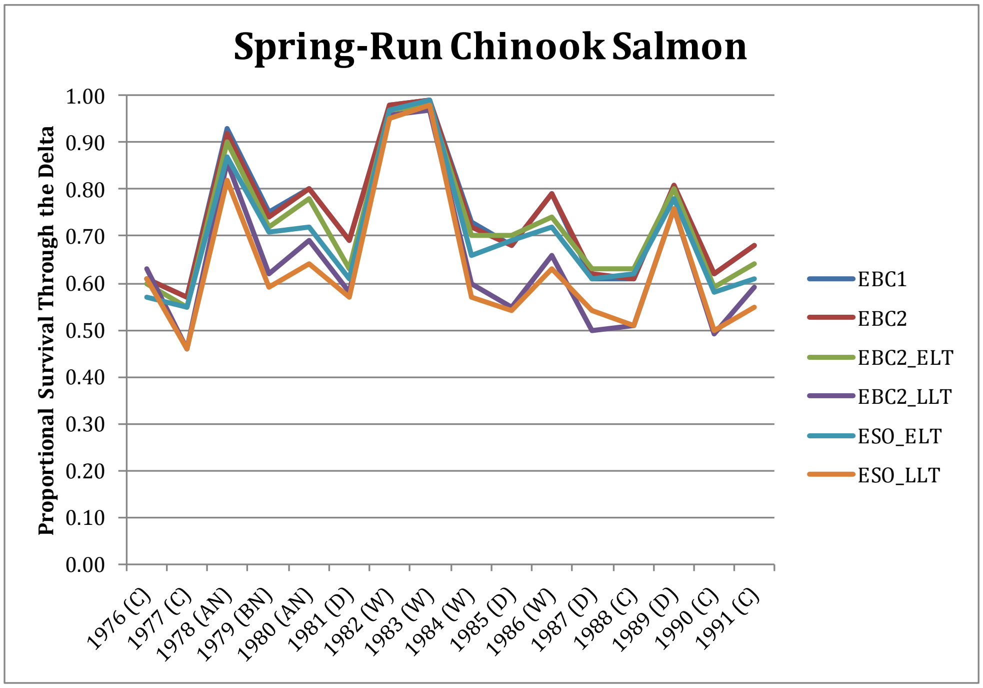
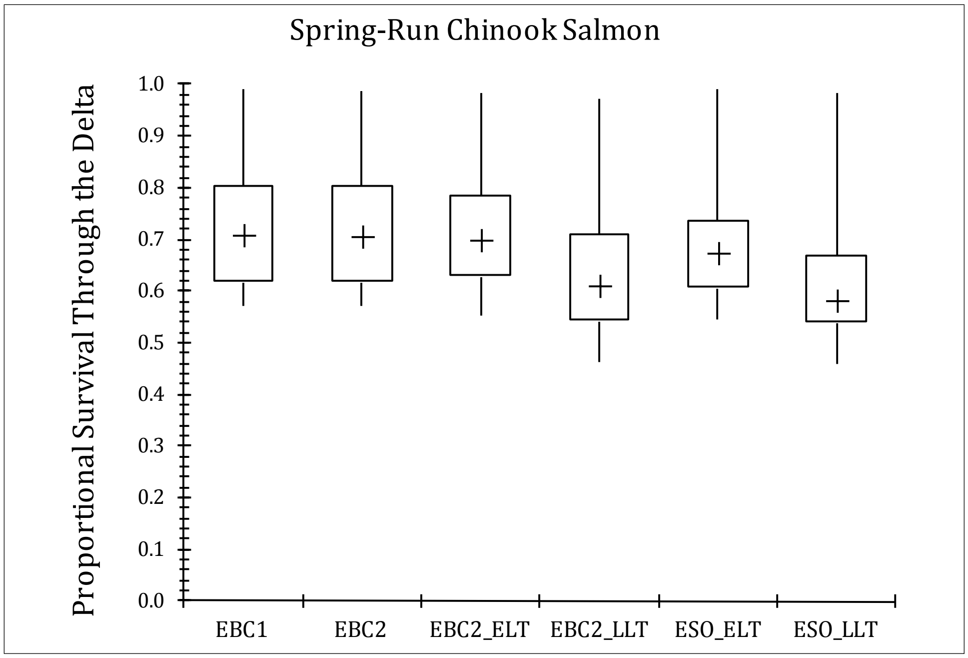


Figure 5C.5.3-41. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts, from Modeling Based on Newman (2003)



Note: Median is marked with "+," upper and lower boundaries of the box indicate interquartile range, and upper and lower whiskers indicate maximum and minimum proportional survival.

Figure 5C.5.3-42. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts, from Modeling Based on Newman (2003)

Table 5C.5.3-65. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts under EBC and ESO Scenarios, from Modeling Based on Newman (2003)

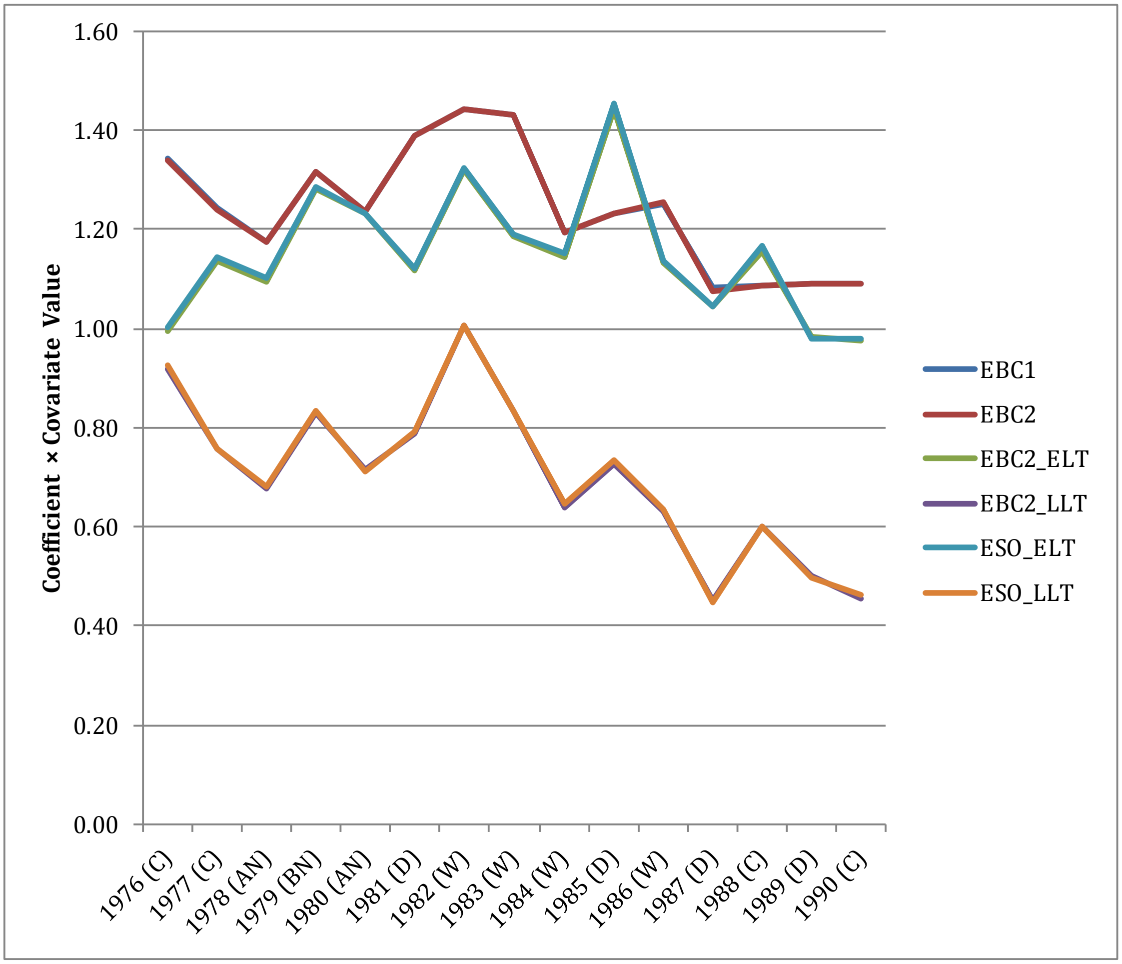
	Scenario[b]					
Water Year[a]	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**
1976 (C)	0.61	0.61	0.60	0.63	0.57	0.61
1977 (C)	0.57	0.57	0.55	0.46	0.55	0.46
1978 (AN)	0.93	0.92	0.90	0.86	0.87	0.82
1979 (BN)	0.75	0.74	0.72	0.62	0.71	0.59
1980 (AN)	0.80	0.80	0.78	0.69	0.72	0.64
1981 (D)	0.69	0.69	0.63	0.58	0.61	0.57
1982 (W)	0.98	0.98	0.97	0.96	0.97	0.95
1983 (W)	0.99	0.99	0.98	0.97	0.99	0.98
1984 (W)	0.73	0.72	0.70	0.60	0.66	0.57
1985 (D)	0.68	0.68	0.70	0.55	0.69	0.54
1986 (W)	0.79	0.79	0.74	0.66	0.72	0.63
1987 (D)	0.61	0.62	0.63	0.50	0.61	0.54
1988 (C)	0.61	0.61	0.63	0.51	0.62	0.51
1989 (D)	0.81	0.81	0.80	0.76	0.78	0.76
1990 (C)	0.62	0.62	0.59	0.49	0.58	0.50
1991 (C)	0.68	0.68	0.64	0.59	0.61	0.55
Average	0.74	0.74	0.72	0.65	0.70	0.64

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-66. Differences[a] between EBC and ESO Scenarios in Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts, From Modeling Based on Newman (2003)

Water Year[b]	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs ESO_LLT	EBC2_ELT vs ESO_ELT	EBC2_LLT vs. ESO_LLT
1976 (C)	-0.04 (-7%)	0.00 (0%)	-0.04 (-7%)	0.00 (0%)	-0.03 (-5%)	-0.02 (-3%)
1977 (C)	-0.02 (-4%)	-0.11 (-19%)	-0.02 (-4%)	-0.11 (-19%)	0.00 (0%)	0.00 (0%)
1978 (AN)	-0.06 (-6%)	-0.11 (-12%)	-0.05 (-5%)	-0.10 (-11%)	-0.03 (-3%)	-0.04 (-5%)
1979 (BN)	-0.04 (-5%)	-0.16 (-21%)	-0.03 (-4%)	-0.15 (-20%)	-0.01 (-1%)	-0.03 (-5%)
1980 (AN)	-0.08 (-10%)	-0.16 (-20%)	-0.08 (-10%)	-0.16 (-20%)	-0.06 (-8%)	-0.05 (-7%)
1981 (D)	-0.08 (-12%)	-0.12 (-17%)	-0.08 (-12%)	-0.12 (-17%)	-0.02 (-3%)	-0.01 (-2%)
1982 (W)	-0.01 (-1%)	-0.03 (-3%)	-0.01 (-1%)	-0.03 (-3%)	0.00 (0%)	-0.01 (-1%)
1983 (W)	0.00 (0%)	-0.01 (-1%)	0.00 (0%)	-0.01 (-1%)	0.01 (1%)	0.01 (1%)
1984 (W)	-0.07 (-10%)	-0.16 (-22%)	-0.06 (-8%)	-0.15 (-21%)	-0.04 (-6%)	-0.03 (-5%)
1985 (D)	0.01 (1%)	-0.14 (-21%)	0.01 (1%)	-0.14 (-21%)	-0.01 (-1%)	-0.01 (-2%)
1986 (W)	-0.07 (-9%)	-0.16 (-20%)	-0.07 (-9%)	-0.16 (-20%)	-0.02 (-3%)	-0.03 (-5%)
1987 (D)	0.00 (0%)	-0.07 (-11%)	-0.01 (-2%)	-0.08 (-13%)	-0.02 (-3%)	0.04 (8%)
1988 (C)	0.01 (2%)	-0.10 (-16%)	0.01 (2%)	-0.10 (-16%)	-0.01 (-2%)	0.00 (0%)
1989 (D)	-0.03 (-4%)	-0.05 (-6%)	-0.03 (-4%)	-0.05 (-6%)	-0.02 (-3%)	0.00 (0%)
1990 (C)	-0.04 (-6%)	-0.12 (-19%)	-0.04 (-6%)	-0.12 (-19%)	-0.01 (-2%)	0.01 (2%)
1991 (C)	-0.07 (-10%)	-0.13 (-19%)	-0.07 (-10%)	-0.13 (-19%)	-0.03 (-5%)	-0.04 (-7%)
Average	-0.04 (-5%)	-0.10 (-14%)	-0.04 (-5%)	-0.10 (-14%)	-0.02 (-3%)	-0.01 (-2%)

[a] Negative values indicate lower survival under ESO than under EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.



Plots illustrate virtually identical values for three pairs of scenarios: EBC1 and EBC2, EBC2_ELT and ESO_ELT, and EBC2_LLT and ESO_LLT.

Figure 5C.5.3-43. Relative Effect of Release Temperature (Model Coefficient Multiplied by Mean Covariate Value Weighted by Proportion of Smolts) on Spring-Run Chinook Salmon Smolt through-Delta Survival, from Modeling Based on Newman (2003)

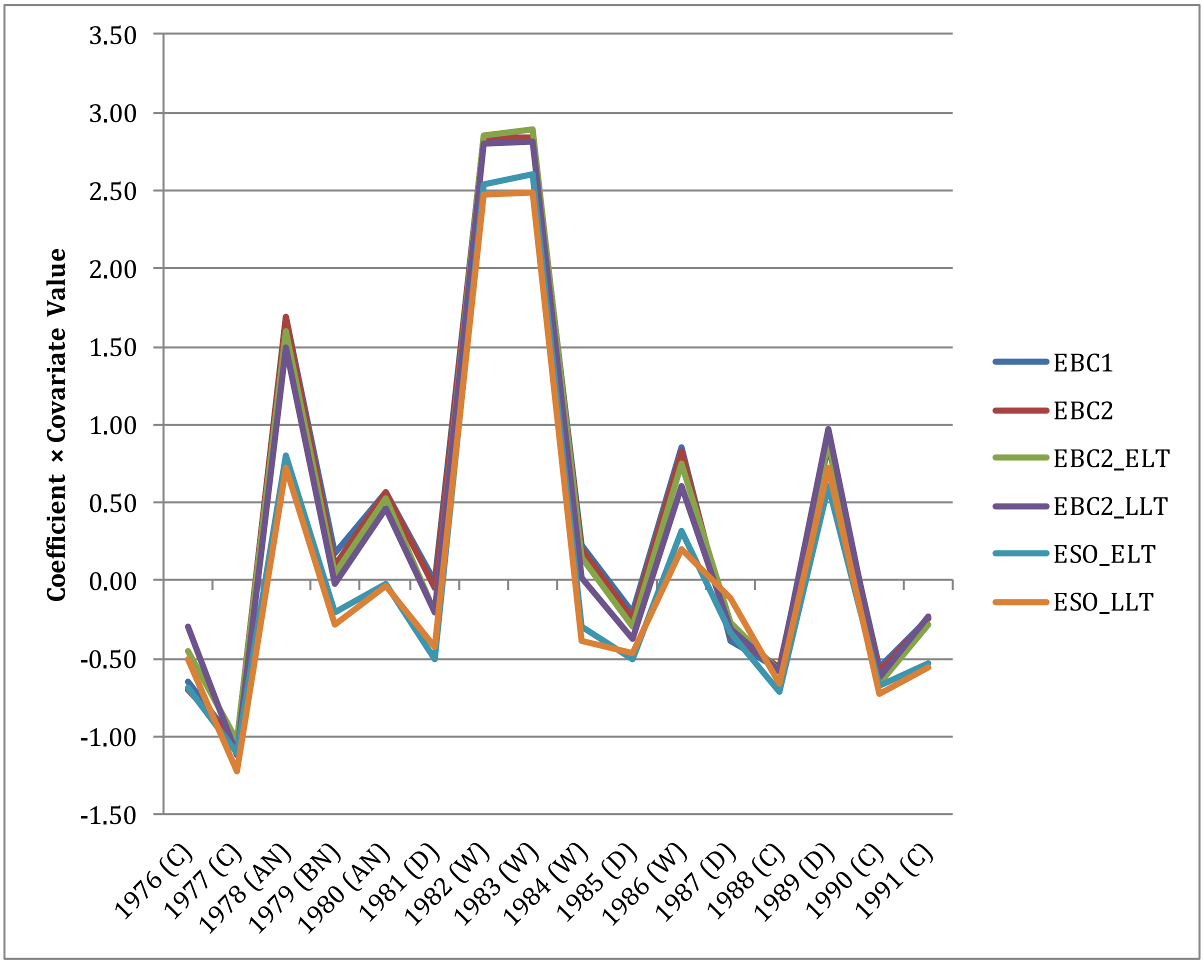


Figure 5C.5.3-44. Relative Effect of Log Flow (Model Coefficient Multiplied by Mean Covariate Value Weighted by Proportion of Smolts) on Spring-Run Chinook Salmon Smolt through-Delta Survival, from Modeling Based on Newman (2003)

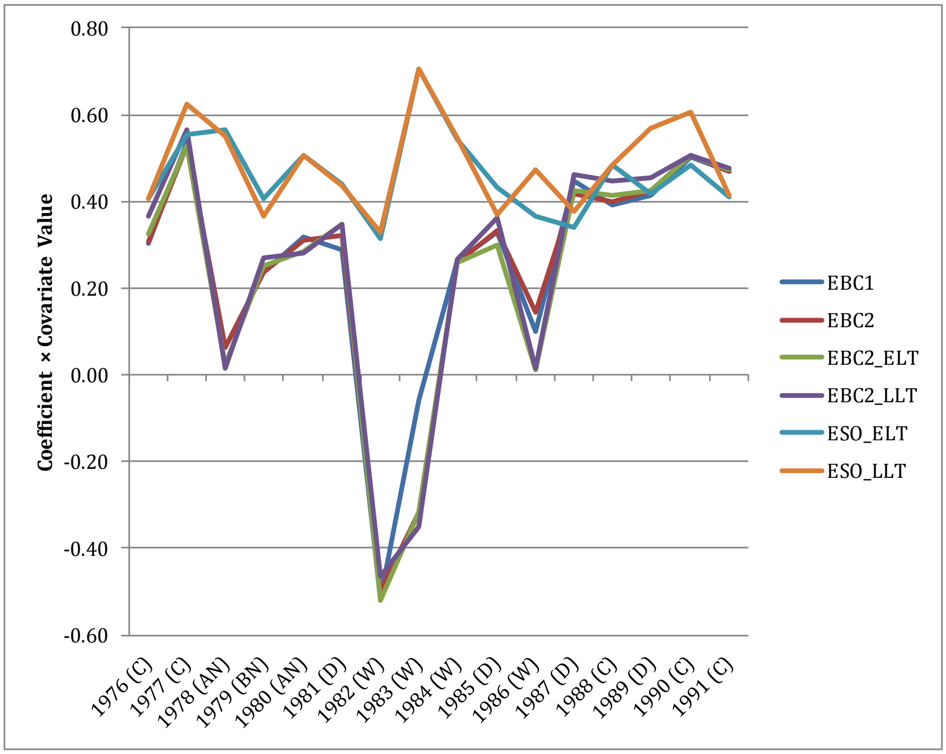


Figure 5C.5.3-45. Relative Effect of South Delta Exports (Model Coefficient Multiplied by Mean Covariate Value Weighted by Proportion of Smolts) on Spring-Run Chinook Salmon Smolt through-Delta Survival, from Modeling Based on Newman (2003)

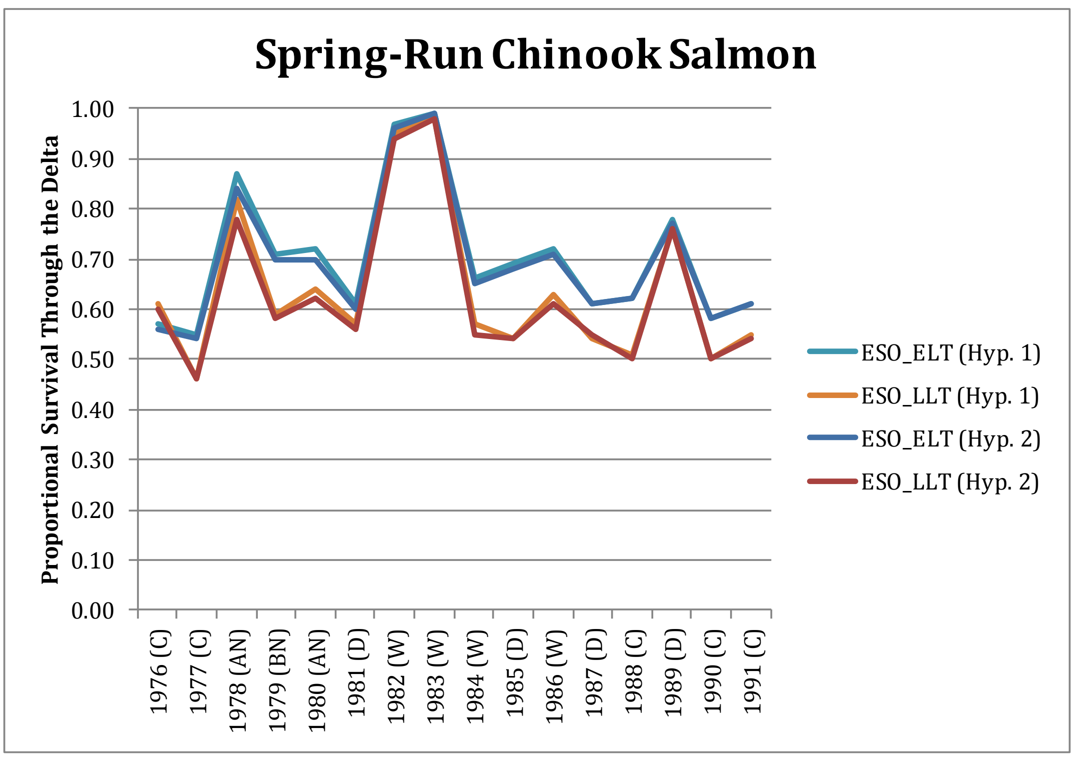


Figure 5C.5.3-46. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts Based on Flow-Turbidity Hypotheses 1 and 2, from Modeling Based on Newman (2003)

5C.5.3.5.2 Fall-Run Chinook Salmon

Through-Delta proportional survival of spring-run Chinook salmon smolts estimated using model coefficients from Newman (2003) averaged 0.48–0.55 and ranged from 0.30 (EBC2_LLT in 1990, a critically dry year) to 0.96 (EBC2 in 1983, a wet year) for EBC scenarios (Figure 5C.5.3-47, Figure 5C.5.3-48, Table 5C.5.3-67). Through-Delta survival under ESO scenarios averaged 0.47–0.50 and had a similar range to the EBC scenarios. ESO scenarios averaged 0.01–0.08 lower survival than EBC scenarios, with the greatest differences occurring in comparisons across time periods (particularly EBC2 vs. ESO_LLT) (Table 5C.5.3-66). As noted for spring-run Chinook salmon smolts (see above), differences between time periods were driven by modeled temperature differences: lower survival under the EBC2_LLT scenario compared to the EBC2 and EBC2_ELT scenarios was caused by higher temperatures in the LLT, as shown in Figure 5C.5.3-49 where the release temperature coefficient is multiplied by the mean standardized temperature covariate value weighted by the proportion of the population. Accounting for differences due to climate change, the proportional survival averaged 0.02 (4%) lower under ESO_ELT compared to EBC2_ELT and 0.01 (2%) lower under ESO_LLT compared to EBC2_LLT (Table 5C.5.3-68). The largest differences between ESO and EBC2 scenarios in the ELT and LLT came in the above-normal water year of 1980 (0.03–0.06 [7–11%] lower under ESO scenarios). In this year Sacramento River flows were appreciably lower under the ESO scenarios than under EBC2 scenarios (Figure 5C.5.3-50) and this gave a noticeably greater effect on survival than the lower south Delta exports under the ESO scenarios in the same year (Figure 5C.5.3-51). In contrast, the scenario comparison wherein an ESO scenario had the greatest positive difference compared to an EBC scenario was the wet year of 1982 wherein ESO_LLT had 0.04 (5%) greater survival than EBC2_LLT (Table 5C.5.3-67 and Table 5C.5.3-68)—this was because under ESO_LLT south Delta exports were relatively high (Figure 5C.5.3-51) despite Sacramento River flow being somewhat lower (Figure 5C.5.3-50). This result was very similar for the ESO_ELT vs. EBC2_ELT comparison in the same year. In general and as noted for spring-run Chinook salmon (above), the results therefore in large part reflect the interplay of changes in Sacramento River flows and south Delta exports.

The aforementioned results for ESO scenarios were based on the first turbidity hypothesis, i.e., that turbidity would not differ between ESO and EBC scenarios. A comparison of the results from this hypothesis with a second hypothesis—turbidity may be lower because of north Delta intake operations and would be a function of lower river flow downstream of the north Delta intakes—gave very little difference in estimates of through-Delta survival (Figure 5C.5.3-52).

Fall-run Chinook salmon smolt survival estimated using the model coefficients from Newman (2003) was relatively low compared to survival estimates for spring-run Chinook salmon using the same method (discussed above). This difference was driven largely by the lower temperatures during the spring-run Chinook salmon migration period (compare y-axis scales on Figure 5C.5.3-43 and Figure 5C.5.3-49).

As noted above for spring-run Chinook salmon smolts, a number of potential effects of the BDCP were not accounted for the modeling based on the analysis of Newman (2003). Some of these factors were explored further in analysis based on the Delta Passage Model.

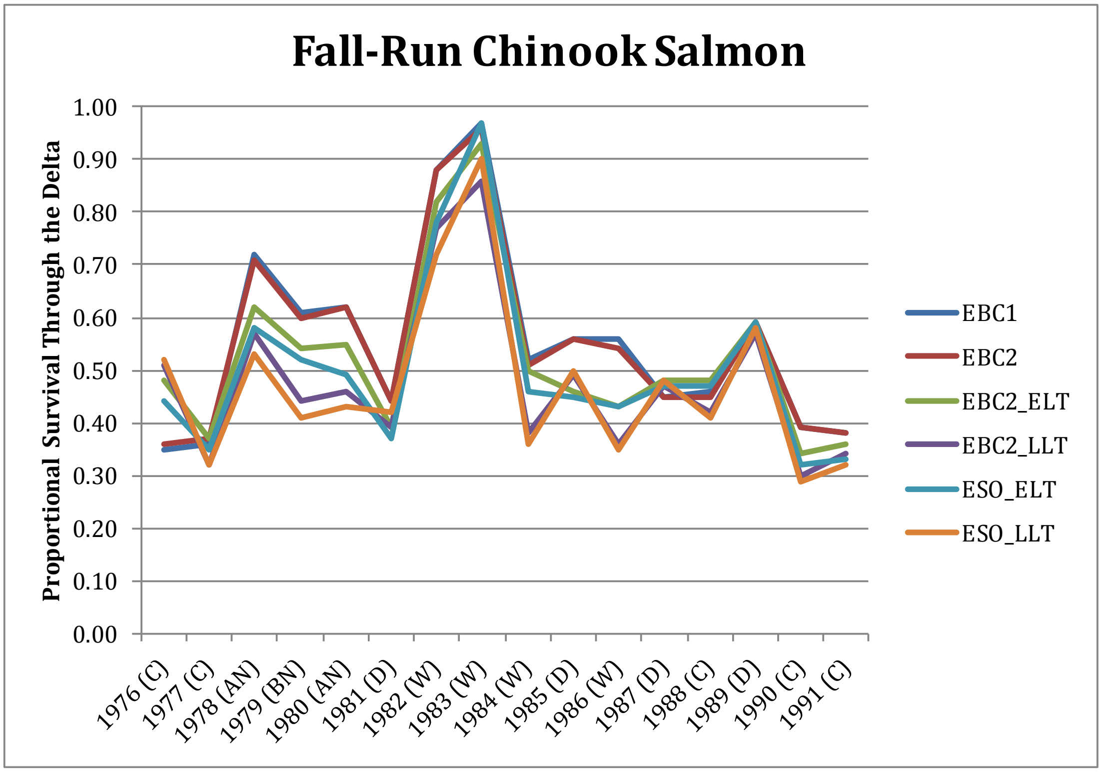
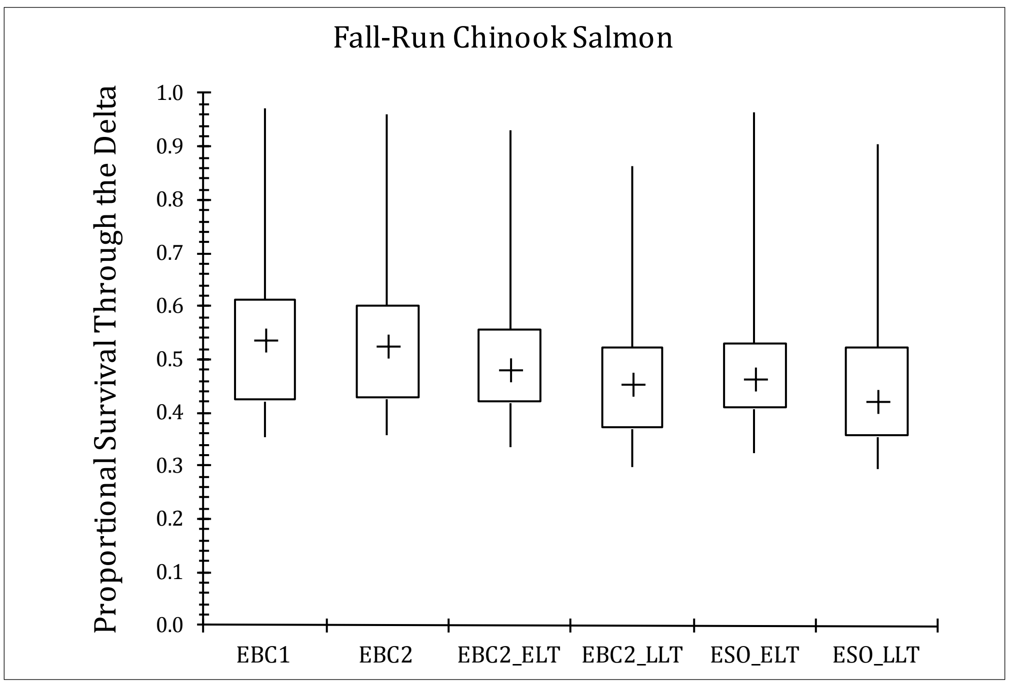


Figure 5C.5.3-47. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts, from Modeling Based on Newman (2003)



Note: Median is marked with "+," upper and lower boundaries of the box indicate interquartile range, and upper and lower whiskers indicate maximum and minimum proportional survival.

Figure 5C.5.3-48. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts, from Modeling Based on Newman (2003)

Table 5C.5.3-67. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts under EBC and ESO Scenarios, From Modeling Based on Newman (2003)

Water Year[a]	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
1976 (C)	0.35	0.36	0.48	0.51	0.44	0.52
1977 (C)	0.36	0.37	0.37	0.32	0.35	0.32
1978 (AN)	0.72	0.71	0.62	0.57	0.58	0.53
1979 (BN)	0.61	0.60	0.54	0.44	0.52	0.41
1980 (AN)	0.62	0.62	0.55	0.46	0.49	0.43
1981 (D)	0.44	0.44	0.39	0.39	0.37	0.42
1982 (W)	0.88	0.88	0.82	0.77	0.78	0.72
1983 (W)	0.97	0.96	0.93	0.86	0.97	0.90
1984 (W)	0.52	0.51	0.50	0.38	0.46	0.36
1985 (D)	0.56	0.56	0.46	0.49	0.45	0.50
1986 (W)	0.56	0.54	0.43	0.36	0.43	0.35
1987 (D)	0.45	0.45	0.48	0.47	0.47	0.48
1988 (C)	0.46	0.45	0.48	0.42	0.47	0.41
1989 (D)	0.59	0.59	0.59	0.57	0.59	0.58
1990 (C)	0.39	0.39	0.34	0.30	0.32	0.29
1991 (C)	0.38	0.38	0.36	0.34	0.33	0.32
Average	0.55	0.55	0.52	0.48	0.50	0.47

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-68. Differences[a] between EBC and ESO Scenarios in Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts, From Modeling Based on Newman (2003)

Water Year[b]	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs ESO_LLT	EBC2_ELT vs ESO_ELT	EBC2_LLT vs. ESO_LLT
1976 (C)	0.09 (26%)	0.17 (49%)	0.08 (22%)	0.16 (44%)	-0.04 (-8%)	0.01 (2%)
1977 (C)	-0.01 (-3%)	-0.04 (-11%)	-0.02 (-5%)	-0.05 (-14%)	-0.02 (-5%)	0.00 (0%)
1978 (AN)	-0.14 (-19%)	-0.19 (-26%)	-0.13 (-18%)	-0.18 (-25%)	-0.04 (-6%)	-0.04 (-7%)
1979 (BN)	-0.09 (-15%)	-0.20 (-33%)	-0.08 (-13%)	-0.19 (-32%)	-0.02 (-4%)	-0.03 (-7%)
1980 (AN)	-0.13 (-21%)	-0.19 (-31%)	-0.13 (-21%)	-0.19 (-31%)	-0.06 (-11%)	-0.03 (-7%)
1981 (D)	-0.07 (-16%)	-0.02 (-5%)	-0.07 (-16%)	-0.02 (-5%)	-0.02 (-5%)	0.03 (8%)
1982 (W)	-0.10 (-11%)	-0.16 (-18%)	-0.10 (-11%)	-0.16 (-18%)	-0.04 (-5%)	-0.05 (-6%)
1983 (W)	0.00 (0%)	-0.07 (-7%)	0.01 (1%)	-0.06 (-6%)	0.04 (4%)	0.04 (5%)
1984 (W)	-0.06 (-12%)	-0.16 (-31%)	-0.05 (-10%)	-0.15 (-29%)	-0.04 (-8%)	-0.02 (-5%)
1985 (D)	-0.11 (-20%)	-0.06 (-11%)	-0.11 (-20%)	-0.06 (-11%)	-0.01 (-2%)	0.01 (2%)
1986 (W)	-0.13 (-23%)	-0.21 (-38%)	-0.11 (-20%)	-0.19 (-35%)	0.00 (0%)	-0.01 (-3%)
1987 (D)	0.02 (4%)	0.03 (7%)	0.02 (4%)	0.03 (7%)	-0.01 (-2%)	0.01 (2%)
1988 (C)	0.01 (2%)	-0.05 (-11%)	0.02 (4%)	-0.04 (-9%)	-0.01 (-2%)	-0.01 (-2%)
1989 (D)	0.00 (0%)	-0.01 (-2%)	0.00 (0%)	-0.01 (-2%)	0.00 (0%)	0.01 (2%)
1990 (C)	-0.07 (-18%)	-0.10 (-26%)	-0.07 (-18%)	-0.10 (-26%)	-0.02 (-6%)	-0.01 (-3%)
1991 (C)	-0.05 (-13%)	-0.06 (-16%)	-0.05 (-13%)	-0.06 (-16%)	-0.03 (-8%)	-0.02 (-6%)
Average	-0.05 (-9%)	-0.08 (-15%)	-0.05 (-9%)	-0.08 (-14%)	-0.02 (-4%)	-0.01 (-1%)

[a] Negative values indicate lower survival under ESO than under EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of the scenarios.

Plots illustrate virtually identical values for three pairs of scenarios: EBC1 and EBC2, EBC2_ELT and ESO_ELT, and EBC2_LLT and ESO_LLT.

Figure 5C.5.3-49. Relative Effect of Release Temperature (Model Coefficient Multiplied by Mean Covariate Value Weighted by Proportion of Smolts) on Fall-Run Chinook Salmon Smolt through-Delta Survival, from Modeling Based on Newman (2003)

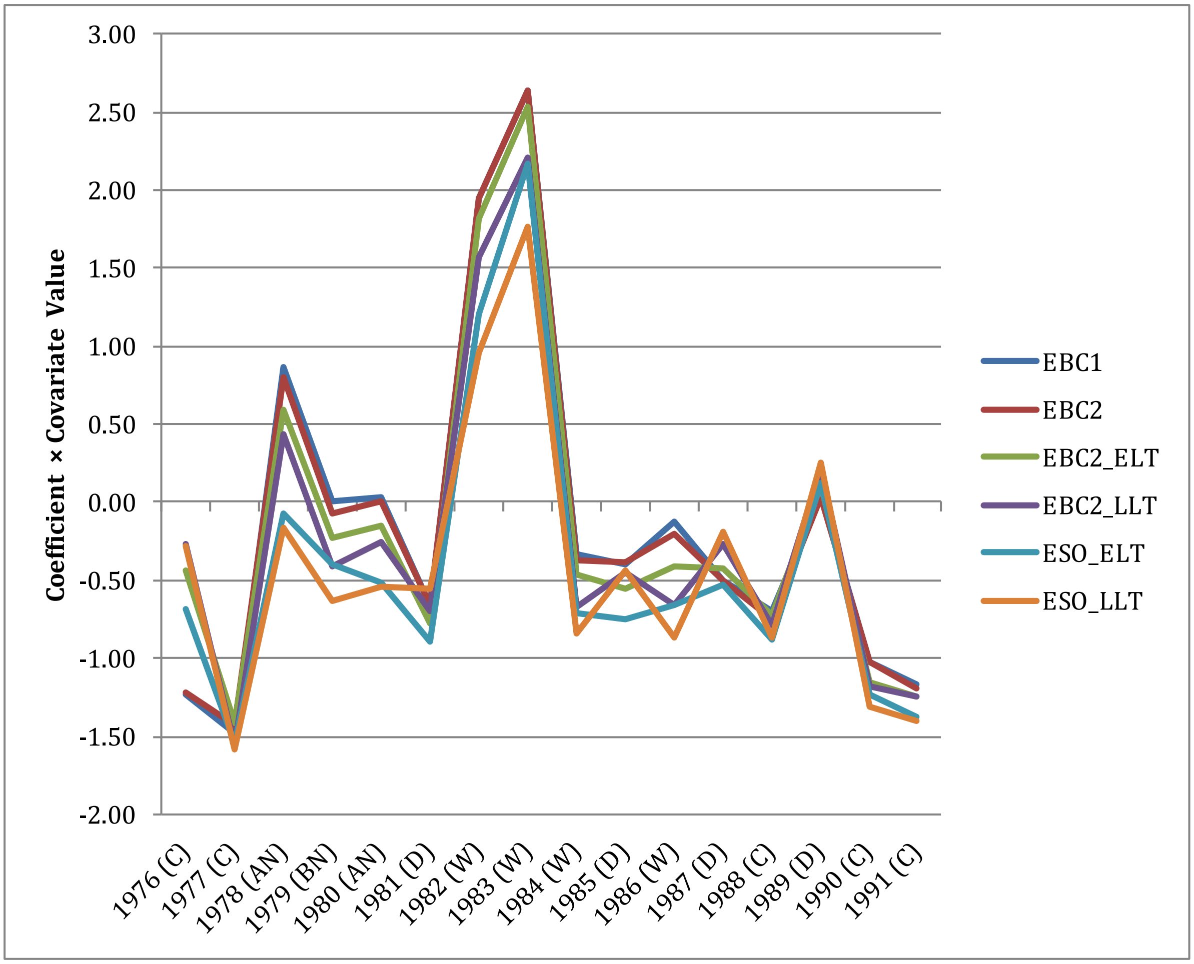


Figure 5C.5.3-50. Relative Effect of Log Flow (Model Coefficient Multiplied by Mean Covariate Value Weighted by Proportion of Smolts) on Fall-Run Chinook Salmon Smolt through-Delta Survival, from Modeling Based on Newman (2003)

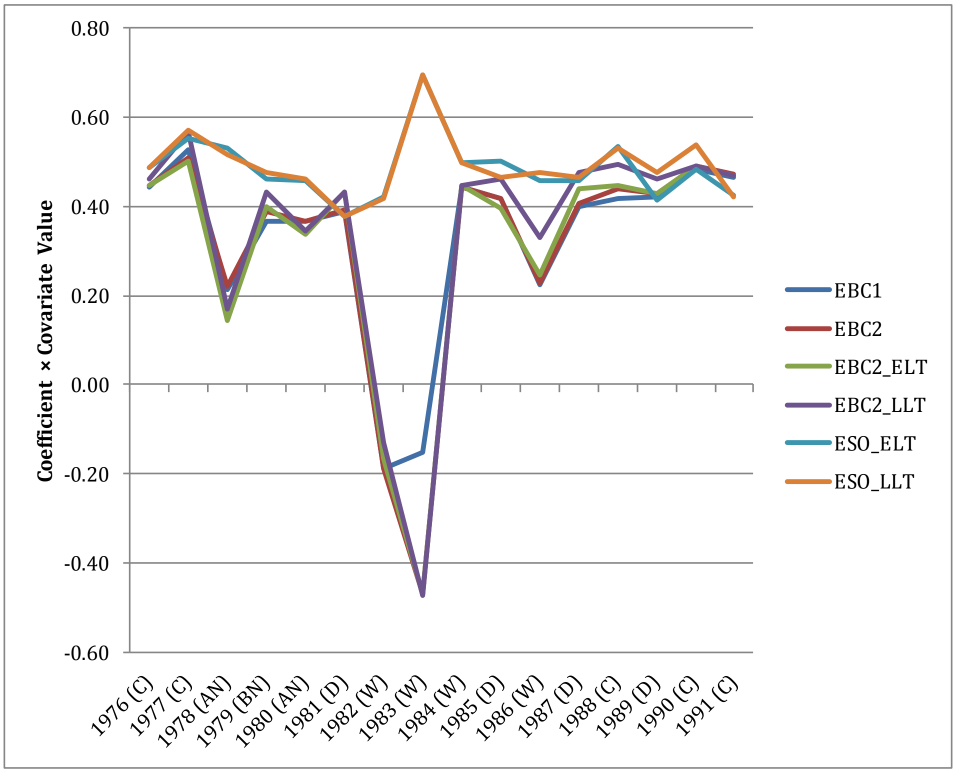


Figure 5C.5.3-51. Relative Effect of South Delta Exports (Model Coefficient Multiplied by Mean Covariate Value Weighted by Proportion of Smolts) on Fall-Run Chinook Salmon Smolt through-Delta Survival, from Modeling Based on Newman (2003)

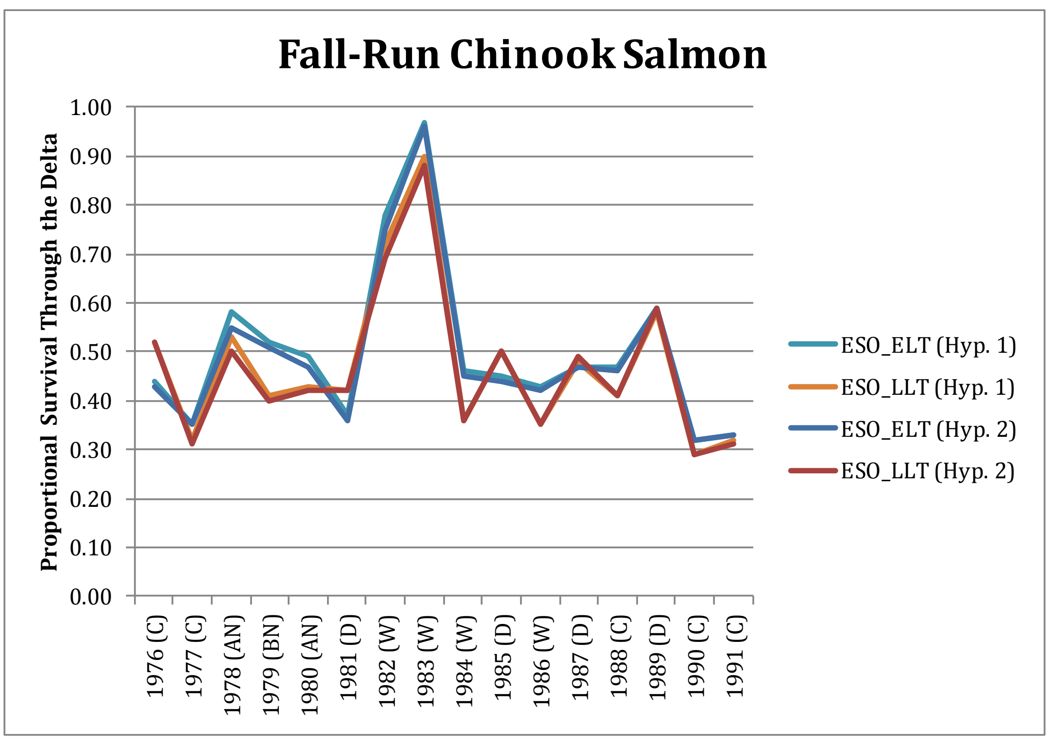


Figure 5C.5.3-52. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts Based on Flow-Turbidity Hypotheses 1 and 2, from Modeling Based on Newman (2003)

5C.5.3.5.3 HOS-LOS Scenarios

For spring-run Chinook salmon smolts, the LOS scenarios gave through-Delta proportional survival that was virtually identical to the ESO scenarios, with average survival of 0.70 for LOS_ELT and 0.64 for LOS_LLT (Figure 5C.5.3-53, Figure 5C.5.3-54, Table 5C.5.3-69). This reflects the similarity of water operations in the spring through-Delta survival period. Average and median through-Delta proportional survival under the LOS scenarios was slightly lower (0.01–0.02) than for EBC2_ELT and EBC2_LLT. The HOS scenarios had slightly greater average through-Delta survival than the other scenarios, 0.73 for HOS_ELT and 0.67 for HOS_LLT (Table 5C.5.3-69). As with the DPM results described elsewhere in this appendix, the average was driven up by appreciably higher survival in 1980 and 1984 (Figure 5C.5.3-53); the median survival under the HOS scenarios was nearly the same as the EBC2 scenarios. Note that the similarity of the trends for the DPM and the analysis based on Newman (2003) can be attributed to the use of the same Delta entry distributions.

Through-Delta proportional survival was lower for fall-run Chinook salmon than for spring-run Chinook salmon because temperatures were warmer during the fall-run migration period. The basic pattern noted above for spring-run Chinook salmon was also true for fall-run: little difference in survival between LOS and ESO scenarios, with a slightly greater average for HOS scenarios that was driven mostly by 1980 and 1984 (Figure 5C.5.3-55, Figure 5C.5.3-56, Table 5C.5.3-70).

The aforementioned results for HOS and LOS scenarios were based on the first turbidity hypothesis, i.e., that turbidity would not differ between ESO and EBC scenarios. As with ESO scenarios, a comparison of the results from this hypothesis with a second hypothesis—turbidity may be lower because of north Delta intake operations and would be a function of lower river flow downstream of the north Delta intakes—gave very little difference in estimates of through-Delta survival, i.e., 0.01 or less difference.

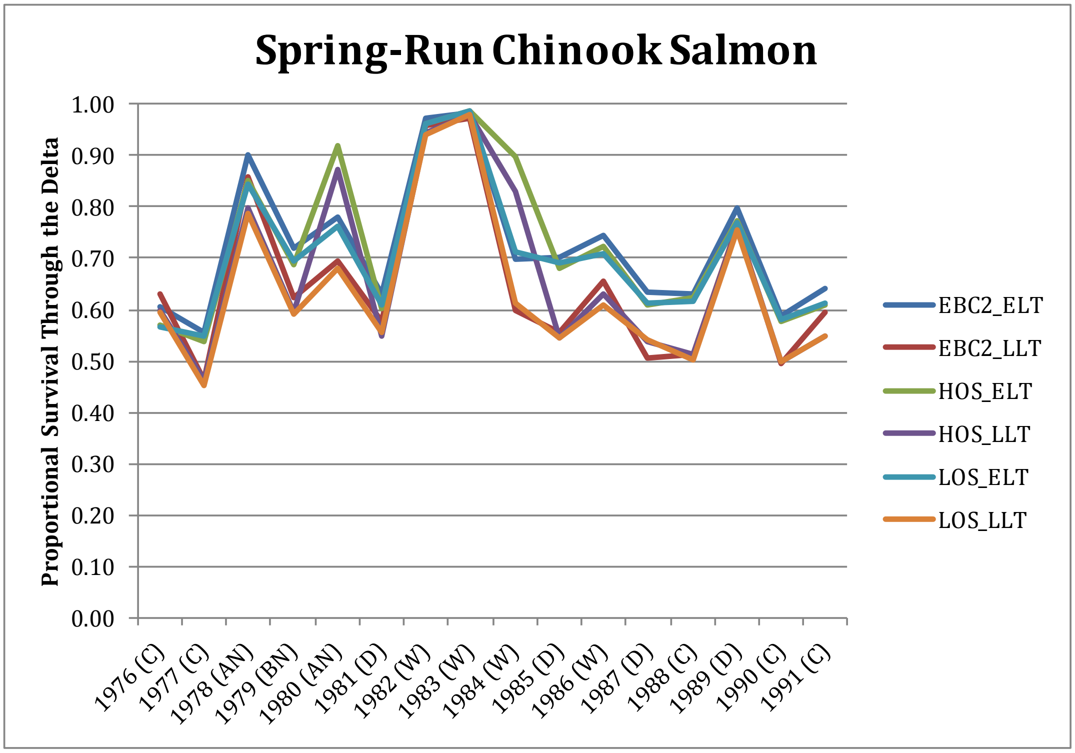
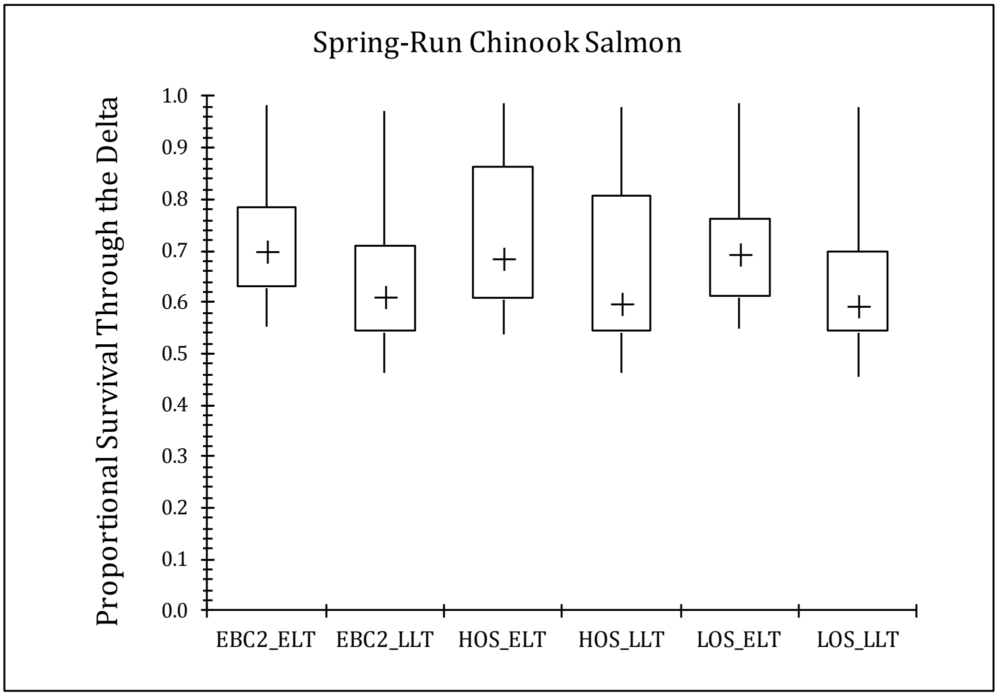


Figure 5C.5.3-53. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts under EBC2, HOS, and LOS Scenarios, from Modeling Based on Newman (2003)



Note: Median is marked with “+,” upper and lower boundaries of the box indicate interquartile range, and upper and lower whiskers indicate maximum and minimum proportional survival.

Figure 5C.5.3-54. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts under EBC2, HOS, and LOS Scenarios, from Modeling Based on Newman (2003)

Table 5C.5.3-69. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts under EBC2, HOS, and LOS Scenarios, from Modeling Based on Newman (2003)

Water Year[a]	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	0.60	0.63	0.57	0.60	0.57	0.59
1977 (C)	0.55	0.46	0.54	0.46	0.55	0.45
1978 (AN)	0.90	0.86	0.85	0.80	0.84	0.79
1979 (BN)	0.72	0.62	0.69	0.60	0.70	0.59
1980 (AN)	0.78	0.69	0.92	0.87	0.76	0.68
1981 (D)	0.63	0.58	0.60	0.55	0.61	0.55
1982 (W)	0.97	0.96	0.96	0.94	0.96	0.94
1983 (W)	0.98	0.97	0.99	0.98	0.99	0.98
1984 (W)	0.70	0.60	0.90	0.83	0.71	0.61
1985 (D)	0.70	0.55	0.68	0.55	0.69	0.55
1986 (W)	0.74	0.66	0.72	0.63	0.71	0.61
1987 (D)	0.63	0.50	0.61	0.54	0.61	0.54
1988 (C)	0.63	0.51	0.62	0.51	0.61	0.50
1989 (D)	0.80	0.76	0.77	0.76	0.77	0.76
1990 (C)	0.59	0.49	0.58	0.50	0.58	0.50
1991 (C)	0.64	0.59	0.61	0.55	0.61	0.55
Average	0.72	0.65	0.73	0.67	0.70	0.64

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

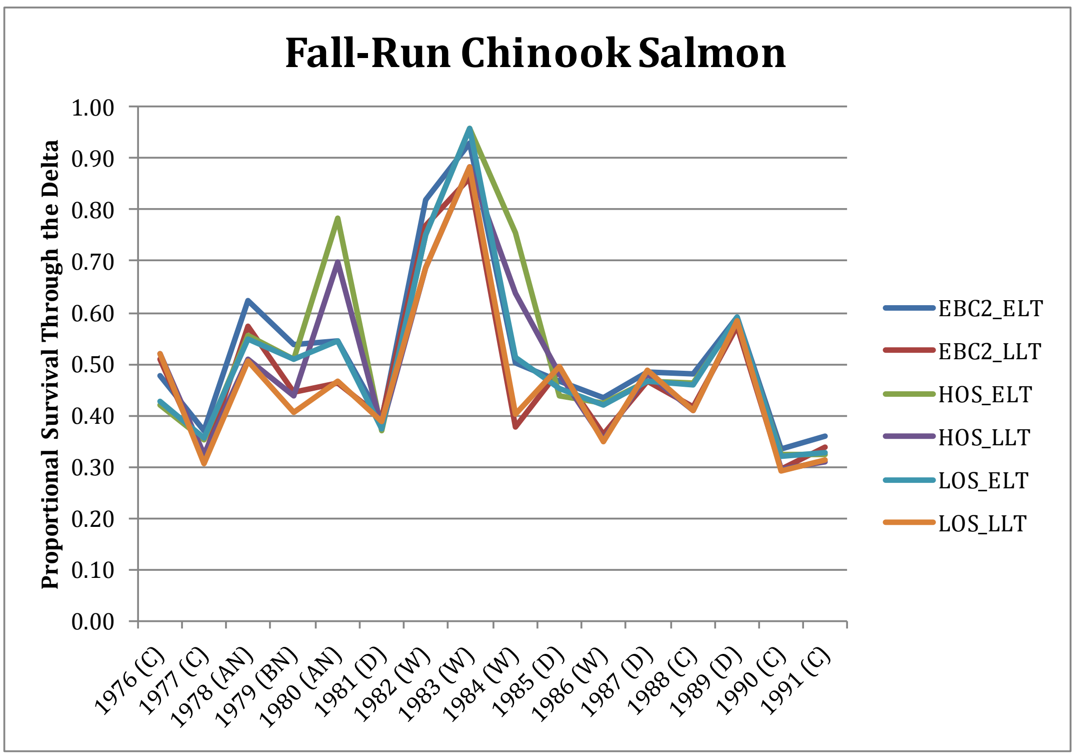
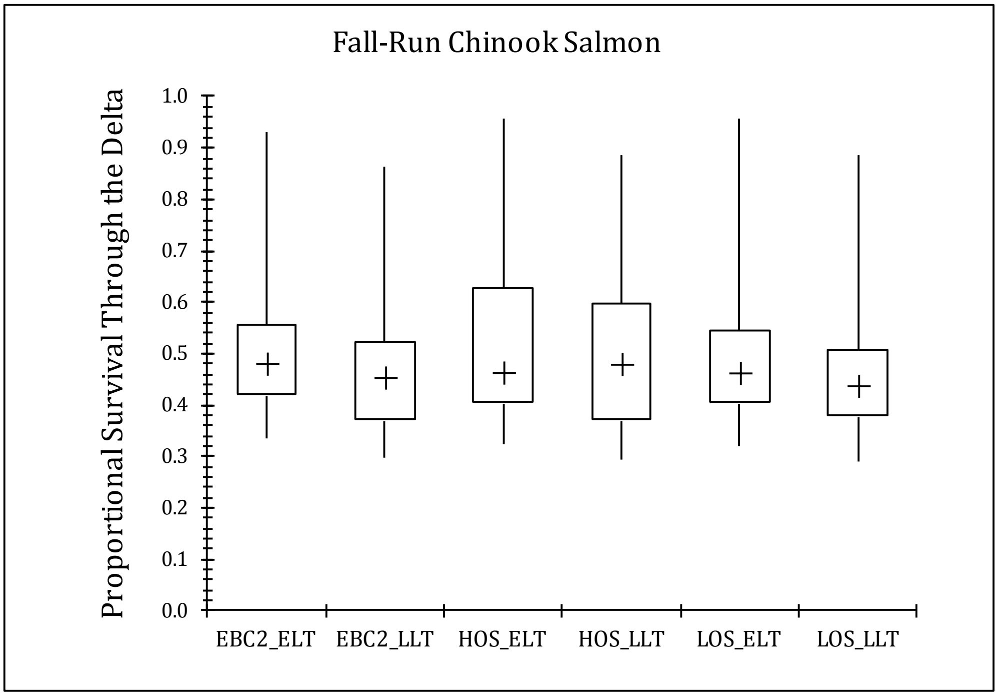


Figure 5C.5.3-55. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts under EBC2, HOS, and LOS Scenarios, from Modeling Based on Newman (2003)



Note: Median is marked with "+," upper and lower boundaries of the box indicate interquartile range, and upper and lower whiskers indicate maximum and minimum proportional survival.

Figure 5C.5.3-56. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts under EBC2, HOS, and LOS Scnearios, from Modeling Based on Newman (2003)

Table 5C.5.3-70. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts under EBC2, HOS, and LOS Scenarios, from Modeling Based on Newman (2003)

Water Year[a]	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	0.48	0.51	0.42	0.52	0.43	0.52
1977 (C)	0.37	0.32	0.35	0.32	0.36	0.31
1978 (AN)	0.62	0.57	0.55	0.51	0.55	0.50
1979 (BN)	0.54	0.44	0.51	0.44	0.51	0.41
1980 (AN)	0.55	0.46	0.78	0.70	0.54	0.47
1981 (D)	0.39	0.39	0.37	0.38	0.37	0.39
1982 (W)	0.82	0.77	0.75	0.69	0.75	0.69
1983 (W)	0.93	0.86	0.96	0.88	0.96	0.88
1984 (W)	0.50	0.38	0.76	0.64	0.51	0.40
1985 (D)	0.46	0.49	0.44	0.48	0.45	0.50
1986 (W)	0.43	0.36	0.42	0.35	0.42	0.35
1987 (D)	0.48	0.47	0.47	0.48	0.47	0.49
1988 (C)	0.48	0.42	0.46	0.41	0.46	0.41
1989 (D)	0.59	0.57	0.59	0.58	0.59	0.59
1990 (C)	0.34	0.30	0.32	0.29	0.32	0.29
1991 (C)	0.36	0.34	0.32	0.31	0.33	0.31
Average	0.52	0.48	0.53	0.50	0.50	0.47

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of the scenarios.

5C.5.3.6 North Delta Diversion Bypass Flow Effects on Chinook Salmon Smolt Survival

5C.5.3.6.1 Survival Based on Perry (2010)

The analysis of Chinook salmon smolt survival from the Sacramento River at its junction with the Delta Cross Channel/Georgiana Slough to Chipps Island based on Perry (2010) is provided below. There are numerous outputs for each run, as well as for the December–June equal-weighting period. In addition to general statistical summaries (means by water-year type and percentiles across all water years; for examples, see Figure 5C.5.3-57 and Table 5C.5.3-71), the results for individual water years are shown as exceedance plots (e.g., Figure 5C.5.3-58) and time series plots (e.g., Figure 5C.5.3-59). In all cases, survival is shown for each bypass flow level (pulse protection, Level I [LI], Level II [LII], and Level III [LIII]) as the sum of the daily survivals weighted by (i.e., multiplied by) proportion of the run. In this way, the survivals within each bypass flow level are shown to contribute to the total estimated survival within a given water year. As with all aspects of the effects analysis, it is the relative difference between scenarios that is of primary importance; for this particular analysis, relative survival differences should only be compared between scenarios within each flow level and not across flow levels, because of the different daily weightings that would have occurred between flow levels.

Because the relative difference between the scenarios is of importance and in order to account for the fact that all flow levels do not occur in every water year, summaries of estimated survival under the BDCP scenarios as a percentage of survival under the corresponding EBC2 scenarios were also made, including only the years in which different flow levels had occurred (e.g., Table 5C.5.3-72). These comparisons were made within the same time periods, i.e., EBC2_ELT vs. ESO_ELT or HOS_ELT, and EBC2_LLT vs. ESO_LLT or HOS_LLT.

5C.5.3.6.1.1 Winter-Run Chinook Salmon

Winter-run Chinook salmon smolt assumed migration timing generally lies outside the spring period that mostly differentiates the ESO and HOS scenarios in terms of spring water operations, with the result that survival estimates for the corresponding ESO and HOS scenarios do not differ greatly (Figure 5C.5.3-57, Figure 5C.5.3-58, Figure 5C.5.3-59, Figure 5C.5.3-60, Figure 5C.5.3-61, Figure 5C.5.3-62, Figure 5C.5.3-63, Figure 5C.5.3-64, Figure 5C.5.3-65, Figure 5C.5.3-66, Figure 5C.5.3-67, and Figure 5C.5.3-68; Table 5C.5.3-71, Table 5C.5.3-72, Table 5C.5.3-73, Table 5C.5.3-74, Table 5C.5.3-75, Table 5C.5.3-76, Table 5C.5.3-77, and Table 5C.5.3-78). In light of this observation, the results are mostly discussed from the perspective of differences between the ESO and EBC2 scenarios, recognizing that this generally represents the differences between HOS and EBC2 scenarios.

Survival during pulse protection flows was low under all scenarios, primarily because these periods are short in duration relative to the overall assumed migration period. Survival during the pulse protection period under ESO_ELT and ESO_LLT scenarios ranged from 0.00 to 0.14 (median = 0.03, average = 0.03) for bypass flows under ESO. For years including pulse protection flows during the migration period, pulse protection survival under ESO scenarios averaged 95% (range = 75–110%) of survival under EBC scenarios.

Level I survival averaged 0.30 under EBC2 scenarios (median = 0.27–0.30; range = 0.09–0.56), which was slightly higher than survival under ESO scenarios (average = 0.28, median = 0.25–0.29;

range = 0.08–0.53). For years in which Level I flows occurred and overlapped the migration period, Level I survival under ESO scenarios averaged around 93% that of EBC2 scenarios (median: 94–95%, range 79–101%).

Level II survival averaged 0.10 under EBC2 scenarios (median = 0.07; range = 0.00–0.45), which was slightly higher than survival under ESO scenarios (average = 0.09, median = 0.06; range = 0.00–0.42). For years in which Level II flows occurred and overlapped the migration period, Level II survival under ESO scenarios averaged around 92–93% that of EBC2 scenarios (median: 92–93%, range 83–98%).

Level III survival averaged 0.23–0.24 under EBC2 scenarios (median = 0.00; range = 0.00–0.71), which was slightly higher than survival under ESO scenarios (average = 0.21–0.22, median = 0.00; range = 0.00–0.69). For years in which Level III flows occurred and overlapped the migration period, Level III survival under ESO scenarios averaged around 90% that of EBC2 scenarios (median: 90%, range 82–99%).

Total survival averaged 0.67 under EBC2 scenarios (median = 0.63–0.65; range = 0.44–0.93), which was slightly higher than of survival under ESO scenarios (average = 0.62, median = 0.58; range = 0.44–0.89). Total survival under ESO scenarios averaged around 93% that of EBC2 scenarios (median: 93%, range 85–101%).

Table 5C.5.3-71. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	ESO_ELT (Pulse)	EBC2_ELT (LI)	ESO_ELT (LI)	EBC2_ELT (LII)	ESO_ELT (LII)	EBC2_ELT (LIII)	ESO_ELT (LIII)	EBC2_ELT (Total)	ESO_ELT (Total)
W	0.04	0.04	0.16	0.14	0.08	0.08	0.53	0.49	0.81	0.74
AN	0.05	0.05	0.22	0.20	0.11	0.10	0.36	0.32	0.74	0.68
BN	0.03	0.03	0.31	0.29	0.21	0.19	0.08	0.06	0.62	0.56
D	0.03	0.03	0.42	0.39	0.10	0.09	0.02	0.02	0.57	0.53
C	0.03	0.03	0.47	0.46	0.00	0.00	0.00	0.00	0.50	0.49
All	0.03	0.03	0.30	0.28	0.10	0.09	0.24	0.22	0.67	0.62

Table 5C.5.3-72. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_ELT (Pulse)	ESO_ELT (LI)	ESO_ELT (LII)	ESO_ELT (LIII)	ESO_ELT (Total)
Maximum	102%	100%	98%	97%	100%
75th Percentile	97%	96%	96%	93%	95%
Median	95%	94%	93%	90%	93%
25th Percentile	93%	91%	89%	86%	90%
Minimum	83%	84%	83%	82%	85%
W	95%	91%	94%	91%	91%
AN	95%	93%	93%	90%	92%
BN	94%	93%	89%	84%	91%
D	95%	93%	90%	86%	93%
C	95%	97%	–	–	97%
All	95%	93%	92%	90%	93%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-73. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	ESO_LLT (Pulse)	EBC2_LLT (LI)	ESO_LLT (LI)	EBC2_LLT (LII)	ESO_LLT (LII)	EBC2_LLT (LIII)	ESO_LLT (LIII)	EBC2_LLT (Total)	ESO_LLT (Total)
W	0.04	0.04	0.15	0.14	0.08	0.08	0.53	0.48	0.81	0.74
AN	0.05	0.05	0.22	0.20	0.11	0.11	0.36	0.32	0.74	0.68
BN	0.02	0.02	0.34	0.32	0.18	0.16	0.08	0.07	0.61	0.56
D	0.02	0.02	0.43	0.41	0.11	0.10	0.00	0.00	0.56	0.53
C	0.03	0.03	0.47	0.46	0.00	0.00	0.00	0.00	0.50	0.49
All	0.03	0.03	0.30	0.28	0.10	0.09	0.23	0.21	0.67	0.62

Table 5C.5.3-74. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_LLT (Pulse)	ESO_LLT (LI)	ESO_LLT (LII)	ESO_LLT (LIII)	ESO_LLT (Total)
Maximum	110%	101%	98%	99%	101%
75th Percentile	97%	96%	96%	93%	95%
Median	95%	94%	92%	90%	93%
25th Percentile	93%	91%	89%	86%	90%
Minimum	75%	83%	83%	82%	85%
W	94%	91%	94%	91%	91%
AN	95%	94%	92%	90%	92%
BN	96%	93%	88%	89%	92%
D	95%	94%	90%	–	94%
C	96%	97%	–	–	97%
All	95%	93%	92%	90%	93%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-75. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	HOS_ELT (Pulse)	EBC2_ELT (LI)	HOS_ELT (LI)	EBC2_ELT (LII)	HOS_ELT (LII)	EBC2_ELT (LIII)	HOS_ELT (LIII)	EBC2_ELT (Total)	HOS_ELT (Total)
W	0.04	0.04	0.16	0.14	0.08	0.07	0.54	0.50	0.81	0.75
AN	0.05	0.05	0.22	0.20	0.11	0.10	0.36	0.33	0.74	0.69
BN	0.03	0.03	0.33	0.31	0.18	0.17	0.08	0.07	0.62	0.58
D	0.03	0.03	0.43	0.41	0.08	0.08	0.02	0.02	0.57	0.53
C	0.03	0.03	0.47	0.46	0.00	0.00	0.00	0.00	0.50	0.48
All	0.03	0.03	0.30	0.28	0.09	0.08	0.24	0.22	0.67	0.63

Table 5C.5.3-76. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	HOS_ELT (Pulse)	HOS_ELT (LI)	HOS_ELT (LII)	HOS_ELT (LIII)	HOS_ELT (Total)
Maximum	104%	99%	101%	97%	99%
75th Percentile	97%	96%	97%	95%	96%
Median	95%	94%	94%	93%	94%
25th Percentile	93%	91%	89%	90%	91%
Minimum	80%	86%	83%	80%	85%
W	96%	91%	95%	93%	93%
AN	95%	93%	92%	92%	93%
BN	94%	93%	92%	92%	94%
D	95%	93%	91%	91%	94%
C	96%	96%	–	–	96%
All	95%	93%	93%	92%	94%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

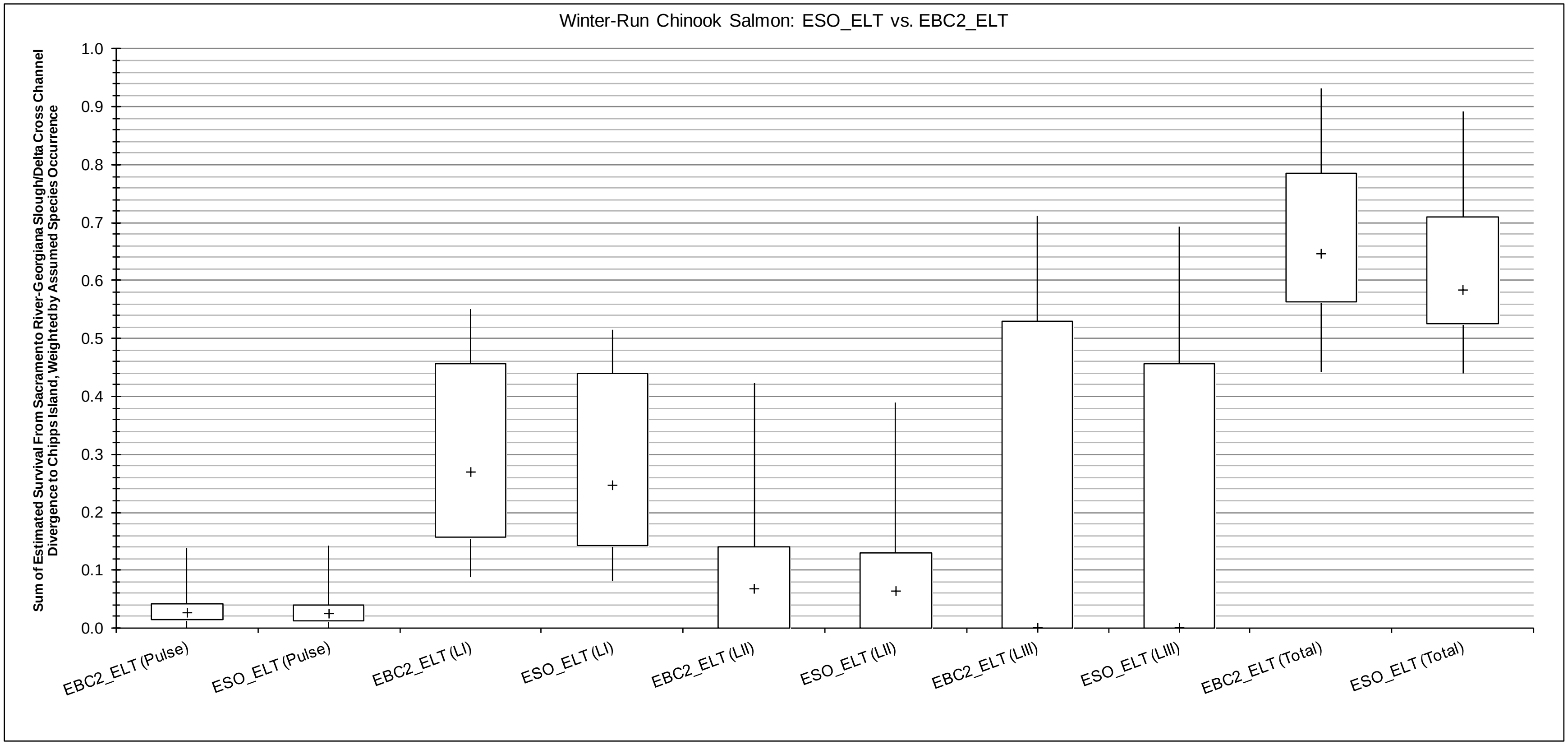
Table 5C.5.3-77. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	HOS_LLT (Pulse)	EBC2_LLT (LI)	HOS_LLT (LI)	EBC2_LLT (LII)	HOS_LLT (LII)	EBC2_LLT (LIII)	HOS_LLT (LIII)	EBC2_LLT (Total)	HOS_LLT (Total)
W	0.04	0.04	0.16	0.14	0.08	0.08	0.53	0.49	0.81	0.75
AN	0.05	0.05	0.22	0.20	0.12	0.11	0.36	0.33	0.74	0.68
BN	0.02	0.02	0.34	0.32	0.18	0.16	0.08	0.07	0.61	0.57
D	0.03	0.03	0.42	0.40	0.11	0.11	0.00	0.00	0.56	0.53
C	0.03	0.03	0.44	0.43	0.03	0.03	0.00	0.00	0.50	0.48
All	0.03	0.03	0.30	0.28	0.10	0.09	0.23	0.22	0.67	0.62

Table 5C.5.3-78. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

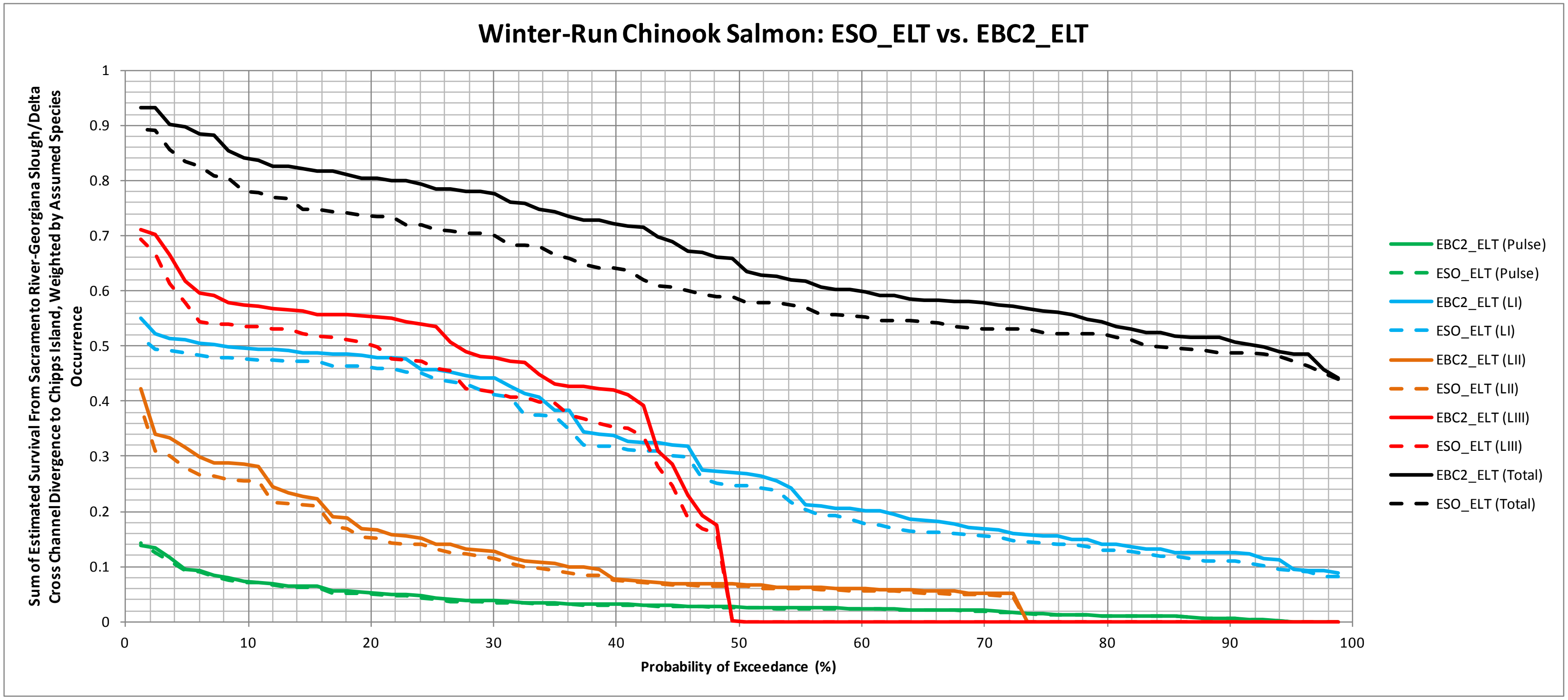
Percentile or Water-Year Type Average	HOS_LLT (Pulse)	HOS_LLT (LI)	HOS_LLT (LII)	HOS_LLT (LIII)	HOS_LLT (Total)
Maximum	102%	98%	100%	99%	98%
75th Percentile	97%	95%	97%	95%	96%
Median	95%	94%	94%	93%	94%
25th Percentile	93%	92%	90%	91%	92%
Minimum	76%	84%	83%	80%	86%
W	95%	92%	94%	93%	93%
AN	94%	93%	92%	92%	92%
BN	94%	94%	92%	93%	94%
D	95%	94%	92%	–	94%
C	95%	96%	98%	–	97%
All	95%	93%	93%	92%	94%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.



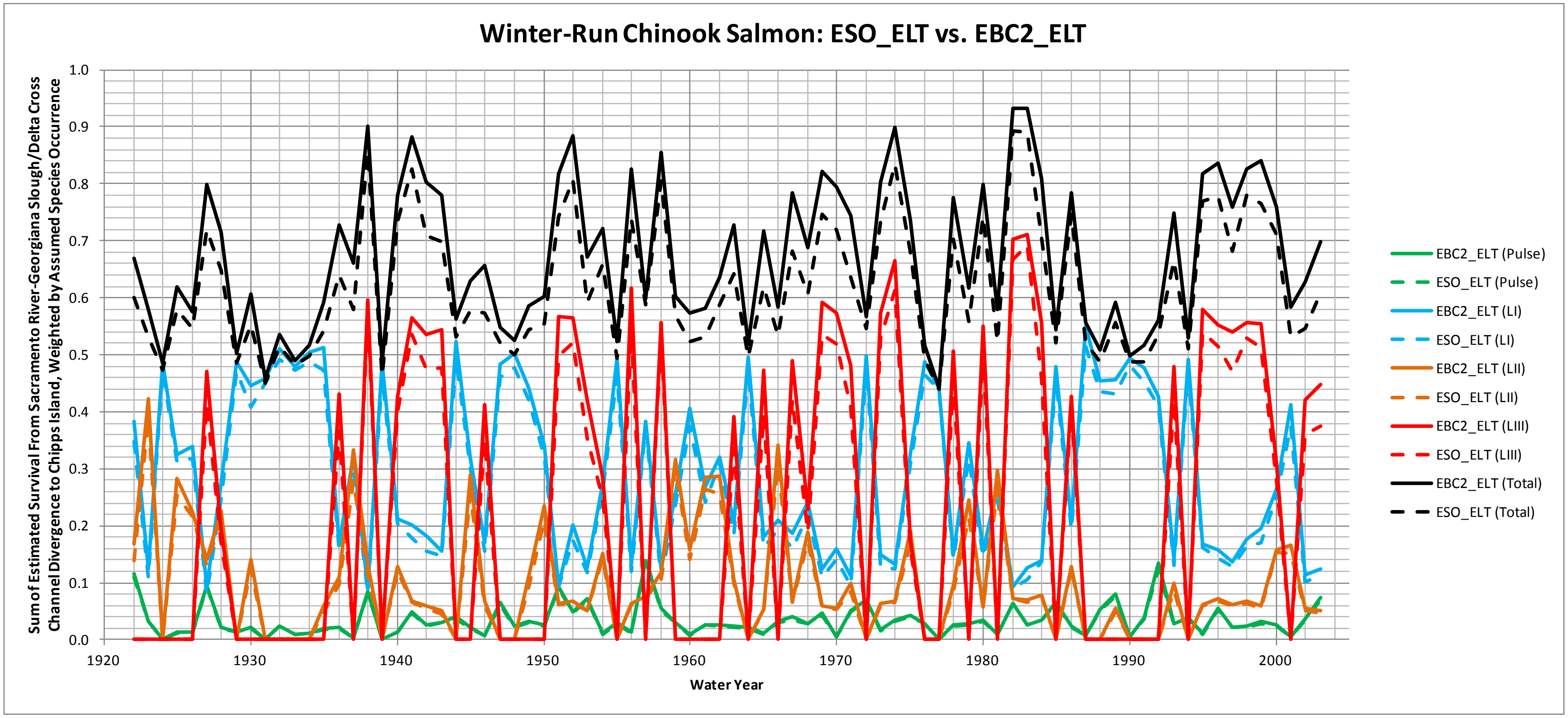
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-57. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



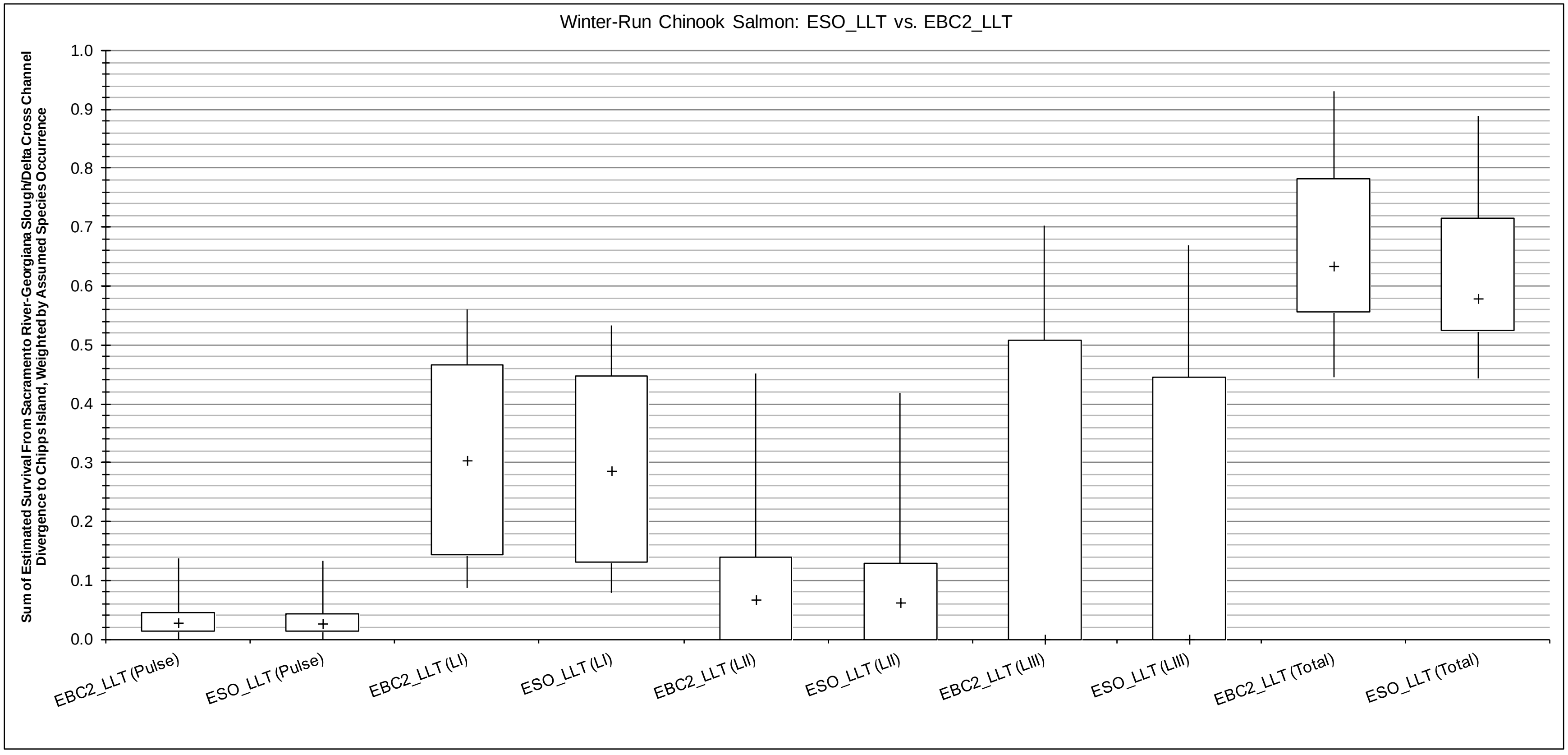
Pulse = pulse protection flow.

Figure 5C.5.3-58. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



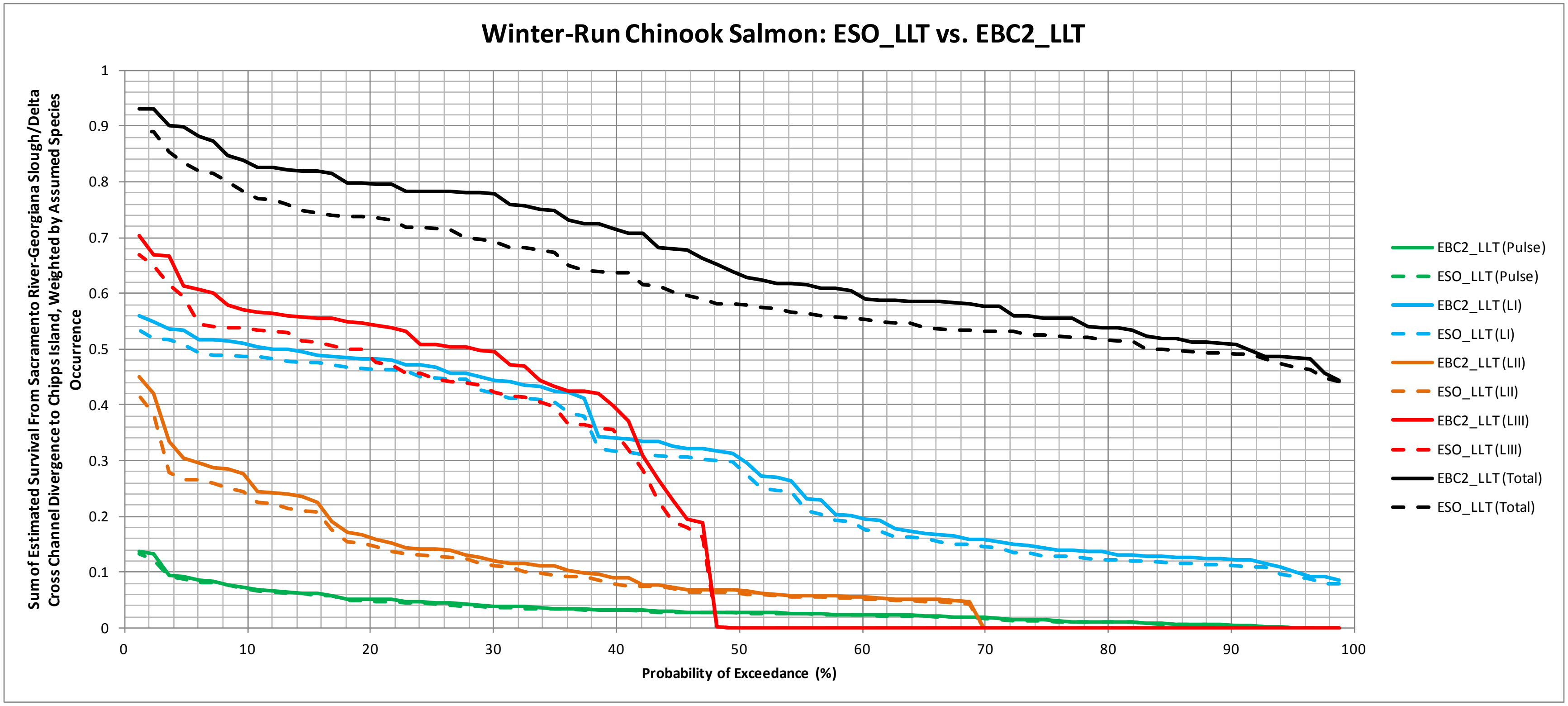
Pulse = pulse protection flow.

Figure 5C.5.3-59. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



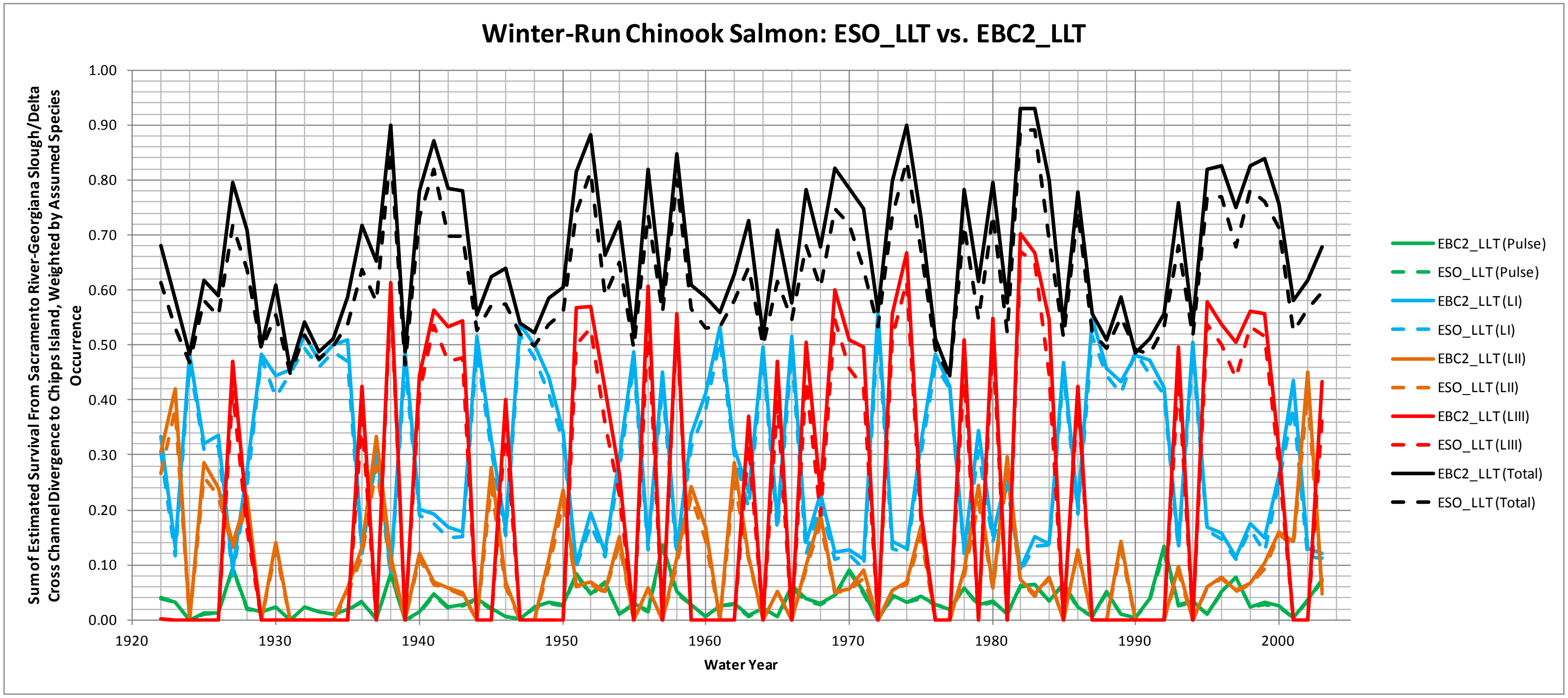
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-60. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



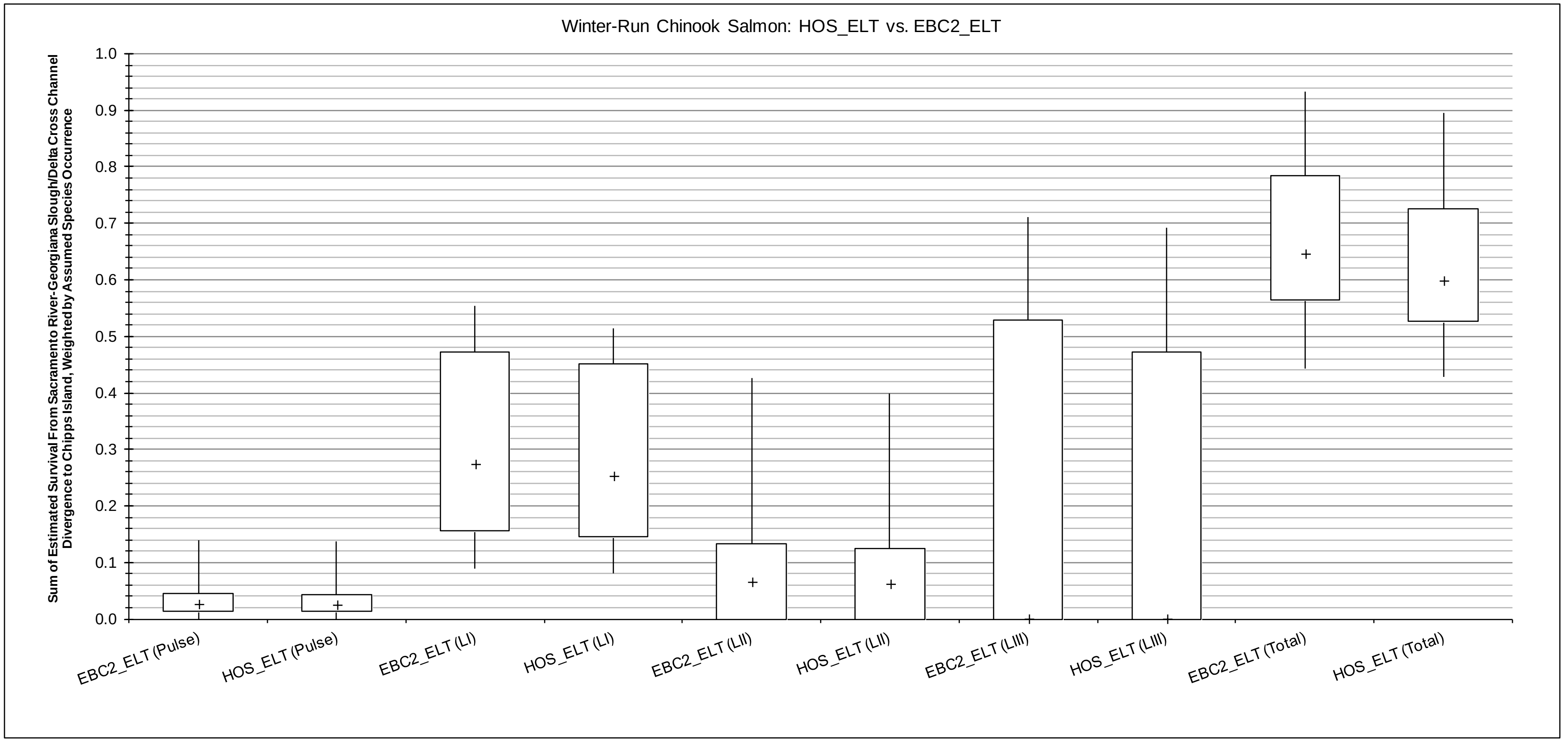
Pulse = pulse protection flow.

Figure 5C.5.3-61. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



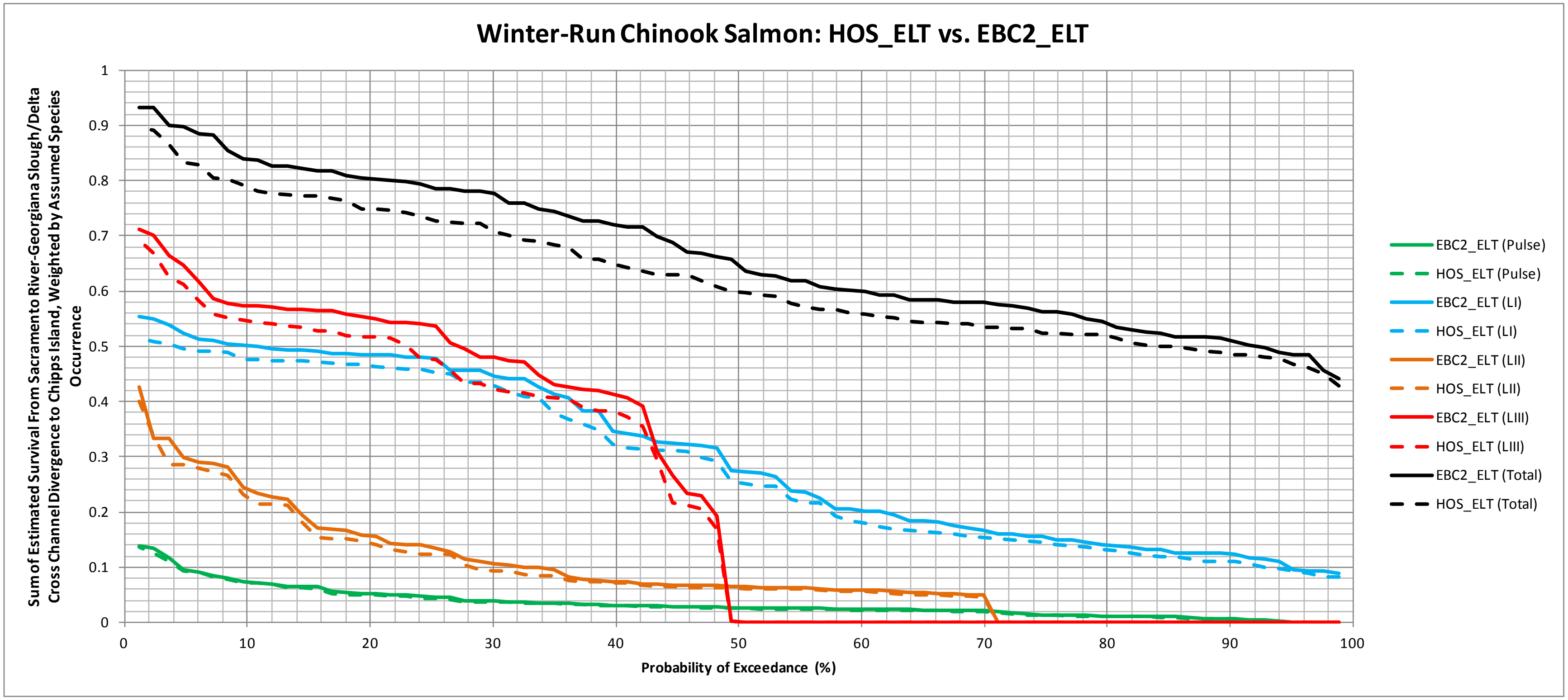
Pulse = pulse protection flow.

Figure 5C.5.3-62. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



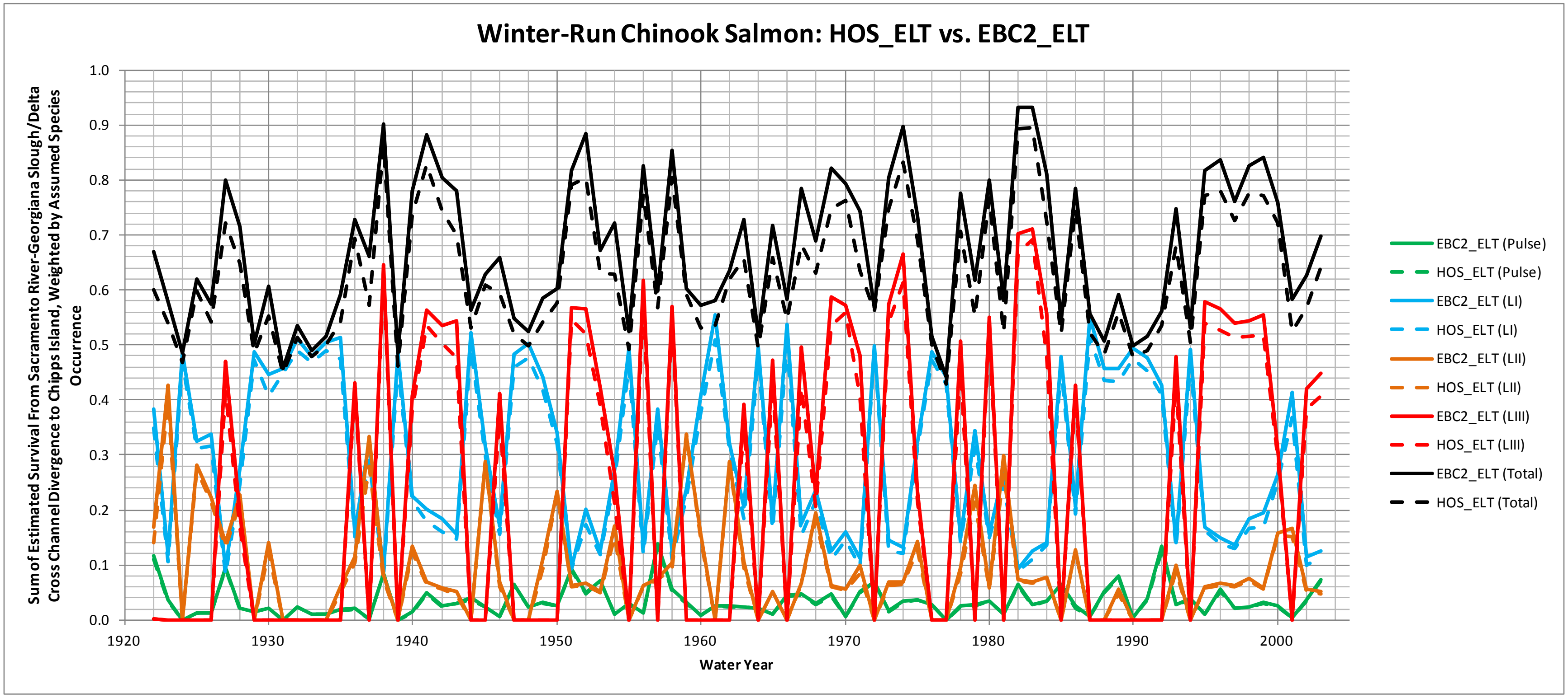
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-63. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



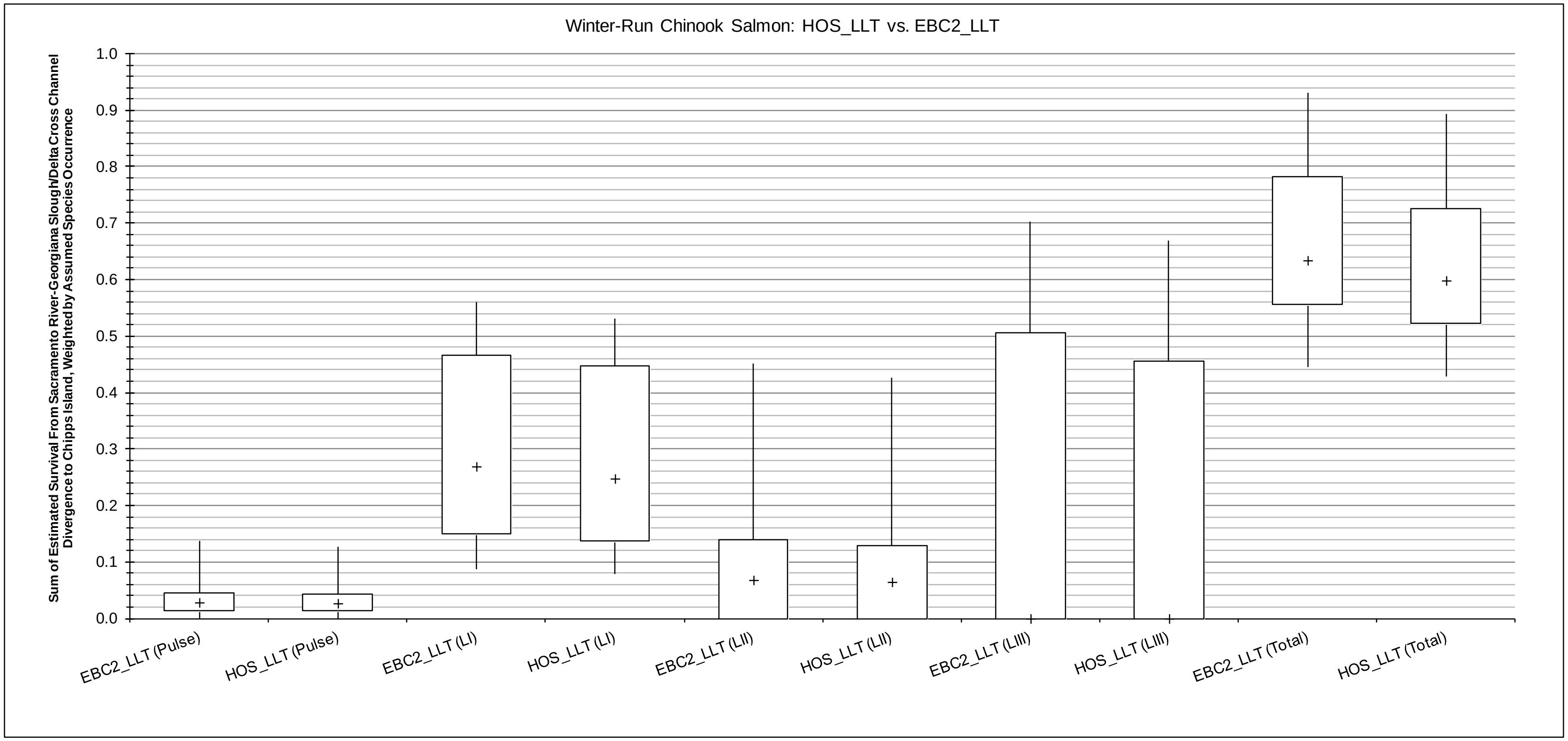
Pulse = pulse protection flow.

Figure 5C.5.3-64. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



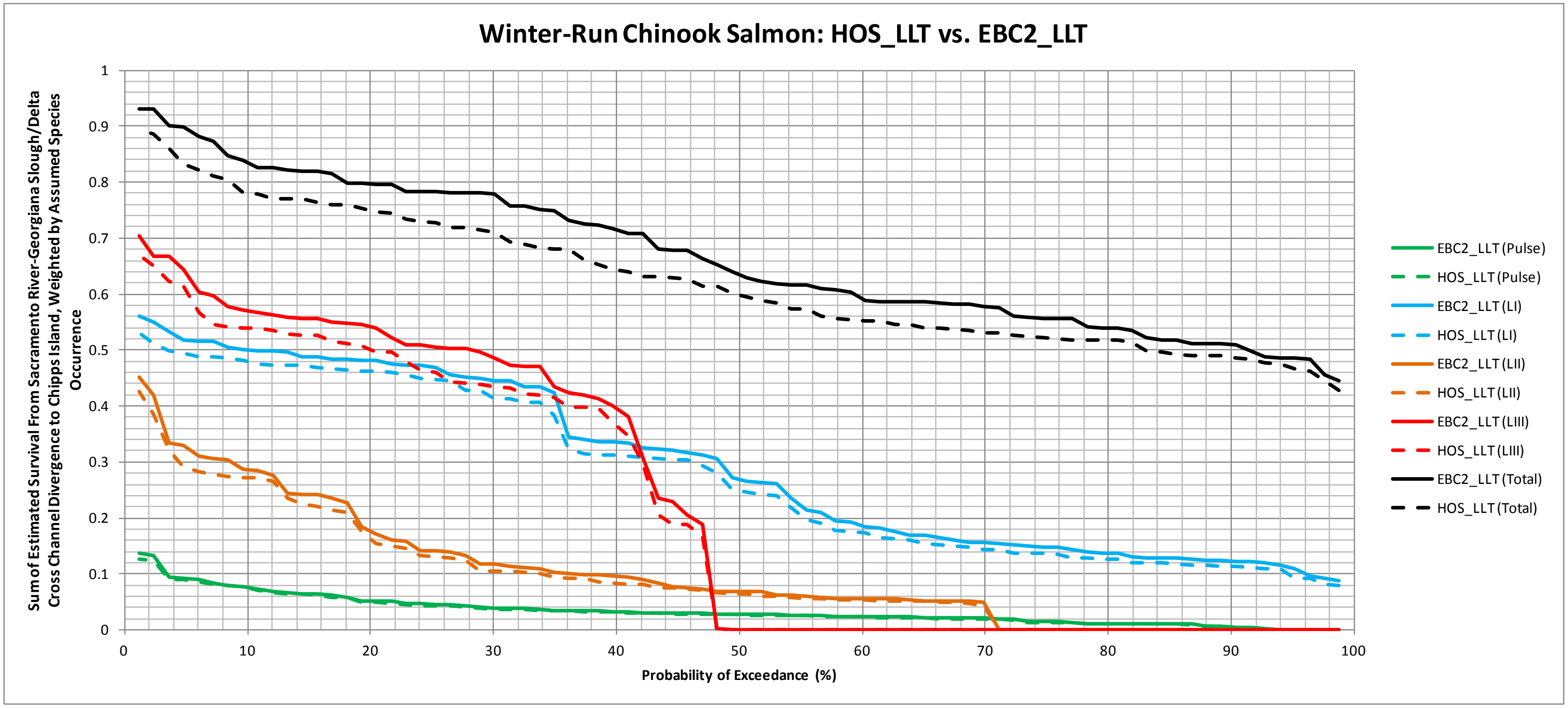
Pulse = pulse protection flow.

Figure 5C.5.3-65. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



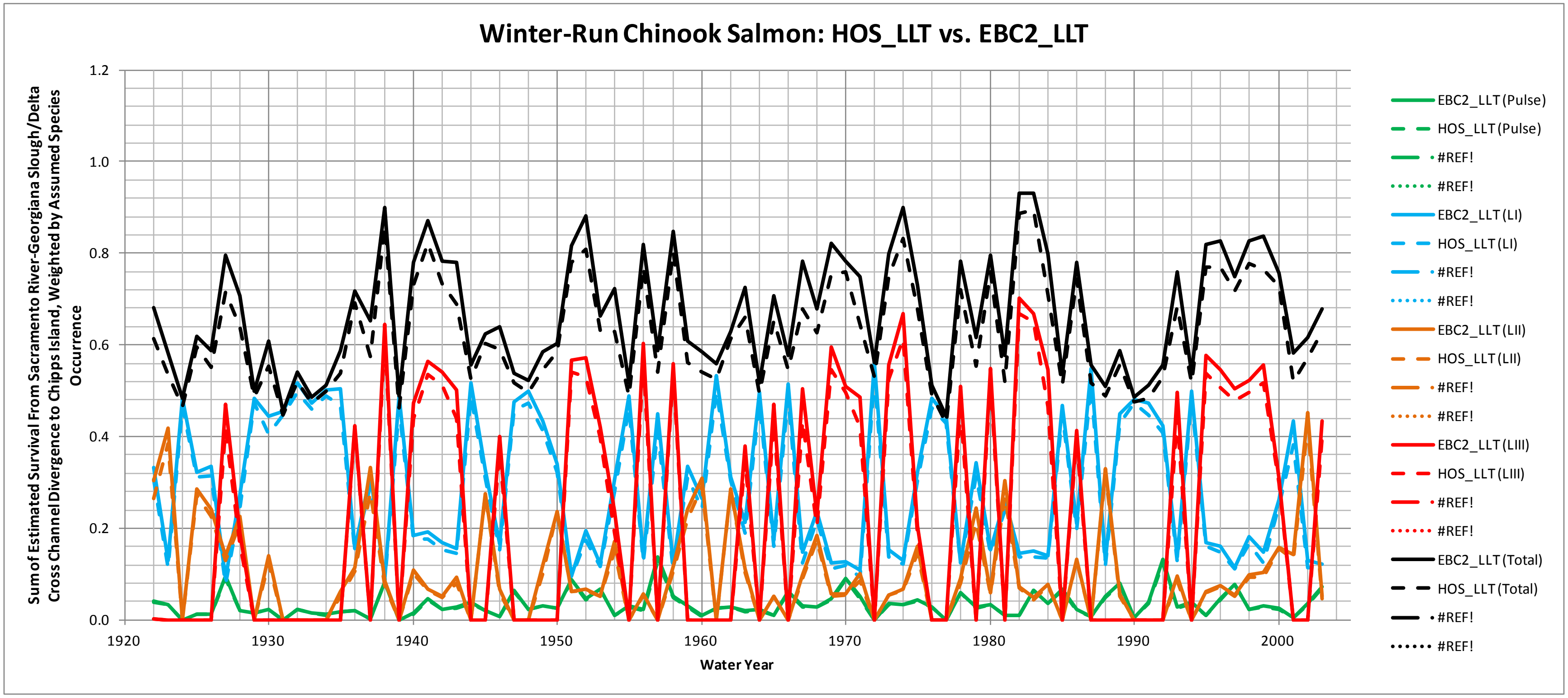
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-66. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-67. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-68. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

5C.5.3.6.1.2 Spring-Run Chinook Salmon

Results for spring-run Chinook salmon smolts are presented below (Figure 5C.5.3-69, Figure 5C.5.3-70, Figure 5C.5.3-71, Figure 5C.5.3-72, Figure 5C.5.3-73, Figure 5C.5.3-74, Figure 5C.5.3-75, Figure 5C.5.3-76, Figure 5C.5.3-77, Figure 5C.5.3-78, Figure 5C.5.3-79, and Figure 5C.5.3-80; Table 5C.5.3-79, Table 5C.5.3-80, Table 5C.5.3-81, Table 5C.5.3-82, Table 5C.5.3-83, Table 5C.5.3-84, Table 5C.5.3-85, and Table 5C.5.3-86). For brevity, the results summary discussed in the text focuses on survival under the BDCP scenarios as a percentage of survival under the EBC2 scenarios.

For years in which pulse protection flows occurred and overlapped the migration period, pulse protection survival under ESO scenarios averaged around 95–96% that of EBC2 scenarios (median: 95–96%, range 91–102%). Note that there was little overlap between pulse protection flows and the spring-run Chinook migration period.

For years in which Level I flows occurred and overlapped the migration period, Level I survival under ESO scenarios averaged around 93% that of EBC2 scenarios (median: 95–96%, range 79–101%). For years in which Level II flows occurred and overlapped the migration period, Level II survival under ESO scenarios averaged around 93% that of EBC2 scenarios (median: 93%, range 85–99%). For years in which Level III flows occurred and overlapped the migration period, Level III survival under ESO scenarios averaged around 88–89% that of EBC2 scenarios (median: 88–89%, range 82–98%). Total survival under ESO scenarios averaged around 92% that of EBC2 scenarios (median: 92–93%, range 82–101%).

For years in which pulse protection flows occurred and overlapped the migration period, pulse protection survival under HOS scenarios averaged around 95–96% that of EBC2 scenarios (median: 96%, range 91–100%). For years in which Level I flows occurred and overlapped the migration period, Level I survival under HOS scenarios averaged around 93% that of EBC2 scenarios (median: 95–96%, range 80–104%). For years in which Level II flows occurred and overlapped the migration period, Level II survival under HOS scenarios averaged around 95% that of EBC2 scenarios (median: 93–94%, range 84–121%). For years in which Level III flows occurred and overlapped the migration period, Level III survival under HOS scenarios around 97% that of EBC2 scenarios (median: 94%, range 79–118%). Total survival under HOS scenarios with averaged around 97% that of EBC2 scenarios (median: 95%, range 79–121%).

Table 5C.5.3-79. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	ESO_ELT (Pulse)	EBC2_ELT (LI)	ESO_ELT (LI)	EBC2_ELT (LII)	ESO_ELT (LII)	EBC2_ELT (LIII)	ESO_ELT (LIII)	EBC2_ELT (Total)	ESO_ELT (Total)
W	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.67	0.76	0.67
AN	0.00	0.00	0.01	0.01	0.09	0.08	0.57	0.50	0.68	0.59
BN	0.00	0.00	0.10	0.09	0.35	0.32	0.12	0.10	0.56	0.51
D	0.00	0.00	0.23	0.22	0.25	0.24	0.03	0.03	0.52	0.49
C	0.00	0.00	0.47	0.46	0.00	0.00	0.00	0.00	0.47	0.46
All	0.00	0.00	0.14	0.13	0.13	0.12	0.35	0.31	0.62	0.56

Table 5C.5.3-80. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_ELT (Pulse)	ESO_ELT (LI)	ESO_ELT (LII)	ESO_ELT (LIII)	ESO_ELT (Total)
Maximum	102%	101%	99%	96%	101%
75th Percentile	96%	97%	96%	91%	96%
Median	95%	95%	93%	88%	92%
25th Percentile	94%	89%	91%	84%	88%
Minimum	91%	79%	85%	83%	83%
W	–	93%	93%	89%	89%
AN	98%	89%	93%	88%	88%
BN	97%	91%	92%	88%	92%
D	95%	91%	93%	90%	94%
C	94%	97%	–	–	97%
All	96%	93%	93%	88%	92%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-81. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	ESO_LLT (Pulse)	EBC2_LLT (LI)	ESO_LLT (LI)	EBC2_LLT (LII)	ESO_LLT (LII)	EBC2_LLT (LIII)	ESO_LLT (LIII)	EBC2_LLT (Total)	ESO_LLT (Total)
W	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.66	0.75	0.67
AN	0.00	0.00	0.04	0.04	0.06	0.05	0.57	0.50	0.67	0.59
BN	0.00	0.00	0.13	0.13	0.31	0.28	0.12	0.11	0.56	0.52
D	0.00	0.00	0.26	0.25	0.26	0.25	0.00	0.00	0.52	0.50
C	0.00	0.00	0.47	0.46	0.00	0.00	0.00	0.00	0.47	0.46
All	0.00	0.00	0.15	0.15	0.12	0.11	0.34	0.30	0.61	0.56

Table 5C.5.3-82. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring -Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_LLT (Pulse)	ESO_LLT (LI)	ESO_LLT (LII)	ESO_LLT (LIII)	ESO_LLT (Total)
Maximum	98%	101%	99%	98%	101%
75th Percentile	97%	98%	95%	92%	97%
Median	96%	96%	93%	89%	93%
25th Percentile	94%	89%	90%	85%	88%
Minimum	91%	80%	85%	82%	82%
W	–	89%	94%	89%	89%
AN	98%	91%	91%	88%	88%
BN	–	92%	92%	94%	93%
D	–	92%	94%	–	96%
C	94%	97%	–	–	97%
All	95%	93%	93%	89%	92%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-83. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	HOS_ELT (Pulse)	EBC2_ELT (LI)	HOS_ELT (LI)	EBC2_ELT (LII)	HOS_ELT (LII)	EBC2_ELT (LIII)	HOS_ELT (LIII)	EBC2_ELT (Total)	HOS_ELT (Total)
W	0.00	0.00	0.00	0.00	0.00	0.00	0.76	0.71	0.76	0.72
AN	0.00	0.00	0.01	0.01	0.09	0.08	0.57	0.54	0.68	0.64
BN	0.00	0.00	0.13	0.13	0.31	0.31	0.12	0.13	0.56	0.57
D	0.00	0.00	0.26	0.25	0.22	0.21	0.03	0.03	0.52	0.49
C	0.00	0.00	0.47	0.45	0.00	0.00	0.00	0.00	0.47	0.46
All	0.00	0.00	0.15	0.14	0.12	0.11	0.35	0.33	0.62	0.59

Table 5C.5.3-84. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring -Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	HOS_ELT (Pulse)	HOS_ELT (LI)	HOS_ELT (LII)	HOS_ELT (LIII)	HOS_ELT (Total)
Maximum	100%	104%	121%	117%	121%
75th Percentile	98%	97%	97%	106%	98%
Median	96%	96%	93%	94%	95%
25th Percentile	94%	90%	90%	89%	91%
Minimum	91%	80%	84%	79%	79%
W	–	98%	91%	95%	95%
AN	95%	87%	91%	96%	95%
BN	99%	93%	101%	111%	102%
D	96%	92%	94%	95%	95%
C	95%	97%	–	–	97%
All	96%	93%	95%	97%	97%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

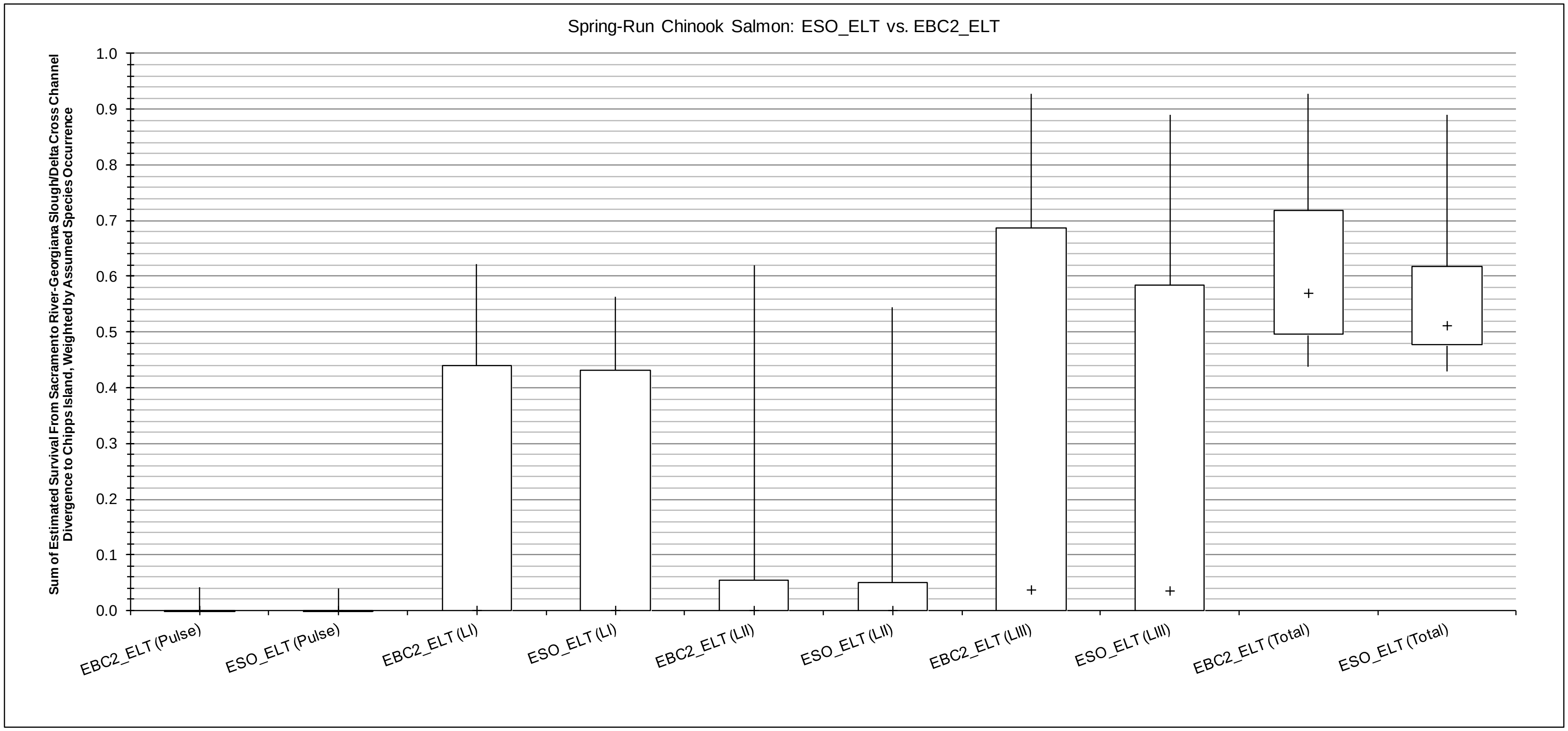
Table 5C.5.3-85. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	HOS_LLT (Pulse)	EBC2_LLT (LI)	HOS_LLT (LI)	EBC2_LLT (LII)	HOS_LLT (LII)	EBC2_LLT (LIII)	HOS_LLT (LIII)	EBC2_LLT (Total)	HOS_LLT (Total)
W	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.70	0.75	0.71
AN	0.00	0.00	0.04	0.04	0.06	0.05	0.57	0.55	0.67	0.64
BN	0.00	0.00	0.13	0.12	0.31	0.31	0.12	0.12	0.56	0.55
D	0.00	0.00	0.26	0.25	0.26	0.24	0.00	0.00	0.52	0.50
C	0.00	0.00	0.43	0.42	0.04	0.04	0.00	0.00	0.47	0.46
All	0.00	0.00	0.15	0.14	0.12	0.12	0.34	0.32	0.61	0.59

Table 5C.5.3-86. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring -Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

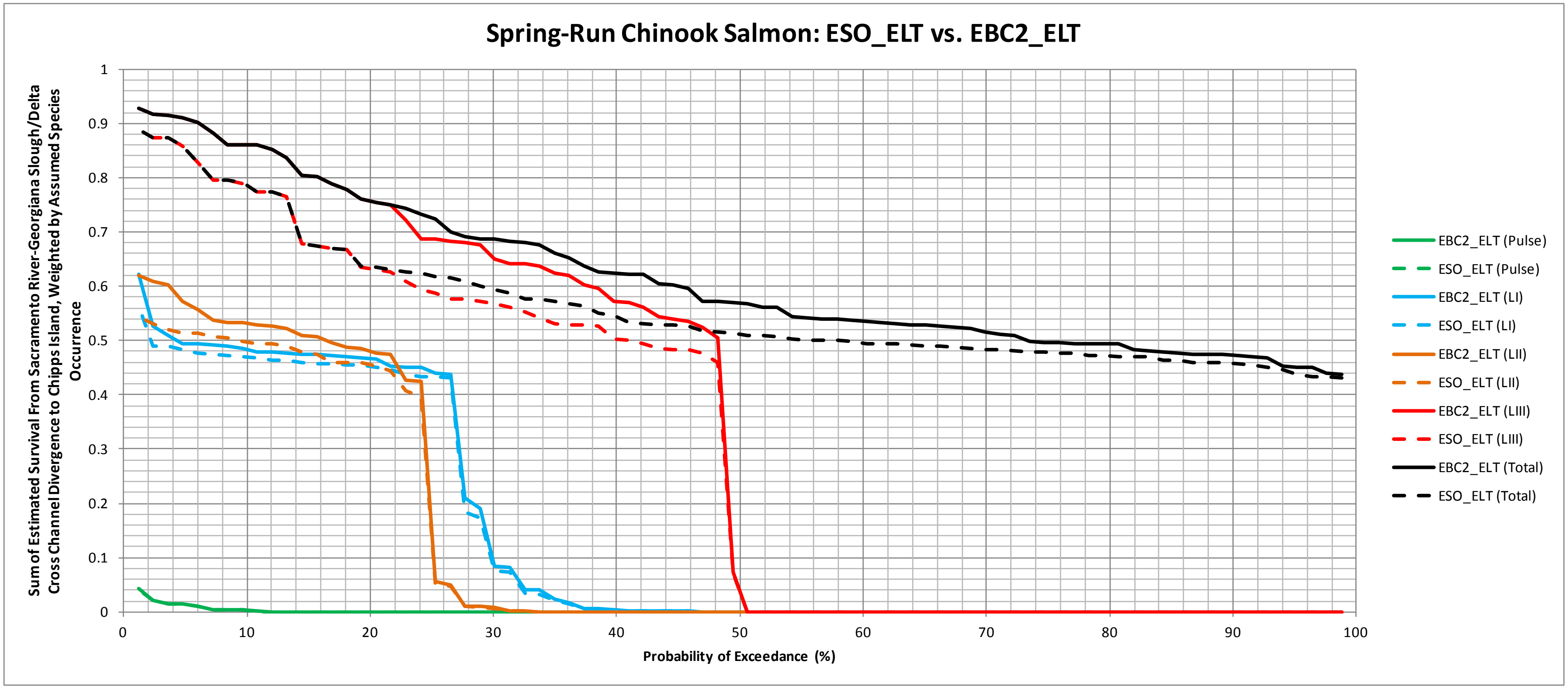
Percentile or Water-Year Type Average	HOS_LLT (Pulse)	HOS_LLT (LI)	HOS_LLT (LII)	HOS_LLT (LIII)	HOS_LLT (Total)
Maximum	97%	99%	118%	118%	118%
75th Percentile	96%	97%	97%	106%	98%
Median	96%	95%	94%	94%	95%
25th Percentile	93%	91%	91%	89%	92%
Minimum	91%	80%	85%	81%	82%
W	–	91%	94%	95%	95%
AN	92%	90%	90%	97%	96%
BN	–	92%	99%	106%	100%
D	96%	92%	95%	–	96%
C	94%	97%	97%	–	97%
All	95%	93%	95%	97%	97%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.



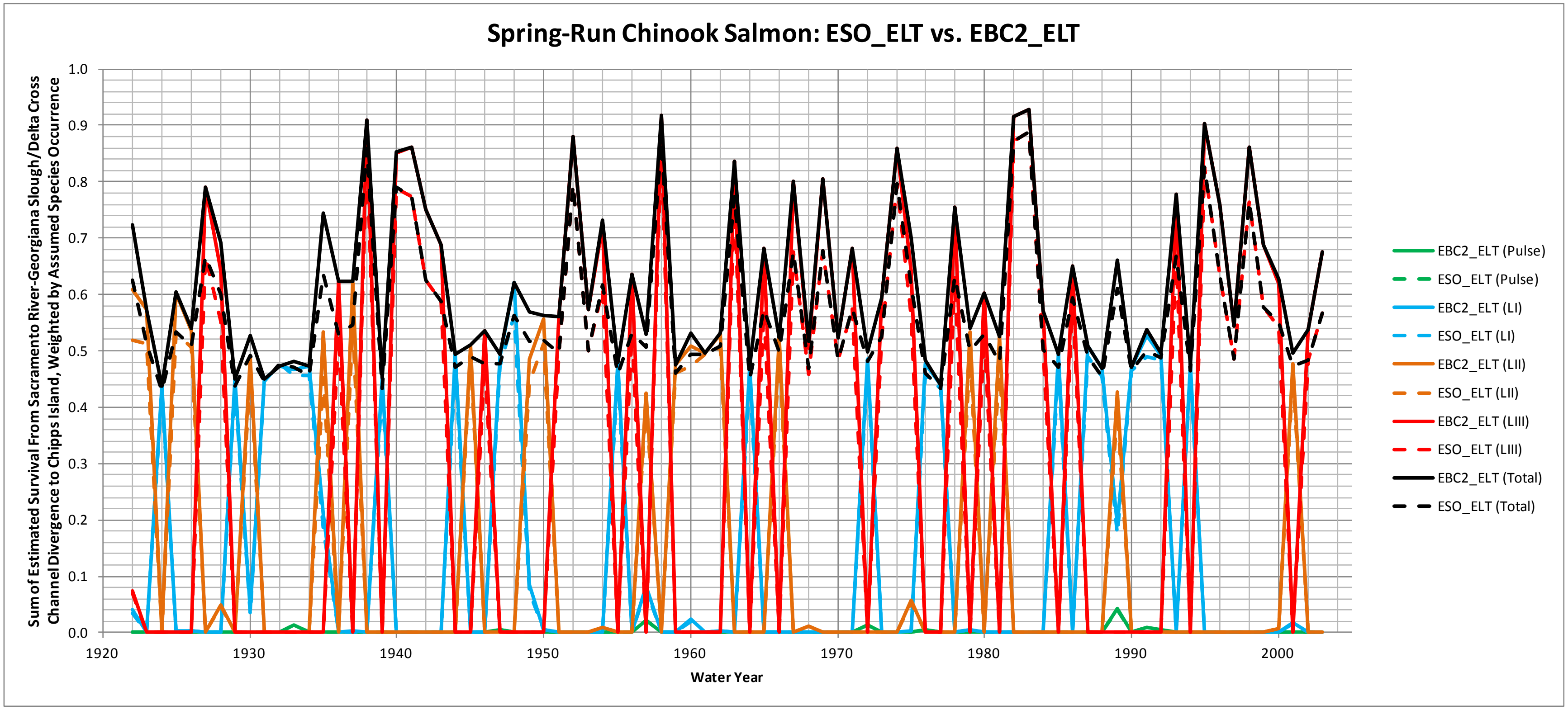
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-69. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



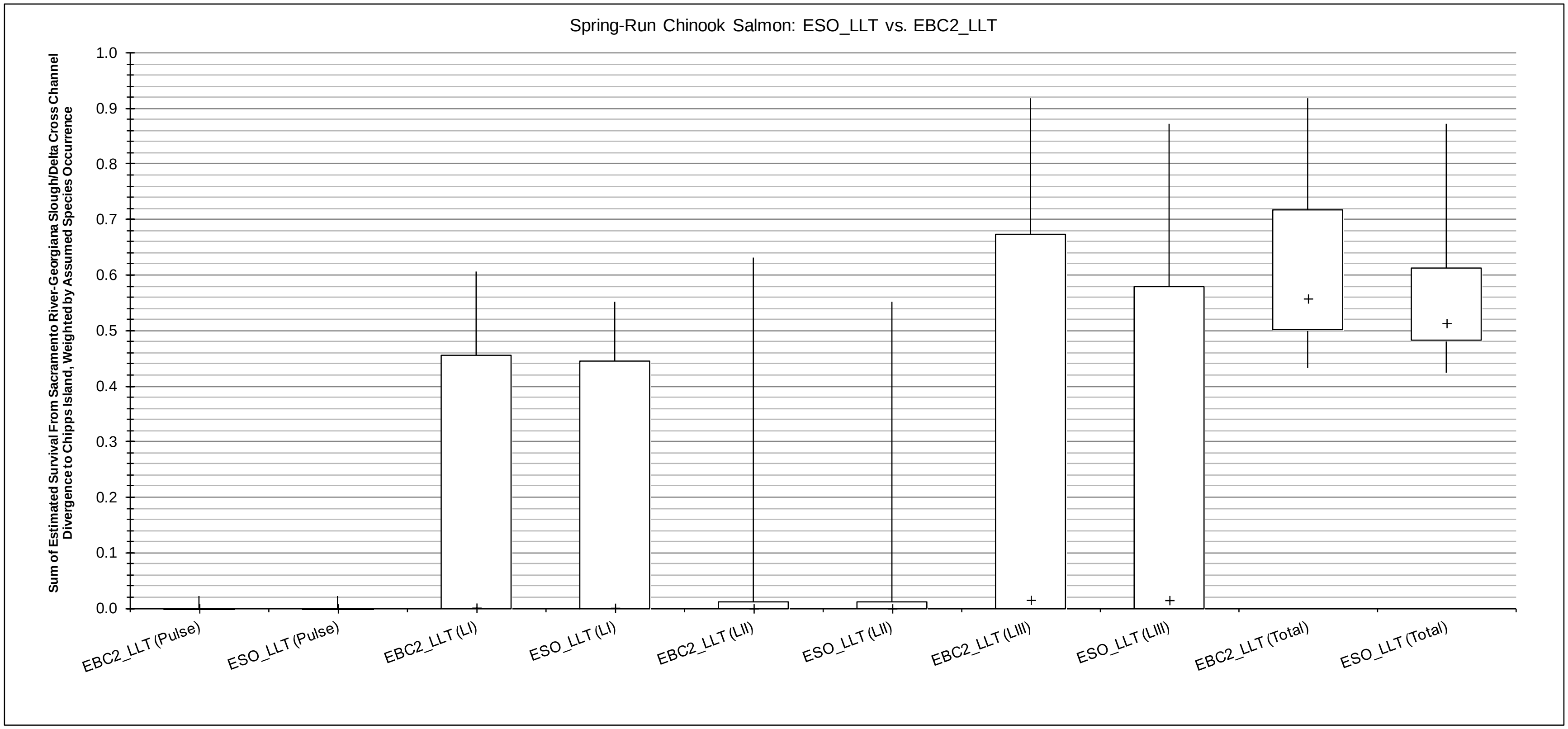
Pulse = pulse protection flow.

Figure 5C.5.3-70. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



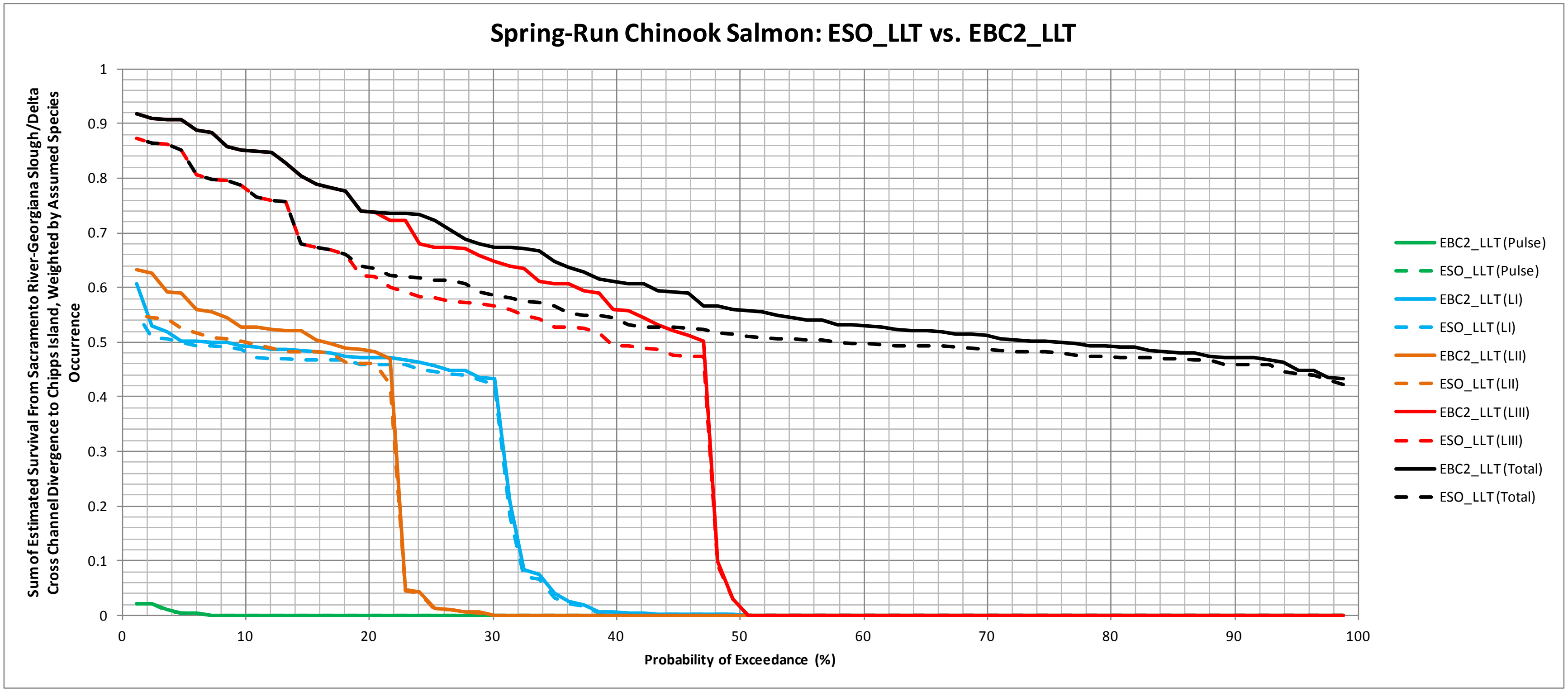
Pulse = pulse protection flow.

Figure 5C.5.3-71. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



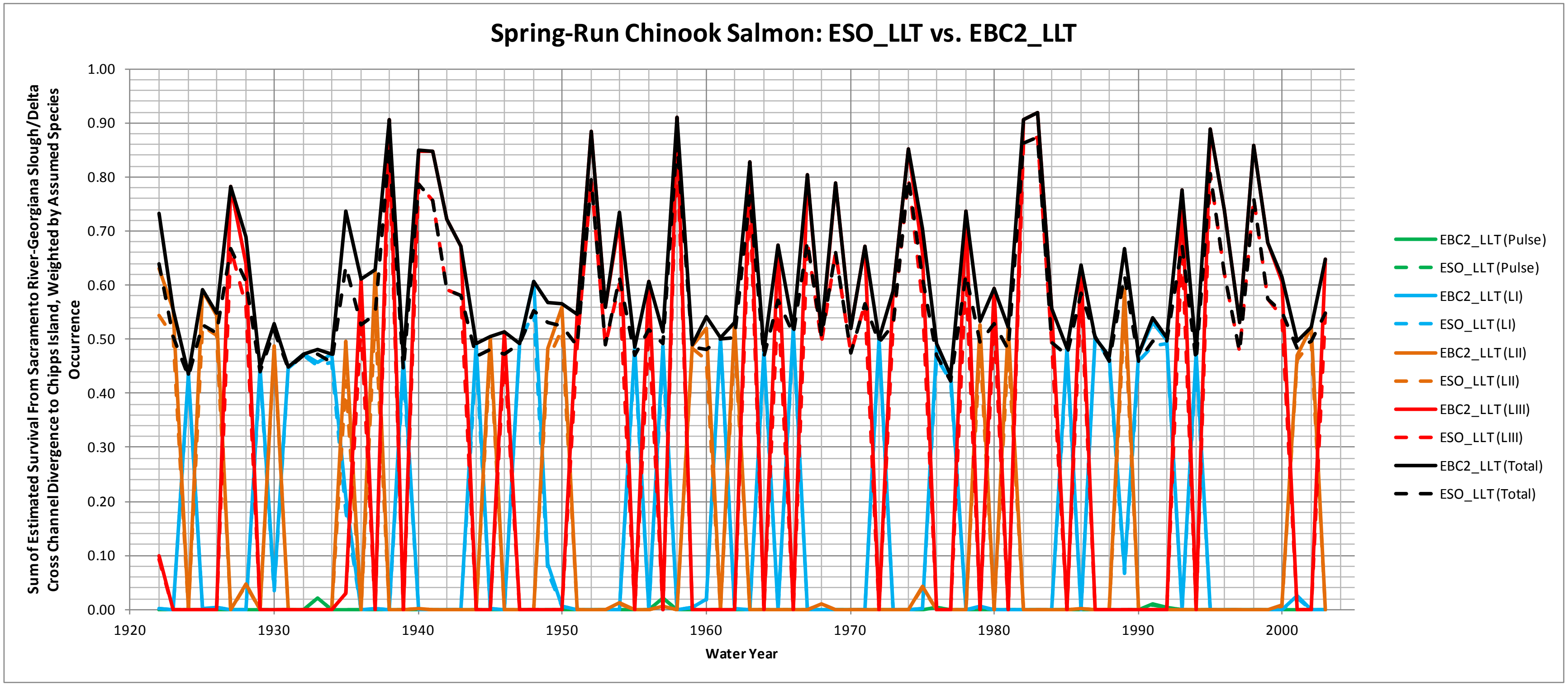
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-72. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



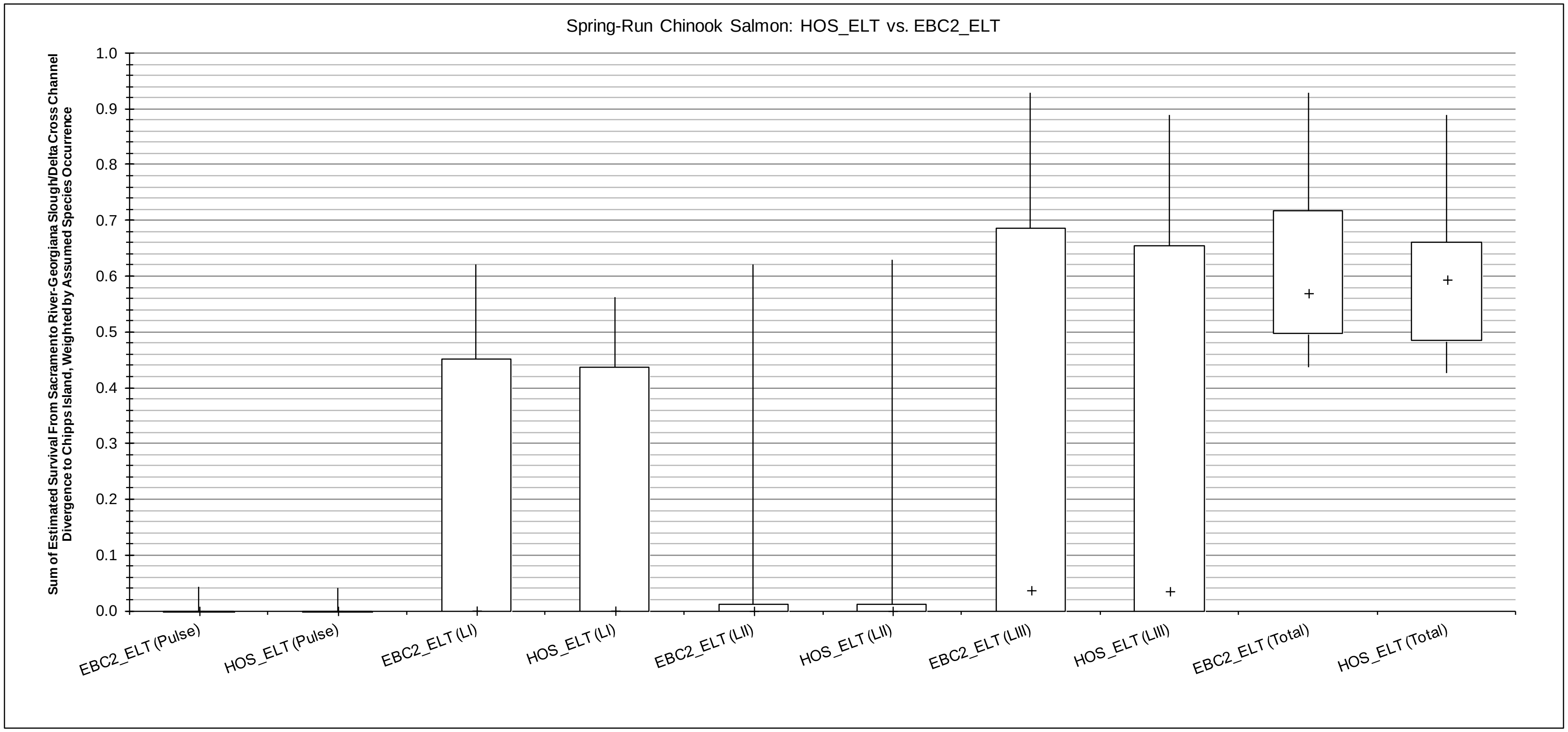
Pulse = pulse protection flow.

Figure 5C.5.3-73. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



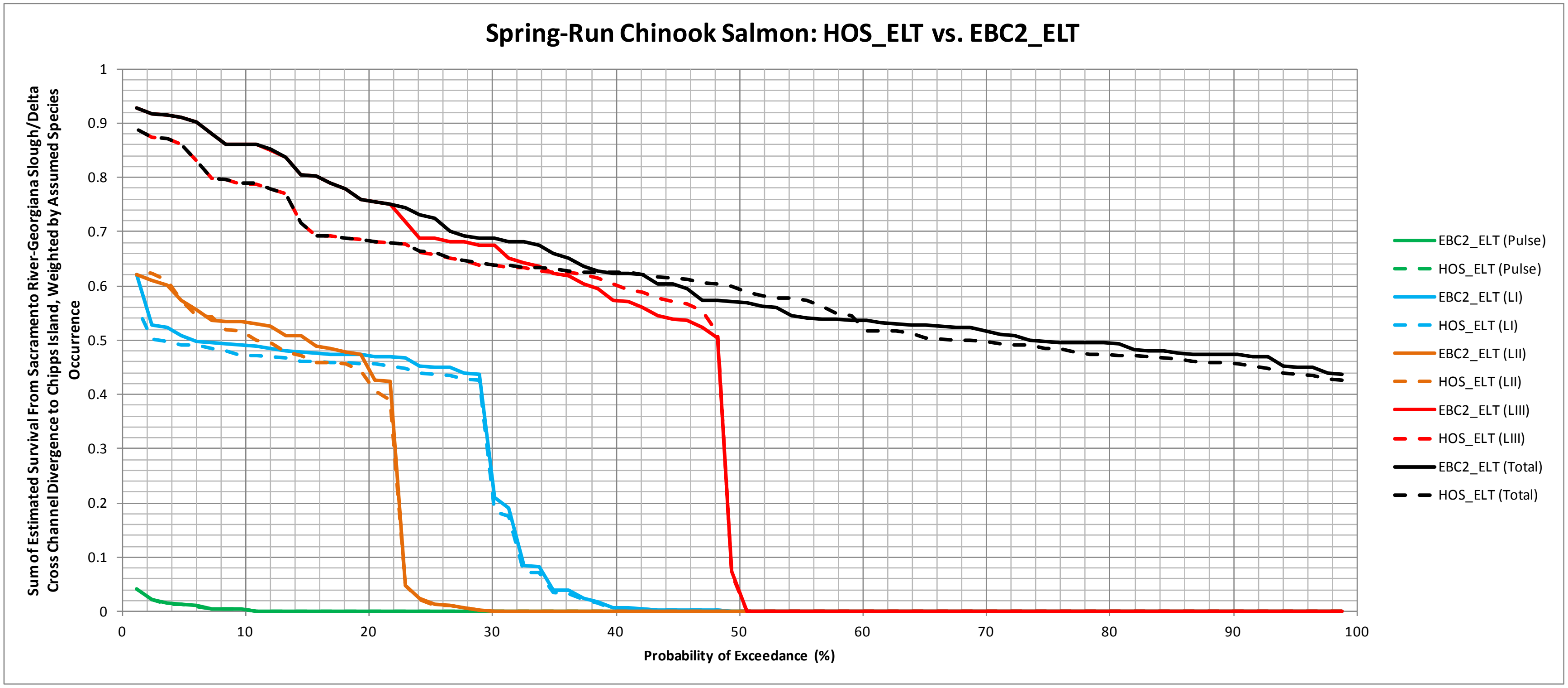
Pulse = pulse protection flow.

Figure 5C.5.3-74. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



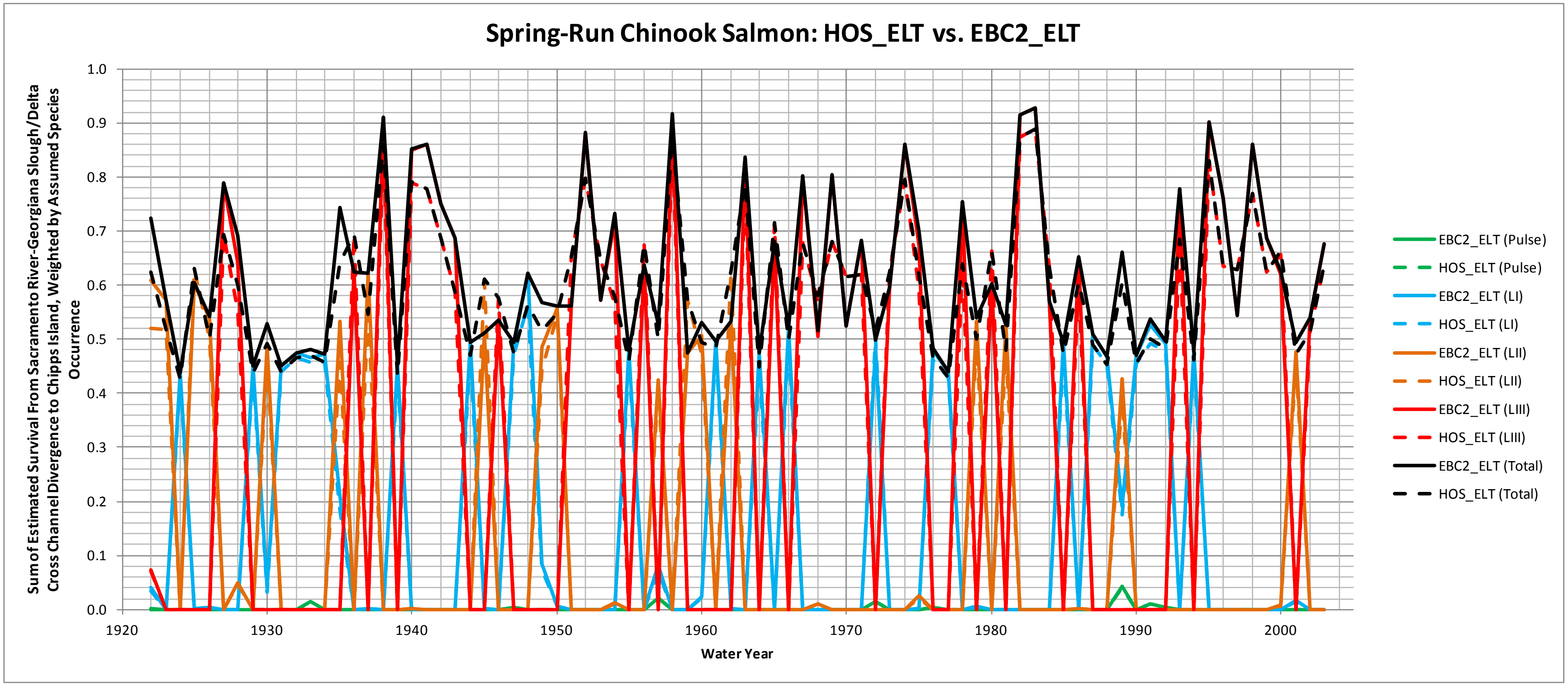
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-75. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



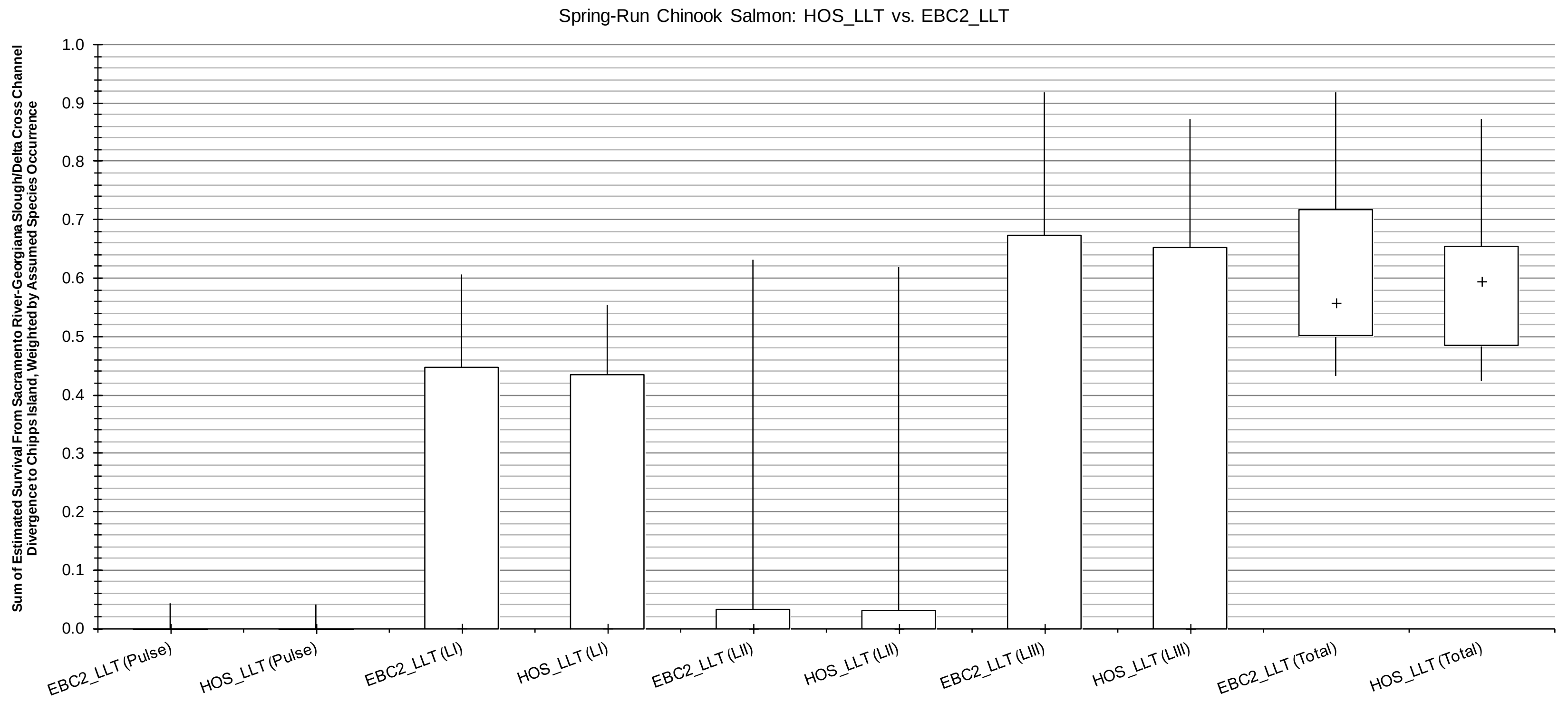
Pulse = pulse protection flow.

Figure 5C.5.3-76. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



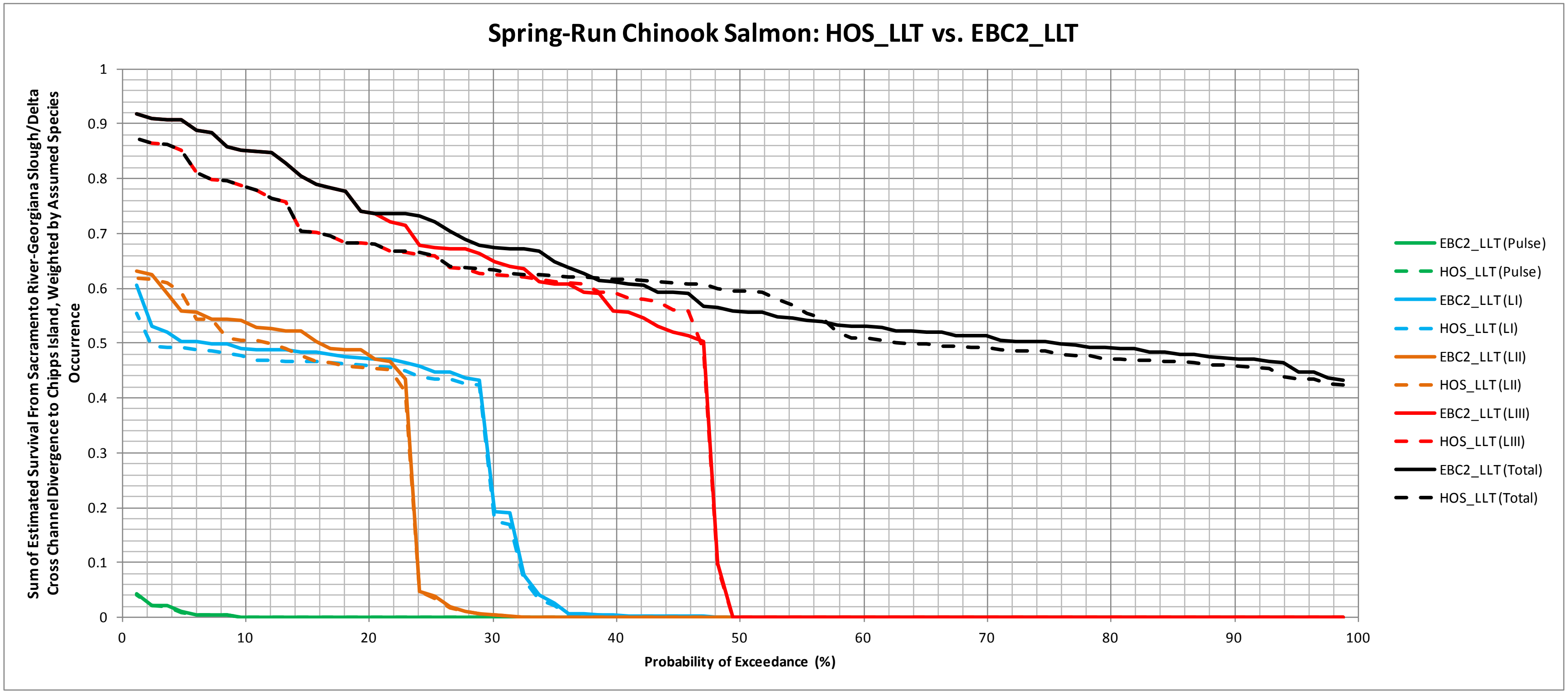
Pulse = pulse protection flow.

Figure 5C.5.3-77. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



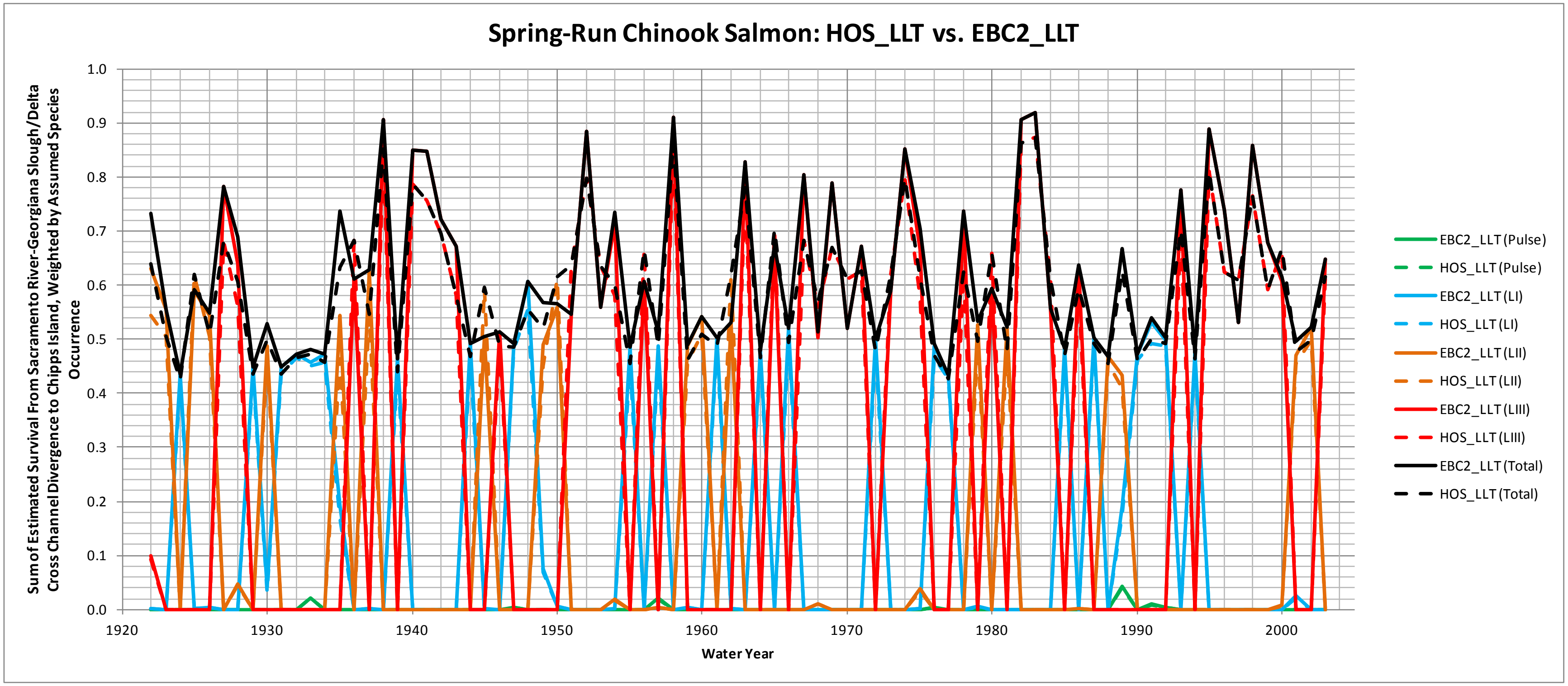
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-78. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-79. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-80. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Spring-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

5C.5.3.6.1.3 Fall-Run Chinook Salmon

Results for fall-run Chinook salmon smolts are presented below (Figure 5C.5.3-81, Figure 5C.5.3-82, Figure 5C.5.3-83, Figure 5C.5.3-84, Figure 5C.5.3-85, Figure 5C.5.3-86, Figure 5C.5.3-87, Figure 5C.5.3-88, Figure 5C.5.3-89, Figure 5C.5.3-90, Figure 5C.5.3-91, and Figure 5C.5.3-92; Table 5C.5.3-87, Table 5C.5.3-88, Table 5C.5.3-89, Table 5C.5.3-90, Table 5C.5.3-91, Table 5C.5.3-92, Table 5C.5.3-93, and Table 5C.5.3-94). For brevity, the results summary discussed in the text focuses on survival under the BDCP scenarios as a percentage of survival under the EBC2 scenarios.

There was very little overlap between the fall-run Chinook salmon migration period and pulse protection flow periods.

For years in which Level I flows occurred and overlapped the migration period, Level I survival under ESO scenarios averaged around 95–96% that of EBC2 scenarios (median: 97–99%, range 74–101%). For years in which Level II flows occurred and overlapped the migration period, Level II survival under ESO scenarios with actual bypass flows averaged around 96–97% that of EBC2 scenarios (median: 98%, range 87–104%). For years in which Level III flows occurred and overlapped the migration period, Level III survival under ESO scenarios averaged around 90% that of EBC2 scenarios (median: 90–91%, range 81–103%). Total survival under ESO scenarios averaged around 93–94% that of EBC2 scenarios (median: 94–96%, range 81–104%).

For years in which Level I flows occurred and overlapped the migration period, Level I survival under HOS scenarios averaged around 95–96% that of EBC2 scenarios (median: 97%, range 78–99%). For years in which Level II flows occurred and overlapped the migration period, Level II survival under HOS scenarios averaged around 99–100% that of EBC2 scenarios (median: 97%, range 87–119%). For years in which Level III flows occurred and overlapped the migration period, Level III survival under HOS scenarios averaged around 98–99% that of EBC2 scenarios (median: 93–94%, range 83–122%). Total survival under HOS scenarios averaged around 98–99% that of EBC2 scenarios (median: 96–97%, range 83–122%).

Table 5C.5.3-87. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	ESO_ELT (Pulse)	EBC2_ELT (LI)	ESO_ELT (LI)	EBC2_ELT (LII)	ESO_ELT (LII)	EBC2_ELT (LIII)	ESO_ELT (LIII)	EBC2_ELT (Total)	ESO_ELT (Total)
W	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.61	0.69	0.61
AN	0.00	0.00	0.00	0.00	0.07	0.06	0.53	0.48	0.59	0.54
BN	0.00	0.00	0.08	0.07	0.33	0.32	0.11	0.10	0.52	0.49
D	0.00	0.00	0.21	0.20	0.24	0.24	0.03	0.03	0.48	0.46
C	0.00	0.00	0.45	0.43	0.00	0.00	0.00	0.00	0.45	0.43
All	0.00	0.00	0.12	0.12	0.12	0.12	0.32	0.29	0.57	0.52

Table 5C.5.3-88. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_ELT (Pulse)	ESO_ELT (LI)	ESO_ELT (LII)	ESO_ELT (LIII)	ESO_ELT (Total)
Maximum	96%	98%	102%	96%	102%
75th Percentile	96%	98%	99%	93%	97%
Median	96%	97%	98%	90%	94%
25th Percentile	96%	96%	94%	86%	89%
Minimum	96%	78%	89%	82%	82%
W	–	–	–	89%	89%
AN	–	89%	92%	91%	91%
BN	–	90%	96%	92%	95%
D	–	94%	98%	95%	97%
C	96%	97%	–	–	97%
All	96%	95%	96%	90%	93%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-89. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	ESO_LLT (Pulse)	EBC2_LLT (LI)	ESO_LLT (LI)	EBC2_LLT (LII)	ESO_LLT (LII)	EBC2_LLT (LIII)	ESO_LLT (LIII)	EBC2_LLT (Total)	ESO_LLT (Total)
W	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.58	0.66	0.58
AN	0.00	0.00	0.03	0.03	0.03	0.03	0.52	0.48	0.59	0.54
BN	0.00	0.00	0.11	0.11	0.28	0.27	0.12	0.12	0.51	0.50
D	0.00	0.00	0.24	0.23	0.24	0.24	0.00	0.00	0.48	0.48
C	0.00	0.00	0.44	0.44	0.00	0.00	0.00	0.00	0.44	0.44
All	0.00	0.00	0.14	0.14	0.11	0.10	0.31	0.28	0.55	0.52

Table 5C.5.3-90. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall -Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_LLT (Pulse)	ESO_LLT (LI)	ESO_LLT (LII)	ESO_LLT (LIII)	ESO_LLT (Total)
Maximum	97%	101%	104%	103%	104%
75th Percentile	97%	99%	100%	94%	99%
Median	97%	99%	98%	91%	96%
25th Percentile	97%	97%	94%	87%	91%
Minimum	97%	74%	87%	81%	81%
W	–	–	–	89%	89%
AN	–	96%	89%	92%	92%
BN	–	94%	97%	97%	97%
D	–	96%	99%	–	99%
C	97%	98%	–	–	98%
All	97%	96%	97%	90%	94%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-91. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	HOS_ELT (Pulse)	EBC2_ELT (LI)	HOS_ELT (LI)	EBC2_ELT (LII)	HOS_ELT (LII)	EBC2_ELT (LIII)	HOS_ELT (LIII)	EBC2_ELT (Total)	HOS_ELT (Total)
W	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.66	0.69	0.66
AN	0.00	0.00	0.00	0.00	0.07	0.06	0.53	0.52	0.59	0.59
BN	0.00	0.00	0.11	0.11	0.30	0.30	0.11	0.13	0.52	0.54
D	0.00	0.00	0.23	0.22	0.22	0.21	0.03	0.03	0.48	0.46
C	0.00	0.00	0.45	0.43	0.00	0.00	0.00	0.00	0.45	0.43
All	0.00	0.00	0.14	0.13	0.11	0.11	0.32	0.31	0.57	0.55

Table 5C.5.3-92. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	HOS_ELT (Pulse)	HOS_ELT (LI)	HOS_ELT (LII)	HOS_ELT (LIII)	HOS_ELT (Total)
Maximum	96%	99%	119%	122%	122%
75th Percentile	96%	97%	99%	115%	99%
Median	96%	97%	97%	94%	96%
25th Percentile	96%	96%	94%	88%	92%
Minimum	96%	78%	89%	85%	85%
W	–	–	–	97%	97%
AN	–	86%	92%	101%	100%
BN	–	93%	103%	117%	104%
D	–	94%	99%	96%	97%
C	96%	97%	–	–	97%
All	96%	95%	100%	99%	99%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

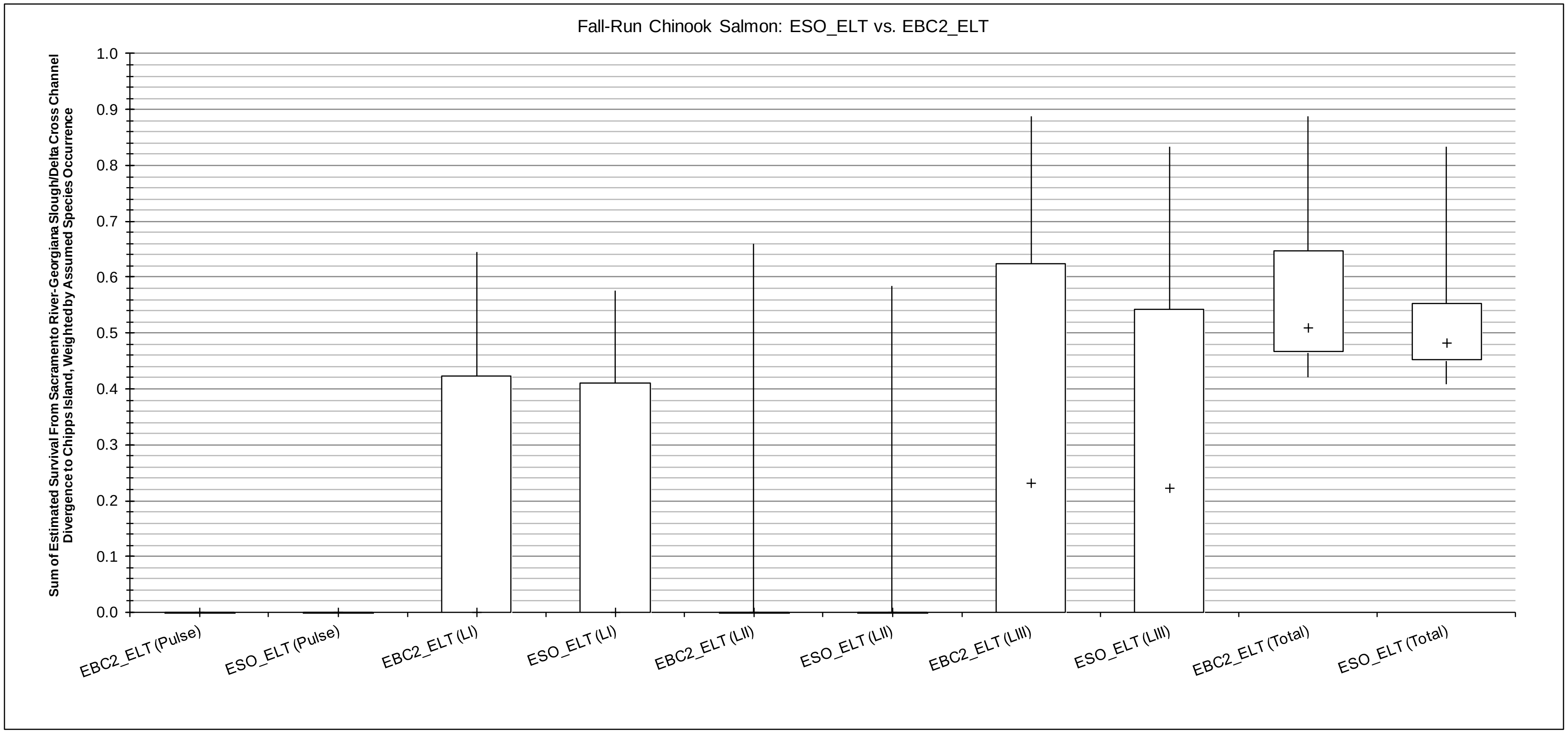
Table 5C.5.3-93. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	HOS_LLT (Pulse)	EBC2_LLT (LI)	HOS_LLT (LI)	EBC2_LLT (LII)	HOS_LLT (LII)	EBC2_LLT (LIII)	HOS_LLT (LIII)	EBC2_LLT (Total)	HOS_LLT (Total)
W	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.63	0.66	0.63
AN	0.00	0.00	0.03	0.03	0.03	0.02	0.52	0.52	0.59	0.57
BN	0.00	0.00	0.11	0.11	0.29	0.30	0.11	0.11	0.51	0.52
D	0.00	0.00	0.24	0.23	0.24	0.24	0.00	0.00	0.48	0.47
C	0.00	0.00	0.41	0.40	0.04	0.04	0.00	0.00	0.44	0.43
All	0.00	0.00	0.14	0.13	0.11	0.11	0.30	0.29	0.55	0.54

Table 5C.5.3-94. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

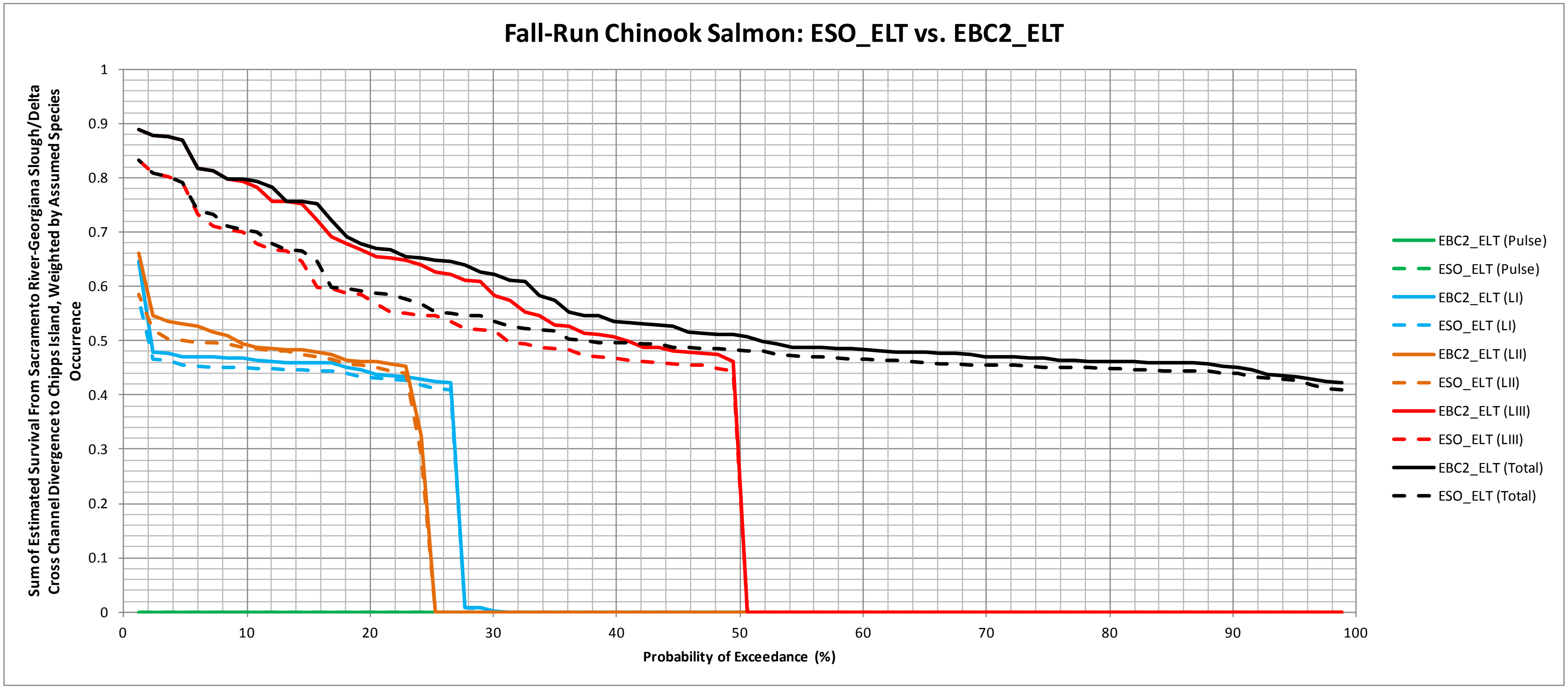
Percentile or Water-Year Type Average	HOS_LLT (Pulse)	HOS_LLT (LI)	HOS_LLT (LII)	HOS_LLT (LIII)	HOS_LLT (Total)
Maximum	97%	99%	119%	120%	120%
75th Percentile	97%	98%	99%	112%	99%
Median	97%	97%	97%	93%	97%
25th Percentile	97%	96%	96%	90%	92%
Minimum	97%	83%	87%	83%	83%
W	–	–	–	96%	96%
AN	–	96%	88%	100%	100%
BN	–	93%	102%	107%	102%
D	–	96%	99%	–	98%
C	97%	98%	97%	–	98%
All	97%	96%	99%	98%	98%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.



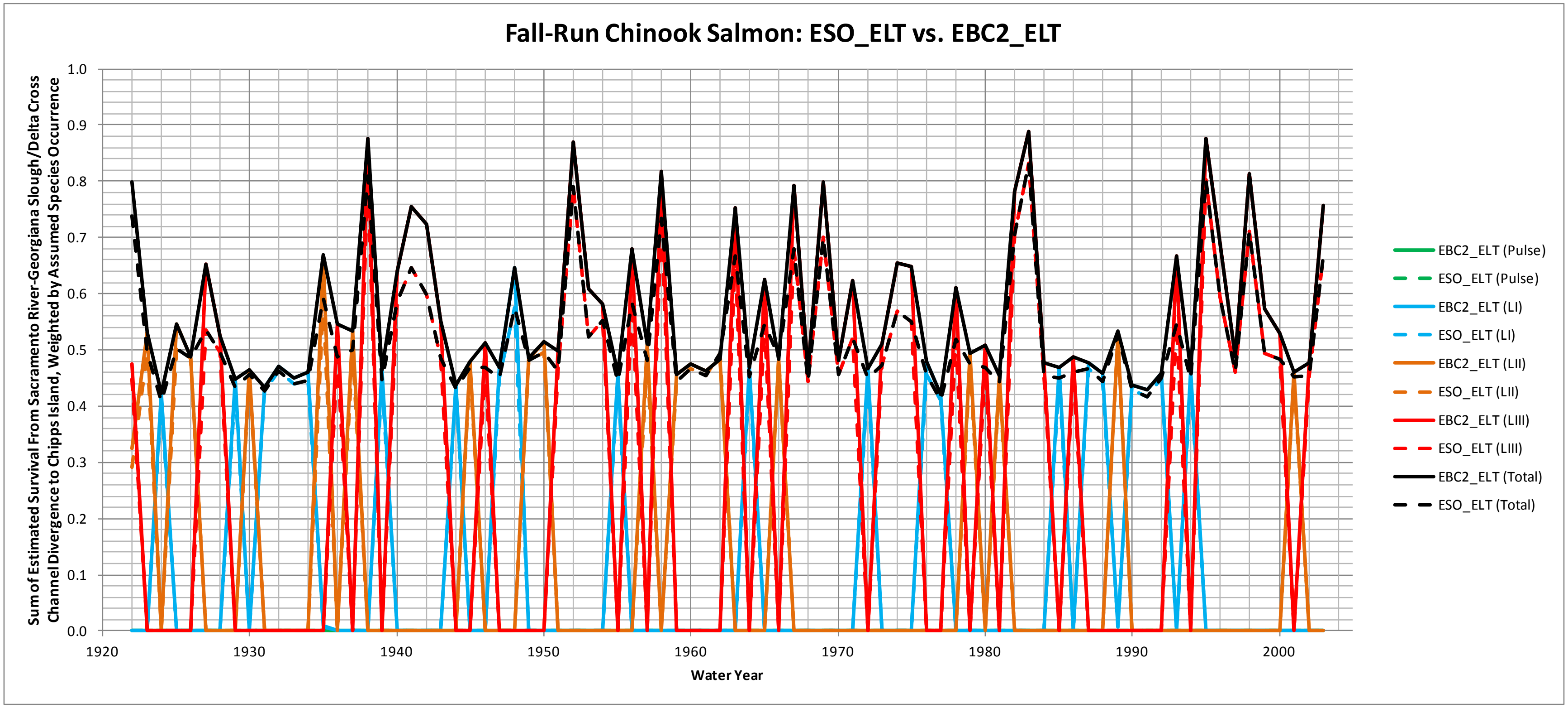
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-81. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



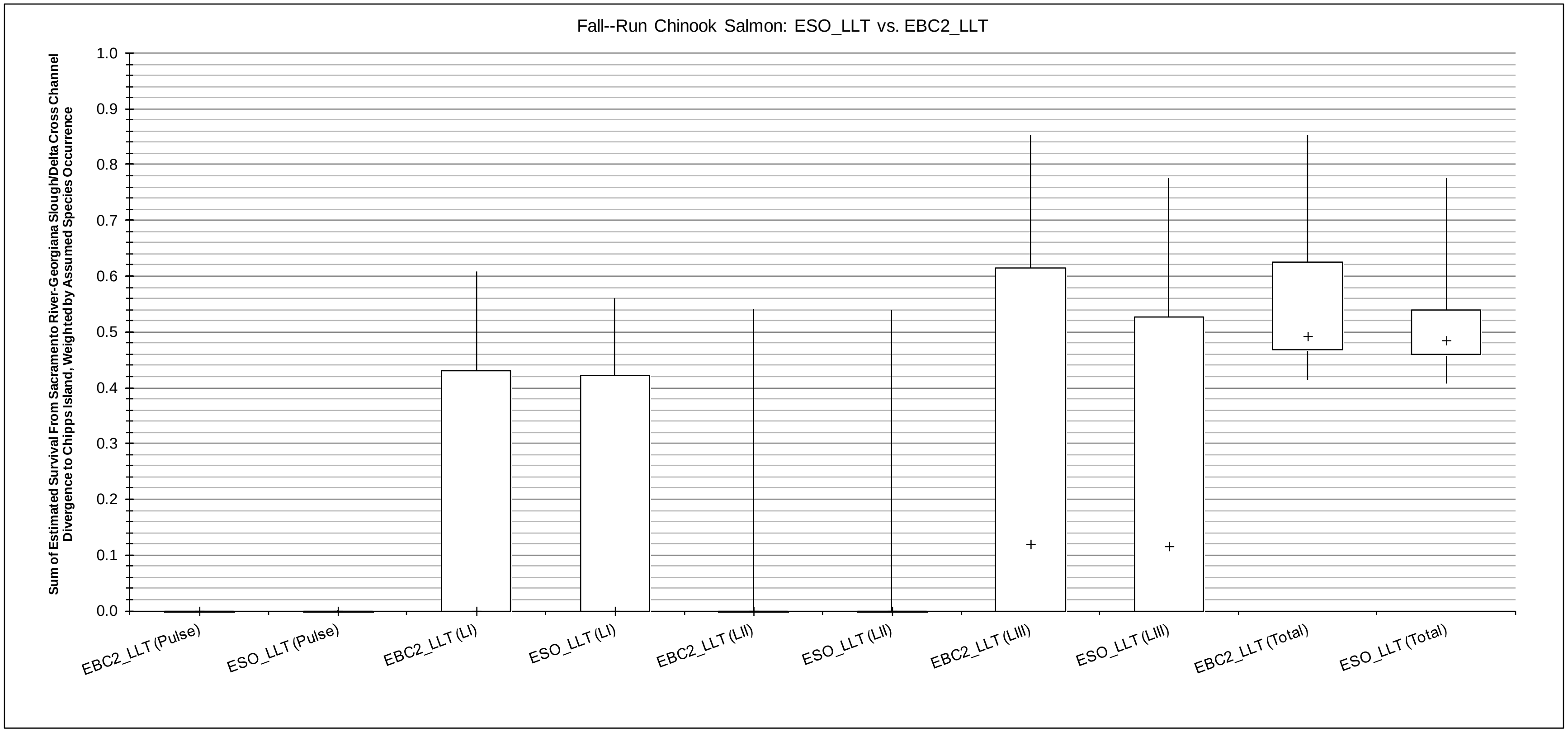
Pulse = pulse protection flow.

Figure 5C.5.3-82. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



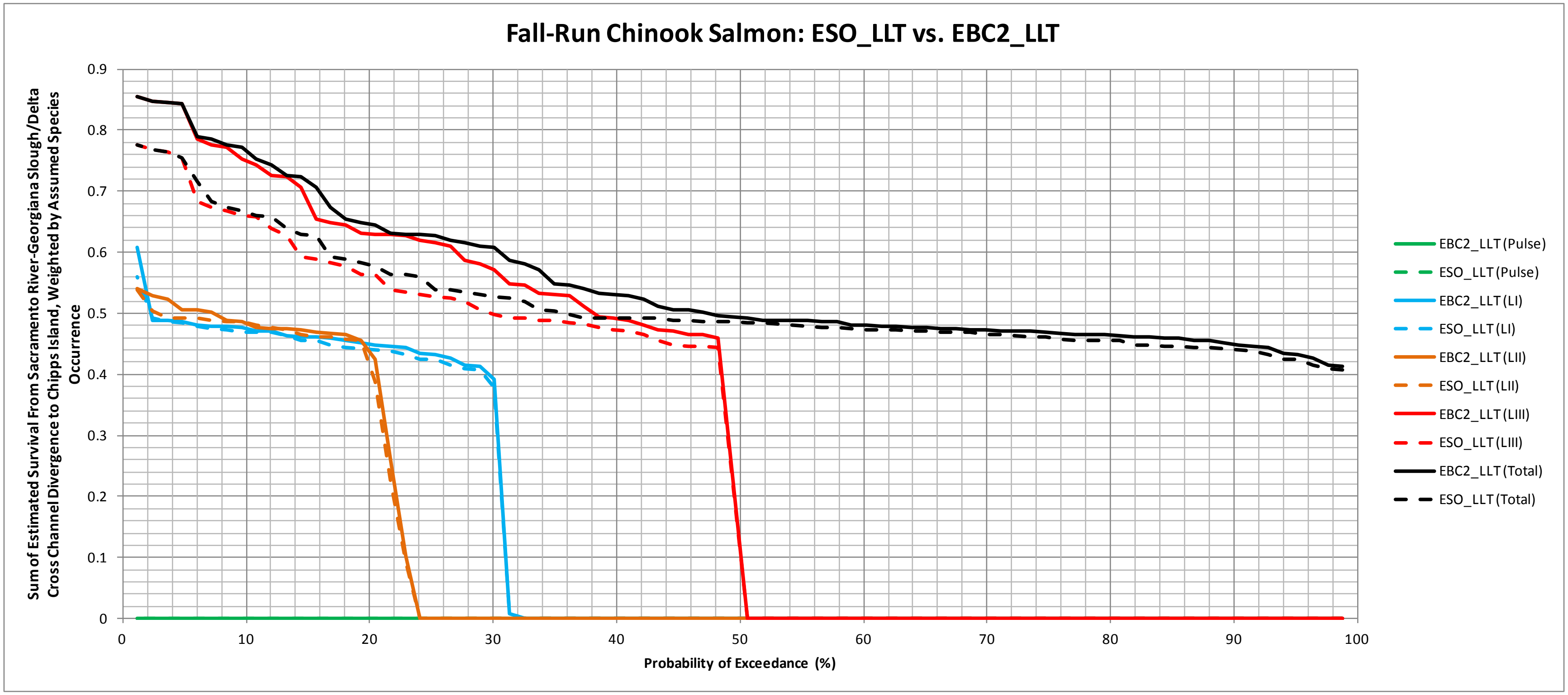
Pulse = pulse protection flow.

Figure 5C.5.3-83. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



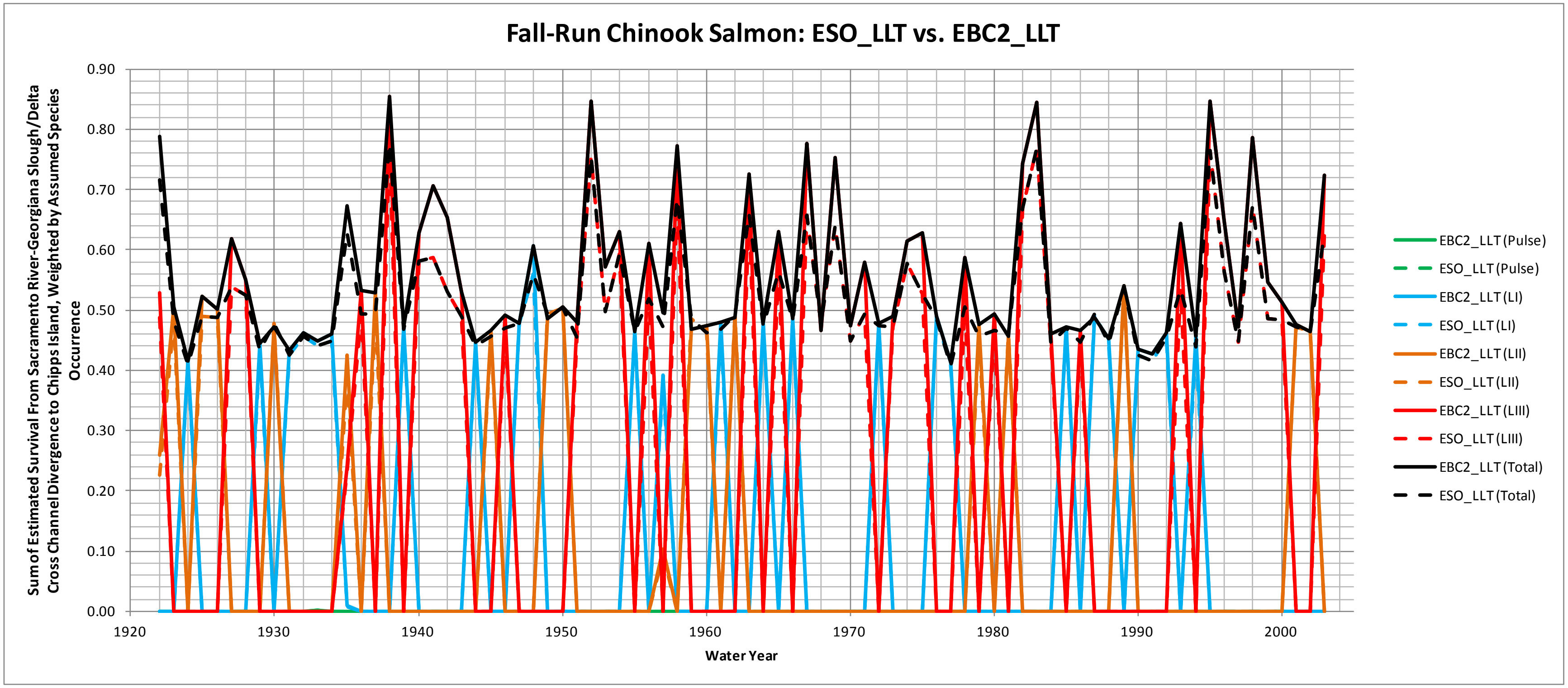
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-84. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



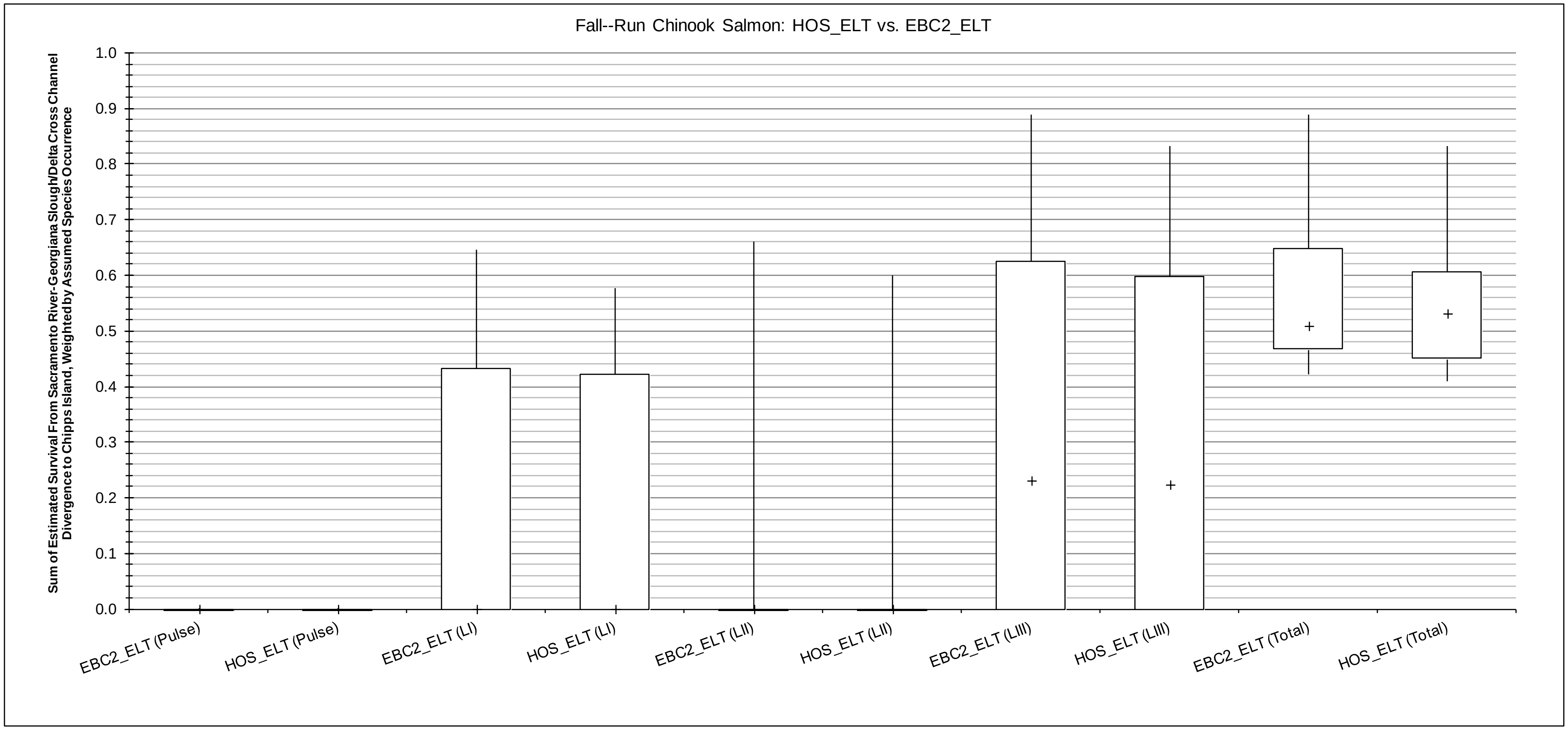
Pulse = pulse protection flow.

Figure 5C.5.3-85. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



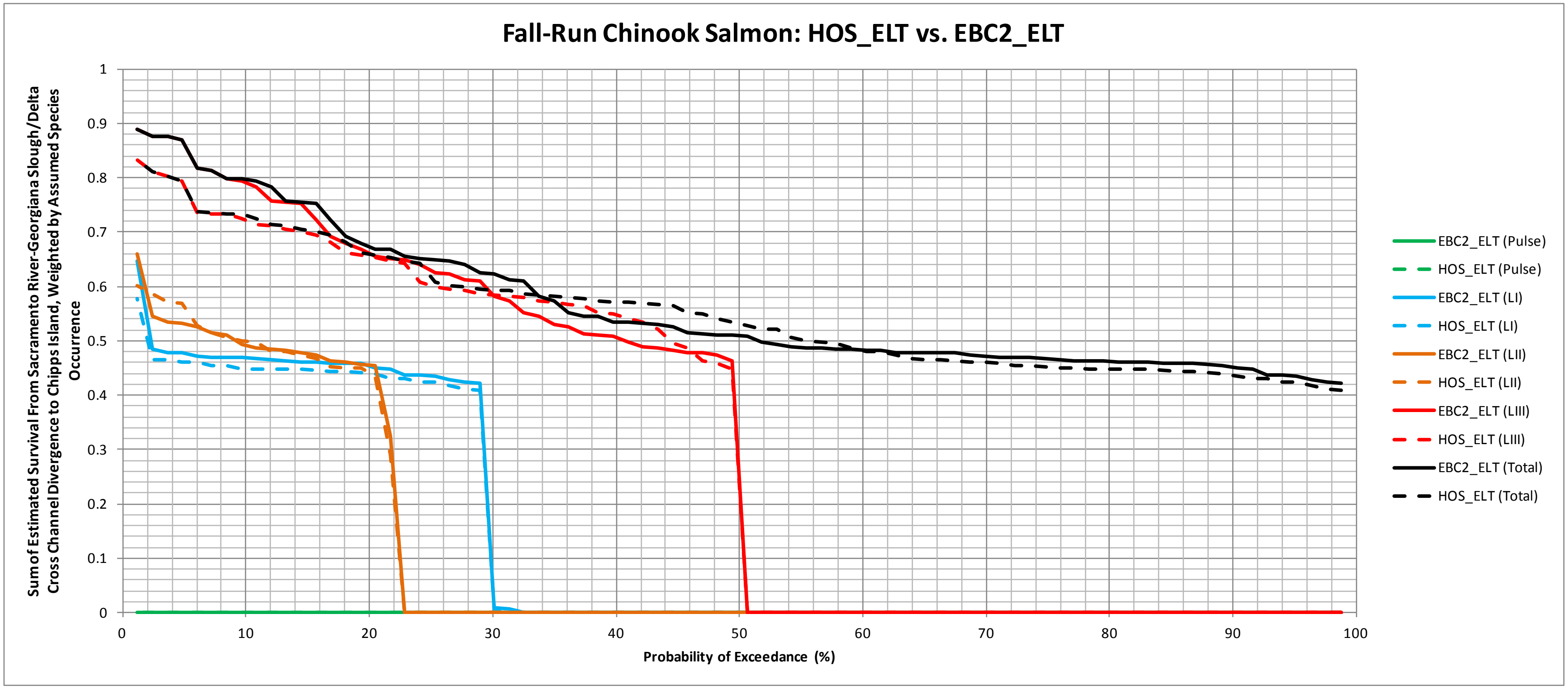
Pulse = pulse protection flow.

Figure 5C.5.3-86. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



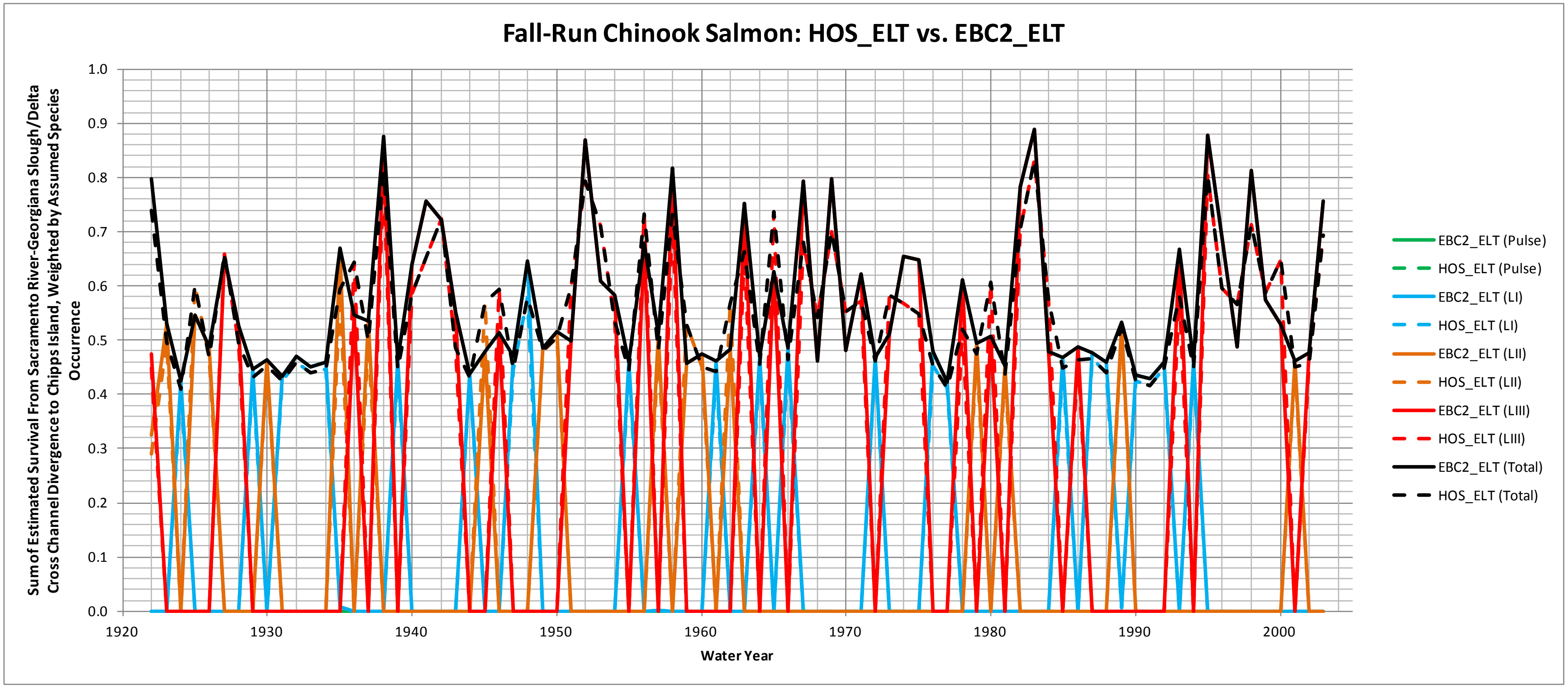
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-87. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



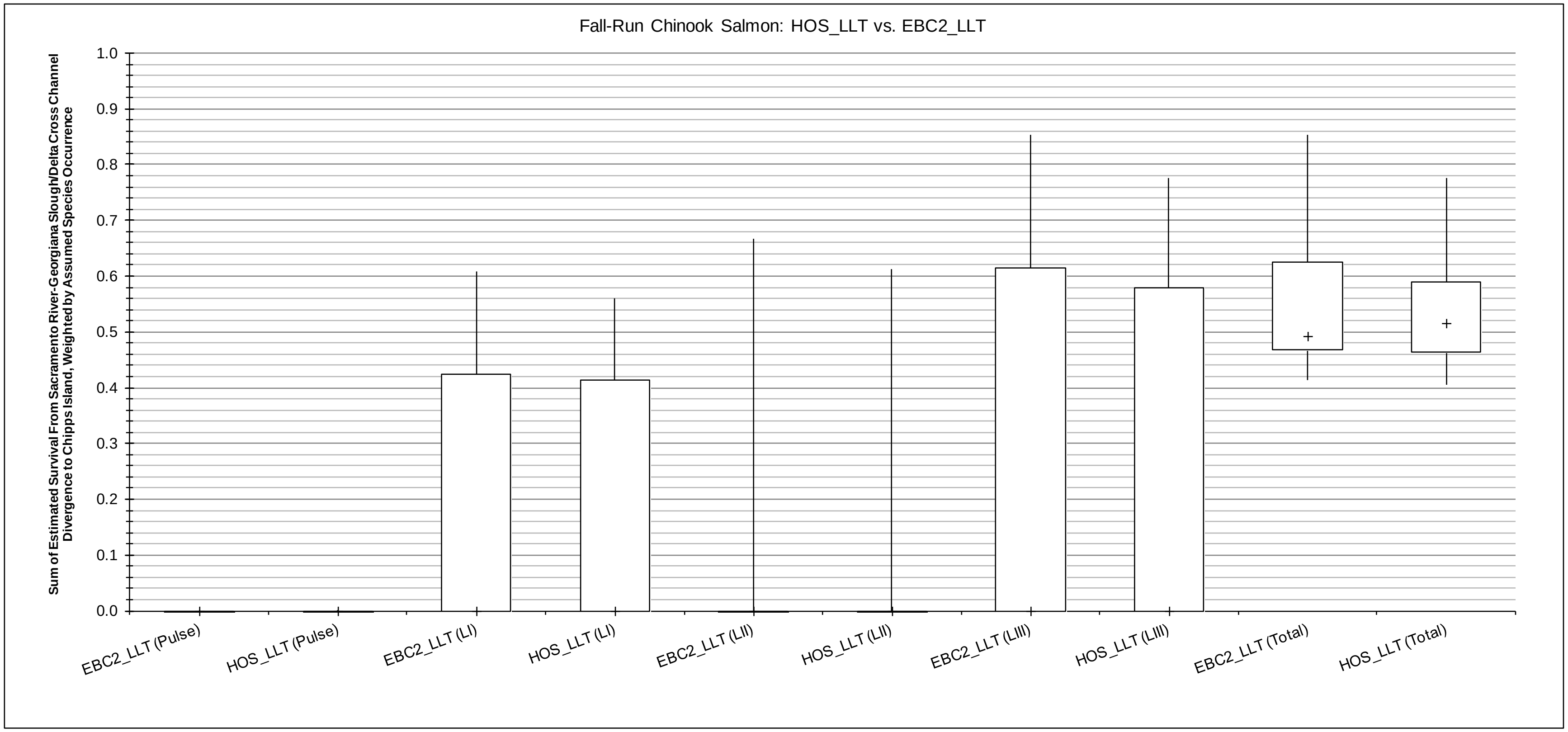
Pulse = pulse protection flow.

Figure 5C.5.3-88. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



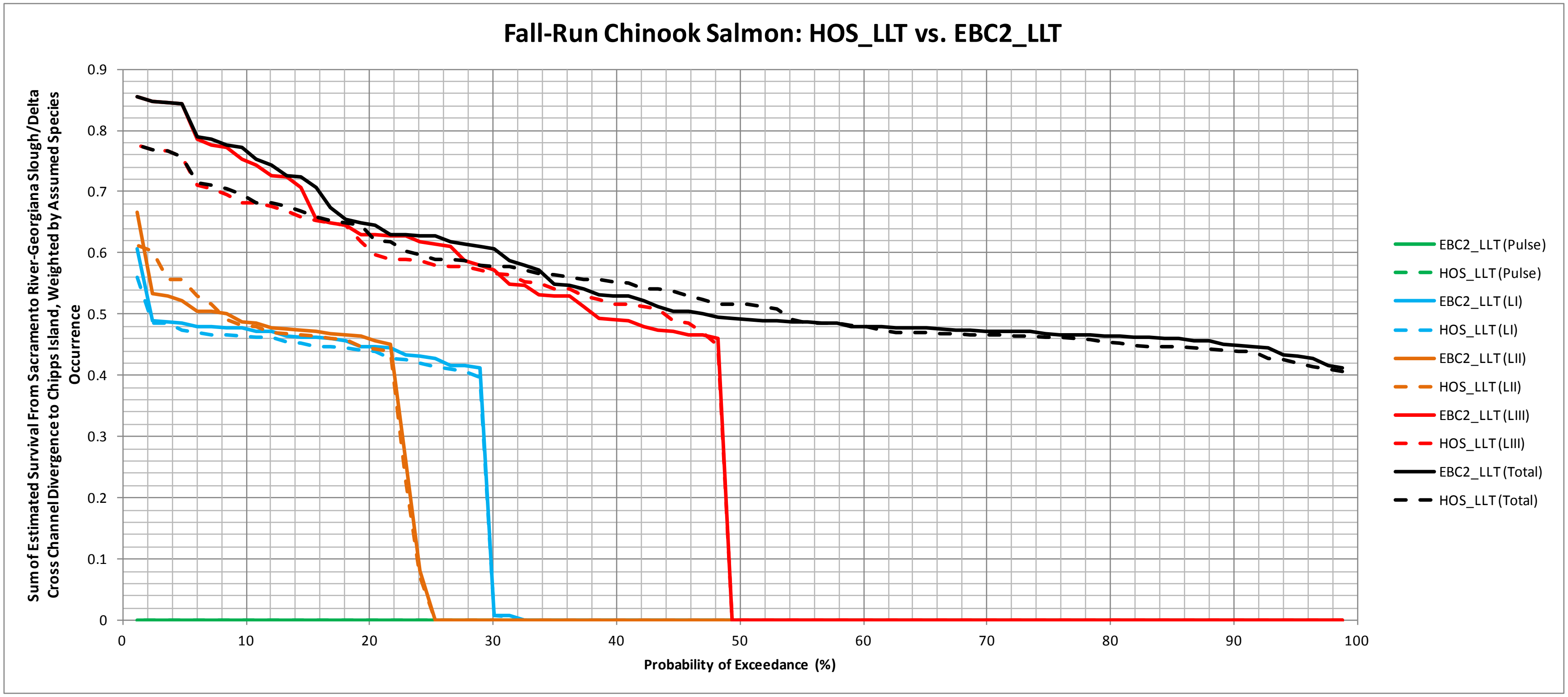
Pulse = pulse protection flow.

Figure 5C.5.3-89. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



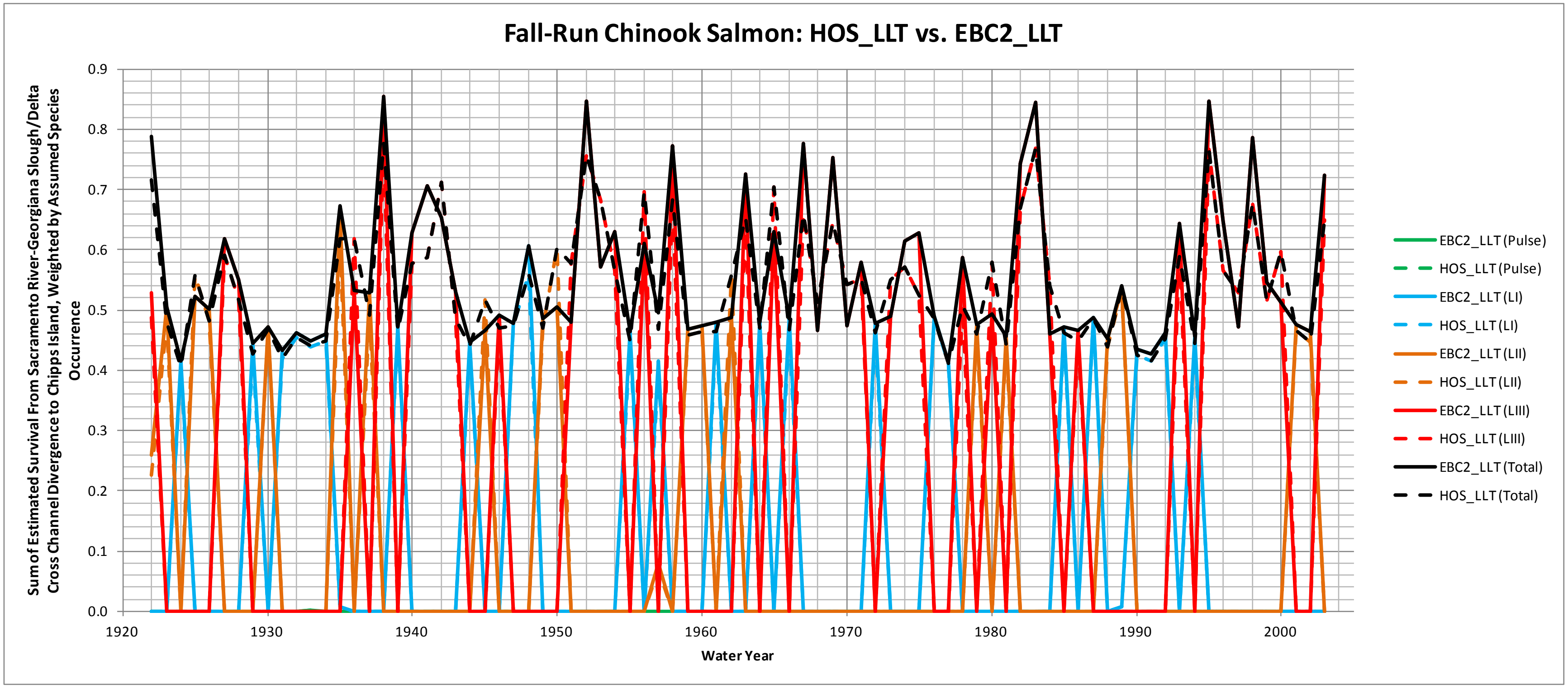
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-90. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-91. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-92. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Fall-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

5C.5.3.6.1.4 Late Fall–Run Chinook Salmon

Results for late fall–run Chinook salmon smolts are presented below (Figure 5C.5.3-93, Figure 5C.5.3-94, Figure 5C.5.3-95, Figure 5C.5.3-96, Figure 5C.5.3-97, Figure 5C.5.3-98, Figure 5C.5.3-99, Figure 5C.5.3-100, Figure 5C.5.3-101, Figure 5C.5.3-102, Figure 5C.5.3-103, and Figure 5C.5.3-104; Table 5C.5.3-95, Table 5C.5.3-96, Table 5C.5.3-97, Table 5C.5.3-98, Table 5C.5.3-99, Table 5C.5.3-100, Table 5C.5.3-101, and Table 5C.5.3-102). For brevity, the results summary discussed below in the text focuses on survival under the BDCP scenarios as a percentage of survival under the EBC2 scenarios.

For years in which pulse protection flows occurred and overlapped the migration period, pulse protection survival under ESO scenarios averaged around 94–96% that of EBC2 scenarios (median: 95–96%, range 75–121%). For years in which Level I flows occurred and overlapped the migration period, Level I survival under ESO scenarios averaged around 94–95% that of EBC2 scenarios (median: 93–95%, range 82–107%). For years in which Level II flows occurred and overlapped the migration period, Level II survival under ESO scenarios averaged around 94–95% that of EBC2 scenarios (median: 95–96%, range 79–106%). For years in which Level III flows occurred and overlapped the migration period, Level III survival under ESO scenarios averaged around 87–88% that of EBC2 scenarios (median: 88%, range 72–105%). Total survival under ESO scenarios averaged around 93–95% that of EBC2 scenarios (median: 93–94%, range 82–106%).

For years in which pulse protection flows occurred and overlapped the migration period, pulse protection survival under HOS scenarios averaged around 95–96% that of EBC2 scenarios (median: 95–96%, range 80–111%). For years in which Level I flows occurred and overlapped the migration period, Level I survival under HOS scenarios averaged around 94–95% that of EBC2 scenarios (median: 93–95%, range 82–105%). For years in which Level II flows occurred and overlapped the migration period, Level II survival under HOS scenarios averaged around 95–96% that of EBC2 scenarios (median: 95–97%, range 82–112%). For years in which Level III flows occurred and overlapped the migration period, Level III survival under HOS scenarios averaged around 86–87% that of EBC2 scenarios (median: 86–87%, range 72–99%). Total survival under HOS scenarios averaged around 93–95% that of EBC2 scenarios (median: 93–94%, range 82–105%).

Table 5C.5.3-95. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	ESO_ELT (Pulse)	EBC2_ELT (LI)	ESO_ELT (LI)	EBC2_ELT (LII)	ESO_ELT (LII)	EBC2_ELT (LIII)	ESO_ELT (LIII)	EBC2_ELT (Total)	ESO_ELT (Total)
W	0.06	0.06	0.37	0.34	0.04	0.03	0.13	0.10	0.60	0.53
AN	0.04	0.04	0.37	0.34	0.02	0.02	0.09	0.08	0.52	0.48
BN	0.02	0.02	0.38	0.36	0.06	0.05	0.03	0.02	0.48	0.45
D	0.02	0.02	0.39	0.38	0.04	0.04	0.02	0.01	0.47	0.45
C	0.01	0.01	0.42	0.42	0.01	0.01	0.01	0.01	0.44	0.43
All	0.03	0.03	0.39	0.36	0.03	0.03	0.06	0.05	0.52	0.48

Table 5C.5.3-96. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_ELT (Pulse)	ESO_ELT (LI)	ESO_ELT (LII)	ESO_ELT (LIII)	ESO_ELT (Total)
Maximum	102%	101%	103%	103%	101%
75th Percentile	97%	99%	97%	91%	97%
Median	95%	93%	95%	88%	93%
25th Percentile	93%	90%	93%	80%	89%
Minimum	83%	82%	79%	72%	82%
W	94%	90%	95%	81%	89%
AN	95%	93%	93%	87%	92%
BN	93%	94%	93%	92%	94%
D	95%	96%	97%	93%	96%
C	95%	99%	95%	94%	99%
All	94%	94%	94%	87%	93%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-97. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	ESO_LLT (Pulse)	EBC2_LLT (LI)	ESO_LLT (LI)	EBC2_LLT (LII)	ESO_LLT (LII)	EBC2_LLT (LIII)	ESO_LLT (LIII)	EBC2_LLT (Total)	ESO_LLT (Total)
W	0.07	0.07	0.37	0.34	0.03	0.03	0.12	0.10	0.59	0.54
AN	0.04	0.04	0.37	0.35	0.02	0.02	0.09	0.07	0.53	0.49
BN	0.02	0.02	0.38	0.37	0.04	0.04	0.03	0.03	0.48	0.46
D	0.02	0.02	0.39	0.38	0.04	0.04	0.01	0.01	0.46	0.45
C	0.01	0.01	0.42	0.42	0.01	0.01	0.01	0.01	0.44	0.44
All	0.04	0.04	0.38	0.36	0.03	0.03	0.06	0.05	0.51	0.48

Table 5C.5.3-98. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_LLT (Pulse)	ESO_LLT (LI)	ESO_LLT (LII)	ESO_LLT (LIII)	ESO_LLT (Total)
Maximum	121%	107%	106%	105%	106%
75th Percentile	97%	100%	97%	94%	99%
Median	96%	95%	96%	88%	94%
25th Percentile	93%	91%	92%	82%	90%
Minimum	75%	82%	82%	72%	82%
W	96%	92%	94%	83%	90%
AN	95%	94%	93%	88%	93%
BN	96%	95%	93%	95%	95%
D	96%	97%	102%	93%	97%
C	97%	101%	95%	93%	101%
All	96%	95%	95%	88%	95%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-99. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	HOS_ELT (Pulse)	EBC2_ELT (LI)	HOS_ELT (LI)	EBC2_ELT (LII)	HOS_ELT (LII)	EBC2_ELT (LIII)	HOS_ELT (LIII)	EBC2_ELT (Total)	HOS_ELT (Total)
W	0.06	0.06	0.37	0.34	0.04	0.03	0.13	0.10	0.60	0.53
AN	0.04	0.04	0.37	0.34	0.02	0.02	0.09	0.07	0.52	0.48
BN	0.02	0.02	0.39	0.36	0.05	0.05	0.03	0.02	0.48	0.45
D	0.02	0.02	0.40	0.38	0.03	0.03	0.02	0.01	0.47	0.45
C	0.00	0.00	0.42	0.42	0.01	0.00	0.01	0.00	0.44	0.43
All	0.03	0.03	0.39	0.36	0.03	0.03	0.06	0.05	0.52	0.48

Table 5C.5.3-100. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	HOS_ELT (Pulse)	HOS_ELT (LI)	HOS_ELT (LII)	HOS_ELT (LIII)	HOS_ELT (Total)
Maximum	104%	101%	103%	99%	101%
75th Percentile	97%	98%	98%	90%	97%
Median	95%	93%	95%	86%	93%
25th Percentile	93%	90%	92%	81%	89%
Minimum	80%	83%	82%	72%	83%
W	95%	90%	95%	81%	89%
AN	95%	93%	93%	85%	92%
BN	93%	94%	93%	91%	94%
D	94%	95%	98%	93%	96%
C	95%	98%	93%	88%	98%
All	95%	94%	95%	86%	93%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

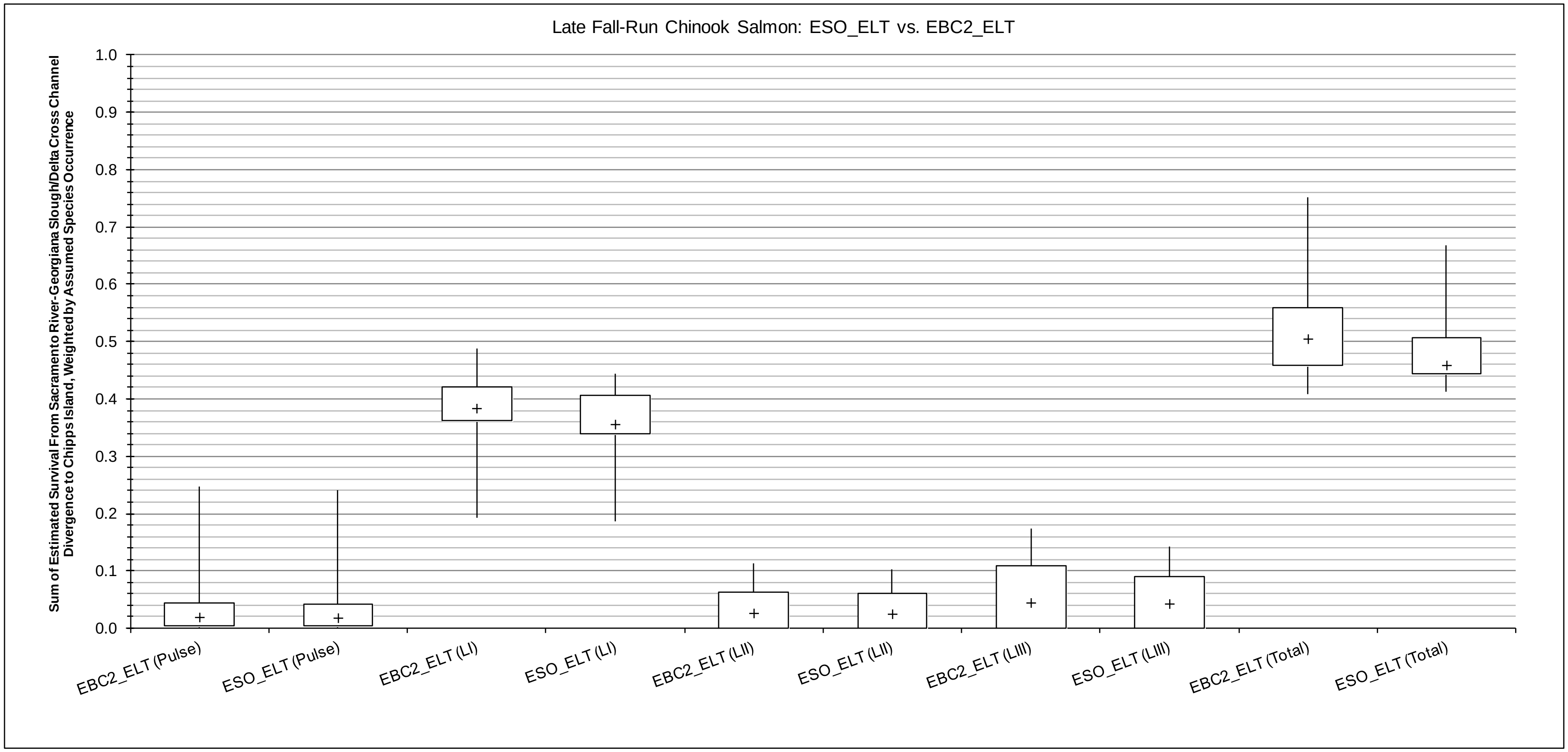
Table 5C.5.3-101. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	HOS_LLT (Pulse)	EBC2_LLT (LI)	HOS_LLT (LI)	EBC2_LLT (LII)	HOS_LLT (LII)	EBC2_LLT (LIII)	HOS_LLT (LIII)	EBC2_LLT (Total)	HOS_LLT (Total)
W	0.06	0.06	0.37	0.34	0.03	0.03	0.12	0.10	0.59	0.54
AN	0.04	0.04	0.37	0.35	0.03	0.02	0.09	0.07	0.53	0.49
BN	0.02	0.02	0.38	0.36	0.05	0.05	0.03	0.02	0.48	0.46
D	0.03	0.03	0.38	0.37	0.04	0.04	0.01	0.01	0.46	0.45
C	0.00	0.00	0.41	0.42	0.01	0.01	0.01	0.00	0.44	0.44
All	0.04	0.04	0.38	0.36	0.03	0.03	0.06	0.05	0.51	0.48

Table 5C.5.3-102. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

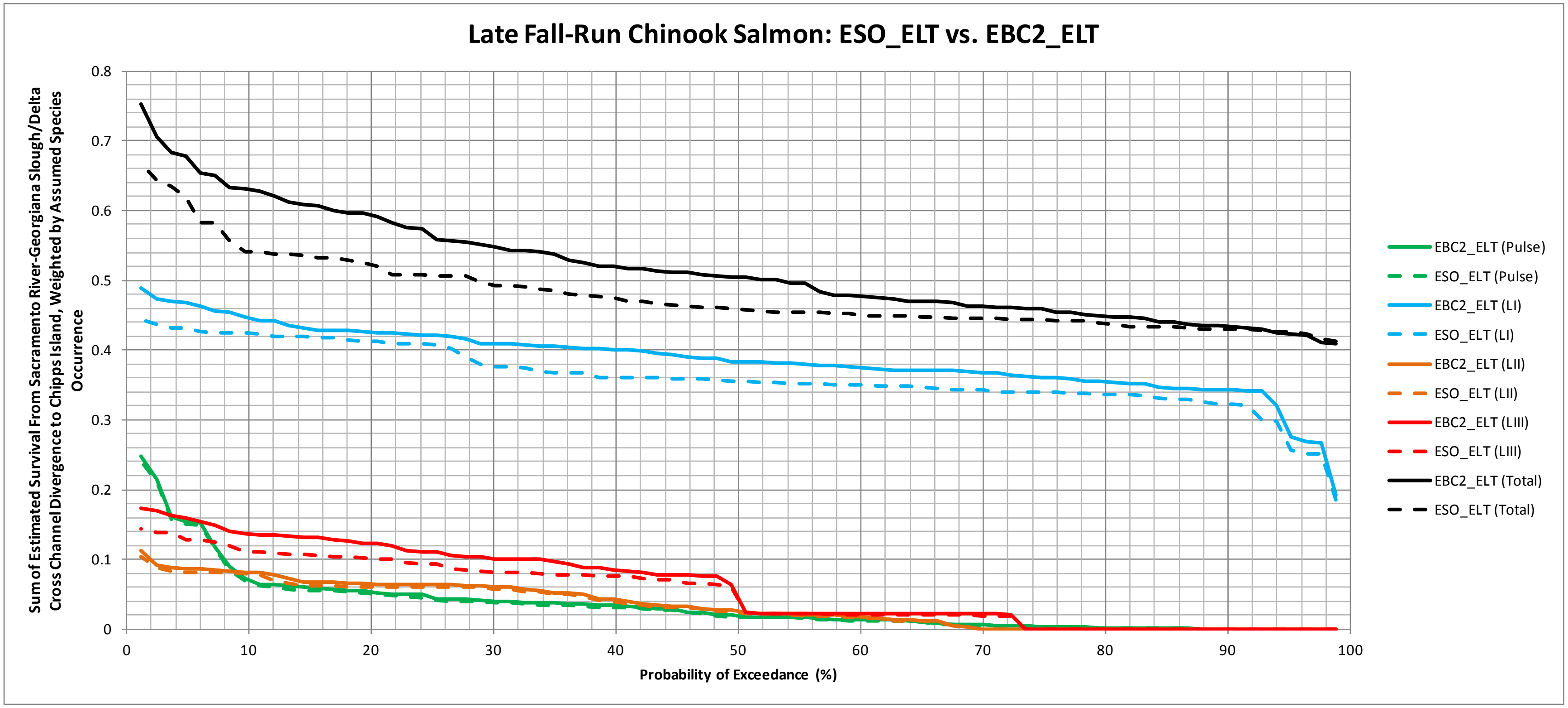
Percentile or Water-Year Type Average	HOS_LLT (Pulse)	HOS_LLT (LI)	HOS_LLT (LII)	HOS_LLT (LIII)	HOS_LLT (Total)
Maximum	111%	105%	112%	99%	105%
75th Percentile	97%	99%	98%	94%	99%
Median	96%	95%	97%	87%	94%
25th Percentile	93%	91%	93%	82%	91%
Minimum	88%	82%	82%	73%	82%
W	95%	92%	94%	83%	90%
AN	97%	94%	94%	88%	93%
BN	94%	94%	96%	94%	95%
D	97%	96%	105%	92%	97%
C	95%	100%	97%	89%	100%
All	96%	95%	96%	87%	95%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.



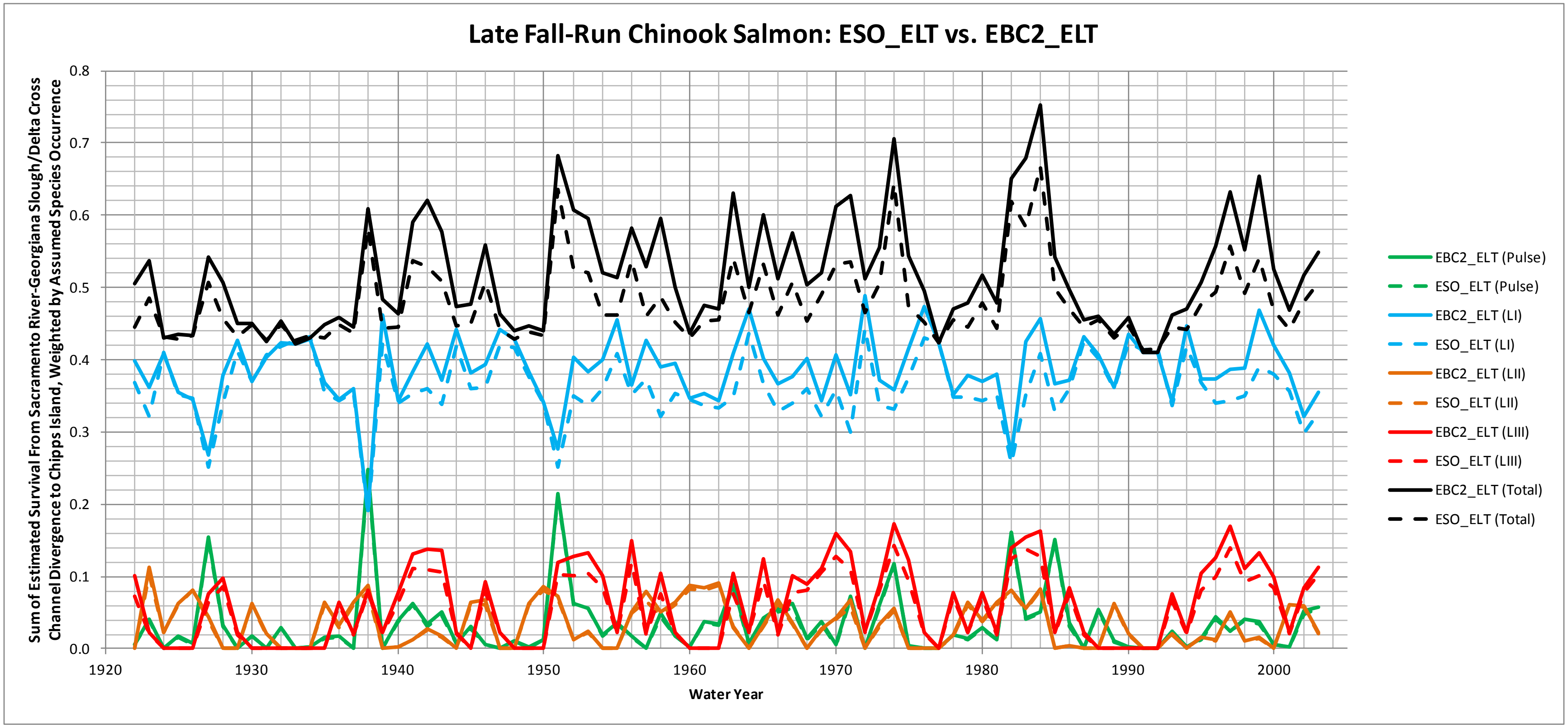
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-93. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



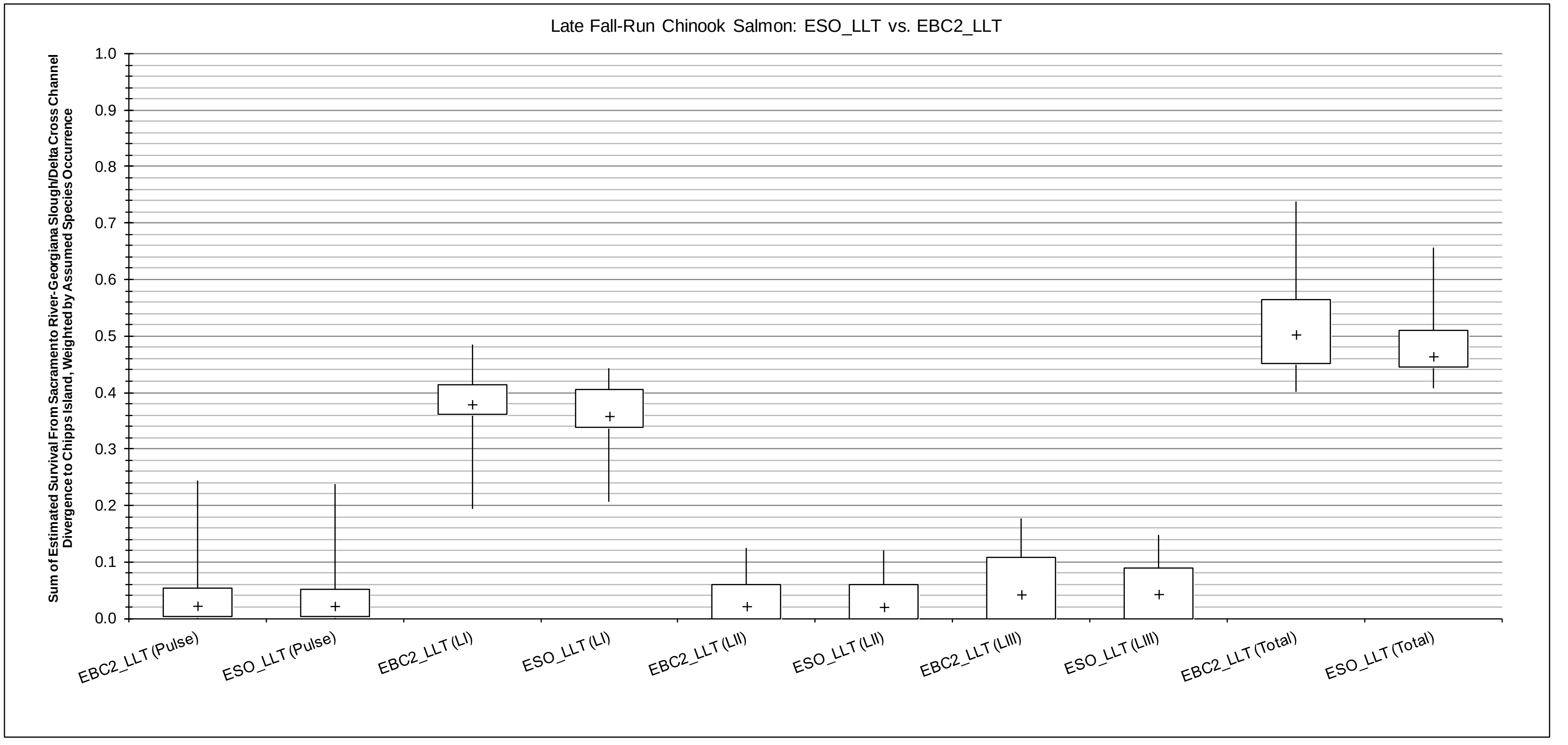
Pulse = pulse protection flow.

Figure 5C.5.3-94. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



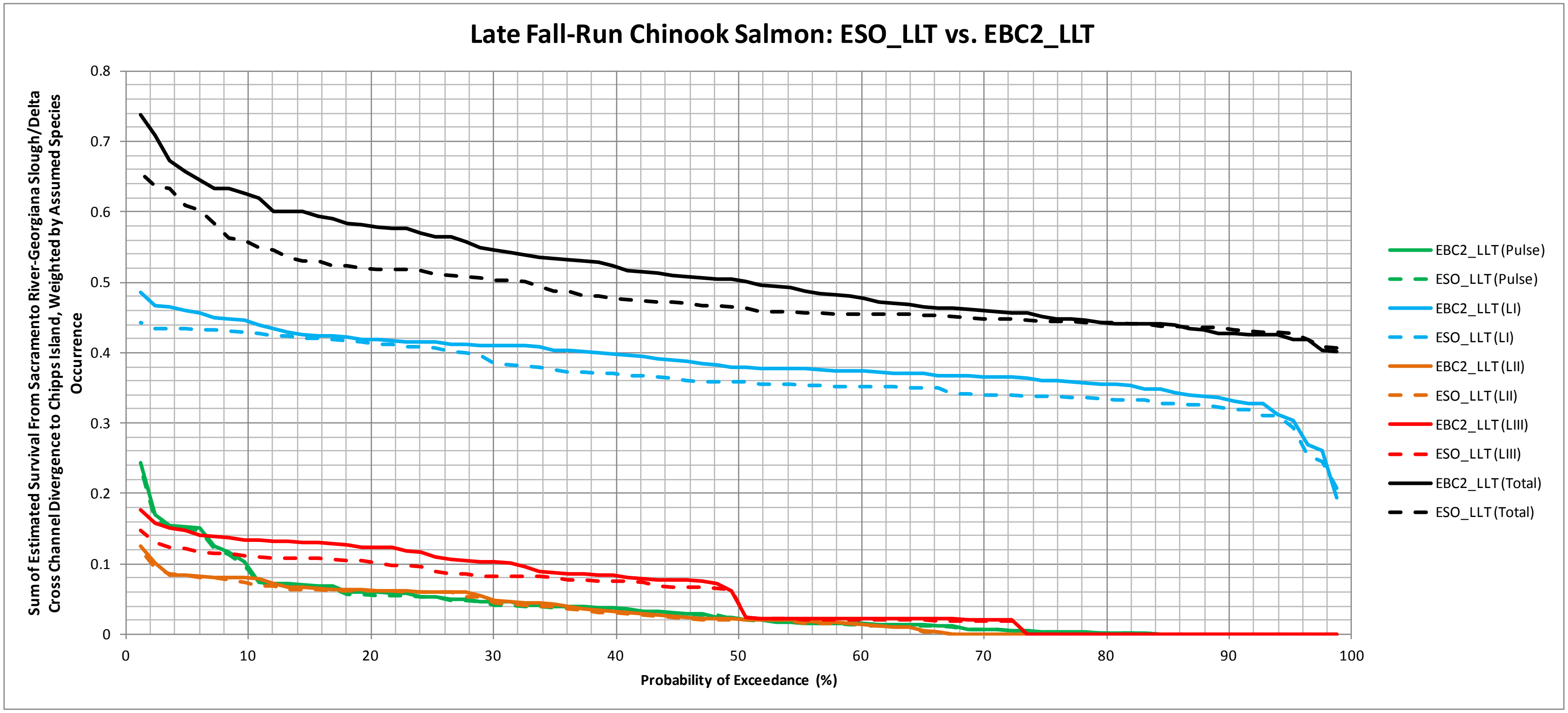
Pulse = pulse protection flow.

Figure 5C.5.3-95. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



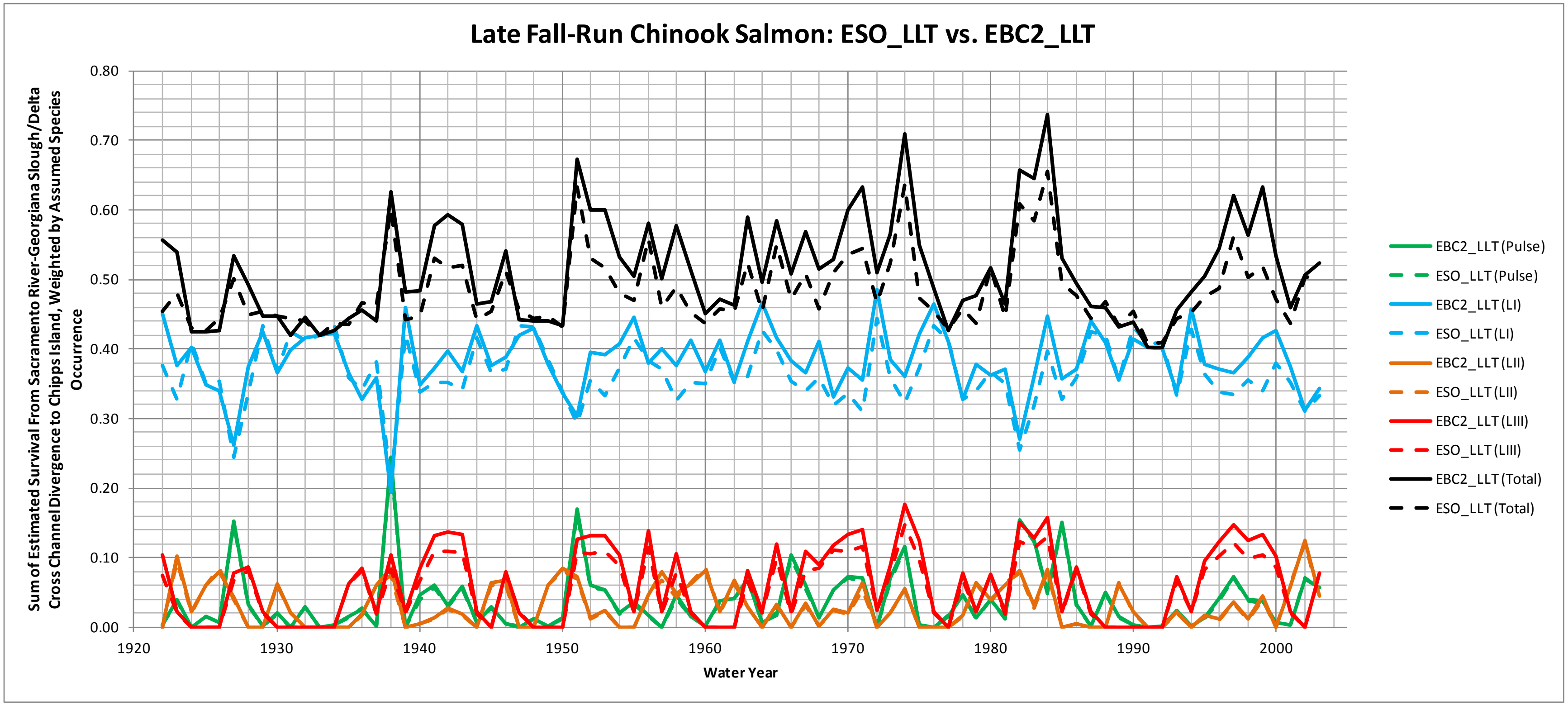
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-96. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



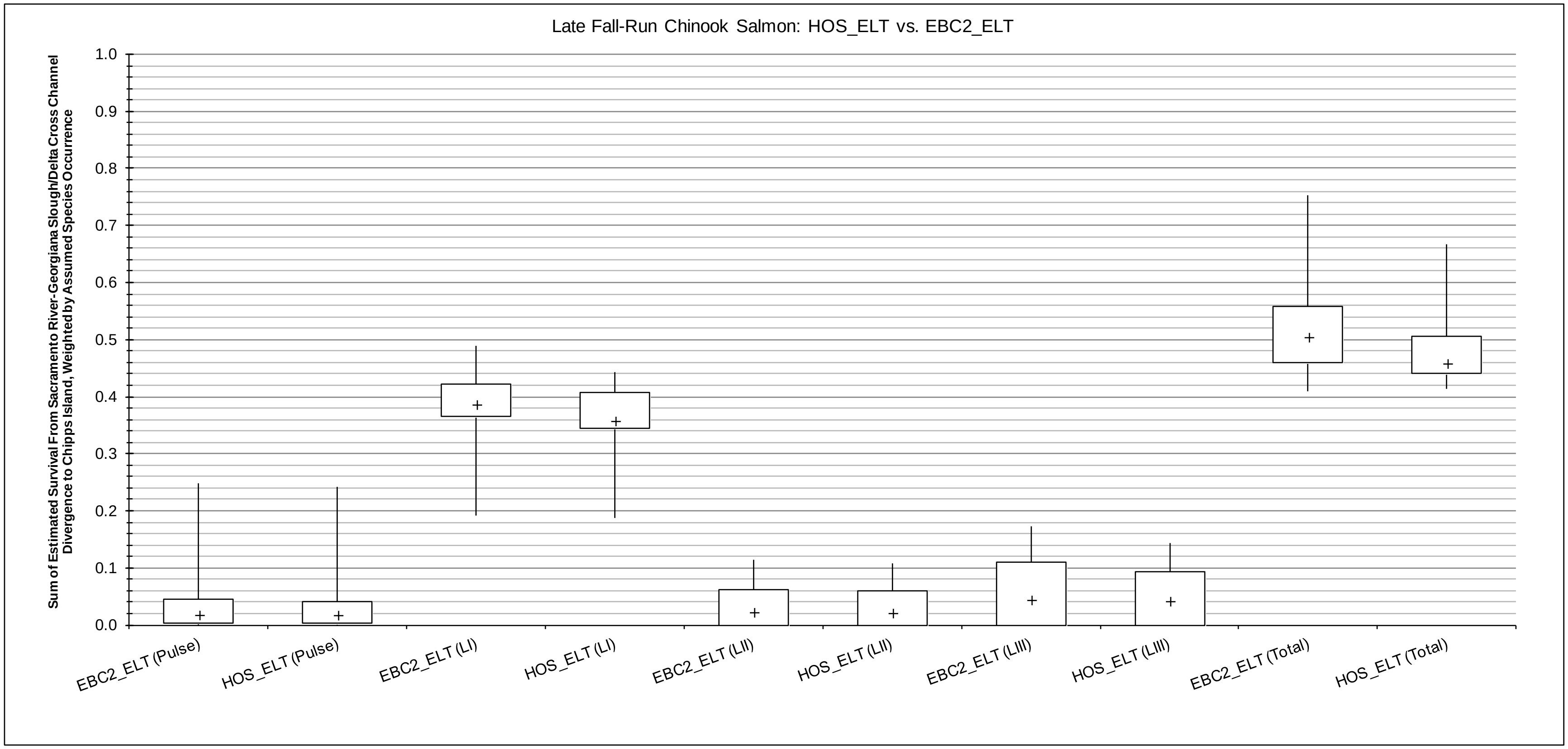
Pulse = pulse protection flow.

Figure 5C.5.3-97. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



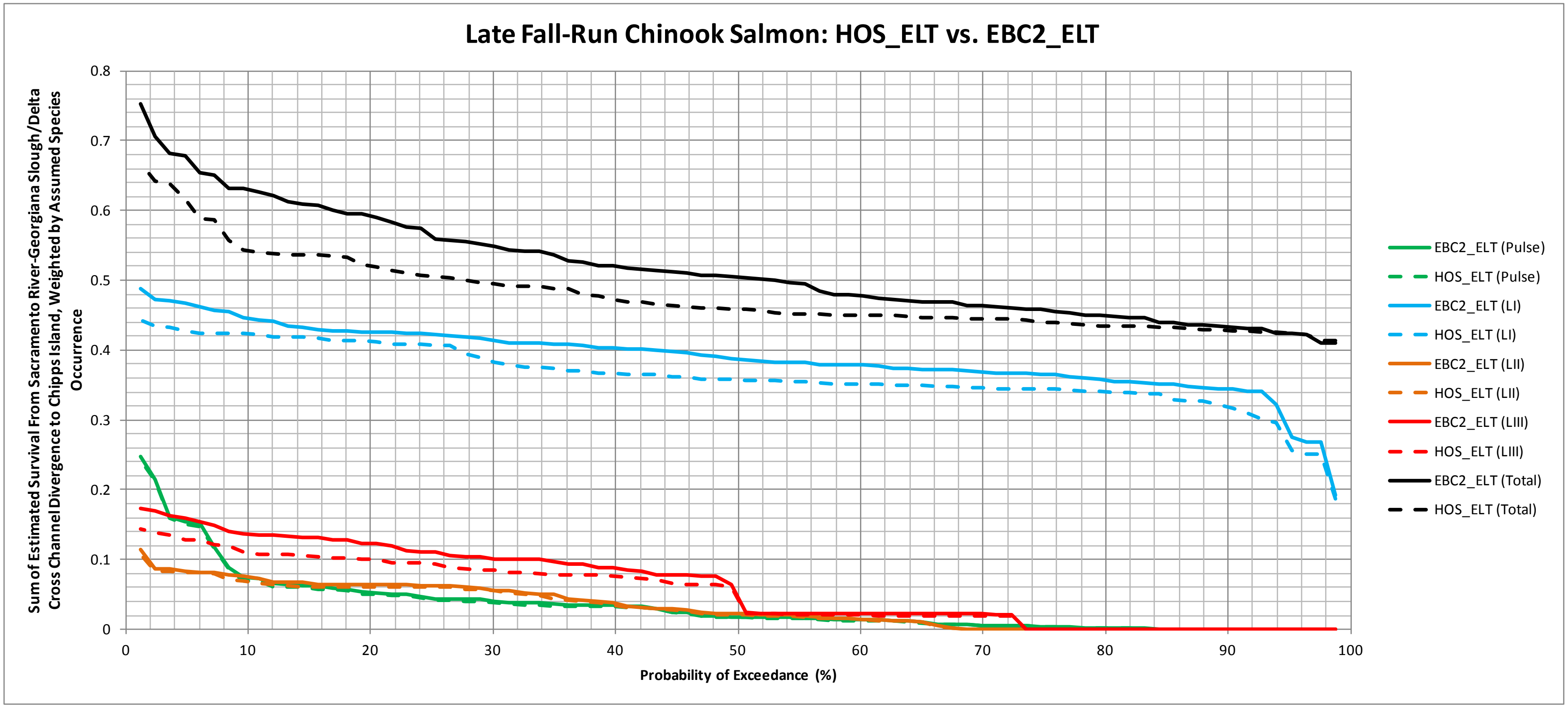
Pulse = pulse protection flow.

Figure 5C.5.3-98. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



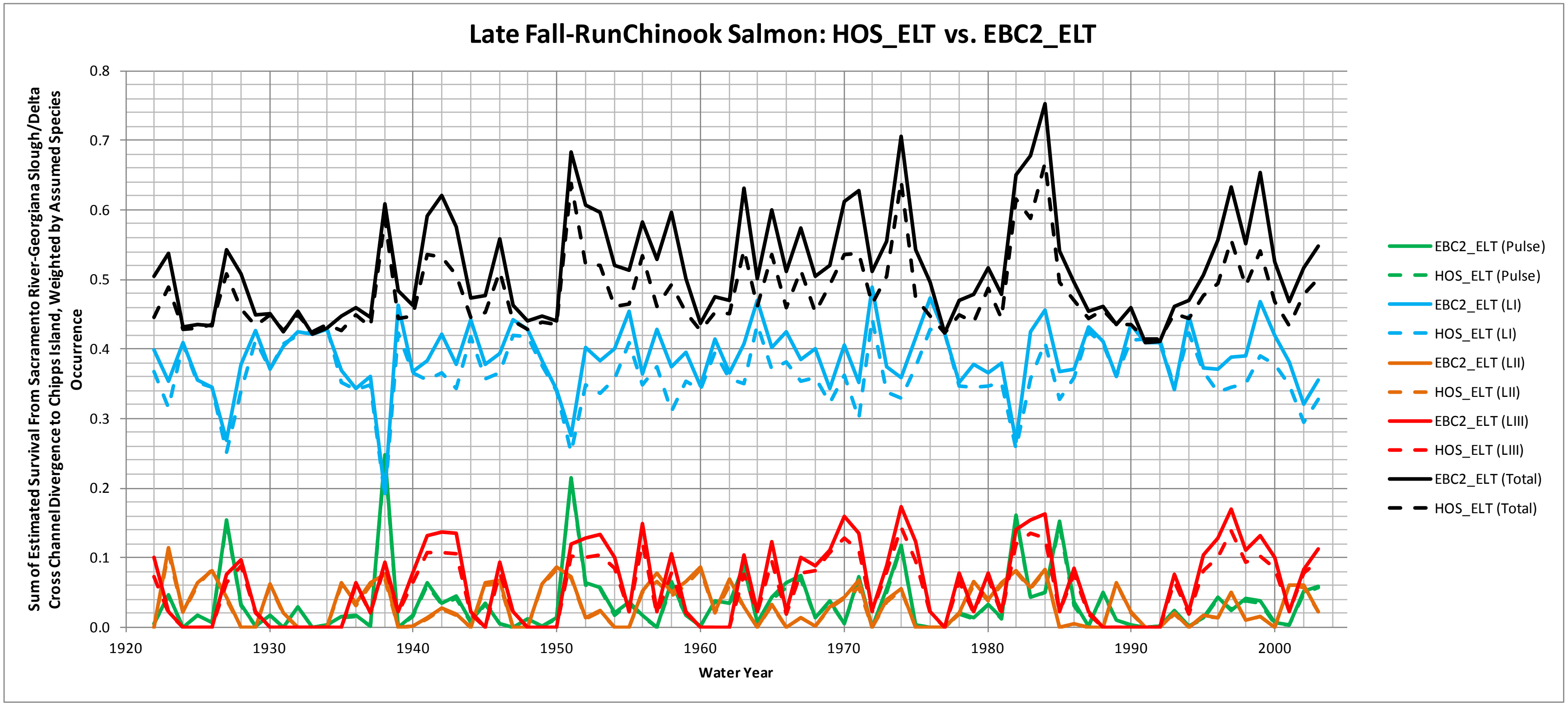
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-99. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



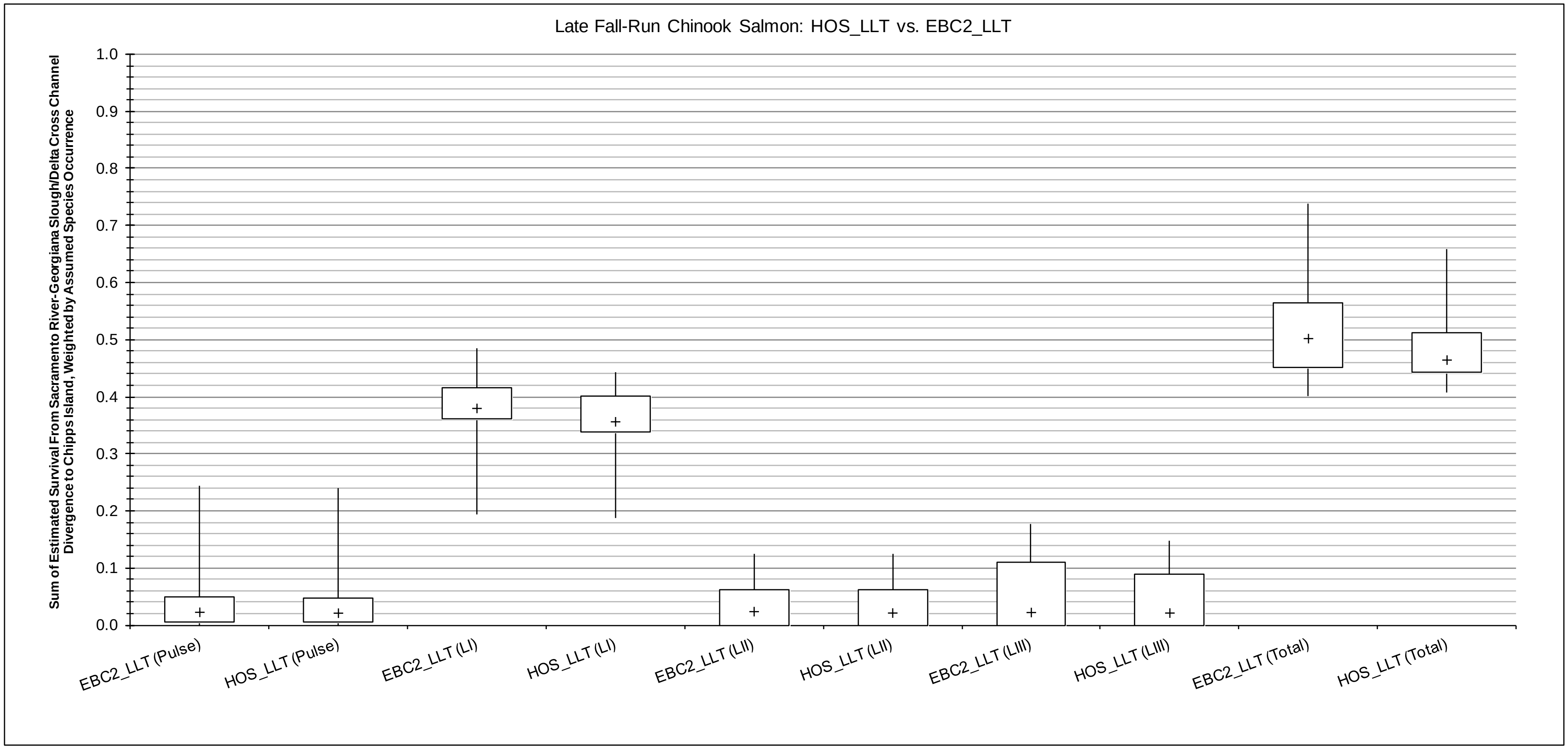
Pulse = pulse protection flow.

Figure 5C.5.3-100. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



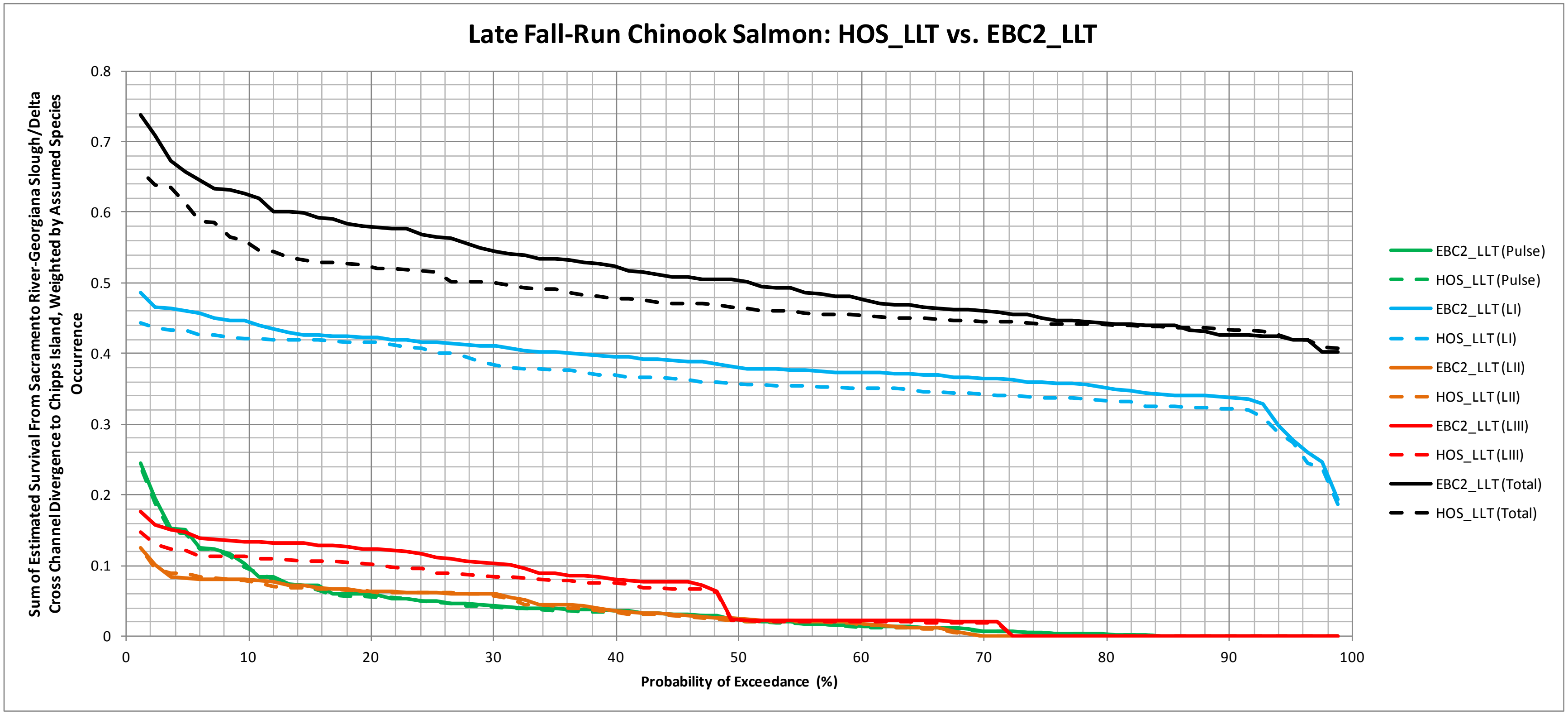
Pulse = pulse protection flow.

Figure 5C.5.3-101. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



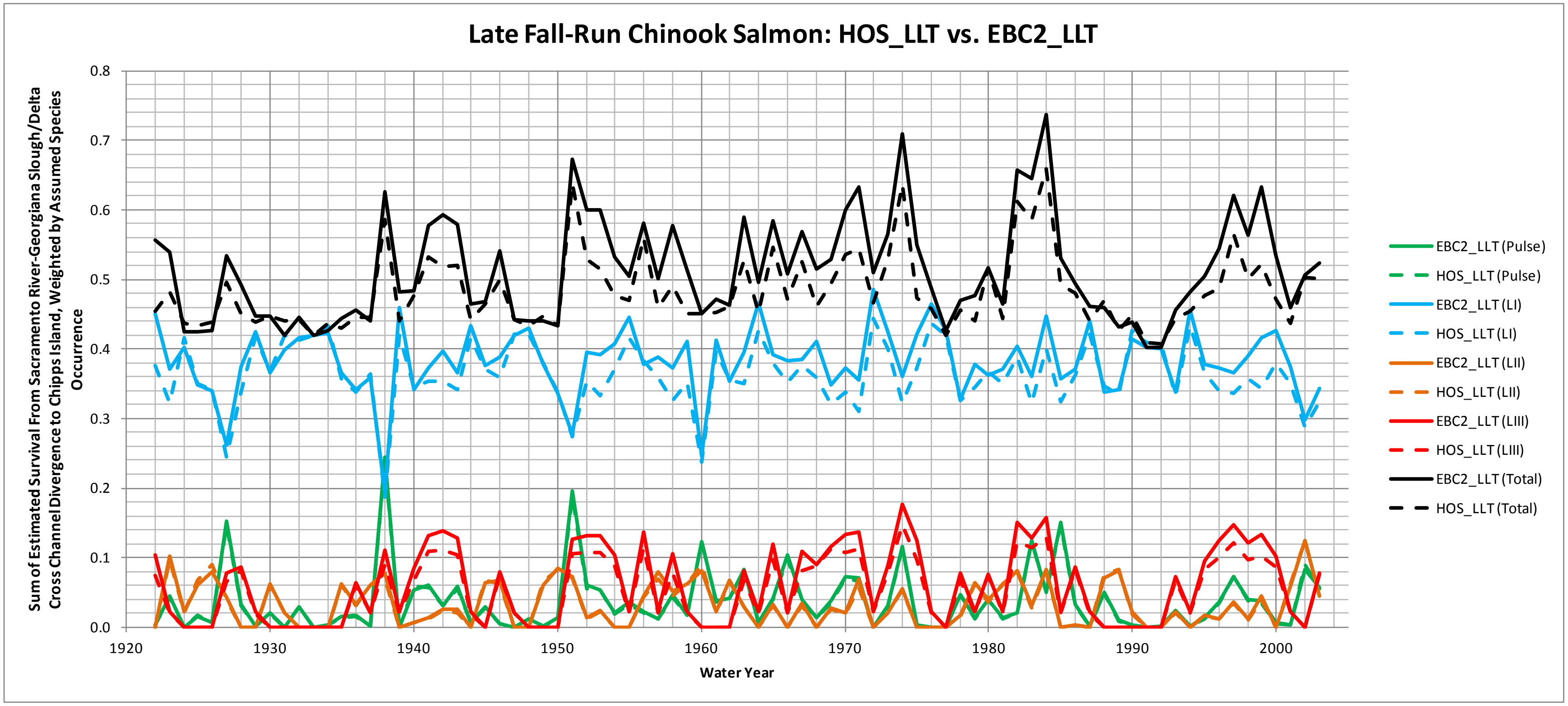
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-102. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-103. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-104. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Late Fall–Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

5C.5.3.6.1.5 December–June (Equal Weighting)

Results for the December–June period with equal daily weighting are presented below (Figure 5C.5.3-105, Figure 5C.5.3-106, Figure 5C.5.3-107, Figure 5C.5.3-108, Figure 5C.5.3-109, Figure 5C.5.3-110, Figure 5C.5.3-111, Figure 5C.5.3-112, Figure 5C.5.3-113, Figure 5C.5.3-114, Figure 5C.5.3-115, and Figure 5C.5.3-116; Table 5C.5.3-103, Table 5C.5.3-104, Table 5C.5.3-105, Table 5C.5.3-106, Table 5C.5.3-107, Table 5C.5.3-108, Table 5C.5.3-109, and Table 5C.5.3-110). For brevity, the results summary discussed below in the text focuses on survival under the BDCP scenarios as a percentage of survival under the EBC2 scenarios.

Pulse protection survival under ESO scenarios averaged around 95% that of EBC2 scenarios (median: 95%, range 75–110%). Level I survival under ESO scenarios averaged around 94% that of EBC2 scenarios (median: 94–95%, range 82–101%). Level II survival under ESO scenarios averaged around 94% that of EBC2 scenarios (median: 95%, range 83–99%). Level III survival under ESO scenarios averaged around 90–91% that of EBC2 scenarios (median: 90–91%, range 84–96%). Total survival under ESO scenarios averaged around 93–94% that of EBC2 scenarios (median: 94%, range 86–101%).

Pulse protection survival under HOS scenarios averaged around 95% that of EBC2 scenarios (median: 95–96%, range 76–104%). Level I survival under HOS scenarios averaged around 94% that of EBC2 scenarios (median: 95%, range 83–100%). Level II survival under HOS scenarios averaged around 95% that of EBC2 scenarios (median: 95%, range 84–108%). Level III survival under HOS scenarios averaged around 94% that of EBC2 scenarios (median: 93%, range 84–105%). Total survival under HOS scenarios averaged around 95% that of EBC2 scenarios (median: 95%, range 86–103%).

Table 5C.5.3-103. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	ESO_ELT (Pulse)	EBC2_ELT (LI)	ESO_ELT (LI)	EBC2_ELT (LII)	ESO_ELT (LII)	EBC2_ELT (LIII)	ESO_ELT (LIII)	EBC2_ELT (Total)	ESO_ELT (Total)
W	0.03	0.03	0.12	0.11	0.08	0.07	0.53	0.48	0.75	0.68
AN	0.03	0.03	0.16	0.15	0.10	0.09	0.38	0.34	0.66	0.61
BN	0.03	0.02	0.23	0.22	0.23	0.22	0.08	0.07	0.57	0.53
D	0.02	0.02	0.34	0.33	0.14	0.14	0.02	0.02	0.53	0.50
C	0.02	0.01	0.46	0.45	0.00	0.00	0.00	0.00	0.48	0.46
All	0.02	0.02	0.24	0.23	0.11	0.10	0.24	0.22	0.62	0.57

Table 5C.5.3-104. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_ELT (Pulse)	ESO_ELT (LI)	ESO_ELT (LII)	ESO_ELT (LIII)	ESO_ELT (Total)
Maximum	102%	99%	98%	95%	99%
75th Percentile	97%	97%	97%	92%	96%
Median	95%	94%	95%	90%	94%
25th Percentile	93%	92%	92%	88%	91%
Minimum	83%	82%	84%	84%	86%
W	95%	91%	94%	90%	91%
AN	95%	94%	93%	91%	92%
BN	94%	93%	93%	91%	94%
D	95%	95%	95%	90%	95%
C	95%	97%	–	–	97%
All	95%	94%	94%	90%	93%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-105. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	ESO_LLT (Pulse)	EBC2_LLT (LI)	ESO_LLT (LI)	EBC2_LLT (LII)	ESO_LLT (LII)	EBC2_LLT (LIII)	ESO_LLT (LIII)	EBC2_LLT (Total)	ESO_LLT (Total)
W	0.03	0.03	0.11	0.11	0.08	0.07	0.51	0.47	0.73	0.67
AN	0.03	0.03	0.17	0.16	0.09	0.08	0.37	0.34	0.66	0.61
BN	0.02	0.02	0.26	0.24	0.19	0.18	0.09	0.08	0.56	0.53
D	0.02	0.02	0.36	0.34	0.15	0.14	0.00	0.00	0.52	0.50
C	0.02	0.02	0.46	0.45	0.00	0.00	0.00	0.00	0.48	0.47
All	0.02	0.02	0.25	0.24	0.10	0.10	0.23	0.21	0.61	0.57

Table 5C.5.3-106. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with ESO_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	ESO_LLT (Pulse)	ESO_LLT (LI)	ESO_LLT (LII)	ESO_LLT (LIII)	ESO_LLT (Total)
Maximum	110%	101%	99%	96%	101%
75th Percentile	97%	97%	97%	93%	97%
Median	95%	95%	95%	91%	94%
25th Percentile	93%	92%	91%	89%	92%
Minimum	75%	83%	83%	86%	87%
W	94%	92%	94%	91%	91%
AN	94%	94%	94%	91%	92%
BN	95%	94%	92%	94%	94%
D	96%	95%	96%	–	96%
C	96%	98%	–	–	98%
All	95%	94%	94%	91%	94%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

Table 5C.5.3-107. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_ELT (Pulse)	HOS_ELT (Pulse)	EBC2_ELT (LI)	HOS_ELT (LI)	EBC2_ELT (LII)	HOS_ELT (LII)	EBC2_ELT (LIII)	HOS_ELT (LIII)	EBC2_ELT (Total)	HOS_ELT (Total)
W	0.03	0.03	0.12	0.11	0.07	0.07	0.53	0.50	0.75	0.70
AN	0.03	0.03	0.16	0.15	0.10	0.09	0.38	0.36	0.66	0.63
BN	0.03	0.03	0.25	0.24	0.21	0.20	0.08	0.08	0.57	0.55
D	0.02	0.02	0.36	0.34	0.13	0.12	0.02	0.02	0.53	0.50
C	0.01	0.01	0.46	0.45	0.00	0.00	0.00	0.00	0.48	0.46
All	0.02	0.02	0.25	0.24	0.10	0.10	0.24	0.23	0.62	0.58

Table 5C.5.3-108. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_ELT Scenarios Expressed as Percentage of EBC2_ELT, Based on Flow-Survival Relationship of Perry (2010)

Percentile or Water-Year Type Average	HOS_ELT (Pulse)	HOS_ELT (LI)	HOS_ELT (LII)	HOS_ELT (LIII)	HOS_ELT (Total)
Maximum	104%	100%	108%	105%	103%
75th Percentile	97%	97%	97%	98%	97%
Median	96%	95%	95%	93%	95%
25th Percentile	94%	92%	92%	90%	92%
Minimum	80%	86%	84%	84%	86%
W	96%	92%	94%	93%	93%
AN	95%	94%	93%	95%	94%
BN	94%	94%	96%	102%	97%
D	95%	95%	96%	92%	95%
C	96%	97%	–	–	97%
All	95%	94%	95%	94%	95%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.

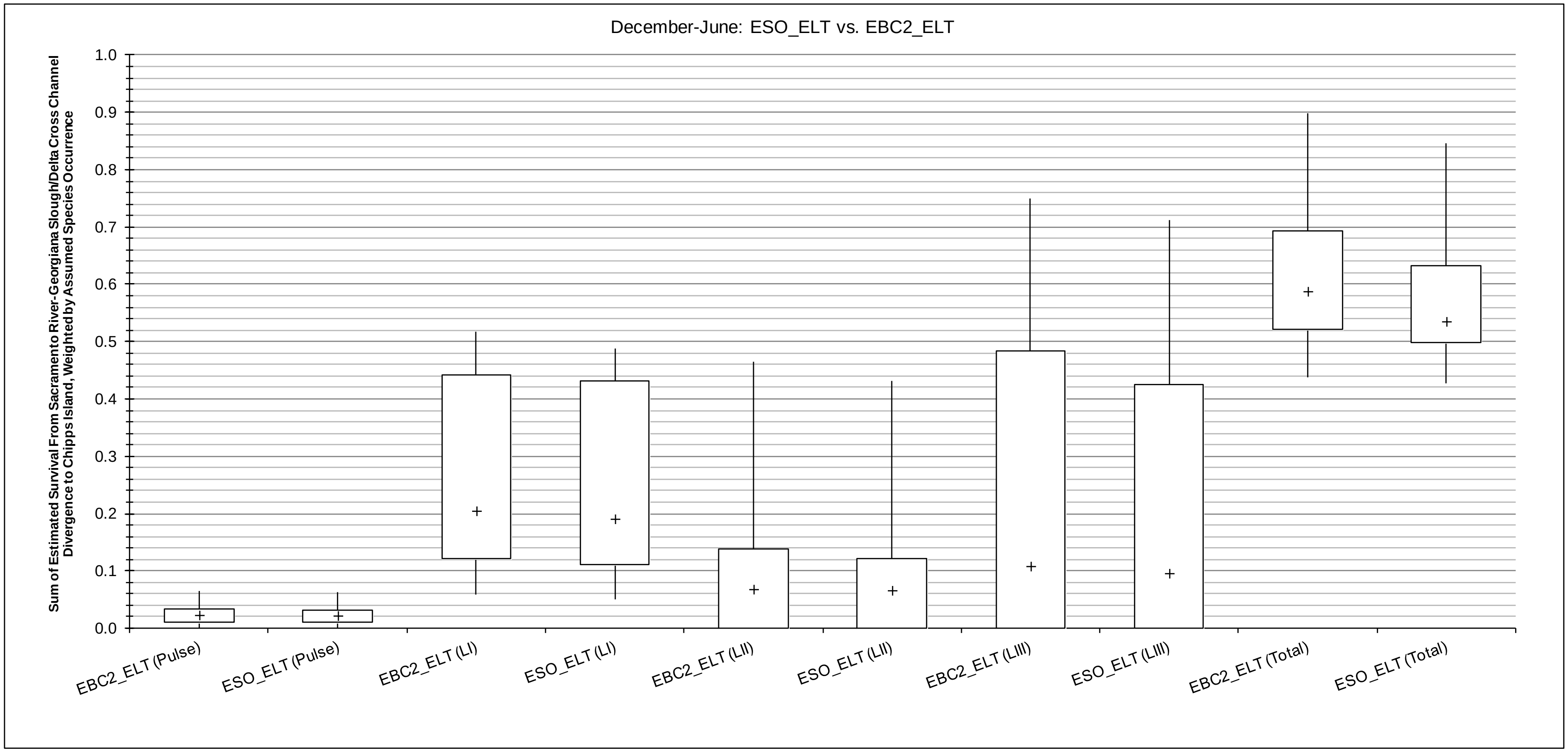
Table 5C.5.3-109. Water-Year-Average Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

Water-Year Type	EBC2_LLT (Pulse)	HOS_LLT (Pulse)	EBC2_LLT (LI)	HOS_LLT (LI)	EBC2_LLT (LII)	HOS_LLT (LII)	EBC2_LLT (LIII)	HOS_LLT (LIII)	EBC2_LLT (Total)	HOS_LLT (Total)
W	0.03	0.03	0.11	0.11	0.08	0.07	0.51	0.48	0.73	0.68
AN	0.03	0.03	0.17	0.16	0.09	0.08	0.37	0.35	0.66	0.62
BN	0.02	0.02	0.26	0.24	0.20	0.20	0.08	0.08	0.56	0.54
D	0.02	0.02	0.35	0.34	0.15	0.15	0.00	0.00	0.52	0.50
C	0.01	0.01	0.43	0.42	0.03	0.03	0.00	0.00	0.48	0.46
All	0.02	0.02	0.25	0.23	0.11	0.10	0.23	0.22	0.61	0.58

Table 5C.5.3-110. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 with HOS_LLT Scenarios Expressed as Percentage of EBC2_LLT, Based on Flow-Survival Relationship of Perry (2010)

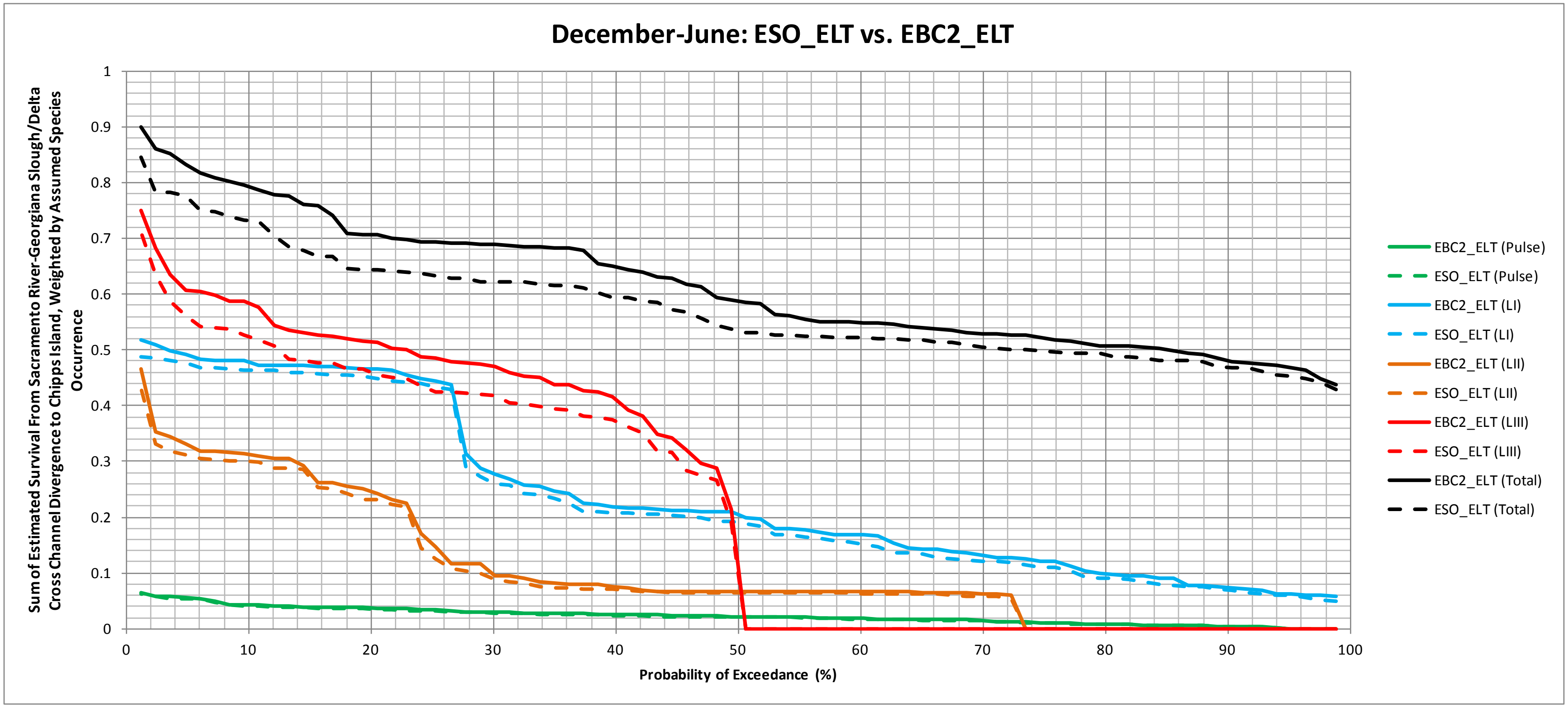
Percentile or Water-Year Type Average	HOS_LLT (Pulse)	HOS_LLT (LI)	HOS_LLT (LII)	HOS_LLT (LIII)	HOS_LLT (Total)
Maximum	102%	98%	108%	104%	102%
75th Percentile	97%	96%	97%	99%	97%
Median	95%	95%	95%	93%	95%
25th Percentile	93%	92%	92%	91%	92%
Minimum	76%	83%	84%	86%	87%
W	95%	92%	94%	94%	93%
AN	94%	93%	93%	94%	94%
BN	94%	94%	96%	100%	96%
D	95%	95%	96%	–	96%
C	95%	97%	98%	–	97%
All	95%	94%	95%	94%	95%

Note: Only Years in Which Particular Flow Levels Occurred Are Included in the Summary. '–' Indicates Computation That Was Not Possible Because A Flow Level Did Not Occur in a Given Water-Year Type.



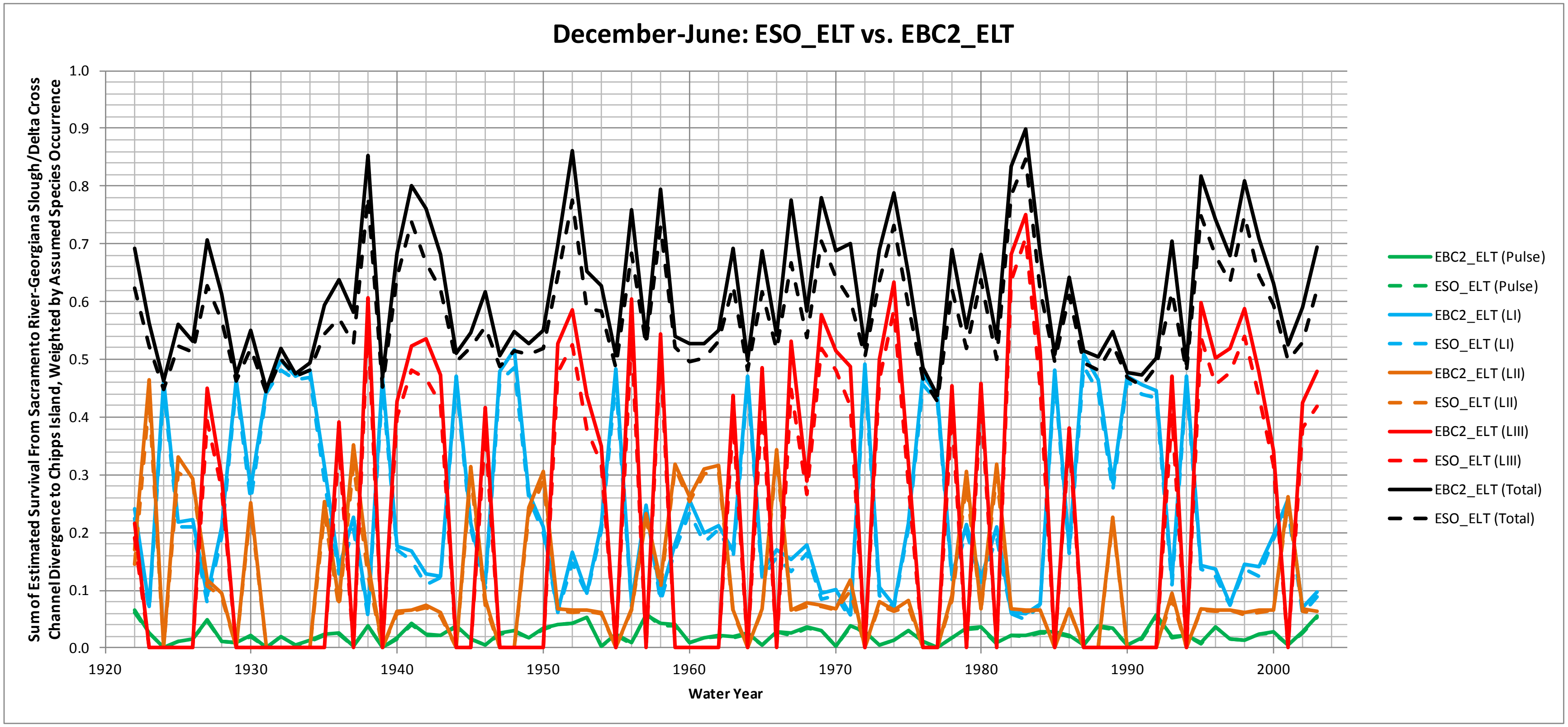
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-105. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



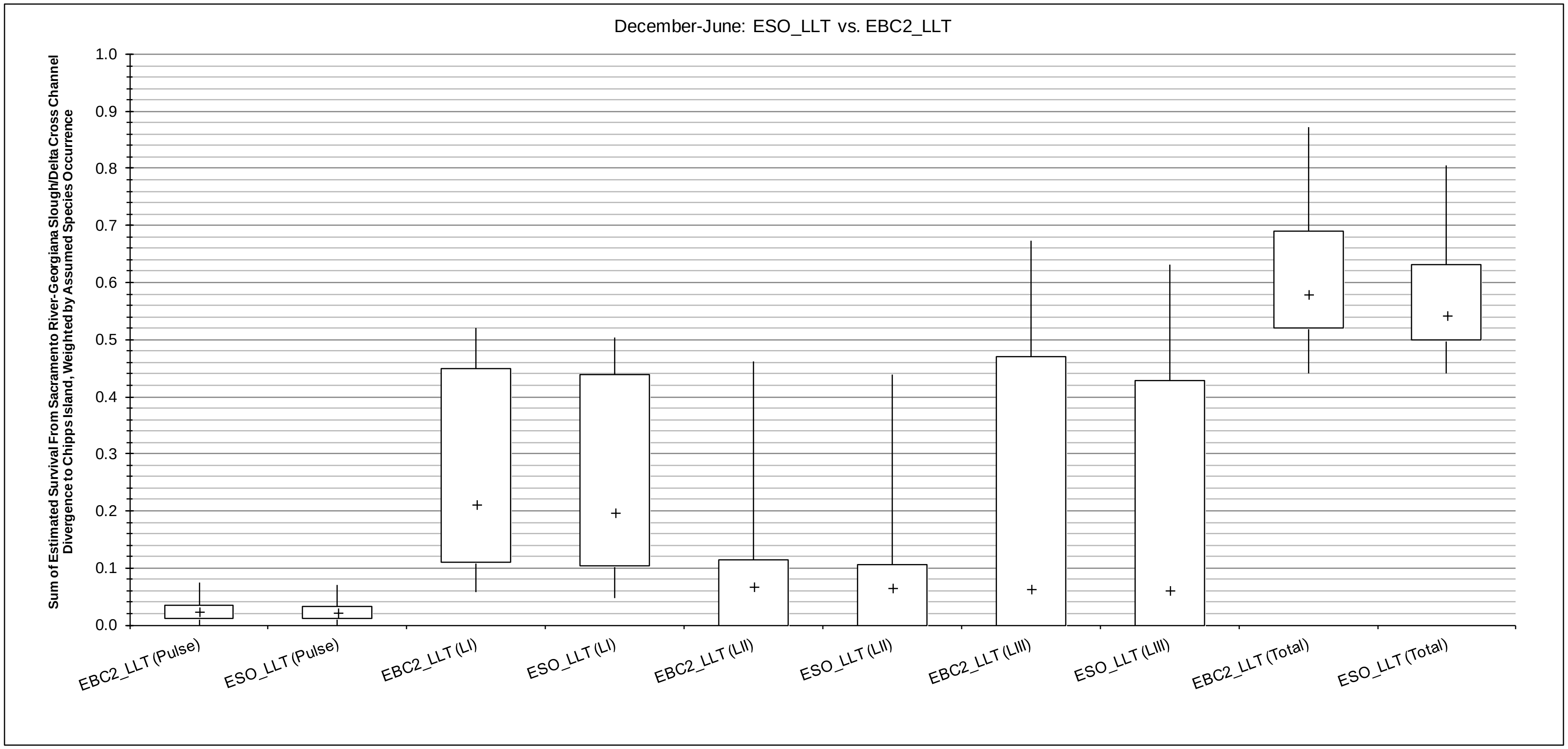
Pulse = pulse protection flow.

Figure 5C.5.3-106. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island Weighted by Species Occurrence for Winter-Run Chinook Salmon Smolts, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



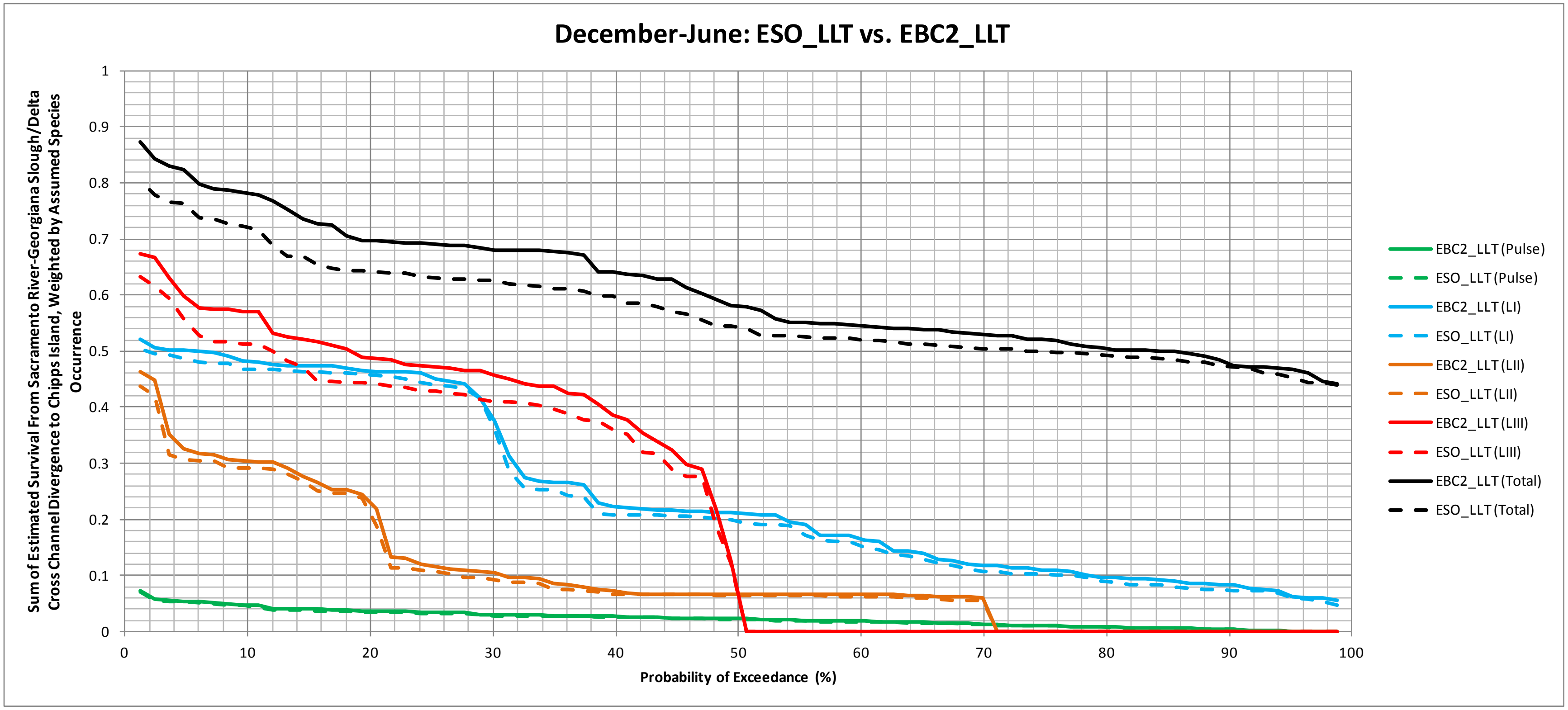
Pulse = pulse protection flow.

Figure 5C.5.3-107. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



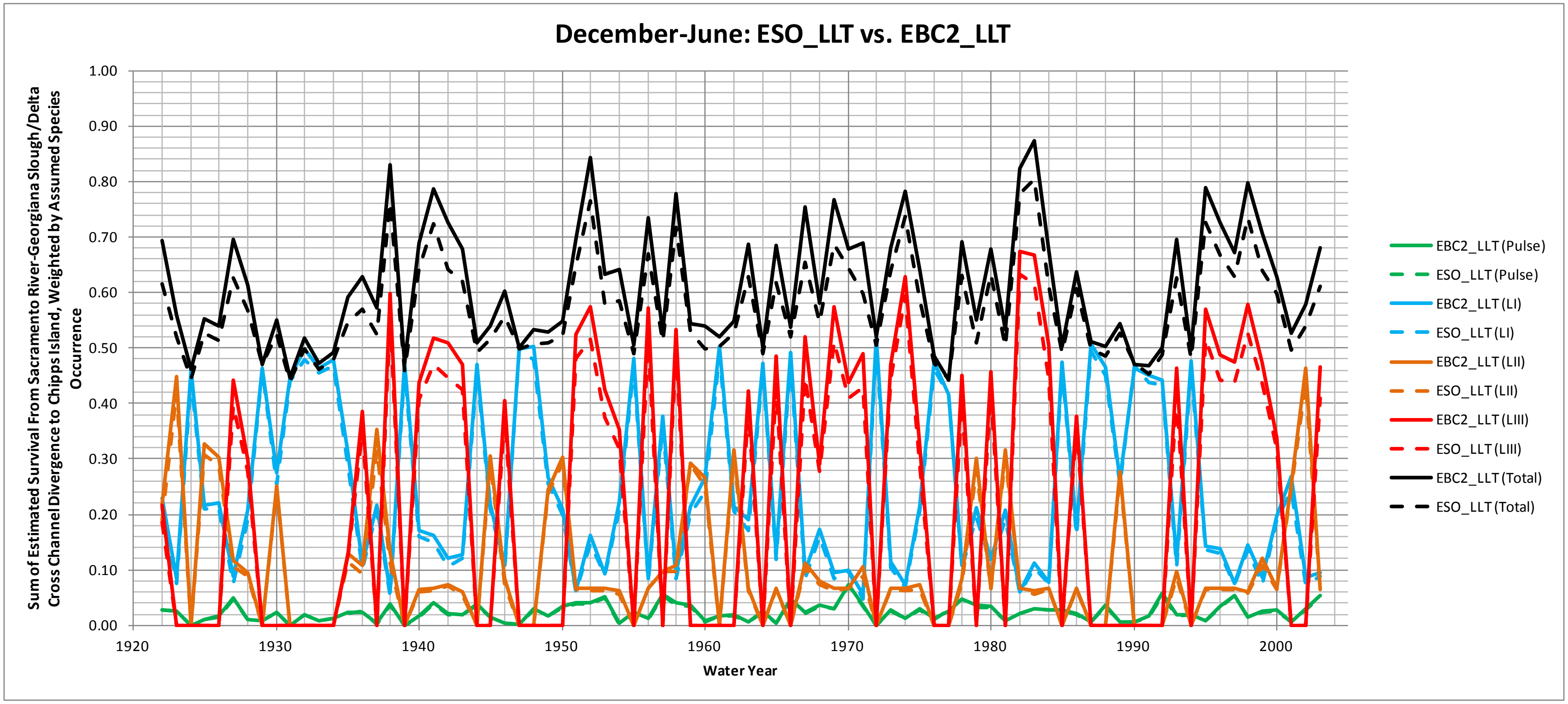
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-108. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



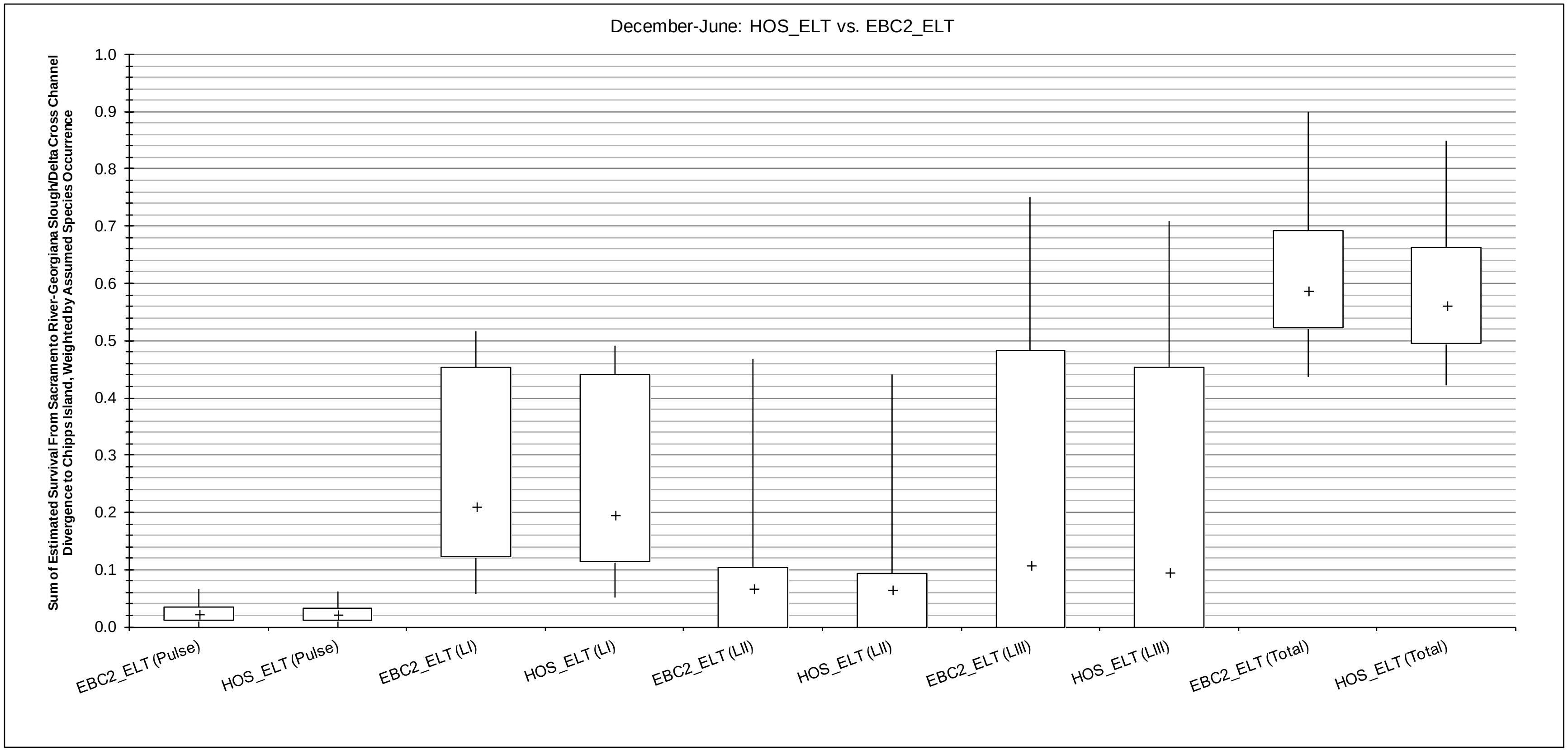
Pulse = pulse protection flow.

Figure 5C.5.3-109. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



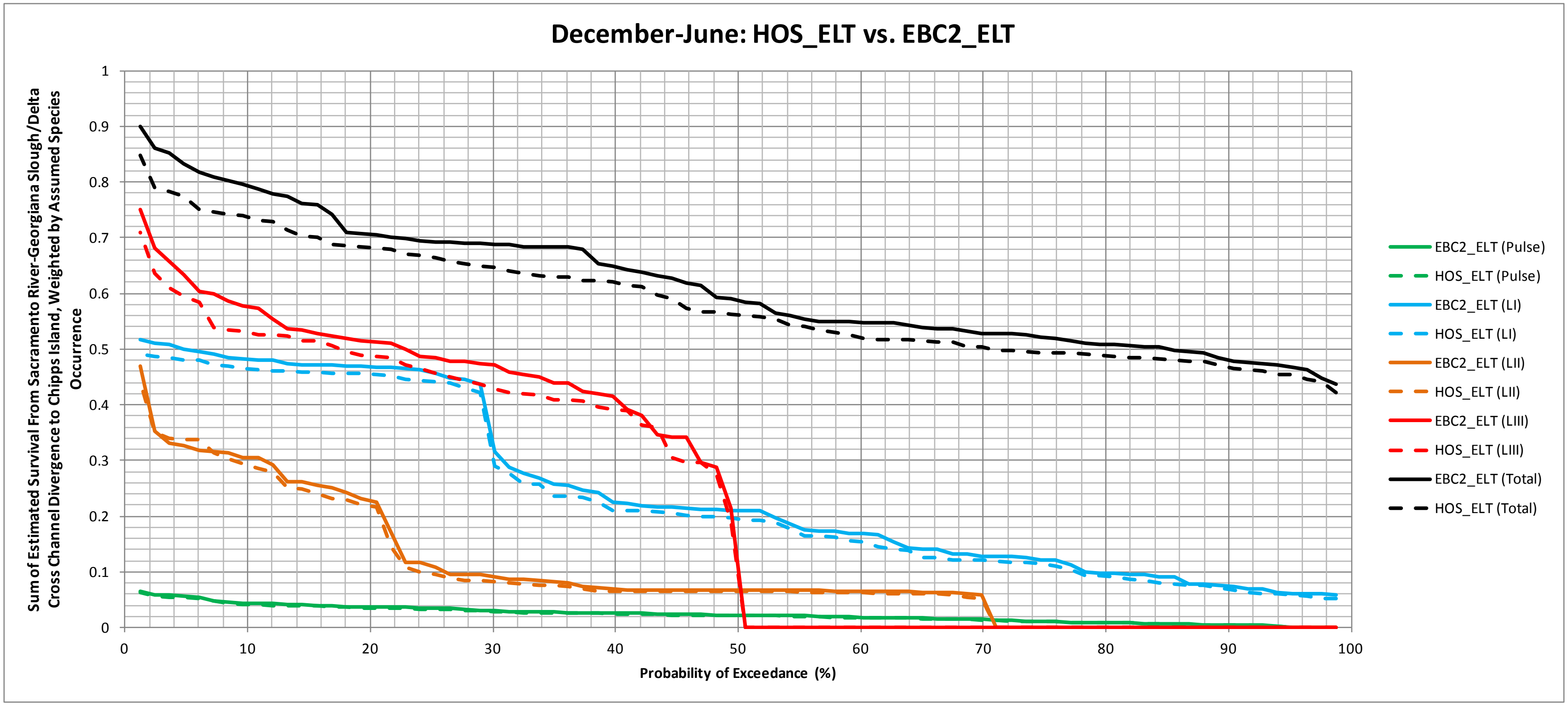
Pulse = pulse protection flow.

Figure 5C.5.3-110. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of ESO_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



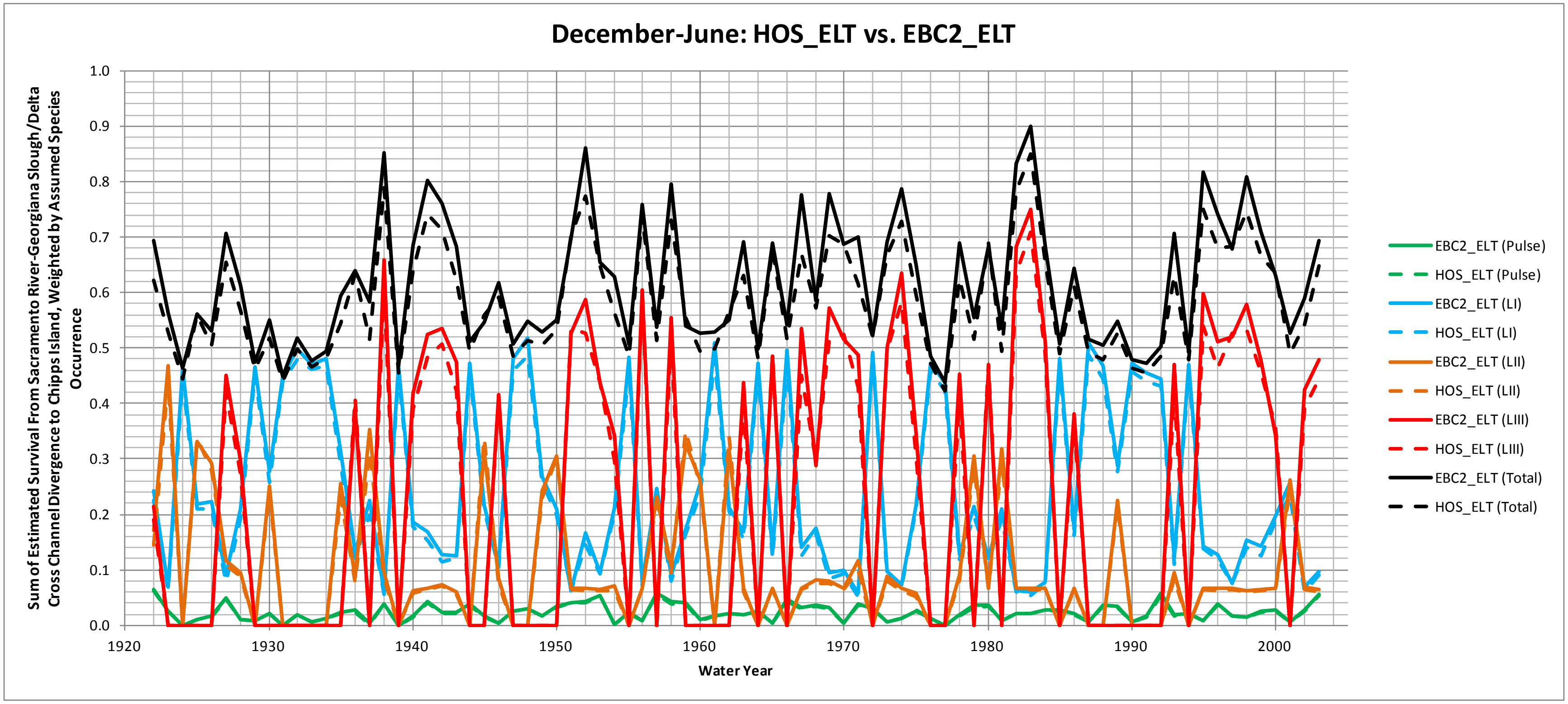
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-111. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



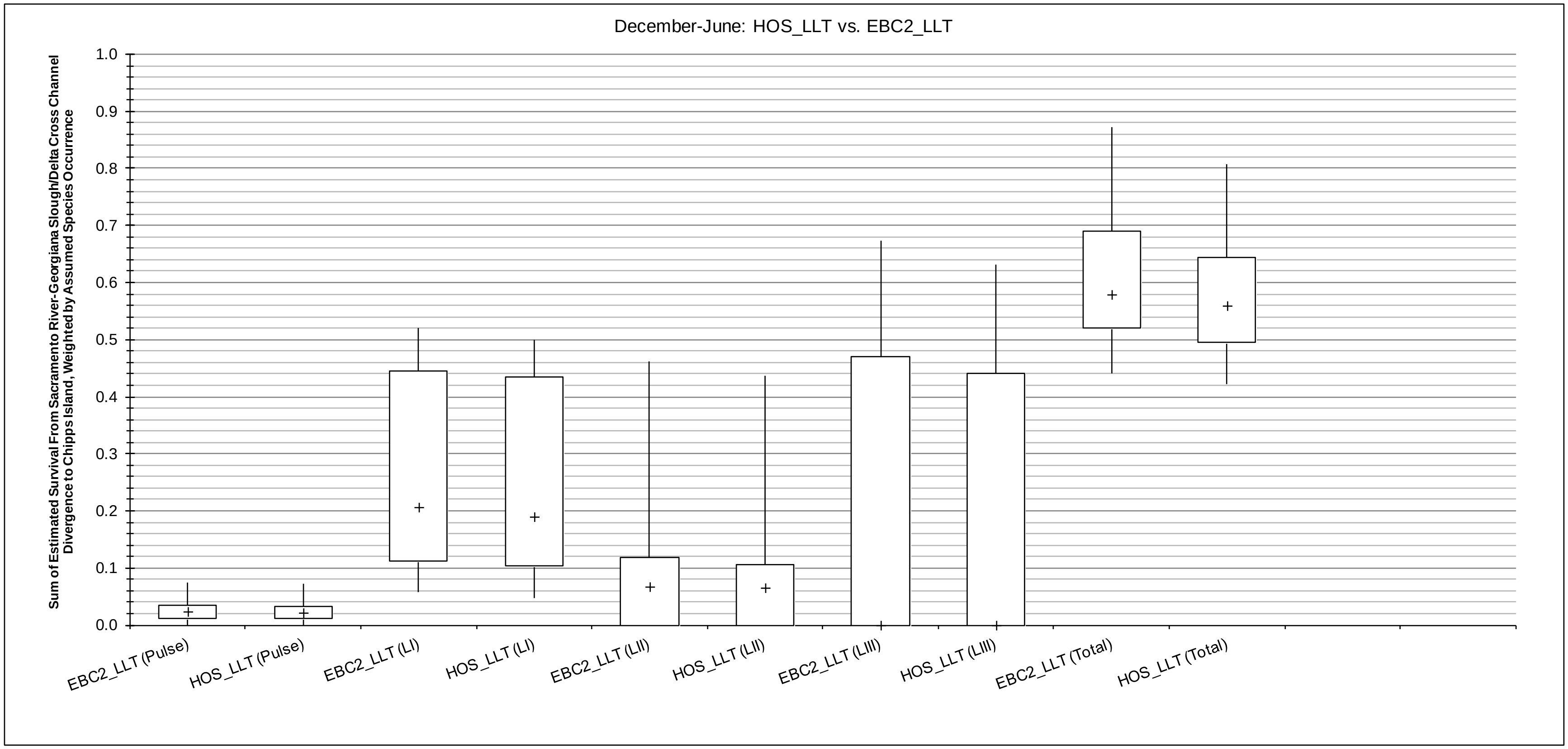
Pulse = pulse protection flow.

Figure 5C.5.3-112. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



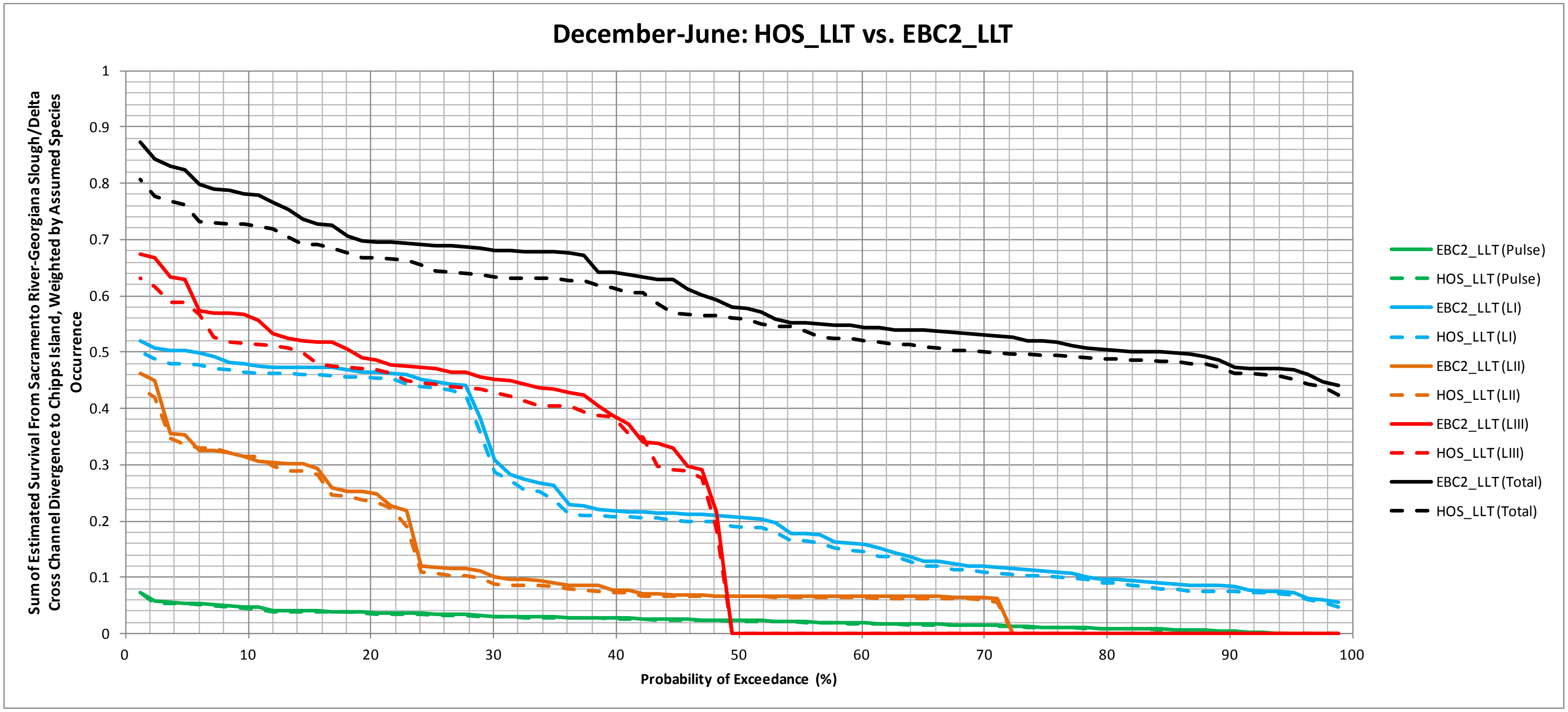
Pulse = pulse protection flow.

Figure 5C.5.3-113. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_ELT and EBC2_ELT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



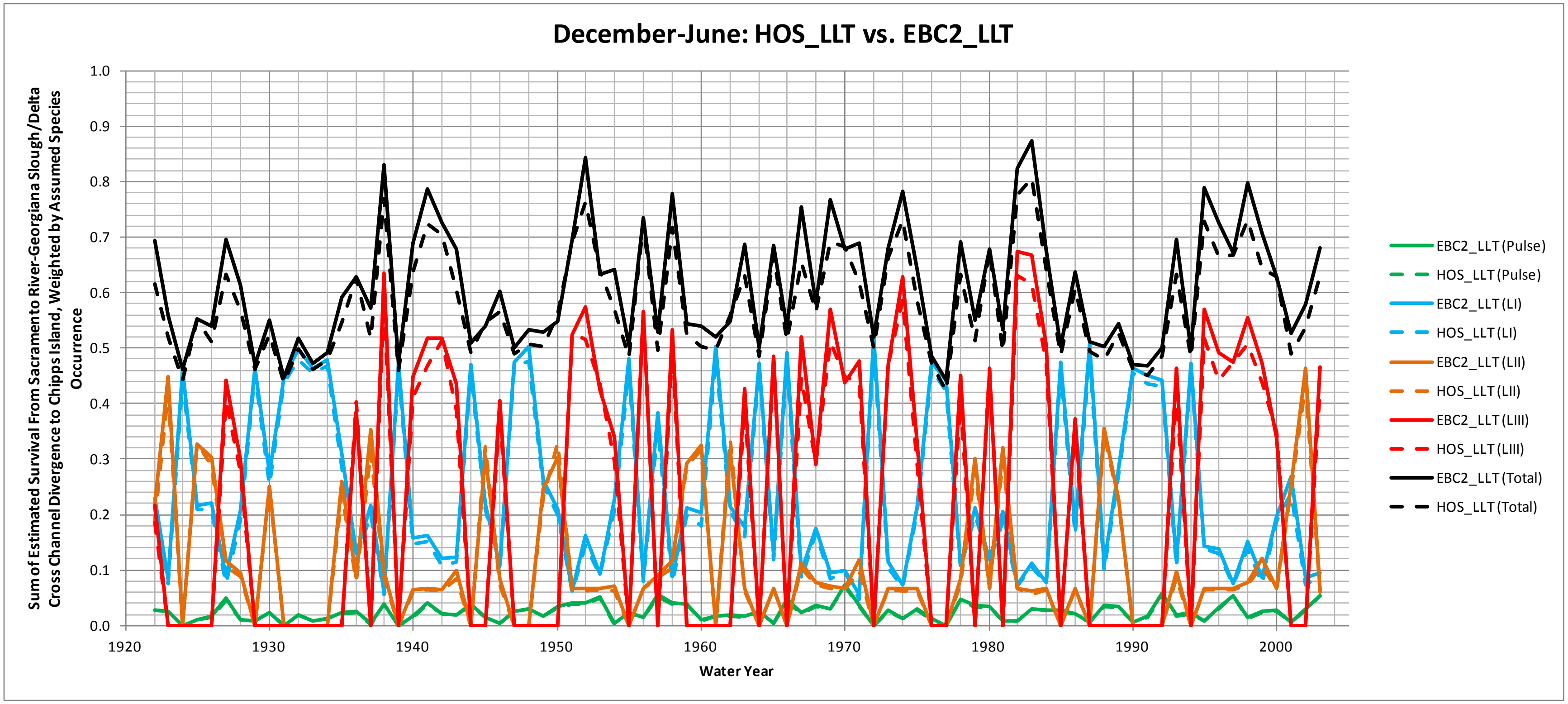
Box and whisker plot shows survival distribution across all modeled years. Median is marked with "+," upper and lower boundaries of the box indicate 75th and 25th percentiles, and upper and lower whiskers indicate maximum and minimum percentage survival. Pulse = pulse protection flow.

Figure 5C.5.3-114. Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-115. Exceedance Plot of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)



Pulse = pulse protection flow.

Figure 5C.5.3-116. Time Series of Survival from Sacramento River-Georgiana Slough/Delta Cross Channel Divergence to Chipps Island With Equal Daily Weighting for December-June, By North Delta Diversion Bypass Flow Level (Pulse Protection, Level I [LI], Level II [LII], and Level III [LIII]) for Water Years 1922–2003 of HOS_LLT and EBC2_LLT Scenarios, Based on Flow-Survival Relationship of Perry (2010)

5C.5.3.6.2 Survival Based on Newman (2003)

5C.5.3.6.2.1 Spring-Run Chinook Salmon

The analysis of estimated survival based on the coefficients from Newman (2003) illustrated that the assumed migration timing of spring-run Chinook salmon smolts generally fell within a single flow level category within each of the modeled water years (Table 5C.5.3-111, Table 5C.5.3-112, Table 5C.5.3-113, and Table 5C.5.3-114). Therefore the results for total survival in a given water year generally were the same or very similar to the survival provided under the particular pulse flow level during which migration had occurred. There was little overlap of the assumed migration period with pulse protection flows, resulting in minimal or zero survival values during that period. Level I and Level III survival made the most frequent major contributions to total survival (6–7 of 16 years), whereas Level II survival constituted the bulk of survival in 3–4 years. In general, survival within each water year under each flow level for the ESO scenarios was similar to or slightly lower than the corresponding EBC2 scenarios (Table 5C.5.3-111 and Table 5C.5.3-112). The greatest difference occurred during Level I pumping in the ELT, where survival under the ESO_LLT was around 0.05 lower (~9% lower in relative terms) than under EBC2_LLT. Survival for the HOS scenarios under Level I and II pumping was similar to or slightly lower than under the corresponding EBC2 scenarios, whereas for Level III pumping survival in the above normal or wet water years of 1980 and 1984 was considerably greater under the HOS scenarios than under the EBC2 scenarios (~0.11–0.19, or a relative difference of ~14–30%) (Table 5C.5.3-113 and Table 5C.5.3-114).

Table 5C.5.3-111. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts under EBC2_ELT and ESO_ELT Scenarios, from Modeling Based on Newman (2003), by North Delta Bypass Flow Level

Water Year	Pulse Protection		Level I		Level II		Level III		Total	
	EBC2_ELT	ESO_ELT	EBC2_ELT	ESO_ELT	EBC2_ELT	ESO_ELT	EBC2_ELT	ESO_ELT	EBC2_ELT	ESO_ELT
1976 (C)	0.01	0.01	0.60	0.56	0.00	0.00	0.00	0.00	0.60	0.57
1977 (C)	0.00	0.00	0.55	0.55	0.00	0.00	0.00	0.00	0.55	0.55
1978 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.90	0.87	0.90	0.87
1979 (BN)	0.00	0.00	0.01	0.01	0.71	0.70	0.00	0.00	0.72	0.71
1980 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.78	0.72	0.78	0.72
1981 (D)	0.00	0.00	0.00	0.00	0.63	0.61	0.00	0.00	0.63	0.61
1982 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.97	0.97	0.97
1983 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.99	0.98	0.99
1984 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.70	0.66	0.70	0.66
1985 (D)	0.00	0.00	0.70	0.69	0.00	0.00	0.00	0.00	0.70	0.69
1986 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.72	0.74	0.72
1987 (D)	0.00	0.00	0.63	0.61	0.00	0.00	0.00	0.00	0.63	0.61
1988 (C)	0.00	0.00	0.63	0.62	0.00	0.00	0.00	0.00	0.63	0.62
1989 (D)	0.05	0.05	0.22	0.22	0.53	0.52	0.00	0.00	0.80	0.78
1990 (C)	0.00	0.00	0.59	0.58	0.00	0.00	0.00	0.00	0.59	0.58
1991 (C)	0.01	0.01	0.63	0.60	0.00	0.00	0.00	0.00	0.64	0.61
Average	0.00	0.00	0.28	0.28	0.12	0.11	0.32	0.31	0.72	0.70
Median	0.00	0.00	0.11	0.11	0.00	0.00	0.00	0.00	0.70	0.67

Table 5C.5.3-112. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts under EBC2_LLT and ESO_LLT Scenarios, from Modeling Based on Newman (2003), by North Delta Bypass Flow Level

	Pulse Protection		Level I		Level II		Level III		Total	
Water Year	EBC2_LLT	ESO_LLT	EBC2_LLT	ESO_LLT	EBC2_LLT	ESO_LLT	EBC2_LLT	ESO_LLT	EBC2_LLT	ESO_LLT
1976 (C)	0.01	0.01	0.63	0.60	0.00	0.00	0.00	0.00	0.63	0.61
1977 (C)	0.00	0.00	0.46	0.46	0.00	0.00	0.00	0.00	0.46	0.46
1978 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.82	0.86	0.82
1979 (BN)	0.00	0.00	0.01	0.01	0.62	0.59	0.00	0.00	0.62	0.59
1980 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.69	0.64	0.69	0.64
1981 (D)	0.00	0.00	0.00	0.00	0.58	0.57	0.00	0.00	0.58	0.57
1982 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.95	0.96	0.95
1983 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.98	0.97	0.98
1984 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.57	0.60	0.57
1985 (D)	0.00	0.00	0.55	0.54	0.00	0.00	0.00	0.00	0.55	0.54
1986 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.65	0.62	0.66	0.63
1987 (D)	0.00	0.00	0.50	0.54	0.00	0.00	0.00	0.00	0.50	0.54
1988 (C)	0.00	0.00	0.51	0.51	0.00	0.00	0.00	0.00	0.51	0.51
1989 (D)	0.00	0.00	0.09	0.09	0.67	0.68	0.00	0.00	0.76	0.76
1990 (C)	0.00	0.00	0.49	0.50	0.00	0.00	0.00	0.00	0.49	0.50
1991 (C)	0.01	0.01	0.58	0.53	0.00	0.00	0.00	0.00	0.59	0.55
Average	0.00	0.00	0.24	0.24	0.12	0.11	0.30	0.29	0.65	0.64
Median	0.00	0.00	0.05	0.05	0.00	0.00	0.00	0.00	0.61	0.58

Table 5C.5.3-113. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts under EBC2_ELT and HOS_ELT Scenarios, from Modeling Based on Newman (2003), by North Delta Bypass Flow Level

	Pulse Protection		Level I		Level II		Level III		Total	
Water Year	EBC2_ELT	HOS_ELT	EBC2_ELT	HOS_ELT	EBC2_ELT	HOS_ELT	EBC2_ELT	HOS_ELT	EBC2_ELT	HOS_ELT
1976 (C)	0.01	0.01	0.59	0.56	0.00	0.00	0.00	0.00	0.60	0.57
1977 (C)	0.00	0.00	0.55	0.54	0.00	0.00	0.00	0.00	0.55	0.54
1978 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.88	0.85	0.88	0.85
1979 (BN)	0.00	0.00	0.01	0.01	0.71	0.68	0.00	0.00	0.71	0.69
1980 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.92	0.81	0.92
1981 (D)	0.00	0.00	0.00	0.00	0.62	0.60	0.00	0.00	0.62	0.60
1982 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.97	0.96	0.97	0.96
1983 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.98	0.99	0.98	0.99
1984 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.90	0.74	0.90
1985 (D)	0.00	0.00	0.69	0.68	0.00	0.00	0.00	0.00	0.69	0.68
1986 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.72	0.73	0.72
1987 (D)	0.00	0.00	0.63	0.61	0.00	0.00	0.00	0.00	0.63	0.61
1988 (C)	0.00	0.00	0.63	0.62	0.00	0.00	0.00	0.00	0.63	0.62
1989 (D)	0.05	0.05	0.22	0.21	0.53	0.51	0.00	0.00	0.79	0.77
1990 (C)	0.00	0.00	0.58	0.58	0.00	0.00	0.00	0.00	0.58	0.58
1991 (C)	0.01	0.01	0.63	0.60	0.00	0.00	0.00	0.00	0.64	0.61
Average	0.00	0.00	0.28	0.28	0.12	0.11	0.32	0.33	0.72	0.73
Median	0.00	0.00	0.11	0.11	0.00	0.00	0.00	0.00	0.70	0.69

Table 5C.5.3-114. Proportional through-Delta Survival of Spring-Run Chinook Salmon Smolts under EBC2_LLT and HOS_LLT Scenarios, from Modeling Based on Newman (2003), by North Delta Bypass Flow Level

Water Year	Pulse Protection		Level I		Level II		Level III		Total	
	EBC2_LLT	HOS_LLT	EBC2_LLT	HOS_LLT	EBC2_LLT	HOS_LLT	EBC2_LLT	HOS_LLT	EBC2_LLT	HOS_LLT
1976 (C)	0.01	0.01	0.62	0.59	0.00	0.00	0.00	0.00	0.62	0.60
1977 (C)	0.00	0.00	0.46	0.46	0.00	0.00	0.00	0.00	0.46	0.46
1978 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.83	0.80	0.83	0.80
1979 (BN)	0.00	0.00	0.01	0.01	0.61	0.59	0.00	0.00	0.61	0.60
1980 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.73	0.87	0.73	0.87
1981 (D)	0.00	0.00	0.00	0.00	0.57	0.55	0.00	0.00	0.57	0.55
1982 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.95	0.94	0.95	0.94
1983 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.96	0.98	0.96	0.98
1984 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.83	0.64	0.83
1985 (D)	0.00	0.00	0.55	0.55	0.00	0.00	0.00	0.00	0.55	0.55
1986 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.64	0.63	0.64	0.63
1987 (D)	0.00	0.00	0.51	0.54	0.00	0.00	0.00	0.00	0.51	0.54
1988 (C)	0.00	0.00	0.00	0.00	0.51	0.51	0.00	0.00	0.51	0.51
1989 (D)	0.05	0.05	0.22	0.21	0.50	0.50	0.00	0.00	0.76	0.76
1990 (C)	0.00	0.00	0.49	0.50	0.00	0.00	0.00	0.00	0.49	0.50
1991 (C)	0.01	0.01	0.57	0.53	0.00	0.00	0.00	0.00	0.59	0.55
Average	0.00	0.00	0.21	0.21	0.14	0.13	0.30	0.32	0.65	0.67
Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.60

5C.5.3.6.2.2 Fall-Run Chinook Salmon

As with spring-run Chinook salmon, the analysis of estimated survival based on the coefficients from Newman (2003) illustrated that the assumed migration timing of fall-run Chinook salmon smolts generally fell within a single flow level category within each of the modeled water years (Table 5C.5.3-115, Table 5C.5.3-116, Table 5C.5.3-117, and Table 5C.5.3-118). Survival was zero during pulse protection flows, reflecting the spring timing of the migration period occurring after pulse protection flows would have finished. Level I survival made the most frequent major contributions to total survival (7 of 16 years), followed by level III survival (6 of 16 years). Level II survival constituted the bulk of survival in 3–4 years. In general, survival within each water year under each flow level for the ESO scenarios was similar to or slightly lower than the survival under the EBC2 scenarios, although there were also a number of comparisons in which survival under ESO scenarios was slightly higher relative to EBC2 scenarios (Table 5C.5.3-115 and Table 5C.5.3-116). The greatest difference occurred during Level III pumping in the ELT, where ESO_LLT survival was around 0.06 lower (~11% lower in relative terms) than under EBC2_LLT. Survival for the HOS scenarios under Level I and II pumping was similar to or slightly lower than under the corresponding EBC2 scenarios (Table 5C.5.3-117 and Table 5C.5.3-118). As with spring-run Chinook salmon, Level III pumping survival in 1980 and 1984 was considerably greater under the HOS scenarios than under the EBC2 scenarios (~0.18–0.22, or a relative difference of ~30–52%).

Table 5C.5.3-115. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts under EBC2_ELT and ESO_ELT Scenarios, from Modeling Based on Newman (2003), by North Delta Bypass Flow Level

Water Year	Pulse Protection		Level I		Level II		Level III		Total	
	EBC2_ELT	ESO_ELT	EBC2_ELT	ESO_ELT	EBC2_ELT	ESO_ELT	EBC2_ELT	ESO_ELT	EBC2_ELT	ESO_ELT
1976 (C)	0.00	0.00	0.48	0.44	0.00	0.00	0.00	0.00	0.48	0.44
1977 (C)	0.00	0.00	0.37	0.35	0.00	0.00	0.00	0.00	0.37	0.35
1978 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.58	0.62	0.58
1979 (BN)	0.00	0.00	0.00	0.00	0.54	0.52	0.00	0.00	0.54	0.52
1980 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.49	0.55	0.49
1981 (D)	0.00	0.00	0.00	0.00	0.39	0.37	0.00	0.00	0.39	0.37
1982 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.82	0.78	0.82	0.78
1983 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.97	0.93	0.97
1984 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.46	0.50	0.46
1985 (D)	0.00	0.00	0.46	0.45	0.00	0.00	0.00	0.00	0.46	0.45
1986 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.43	0.43	0.43
1987 (D)	0.00	0.00	0.48	0.47	0.00	0.00	0.00	0.00	0.48	0.47
1988 (C)	0.00	0.00	0.48	0.47	0.00	0.00	0.00	0.00	0.48	0.47
1989 (D)	0.00	0.00	0.01	0.01	0.58	0.58	0.00	0.00	0.59	0.59
1990 (C)	0.00	0.00	0.34	0.32	0.00	0.00	0.00	0.00	0.34	0.32
1991 (C)	0.00	0.00	0.36	0.33	0.00	0.00	0.00	0.00	0.36	0.33
Average	0.00	0.00	0.19	0.18	0.09	0.09	0.24	0.23	0.52	0.50
Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.46

Table 5C.5.3-116. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts under EBC2_LLT and ESO_LLT Scenarios, from Modeling Based on Newman (2003), by North Delta Bypass Flow Level

	Pulse Protection		Level I		Level II		Level III		Total	
Water Year	EBC2_LLT	ESO_LLT	EBC2_LLT	ESO_LLT	EBC2_LLT	ESO_LLT	EBC2_LLT	ESO_LLT	EBC2_LLT	ESO_LLT
1976 (C)	0.00	0.00	0.51	0.52	0.00	0.00	0.00	0.00	0.51	0.52
1977 (C)	0.00	0.00	0.32	0.32	0.00	0.00	0.00	0.00	0.32	0.32
1978 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.57	0.53	0.57	0.53
1979 (BN)	0.00	0.00	0.00	0.00	0.44	0.41	0.00	0.00	0.44	0.41
1980 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.46	0.43	0.46	0.43
1981 (D)	0.00	0.00	0.00	0.00	0.39	0.42	0.00	0.00	0.39	0.42
1982 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.77	0.72	0.77	0.72
1983 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.86	0.90	0.86	0.90
1984 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.38	0.36	0.38	0.36
1985 (D)	0.00	0.00	0.49	0.50	0.00	0.00	0.00	0.00	0.49	0.50
1986 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.35	0.36	0.35
1987 (D)	0.00	0.00	0.47	0.48	0.00	0.00	0.00	0.00	0.47	0.48
1988 (C)	0.00	0.00	0.42	0.41	0.00	0.00	0.00	0.00	0.42	0.41
1989 (D)	0.00	0.00	0.00	0.00	0.57	0.58	0.00	0.00	0.57	0.58
1990 (C)	0.00	0.00	0.30	0.29	0.00	0.00	0.00	0.00	0.30	0.29
1991 (C)	0.00	0.00	0.34	0.32	0.00	0.00	0.00	0.00	0.34	0.32
Average	0.00	0.00	0.18	0.18	0.09	0.09	0.21	0.21	0.48	0.47
Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.42

Table 5C.5.3-117. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts under EBC2_ELT and HOS_ELT Scenarios, from Modeling Based on Newman (2003), by North Delta Bypass Flow Level

Water Year	Pulse Protection		Level I		Level II		Level III		Total	
	EBC2_ELT	HOS_ELT	EBC2_ELT	HOS_ELT	EBC2_ELT	HOS_ELT	EBC2_ELT	HOS_ELT	EBC2_ELT	HOS_ELT
1976 (C)	0.00	0.00	0.47	0.42	0.00	0.00	0.00	0.00	0.47	0.42
1977 (C)	0.00	0.00	0.37	0.35	0.00	0.00	0.00	0.00	0.37	0.35
1978 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.55	0.60	0.55
1979 (BN)	0.00	0.00	0.00	0.00	0.53	0.51	0.00	0.00	0.53	0.51
1980 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.78	0.60	0.78
1981 (D)	0.00	0.00	0.00	0.00	0.39	0.37	0.00	0.00	0.39	0.37
1982 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.79	0.75	0.79	0.75
1983 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.91	0.96	0.91	0.96
1984 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.76	0.55	0.76
1985 (D)	0.00	0.00	0.46	0.44	0.00	0.00	0.00	0.00	0.46	0.44
1986 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.42	0.43	0.42
1987 (D)	0.00	0.00	0.48	0.47	0.00	0.00	0.00	0.00	0.48	0.47
1988 (C)	0.00	0.00	0.47	0.46	0.00	0.00	0.00	0.00	0.47	0.46
1989 (D)	0.00	0.00	0.01	0.01	0.58	0.58	0.00	0.00	0.59	0.59
1990 (C)	0.00	0.00	0.33	0.32	0.00	0.00	0.00	0.00	0.33	0.32
1991 (C)	0.00	0.00	0.35	0.32	0.00	0.00	0.00	0.00	0.35	0.32
Average	0.00	0.00	0.18	0.17	0.09	0.09	0.24	0.26	0.52	0.53
Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.48	0.46

Table 5C.5.3-118. Proportional through-Delta Survival of Fall-Run Chinook Salmon Smolts under EBC2_LLT and HOS_LLT Scenarios, from Modeling Based on Newman (2003), by North Delta Bypass Flow Level

Water Year	Pulse Protection		Level I		Level II		Level III		Total	
	EBC2_LLT	HOS_LLT	EBC2_LLT	HOS_LLT	EBC2_LLT	HOS_LLT	EBC2_LLT	HOS_LLT	EBC2_LLT	HOS_LLT
1976 (C)	0.00	0.00	0.51	0.52	0.00	0.00	0.00	0.00	0.51	0.52
1977 (C)	0.00	0.00	0.32	0.32	0.00	0.00	0.00	0.00	0.32	0.32
1978 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.51	0.55	0.51
1979 (BN)	0.00	0.00	0.00	0.00	0.44	0.44	0.00	0.00	0.44	0.44
1980 (AN)	0.00	0.00	0.00	0.00	0.00	0.00	0.51	0.70	0.51	0.70
1981 (D)	0.00	0.00	0.00	0.00	0.39	0.38	0.00	0.00	0.39	0.38
1982 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.74	0.69	0.74	0.69
1983 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.84	0.88	0.84	0.88
1984 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.42	0.64	0.42	0.64
1985 (D)	0.00	0.00	0.48	0.48	0.00	0.00	0.00	0.00	0.48	0.48
1986 (W)	0.00	0.00	0.00	0.00	0.00	0.00	0.36	0.35	0.36	0.35
1987 (D)	0.00	0.00	0.47	0.48	0.00	0.00	0.00	0.00	0.47	0.48
1988 (C)	0.00	0.00	0.00	0.00	0.41	0.41	0.00	0.00	0.41	0.41
1989 (D)	0.00	0.00	0.01	0.01	0.56	0.58	0.00	0.00	0.57	0.58
1990 (C)	0.00	0.00	0.29	0.29	0.00	0.00	0.00	0.00	0.29	0.29
1991 (C)	0.00	0.00	0.33	0.31	0.00	0.00	0.00	0.00	0.33	0.31
Average	0.00	0.00	0.15	0.15	0.11	0.11	0.21	0.24	0.48	0.50
Median	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.48

5C.5.3.7 Particle Tracking Modeling Nonlinear Regression Analyses (Chinook Salmon Fry/Parr)

5C.5.3.7.1 ESO Scenarios

The PTM Nonlinear Regression Analyses results showed considerable variability in the estimated weighted-average proportion of particles reaching Chipps Island after 30 days. For the Sacramento River at Sutter Slough release location, the estimated proportion of particles reaching Chipps Island ranged from minima of just under 0.3 of particles to a maximum of all (1.0) particles (Figure 5C.5.3-117 and Figure 5C.5.3-118). The average proportion of particles reaching Chipps Island across all water-year types was not greatly different between scenarios and ranged from 0.75–0.77 (Table 5C.5.3-119). As would be expected, more particles reached Chipps Island after 30 days in wetter year types, with average proportions ranging from 0.44–0.48 in critical years to 0.95–0.96 in wet years. The median proportion of particles reaching Chipps Island was 0.81–0.82 across all scenarios except for ESO_LLT, for which the median was somewhat lower (0.78) and the overall distribution of weighted-average annual proportions was slightly lower (Figure 5C.5.3-118 and Figure 5C.5.3-119). ESO scenarios had a greater proportion of particles reaching Chipps Island than the corresponding water year from EBC scenarios in 20% (EBC2 vs. ESO_LLT) to 54% (EBC2_ELT vs. ESO_ELT) of years. There was little difference between scenarios in the average proportion of particles reaching Chipps Island, with most comparisons indicating a relative change of less than 5% (Table 5C.5.3-120).

Results for the Cache Slough at Liberty Island release location were somewhat similar to those for the Sacramento River at Sutter Slough location. The estimated proportion of particles reaching Chipps Island after 30 days ranged from minima of 0.34–0.35 (EBC2 scenarios) and 0.35–0.39 (ESO scenarios) of particles to a maximum of all (1.0) particles under all scenarios (Figure 5C.5.3-120 and Figure 5C.5.3-121). The average proportion of particles reaching Chipps Island across all water-year types was 0.76–0.77 for EBC2 scenarios and 0.74–0.75 for ESO scenarios (Table 5C.5.3-121). The median proportion of particles reaching Chipps Island was 0.79–0.81 for EBC2 scenarios and 0.77–0.78 for ESO scenarios (Figure 5C.5.3-121 and Figure 5C.5.3-122). ESO scenarios had a greater proportion of particles reaching Chipps Island than the corresponding water year from EBC scenarios in 15% (EBC2 vs. ESO_LLT) to 23% (EBC2_LLT vs. ESO_LLT) of years. Averaged across all water-year types there was little difference between scenarios in the average proportion of particles reaching Chipps Island (relative changes of 5% or less), with ESO scenarios being somewhat lower than EBC2 scenarios when compared across time periods, e.g., 7% relatively lower under ESO_LLT compared to EBC2 (Table 5C.5.3-122).

The San Joaquin River at Mossdale location had a relatively low estimated proportion of particles reaching Chipps Island in comparison to other locations, as would be expected given the longer migration route and the potential for entry into the channels leading to the south Delta export facilities and assumed entrainment of particles. (Note that the PTM does not account for the potential salvage of fish that occurs at the south Delta export facilities, although the proportion salvaged is a small subset of the total entrained) (Brown et al. 1996). The estimated proportion of particles reaching Chipps Island from the San Joaquin River at Mossdale ranged from minima of 0.01 (EBC2 scenarios) and 0.03–0.05 (ESO scenarios) of particles to maxima of all or nearly all particles in the wet water year of 1983 (Figure 5C.5.3-123 and Figure 5C.5.3-124). There was appreciable upward skew in the estimated proportion of particles reaching Chipps Island because of generally low proportions punctuated by occasional high proportions: The average proportion of particles reaching Chipps Island across all water years was 0.07–0.08 for EBC2 scenarios and 0.17–0.21 for ESO scenarios (Table 5C.5.3-123), whereas the median proportions were 0.01–0.02 for EBC2 scenarios and 0.06–0.09 for ESO scenarios (Figure 5C.5.3-124 and Figure 5C.5.3-125). The average proportion of particles reaching Chipps Island ranged from 0.01–0.02 (EBC2 scenarios) and 0.04–0.06 (ESO scenarios) in critical years to 0.18–0.19 (EBC2 scenarios) and 0.36–0.41 (ESO scenarios) in wet years. Regardless of whether averages or medians are compared, the results suggested that the estimated proportion of particles reaching Chipps Island after 30 days from the San Joaquin River at Mossdale under ESO scenarios would be more than double the proportion under EBC2 scenarios (Table 5C.5.3-124). ESO scenarios had greater proportions of particles reaching Chipps Island in all or nearly all (81 or 82 out of 82) water years included in the assessment. These results reflect the potential for use of the north Delta intakes in wetter years—allowing less use of the south Delta export facilities—and the use of the Head of Old River operable barrier to limit the proportion of particles (taken here to represent migration of Chinook salmon fry/parr) that would enter Old River and therefore be entrained by the south Delta export facilities. Note that the difference between ESO and EBC2 scenarios was greater when comparing the ESO_ELT scenario than the ESO_LLT scenario. This reflects the lack of any assumed tidal natural communities and transitional uplands (tidal habitat) restoration in the ESO_ELT, which contrasts with a doubling of tidal habitat in the South Delta subregion in the ESO_LLT because of the assumed habitat restoration (See Appendix 5.E, *Habitat Restoration*, for more details). Greater tidal habitat volume in the ESO_LLT results in increased tidal flux to the South Delta subregion, which is translated into longer travel times for particles released in the San Joaquin River at Mossdale (see separation of ESO_ELT and ESO_LLT curves in Figure 5C.5.3-17 of the *Computation of Nonlinear Regressions* section of the PTM Nonlinear Regression Analyses methods).

The results for the Mokelumne River below Cosumnes River confluence particle release location were intermediate to the results from the other locations, as might be expected given the intermediate proximity to potential hydrodynamic influences such as the south Delta export facilities. The estimated proportion of particles reaching Chipps Island from the Mokelumne River location ranged from minima of 0.02 (EBC2 scenarios) and 0.03–0.04 (ESO scenarios) of particles to maxima of all particles in the wet water year of 1983 (Figure 5C.5.3-126 and Figure 5C.5.3-127). As with the San Joaquin River location, there was upward skew in the estimated proportion of particles reaching Chipps Island because of occasional high proportions mixed with generally lower proportions: The average proportion of particles reaching Chipps Island across all water years was 0.29 for EBC2 scenarios and 0.31–0.34 for ESO scenarios (Table 5C.5.3-125), whereas the median proportions were 0.14–0.15 for EBC2 scenarios and 0.18–0.24 for ESO scenarios (Figure 5C.5.3-127 and Figure 5C.5.3-128). The average proportion of particles reaching Chipps Island ranged from 0.04–0.05 (all scenarios) in critical years to 0.58–0.59 (EBC2 scenarios) and 0.63–0.68 (ESO scenarios) in wet years. ESO scenarios had a greater proportion of particles reaching Chipps Island than the corresponding water year from EBC scenarios in 56% (EBC2 vs. ESO_LLT) to 85% (EBC2_ELT vs. ESO_ELT) of years. Across all water-year types, ESO scenarios had on average 5–19% more particles reaching Chipps Island than EBC2 scenarios, with below normal water years in the EBC2_ELT vs. ESO_ELT comparisons having the greatest differences (Table 5C.5.3-126). Ten to eleven percent lower average proportions occurred under ESO_LLT scenarios compared to EBC2_LLT in dry and critical years, with the overall proportions reaching Chipps Island in these water-year types being relatively low under all scenarios. The EBC2_ELT vs. ESO_ELT and EBC2_LLT vs. ESO_LLT comparisons suggest interacting effects of the BDCP's ESO and tidal natural communities and transitional uplands restoration. As noted for the San Joaquin River release location, the differences between ESO and EBC2 scenarios were greatest in the ELT, as the benefits of changes in water operations—i.e., balancing of north and south Delta export pumping and an operable barrier contributing to a greater proportion of San Joaquin inflow passing the Head of Old River—occurred with relatively little tidal natural communities and transitional uplands restoration having taken place in the South Delta subregion. Essentially all of the tidal natural communities and transitional uplands restoration in the Cosumnes-Mokelumne ROA would have occurred in the near term (NT) (see Appendix 5.E, *Habitat Restoration*), however, which appreciably shifted the Chipps Island proportion-inflow sigmoid curve for ESO_ELT compared to the EBC2 scenarios (see Figure 5C.5.3-18 in the *Computation of Nonlinear Regressions* section of the PTM Nonlinear Regression Analyses methods). Therefore relatively more flow would be required to achieve the same proportion of particles reaching Chipps Island because of the longer particle residence time caused by the Cosumnes-Mokelumne restoration in the NT[1]. The results suggested that the effects of lower south Delta exports and Head of Old River barrier operations provided more than sufficient flow to compensate for this shift. In the LLT, with additional tidal natural communities and transitional uplands restoration in the South Delta ROA, particle residence time would have increased and resulted in less of a difference in the proportion of particles reaching Chipps Island for the same flow. The larger differences between EBC2_ELT and ESO_ELT in the proportion of particles reaching Chipps Island in above normal and below normal water years (Table 5C.5.3-126) appears to reflect the combination of relatively low south Delta export pumping in addition to operation of the Head of Old River barrier, whereas in drier years there would be relatively greater reliance on south Delta export pumping and in wetter years there would more north Delta export pumping—affecting the Georgiana Slough/DCC component of the flow term—and more instances of the Head of Old River barrier not being operated because of high San Joaquin River flow.

In summary, the PTM Nonlinear Regression analyses estimated that the migration index for Chinook salmon fry/parr represented by 30-day proportion of particles reaching Chipps Island after 30 days would be similar or slightly lower under ESO scenarios compared to EBC scenarios for fish entering the Delta from the Sacramento River or the Yolo Bypass. The migration index was appreciably greater under ESO scenarios for Chinook salmon fry/parr entering the Delta from the San Joaquin River and modestly greater under ESO scenarios for migrants entering the Delta from the Mokelumne River. More emphasis perhaps should be placed on the results from wetter years because Chinook salmon fry/parr migrants are more common in wetter years (Williams 2006).

[1] As described in Appendix 5.E, *Habitat Restoration*, the assumed increase in tidal habitat through restoration within the Cosumnes-Mokelumne ROA in the East Delta subregion was around 2,700 acres (46% greater than EBC) in the NT (0–10 years following BDCP implementation).

Table 5C.5.3-119. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location for EBC and ESO Scenarios[a]

Water-Year Type	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
All	0.78	0.77	0.76	0.76	0.77	0.75
Wet	0.96	0.96	0.96	0.96	0.96	0.95
Above Normal	0.91	0.90	0.90	0.89	0.90	0.88
Below Normal	0.79	0.78	0.77	0.76	0.78	0.74
Dry	0.61	0.61	0.59	0.60	0.61	0.58
Critical	0.46	0.46	0.44	0.46	0.48	0.47

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-120. Differences[a] between EBC and ESO Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location[b]

Water-Year Type	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
All	0.0 (0%)	-0.03 (-3%)	0.0 (0%)	-0.02 (-3%)	0.01 (1%)	-0.01 (-2%)
Wet	0.0 (0%)	-0.02 (-2%)	-0.01 (-1%)	-0.02 (-2%)	0.0 (0%)	-0.01 (-1%)
Above Normal	-0.01 (-1%)	-0.04 (-4%)	0.01 (1%)	-0.02 (-2%)	0.01 (1%)	-0.02 (-2%)
Below Normal	-0.01 (-1%)	-0.06 (-7%)	0.0 (1%)	-0.04 (-5%)	0.01 (1%)	-0.03 (-3%)
Dry	0.0 (0%)	-0.03 (-5%)	0.01 (1%)	-0.03 (-4%)	0.02 (4%)	-0.02 (-3%)
Critical	0.02 (4%)	0.01 (3%)	0.01 (3%)	0.01 (1%)	0.03 (7%)	0.01 (3%)

[a] Negative values indicate lower proportion of particles reaching Chipps Island under ESO scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-121. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location for EBC and ESO Scenarios[a]

	Scenario[b]					
Water-Year Type	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**
All	0.78	0.77	0.77	0.76	0.75	0.74
Wet	0.96	0.96	0.96	0.95	0.94	0.93
Above Normal	0.91	0.89	0.90	0.88	0.88	0.86
Below Normal	0.80	0.76	0.78	0.74	0.74	0.71
Dry	0.63	0.60	0.61	0.59	0.59	0.58
Critical	0.49	0.48	0.47	0.47	0.47	0.49

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-122. Differences[a] between EBC and ESO Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location[b]

	Scenarios[c]					
Water-Year Type	**EBC1 vs. ESO_ELT**	**EBC1 vs. ESO_LLT**	**EBC2 vs. ESO_ELT**	**EBC2 vs. ESO_LLT**	**EBC2_ELT vs. ESO_ELT**	**EBC2_LLT vs. ESO_LLT**
All	-0.03 (-4%)	-0.04 (-5%)	-0.02 (-2%)	-0.02 (-3%)	-0.02 (-3%)	-0.01 (-2%)
Wet	-0.02 (-2%)	-0.03 (-3%)	-0.02 (-2%)	-0.02 (-2%)	-0.02 (-2%)	-0.02 (-2%)
Above Normal	-0.04 (-4%)	-0.05 (-6%)	-0.01 (-1%)	-0.03 (-3%)	-0.02 (-2%)	-0.02 (-2%)
Below Normal	-0.06 (-7%)	-0.08 (-10%)	-0.03 (-3%)	-0.05 (-7%)	-0.04 (-5%)	-0.03 (-4%)
Dry	-0.04 (-6%)	-0.05 (-7%)	-0.02 (-3%)	-0.02 (-4%)	-0.02 (-4%)	-0.01 (-2%)
Critical	-0.01 (-3%)	0.01 (1%)	0.0 (-1%)	0.01 (3%)	0.0 (0%)	0.02 (4%)

[a] Negative values indicate lower proportion of particles reaching Chipps Island under ESO scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-123. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location for EBC and ESO Scenarios[a]

Water-Year Type	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
All	0.08	0.08	0.08	0.07	0.21	0.17
Wet	0.18	0.18	0.19	0.18	0.41	0.36
Above Normal	0.06	0.06	0.07	0.07	0.22	0.19
Below Normal	0.03	0.03	0.04	0.02	0.14	0.09
Dry	0.02	0.02	0.02	0.01	0.07	0.05
Critical	0.02	0.02	0.02	0.01	0.06	0.04

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-124. Differences[a] between EBC and ESO Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location[b]

Water-Year Type	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
All	0.13 (168%)	0.10 (121%)	0.13 (176%)	0.10 (128%)	0.13 (153%)	0.10 (136%)
Wet	0.23 (125%)	0.18 (96%)	0.24 (136%)	0.18 (105%)	0.22 (116%)	0.18 (104%)
Above Normal	0.16 (254%)	0.13 (216%)	0.15 (252%)	0.13 (214%)	0.15 (214%)	0.12 (182%)
Below Normal	0.11 (333%)	0.06 (172%)	0.11 (327%)	0.06 (168%)	0.11 (276%)	0.07 (373%)
Dry	0.05 (348%)	0.03 (209%)	0.05 (340%)	0.03 (203%)	0.05 (350%)	0.04 (314%)
Critical	0.04 (247%)	0.02 (135%)	0.04 (226%)	0.02 (121%)	0.04 (214%)	0.03 (187%)

[a] Positive values indicate higher proportion of particles reaching Chipps Island under ESO scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-125. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location for EBC and ESO Scenarios[a]

Water-Year Type	Scenario[b]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
All	0.30	0.29	0.29	0.29	0.34	0.31
Wet	0.58	0.58	0.58	0.59	0.68	0.63
Above Normal	0.36	0.36	0.36	0.37	0.44	0.39
Below Normal	0.20	0.19	0.18	0.16	0.24	0.17
Dry	0.09	0.08	0.07	0.07	0.08	0.06
Critical	0.06	0.05	0.04	0.04	0.05	0.04

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-126. Differences[a] between EBC and ESO Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location[b]

Water-Year Type	Scenarios[c]					
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
All	0.04 (15%)	0.01 (2%)	0.05 (17%)	0.01 (5%)	0.05 (19%)	0.02 (6%)
Wet	0.09 (16%)	0.05 (9%)	0.10 (17%)	0.06 (10%)	0.09 (16%)	0.05 (8%)
Above Normal	0.07 (20%)	0.03 (8%)	0.08 (23%)	0.04 (10%)	0.08 (22%)	0.02 (6%)
Below Normal	0.03 (17%)	-0.03 (-14%)	0.05 (26%)	-0.02 (-8%)	0.06 (34%)	0.01 (7%)
Dry	0.0 (-4%)	-0.02 (-28%)	0.0 (3%)	-0.02 (-22%)	0.01 (17%)	-0.01 (-11%)
Critical	-0.01 (-9%)	-0.02 (-30%)	0.0 (-4%)	-0.01 (-27%)	0.01 (18%)	0.0 (-10%)

[a] Negative values indicate lower proportion of particles reaching Chipps Island under ESO scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

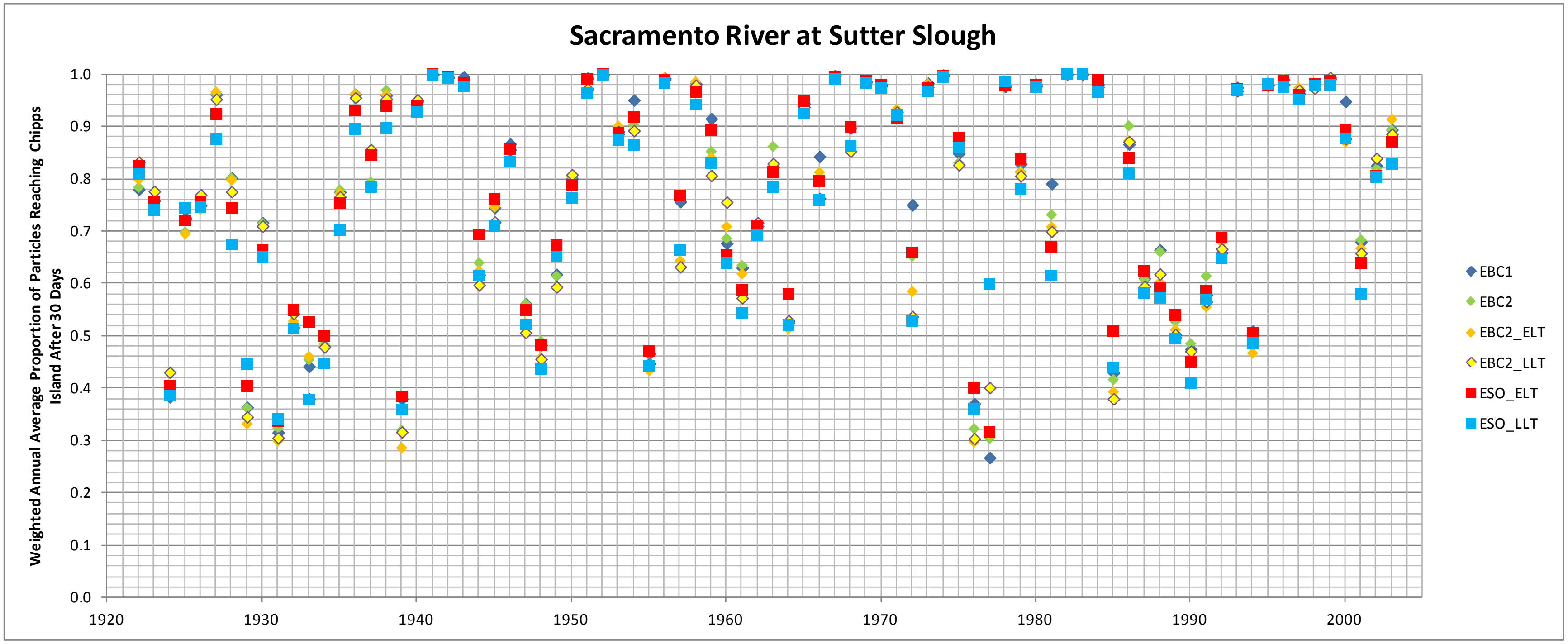
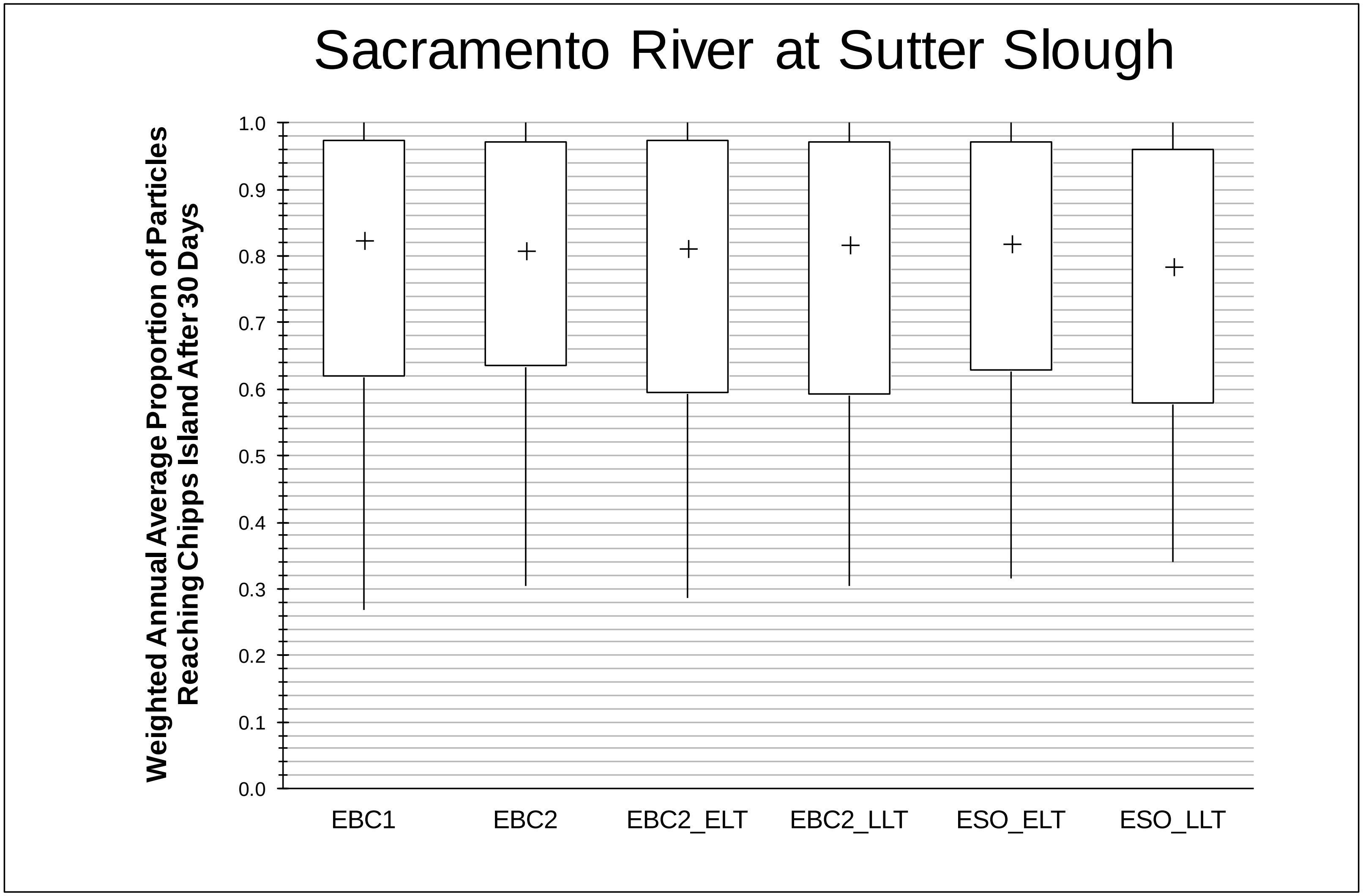


Figure 5C.5.3-117. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period



Shown are medians (+), maximum and minimum (whiskers), and interquartile range (boxes).

Figure 5C.5.3-118. Summary of Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period

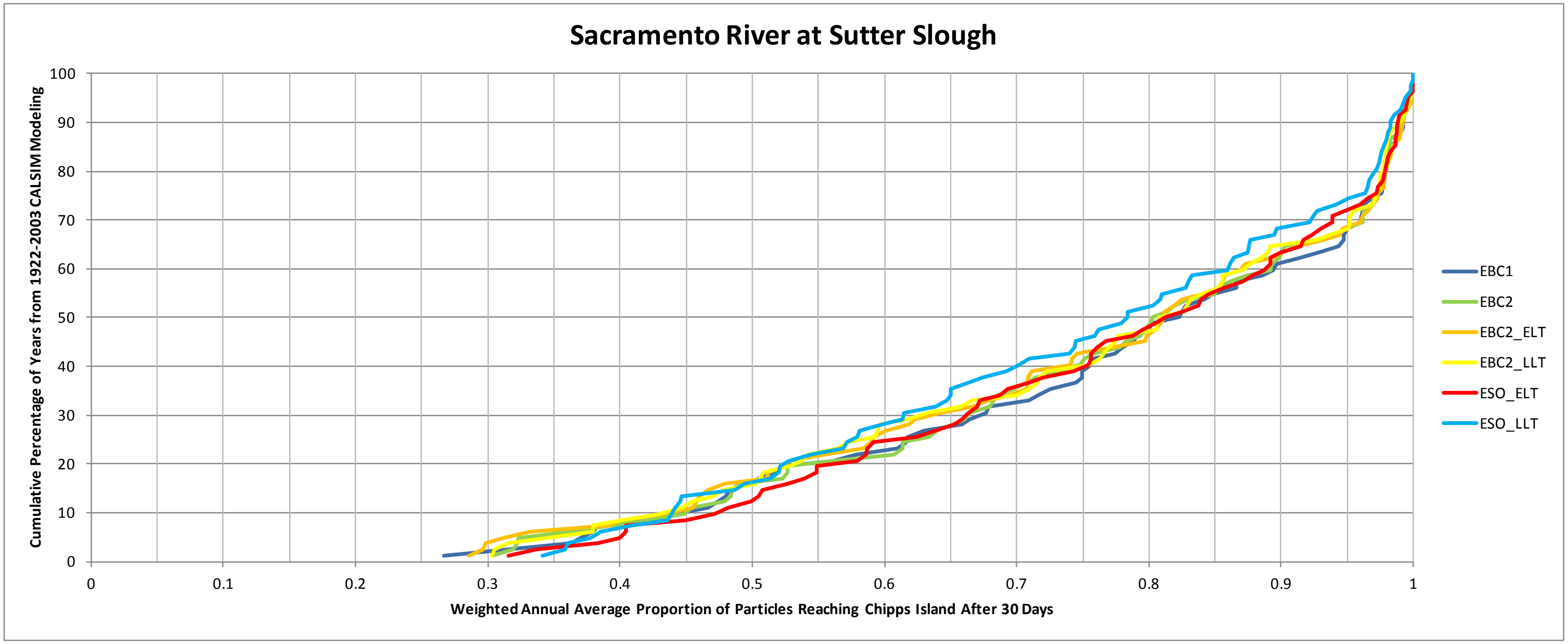


Figure 5C.5.3-119. Cumulative Percentage of Years for Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location for EBC and ESO Scenarios, from PTM Modeling Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period

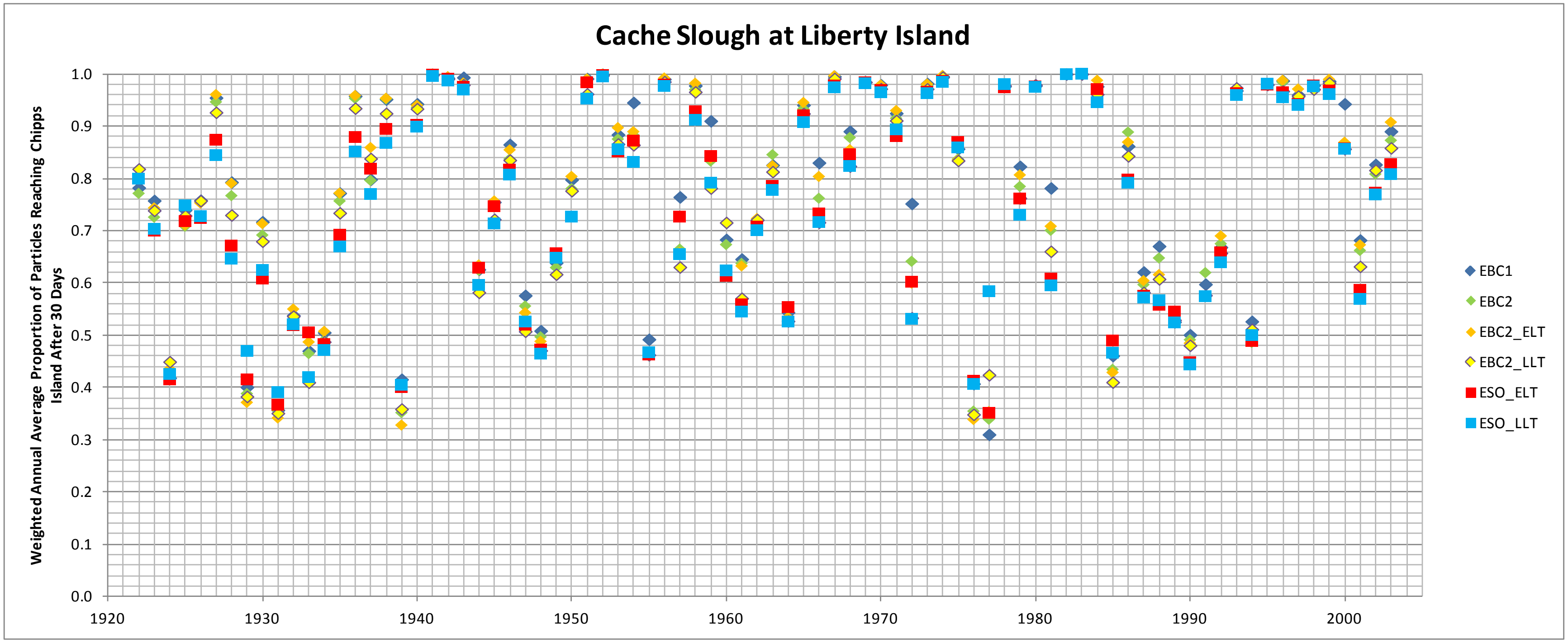
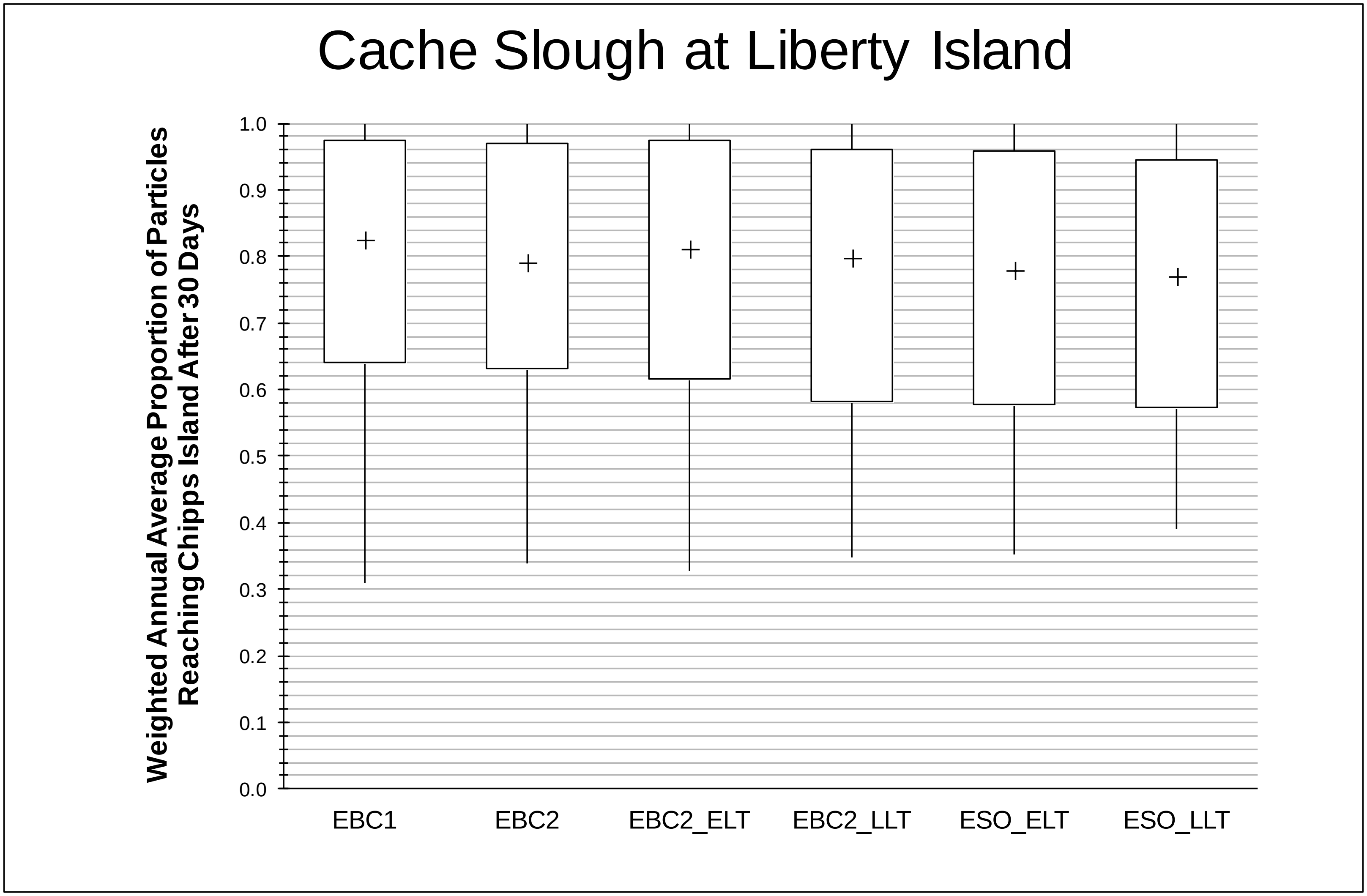


Figure 5C.5.3-120. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period



Shown are medians (+), maximum and minimum (whiskers), and interquartile range (boxes).

Figure 5C.5.3-121. Summary of Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period

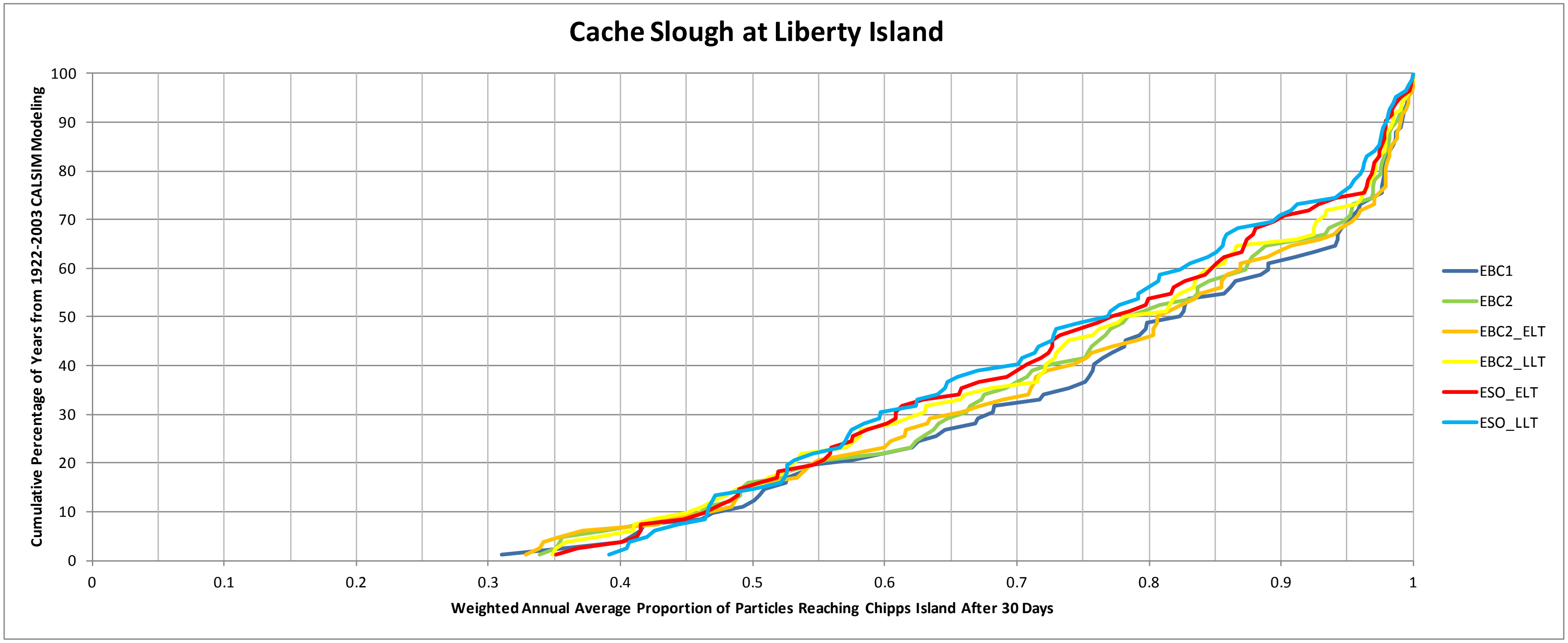


Figure 5C.5.3-122. Cumulative Percentage of Years for Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location for EBC and ESO Scenarios, from PTM Modeling Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period

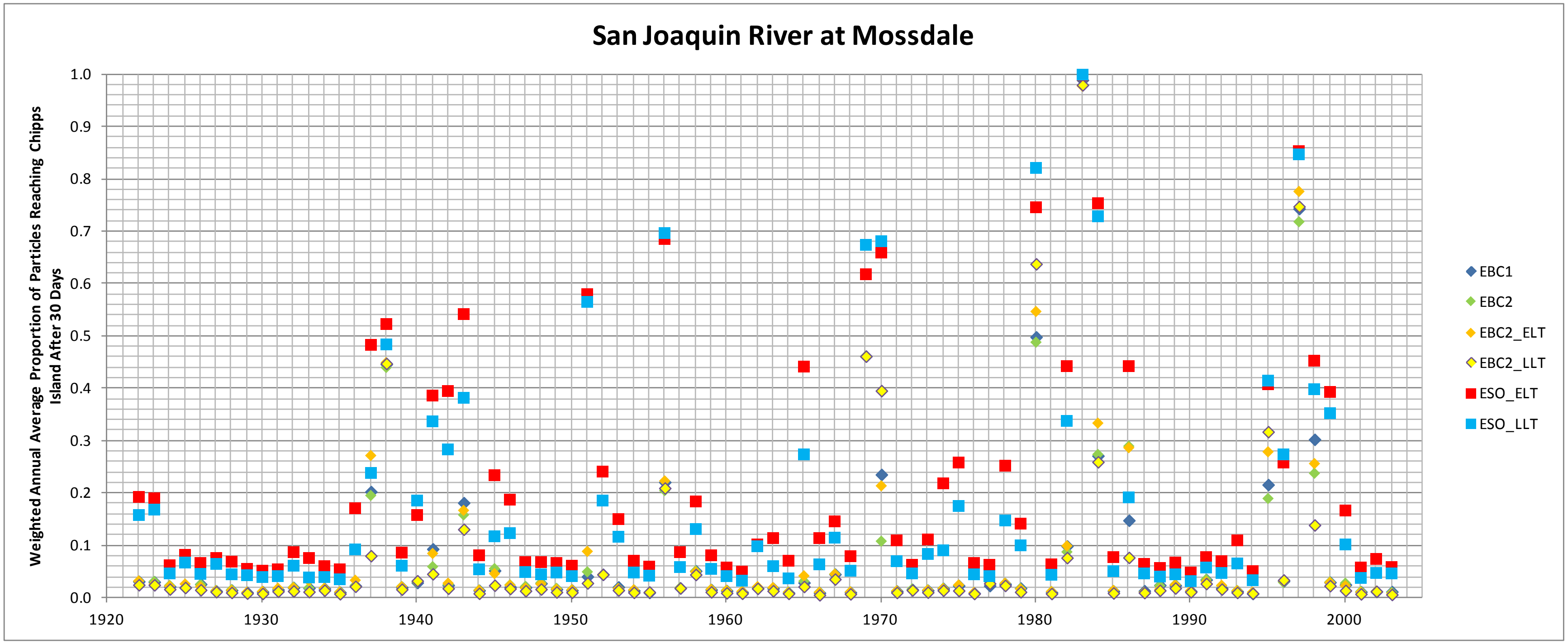
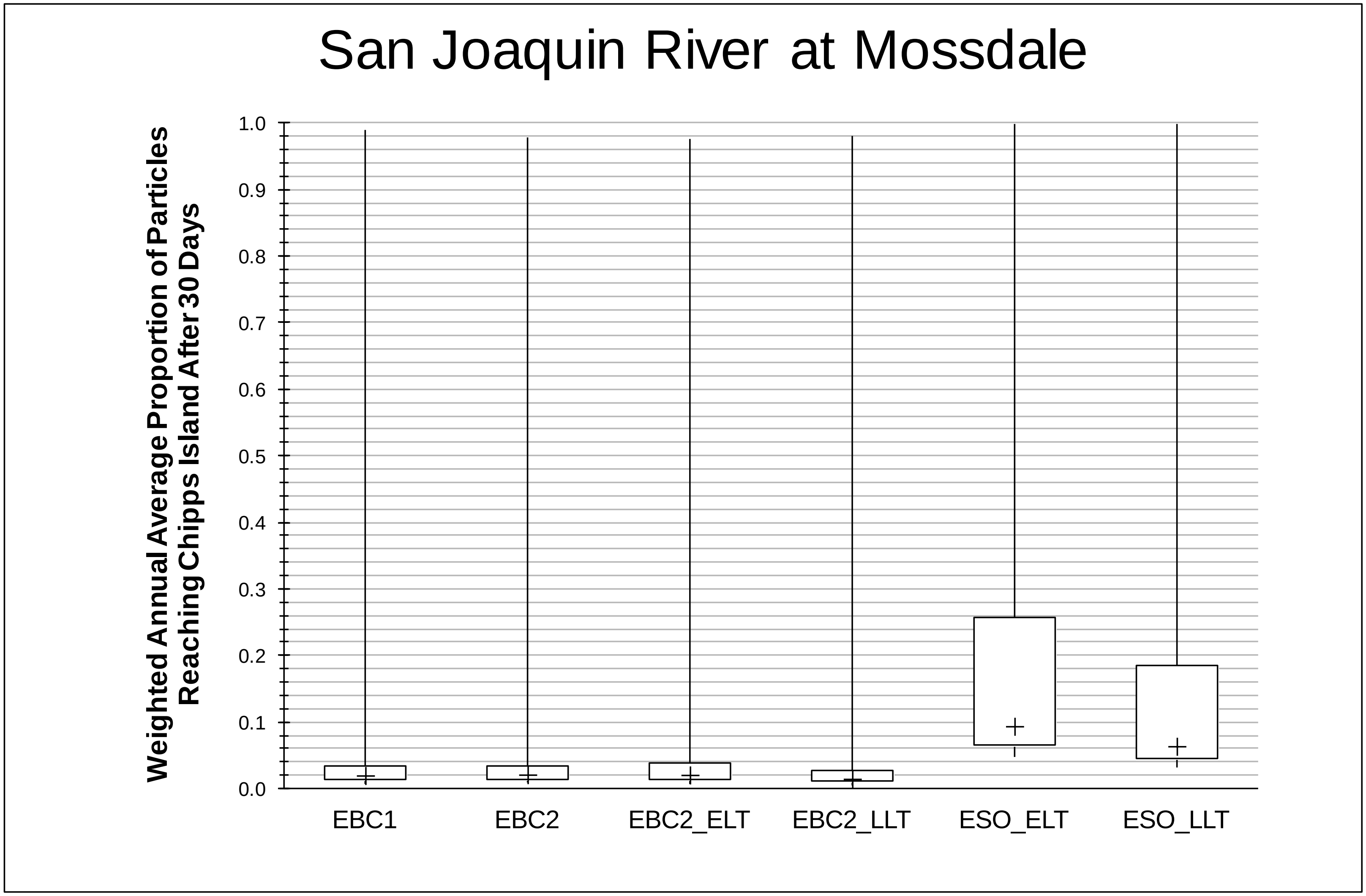


Figure 5C.5.3-123. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period



Shown are medians (+), maximum and minimum (whiskers), and interquartile range (boxes).

Figure 5C.5.3-124. Summary of Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period

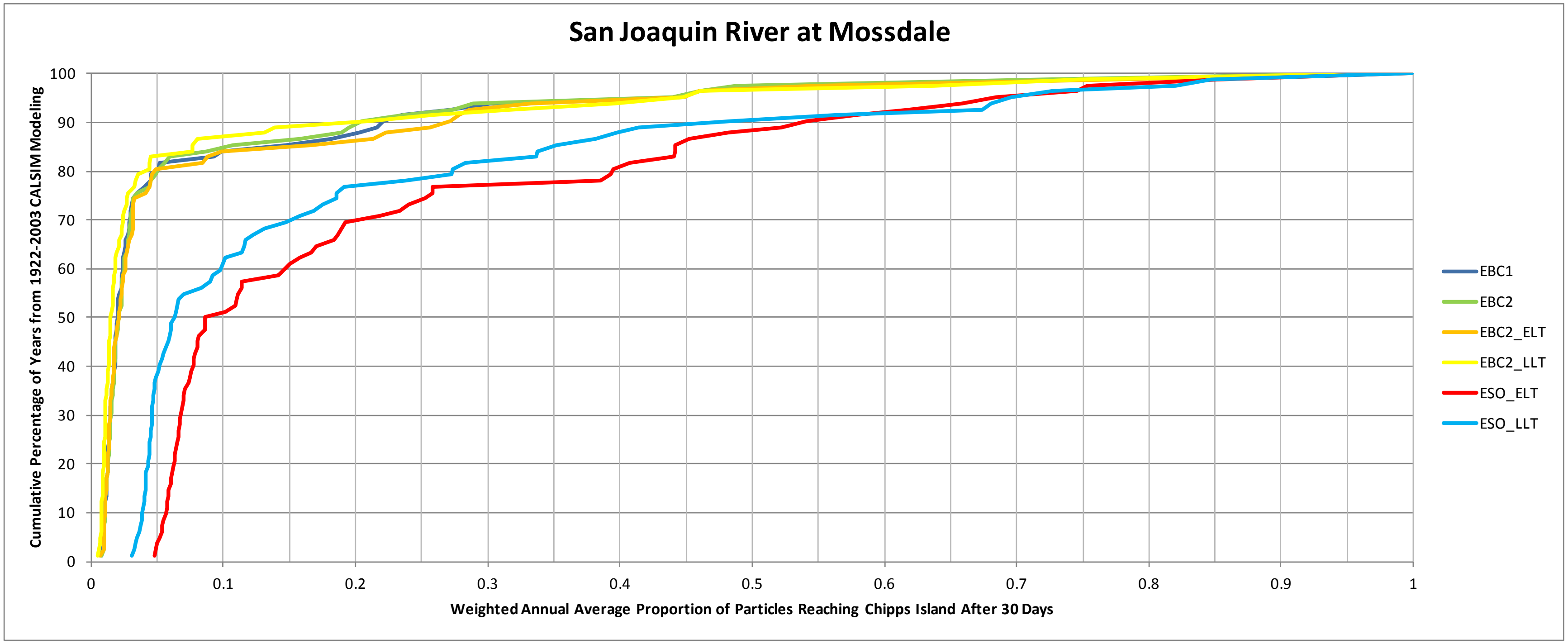


Figure 5C.5.3-125. Cumulative Percentage of Years for Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period

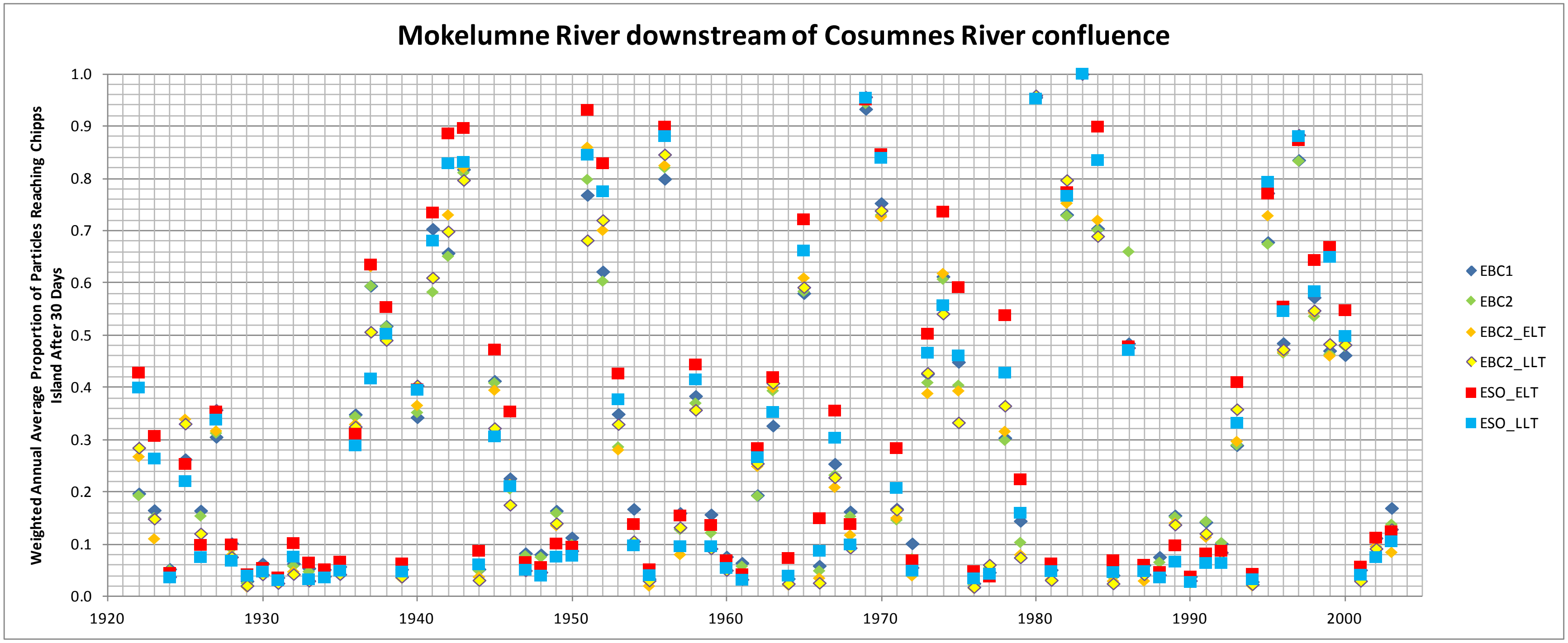
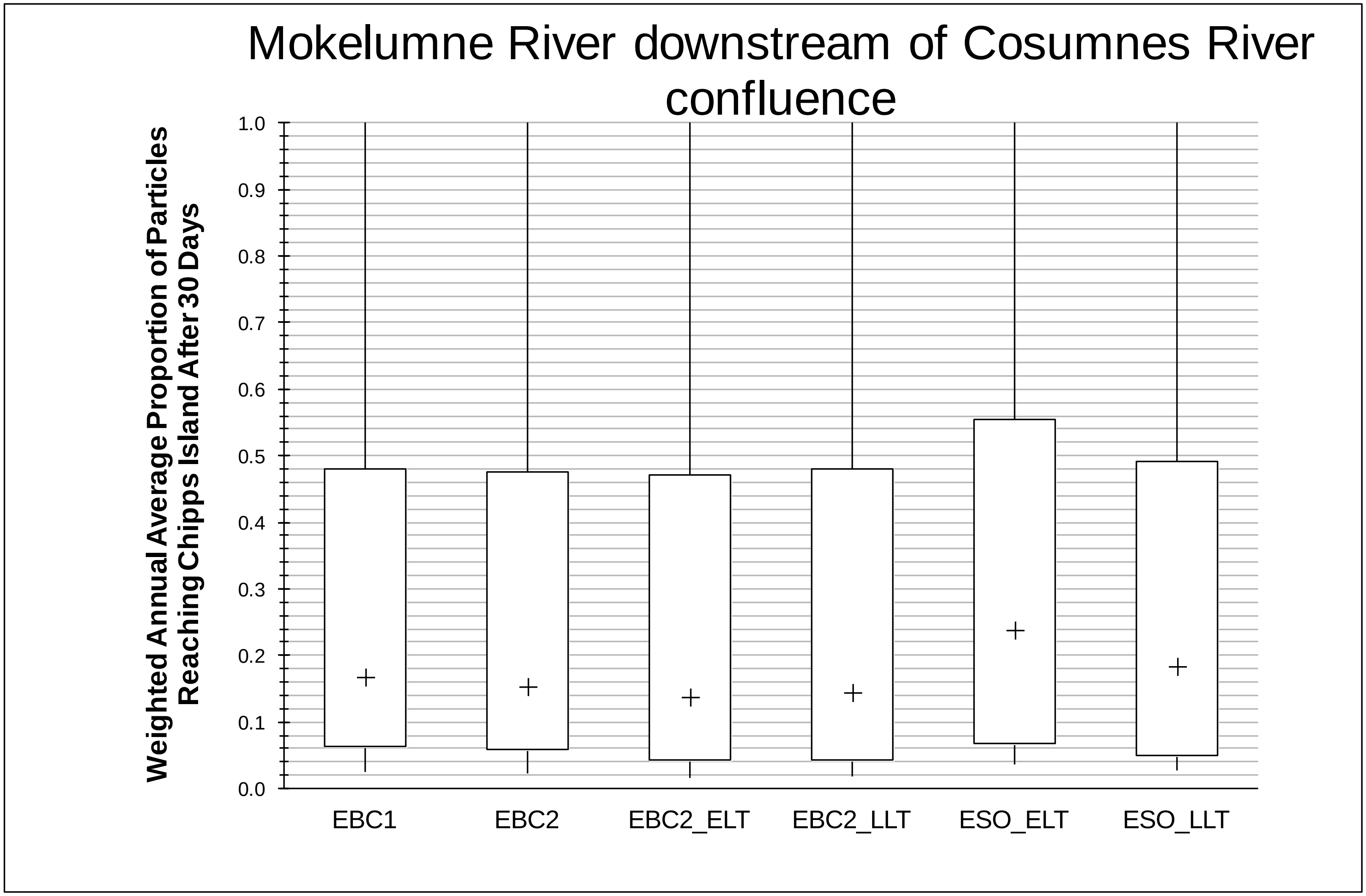


Figure 5C.5.3-126. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period



Shown are medians (+), maximum and minimum (whiskers), and interquartile range (boxes).

Figure 5C.5.3-127. Summary of Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period

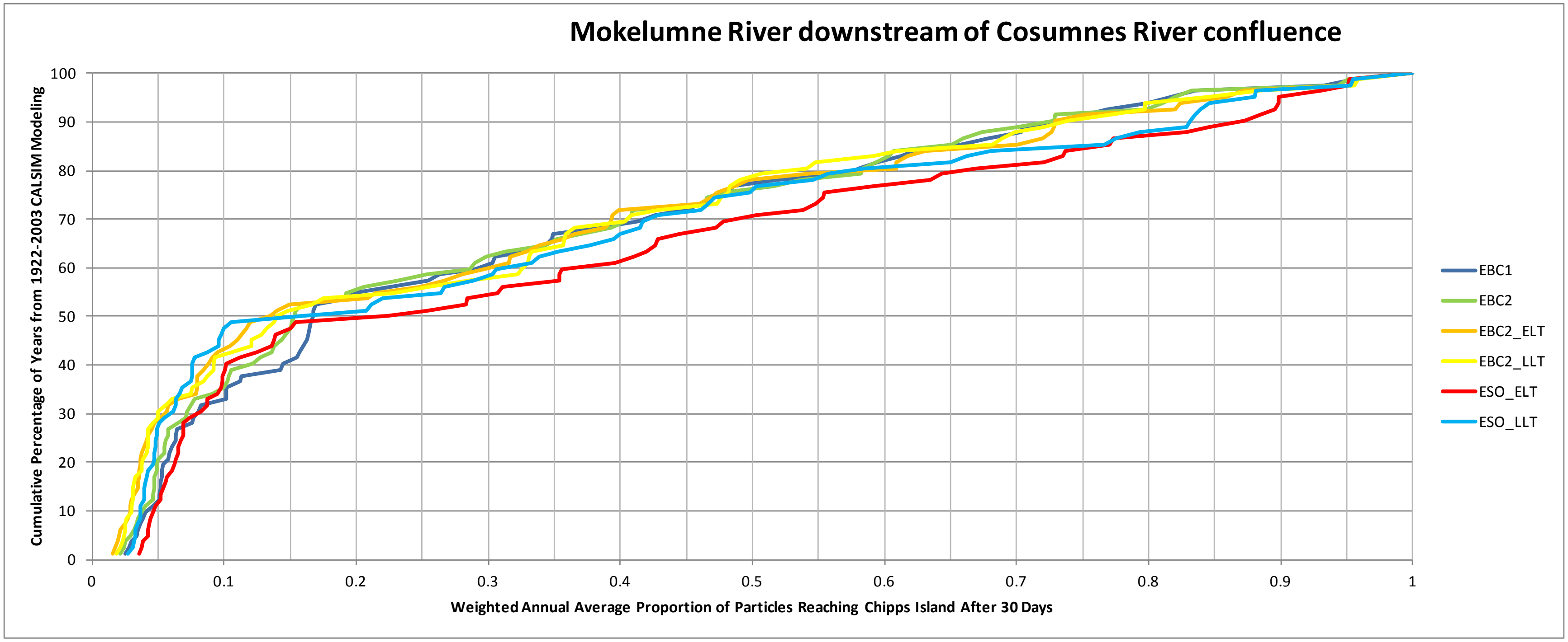


Figure 5C.5.3-128. Cumulative Percentage of Years for Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location for EBC and ESO Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on the 1922–2003 CALSIM Modeling Period

5C.5.3.7.2 HOS and LOS Scenarios

Results of the PTM nonlinear regression analyses for HOS/LOS scenarios gave very similar results to the ESO scenarios (see Section 5C.5.3.7.1, *ESO Scenarios*) in terms of the overall average and water-year-type-average weighted annual average proportion of particles reaching Chipps Island after 30 days (Table 5C.5.3-127, Table 5C.5.3-128, Table 5C.5.3-129, Table 5C.5.3-130, Table 5C.5.3-131, Table 5C.5.3-132, Table 5C.5.3-133, and Table 5C.5.3-134). This reflects the assumed timing for fall-run Chinook salmon fry, with most fry entering the Plan Area in the winter months of January or February (see Figure 5C.5.3-25 of Methods): there is relatively little difference between the ESO, HOS, and LOS scenarios in flows and exports in winter.

Table 5C.5.3-127. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location for EBC2, HOS, and LOS Scenarios[a]

Water-Year Type	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	0.76	0.76	0.78	0.76	0.78	0.76
Wet	0.96	0.96	0.97	0.95	0.96	0.95
Above Normal	0.90	0.89	0.90	0.88	0.91	0.90
Below Normal	0.77	0.76	0.80	0.76	0.79	0.75
Dry	0.59	0.60	0.63	0.59	0.62	0.58
Critical	0.44	0.46	0.48	0.45	0.50	0.47

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-128. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location[b]

Water-Year Type	Scenarios[c]			
	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	0.02 (3%)	-0.01 (-1%)	0.02 (2%)	-0.01 (-1%)
Wet	0.0 (0%)	-0.01 (-1%)	0.0 (0%)	-0.01 (-1%)
Above Normal	0.01 (1%)	-0.01 (-2%)	0.02 (2%)	0.0 (0%)
Below Normal	0.03 (4%)	0.0 (0%)	0.02 (2%)	-0.01 (-2%)
Dry	0.04 (6%)	-0.01 (-2%)	0.03 (5%)	-0.01 (-2%)
Critical	0.03 (8%)	-0.01 (-2%)	0.05 (12%)	0.01 (3%)

[a] Negative values indicate lower proportion of particles reaching Chipps Island under HOS or LOS than under EBC2 scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-129. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location for EBC2, HOS, and LOS Scenarios, from PTM Nonlinear Regression Analysis for Fall-Run Chinook Salmon Fry/Parr Based on 1922–2003 CALSIM Modeling Period

	Scenario[a]					
Water-Year Type	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	0.77	0.76	0.76	0.75	0.76	0.75
Wet	0.96	0.95	0.95	0.94	0.94	0.94
Above Normal	0.90	0.88	0.88	0.86	0.89	0.88
Below Normal	0.78	0.74	0.76	0.73	0.75	0.73
Dry	0.61	0.59	0.60	0.59	0.59	0.58
Critical	0.47	0.47	0.47	0.47	0.49	0.49

[a] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-130. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location[b]

	Scenarios[c]			
Water-Year Type	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	-0.01 (-2%)	-0.01 (-1%)	-0.01 (-2%)	-0.01 (-1%)
Wet	-0.01 (-1%)	-0.01 (-1%)	-0.02 (-2%)	-0.02 (-2%)
Above Normal	-0.02 (-2%)	-0.02 (-2%)	-0.01 (-1%)	0.0 (0%)
Below Normal	-0.02 (-2%)	-0.01 (-1%)	-0.03 (-4%)	-0.02 (-2%)
Dry	-0.01 (-2%)	-0.01 (-1%)	-0.02 (-3%)	-0.01 (-2%)
Critical	0.0 (0%)	0.0 (0%)	0.02 (3%)	0.02 (4%)

[a] Negative values indicate lower proportion of particles reaching Chipps Island under HOS or LOS than under EBC2 scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-131. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location for EBC2[a]

	Scenario[b]					
Water-Year Type	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	0.08	0.07	0.21	0.18	0.22	0.18
Wet	0.19	0.18	0.41	0.37	0.42	0.37
Above Normal	0.07	0.07	0.21	0.18	0.22	0.19
Below Normal	0.04	0.02	0.15	0.10	0.15	0.09
Dry	0.02	0.01	0.07	0.05	0.07	0.05
Critical	0.02	0.01	0.06	0.04	0.06	0.04

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-132. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location[b]

Water-Year Type	Scenarios[c]			
	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	0.13 (152%)	0.10 (139%)	0.13 (159%)	0.10 (140%)
Wet	0.22 (114%)	0.19 (109%)	0.23 (122%)	0.20 (111%)
Above Normal	0.14 (201%)	0.11 (160%)	0.15 (215%)	0.12 (177%)
Below Normal	0.11 (278%)	0.08 (399%)	0.11 (284%)	0.07 (374%)
Dry	0.06 (371%)	0.04 (332%)	0.05 (352%)	0.03 (306%)
Critical	0.04 (222%)	0.03 (197%)	0.04 (217%)	0.03 (184%)

a Positive values indicate higher proportion of particles reaching Chipps Island under HOS or LOS than under EBC2 scenarios.

[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.

[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-133. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location for EBC2, HOS, andLOS Scenarios[a]

Water-Year Type	Scenario[b]					
	EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	0.29	0.29	0.35	0.31	0.35	0.31
Wet	0.58	0.59	0.68	0.65	0.69	0.64
Above Normal	0.36	0.37	0.43	0.39	0.44	0.39
Below Normal	0.18	0.16	0.24	0.18	0.24	0.17
Dry	0.07	0.07	0.09	0.07	0.09	0.06
Critical	0.04	0.04	0.05	0.04	0.05	0.04

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.

[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-134. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location[b]

Water-Year Type	Scenario[b]			
	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	0.06 (21%)	0.02 (8%)	0.06 (20%)	0.02 (7%)
Wet	0.10 (17%)	0.06 (10%)	0.10 (17%)	0.05 (9%)
Above Normal	0.08 (22%)	0.03 (8%)	0.08 (22%)	0.02 (7%)
Below Normal	0.07 (39%)	0.02 (13%)	0.06 (36%)	0.01 (8%)
Dry	0.02 (24%)	0.0 (-6%)	0.01 (18%)	-0.01 (-11%)
Critical	0.01 (20%)	0.0 (-11%)	0.01 (22%)	0.0 (-11%)

[a] Positive values indicate higher proportion of particles reaching Chipps Island under HOS or LOS than under EBC2 scenarios.

[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.

[c] See Table 5C.0-1 for definitions of the scenarios.

5C.5.3.7.3 March–May Differences

The general, non-species-specific analysis that included an equal proportion (0.33) of particles being released in March, April, and May allows an assessment of the effects of higher outflows under the HOS scenarios compared to lower outflows under the ESO and LOS scenarios. There is little difference in March–May flows between ESO and LOS scenarios, so the particle tracking regression results were very similar for these two scenarios.

For the Sacramento River at Sutter Slough particle release location, the estimated weighted annual average proportion of particles reaching Chipps Island after 30 days averaged across all water years ranged from 0.67 (ESO_LLT/LOS_LLT) to 0.76 (HOS_ELT) (Table 5C.5.3-135). Wetter water-year types had higher average annual proportions of particles reaching Chipps Island than drier years, reflecting the lower outflow in the latter, with the results ranging from 0.37 in critical years (EBC2_ELT) to 0.96 in wet years (HOS_ELT). For ESO_ELT/LOS_ELT scenarios, the average proportion of particles reaching Chipps Island was similar to (generally less than 5% difference) EBC2 scenarios, whereas the ESO_LLT/LOS_LLT scenarios were slightly lower (generally more than 5%) than EBC scenarios (Table 5C.5.3-136). The HOS_ELT scenario had slightly greater (3–14%) average proportion of particles reaching Chipps Island than EBC2_ELT scenarios, whereas the HOS_LLT and EBC2_LLT scenarios had similar average results (generally 3% or less difference, except in below normal years where HOS_LLT was 6% greater).

For the Cache Slough at Liberty Island particle release location, the estimated weighted annual average proportion of particles reaching Chipps Island after 30 days averaged across all water years ranged from 0.66 (ESO_LLT) to 0.73 (HOS_ELT) (Table 5C.5.3-137). Results for individual water years ranged from 0.41 in critical years (EBC2 scenarios) to 0.93 in wet years (EBC2, EBC2_ELT, and HOS_ELT). The average proportion of particles reaching Chipps Island under the ESO_ELT/LOS_ELT scenarios generally was slightly lower (6-10%) than EBC2_ELT, whereas the differences between the average proportions for ESO_LLT/LOS_LLT and EBC2_LLT were less (6% or lower) (Table 5C.5.3-138). The HOS_ELT/HOS_LLT and EBC2_ELT/EBC2_LLT scenarios had average proportions of particles reaching Chipps Island that were similar (less than 5% difference).

There generally was less of a relative difference between the ESO/LOS scenarios and the HOS for the San Joaquin River at Mossdale particle release location compared to the Sacramento River and Cache Slough locations, reflecting the fact that Delta outflow differences were modeled to be driven by reservoir releases from the Sacramento River system (i.e., principally Lake Oroville) and north Delta exports, although with some contribution from differences in south Delta exports. The ESO/HOS/LOS scenarios had estimated average proportions of particles reaching Chipps Island averaged across all water years that ranged from 0.24 to 0.28, compared to 0.16 to 0.19 for EBC scenarios, or relative differences of around 30–60% (Table 5C.5.3-139 and Table 5C.5.3-140). Within individual water-year types, average proportions of particles reaching Chipps Island ranged from 0.03–0.04 (EBC scenarios in critical years) to 0.49–0.54 (ESO/HOS/LOS scenarios in wet years). The greatest relative differences in proportion of particles reaching Chipps Island between ESO/HOS/LOS and EBC2 scenarios in the ELT/LLT were in dry years (~110–130% greater under ESO/HOS/LOS scenarios) and the least relative differences in the ELT/LLT were in wet water years (~35–40% greater under ESO/HOS/LOS scenarios).

The Mokelumne River below Cosumnes River confluence particle release location had a broad range of estimated average proportion of particles reaching Chipps Island across scenarios and water-year types. Across all water years, the average proportion was 0.31–0.36 for ESO/LOS scenarios, 0.34–0.39 for HOS scenarios, and 0.36–0.41 for EBC2 scenarios (Table 5C.5.3-141). By water-year type, average proportions ranged from very low values in critical years (0.04–0.06 under ESO/HOS/LOS scenarios; 0.06–0.08 for EBC2 scenarios) to ten times greater values in wet years (0.63–0.68 for ESO/LOS scenarios; 0.67–0.73 for HOS; and 0.69–0.72 for EBC2 scenarios). Relative differences between ESO/HOS/LOS scenarios and EBC scenarios were greater in the LLT than in the ELT and with drier water years than wetter water years. Thus differences ranged from similar or slightly higher average proportion of particles reaching Chipps Island under the HOS_ELT compared to EBC2_ELT in wet, above normal, and below normal years, to ~35% less particles reaching Chipps Island under the ESO_LLT/HOS_LLT/ESO_LLT scenarios in dry or critical years (Table 5C.5.3-142).

Table 5C.5.3-135. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location for EBC, ESO, HOS, and LOS Scenarios[a]

Water-Year Type	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	0.74	0.73	0.72	0.70	0.70	0.67	0.76	0.72	0.71	0.67
Wet	0.94	0.94	0.93	0.91	0.91	0.87	0.96	0.93	0.91	0.87
Above Normal	0.89	0.88	0.87	0.85	0.84	0.80	0.92	0.88	0.84	0.80
Below Normal	0.75	0.73	0.71	0.68	0.69	0.63	0.80	0.72	0.70	0.64
Dry	0.58	0.57	0.54	0.55	0.54	0.52	0.57	0.54	0.54	0.52
Critical	0.39	0.39	0.37	0.38	0.40	0.38	0.41	0.38	0.41	0.38

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-136. Differences[a] between EBC Scenarios and ESO, HOS, and LOS Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Sacramento River at Sutter Slough Release Location[b]

Water-Year Type	Scenarios[c]									
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	-0.03 (-5%)	-0.07 (-10%)	-0.03 (-4%)	-0.07 (-9%)	-0.01 (-2%)	-0.04 (-5%)	0.05 (6%)	0.02 (2%)	-0.01 (-1%)	-0.03 (-5%)
Wet	-0.03 (-3%)	-0.07 (-8%)	-0.03 (-3%)	-0.07 (-8%)	-0.03 (-3%)	-0.04 (-5%)	0.03 (3%)	0.02 (2%)	-0.03 (-3%)	-0.04 (-5%)
Above Normal	-0.05 (-5%)	-0.09 (-10%)	-0.04 (-5%)	-0.09 (-10%)	-0.03 (-4%)	-0.05 (-6%)	0.05 (5%)	0.03 (3%)	-0.03 (-4%)	-0.05 (-6%)
Below Normal	-0.06 (-8%)	-0.12 (-16%)	-0.04 (-6%)	-0.10 (-14%)	-0.02 (-2%)	-0.05 (-7%)	0.10 (14%)	0.04 (6%)	-0.01 (-1%)	-0.04 (-6%)
Dry	-0.04 (-7%)	-0.06 (-10%)	-0.03 (-6%)	-0.05 (-9%)	0.0 (-1%)	-0.02 (-5%)	0.03 (6%)	-0.01 (-1%)	0.0 (0%)	-0.03 (-5%)
Critical	0.01 (3%)	-0.02 (-4%)	0.02 (5%)	-0.01 (-2%)	0.03 (9%)	0.0 (-1%)	0.04 (11%)	0.0 (0%)	0.03 (9%)	0.0 (0%)

[a] Negative values indicate lower proportion of particles reaching Chipps Island under ESO, HOS, or LOS scenarios than under EBC scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-137. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location for EBC, ESO, HOS, and LOS Scenarios[a]

Water-Year Type	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	0.75	0.73	0.73	0.70	0.68	0.66	0.73	0.71	0.68	0.67
Wet	0.93	0.93	0.93	0.89	0.87	0.85	0.93	0.90	0.87	0.85
Above Normal	0.88	0.86	0.87	0.83	0.79	0.77	0.87	0.85	0.79	0.77
Below Normal	0.75	0.71	0.71	0.66	0.64	0.61	0.74	0.69	0.64	0.62
Dry	0.59	0.57	0.56	0.55	0.52	0.53	0.54	0.55	0.52	0.53
Critical	0.43	0.41	0.41	0.41	0.42	0.42	0.42	0.42	0.42	0.42

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-138. Differences[a] between EBC Scenarios and ESO, HOS, and LOS Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Cache Slough at Liberty Island Release Location[b]

Water-Year Type	Scenarios[c]									
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	-0.07 (-9%)	-0.08 (-11%)	-0.05 (-7%)	-0.06 (-8%)	-0.05 (-7%)	-0.03 (-4%)	0.0 (0%)	0.01 (2%)	-0.05 (-7%)	-0.03 (-4%)
Wet	-0.06 (-7%)	-0.09 (-9%)	-0.05 (-6%)	-0.08 (-8%)	-0.06 (-6%)	-0.04 (-5%)	0.0 (0%)	0.01 (1%)	-0.06 (-6%)	-0.04 (-5%)
Above Normal	-0.09 (-10%)	-0.11 (-12%)	-0.07 (-8%)	-0.09 (-10%)	-0.08 (-9%)	-0.05 (-6%)	0.0 (0%)	0.02 (2%)	-0.08 (-9%)	-0.05 (-6%)
Below Normal	-0.11 (-15%)	-0.13 (-18%)	-0.08 (-11%)	-0.10 (-14%)	-0.08 (-11%)	-0.04 (-6%)	0.03 (4%)	0.03 (5%)	-0.07 (-10%)	-0.04 (-6%)
Dry	-0.08 (-13%)	-0.06 (-11%)	-0.05 (-9%)	-0.04 (-7%)	-0.04 (-8%)	-0.02 (-3%)	-0.02 (-3%)	0.0 (0%)	-0.04 (-8%)	-0.02 (-3%)
Critical	-0.01 (-2%)	-0.01 (-2%)	0.01 (2%)	0.01 (2%)	0.01 (2%)	0.01 (2%)	0.01 (3%)	0.01 (3%)	0.01 (2%)	0.01 (2%)

[a] Negative value indicate lower proportion of particles reaching Chipps Island under ESO, HOS, or LOS scenarios than under EBC scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-139. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location for EBC, ESO, HOS, and LOS Scenarios[a]

Water-Year Type	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	0.19	0.19	0.18	0.16	0.28	0.24	0.29	0.26	0.28	0.25
Wet	0.40	0.39	0.39	0.37	0.52	0.49	0.54	0.51	0.54	0.51
Above Normal	0.17	0.16	0.17	0.15	0.28	0.26	0.30	0.28	0.29	0.26
Below Normal	0.12	0.13	0.11	0.08	0.21	0.15	0.23	0.18	0.20	0.15
Dry	0.06	0.06	0.05	0.03	0.10	0.07	0.11	0.08	0.10	0.07
Critical	0.04	0.04	0.04	0.03	0.08	0.06	0.08	0.06	0.08	0.06

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-140. Differences[a] between EBC Scenarios and ESO, HOS, and LOS Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the San Joaquin River at Mossdale Release Location[b]

Water-Year Type	Scenarios[c]									
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	0.09 (46%)	0.06 (29%)	0.09 (48%)	0.06 (31%)	0.09 (52%)	0.08 (49%)	0.11 (60%)	0.09 (58%)	0.10 (55%)	0.09 (52%)
Wet	0.12 (31%)	0.10 (24%)	0.13 (34%)	0.11 (27%)	0.14 (35%)	0.13 (35%)	0.15 (39%)	0.14 (39%)	0.15 (39%)	0.14 (39%)
Above Normal	0.12 (71%)	0.09 (56%)	0.12 (73%)	0.10 (59%)	0.12 (72%)	0.11 (79%)	0.13 (80%)	0.13 (89%)	0.12 (73%)	0.11 (78%)
Below Normal	0.08 (69%)	0.03 (24%)	0.08 (64%)	0.03 (20%)	0.10 (89%)	0.07 (83%)	0.12 (108%)	0.10 (115%)	0.10 (87%)	0.07 (85%)
Dry	0.04 (78%)	0.01 (26%)	0.04 (74%)	0.01 (23%)	0.05 (109%)	0.04 (110%)	0.06 (132%)	0.04 (133%)	0.05 (109%)	0.04 (108%)
Critical	0.04 (111%)	0.02 (46%)	0.04 (104%)	0.02 (41%)	0.04 (111%)	0.03 (91%)	0.05 (119%)	0.03 (97%)	0.04 (112%)	0.03 (90%)

[a] Negative values indicate lower proportion of particles reaching Chipps Island under ESO, HOS, or LOS scenarios than under EBC scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-141. Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location for EBC, ESO, HOS, and LOS Scenarios[a]

Water-Year Type	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	0.41	0.41	0.38	0.36	0.36	0.31	0.39	0.34	0.36	0.31
Wet	0.73	0.72	0.71	0.69	0.68	0.63	0.73	0.67	0.69	0.63
Above Normal	0.51	0.50	0.48	0.46	0.44	0.38	0.49	0.43	0.45	0.39
Below Normal	0.35	0.35	0.30	0.27	0.27	0.19	0.33	0.24	0.27	0.20
Dry	0.17	0.16	0.12	0.11	0.10	0.07	0.11	0.08	0.10	0.07
Critical	0.09	0.08	0.06	0.06	0.06	0.04	0.06	0.04	0.06	0.04

[a] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[b] See Table 5C.0-1 for definitions of the scenarios.

Table 5C.5.3-142. Differences[a] between EBC Scenarios and ESO, HOS, and LOS Scenarios in Weighted Annual Average Proportion of Particles Reaching Chipps Island after 30 Days from the Mokelumne River below the Cosumnes River Confluence Release Location[b]

Water-Year Type	Scenarios[c]									
	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	-0.06 (-14%)	-0.11 (-25%)	-0.05 (-13%)	-0.10 (-24%)	-0.02 (-6%)	-0.05 (-15%)	0.01 (3%)	-0.02 (-6%)	-0.02 (-6%)	-0.05 (-14%)
Wet	-0.05 (-7%)	-0.10 (-14%)	-0.04 (-6%)	-0.10 (-13%)	-0.03 (-4%)	-0.06 (-9%)	0.03 (4%)	-0.02 (-3%)	-0.02 (-3%)	-0.05 (-8%)
Above Normal	-0.07 (-13%)	-0.12 (-24%)	-0.05 (-11%)	-0.11 (-23%)	-0.03 (-7%)	-0.07 (-16%)	0.02 (3%)	-0.03 (-6%)	-0.03 (-7%)	-0.07 (-15%)
Below Normal	-0.08 (-24%)	-0.16 (-45%)	-0.08 (-22%)	-0.15 (-44%)	-0.03 (-12%)	-0.07 (-28%)	0.02 (7%)	-0.02 (-9%)	-0.04 (-12%)	-0.07 (-27%)
Dry	-0.07 (-43%)	-0.10 (-58%)	-0.06 (-39%)	-0.09 (-55%)	-0.02 (-18%)	-0.04 (-35%)	0.0 (-4%)	-0.03 (-25%)	-0.02 (-17%)	-0.04 (-35%)
Critical	-0.03 (-35%)	-0.05 (-52%)	-0.02 (-30%)	-0.04 (-49%)	-0.01 (-12%)	-0.02 (-36%)	-0.01 (-8%)	-0.02 (-34%)	-0.01 (-11%)	-0.02 (-36%)

[a] Negative values indicate lower proportion of particles reaching Chipps Island under ESO, HOS, or LOS scenarios than under EBC scenarios.
[b] Values are from PTM nonlinear regression analysis for fall-run Chinook salmon fry/parr based on 1922–2003 CALSIM modeling period.
[c] See Table 5C.0-1 for definitions of the scenarios.

5C.5.3.8 Sacramento River Reverse Flows Entering Georgiana Slough

5C.5.3.8.1 Monthly Percentage of Sacramento River Reverse Flows Downstream of Georgiana Slough

Based on DSM2-HYDRO Modeling at 15-minute interval, the main trends that were apparent in the monthly percentages of time that the Sacramento River below Georgiana Slough was reversing were related to the relative magnitude of river flow within and between years. Thus, reverse flows were more prevalent during the drier portions of the year (August–October) and in drier years (Table 5C.5.3-143, Table 5C.5.3-144, Table 5C.5.3-145, Table 5C.5.3-146, Table 5C.5.3-147). The percentage of each month with reverse flows ranged from 0% in the winter and spring months of wetter years to over 40% in late summer/fall of drier years. Monthly averages and medians for March, the month with least reverse flow, were 4–12% under EBC2 scenarios and 6–10% for ESO/HOS/LOS scenarios. Monthly averages and medians for August–October, the months that tended to have most reverse flow, were 29–40% under EBC2 scenarios and 33–40% for ESO/HOS/LOS scenarios.

Differences between EBC2 senarios and ESO/HOS/LOS scenarios in the percentage of each month with reverse flows are presented in Table 5C.5.3-148, Table 5C.5.3-149, Table 5C.5.3-150, and Table 5C.5.3-151. Note that the differences shown are ‘absolute’ percentages as opposed to ‘relative’ percentages, e.g., 20% reversed flow under scenario A compared to 10% reversed flow under scenario B would result in 10% greater ‘absolute’ percentage under scenario A (as opposed toa 50% greater for the ‘relative’ percentage).

The monthly percentages of flow reversals under ESO_ELT and ESO_LLT scenarios generally were similar to, or slightly greater than, the percentages of flow reversals under the EBC2 scenario (Table 5C.5.3-148); note that sea level rise is included in the ESO scenarios but not under the EBC2 scenario, which represents current conditions. During the December–June period, which is of particular interest because of downstream salmonid migration, the average and median differences ranged from 1% less reversal under ESO scenarios to 2% more reversal under ESO scenarios. In the other months, the average or median monthly percentage of flow reversals was up to 6% more under ESO scenarios.

Accounting for sea level rise, the analyses suggested that the monthly percentage of flow reversals under the ESO scenarios generally would be similar to, or slightly lower than, the percentage of flow reversals under the EBC2_ELT and EBC2_LLT scenarios (Table 5C.5.3-149). During December–June, the average and median differences ranged from no difference between ESO and EBC2_ELT and EBC2_LLT scenarios to 5% less entry under ESO scenarios. In the other months, the average or median monthly percentage of flow reversals ranged from 3% less under ESO scenarios to 4% more under ESO scenarios (Table 5C.5.3-149).

Comparisons of HOS/LOS scenarios to EBC2_ELT and EBC2_LLT scenarios gave very similar results to the ESO EBC2_ELT/EBC2_LLT comparison described above. During December–June, the average and median differences ranged from no difference between HOS and EBC2_ELT and EBC2_LLT scenarios to 6% less entry under HOS scenarios (Table 5C.5.3-150). In the other months, the average or median monthly percentage of flow reversals ranged from 1% less under HOS scenarios to 5% more under HOS scenarios (Table 5C.5.3-150). For the LOS scenarios during December–June, the average and median differences ranged from no difference between LOS and EBC2_ELT and EBC2_LLT scenarios to 5% less entry under HOS scenarios (Table 5C.5.3-151). In the other months, the average or median monthly percentage of flow reversals ranged from 3% less under LOS scenarios to 6% more under LOS scenarios (Table 5C.5.3-151).

Table 5C.5.3-143. Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Slough under EBC2[a, b]

Water Year[c]	Month											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976 (C)	17%	9%	20%	24%	23%	18%	29%	38%	39%	29%	35%	39%
1977 (C)	39%	39%	37%	29%	31%	33%	32%	39%	39%	37%	40%	41%
1978 (AN)	41%	39%	18%	2%	1%	0%	0%	9%	27%	23%	30%	21%
1979 (BN)	34%	22%	25%	11%	12%	3%	18%	16%	31%	22%	30%	35%
1980 (AN)	36%	21%	13%	0%	0%	0%	9%	18%	32%	29%	32%	29%
1981 (D)	36%	29%	17%	15%	2%	6%	21%	31%	32%	25%	26%	33%
1982 (W)	38%	14%	0%	0%	0%	0%	0%	0%	18%	32%	34%	15%
1983 (W)	7%	0%	0%	0%	0%	0%	0%	0%	0%	11%	26%	0%
1984 (W)	10%	0%	0%	0%	0%	0%	18%	24%	33%	17%	31%	1%
1985 (D)	35%	7%	4%	17%	16%	17%	22%	25%	33%	24%	27%	33%
1986 (W)	36%	30%	17%	7%	0%	0%	10%	22%	34%	21%	30%	18%
1987 (D)	36%	28%	26%	19%	9%	6%	29%	28%	32%	26%	38%	41%
1988 (C)	39%	38%	12%	4%	19%	34%	25%	33%	34%	31%	40%	41%
1989 (D)	41%	32%	28%	18%	31%	1%	4%	18%	30%	22%	25%	37%
1990 (C)	37%	37%	29%	10%	17%	22%	26%	35%	38%	28%	33%	41%
1991 (C)	41%	40%	38%	26%	31%	4%	21%	36%	38%	27%	39%	42%
Average	33%	24%	18%	11%	12%	9%	16%	23%	31%	25%	32%	29%
Median	36%	29%	18%	10%	10%	4%	20%	25%	32%	25%	31%	34%

[a] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[b] See Table 5C.0-1 for a definition of the scenario.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.

Table 5C.5.3-144. Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Slough under EBC2_ELT and EBC2_LLT[a, b],

Water Year[c]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	24%	33%	16%	14%	23%	28%	25%	29%	24%	30%	20%	23%	29%	29%	26%	27%	39%	38%	28%	31%	37%	41%	42%	43%
1977 (C)	40%	38%	38%	40%	38%	40%	23%	14%	35%	38%	35%	37%	34%	36%	40%	42%	40%	41%	41%	42%	42%	43%	42%	43%
1978 (AN)	44%	44%	40%	41%	19%	21%	1%	1%	0%	0%	0%	0%	0%	0%	14%	22%	33%	31%	24%	25%	31%	33%	24%	27%
1979 (BN)	35%	34%	24%	28%	26%	28%	12%	14%	13%	15%	4%	6%	20%	23%	24%	32%	31%	31%	27%	30%	34%	35%	36%	38%
1980 (AN)	39%	36%	25%	28%	15%	18%	0%	0%	0%	0%	0%	0%	11%	16%	24%	29%	36%	36%	27%	14%	32%	34%	29%	32%
1981 (D)	37%	38%	26%	32%	19%	23%	16%	18%	3%	6%	13%	16%	24%	27%	34%	34%	32%	35%	26%	20%	27%	30%	36%	41%
1982 (W)	40%	36%	14%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	5%	27%	30%	29%	15%	33%	32%	11%	1%
1983 (W)	19%	35%	2%	7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	26%	36%	33%	36%	16%	17%
1984 (W)	16%	20%	1%	2%	0%	0%	0%	0%	0%	0%	0%	0%	20%	25%	28%	34%	34%	34%	20%	20%	31%	33%	1%	3%
1985 (D)	29%	29%	10%	13%	6%	12%	18%	23%	17%	19%	20%	25%	25%	30%	30%	31%	36%	35%	16%	12%	30%	35%	35%	40%
1986 (W)	39%	36%	33%	37%	18%	22%	7%	10%	0%	0%	0%	0%	11%	15%	28%	35%	38%	36%	13%	25%	31%	34%	18%	19%
1987 (D)	36%	37%	30%	26%	28%	31%	21%	25%	11%	14%	7%	9%	29%	34%	29%	27%	33%	37%	29%	29%	41%	40%	41%	42%
1988 (C)	40%	40%	38%	40%	13%	16%	5%	7%	28%	31%	33%	34%	28%	31%	33%	36%	35%	37%	35%	36%	42%	40%	42%	43%
1989 (D)	42%	40%	32%	35%	29%	33%	20%	25%	32%	35%	1%	2%	6%	8%	17%	19%	32%	36%	24%	28%	30%	32%	38%	40%
1990 (C)	31%	34%	32%	39%	32%	39%	12%	16%	19%	24%	26%	30%	28%	29%	37%	39%	38%	40%	31%	18%	39%	42%	42%	42%
1991 (C)	41%	42%	40%	42%	39%	41%	36%	40%	32%	35%	5%	6%	23%	24%	38%	40%	39%	40%	26%	34%	40%	41%	42%	43%
Average	34%	36%	25%	28%	19%	22%	12%	14%	13%	15%	10%	12%	18%	20%	25%	28%	33%	33%	26%	26%	35%	36%	31%	32%
Median	38%	36%	28%	30%	19%	22%	12%	14%	12%	14%	5%	6%	22%	25%	28%	31%	35%	36%	27%	26%	33%	35%	36%	40%

[a] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-145. Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Slough under ESO_ELT and ESO_LLT[a, b],

Water Year[b]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	36%	37%	26%	19%	23%	24%	25%	26%	25%	26%	19%	19%	30%	28%	27%	13%	37%	38%	25%	32%	39%	41%	39%	42%
1977 (C)	37%	40%	36%	38%	37%	38%	32%	1%	29%	38%	30%	37%	33%	36%	40%	42%	38%	39%	37%	38%	40%	41%	38%	41%
1978 (AN)	41%	44%	39%	40%	20%	15%	2%	1%	2%	1%	0%	0%	1%	1%	20%	20%	32%	32%	11%	6%	24%	28%	29%	33%
1979 (BN)	37%	39%	35%	36%	25%	33%	11%	11%	13%	13%	7%	6%	19%	18%	21%	29%	27%	27%	36%	38%	38%	40%	38%	40%
1980 (AN)	37%	4%	35%	35%	14%	13%	0%	0%	0%	0%	0%	0%	17%	15%	25%	25%	34%	36%	22%	20%	38%	39%	35%	32%
1981 (D)	37%	38%	35%	36%	19%	19%	16%	14%	7%	6%	14%	13%	24%	24%	32%	22%	28%	28%	9%	19%	30%	35%	39%	37%
1982 (W)	38%	39%	17%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	9%	30%	27%	22%	9%	29%	31%	20%	21%
1983 (W)	34%	37%	12%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	30%	32%	37%	39%	30%	26%
1984 (W)	30%	32%	3%	7%	0%	0%	0%	0%	2%	2%	3%	2%	22%	24%	27%	31%	31%	29%	13%	21%	36%	37%	20%	11%
1985 (D)	39%	40%	15%	15%	5%	5%	17%	19%	17%	15%	19%	18%	23%	24%	31%	21%	25%	30%	1%	1%	25%	25%	39%	33%
1986 (W)	37%	39%	37%	38%	17%	16%	7%	4%	0%	0%	0%	0%	16%	16%	28%	34%	35%	34%	21%	21%	38%	40%	20%	18%
1987 (D)	36%	37%	30%	31%	26%	25%	20%	19%	11%	9%	9%	8%	25%	17%	28%	16%	32%	34%	31%	36%	39%	39%	39%	41%
1988 (C)	38%	32%	37%	38%	12%	11%	6%	4%	26%	24%	32%	27%	26%	26%	33%	34%	31%	32%	37%	40%	39%	37%	39%	35%
1989 (D)	38%	41%	34%	35%	29%	24%	20%	21%	31%	34%	2%	2%	7%	3%	10%	6%	28%	28%	21%	29%	34%	33%	39%	37%
1990 (C)	35%	34%	32%	37%	26%	12%	12%	12%	19%	19%	24%	24%	22%	23%	37%	39%	36%	38%	35%	32%	39%	40%	40%	42%
1991 (C)	40%	42%	39%	42%	38%	41%	32%	31%	32%	35%	6%	6%	22%	23%	38%	40%	38%	38%	34%	36%	37%	40%	39%	40%
Average	37%	36%	29%	30%	18%	17%	12%	10%	13%	14%	10%	10%	18%	17%	25%	24%	30%	31%	24%	25%	35%	37%	34%	33%
Median	37%	38%	34%	36%	20%	16%	12%	7%	12%	11%	7%	6%	22%	20%	27%	23%	32%	32%	24%	30%	38%	39%	39%	36%

[a] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-146. Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Slough under HOS_ELT and HOS_LLT[a, b],

Water Year[c]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	35%	37%	28%	19%	23%	24%	25%	26%	24%	26%	13%	19%	30%	28%	27%	13%	37%	38%	26%	27%	35%	39%	40%	38%
1977 (C)	37%	39%	36%	38%	37%	38%	31%	29%	35%	35%	34%	37%	33%	35%	40%	41%	38%	40%	36%	37%	40%	41%	40%	41%
1978 (AN)	42%	44%	39%	40%	20%	15%	2%	1%	2%	1%	0%	0%	1%	1%	19%	20%	32%	32%	11%	26%	32%	33%	36%	33%
1979 (BN)	37%	38%	35%	36%	30%	28%	11%	10%	13%	13%	7%	6%	19%	18%	21%	27%	27%	29%	36%	37%	34%	39%	39%	40%
1980 (AN)	37%	5%	31%	35%	11%	13%	0%	0%	0%	0%	0%	0%	0%	0%	1%	4%	33%	37%	35%	37%	39%	38%	35%	32%
1981 (D)	36%	38%	35%	36%	19%	18%	16%	14%	7%	6%	14%	13%	24%	24%	34%	32%	33%	35%	26%	30%	28%	27%	39%	39%
1982 (W)	37%	30%	17%	19%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	9%	30%	27%	20%	36%	36%	33%	28%	21%
1983 (W)	33%	37%	13%	15%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	30%	32%	37%	39%	30%	28%
1984 (W)	30%	31%	3%	5%	0%	0%	0%	0%	2%	2%	3%	2%	1%	2%	6%	10%	35%	35%	20%	24%	26%	34%	19%	11%
1985 (D)	39%	39%	15%	15%	6%	5%	17%	19%	17%	16%	19%	18%	23%	24%	31%	23%	29%	32%	14%	13%	30%	31%	39%	38%
1986 (W)	37%	34%	37%	38%	17%	16%	7%	6%	0%	0%	0%	0%	13%	15%	28%	34%	36%	36%	31%	24%	38%	40%	19%	18%
1987 (D)	36%	37%	30%	31%	26%	29%	20%	19%	11%	9%	9%	8%	25%	26%	28%	17%	32%	33%	31%	36%	39%	38%	39%	41%
1988 (C)	36%	30%	37%	38%	11%	10%	6%	7%	27%	25%	34%	30%	26%	26%	34%	35%	33%	34%	38%	39%	38%	37%	40%	36%
1989 (D)	37%	41%	35%	37%	29%	29%	14%	21%	32%	34%	2%	2%	8%	6%	10%	7%	31%	30%	27%	30%	36%	38%	35%	38%
1990 (C)	37%	27%	36%	37%	32%	33%	12%	12%	19%	20%	24%	24%	26%	22%	37%	39%	37%	38%	38%	35%	36%	35%	40%	39%
1991 (C)	39%	43%	39%	40%	38%	41%	31%	36%	32%	34%	6%	6%	22%	23%	38%	40%	39%	38%	39%	33%	38%	39%	40%	39%
Average	37%	34%	29%	30%	19%	19%	12%	12%	14%	14%	10%	10%	16%	16%	22%	22%	31%	33%	29%	31%	35%	36%	35%	33%
Median	37%	37%	35%	36%	20%	17%	12%	11%	12%	11%	7%	6%	20%	20%	27%	22%	33%	34%	30%	33%	36%	38%	39%	38%

[a] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-147. Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Sloughunder LOS_ELT and LOS_LLT[a, b]

Water Year[c]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	33%	29%	36%	35%	27%	25%	14%	2%	25%	26%	19%	19%	29%	29%	27%	13%	37%	38%	17%	28%	38%	40%	39%	41%
1977 (C)	37%	31%	36%	38%	37%	38%	31%	1%	32%	36%	33%	37%	31%	36%	40%	42%	38%	39%	37%	38%	40%	41%	39%	41%
1978 (AN)	42%	44%	39%	40%	20%	19%	2%	1%	2%	1%	0%	0%	1%	1%	20%	20%	32%	32%	10%	6%	23%	29%	21%	38%
1979 (BN)	37%	31%	35%	36%	29%	26%	11%	10%	13%	13%	7%	6%	19%	18%	21%	29%	27%	28%	36%	38%	39%	40%	39%	40%
1980 (AN)	37%	16%	35%	35%	14%	13%	0%	0%	0%	0%	0%	0%	17%	15%	25%	26%	34%	36%	25%	20%	38%	39%	39%	40%
1981 (D)	37%	39%	35%	37%	19%	17%	16%	14%	7%	6%	13%	12%	23%	23%	31%	26%	28%	29%	9%	18%	33%	33%	39%	34%
1982 (W)	37%	39%	17%	18%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	9%	30%	27%	22%	9%	29%	30%	35%	39%
1983 (W)	33%	38%	12%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	30%	32%	37%	39%	30%	36%
1984 (W)	30%	31%	3%	4%	0%	0%	0%	0%	2%	2%	3%	2%	22%	24%	27%	31%	31%	29%	13%	21%	36%	38%	39%	40%
1985 (D)	39%	41%	15%	15%	3%	2%	17%	19%	17%	15%	19%	18%	21%	22%	30%	22%	25%	29%	1%	1%	24%	17%	35%	29%
1986 (W)	37%	39%	37%	38%	17%	17%	7%	4%	0%	0%	0%	0%	16%	16%	28%	33%	35%	34%	22%	19%	38%	40%	38%	40%
1987 (D)	36%	38%	35%	36%	27%	29%	14%	9%	11%	10%	9%	8%	25%	17%	28%	16%	32%	33%	30%	34%	38%	38%	39%	41%
1988 (C)	36%	23%	37%	38%	11%	10%	6%	7%	27%	25%	32%	27%	26%	26%	33%	34%	32%	31%	38%	40%	39%	37%	40%	36%
1989 (D)	38%	41%	34%	35%	29%	25%	20%	21%	30%	34%	2%	2%	7%	3%	9%	6%	28%	29%	20%	29%	34%	33%	40%	38%
1990 (C)	35%	33%	30%	37%	26%	13%	12%	12%	19%	20%	24%	24%	22%	19%	37%	39%	36%	38%	37%	33%	39%	38%	40%	40%
1991 (C)	40%	43%	39%	42%	38%	40%	31%	40%	32%	31%	6%	6%	22%	23%	38%	40%	38%	38%	34%	36%	36%	41%	39%	41%
Average	36%	35%	30%	31%	18%	17%	11%	9%	14%	14%	10%	10%	18%	17%	25%	24%	30%	31%	24%	25%	35%	36%	37%	38%
Median	37%	38%	35%	36%	20%	17%	12%	5%	12%	12%	7%	6%	21%	19%	28%	26%	32%	32%	24%	28%	38%	38%	39%	40%

[a] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-148. Differences[a] between EBC2 Scenario and ESO_ELT and ESO_LLT Scenarios[b] in Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Slough[c],

Water Year[d]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	19%	20%	17%	10%	3%	3%	2%	2%	3%	3%	1%	1%	1%	-1%	-11%	-25%	-2%	-1%	-4%	3%	3%	5%	1%	3%
1977 (C)	-2%	0%	-2%	-1%	0%	1%	2%	-28%	-2%	6%	-3%	4%	1%	3%	1%	2%	0%	1%	0%	1%	0%	1%	-3%	0%
1978 (AN)	0%	3%	-1%	1%	1%	-4%	0%	-1%	1%	0%	0%	0%	1%	1%	10%	11%	5%	5%	-13%	-18%	-6%	-2%	8%	12%
1979 (BN)	3%	5%	13%	14%	0%	8%	1%	0%	1%	1%	4%	2%	1%	0%	5%	14%	-4%	-4%	15%	16%	9%	10%	4%	6%
1980 (AN)	0%	-32%	14%	14%	2%	0%	0%	0%	0%	0%	0%	0%	8%	6%	7%	7%	2%	4%	-7%	-10%	7%	8%	6%	4%
1981 (D)	1%	2%	5%	6%	2%	2%	2%	0%	5%	4%	8%	7%	3%	3%	2%	-9%	-4%	-3%	-16%	-6%	3%	9%	6%	4%
1982 (W)	-1%	1%	4%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	9%	12%	8%	-10%	-22%	-5%	-2%	5%	6%
1983 (W)	26%	30%	12%	16%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	20%	21%	12%	14%	29%	26%
1984 (W)	20%	22%	3%	6%	0%	0%	0%	0%	2%	2%	3%	2%	4%	6%	3%	8%	-3%	-5%	-4%	4%	5%	7%	19%	10%
1985 (D)	3%	4%	8%	8%	1%	1%	0%	2%	1%	-1%	1%	1%	1%	3%	6%	-4%	-8%	-3%	-23%	-23%	-2%	-2%	6%	0%
1986 (W)	1%	3%	7%	8%	0%	0%	0%	-3%	0%	0%	0%	0%	6%	7%	6%	11%	2%	1%	0%	0%	7%	9%	2%	0%
1987 (D)	0%	1%	3%	3%	0%	-1%	1%	0%	2%	0%	3%	2%	-4%	-12%	-1%	-12%	0%	2%	6%	10%	1%	2%	-2%	0%
1988 (C)	-1%	-7%	-1%	1%	0%	-1%	2%	0%	7%	5%	-2%	-7%	1%	1%	0%	0%	-3%	-2%	6%	9%	-1%	-3%	-2%	-6%
1989 (D)	-3%	0%	2%	4%	1%	-4%	2%	3%	0%	2%	1%	0%	3%	-1%	-8%	-12%	-2%	-2%	-1%	7%	9%	8%	2%	0%
1990 (C)	-3%	-4%	-5%	0%	-3%	-17%	2%	1%	3%	2%	2%	2%	-4%	-3%	2%	4%	-2%	0%	7%	3%	6%	8%	-1%	1%
1991 (C)	-1%	1%	0%	3%	0%	3%	6%	6%	1%	5%	2%	2%	1%	2%	1%	3%	0%	0%	7%	10%	-3%	0%	-2%	-1%
Average	4%	3%	5%	6%	0%	-1%	1%	-1%	1%	2%	1%	1%	1%	1%	2%	0%	0%	1%	-1%	0%	3%	4%	5%	4%
Median	0%	2%	3%	5%	0%	0%	1%	0%	1%	2%	1%	1%	1%	1%	2%	3%	-1%	0%	0%	3%	3%	6%	3%	2%

[a] Negative numbers indicate greater percentage of reverse flows under EBC2 than under ESO.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-149. Differences[a] between EBC2_ELT and ESO_ELT and between EBC2_LLT and ESO_LLT[b] in Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Slough[c]

Water Year[d]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	12%	3%	10%	5%	0%	-4%	0%	-3%	1%	-4%	-1%	-4%	1%	-2%	0%	-14%	-2%	0%	-2%	1%	2%	-1%	-2%	-1%
1977 (C)	-3%	2%	-2%	-2%	-1%	-2%	8%	-13%	-5%	0%	-5%	0%	-1%	0%	0%	0%	-1%	-1%	-4%	-3%	-2%	-1%	-4%	-2%
1978 (AN)	-2%	1%	-1%	-1%	1%	-6%	0%	0%	2%	1%	0%	0%	1%	1%	6%	-1%	-1%	1%	-13%	-19%	-7%	-4%	6%	6%
1979 (BN)	2%	5%	11%	8%	-1%	4%	-1%	-4%	0%	-2%	3%	0%	-1%	-5%	-4%	-2%	-4%	-3%	9%	8%	4%	5%	2%	3%
1980 (AN)	-2%	-32%	10%	6%	0%	-5%	0%	0%	0%	0%	0%	0%	5%	-1%	1%	-4%	-1%	0%	-5%	6%	6%	6%	6%	0%
1981 (D)	0%	0%	8%	4%	0%	-4%	0%	-4%	4%	0%	0%	-3%	0%	-3%	-1%	-12%	-5%	-6%	-18%	-1%	3%	5%	3%	-4%
1982 (W)	-2%	3%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	4%	3%	-3%	-7%	-6%	-4%	-1%	10%	20%
1983 (W)	15%	2%	11%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	4%	-4%	4%	3%	14%	9%
1984 (W)	14%	12%	3%	5%	0%	0%	0%	0%	2%	2%	3%	2%	2%	-1%	0%	-2%	-4%	-5%	-6%	1%	4%	4%	19%	8%
1985 (D)	9%	11%	5%	2%	-1%	-6%	-2%	-5%	0%	-4%	-2%	-6%	-2%	-6%	1%	-10%	-11%	-5%	-15%	-11%	-5%	-10%	3%	-7%
1986 (W)	-2%	2%	4%	1%	-2%	-5%	-1%	-6%	0%	0%	0%	0%	5%	1%	0%	-2%	-2%	-1%	8%	-4%	7%	6%	2%	-1%
1987 (D)	0%	-1%	0%	5%	-2%	-5%	-2%	-6%	0%	-5%	1%	-1%	-4%	-17%	-1%	-11%	-1%	-3%	2%	7%	-3%	-1%	-2%	-1%
1988 (C)	-2%	-7%	-2%	-2%	-2%	-5%	1%	-2%	-2%	-7%	-1%	-7%	-2%	-4%	0%	-3%	-4%	-5%	2%	3%	-2%	-3%	-2%	-8%
1989 (D)	-4%	1%	2%	0%	-1%	-9%	-1%	-4%	-1%	-2%	1%	0%	1%	-4%	-8%	-13%	-5%	-7%	-3%	1%	4%	2%	1%	-2%
1990 (C)	3%	0%	0%	-2%	-6%	-27%	0%	-4%	0%	-5%	-2%	-5%	-6%	-7%	0%	-1%	-3%	-2%	4%	13%	0%	-1%	-2%	0%
1991 (C)	-2%	-1%	-1%	0%	-1%	0%	-4%	-8%	0%	0%	1%	0%	-1%	-1%	0%	0%	-1%	-2%	8%	2%	-3%	-2%	-3%	-3%
Average	2%	0%	4%	3%	-1%	-5%	0%	-4%	0%	-2%	0%	-2%	0%	-3%	0%	-5%	-2%	-2%	-2%	0%	0%	0%	3%	1%
Median	-1%	1%	3%	2%	-1%	-4%	0%	-4%	0%	0%	0%	0%	0%	-2%	0%	-2%	-2%	-3%	-3%	1%	1%	-1%	2%	-1%

[a] Negative values indicate greater percentage of reverse flows under EBC2 scenarios.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-150. Differences[a] between EBC2_ELT and HOS_ELT and between EBC_LLT and HOS_LLT[b] in Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Slough[c]

Water Year[d]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	10%	3%	12%	4%	0%	-4%	0%	-3%	0%	-4%	-7%	-4%	1%	-2%	1%	-14%	-2%	0%	-2%	-3%	-2%	-2%	-2%	-5%
1977 (C)	-3%	1%	-2%	-2%	-1%	-2%	8%	14%	0%	-2%	-1%	0%	0%	-1%	0%	-1%	-1%	-1%	-5%	-4%	-2%	-1%	-2%	-2%
1978 (AN)	-2%	1%	-1%	-1%	1%	-6%	0%	0%	2%	1%	0%	0%	1%	1%	6%	-2%	0%	2%	-13%	1%	2%	0%	12%	6%
1979 (BN)	2%	4%	11%	8%	4%	-1%	-1%	-4%	0%	-2%	3%	0%	-1%	-5%	-4%	-5%	-4%	-2%	9%	7%	0%	4%	2%	2%
1980 (AN)	-2%	-31%	6%	6%	-4%	-6%	0%	0%	0%	0%	0%	0%	-11%	-16%	-23%	-25%	-2%	1%	8%	23%	7%	5%	6%	0%
1981 (D)	-1%	0%	9%	4%	0%	-4%	0%	-4%	4%	0%	0%	-3%	0%	-3%	0%	-2%	1%	0%	0%	11%	1%	-4%	3%	-2%
1982 (W)	-2%	-6%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	4%	3%	-3%	-9%	21%	3%	1%	17%	20%
1983 (W)	14%	2%	11%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	4%	-4%	4%	3%	14%	11%
1984 (W)	14%	11%	3%	3%	0%	0%	0%	0%	2%	2%	3%	2%	-19%	-23%	-21%	-24%	0%	1%	0%	4%	-5%	1%	18%	8%
1985 (D)	10%	11%	5%	2%	0%	-6%	-1%	-5%	0%	-3%	-2%	-6%	-2%	-6%	1%	-8%	-7%	-3%	-1%	1%	0%	-4%	4%	-3%
1986 (W)	-2%	-2%	5%	1%	-2%	-5%	-1%	-4%	0%	0%	0%	0%	2%	-1%	0%	-2%	-2%	0%	17%	-1%	7%	6%	1%	-1%
1987 (D)	0%	-1%	0%	5%	-1%	-1%	-2%	-6%	0%	-5%	1%	-1%	-4%	-8%	-1%	-10%	-1%	-3%	2%	6%	-3%	-2%	-2%	-1%
1988 (C)	-4%	-10%	-2%	-2%	-2%	-5%	1%	0%	-1%	-6%	0%	-4%	-2%	-4%	1%	-1%	-2%	-2%	4%	3%	-4%	-3%	-2%	-7%
1989 (D)	-4%	1%	3%	2%	-1%	-5%	-7%	-4%	0%	-1%	1%	0%	2%	-2%	-7%	-12%	-2%	-6%	3%	1%	6%	6%	-3%	-2%
1990 (C)	5%	-7%	4%	-2%	-1%	-6%	0%	-3%	-1%	-4%	-2%	-6%	-2%	-7%	0%	-1%	-1%	-1%	7%	17%	-3%	-7%	-2%	-3%
1991 (C)	-3%	1%	-1%	-2%	-1%	0%	-5%	-4%	-1%	-1%	1%	0%	-1%	-1%	0%	1%	0%	-2%	13%	-1%	-2%	-2%	-3%	-4%
Average	2%	-1%	4%	2%	0%	-3%	0%	-1%	0%	-2%	0%	-1%	-2%	-5%	-3%	-6%	-1%	-1%	2%	5%	1%	0%	4%	1%
Median	-1%	1%	3%	2%	0%	-4%	0%	-3%	0%	-1%	0%	0%	-1%	-2%	0%	-2%	-1%	-1%	3%	2%	0%	-1%	2%	-1%

[a] Negative numbers indicate greater percentage of reverse flows under EBC2 scenarios.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-151. Differences[a] between EBC2_ELT and LOS_ELT and between EBC2_LLT and LOS_LLT[b] in Percentage of Each Month With Reverse Flows in the Sacramento River below Georgiana Slough[c]

Water Year[d]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	9%	-5%	20%	21%	4%	-2%	-12%	-26%	1%	-4%	-1%	-4%	0%	-1%	1%	-14%	-2%	0%	-10%	-3%	1%	-1%	-2%	-2%
1977 (C)	-3%	-7%	-2%	-2%	-2%	-2%	8%	-13%	-3%	-1%	-1%	0%	-2%	0%	0%	0%	-1%	-1%	-3%	-4%	-2%	-1%	-3%	-2%
1978 (AN)	-2%	1%	-1%	-1%	1%	-2%	0%	0%	2%	1%	0%	0%	1%	1%	6%	-1%	0%	1%	-14%	-19%	-8%	-4%	-3%	12%
1979 (BN)	2%	-3%	11%	8%	3%	-3%	-1%	-4%	0%	-2%	3%	0%	-1%	-5%	-4%	-2%	-4%	-2%	9%	8%	4%	5%	3%	3%
1980 (AN)	-2%	-20%	10%	6%	-1%	-5%	0%	0%	0%	0%	0%	0%	5%	-1%	1%	-3%	-1%	0%	-3%	6%	6%	6%	9%	8%
1981 (D)	0%	0%	9%	5%	0%	-5%	0%	-5%	4%	0%	0%	-3%	-1%	-4%	-3%	-8%	-5%	-6%	-17%	-1%	6%	3%	3%	-7%
1982 (W)	-3%	3%	3%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	4%	3%	-3%	-7%	-6%	-4%	-2%	25%	38%
1983 (W)	14%	3%	11%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	9%	4%	-4%	4%	3%	14%	19%
1984 (W)	14%	11%	3%	2%	0%	0%	0%	0%	2%	2%	3%	2%	2%	-1%	0%	-2%	-4%	-5%	-7%	1%	5%	5%	38%	38%
1985 (D)	10%	12%	4%	3%	-3%	-9%	-2%	-5%	0%	-4%	-2%	-6%	-4%	-8%	0%	-9%	-11%	-6%	-15%	-11%	-6%	-18%	0%	-11%
1986 (W)	-2%	2%	4%	1%	-2%	-5%	0%	-6%	0%	0%	0%	0%	5%	1%	0%	-2%	-2%	-2%	9%	-6%	7%	6%	20%	21%
1987 (D)	1%	1%	5%	11%	-1%	-2%	-8%	-16%	0%	-4%	1%	-1%	-4%	-17%	-1%	-11%	-1%	-4%	1%	5%	-3%	-2%	-2%	-1%
1988 (C)	-4%	-17%	-2%	-2%	-2%	-5%	1%	0%	-1%	-6%	-1%	-7%	-2%	-4%	0%	-3%	-4%	-5%	3%	3%	-2%	-3%	-2%	-7%
1989 (D)	-4%	1%	2%	0%	-1%	-8%	-1%	-4%	-2%	-1%	1%	0%	1%	-4%	-8%	-13%	-4%	-7%	-3%	1%	4%	2%	1%	-2%
1990 (C)	3%	-1%	-2%	-2%	-7%	-26%	0%	-4%	-1%	-4%	-2%	-6%	-6%	-11%	0%	-1%	-2%	-2%	6%	15%	0%	-4%	-2%	-2%
1991 (C)	-2%	0%	-1%	0%	-1%	0%	-5%	0%	0%	-4%	1%	0%	-1%	-1%	0%	0%	-1%	-2%	8%	2%	-4%	0%	-3%	-2%
Average	2%	-1%	5%	4%	-1%	-5%	-1%	-5%	0%	-2%	0%	-2%	0%	-4%	0%	-4%	-3%	-2%	-3%	-1%	1%	0%	6%	6%
Median	-1%	1%	4%	1%	-1%	-3%	0%	-4%	0%	-1%	0%	0%	0%	-1%	0%	-2%	-2%	-2%	-3%	0%	1%	-1%	1%	-2%

[a] Negative numbers indicate greater percentage of reverse flows under EBC2 scenarios.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2-HYDRO Modeling (Channel 423 at 1000 feet; SAC_37).
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

5C.5.3.8.2 Percentage of Total Sacramento River Flow Entering Georgiana Slough

The monthly average percentage of total Sacramento River flow at the Sacramento River-Georgiana Slough junction that entered Georgiana Slough ranged from 20% in October 1978 for ESO_LLT, HOS_LLT, and LOS_LLT scenarios; to 48% in July or August of several years under the EBC2 and EBC2_ELT scenarios (Table 5C.5.3-152, Table 5C.5.3-153, Table 5C.5.3-154, Table 5C.5.3-155, and Table 5C.5.3-156). Within the December–June period that is of prime importance to downstream migrating salmonids and during which nearly all flow entering the interior Delta from the Sacramento River would be through Georgiana Slough because of DCC closure, the monthly average percentage ranged from 28– to 46% under all EBC2 scenarios and the ESO_ELT/HOS_ELT/LOS_ELT scenarios. The minimum and maximum monthly average percentage for the ESO_LLT/HOS_LLT/LOS_LLT scenarios were lower than for the other scenarios, and ranged from 24– to 43% (Table 5C.5.3-154, Table 5C.5.3-155, and Table 5C.5.3-156).

Differences between EBC scenarios and ESO/HOS/LOS scenarios in the monthly average percentage of total Sacramento River flow at the Sacramento River-Georgiana Slough junction that entered Georgiana Slough varied by month (Table 5C.5.3-157, Table 5C.5.3-158, Table 5C.5.3-159, and Table 5C.5.3-160). In general, there was little difference between the EBC and ESO/HOS/LOS scenarios in the months of January–March: the average or median difference ranged from 3% less under ESO/HOS/LOS to no difference (0%). Differences progressively got larger from April through June, with average and median differences ranging from 2% lower under ESO_ELT/HOS_ELT/LOS_ELT scenarios in April to 9–10% lower under the ESO_LLT scenario compared to the EBC2 scenario in June (Table 5C.5.3-157). Differences between EBC2 scenarios and ESO/HOS/LOS scenarios were greater in the LLT than other time periods.

Computing averages weighted by the CALSIM water-year type percentages gave similar or slightly different averages and differences between averages to the results from the original DSM2 simulations (Table 5C.5.3-161). The overall conclusion—a similar or lower percentage of total Sacramento River flow entering Georgiana Slough under ESO/HOS/LOS scenarios compared to EBC scenarios—remained applicable for the recomputed averages based on the CALSIM water-year type percentages.

1 **Table 5C.5.3-152. Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-**
2 **Georgiana Slough Junction Entering Georgiana Slough under EBC2[a, b]**

Water Year[c]	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
1976 (C)	43%	39%	45%	45%	46%	44%	46%	38%	37%	48%	44%	38%
1977 (C)	37%	36%	38%	45%	45%	45%	46%	34%	37%	42%	36%	33%
1978 (AN)	32%	35%	39%	31%	31%	29%	30%	38%	45%	46%	48%	46%
1979 (BN)	45%	43%	45%	39%	38%	34%	42%	43%	44%	46%	48%	45%
1980 (AN)	42%	43%	41%	29%	29%	29%	39%	43%	43%	47%	47%	47%
1981 (D)	42%	45%	43%	41%	35%	37%	43%	44%	45%	47%	48%	47%
1982 (W)	39%	38%	29%	29%	29%	29%	29%	31%	42%	46%	45%	42%
1983 (W)	39%	31%	29%	29%	29%	29%	29%	29%	29%	37%	46%	33%
1984 (W)	40%	31%	29%	29%	30%	30%	42%	44%	44%	43%	47%	32%
1985 (D)	42%	37%	36%	43%	43%	44%	45%	45%	45%	47%	48%	46%
1986 (W)	44%	43%	42%	37%	29%	29%	37%	44%	41%	45%	47%	42%
1987 (D)	41%	44%	46%	44%	39%	36%	46%	45%	45%	47%	41%	34%
1988 (C)	37%	38%	40%	35%	44%	42%	45%	42%	43%	47%	33%	33%
1989 (D)	34%	37%	41%	43%	44%	31%	36%	42%	45%	46%	46%	41%
1990 (C)	40%	39%	45%	39%	43%	45%	45%	39%	35%	47%	46%	32%
1991 (C)	33%	34%	37%	44%	42%	34%	40%	40%	38%	47%	37%	32%
Average	40%	38%	39%	38%	37%	35%	40%	40%	41%	46%	44%	39%
Median	40%	38%	40%	39%	38%	34%	42%	42%	43%	47%	46%	40%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for a definition of the scenario.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.

3

Table 5C.5.3-153. Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering Georgiana Slough under EBC2_ELT and EBC2_LLT[a, b]

Water Year[c]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	45%	44%	42%	41%	46%	46%	45%	45%	46%	46%	44%	45%	46%	45%	46%	46%	38%	39%	47%	47%	42%	32%	33%	30%
1977 (C)	35%	40%	38%	35%	36%	34%	45%	41%	42%	36%	44%	40%	45%	42%	33%	28%	36%	34%	35%	32%	30%	29%	31%	26%
1978 (AN)	25%	25%	33%	31%	39%	39%	31%	30%	30%	30%	29%	29%	30%	31%	39%	41%	44%	45%	47%	46%	48%	47%	46%	47%
1979 (BN)	44%	44%	43%	42%	45%	45%	39%	40%	38%	38%	35%	35%	42%	42%	45%	44%	44%	44%	47%	47%	45%	44%	44%	42%
1980 (AN)	38%	40%	43%	43%	42%	42%	29%	29%	29%	29%	29%	29%	40%	42%	45%	44%	40%	41%	47%	41%	47%	46%	47%	46%
1981 (D)	41%	38%	45%	43%	43%	44%	41%	42%	35%	37%	40%	41%	43%	42%	42%	41%	44%	43%	47%	44%	48%	47%	44%	35%
1982 (W)	37%	42%	38%	37%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	31%	35%	44%	44%	46%	41%	46%	46%	39%	35%
1983 (W)	44%	41%	34%	36%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	32%	43%	39%	45%	43%	42%	42%
1984 (W)	43%	44%	30%	32%	29%	29%	29%	29%	30%	31%	31%	31%	42%	42%	44%	42%	43%	44%	44%	44%	47%	46%	33%	35%
1985 (D)	46%	46%	38%	39%	37%	41%	44%	45%	43%	43%	45%	45%	46%	46%	45%	45%	42%	43%	43%	41%	48%	45%	44%	37%
1986 (W)	38%	42%	42%	39%	42%	43%	37%	38%	29%	29%	29%	29%	37%	38%	44%	39%	36%	40%	41%	46%	47%	46%	41%	41%
1987 (D)	40%	38%	43%	44%	46%	45%	45%	45%	40%	41%	37%	37%	46%	44%	45%	45%	45%	41%	47%	47%	32%	37%	33%	31%
1988 (C)	36%	35%	37%	34%	40%	41%	35%	36%	44%	43%	43%	42%	45%	45%	42%	39%	42%	40%	44%	43%	31%	36%	32%	30%
1989 (D)	32%	34%	36%	35%	41%	38%	44%	44%	44%	41%	31%	31%	38%	38%	42%	42%	44%	42%	46%	47%	46%	46%	40%	37%
1990 (C)	43%	40%	43%	35%	44%	36%	40%	41%	44%	45%	46%	46%	45%	45%	36%	33%	34%	32%	47%	44%	38%	33%	31%	31%
1991 (C)	31%	28%	33%	28%	35%	31%	39%	33%	41%	38%	34%	34%	40%	40%	38%	34%	37%	36%	47%	45%	36%	34%	31%	28%
Average	39%	39%	39%	37%	39%	38%	38%	37%	37%	37%	36%	36%	40%	40%	40%	39%	40%	40%	45%	43%	42%	41%	38%	36%
Median	39%	40%	38%	37%	41%	40%	39%	39%	39%	38%	34%	35%	42%	42%	42%	41%	42%	41%	46%	44%	45%	45%	40%	35%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-154. Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering Georgiana Slough under ESO_ELT and ESO_LLT[a, b]

Water Year[c]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	29%	25%	38%	36%	44%	42%	42%	40%	45%	43%	42%	41%	41%	40%	43%	40%	31%	27%	43%	35%	26%	23%	26%	22%
1977 (C)	29%	25%	31%	27%	31%	27%	40%	32%	43%	28%	44%	32%	40%	35%	28%	24%	28%	25%	31%	26%	25%	22%	28%	21%
1978 (AN)	22%	20%	28%	26%	38%	35%	31%	30%	32%	31%	30%	29%	32%	32%	40%	37%	35%	34%	40%	37%	44%	40%	41%	31%
1979 (BN)	30%	24%	29%	26%	43%	35%	39%	38%	38%	36%	36%	35%	39%	37%	41%	37%	41%	38%	32%	25%	29%	24%	26%	23%
1980 (AN)	28%	36%	34%	32%	42%	41%	29%	29%	29%	29%	30%	29%	41%	39%	40%	37%	31%	28%	44%	40%	28%	23%	33%	35%
1981 (D)	30%	24%	32%	28%	41%	40%	42%	41%	38%	37%	41%	40%	40%	38%	38%	38%	41%	38%	38%	40%	40%	31%	27%	29%
1982 (W)	30%	25%	34%	32%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	34%	34%	36%	36%	37%	38%	42%	38%	43%	41%
1983 (W)	36%	23%	38%	37%	29%	29%	29%	28%	29%	29%	29%	29%	29%	28%	28%	28%	29%	32%	28%	27%	27%	22%	39%	39%
1984 (W)	42%	37%	32%	33%	29%	29%	29%	29%	32%	32%	34%	33%	40%	37%	39%	36%	38%	36%	42%	40%	36%	29%	43%	39%
1985 (D)	25%	23%	34%	32%	37%	37%	43%	43%	43%	42%	43%	42%	43%	41%	39%	40%	40%	35%	32%	32%	43%	41%	28%	34%
1986 (W)	29%	24%	33%	29%	42%	42%	37%	36%	29%	29%	29%	29%	38%	36%	38%	31%	28%	31%	43%	40%	32%	25%	40%	36%
1987 (D)	29%	24%	34%	30%	43%	42%	43%	42%	40%	39%	37%	36%	42%	40%	41%	39%	38%	34%	38%	29%	27%	24%	26%	22%
1988 (C)	27%	36%	31%	28%	39%	38%	37%	36%	40%	38%	38%	37%	41%	39%	38%	35%	36%	32%	32%	25%	27%	28%	27%	32%
1989 (D)	28%	22%	31%	28%	35%	33%	43%	42%	40%	33%	32%	32%	37%	34%	39%	37%	40%	38%	42%	36%	34%	33%	27%	27%
1990 (C)	38%	32%	36%	28%	44%	41%	41%	40%	43%	43%	43%	41%	42%	39%	32%	28%	29%	25%	33%	35%	27%	23%	25%	22%
1991 (C)	24%	21%	27%	23%	31%	24%	38%	35%	36%	30%	35%	33%	36%	33%	33%	28%	29%	28%	36%	30%	32%	24%	26%	23%
Average	30%	26%	33%	30%	37%	35%	37%	36%	37%	34%	36%	34%	38%	36%	37%	34%	34%	32%	37%	33%	32%	28%	32%	30%
Median	29%	24%	32%	29%	38%	36%	38%	36%	38%	32%	35%	33%	40%	37%	38%	36%	35%	33%	38%	35%	30%	25%	28%	30%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-155. Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering Georgiana Slough under HOS_ELT and HOS_LLT[a, b]

Water Year[c]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	40%	25%	37%	36%	44%	42%	42%	40%	45%	43%	41%	41%	41%	40%	42%	40%	31%	27%	44%	39%	33%	25%	25%	26%
1977 (C)	29%	25%	31%	27%	31%	27%	40%	38%	36%	31%	39%	33%	40%	36%	28%	25%	28%	25%	32%	28%	26%	22%	25%	22%
1978 (AN)	22%	20%	28%	26%	38%	34%	31%	30%	32%	31%	30%	29%	32%	31%	40%	37%	35%	33%	41%	38%	40%	37%	30%	31%
1979 (BN)	29%	24%	30%	26%	40%	39%	39%	38%	38%	37%	37%	35%	39%	37%	41%	38%	40%	37%	33%	25%	35%	25%	27%	23%
1980 (AN)	31%	37%	42%	32%	40%	41%	29%	29%	29%	29%	30%	29%	31%	30%	33%	35%	31%	27%	34%	28%	28%	24%	32%	33%
1981 (D)	30%	25%	32%	27%	41%	40%	41%	41%	38%	37%	41%	40%	40%	38%	37%	36%	34%	30%	41%	37%	42%	41%	27%	25%
1982 (W)	29%	36%	34%	33%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	34%	34%	36%	36%	41%	28%	32%	36%	41%	40%
1983 (W)	37%	23%	38%	38%	29%	29%	29%	28%	29%	29%	29%	29%	29%	28%	28%	28%	29%	32%	28%	28%	26%	23%	39%	36%
1984 (W)	42%	38%	32%	33%	29%	29%	29%	29%	32%	32%	34%	33%	32%	32%	36%	38%	31%	30%	43%	41%	43%	35%	43%	39%
1985 (D)	26%	23%	34%	32%	38%	37%	43%	43%	43%	42%	43%	41%	43%	41%	39%	40%	39%	33%	41%	40%	41%	38%	28%	26%
1986 (W)	29%	32%	33%	29%	42%	42%	37%	37%	29%	29%	29%	29%	36%	34%	38%	31%	28%	29%	39%	41%	32%	24%	40%	36%
1987 (D)	29%	24%	34%	30%	43%	38%	43%	42%	40%	39%	37%	36%	42%	40%	41%	39%	38%	34%	38%	29%	27%	25%	26%	23%
1988 (C)	29%	40%	31%	28%	39%	38%	37%	38%	40%	39%	37%	35%	41%	39%	37%	29%	34%	31%	29%	26%	29%	29%	26%	31%
1989 (D)	29%	22%	31%	28%	36%	31%	41%	42%	39%	33%	32%	31%	37%	35%	39%	37%	36%	35%	40%	35%	32%	27%	33%	27%
1990 (C)	30%	38%	32%	28%	39%	34%	40%	40%	43%	43%	43%	41%	41%	39%	32%	28%	28%	25%	29%	31%	32%	32%	26%	24%
1991 (C)	25%	21%	27%	24%	30%	25%	39%	30%	36%	31%	35%	33%	36%	34%	32%	27%	27%	28%	28%	34%	28%	24%	26%	23%
Average	30%	28%	33%	30%	37%	35%	37%	36%	36%	35%	35%	34%	37%	35%	36%	34%	33%	31%	36%	33%	33%	29%	31%	29%
Median	29%	25%	32%	29%	38%	36%	39%	38%	37%	32%	36%	33%	38%	35%	37%	36%	33%	30%	39%	32%	32%	26%	27%	27%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

1 **Table 5C.5.3-156. Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering**
2 **Georgiana Slough under LOS_ELT and LOS_LLT[a, b]**

Water Year[c]	October		November		December		January		February		March		April		May		June		July		August		September	
	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	43%	35%	32%	31%	42%	41%	41%	35%	45%	43%	42%	41%	42%	40%	42%	40%	32%	27%	43%	38%	27%	23%	26%	22%
1977 (C)	28%	36%	32%	28%	31%	27%	40%	33%	40%	30%	40%	32%	42%	35%	28%	24%	28%	25%	30%	27%	26%	23%	27%	22%
1978 (AN)	22%	20%	29%	26%	38%	29%	31%	30%	32%	31%	30%	29%	32%	32%	40%	37%	35%	34%	40%	37%	44%	40%	45%	25%
1979 (BN)	29%	37%	30%	27%	41%	40%	39%	38%	38%	37%	36%	35%	39%	37%	41%	37%	41%	38%	32%	26%	28%	23%	27%	23%
1980 (AN)	29%	39%	34%	32%	41%	41%	29%	29%	29%	29%	30%	29%	41%	39%	40%	37%	31%	28%	44%	40%	28%	23%	27%	22%
1981 (D)	29%	25%	33%	29%	41%	40%	41%	41%	38%	37%	41%	40%	40%	38%	39%	37%	41%	38%	38%	42%	36%	34%	28%	33%
1982 (W)	29%	25%	34%	32%	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%	34%	34%	36%	36%	40%	38%	42%	39%	29%	22%
1983 (W)	37%	23%	38%	37%	29%	29%	29%	28%	29%	29%	29%	29%	29%	28%	28%	28%	29%	32%	28%	27%	27%	22%	39%	24%
1984 (W)	42%	38%	32%	32%	29%	29%	29%	29%	32%	32%	34%	33%	40%	37%	39%	36%	38%	35%	41%	40%	35%	25%	28%	23%
1985 (D)	25%	21%	35%	32%	36%	36%	43%	43%	43%	42%	43%	42%	43%	41%	40%	40%	40%	35%	32%	32%	44%	42%	33%	39%
1986 (W)	31%	25%	33%	29%	42%	41%	38%	36%	29%	29%	29%	29%	38%	36%	38%	32%	28%	32%	43%	41%	32%	25%	27%	23%
1987 (D)	29%	24%	31%	27%	42%	39%	41%	40%	40%	39%	37%	36%	42%	40%	41%	39%	38%	35%	39%	32%	28%	26%	26%	23%
1988 (C)	29%	42%	31%	28%	39%	38%	37%	38%	40%	39%	38%	37%	41%	39%	38%	35%	35%	34%	31%	25%	27%	28%	26%	30%
1989 (D)	27%	22%	31%	28%	35%	32%	43%	42%	41%	33%	32%	31%	37%	35%	39%	36%	40%	38%	42%	36%	35%	32%	27%	26%
1990 (C)	38%	33%	41%	28%	45%	41%	41%	40%	43%	43%	43%	41%	42%	40%	32%	28%	29%	25%	30%	33%	26%	26%	25%	23%
1991 (C)	24%	21%	27%	23%	31%	24%	39%	26%	36%	34%	35%	33%	36%	34%	33%	28%	30%	28%	36%	29%	32%	23%	26%	22%
Average	31%	29%	33%	29%	37%	35%	37%	35%	36%	35%	35%	34%	38%	36%	37%	34%	35%	32%	37%	34%	32%	28%	29%	25%
Median	29%	25%	32%	28%	38%	37%	39%	35%	38%	33%	35%	33%	40%	37%	39%	36%	35%	34%	39%	34%	30%	26%	27%	23%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

3

Table 5C.5.3-157. Differences[a] between EBC2 Scenario and ESO_ELT and ESO_LLT Scenarios[b] in Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering Georgiana Slough[c]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[d]	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	-15%	-18%	-1%	-3%	-2%	-3%	-3%	-5%	-1%	-3%	-2%	-3%	-4%	-5%	5%	2%	-6%	-10%	-4%	-12%	-18%	-21%	-13%	-16%
1977 (C)	-9%	-13%	-5%	-9%	-8%	-11%	-5%	-13%	-2%	-17%	-1%	-13%	-6%	-11%	-6%	-10%	-9%	-12%	-11%	-16%	-10%	-13%	-5%	-12%
1978 (AN)	-10%	-12%	-6%	-8%	-2%	-5%	0%	-1%	1%	0%	0%	0%	2%	2%	2%	-1%	-10%	-11%	-6%	-10%	-4%	-8%	-4%	-15%
1979 (BN)	-16%	-21%	-14%	-18%	-2%	-11%	0%	-1%	0%	-2%	2%	1%	-2%	-5%	-1%	-6%	-3%	-6%	-14%	-21%	-18%	-24%	-19%	-23%
1980 (AN)	-14%	-6%	-9%	-11%	0%	0%	0%	0%	0%	0%	0%	0%	2%	0%	-3%	-6%	-12%	-15%	-3%	-7%	-19%	-24%	-14%	-12%
1981 (D)	-13%	-18%	-13%	-17%	-2%	-3%	0%	0%	3%	2%	4%	3%	-3%	-5%	-6%	-6%	-3%	-6%	-9%	-7%	-8%	-16%	-19%	-18%
1982 (W)	-10%	-14%	-4%	-7%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	3%	-6%	-6%	-8%	-8%	-3%	-7%	1%	-2%
1983 (W)	-4%	-17%	7%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	3%	-9%	-10%	-19%	-24%	7%	7%
1984 (W)	2%	-3%	1%	3%	0%	0%	0%	0%	2%	2%	4%	3%	-2%	-4%	-5%	-9%	-5%	-8%	-2%	-3%	-12%	-18%	10%	6%
1985 (D)	-17%	-19%	-2%	-5%	1%	1%	0%	0%	0%	-1%	-1%	-2%	-3%	-5%	-6%	-6%	-4%	-9%	-14%	-15%	-5%	-7%	-18%	-12%
1986 (W)	-15%	-19%	-11%	-14%	0%	-1%	0%	-1%	0%	0%	0%	0%	1%	-1%	-6%	-12%	-12%	-9%	-2%	-6%	-15%	-22%	-2%	-6%
1987 (D)	-12%	-17%	-9%	-13%	-2%	-4%	-1%	-1%	1%	0%	1%	0%	-3%	-5%	-4%	-6%	-7%	-12%	-9%	-18%	-13%	-17%	-8%	-12%
1988 (C)	-10%	-2%	-7%	-10%	-1%	-2%	2%	2%	-3%	-5%	-4%	-5%	-4%	-6%	-4%	-8%	-7%	-11%	-15%	-22%	-7%	-6%	-6%	-1%
1989 (D)	-6%	-11%	-6%	-9%	-6%	-8%	-1%	-1%	-4%	-11%	1%	1%	1%	-2%	-3%	-5%	-5%	-7%	-4%	-10%	-12%	-14%	-14%	-15%
1990 (C)	-3%	-9%	-2%	-10%	-1%	-5%	1%	0%	0%	-1%	-2%	-4%	-4%	-6%	-7%	-11%	-6%	-10%	-15%	-12%	-19%	-23%	-8%	-10%
1991 (C)	-9%	-12%	-6%	-11%	-6%	-12%	-7%	-9%	-6%	-13%	1%	0%	-4%	-7%	-6%	-11%	-9%	-10%	-11%	-18%	-5%	-13%	-6%	-10%
Average	-10%	-13%	-5%	-9%	-2%	-4%	-1%	-2%	-1%	-3%	0%	-1%	-2%	-4%	-3%	-6%	-7%	-9%	-9%	-12%	-12%	-16%	-7%	-9%
Median	-10%	-13%	-6%	-10%	-1%	-3%	0%	-1%	0%	0%	0%	0%	-2%	-5%	-4%	-6%	-6%	-10%	-9%	-11%	-12%	-16%	-7%	-12%

[a] Negative values indicate greater mean monthly percentage of total Sacramento River flow at the Sacramento River-Georgiana Slough junction entering Georgiana Slough under EBC2.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2 HYDRO Modeling.
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-158. Differences[a] between EBC2_ELT and ESO_ELT and between EBC2_LLT and ESO_LLT[b] in Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering Georgiana Slough[c]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[d]	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	-16%	-19%	-4%	-6%	-2%	-4%	-3%	-5%	-2%	-4%	-2%	-4%	-4%	-5%	-4%	-6%	-7%	-12%	-4%	-12%	-16%	-9%	-7%	-8%
1977 (C)	-7%	-15%	-7%	-7%	-6%	-7%	-5%	-9%	1%	-9%	0%	-8%	-5%	-7%	-5%	-4%	-8%	-9%	-4%	-5%	-4%	-6%	-2%	-5%
1978 (AN)	-3%	-5%	-4%	-5%	-2%	-4%	0%	0%	2%	1%	1%	0%	2%	1%	0%	-4%	-9%	-11%	-6%	-9%	-4%	-7%	-5%	-16%
1979 (BN)	-15%	-20%	-14%	-17%	-2%	-11%	-1%	-2%	0%	-2%	2%	0%	-3%	-5%	-3%	-7%	-3%	-6%	-15%	-22%	-16%	-21%	-17%	-19%
1980 (AN)	-9%	-4%	-9%	-12%	0%	-1%	0%	0%	0%	0%	1%	0%	1%	-3%	-4%	-7%	-9%	-13%	-3%	-1%	-19%	-23%	-14%	-11%
1981 (D)	-11%	-14%	-14%	-16%	-2%	-4%	0%	-1%	2%	0%	1%	-1%	-3%	-4%	-4%	-3%	-3%	-4%	-9%	-3%	-8%	-16%	-17%	-7%
1982 (W)	-7%	-17%	-4%	-5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	-1%	-8%	-8%	-9%	-3%	-3%	-8%	4%	6%
1983 (W)	-8%	-18%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-15%	-11%	-18%	-21%	-3%	-3%
1984 (W)	0%	-7%	2%	1%	0%	0%	0%	0%	2%	1%	3%	2%	-2%	-5%	-5%	-6%	-5%	-8%	-3%	-4%	-12%	-17%	10%	4%
1985 (D)	-21%	-23%	-4%	-7%	0%	-4%	-1%	-2%	0%	-1%	-2%	-4%	-3%	-5%	-6%	-5%	-2%	-7%	-10%	-9%	-5%	-4%	-17%	-2%
1986 (W)	-9%	-18%	-9%	-10%	0%	-2%	0%	-2%	0%	0%	0%	0%	1%	-3%	-6%	-8%	-8%	-9%	2%	-6%	-15%	-21%	-1%	-5%
1987 (D)	-11%	-13%	-8%	-13%	-2%	-3%	-1%	-2%	0%	-2%	1%	-1%	-3%	-3%	-4%	-6%	-7%	-7%	-9%	-18%	-5%	-13%	-7%	-8%
1988 (C)	-8%	0%	-6%	-7%	-2%	-3%	2%	0%	-4%	-4%	-5%	-5%	-4%	-5%	-4%	-5%	-6%	-8%	-12%	-18%	-5%	-8%	-5%	2%
1989 (D)	-4%	-12%	-5%	-7%	-5%	-5%	-1%	-2%	-4%	-8%	1%	1%	-1%	-4%	-3%	-5%	-5%	-4%	-4%	-11%	-12%	-13%	-12%	-10%
1990 (C)	-5%	-8%	-6%	-7%	0%	5%	0%	-1%	-1%	-2%	-3%	-4%	-4%	-6%	-4%	-6%	-5%	-7%	-14%	-9%	-11%	-10%	-6%	-9%
1991 (C)	-7%	-7%	-5%	-6%	-4%	-7%	-1%	2%	-5%	-9%	1%	-1%	-4%	-6%	-5%	-6%	-8%	-8%	-11%	-15%	-5%	-10%	-5%	-6%
Average	-9%	-13%	-6%	-8%	-2%	-3%	-1%	-1%	-1%	-2%	0%	-2%	-2%	-4%	-3%	-5%	-6%	-8%	-8%	-10%	-10%	-13%	-6%	-6%
Median	-8%	-14%	-6%	-7%	-2%	-4%	0%	-1%	0%	-2%	0%	-1%	-3%	-4%	-4%	-5%	-6%	-8%	-9%	-9%	-9%	-12%	-6%	-6%

[a] Negative values indicate greater mean monthly percentage of total Sacramento River flow at the Sacramento River-Georgiana Slough junction entering Georgiana Slough under EBC2 scenarios.

[b] See Table 5C.0-1 for definitions of the scenarios.

[c] Values based on DSM2 HYDRO Modeling.

[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.

ELT = early long-term; LLT = late long-term.

Table 5C.5.3-159. Differences[a] between EBC2_ELT and HOS_ELT and between EBC2_LLT and HOS_LLT[b] in Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering Georgiana Slough[c]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[d]	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	-5%	-19%	-4%	-6%	-2%	-4%	-3%	-5%	-1%	-4%	-3%	-4%	-4%	-5%	-4%	-6%	-7%	-12%	-4%	-8%	-9%	-7%	-8%	-4%
1977 (C)	-7%	-15%	-6%	-7%	-6%	-7%	-5%	-3%	-6%	-5%	-4%	-7%	-5%	-6%	-5%	-3%	-8%	-9%	-2%	-4%	-4%	-6%	-6%	-5%
1978 (AN)	-3%	-5%	-5%	-5%	-2%	-4%	0%	0%	2%	1%	1%	0%	2%	0%	0%	-4%	-9%	-12%	-6%	-8%	-7%	-9%	-16%	-16%
1979 (BN)	-15%	-20%	-13%	-17%	-5%	-6%	-1%	-2%	0%	-2%	2%	0%	-3%	-5%	-3%	-6%	-4%	-7%	-14%	-22%	-10%	-19%	-17%	-18%
1980 (AN)	-7%	-3%	-1%	-11%	-1%	-1%	0%	0%	0%	0%	1%	0%	-9%	-12%	-11%	-9%	-9%	-14%	-13%	-13%	-19%	-22%	-15%	-12%
1981 (D)	-11%	-14%	-13%	-16%	-2%	-4%	0%	-1%	2%	0%	1%	-1%	-3%	-4%	-5%	-5%	-10%	-13%	-6%	-6%	-6%	-7%	-17%	-11%
1982 (W)	-8%	-6%	-4%	-4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	-1%	-8%	-9%	-6%	-13%	-14%	-10%	2%	6%
1983 (W)	-7%	-18%	5%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-16%	-11%	-19%	-20%	-3%	-7%
1984 (W)	0%	-6%	2%	1%	0%	0%	0%	0%	2%	1%	3%	2%	-10%	-10%	-8%	-4%	-12%	-14%	-1%	-3%	-4%	-11%	10%	4%
1985 (D)	-20%	-23%	-4%	-7%	0%	-4%	-1%	-2%	0%	-1%	-2%	-4%	-3%	-5%	-6%	-5%	-3%	-9%	-2%	-1%	-7%	-7%	-17%	-10%
1986 (W)	-9%	-10%	-10%	-10%	0%	-2%	0%	-1%	0%	0%	0%	0%	-1%	-4%	-6%	-8%	-9%	-11%	-2%	-5%	-15%	-22%	-1%	-5%
1987 (D)	-11%	-14%	-8%	-13%	-3%	-7%	-1%	-2%	0%	-2%	1%	-1%	-3%	-4%	-4%	-6%	-7%	-7%	-9%	-18%	-5%	-12%	-7%	-8%
1988 (C)	-7%	5%	-6%	-7%	-2%	-3%	2%	2%	-4%	-4%	-6%	-7%	-4%	-6%	-5%	-10%	-7%	-10%	-15%	-17%	-2%	-7%	-6%	1%
1989 (D)	-3%	-12%	-5%	-7%	-5%	-7%	-3%	-2%	-5%	-8%	1%	0%	0%	-3%	-3%	-5%	-8%	-7%	-5%	-11%	-14%	-19%	-7%	-10%
1990 (C)	-13%	-2%	-10%	-7%	-5%	-1%	0%	-1%	-1%	-2%	-3%	-5%	-4%	-6%	-4%	-5%	-7%	-7%	-17%	-13%	-6%	-1%	-5%	-6%
1991 (C)	-6%	-8%	-5%	-4%	-5%	-6%	0%	-4%	-5%	-7%	1%	-1%	-4%	-6%	-5%	-7%	-10%	-8%	-19%	-11%	-8%	-10%	-5%	-5%
Average	-8%	-11%	-6%	-7%	-2%	-4%	-1%	-1%	-1%	-2%	-1%	-2%	-3%	-5%	-4%	-5%	-7%	-9%	-9%	-10%	-9%	-12%	-7%	-7%
Median	-7%	-11%	-5%	-7%	-2%	-4%	0%	-1%	0%	-1%	0%	0%	-3%	-5%	-5%	-5%	-8%	-9%	-6%	-11%	-8%	-10%	-6%	-7%

[a] Negative values indicate greater mean monthly percentage of total Sacramento River flow at the Sacramento River-Georgiana Slough junction entering Georgiana Slough under EBC2 scenarios.

[b] See Table 5C.0-1 for definitions of the scenarios.

[c] Values based on DSM2 HYDRO Modeling.

[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.

ELT = early long-term; LLT = late long-term.

Table 5C.5.3-160. Differences[a] between EBC2_ELT and LOS_ELT and between EBC2_LLT and LOS_LLT[b] in Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering Georgiana Slough[c]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[d]	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	-1%	-8%	-10%	-10%	-3%	-5%	-4%	-10%	-2%	-4%	-2%	-4%	-4%	-5%	-4%	-6%	-6%	-12%	-4%	-9%	-15%	-9%	-7%	-8%
1977 (C)	-7%	-4%	-6%	-7%	-6%	-7%	-5%	-8%	-2%	-6%	-4%	-8%	-3%	-7%	-5%	-4%	-8%	-8%	-5%	-5%	-4%	-6%	-4%	-5%
1978 (AN)	-3%	-5%	-4%	-5%	-2%	-10%	0%	0%	2%	1%	1%	0%	2%	1%	0%	-4%	-9%	-11%	-7%	-9%	-4%	-7%	-2%	-22%
1979 (BN)	-15%	-8%	-13%	-16%	-5%	-5%	-1%	-2%	0%	-2%	2%	-1%	-3%	-5%	-3%	-7%	-3%	-7%	-15%	-21%	-17%	-21%	-16%	-19%
1980 (AN)	-9%	-1%	-9%	-12%	0%	-1%	0%	0%	0%	0%	1%	0%	1%	-3%	-4%	-7%	-9%	-13%	-3%	-2%	-19%	-23%	-20%	-24%
1981 (D)	-12%	-13%	-13%	-15%	-2%	-4%	0%	-1%	2%	0%	1%	-1%	-2%	-4%	-3%	-4%	-3%	-4%	-9%	-2%	-12%	-13%	-16%	-2%
1982 (W)	-8%	-17%	-4%	-5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	3%	-1%	-8%	-8%	-6%	-3%	-3%	-7%	-10%	-13%
1983 (W)	-7%	-18%	4%	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-1%	0%	0%	-15%	-11%	-18%	-21%	-3%	-19%
1984 (W)	0%	-6%	2%	0%	0%	0%	0%	0%	2%	1%	4%	2%	-2%	-5%	-5%	-6%	-5%	-8%	-3%	-4%	-12%	-21%	-5%	-11%
1985 (D)	-21%	-24%	-3%	-8%	-2%	-5%	-1%	-2%	0%	-1%	-2%	-4%	-3%	-5%	-5%	-5%	-2%	-7%	-10%	-9%	-4%	-3%	-11%	2%
1986 (W)	-6%	-18%	-9%	-9%	-1%	-2%	0%	-2%	0%	0%	0%	0%	1%	-3%	-6%	-7%	-8%	-8%	2%	-5%	-15%	-21%	-14%	-18%
1987 (D)	-12%	-14%	-11%	-17%	-3%	-6%	-3%	-5%	0%	-2%	1%	-1%	-3%	-3%	-4%	-6%	-6%	-7%	-8%	-15%	-4%	-11%	-7%	-8%
1988 (C)	-7%	6%	-6%	-7%	-2%	-3%	2%	2%	-4%	-4%	-5%	-5%	-4%	-5%	-4%	-5%	-6%	-6%	-14%	-18%	-5%	-7%	-6%	0%
1989 (D)	-4%	-12%	-5%	-7%	-5%	-6%	-1%	-2%	-4%	-8%	1%	0%	-1%	-3%	-3%	-6%	-4%	-4%	-4%	-11%	-12%	-13%	-13%	-11%
1990 (C)	-5%	-7%	-2%	-7%	1%	6%	0%	-1%	-1%	-2%	-3%	-4%	-4%	-5%	-4%	-5%	-5%	-7%	-16%	-11%	-12%	-6%	-6%	-8%
1991 (C)	-7%	-8%	-5%	-6%	-4%	-7%	-1%	-7%	-5%	-4%	1%	-1%	-4%	-6%	-5%	-6%	-7%	-8%	-11%	-16%	-4%	-11%	-5%	-6%
Average	-8%	-10%	-6%	-8%	-2%	-4%	-1%	-2%	-1%	-2%	0%	-2%	-2%	-4%	-3%	-5%	-6%	-7%	-8%	-9%	-10%	-13%	-9%	-11%
Median	-7%	-8%	-6%	-7%	-2%	-5%	0%	-2%	0%	-2%	0%	-1%	-2%	-4%	-4%	-5%	-6%	-8%	-7%	-9%	-12%	-11%	-7%	-9%

[a] Negative values indicate greater mean monthly percentage of total Sacramento River flow at the Sacramento River-Georgiana Slough junction entering Georgiana Slough under EBC2 scenarios.

[b] See Table 5C.0-1 for definitions of the scenarios.

[c] Values based on DSM2 HYDRO Modeling.

[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.

ELT = early long-term; LLT = late long-term.

Table 5C.5.3-161. Mean Monthly Percentage of Total Sacramento River Flow at the Sacramento River-Georgiana Slough Junction Entering Georgiana Slough By Scenario and Differences between Scenarios, Averaged Across 16-Year DSM2 Simulation Period and Recalculated Based on A Weighted Average of the Water-Year Type Proportions for the 82-Year CALSIM Simulation Period

Scenario[a]	Water-Year Type Average	October	November	December	January	February	March	April	May	June	July	August	September
EBC2_ELT	16-Year	39%	39%	39%	38%	37%	36%	40%	40%	40%	45%	42%	38%
	82-Year	39%	39%	39%	36%	35%	34%	39%	41%	41%	45%	44%	40%
EBC2_LLT	16-Year	39%	37%	38%	37%	37%	36%	40%	39%	40%	43%	41%	36%
	82-Year	40%	38%	39%	36%	35%	34%	39%	40%	41%	44%	43%	38%
ESO_ELT	16-Year	30%	33%	37%	37%	37%	36%	38%	37%	34%	37%	32%	32%
	82-Year	30%	32%	38%	36%	35%	34%	38%	38%	35%	37%	33%	33%
ESO_LLT	16-Year	26%	30%	35%	36%	34%	34%	36%	34%	32%	33%	28%	30%
	82-Year	26%	30%	35%	35%	34%	33%	36%	35%	34%	33%	28%	31%
HOS_ELT	16-Year	30%	33%	37%	37%	36%	35%	37%	36%	33%	36%	33%	31%
	82-Year	30%	33%	37%	36%	35%	34%	36%	37%	34%	37%	34%	32%
HOS_LLT	16-Year	28%	30%	35%	36%	35%	34%	35%	34%	31%	33%	29%	29%
	82-Year	28%	30%	35%	35%	34%	33%	35%	35%	32%	32%	29%	30%
LOS_ELT	16-Year	31%	33%	37%	37%	36%	35%	38%	37%	35%	37%	32%	29%
	82-Year	31%	33%	37%	36%	35%	34%	38%	38%	36%	37%	33%	30%
LOS_LLT	16-Year	29%	29%	35%	35%	35%	34%	36%	34%	32%	34%	28%	25%
	82-Year	29%	30%	35%	35%	34%	33%	36%	35%	34%	34%	28%	25%
Comparison[b]													
ESO_ELT - EBC2_ELT	16-Year	-9%	-6%	-2%	-1%	-1%	0%	-2%	-3%	-6%	-8%	-10%	-6%
	82-Year	-9%	-6%	-1%	0%	0%	0%	-1%	-3%	-5%	-8%	-11%	-7%
ESO_LLT - EBC2_LLT	16-Year	-13%	-8%	-3%	-1%	-2%	-2%	-4%	-5%	-8%	-10%	-13%	-6%
	82-Year	-14%	-8%	-4%	-1%	-2%	-1%	-3%	-5%	-7%	-10%	-15%	-7%
HOS_ELT - EBC2_ELT	16-Year	-8%	-6%	-2%	-1%	-1%	-1%	-3%	-4%	-7%	-9%	-9%	-7%
	82-Year	-9%	-6%	-2%	0%	0%	0%	-3%	-4%	-7%	-9%	-10%	-8%
HOS_LLT - EBC2_LLT	16-Year	-11%	-7%	-4%	-1%	-2%	-2%	-5%	-5%	-9%	-10%	-12%	-7%
	82-Year	-12%	-8%	-3%	-1%	-1%	-1%	-5%	-5%	-9%	-11%	-14%	-8%
LOS_ELT - EBC2_ELT	16-Year	-8%	-6%	-2%	-1%	-1%	0%	-2%	-3%	-6%	-8%	-10%	-9%
	82-Year	-9%	-6%	-2%	0%	0%	0%	-1%	-3%	-5%	-8%	-11%	-10%
LOS_LLT - EBC2_LLT	16-Year	-10%	-8%	-4%	-2%	-2%	-2%	-4%	-5%	-7%	-9%	-13%	-11%
	82-Year	-11%	-8%	-4%	-2%	-1%	-1%	-3%	-5%	-7%	-10%	-15%	-13%

[a] See Table 5C.0-1 for definitions of the scenarios.
[b] Negative values indicate a higher percentage of flow entering Georgiana Slough under EBC2 scenarios than the ESO, HOS, or LOS scenarios.

5C.5.3.8.3 Percentage of Sacramento River Reverse Flow into Georgiana Slough Flow

Trends in the monthly average percentage of Sacramento River reverse flow into Georgiana Slough generally were similar to the trends in the percentage of each month with reversed flows (described above). Within years, the percentage of reverse flows entering Georgiana Slough generally was greatest in the summer/fall months that had relatively low river flow, and was least in the winter/spring months when river flow would be greatest (Table 5C.5.3-162, Table 5C.5.3-163, Table 5C.5.3-164, Table 5C.5.3-165, and Table 5C.5.3-166). Across years, the percentage of reverse flows entering Georgiana Slough was least in wetter years, when months with no contribution from downstream flow were common, and greater in drier years, when 25% or more of the reverse flows entered Georgiana Slough in some months. The overall average and median monthly average percentage of reversed flows entering Georgiana Slough ranged from 3–8% under all scenarios in March to over 25% in several months under the EBC2_ELT and EBC2_LLT scenarios (Table 5C.5.3-162, Table 5C.5.3-163, Table 5C.5.3-164, Table 5C.5.3-165, and Table 5C.5.3-166).

Comparisons of EBC2 scenarios to ESO/HOS/LOS scenarios for the monthly average percentage of Sacramento River reverse flows entering Georgiana Slough showed that there generally was least difference between the scenarios in January–March. In the other months there was often markedly less contribution under the ESO/HOS/LOS scenarios, particularly when climate change was factored in (Table 5C.5.3-167, Table 5C.5.3-168, Table 5C.5.3-169, Table 5C.5.3-170). December–June average and median differences between EBC2 scenarios and ESO/HOS/LOS scenarios for the monthly average percentage of reverse flow entering Georgiana Slough ranged from no difference in January–March to 7–11% lower under ESO/HOS/LOS scenarios in June (Table 5C.5.3-167, Table 5C.5.3-168, Table 5C.5.3-169, Table 5C.5.3-170).

Table 5C.5.3-162. Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough under EBC2[a, b]

Water Year[c]	Oct	Nov	Dec	Jan	Feby	Mar	Apr	May	Jun	Jul	Aug	Sep
1976 (C)	15%	8%	19%	21%	21%	17%	25%	23%	23%	26%	27%	24%
1977 (C)	23%	22%	23%	25%	26%	27%	27%	21%	23%	26%	22%	21%
1978 (AN)	20%	21%	14%	1%	1%	0%	0%	9%	24%	22%	27%	20%
1979 (BN)	27%	19%	22%	10%	11%	3%	17%	15%	24%	20%	27%	28%
1980 (AN)	26%	17%	12%	0%	0%	0%	8%	17%	24%	26%	27%	26%
1981 (D)	26%	24%	15%	14%	2%	5%	19%	24%	25%	23%	24%	28%
1982 (W)	24%	12%	0%	0%	0%	0%	0%	0%	17%	26%	27%	14%
1983 (W)	7%	0%	0%	0%	0%	0%	0%	0%	0%	10%	23%	0%
1984 (W)	10%	0%	0%	0%	0%	0%	16%	21%	25%	16%	27%	1%
1985 (D)	25%	7%	4%	16%	15%	16%	20%	22%	26%	22%	25%	27%
1986 (W)	26%	23%	15%	7%	0%	0%	9%	21%	23%	19%	27%	17%
1987 (D)	25%	23%	22%	17%	9%	5%	25%	24%	26%	24%	25%	21%
1988 (C)	23%	23%	11%	4%	17%	25%	23%	24%	25%	26%	20%	20%
1989 (D)	21%	18%	20%	16%	25%	1%	4%	15%	24%	20%	23%	25%
1990 (C)	24%	23%	24%	10%	15%	21%	23%	22%	20%	25%	27%	20%
1991 (C)	20%	20%	22%	22%	23%	4%	17%	24%	23%	24%	23%	20%
Average	21%	16%	14%	10%	10%	8%	14%	18%	22%	22%	25%	20%
Median	24%	19%	15%	10%	10%	3%	17%	21%	24%	23%	26%	21%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.

1 Table 5C.5.3-163. Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough under EBC2_ELT and EBC2_LLT[a, b]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[c]	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	21%	27%	14%	13%	21%	24%	22%	24%	23%	27%	19%	21%	25%	26%	24%	25%	24%	25%	25%	27%	26%	20%	21%	19%
1977 (C)	22%	26%	24%	22%	22%	21%	21%	13%	25%	22%	27%	25%	27%	26%	20%	18%	23%	22%	22%	21%	19%	19%	19%	17%
1978 (AN)	15%	16%	20%	20%	14%	15%	1%	1%	0%	0%	0%	0%	0%	0%	12%	19%	25%	26%	22%	23%	27%	28%	22%	25%
1979 (BN)	27%	27%	20%	22%	22%	24%	12%	13%	12%	14%	4%	5%	18%	20%	22%	26%	25%	25%	25%	27%	27%	27%	27%	27%
1980 (AN)	24%	24%	20%	23%	14%	17%	0%	0%	0%	0%	0%	0%	11%	15%	22%	25%	24%	25%	25%	13%	28%	28%	27%	28%
1981 (D)	26%	25%	23%	25%	17%	20%	15%	17%	3%	5%	13%	15%	20%	22%	25%	25%	25%	26%	24%	18%	25%	27%	27%	23%
1982 (W)	23%	27%	13%	13%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	5%	23%	25%	26%	14%	27%	27%	10%	1%
1983 (W)	18%	26%	2%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	23%	23%	27%	27%	15%	16%
1984 (W)	15%	19%	0%	2%	0%	0%	0%	0%	0%	0%	0%	0%	18%	21%	24%	25%	26%	26%	18%	19%	27%	28%	1%	2%
1985 (D)	26%	26%	10%	12%	6%	11%	17%	22%	16%	18%	19%	23%	23%	27%	25%	26%	26%	26%	15%	11%	27%	28%	27%	23%
1986 (W)	24%	27%	23%	23%	17%	19%	7%	9%	0%	0%	0%	0%	10%	13%	24%	25%	21%	24%	13%	23%	27%	28%	16%	17%
1987 (D)	25%	24%	23%	22%	24%	25%	20%	22%	10%	13%	7%	8%	25%	27%	25%	24%	26%	26%	26%	27%	20%	24%	21%	20%
1988 (C)	23%	23%	23%	22%	12%	14%	4%	6%	23%	24%	25%	26%	24%	26%	25%	24%	25%	25%	27%	27%	20%	23%	20%	19%
1989 (D)	20%	22%	18%	18%	20%	21%	18%	22%	26%	25%	1%	1%	6%	7%	15%	16%	25%	26%	22%	25%	26%	27%	25%	23%
1990 (C)	23%	23%	24%	22%	25%	22%	12%	14%	18%	22%	24%	26%	24%	25%	22%	21%	20%	20%	27%	17%	24%	21%	19%	20%
1991 (C)	19%	18%	20%	18%	21%	19%	24%	21%	23%	23%	4%	5%	17%	18%	23%	21%	23%	23%	24%	28%	23%	22%	20%	18%
Average	22%	24%	17%	18%	15%	16%	11%	12%	11%	12%	9%	10%	16%	17%	19%	20%	23%	23%	23%	21%	25%	25%	20%	19%
Median	23%	25%	20%	21%	17%	19%	12%	13%	11%	13%	4%	5%	18%	21%	23%	24%	24%	25%	24%	23%	26%	27%	20%	19%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

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Table 5C.5.3-164. Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough under ESO_ELT and ESO_LLT[a, b]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[c]	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**
1976 (C)	14%	9%	17%	10%	19%	17%	20%	17%	21%	19%	16%	14%	21%	18%	20%	10%	16%	11%	20%	15%	12%	8%	12%	8%
1977 (C)	14%	10%	15%	12%	15%	11%	21%	1%	21%	12%	23%	15%	22%	17%	14%	10%	14%	10%	15%	11%	12%	8%	14%	8%
1978 (AN)	10%	7%	14%	11%	12%	8%	1%	1%	2%	1%	0%	0%	1%	1%	16%	13%	18%	15%	10%	5%	20%	17%	21%	13%
1979 (BN)	15%	9%	13%	10%	19%	15%	10%	9%	11%	10%	7%	5%	14%	11%	17%	17%	19%	16%	16%	10%	15%	9%	12%	8%
1980 (AN)	14%	3%	18%	14%	13%	11%	0%	0%	0%	0%	0%	0%	14%	11%	19%	16%	15%	11%	18%	13%	14%	9%	17%	16%
1981 (D)	15%	9%	16%	12%	15%	13%	14%	12%	7%	5%	12%	11%	17%	14%	20%	13%	19%	17%	8%	13%	19%	13%	13%	12%
1982 (W)	15%	10%	11%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	7%	18%	14%	13%	8%	21%	17%	18%	16%
1983 (W)	20%	8%	11%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	11%	9%	13%	8%	20%	17%
1984 (W)	23%	18%	3%	6%	0%	0%	0%	0%	2%	2%	3%	2%	16%	14%	19%	16%	18%	14%	12%	15%	19%	13%	17%	8%
1985 (D)	12%	9%	10%	7%	5%	5%	16%	16%	15%	13%	16%	14%	18%	16%	20%	14%	17%	14%	0%	0%	19%	17%	14%	15%
1986 (W)	14%	10%	17%	13%	15%	14%	6%	4%	0%	0%	0%	0%	12%	10%	19%	14%	13%	13%	17%	14%	17%	10%	15%	11%
1987 (D)	14%	9%	16%	11%	20%	17%	17%	16%	10%	8%	7%	7%	19%	12%	20%	11%	19%	15%	19%	12%	13%	9%	12%	8%
1988 (C)	13%	16%	15%	11%	10%	9%	6%	4%	18%	14%	19%	15%	19%	16%	19%	15%	16%	12%	16%	10%	12%	11%	12%	13%
1989 (D)	13%	8%	13%	10%	15%	10%	17%	16%	20%	14%	2%	1%	6%	3%	8%	4%	18%	16%	16%	14%	17%	13%	13%	10%
1990 (C)	21%	14%	17%	11%	21%	10%	11%	10%	17%	16%	19%	17%	16%	14%	16%	12%	13%	9%	16%	15%	13%	9%	11%	8%
1991 (C)	10%	7%	13%	9%	15%	10%	19%	15%	17%	12%	5%	4%	13%	10%	18%	13%	14%	11%	18%	13%	16%	9%	12%	8%
Average	15%	10%	14%	10%	12%	9%	10%	8%	10%	8%	8%	7%	13%	10%	16%	12%	15%	13%	14%	11%	16%	11%	15%	11%
Median	14%	9%	14%	11%	15%	10%	11%	7%	11%	9%	6%	4%	15%	11%	18%	13%	17%	14%	16%	12%	15%	10%	13%	11%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-165. Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough under HOS_ELT and HOS_LLT[a, b]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[c]	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**
1976 (C)	23%	9%	17%	10%	19%	17%	19%	17%	21%	19%	12%	14%	21%	18%	20%	10%	16%	11%	20%	17%	16%	9%	11%	10%
1977 (C)	14%	10%	15%	11%	15%	11%	21%	17%	19%	14%	21%	16%	21%	18%	14%	11%	14%	10%	16%	12%	12%	8%	12%	8%
1978 (AN)	9%	7%	14%	11%	12%	8%	1%	1%	2%	1%	0%	0%	1%	1%	16%	13%	17%	14%	11%	15%	21%	18%	15%	13%
1979 (BN)	14%	9%	14%	10%	19%	17%	10%	9%	11%	10%	7%	5%	14%	11%	16%	16%	19%	16%	17%	10%	18%	10%	13%	9%
1980 (AN)	16%	4%	22%	14%	10%	11%	0%	0%	0%	0%	0%	0%	0%	0%	1%	4%	15%	11%	18%	12%	14%	9%	17%	15%
1981 (D)	15%	9%	16%	11%	15%	13%	14%	12%	7%	5%	12%	11%	17%	14%	19%	17%	17%	12%	19%	16%	20%	17%	13%	9%
1982 (W)	14%	16%	10%	9%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	7%	18%	14%	15%	11%	16%	17%	20%	15%
1983 (W)	20%	8%	12%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	11%	10%	12%	9%	20%	15%
1984 (W)	23%	19%	3%	5%	0%	0%	0%	0%	2%	2%	3%	2%	1%	2%	6%	8%	15%	12%	17%	17%	20%	16%	17%	8%
1985 (D)	13%	9%	9%	7%	5%	5%	16%	16%	15%	14%	16%	14%	18%	16%	20%	15%	18%	13%	12%	10%	20%	17%	13%	10%
1986 (W)	14%	14%	17%	13%	15%	14%	6%	6%	0%	0%	0%	0%	10%	9%	19%	14%	12%	12%	20%	16%	17%	10%	14%	11%
1987 (D)	14%	9%	16%	11%	20%	16%	17%	16%	10%	8%	7%	7%	19%	16%	20%	11%	19%	15%	19%	12%	13%	10%	12%	8%
1988 (C)	14%	19%	15%	11%	10%	8%	6%	6%	18%	16%	19%	14%	19%	16%	19%	15%	16%	12%	14%	10%	14%	12%	12%	13%
1989 (D)	14%	8%	14%	11%	15%	10%	12%	16%	20%	14%	1%	1%	7%	4%	8%	5%	17%	14%	18%	14%	16%	10%	16%	11%
1990 (C)	14%	16%	16%	11%	19%	15%	11%	11%	17%	16%	19%	16%	19%	14%	16%	12%	12%	9%	14%	13%	15%	14%	12%	9%
1991 (C)	11%	7%	13%	10%	14%	10%	19%	13%	18%	13%	5%	4%	13%	10%	17%	12%	13%	11%	13%	15%	13%	9%	12%	9%
Average	15%	11%	14%	10%	12%	10%	10%	9%	10%	8%	8%	6%	11%	9%	14%	11%	15%	12%	16%	13%	16%	12%	14%	11%
Median	14%	9%	15%	11%	15%	11%	11%	10%	11%	9%	6%	4%	13%	11%	16%	12%	16%	12%	16%	13%	16%	10%	13%	10%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-166. Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough under LOS_ELT and LOS_LLT[a, b]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[c]	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**
1976 (C)	25%	15%	16%	13%	20%	17%	12%	2%	21%	19%	16%	14%	21%	18%	20%	10%	16%	11%	15%	16%	12%	8%	12%	8%
1977 (C)	14%	16%	15%	12%	15%	11%	21%	1%	20%	13%	21%	15%	23%	17%	14%	10%	14%	10%	15%	11%	12%	8%	13%	8%
1978 (AN)	9%	7%	14%	11%	12%	5%	1%	1%	2%	1%	0%	0%	1%	1%	16%	13%	17%	15%	9%	5%	19%	18%	19%	10%
1979 (BN)	15%	17%	14%	10%	20%	16%	10%	9%	11%	10%	7%	5%	14%	11%	17%	17%	20%	16%	16%	10%	14%	9%	14%	9%
1980 (AN)	14%	11%	18%	14%	13%	12%	0%	0%	0%	0%	0%	0%	14%	11%	19%	16%	15%	11%	20%	13%	14%	9%	13%	8%
1981 (D)	14%	11%	16%	12%	15%	12%	14%	12%	7%	6%	12%	10%	17%	14%	20%	14%	19%	17%	8%	14%	18%	15%	14%	15%
1982 (W)	14%	11%	11%	8%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	6%	7%	18%	14%	15%	8%	21%	18%	14%	8%
1983 (W)	20%	8%	11%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	11%	9%	13%	8%	20%	9%
1984 (W)	23%	19%	3%	3%	0%	0%	0%	0%	2%	2%	3%	2%	16%	14%	19%	16%	18%	14%	12%	14%	19%	10%	14%	9%
1985 (D)	12%	8%	10%	7%	3%	2%	16%	16%	15%	13%	16%	14%	17%	15%	20%	14%	17%	14%	0%	0%	20%	14%	16%	17%
1986 (W)	16%	10%	17%	13%	15%	14%	6%	4%	0%	0%	0%	0%	12%	10%	19%	14%	13%	14%	18%	14%	17%	10%	12%	8%
1987 (D)	14%	9%	14%	10%	20%	17%	12%	8%	10%	9%	7%	7%	19%	11%	20%	11%	19%	15%	19%	14%	14%	10%	12%	8%
1988 (C)	14%	17%	15%	11%	10%	8%	6%	6%	18%	16%	19%	15%	19%	16%	19%	15%	16%	14%	15%	10%	12%	12%	12%	13%
1989 (D)	13%	8%	13%	10%	14%	10%	17%	16%	20%	14%	2%	1%	6%	3%	8%	4%	19%	16%	16%	14%	17%	13%	13%	10%
1990 (C)	21%	15%	20%	11%	21%	11%	11%	10%	17%	17%	19%	16%	16%	12%	16%	12%	13%	9%	15%	14%	12%	10%	11%	8%
1991 (C)	10%	7%	13%	9%	15%	10%	19%	11%	17%	14%	5%	4%	13%	10%	18%	13%	15%	11%	18%	12%	16%	8%	12%	8%
Average	15%	12%	14%	10%	12%	9%	9%	6%	10%	8%	8%	7%	13%	10%	16%	12%	15%	13%	14%	11%	16%	11%	14%	10%
Median	14%	11%	14%	11%	15%	10%	11%	5%	11%	9%	6%	4%	15%	11%	18%	13%	17%	14%	15%	13%	15%	10%	13%	8%

[a] Values based on DSM2 HYDRO Modeling.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-167. Differences[a] between EBC2 Scenario and ESO_ELT and ESO_LLT Scenarios[b] in Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough[c]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[d]	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	-1%	-6%	8%	1%	0%	-2%	-2%	-4%	0%	-2%	-1%	-3%	-4%	-7%	-3%	-14%	-7%	-12%	-6%	-11%	-15%	-19%	-12%	-16%
1977 (C)	-9%	-13%	-7%	-11%	-8%	-12%	-4%	-24%	-4%	-14%	-4%	-11%	-5%	-10%	-6%	-10%	-9%	-13%	-11%	-15%	-11%	-14%	-7%	-13%
1978 (AN)	-10%	-13%	-7%	-10%	-2%	-6%	0%	-1%	1%	0%	0%	0%	1%	1%	7%	4%	-6%	-9%	-12%	-17%	-7%	-9%	1%	-6%
1979 (BN)	-12%	-18%	-5%	-9%	-2%	-7%	0%	-1%	0%	-1%	3%	2%	-2%	-5%	2%	2%	-5%	-8%	-4%	-11%	-12%	-17%	-15%	-19%
1980 (AN)	-12%	-23%	0%	-4%	1%	-1%	0%	0%	0%	0%	0%	0%	5%	2%	2%	-1%	-9%	-13%	-8%	-13%	-14%	-19%	-9%	-10%
1981 (D)	-11%	-16%	-9%	-13%	0%	-2%	1%	-1%	5%	3%	7%	5%	-2%	-4%	-5%	-12%	-6%	-9%	-15%	-10%	-6%	-11%	-15%	-16%
1982 (W)	-9%	-14%	-2%	-4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	7%	1%	-2%	-14%	-19%	-6%	-9%	4%	2%
1983 (W)	13%	1%	11%	12%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	2%	-1%	-11%	-15%	20%	17%
1984 (W)	13%	8%	2%	5%	0%	0%	0%	0%	2%	2%	3%	2%	0%	-2%	-3%	-5%	-7%	-11%	-4%	-1%	-8%	-14%	16%	8%
1985 (D)	-13%	-16%	3%	0%	1%	1%	0%	1%	0%	-2%	0%	-2%	-2%	-4%	-3%	-8%	-9%	-12%	-21%	-22%	-6%	-9%	-14%	-12%
1986 (W)	-13%	-17%	-6%	-10%	-1%	-2%	0%	-3%	0%	0%	0%	0%	3%	2%	-2%	-7%	-11%	-10%	-2%	-5%	-10%	-16%	-2%	-6%
1987 (D)	-11%	-16%	-7%	-11%	-3%	-5%	0%	-1%	2%	0%	2%	1%	-6%	-14%	-4%	-13%	-7%	-11%	-5%	-12%	-12%	-16%	-9%	-13%
1988 (C)	-10%	-7%	-8%	-12%	-1%	-2%	2%	0%	0%	-4%	-6%	-10%	-4%	-6%	-5%	-9%	-8%	-12%	-10%	-17%	-8%	-9%	-8%	-7%
1989 (D)	-8%	-13%	-5%	-8%	-5%	-10%	0%	0%	-5%	-11%	1%	0%	2%	-1%	-8%	-11%	-6%	-8%	-4%	-6%	-6%	-9%	-12%	-15%
1990 (C)	-4%	-11%	-6%	-12%	-3%	-14%	2%	1%	2%	1%	-2%	-4%	-6%	-9%	-6%	-10%	-8%	-11%	-10%	-11%	-15%	-19%	-9%	-12%
1991 (C)	-10%	-13%	-7%	-12%	-7%	-12%	-3%	-6%	-6%	-11%	1%	0%	-4%	-6%	-6%	-11%	-9%	-12%	-6%	-12%	-7%	-14%	-8%	-12%
Average	-7%	-12%	-3%	-6%	-2%	-5%	0%	-3%	0%	-2%	0%	-1%	-1%	-4%	-2%	-6%	-7%	-9%	-8%	-11%	-10%	-14%	-5%	-8%
Median	-10%	-13%	-6%	-9%	-1%	-2%	0%	-1%	0%	0%	0%	0%	-2%	-4%	-3%	-9%	-7%	-11%	-7%	-11%	-9%	-14%	-9%	-12%

[a] Negative values indicate greater mean monthly percentage of Sacramento River reverse flows entering Georgiana Slough flow under EBC2.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2 HYDRO Modeling.
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-168. Differences[a] between EBC2_ELT and ESO_ELT and between EBC2_LLT and ESO_LLT[b] in Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough[c]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[d]	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	-8%	-17%	2%	-3%	-2%	-7%	-3%	-7%	-2%	-8%	-3%	-7%	-4%	-8%	-4%	-15%	-8%	-14%	-6%	-12%	-14%	-12%	-9%	-11%
1977 (C)	-9%	-16%	-8%	-10%	-7%	-11%	-1%	-13%	-4%	-11%	-4%	-10%	-6%	-9%	-6%	-7%	-9%	-12%	-7%	-10%	-7%	-10%	-6%	-9%
1978 (AN)	-6%	-9%	-6%	-9%	-2%	-7%	0%	-1%	2%	1%	0%	0%	1%	1%	3%	-6%	-8%	-11%	-13%	-18%	-8%	-11%	-2%	-12%
1979 (BN)	-12%	-18%	-6%	-13%	-3%	-9%	-1%	-4%	-1%	-4%	3%	0%	-4%	-9%	-6%	-10%	-5%	-9%	-9%	-17%	-13%	-18%	-15%	-18%
1980 (AN)	-10%	-21%	-3%	-9%	-1%	-6%	0%	0%	0%	0%	0%	0%	3%	-4%	-3%	-10%	-9%	-14%	-7%	0%	-14%	-19%	-9%	-12%
1981 (D)	-11%	-15%	-8%	-14%	-2%	-7%	-1%	-5%	3%	0%	0%	-4%	-3%	-7%	-5%	-12%	-6%	-9%	-16%	-5%	-6%	-14%	-14%	-11%
1982 (W)	-8%	-17%	-2%	-5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	2%	-6%	-11%	-13%	-6%	-6%	-10%	8%	15%
1983 (W)	2%	-17%	10%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	-11%	-14%	-14%	-19%	5%	2%
1984 (W)	7%	-1%	2%	4%	0%	0%	0%	0%	2%	2%	3%	2%	-2%	-7%	-5%	-9%	-7%	-12%	-6%	-4%	-8%	-15%	16%	6%
1985 (D)	-14%	-17%	0%	-5%	-1%	-6%	-2%	-5%	-1%	-5%	-3%	-9%	-5%	-10%	-5%	-12%	-9%	-12%	-14%	-11%	-8%	-11%	-14%	-8%
1986 (W)	-10%	-17%	-7%	-11%	-2%	-6%	-1%	-5%	0%	0%	0%	0%	2%	-2%	-5%	-11%	-9%	-11%	5%	-9%	-11%	-17%	-2%	-6%
1987 (D)	-11%	-15%	-8%	-11%	-4%	-8%	-2%	-7%	0%	-5%	1%	-2%	-6%	-15%	-5%	-13%	-8%	-11%	-7%	-15%	-7%	-15%	-9%	-12%
1988 (C)	-10%	-6%	-8%	-10%	-2%	-6%	1%	-2%	-5%	-10%	-6%	-11%	-5%	-10%	-5%	-9%	-9%	-12%	-11%	-17%	-7%	-12%	-7%	-6%
1989 (D)	-7%	-14%	-5%	-8%	-5%	-11%	-2%	-6%	-6%	-11%	0%	0%	0%	-4%	-7%	-12%	-7%	-9%	-5%	-11%	-9%	-14%	-12%	-13%
1990 (C)	-3%	-10%	-7%	-10%	-4%	-12%	0%	-4%	-1%	-6%	-5%	-9%	-8%	-11%	-5%	-9%	-7%	-10%	-11%	-2%	-11%	-12%	-8%	-12%
1991 (C)	-9%	-11%	-7%	-9%	-6%	-10%	-5%	-5%	-6%	-10%	0%	-1%	-4%	-7%	-5%	-9%	-9%	-11%	-6%	-15%	-7%	-13%	-8%	-10%
Average	-7%	-14%	-4%	-7%	-3%	-7%	-1%	-4%	-1%	-4%	-1%	-3%	-3%	-7%	-4%	-9%	-7%	-10%	-9%	-10%	-9%	-14%	-5%	-7%
Median	-9%	-15%	-6%	-9%	-2%	-7%	-1%	-4%	0%	-4%	0%	-1%	-3%	-7%	-5%	-9%	-8%	-11%	-8%	-11%	-8%	-13%	-8%	-10%

[a] Negative values indicate greater mean monthly percentage of Sacramento River reverse flows entering Georgiana Slough flow under EBC2 scenarios.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2 HYDRO Modeling.
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-169. Differences[a] between EBC2_ELT and HOS_ELT and between EBC2_LLT and HOS_LLT[b] in Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough[c]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[d]	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT	ELT	LLT
1976 (C)	2%	-17%	3%	-3%	-2%	-7%	-3%	-7%	-2%	-7%	-7%	-7%	-4%	-8%	-4%	-15%	-8%	-14%	-5%	-11%	-10%	-11%	-9%	-9%
1977 (C)	-8%	-16%	-8%	-11%	-7%	-11%	-1%	3%	-6%	-9%	-5%	-9%	-6%	-9%	-6%	-7%	-9%	-12%	-6%	-9%	-7%	-10%	-8%	-9%
1978 (AN)	-6%	-9%	-7%	-9%	-2%	-7%	0%	-1%	2%	1%	0%	0%	1%	0%	3%	-6%	-8%	-11%	-12%	-8%	-6%	-10%	-7%	-12%
1979 (BN)	-13%	-18%	-6%	-13%	-3%	-7%	-1%	-4%	-1%	-4%	3%	-1%	-4%	-9%	-6%	-10%	-6%	-9%	-8%	-17%	-9%	-18%	-15%	-18%
1980 (AN)	-8%	-21%	2%	-8%	-4%	-6%	0%	0%	0%	0%	0%	0%	-11%	-15%	-21%	-22%	-9%	-14%	-7%	0%	-14%	-19%	-10%	-13%
1981 (D)	-11%	-15%	-8%	-14%	-2%	-7%	-1%	-5%	3%	0%	0%	-5%	-3%	-7%	-6%	-8%	-9%	-14%	-6%	-2%	-5%	-10%	-14%	-14%
1982 (W)	-9%	-11%	-2%	-4%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	2%	-6%	-11%	-10%	-3%	-12%	-10%	10%	14%
1983 (W)	2%	-17%	10%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	-12%	-13%	-15%	-18%	5%	-1%
1984 (W)	7%	0%	2%	2%	0%	0%	0%	0%	2%	2%	3%	2%	-17%	-19%	-18%	-18%	-11%	-14%	-2%	-2%	-7%	-12%	16%	6%
1985 (D)	-13%	-17%	0%	-5%	0%	-6%	-1%	-5%	-1%	-4%	-3%	-9%	-5%	-10%	-5%	-11%	-8%	-13%	-3%	-1%	-7%	-11%	-14%	-13%
1986 (W)	-9%	-13%	-7%	-11%	-2%	-6%	-1%	-4%	0%	0%	0%	0%	0%	-4%	-5%	-11%	-9%	-12%	7%	-7%	-10%	-18%	-2%	-6%
1987 (D)	-11%	-15%	-8%	-11%	-4%	-9%	-2%	-7%	0%	-5%	1%	-2%	-6%	-10%	-5%	-13%	-7%	-11%	-7%	-15%	-7%	-14%	-9%	-12%
1988 (C)	-9%	-4%	-7%	-10%	-2%	-6%	1%	0%	-5%	-8%	-6%	-11%	-5%	-10%	-6%	-9%	-9%	-12%	-13%	-16%	-6%	-11%	-8%	-6%
1989 (D)	-6%	-14%	-4%	-8%	-5%	-11%	-6%	-6%	-6%	-11%	0%	0%	1%	-3%	-7%	-11%	-9%	-11%	-4%	-12%	-10%	-17%	-9%	-13%
1990 (C)	-9%	-7%	-8%	-10%	-6%	-7%	-1%	-4%	-1%	-5%	-5%	-10%	-6%	-11%	-5%	-8%	-8%	-10%	-13%	-4%	-8%	-7%	-8%	-11%
1991 (C)	-8%	-11%	-7%	-8%	-6%	-10%	-4%	-8%	-6%	-10%	0%	-1%	-4%	-7%	-6%	-9%	-10%	-11%	-11%	-13%	-10%	-13%	-8%	-9%
Average	-7%	-13%	-3%	-7%	-3%	-6%	-1%	-3%	-1%	-4%	-1%	-3%	-4%	-8%	-6%	-10%	-8%	-11%	-7%	-8%	-9%	-13%	-6%	-8%
Median	-9%	-14%	-6%	-9%	-2%	-7%	-1%	-4%	-1%	-4%	0%	-1%	-4%	-8%	-6%	-10%	-9%	-12%	-7%	-8%	-9%	-12%	-8%	-10%

[a] Negative values indicate greater mean monthly percentage of Sacramento River reverse flows entering Georgiana Slough flow under EBC2 scenarios.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2 HYDRO Modeling.
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

Table 5C.5.3-170. Differences[a] between EBC2_ELT and LOS_ELT and between EBC2_LLT and LOS_LLT[b] in Mean Monthly Percentage of Sacramento River Reverse Flows Entering Georgiana Slough[c]

	October		November		December		January		February		March		April		May		June		July		August		September	
Water Year[d]	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**	**ELT**	**LLT**
1976 (C)	4%	-12%	2%	0%	-1%	-8%	-10%	-22%	-1%	-7%	-3%	-7%	-4%	-8%	-4%	-15%	-8%	-14%	-10%	-11%	-14%	-12%	-8%	-11%
1977 (C)	-9%	-10%	-8%	-10%	-7%	-11%	-1%	-13%	-5%	-10%	-5%	-10%	-5%	-9%	-6%	-8%	-9%	-12%	-7%	-10%	-7%	-10%	-7%	-9%
1978 (AN)	-6%	-9%	-6%	-9%	-2%	-10%	0%	-1%	2%	1%	0%	0%	1%	1%	3%	-6%	-8%	-10%	-13%	-18%	-9%	-11%	-4%	-15%
1979 (BN)	-13%	-11%	-6%	-12%	-3%	-8%	-1%	-4%	-1%	-4%	3%	-1%	-4%	-9%	-6%	-10%	-5%	-9%	-8%	-17%	-13%	-18%	-14%	-18%
1980 (AN)	-10%	-14%	-3%	-9%	-1%	-5%	0%	0%	0%	0%	0%	0%	3%	-4%	-3%	-10%	-9%	-14%	-5%	0%	-13%	-20%	-14%	-20%
1981 (D)	-11%	-14%	-7%	-13%	-2%	-8%	-1%	-5%	3%	0%	-1%	-5%	-3%	-8%	-5%	-11%	-6%	-9%	-16%	-4%	-8%	-13%	-13%	-8%
1982 (W)	-9%	-16%	-2%	-5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	2%	-5%	-11%	-10%	-6%	-6%	-10%	4%	7%
1983 (W)	2%	-17%	10%	6%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	5%	-11%	-14%	-14%	-19%	5%	-7%
1984 (W)	7%	0%	2%	1%	0%	0%	0%	0%	2%	2%	3%	2%	-2%	-7%	-5%	-9%	-7%	-12%	-6%	-5%	-9%	-18%	13%	6%
1985 (D)	-14%	-18%	0%	-5%	-3%	-9%	-2%	-5%	-1%	-5%	-3%	-9%	-6%	-11%	-5%	-12%	-9%	-12%	-14%	-11%	-7%	-14%	-11%	-6%
1986 (W)	-7%	-17%	-6%	-10%	-2%	-6%	0%	-6%	0%	0%	0%	0%	2%	-2%	-5%	-11%	-9%	-10%	6%	-9%	-10%	-18%	-4%	-9%
1987 (D)	-11%	-15%	-9%	-12%	-4%	-9%	-7%	-14%	0%	-4%	1%	-2%	-6%	-16%	-5%	-13%	-7%	-11%	-7%	-13%	-6%	-14%	-9%	-12%
1988 (C)	-9%	-6%	-8%	-10%	-3%	-6%	1%	0%	-5%	-8%	-6%	-11%	-5%	-10%	-5%	-9%	-9%	-11%	-11%	-17%	-7%	-11%	-8%	-6%
1989 (D)	-7%	-14%	-5%	-8%	-5%	-11%	-2%	-6%	-6%	-11%	0%	0%	0%	-4%	-7%	-12%	-7%	-9%	-6%	-12%	-9%	-14%	-12%	-13%
1990 (C)	-3%	-9%	-3%	-10%	-4%	-11%	-1%	-4%	-1%	-5%	-5%	-10%	-8%	-13%	-5%	-9%	-7%	-10%	-12%	-3%	-12%	-11%	-8%	-11%
1991 (C)	-9%	-11%	-7%	-9%	-6%	-10%	-5%	-10%	-6%	-9%	0%	-1%	-4%	-7%	-5%	-9%	-8%	-11%	-6%	-15%	-7%	-14%	-8%	-10%
Average	-6%	-12%	-3%	-7%	-3%	-7%	-2%	-6%	-1%	-4%	-1%	-3%	-3%	-7%	-4%	-9%	-7%	-10%	-9%	-10%	-9%	-14%	-6%	-9%
Median	-9%	-13%	-5%	-9%	-2%	-8%	-1%	-5%	0%	-4%	0%	-1%	-3%	-7%	-5%	-9%	-8%	-11%	-9%	-11%	-9%	-14%	-8%	-9%

[a] Negative values indicate greater mean monthly percentage of Sacramento River reverse flows entering Georgiana Slough flow under EBC2 scenarios.
[b] See Table 5C.0-1 for definitions of the scenarios.
[c] Values based on DSM2 HYDRO Modeling.
[d] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
ELT = early long-term; LLT = late long-term.

5C.5.3.8.4 Percentage of Chinook Salmon Smolts Entering Georgiana Slough/Delta Cross Channel and Steamboat/Sutter Sloughs (Delta Passage Model)

The percentage of smolts entering Georgiana Slough/Delta Cross Channel (DCC) under the ESO/HOS/LOS scenarios as estimated with the Delta Passage Model (DPM) generally was similar to or lower than the percentages for the EBC2 scenarios (Table 5C.5.3-171, Table 5C.5.3-174, Table 5C.5.3-177, Table 5C.5.3-180; Figure 5C.5.3-129, Figure 5C.5.3-132, Figure 5C.5.3-135, Figure 5C.5.3-138). Winter-run, spring-run, and fall-run Chinook salmon smolts have migration periods that mostly occur within the main period of DCC closure (December–June). Therefore most or all entry into the interior Delta would be through Georgiana Slough. The estimates of percentage of smolts entering the interior Delta were similar to the estimates of the percentage of Sacramento River entering Georgiana Slough during December–June from the DSM2-HYDRO modeling (see Table 5C.5.3-162, Table 5C.5.3-163, Table 5C.5.3-164, Table 5C.5.3-165, and Table 5C.5.3-166).

5C.5.3.8.4.1 Winter-Run Chinook Salmon

For winter-run Chinook salmon, the percentage of smolts entering Georgiana Slough/DCC under EBC scenarios ranged from just under 30% in 1982–1983 (wet years) to ~45% in 1977, a critically dry year, with averages and medians of 35–36% (Table 5C.5.3-171). ESO/HOS/LOS scenario percentages ranged from just under 30% to 43%, with lower percentages in the LLT compared to the ELT. Averages and medians for the ESO/HOS/LOS scenarios were similar to each other, at 35–36% in the ELT and 34% in the LLT. The consistency in the similar or lower percentage of smolts entering Georgiana Slough/DCC under ESO/HOS/LOS scenarios compared to EBC scenarios is illustrated in Figure 5C.5.3-129. In this plot, each point represents the paired comparison of the annual percentage of smolts entering Georgiana Slough/DCC under an EBC2 scenario to the percentage from an ESO, HOS, or LOS scenario. Most points fall close to or below the 1:1 ratio, indicating similar or lower percentages under the ESO/HOS/LOS scenarios (Figure 5C.5.3-129). As noted in the methods, the analysis for winter-run Chinook salmon smolts provides an indication of percentage entry into Georgiana Slough/DCC for the winter/spring period (December–March/early April).

The percentage of winter-run Chinook salmon smolts entering Steamboat/Sutter Sloughs under the EBC scenarios ranged from 27% to 40%, with averages and medians of 33–34% (Table 5C.5.3-172). For ESO/HOS/LOS scenarios, the percentages also ranged from 27–40%, with averages of 33% in the ELT and 34% in the LLT; medians were 31% in the ELT and 33% in the LLT. Pairwise comparisons of EBC vs. ESO/HOS/LOS scenarios showed that although variable, the percentage of smolts entering Steamboat/Sutter Sloughs under ESO/HOS/LOS scenarios generally was similar to the percentage entering under EBC scenarios (Figure 5C.5.3-130). As a result, the percentage of winter-run smolts approaching Steamboat/Sutter Sloughs that would have entered Georgiana Slough/Delta Cross Channel was similar to, or lower than, the percentage that would have entered under EBC scenarios (Table 5C.5.3-173; Figure 5C.5.3-131).

5C.5.3.8.4.2 Spring-Run Chinook Salmon

For spring-run Chinook salmon, the percentage of smolts entering Georgiana Slough/DCC under EBC scenarios ranged from just under 30% in 1982–1983 to just over 45% in 1977, with averages and medians of 36–38% (Table 5C.5.3-174). ESO/HOS/LOS scenario percentages ranged from just under

30% to 43%, with lower percentages in the LLT compared to the ELT. Averages and medians for the ESO/HOS/LOS scenarios were 35–37% in the ELT and 34–35% in the LLT. As with winter-run Chinook salmon, the consistency in the similar or lower percentage of smolts entering Georgiana Slough/DCC under ESO/HOS/LOS scenarios compared to EBC scenarios is illustrated in Figure 5C.5.3-132. Most points fall close to or below the 1:1 ratio, indicating similar or lower percentages under the ESO/HOS/LOS scenarios. As noted in the methods, the analysis for spring-run Chinook salmon smolts provides an indication of percentage entry into Georgiana Slough/DCC primarily for the spring period (March–May).

The percentage of spring-run Chinook salmon smolts entering Steamboat/Sutter Sloughs under the EBC scenarios ranged from 26% to 40%, with averages of 32-33% and medians of 31–32% (Table 5C.5.3-175). For ESO/HOS/LOS scenarios, the percentages ranged from 27–39%, with averages of 31–32% in the ELT and 33% in the LLT; medians were 30% in the ELT and 32% in the LLT. As with winter-run Chinook salmon, pairwise comparisons of EBC vs. ESO/HOS/LOS scenarios showed that although variable, the percentage of spring-run smolts entering Steamboat/Sutter Sloughs under ESO/HOS/LOS scenarios generally was similar to the percentage entering under EBC scenarios, particularly in the LLT (Figure 5C.5.3-133). The percentage of spring-run smolts approaching Steamboat/Sutter Sloughs that would have entered Georgiana Slough/Delta Cross Channel therefore was similar to, or lower than, the percentage that would have entered under EBC scenarios (Table 5C.5.3-176; Figure 5C.5.3-134).

5C.5.3.8.4.3 Fall-Run Chinook Salmon

For fall-run Chinook salmon, the percentage of smolts entering Georgiana Slough/DCC under EBC scenarios ranged from just under 30% in 1983 to 53–54% in 1977, with averages and medians of 41–42% (Table 5C.5.3-177). ESO/HOS/LOS scenario percentages ranged from just under 30% to 48%, with lower percentages in the LLT compared to the ELT. Averages and medians for the ESO/HOS/LOS scenarios were 38–40% in the ELT and 36–37% in the LLT. As with winter-run and spring-run Chinook salmon, the consistency in the similar or lower percentage of smolts entering Georgiana Slough/DCC under ESO/HOS/LOS scenarios compared to EBC scenarios is illustrated in Figure 5C.5.3-135. Most points fall close to or below the 1:1 ratio, indicating similar or lower percentages under the ESO/HOS/LOS scenarios. As noted in the methods, the analysis for fall-run Chinook salmon provides an indication of percentage entry into Georgiana Slough/DCC primarily for April–June, with a sharp peak in early May.

The percentage of fall-run Chinook salmon smolts entering Steamboat/Sutter Sloughs under the EBC scenarios ranged from 24% to 38%, with averages of 30% and medians of 29–30% (Table 5C.5.3-178). For ESO/HOS/LOS scenarios, the percentages ranged from 25–37%, with averages of 29–30% in the ELT and 32% in the LLT; medians were 29% in the ELT and 31–32% in the LLT. Pairwise comparisons of EBC vs. ESO/HOS/LOS scenarios showed that although variable, the percentage of fall-run smolts entering Steamboat/Sutter Sloughs under ESO/HOS/LOS scenarios generally was similar to or slightly greater than the percentage entering under EBC scenarios, particularly in the LLT (Figure 5C.5.3-136). The percentage of fall-run smolts approaching Steamboat/Sutter Sloughs that would have entered Georgiana Slough/Delta Cross Channel therefore was similar to, or lower than, the percentage that would have entered under EBC scenarios (Table 5C.5.3-179; Figure 5C.5.3-137).

5C.5.3.8.4.4 Late Fall–Run Chinook Salmon

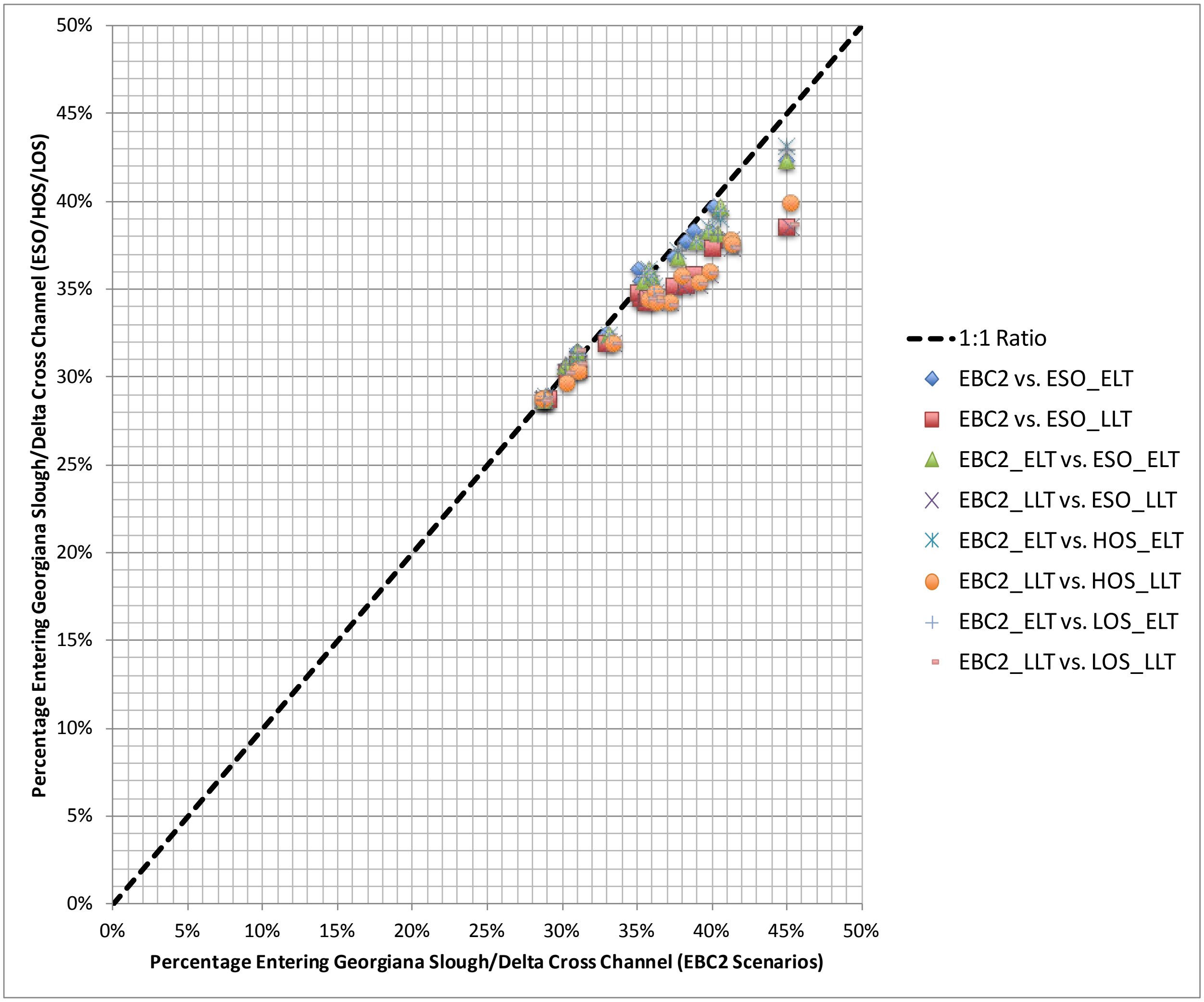
The late fall–run Chinook salmon smolt Plan Area entry distribution differs from the other Chinook salmon runs analyzed with DPM as it includes appreciable overlap with the fall months (September–November). Whereas smolts of the other Chinook salmon runs for the most part encounter a closed DCC, the DCC may be open for much of the late fall–run Chinook through-Delta migration period, resulting in relatively high percentages of late fall–run smolts entering the interior Delta through Georgiana Slough/DCC. For late fall–run Chinook salmon, the percentage of smolts entering Georgiana Slough/DCC under EBC scenarios ranged from 32–36% in 1984 to 62–63% in 1991, with averages of 51–52% and medians of ~55% (Table 5C.5.3-180). ESO/HOS/LOS scenario percentages ranged from 35–37% in 1984 to 56%, with lower percentages in the LLT compared to the ELT. Averages and medians for the ESO/HOS/LOS scenarios were 49–52% in the ELT and 45–48% in the LLT. The percentage of smolts entering Georgiana Slough/DCC under ESO/HOS/LOS scenarios compared to EBC scenarios is illustrated in Figure 5C.5.3-138. The majority of points fall close to or below the 1:1 ratio, indicating similar or lower percentages under the ESO/HOS/LOS scenarios. A number of points fall above the line; these involved comparisons between EBC2 scenarios and ESO/HOS/LOS scenarios in 1976, 1983, 1984, and 1985, which mostly had lower percentages of smolts entering Georgiana Slough/DCC than in other years because of higher fall flows.

The percentage of late fall-run Chinook salmon smolts entering Steamboat/Sutter Sloughs under the EBC scenarios ranged from 21% to 36%, with averages of 27–28% and medians of 26–27% (Table 5C.5.3-181). For ESO/HOS/LOS scenarios, the percentages ranged from 23–35%, with averages of 27% in the ELT and 29–30% in the LLT; medians were 26% in the ELT and 28–29% in the LLT. Pairwise comparisons of EBC vs. ESO/HOS/LOS scenarios showed that although variable, the percentage of late fall–run smolts entering Steamboat/Sutter Sloughs under ESO/HOS/LOS scenarios generally was similar to or slightly greater than the percentage entering under EBC scenarios, particularly in the LLT (Figure 5C.5.3-139). The percentage of late fall-run smolts approaching Steamboat/Sutter Sloughs that would have entered Georgiana Slough/Delta Cross Channel therefore was similar to, or lower than, the percentage that would have entered under EBC scenarios (Table 5C.5.3-182; Figure 5C.5.3-140).

Table 5C.5.3-171. Percentage of Winter-Run Chinook Salmon Smolts Entering the Interior Delta through Georgiana Slough and the Delta Cross Channel under All Scenarios, Estimated with the Delta Passage Model

Water Year[a]	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	39%	40%	41%	41%	40%	38%	39%	38%	39%	37%
1977 (C)	44%	45%	45%	45%	42%	39%	43%	40%	43%	39%
1978 (AN)	31%	31%	31%	31%	31%	30%	31%	30%	31%	32%
1979 (BN)	35%	35%	35%	36%	35%	34%	36%	34%	36%	34%
1980 (AN)	31%	31%	31%	31%	31%	31%	31%	30%	31%	31%
1981 (D)	35%	35%	36%	36%	36%	35%	36%	35%	36%	35%
1982 (W)	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%
1983 (W)	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%
1984 (W)	30%	30%	30%	30%	31%	30%	30%	30%	31%	30%
1985 (D)	35%	36%	36%	37%	35%	34%	35%	34%	35%	34%
1986 (W)	33%	33%	33%	33%	32%	32%	32%	32%	32%	32%
1987 (D)	38%	37%	38%	38%	37%	35%	37%	36%	37%	36%
1988 (C)	39%	39%	40%	40%	38%	36%	39%	36%	38%	36%
1989 (D)	36%	36%	36%	36%	36%	34%	36%	34%	36%	34%
1990 (C)	40%	40%	40%	41%	38%	37%	39%	38%	38%	37%
1991 (C)	39%	38%	39%	39%	38%	35%	38%	35%	38%	35%
Average	35%	35%	36%	36%	35%	34%	35%	34%	35%	34%
Median	35%	35%	36%	36%	36%	34%	36%	34%	36%	34%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



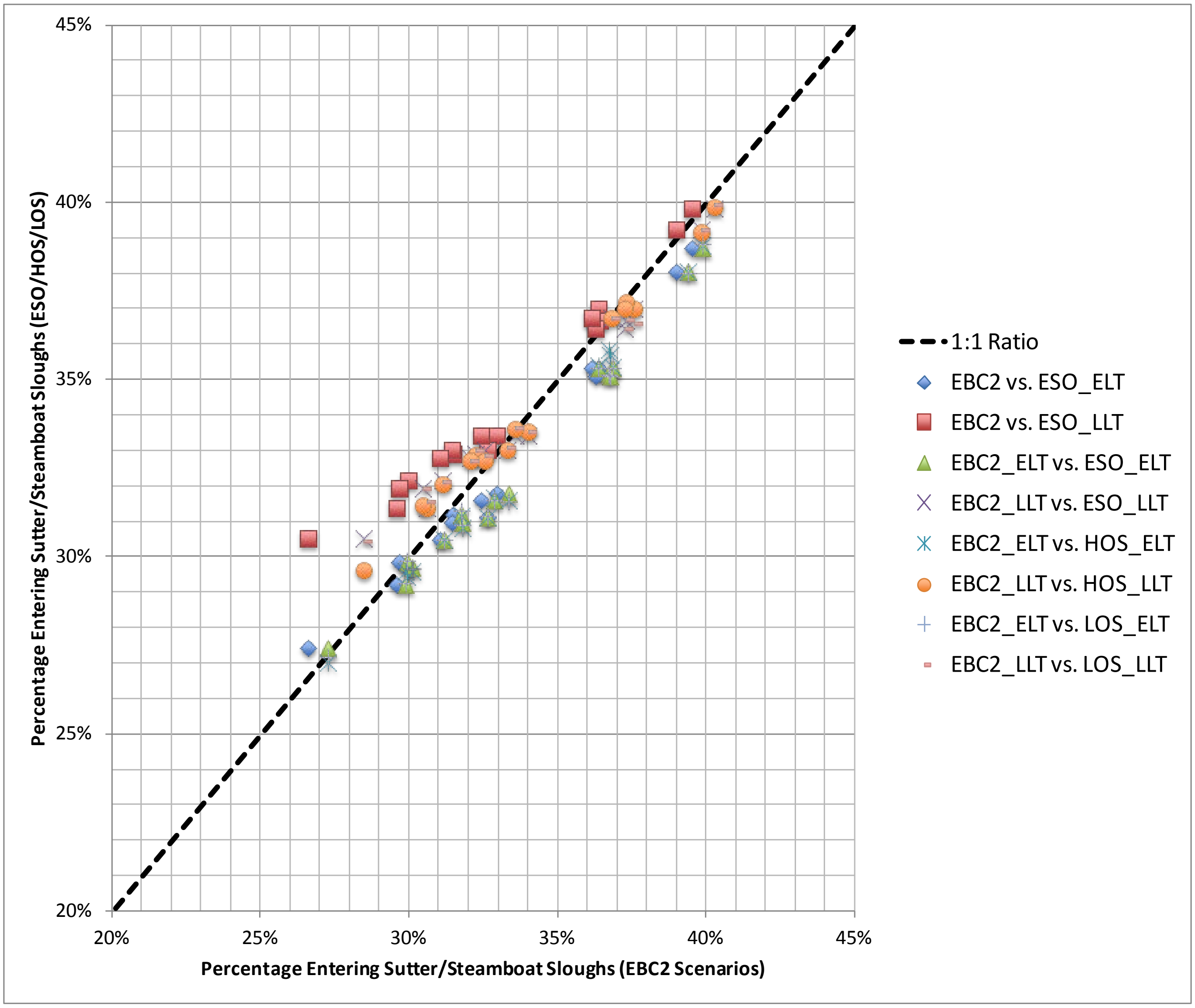
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Georgiana Slough and Delta Cross Channel under the EBC scenarios.

Figure 5C.5.3-129. Percentage of Winter-Run Chinook Salmon Smolts Entering the Interior Delta through Georgiana Slough and the Delta Cross Channel Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-172. Percentage of Winter-Run Chinook Salmon Smolts Entering Sutter/Steamboat Sloughs under All Scenarios, Estimated with the Delta Passage Model

Water Year[a]	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	30%	30%	30%	31%	29%	31%	30%	31%	29%	32%
1977 (C)	27%	27%	27%	28%	27%	31%	27%	30%	27%	30%
1978 (AN)	36%	36%	37%	38%	35%	37%	35%	37%	35%	37%
1979 (BN)	33%	33%	33%	34%	32%	33%	32%	34%	32%	34%
1980 (AN)	36%	36%	37%	37%	35%	37%	36%	37%	35%	37%
1981 (D)	33%	33%	33%	33%	31%	33%	31%	33%	31%	33%
1982 (W)	39%	39%	39%	40%	38%	39%	38%	39%	38%	39%
1983 (W)	40%	40%	40%	40%	39%	40%	39%	40%	39%	40%
1984 (W)	36%	36%	37%	37%	35%	36%	36%	37%	35%	36%
1985 (D)	32%	31%	32%	32%	31%	33%	31%	33%	31%	33%
1986 (W)	36%	36%	36%	37%	35%	37%	35%	37%	35%	37%
1987 (D)	31%	31%	32%	33%	31%	33%	31%	33%	31%	33%
1988 (C)	30%	30%	30%	31%	30%	32%	30%	32%	30%	32%
1989 (D)	32%	32%	33%	34%	32%	33%	32%	34%	32%	34%
1990 (C)	30%	30%	30%	30%	30%	32%	29%	31%	30%	32%
1991 (C)	31%	31%	31%	32%	30%	33%	30%	33%	30%	33%
Average	33%	33%	34%	34%	33%	34%	33%	34%	33%	34%
Median	33%	33%	33%	33%	31%	33%	31%	33%	31%	33%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



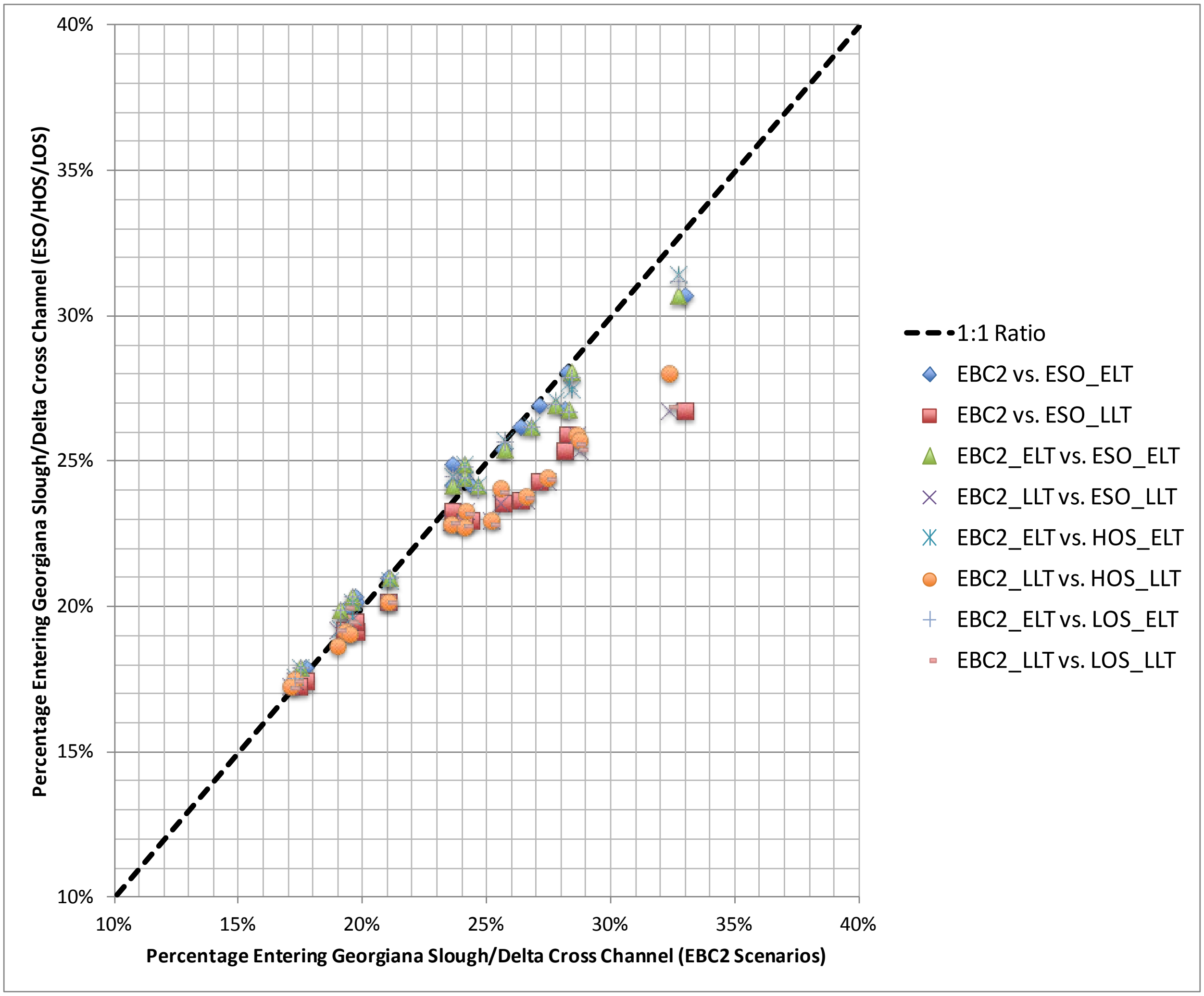
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Steamboat/Sutter Sloughs under the EBC scenarios.

Figure 5C.5.3-130. Percentage of Winter-Run Chinook Salmon Smolts Entering Sutter/Steamboat Sloughs Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

1 **Table 5C.5.3-173. Percentage of Winter-Run Chinook Salmon Smolts the Interior Delta through**
2 **Georgiana Slough and the Delta Cross Channel (Adjusted for Percentage Entering Sutter/Steamboat**
3 **Sloughs) under All Scenarios, Estimated with the Delta Passage Model**

Water Year[a]	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	28%	28%	28%	29%	28%	26%	27%	26%	28%	26%
1977 (C)	32%	33%	33%	32%	31%	27%	31%	28%	31%	27%
1978 (AN)	20%	20%	20%	19%	20%	19%	20%	19%	20%	20%
1979 (BN)	24%	24%	24%	24%	24%	23%	25%	23%	25%	23%
1980 (AN)	20%	20%	20%	19%	20%	19%	20%	19%	20%	19%
1981 (D)	23%	24%	24%	24%	25%	23%	25%	23%	25%	23%
1982 (W)	18%	18%	18%	17%	18%	17%	18%	18%	18%	17%
1983 (W)	17%	17%	17%	17%	18%	17%	18%	17%	18%	17%
1984 (W)	19%	19%	19%	19%	20%	19%	19%	19%	20%	19%
1985 (D)	24%	24%	25%	25%	24%	23%	24%	23%	24%	23%
1986 (W)	21%	21%	21%	21%	21%	20%	21%	20%	21%	20%
1987 (D)	26%	26%	26%	26%	25%	24%	26%	24%	26%	24%
1988 (C)	27%	27%	28%	27%	27%	24%	27%	24%	27%	24%
1989 (D)	24%	24%	24%	24%	24%	23%	24%	23%	24%	23%
1990 (C)	28%	28%	28%	29%	27%	25%	28%	26%	27%	25%
1991 (C)	27%	26%	27%	27%	26%	24%	26%	24%	26%	24%
Average	24%	24%	24%	24%	24%	22%	24%	22%	24%	22%
Median	24%	24%	24%	24%	24%	23%	24%	23%	24%	23%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



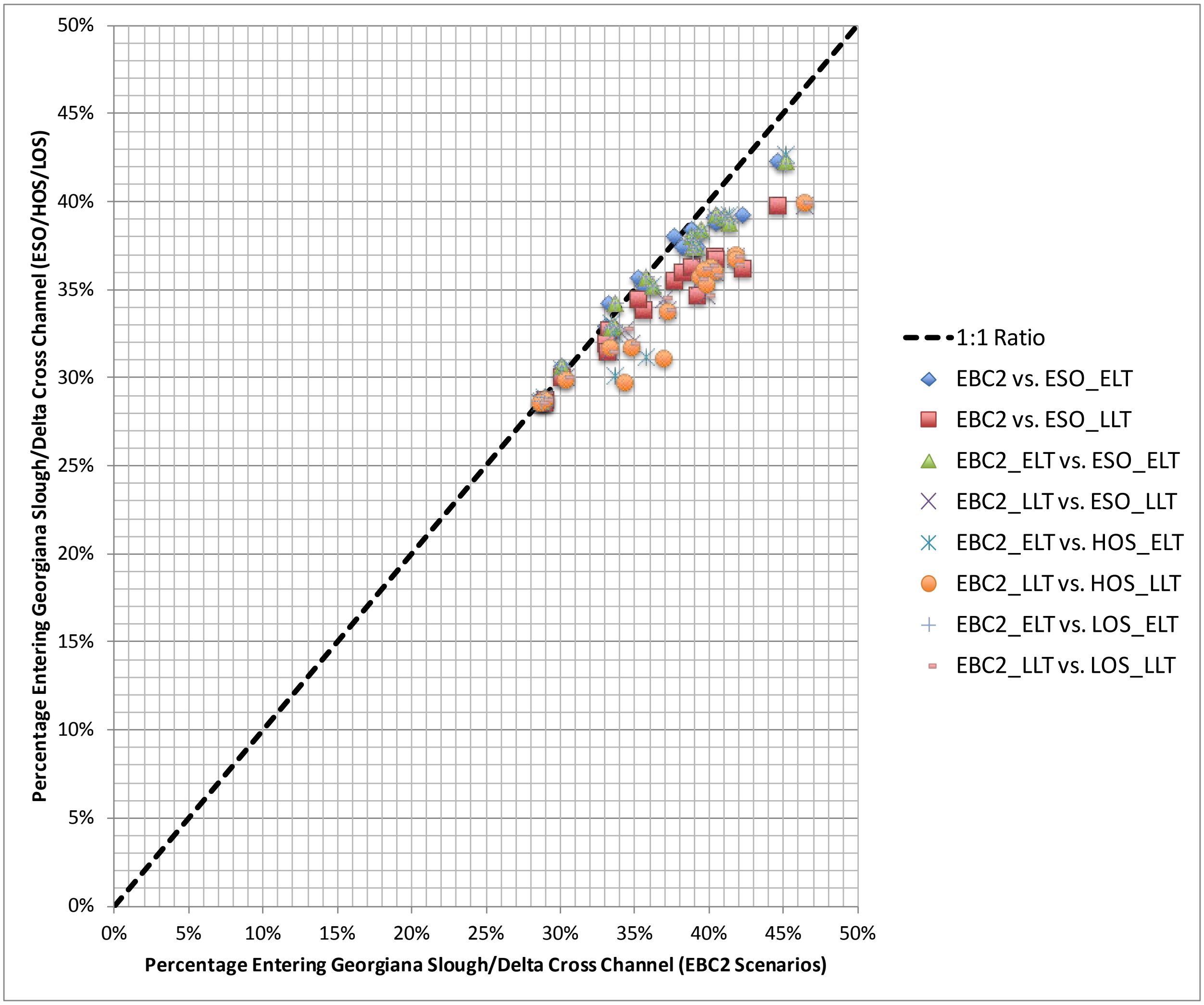
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Georgiana Slough and Delta Cross Channel under the EBC scenarios.

Figure 5C.5.3-131. Percentage of Winter-Run Chinook Salmon Smolts the Interior Delta through Georgiana Slough and the Delta Cross Channel (Adjusted for Percentage Entering Sutter/Steamboat Sloughs) Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-174. Percentage of Spring-Run Chinook Salmon Smolts Entering the Interior Delta through Georgiana Slough and the Delta Cross Channel under All Scenarios, Estimated with the Delta Passage Model

Water Year[a]	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	42%	42%	40%	40%	39%	36%	39%	36%	39%	36%
1977 (C)	45%	45%	45%	46%	42%	40%	43%	40%	42%	40%
1978 (AN)	30%	30%	30%	30%	31%	30%	31%	30%	31%	30%
1979 (BN)	35%	36%	36%	37%	35%	34%	35%	34%	35%	34%
1980 (AN)	33%	33%	34%	34%	34%	33%	30%	30%	34%	33%
1981 (D)	37%	38%	39%	39%	38%	36%	38%	36%	38%	36%
1982 (W)	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%
1983 (W)	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%
1984 (W)	35%	35%	36%	37%	36%	34%	31%	31%	36%	35%
1985 (D)	38%	38%	39%	40%	37%	36%	38%	36%	37%	36%
1986 (W)	33%	33%	34%	35%	33%	32%	33%	32%	33%	32%
1987 (D)	39%	39%	39%	40%	37%	35%	37%	35%	37%	35%
1988 (C)	40%	40%	41%	42%	39%	37%	39%	37%	39%	37%
1989 (D)	33%	33%	33%	33%	33%	32%	33%	32%	33%	32%
1990 (C)	40%	40%	41%	42%	39%	37%	39%	37%	39%	36%
1991 (C)	39%	39%	39%	40%	38%	36%	38%	36%	38%	36%
Average	36%	36%	37%	37%	36%	34%	35%	34%	36%	34%
Median	36%	37%	38%	38%	37%	35%	36%	35%	36%	35%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



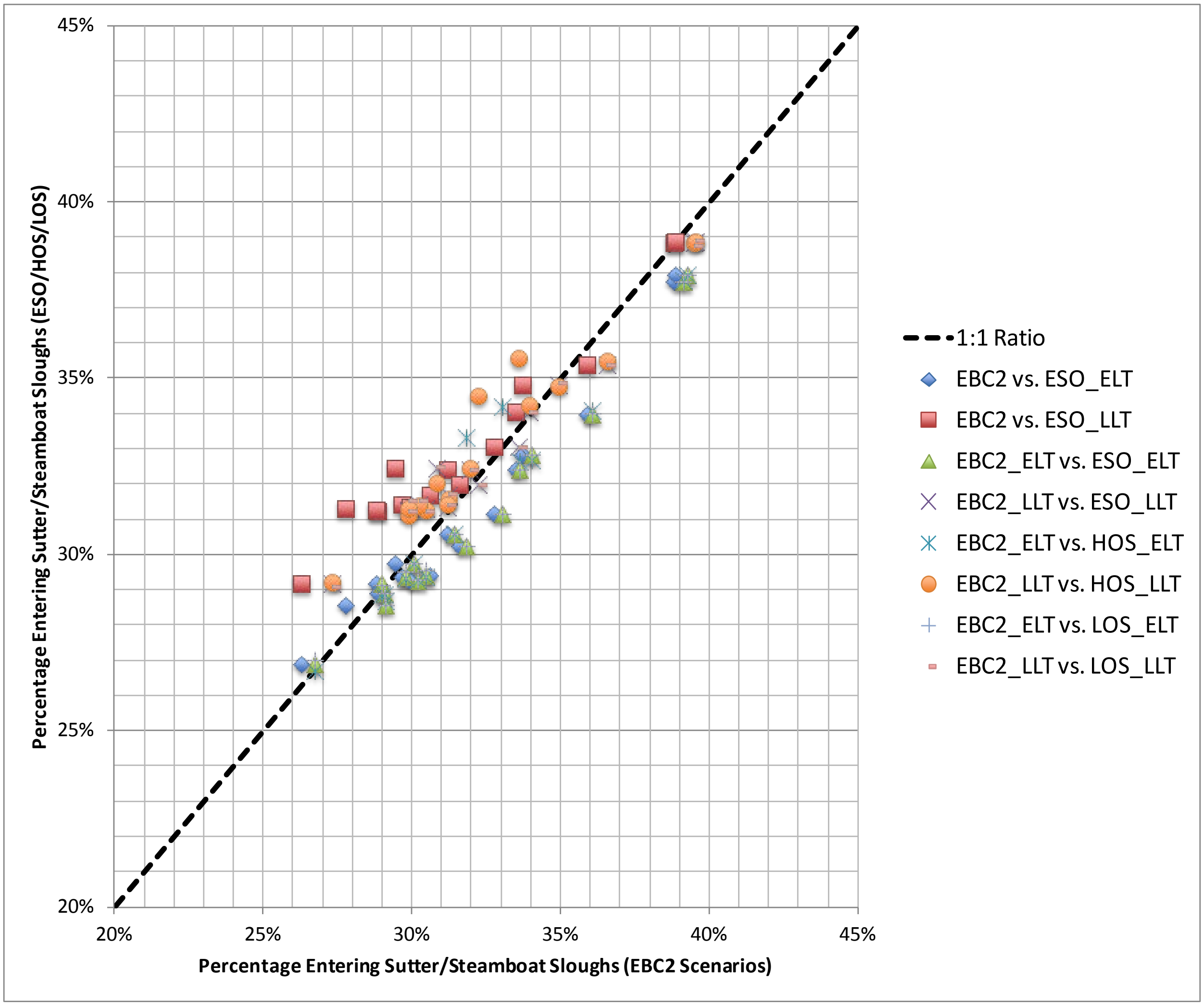
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Georgiana Slough and Delta Cross Channel under the EBC scenarios.

Figure 5C.5.3-132. Percentage of Spring-Run Chinook Salmon Smolts Entering the Interior Delta through Georgiana Slough and the Delta Cross Channel Estimated with the Delta Passage Model, With Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-175. Percentage of Spring-Run Chinook Salmon Smolts Entering Sutter/Steamboat Sloughs under All Scenarios, Estimated with the Delta Passage Model

	Scenario[b]									
Water Year[a]	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**	**HOS_ELT**	**HOS_LLT**	**LOS_ELT**	**LOS_LLT**
1976 (C)	28%	28%	29%	30%	29%	31%	29%	31%	29%	31%
1977 (C)	26%	26%	27%	27%	27%	29%	27%	29%	27%	29%
1978 (AN)	36%	36%	36%	37%	34%	35%	34%	36%	34%	35%
1979 (BN)	31%	31%	31%	32%	31%	32%	31%	32%	31%	32%
1980 (AN)	33%	33%	33%	34%	31%	33%	34%	36%	31%	33%
1981 (D)	31%	31%	30%	31%	29%	32%	29%	32%	30%	32%
1982 (W)	39%	39%	39%	39%	38%	39%	38%	39%	38%	39%
1983 (W)	39%	39%	39%	40%	38%	39%	38%	39%	38%	39%
1984 (W)	32%	32%	32%	32%	30%	32%	33%	34%	30%	32%
1985 (D)	30%	30%	30%	30%	29%	31%	29%	31%	30%	32%
1986 (W)	34%	33%	34%	34%	32%	34%	33%	34%	32%	34%
1987 (D)	29%	29%	30%	31%	30%	32%	30%	32%	30%	32%
1988 (C)	29%	29%	29%	30%	29%	31%	29%	31%	29%	31%
1989 (D)	34%	34%	34%	35%	33%	35%	33%	35%	33%	35%
1990 (C)	29%	29%	29%	30%	29%	31%	29%	31%	29%	32%
1991 (C)	30%	30%	30%	31%	29%	31%	29%	31%	29%	31%
Average	32%	32%	32%	33%	31%	33%	32%	33%	31%	33%
Median	31%	31%	31%	32%	30%	32%	30%	32%	30%	32%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



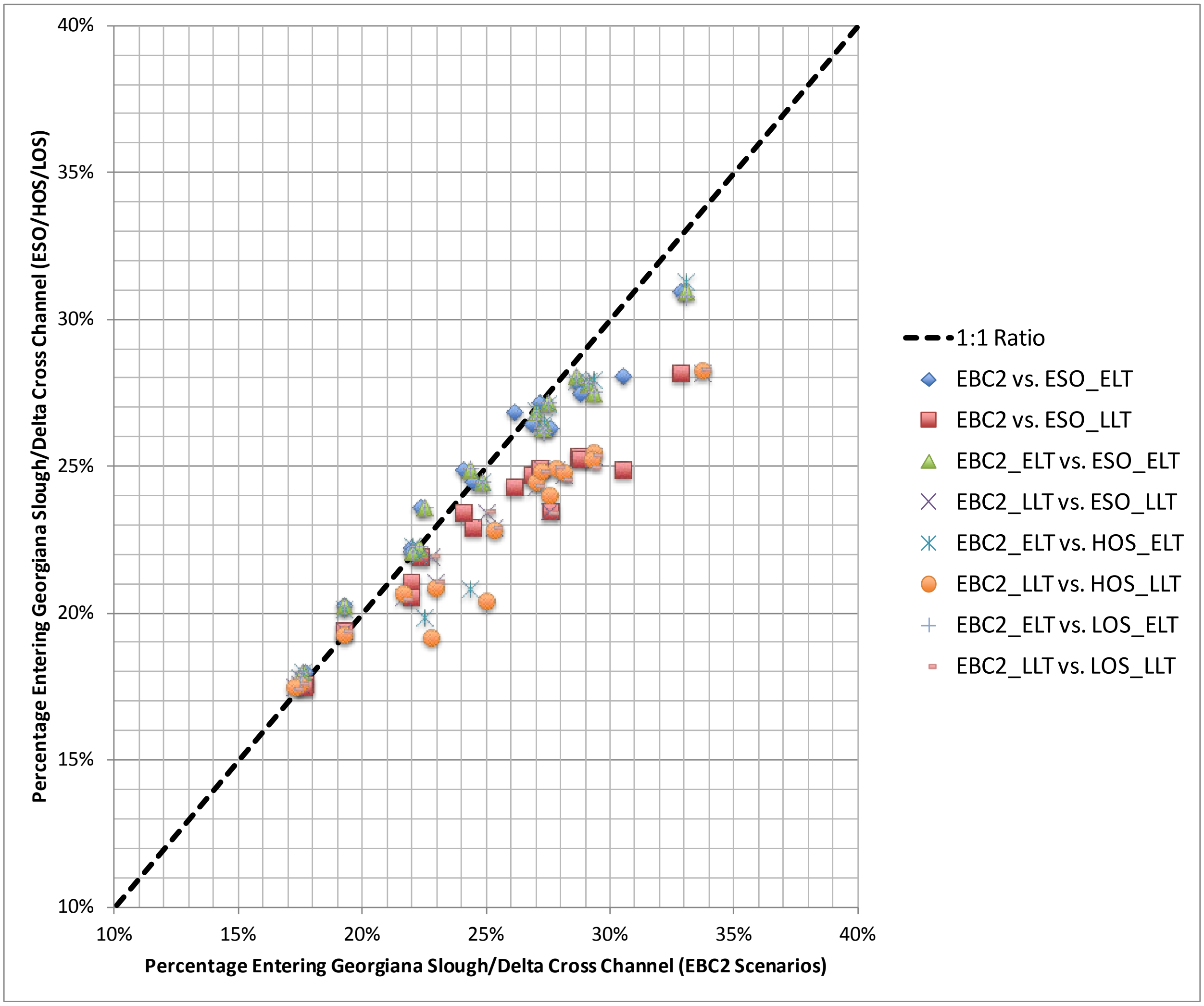
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Steamboat/Sutter Sloughs under the EBC scenarios.

Figure 5C.5.3-133. Percentage of Spring-Run Chinook Salmon Smolts Entering Sutter/Steamboat Sloughs Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-176. Percentage of Spring-Run Chinook Salmon Smolts the Interior Delta through Georgiana Slough and the Delta Cross Channel (Adjusted for Percentage Entering Sutter/Steamboat Sloughs) under All Scenarios, Estimated with the Delta Passage Model

Water Year[a]	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	30%	31%	29%	28%	28%	25%	28%	25%	28%	25%
1977 (C)	33%	33%	33%	34%	31%	28%	31%	28%	31%	28%
1978 (AN)	19%	19%	19%	19%	20%	19%	20%	19%	20%	19%
1979 (BN)	24%	24%	25%	25%	24%	23%	25%	23%	24%	23%
1980 (AN)	22%	22%	23%	23%	24%	22%	20%	19%	24%	22%
1981 (D)	26%	26%	27%	27%	27%	24%	27%	24%	27%	24%
1982 (W)	18%	18%	18%	17%	18%	18%	18%	18%	18%	18%
1983 (W)	18%	18%	17%	17%	18%	17%	18%	17%	18%	17%
1984 (W)	24%	24%	24%	25%	25%	23%	21%	20%	25%	24%
1985 (D)	27%	27%	27%	28%	26%	25%	27%	25%	26%	25%
1986 (W)	22%	22%	22%	23%	22%	21%	22%	21%	22%	21%
1987 (D)	28%	28%	27%	28%	26%	23%	26%	24%	26%	23%
1988 (C)	29%	29%	29%	29%	28%	25%	28%	25%	28%	25%
1989 (D)	22%	22%	22%	22%	22%	21%	22%	21%	22%	21%
1990 (C)	29%	29%	29%	29%	28%	25%	28%	25%	28%	25%
1991 (C)	27%	27%	27%	27%	27%	25%	27%	25%	27%	25%
Average	25%	25%	25%	25%	25%	23%	24%	23%	25%	23%
Median	25%	25%	26%	26%	26%	23%	25%	23%	26%	23%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



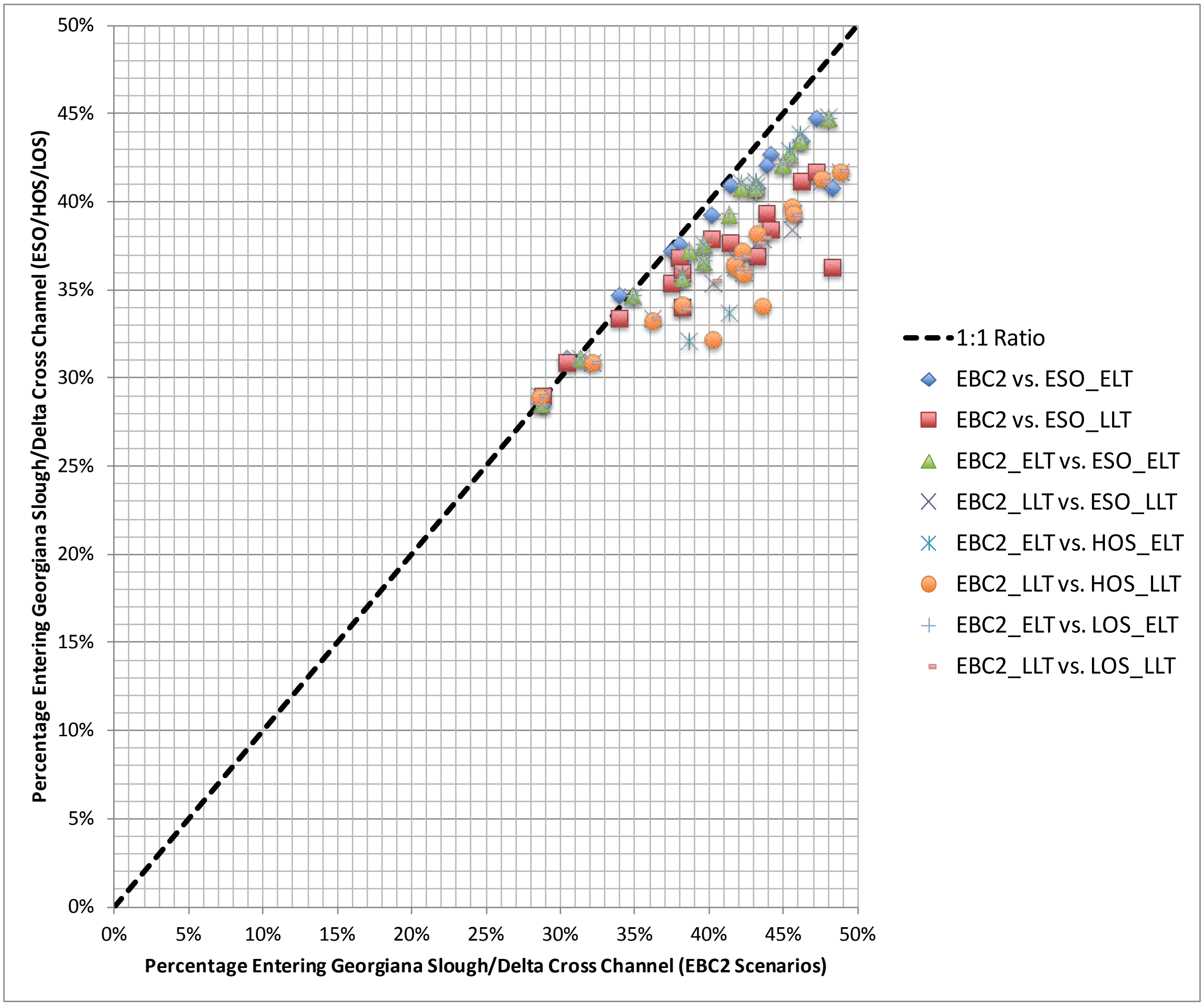
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Georgiana Slough and Delta Cross Channel under the EBC scenarios.

Figure 5C.5.3-134. Percentage of Spring-Run Chinook Salmon Smolts the Interior Delta through Georgiana Slough and the Delta Cross Channel (Adjusted for Percentage Entering Sutter/Steamboat Sloughs) Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-177. Percentage of Fall-Run Chinook Salmon Smolts Entering the Interior Delta through Georgiana Slough and the Delta Cross Channel under All Scenarios, Estimated with the Delta Passage Model

Water Year[a]	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	48%	48%	42%	42%	41%	36%	41%	36%	41%	36%
1977 (C)	53%	52%	53%	54%	48%	44%	48%	45%	48%	44%
1978 (AN)	34%	34%	35%	36%	35%	33%	35%	33%	35%	33%
1979 (BN)	38%	38%	40%	42%	38%	37%	38%	36%	38%	37%
1980 (AN)	37%	37%	39%	40%	37%	35%	32%	32%	37%	36%
1981 (D)	44%	44%	45%	46%	43%	38%	43%	40%	42%	39%
1982 (W)	30%	30%	31%	32%	31%	31%	31%	31%	31%	31%
1983 (W)	29%	29%	29%	29%	29%	29%	29%	29%	29%	29%
1984 (W)	40%	40%	41%	44%	39%	38%	34%	34%	39%	38%
1985 (D)	42%	41%	43%	43%	41%	38%	41%	38%	41%	38%
1986 (W)	38%	38%	40%	42%	37%	36%	37%	36%	37%	36%
1987 (D)	43%	43%	43%	42%	41%	37%	41%	37%	41%	37%
1988 (C)	46%	46%	46%	48%	44%	41%	44%	41%	44%	41%
1989 (D)	38%	38%	38%	38%	36%	34%	36%	34%	36%	34%
1990 (C)	44%	44%	45%	46%	42%	39%	42%	39%	42%	39%
1991 (C)	47%	47%	48%	49%	45%	42%	45%	42%	45%	42%
Average	41%	41%	41%	42%	39%	37%	38%	37%	39%	37%
Median	41%	41%	42%	42%	40%	37%	39%	36%	40%	37%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



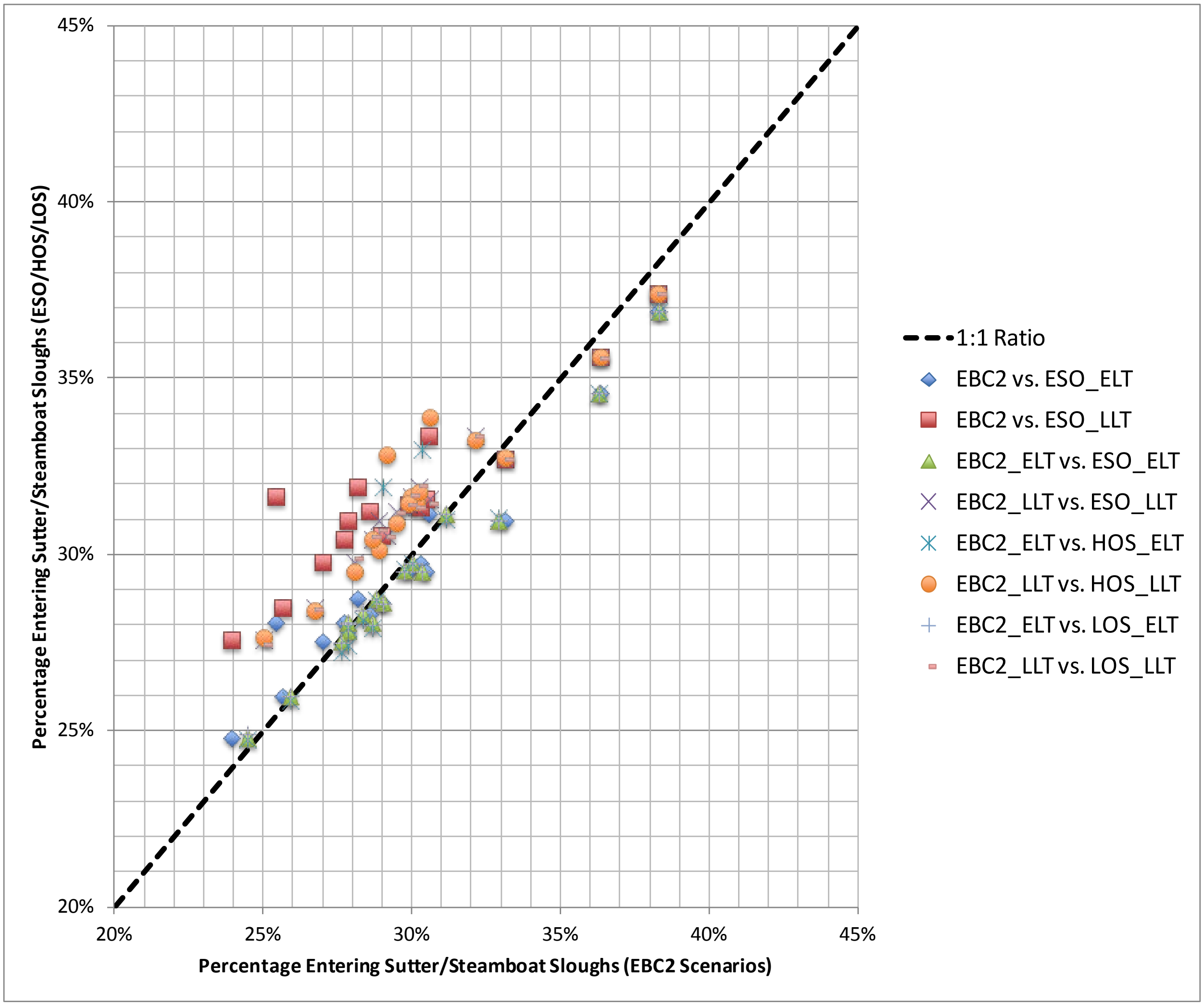
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Georgiana Slough and Delta Cross Channel under the EBC scenarios.

Figure 5C.5.3-135. Percentage of Fall-Run Chinook Salmon Smolts Entering the Interior Delta through Georgiana Slough and the Delta Cross Channel Estimated with the Delta Passage Model, With Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-178. Percentage of Fall-Run Chinook Salmon Smolts Entering Sutter/Steamboat Sloughs under All Scenarios, Estimated with the Delta Passage Model

	Scenario[b]									
Water Year[a]	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	25%	25%	29%	30%	28%	32%	28%	32%	28%	32%
1977 (C)	24%	24%	24%	25%	25%	28%	25%	28%	25%	27%
1978 (AN)	33%	33%	33%	33%	31%	33%	31%	33%	31%	33%
1979 (BN)	31%	30%	30%	30%	30%	31%	30%	31%	30%	31%
1980 (AN)	31%	30%	30%	31%	30%	32%	33%	34%	30%	31%
1981 (D)	28%	28%	28%	29%	28%	31%	27%	30%	28%	31%
1982 (W)	36%	36%	36%	36%	35%	36%	35%	36%	35%	36%
1983 (W)	38%	38%	38%	38%	37%	37%	37%	37%	37%	37%
1984 (W)	29%	29%	29%	29%	29%	31%	32%	33%	29%	31%
1985 (D)	29%	29%	28%	29%	28%	31%	28%	31%	28%	31%
1986 (W)	30%	30%	30%	30%	30%	31%	30%	31%	30%	31%
1987 (D)	28%	28%	29%	30%	29%	32%	29%	32%	29%	32%
1988 (C)	27%	27%	28%	28%	28%	30%	27%	30%	28%	30%
1989 (D)	31%	31%	31%	32%	31%	33%	31%	33%	31%	33%
1990 (C)	28%	28%	28%	29%	28%	30%	28%	30%	28%	31%
1991 (C)	26%	26%	26%	27%	26%	28%	26%	28%	26%	28%
Average	30%	30%	30%	30%	29%	32%	30%	32%	29%	32%
Median	29%	29%	29%	30%	29%	31%	29%	32%	29%	31%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



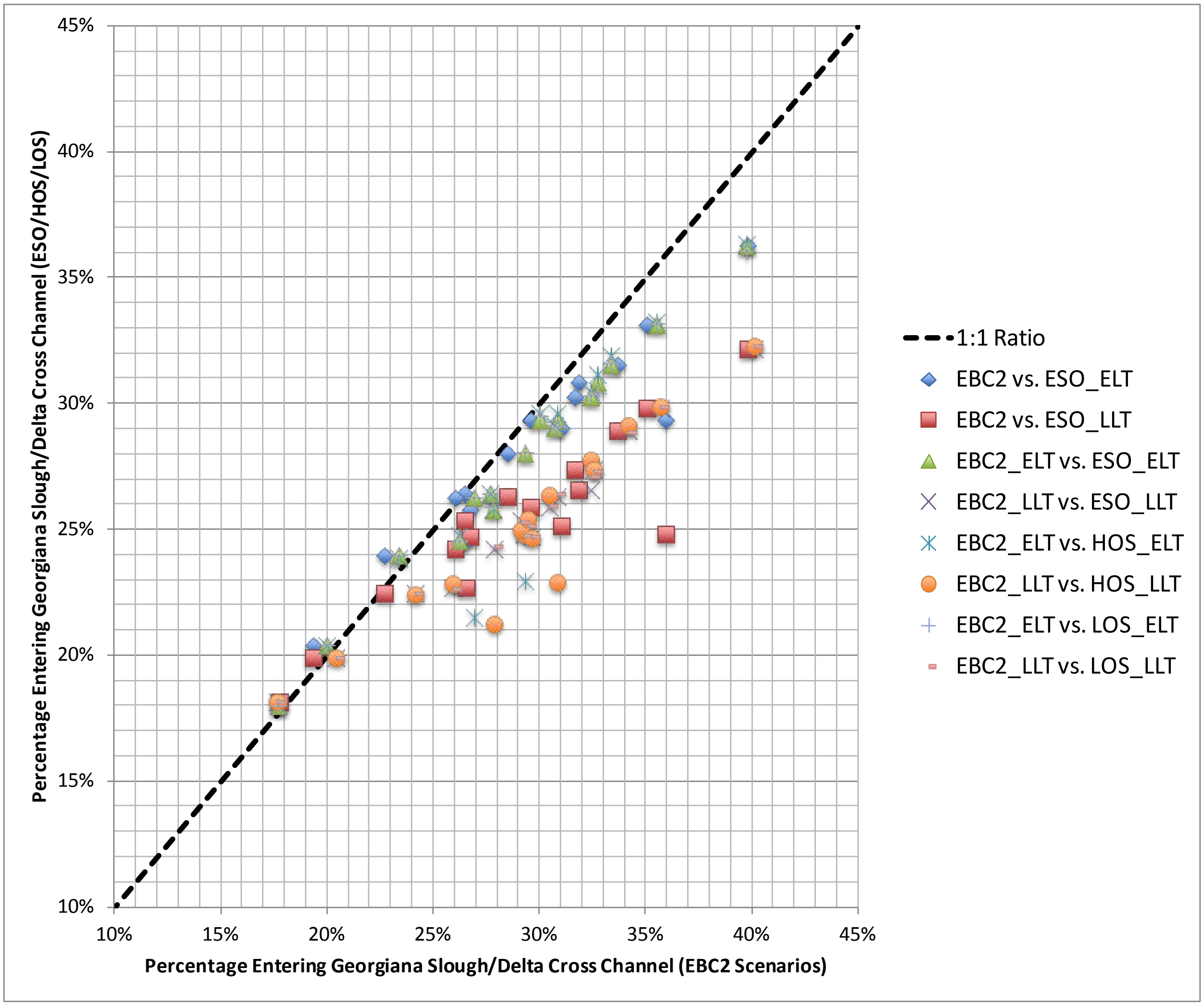
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Steamboat/Sutter Sloughs under the EBC scenarios.

Figure 5C.5.3-136. Percentage of Fall-Run Chinook Salmon Smolts Entering Sutter/Steamboat Sloughs Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-179. Percentage of Fall-Run Chinook Salmon Smolts the Interior Delta through Georgiana Slough and the Delta Cross Channel (Adjusted for Percentage Entering Sutter/Steamboat Sloughs) under All Scenarios, Estimated with the Delta Passage Model

Water Year[a]	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	36%	36%	30%	29%	29%	25%	30%	25%	30%	25%
1977 (C)	40%	40%	40%	40%	36%	32%	36%	32%	36%	32%
1978 (AN)	22%	23%	23%	24%	24%	22%	24%	22%	24%	22%
1979 (BN)	26%	26%	28%	29%	26%	25%	26%	25%	26%	25%
1980 (AN)	26%	26%	27%	28%	26%	24%	22%	21%	26%	24%
1981 (D)	32%	32%	33%	32%	31%	27%	31%	28%	30%	27%
1982 (W)	19%	19%	20%	20%	20%	20%	20%	20%	20%	20%
1983 (W)	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
1984 (W)	28%	28%	29%	31%	28%	26%	23%	23%	28%	26%
1985 (D)	30%	30%	31%	30%	29%	26%	30%	26%	29%	26%
1986 (W)	26%	27%	28%	30%	26%	25%	26%	25%	26%	25%
1987 (D)	31%	31%	31%	29%	29%	25%	29%	25%	29%	25%
1988 (C)	33%	34%	33%	34%	32%	29%	32%	29%	32%	29%
1989 (D)	27%	27%	26%	26%	25%	23%	25%	23%	25%	23%
1990 (C)	32%	32%	32%	33%	30%	27%	30%	27%	30%	27%
1991 (C)	35%	35%	36%	36%	33%	30%	33%	30%	33%	30%
Average	29%	29%	29%	29%	28%	25%	27%	25%	28%	25%
Median	29%	29%	30%	30%	29%	25%	28%	25%	29%	25%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



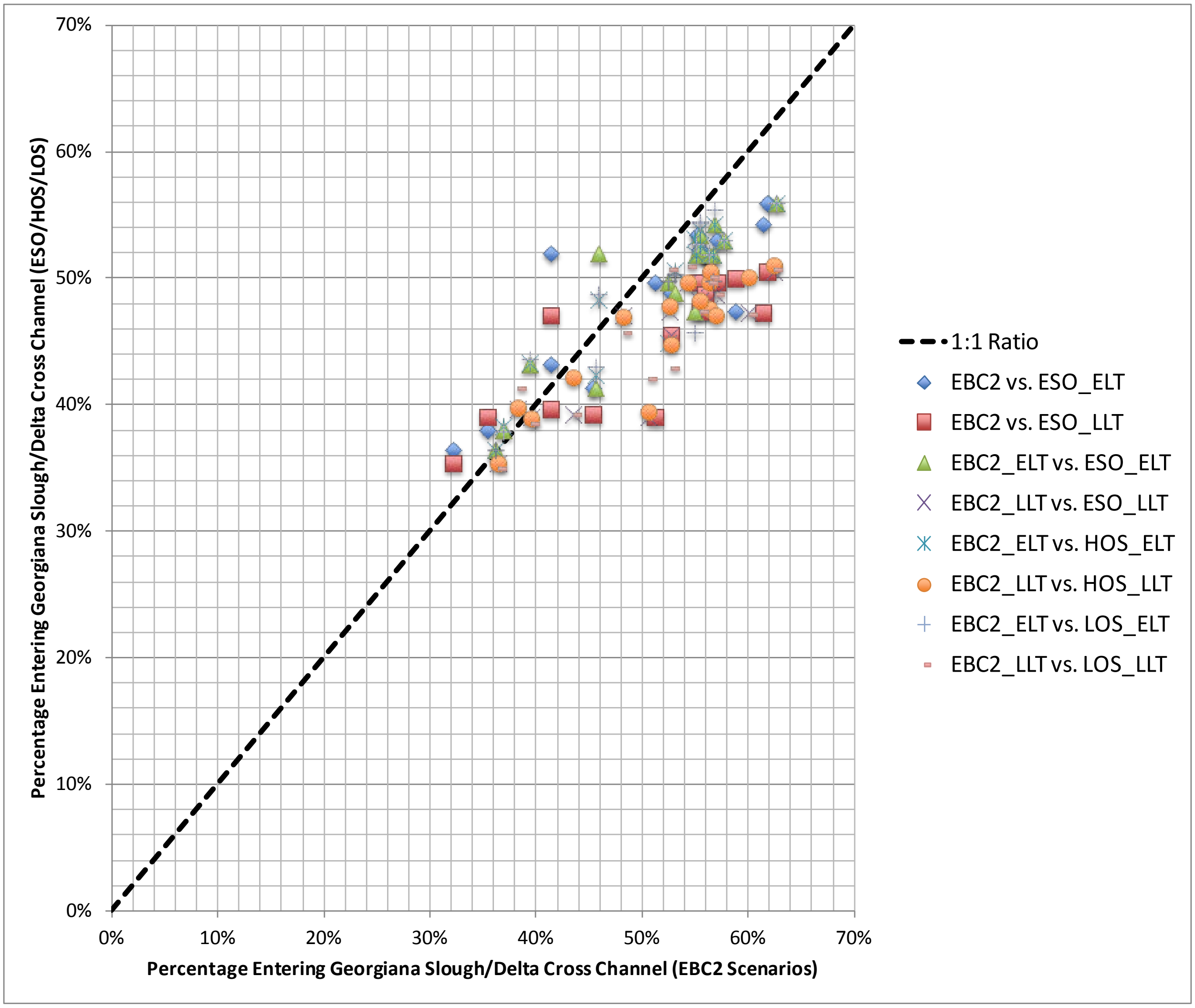
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Georgiana Slough and Delta Cross Channel under the EBC scenarios.

Figure 5C.5.3-137. Percentage of Fall-Run Chinook Salmon Smolts the Interior Delta through Georgiana Slough and the Delta Cross Channel (Adjusted for Percentage Entering Sutter/Steamboat Sloughs) Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-180. Percentage of Late Fall–Run Chinook Salmon Smolts Entering the Interior Delta through Georgiana Slough and the Delta Cross Channel under All Scenarios, Estimated with the Delta Passage Model

Water Year[a]	Scenario[b]									
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
1976 (C)	49%	41%	46%	48%	52%	47%	48%	47%	49%	46%
1977 (C)	61%	61%	57%	60%	54%	47%	54%	50%	55%	47%
1978 (AN)	55%	56%	56%	56%	52%	48%	52%	48%	52%	50%
1979 (BN)	59%	55%	55%	54%	53%	50%	54%	50%	54%	51%
1980 (AN)	50%	51%	52%	51%	50%	39%	45%	39%	50%	42%
1981 (D)	57%	56%	55%	55%	52%	48%	52%	48%	53%	47%
1982 (W)	46%	45%	46%	43%	41%	39%	42%	42%	43%	39%
1983 (W)	35%	35%	37%	40%	38%	39%	38%	39%	38%	39%
1984 (W)	32%	32%	36%	36%	36%	35%	36%	35%	36%	35%
1985 (D)	42%	41%	39%	38%	43%	40%	43%	40%	44%	41%
1986 (W)	56%	56%	57%	57%	52%	49%	52%	47%	50%	49%
1987 (D)	59%	55%	55%	53%	52%	47%	53%	48%	55%	51%
1988 (C)	52%	53%	53%	53%	49%	46%	51%	45%	50%	43%
1989 (D)	57%	57%	58%	56%	53%	50%	53%	50%	53%	50%
1990 (C)	58%	59%	55%	56%	47%	50%	53%	51%	46%	50%
1991 (C)	62%	62%	63%	62%	56%	51%	56%	51%	56%	51%
Average	52%	51%	51%	51%	49%	45%	49%	46%	49%	46%
Median	55%	55%	55%	53%	52%	47%	52%	47%	50%	47%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



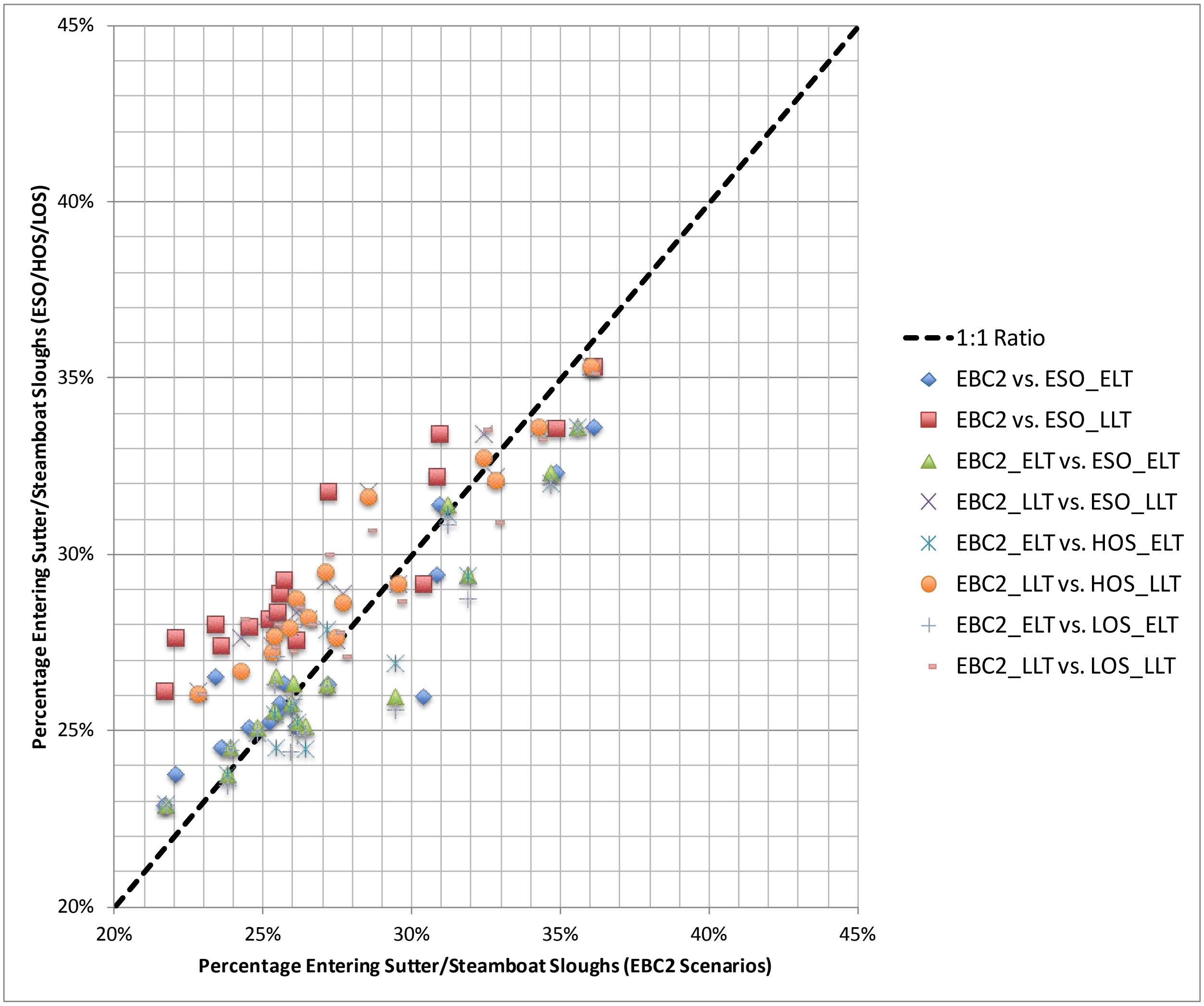
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Georgiana Slough and Delta Cross Channel under the EBC scenarios.

Figure 5C.5.3-138. Percentage of Late Fall–Run Chinook Salmon Smolts Entering the Interior Delta through Georgiana Slough and the Delta Cross Channel Estimated with the Delta Passage Model, With Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-181. Percentage of Late Fall–Run Chinook Salmon Smolts Entering Sutter/Steamboat Sloughs under All Scenarios, Estimated with the Delta Passage Model

	Scenario[b]									
Water Year[a]	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**	**HOS_ELT**	**HOS_LLT**	**LOS_ELT**	**LOS_LLT**
1976 (C)	28%	30%	29%	30%	26%	29%	27%	29%	26%	29%
1977 (C)	22%	22%	24%	24%	24%	28%	24%	27%	23%	28%
1978 (AN)	25%	25%	25%	26%	25%	28%	25%	28%	25%	27%
1979 (BN)	24%	26%	26%	27%	25%	28%	25%	28%	25%	28%
1980 (AN)	28%	27%	27%	29%	26%	32%	28%	32%	26%	31%
1981 (D)	25%	25%	26%	27%	25%	28%	25%	28%	25%	28%
1982 (W)	31%	31%	31%	32%	31%	33%	31%	33%	31%	34%
1983 (W)	35%	35%	35%	34%	32%	34%	32%	34%	32%	33%
1984 (W)	36%	36%	36%	36%	34%	35%	34%	35%	34%	35%
1985 (D)	31%	31%	32%	33%	29%	32%	29%	32%	29%	31%
1986 (W)	25%	25%	25%	26%	26%	28%	25%	29%	26%	29%
1987 (D)	24%	26%	26%	28%	26%	29%	26%	29%	24%	27%
1988 (C)	26%	26%	26%	27%	26%	29%	26%	30%	26%	30%
1989 (D)	23%	24%	24%	25%	25%	27%	25%	27%	24%	27%
1990 (C)	24%	23%	25%	25%	27%	28%	25%	28%	27%	28%
1991 (C)	21%	22%	22%	23%	23%	26%	23%	26%	23%	26%
Average	27%	27%	27%	28%	27%	30%	27%	30%	27%	29%
Median	25%	26%	26%	27%	26%	29%	26%	29%	26%	28%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



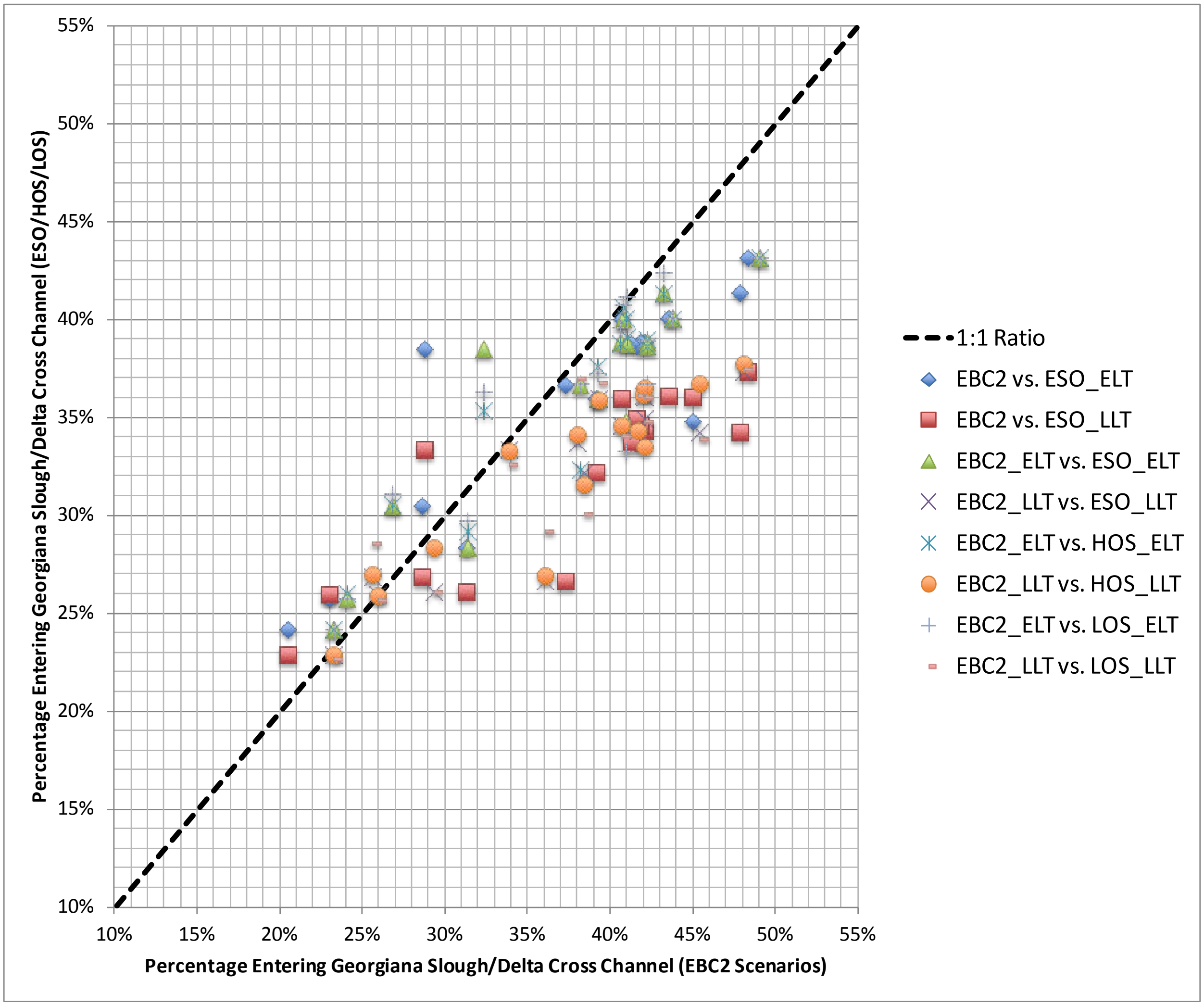
Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Steamboat/Sutter Sloughs under the EBC scenarios.

Figure 5C.5.3-139. Percentage of Late Fall-Run Chinook Salmon Smolts Entering Sutter/Steamboat Sloughs Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

Table 5C.5.3-182. Percentage of Late Fall–Run Chinook Salmon Smolts the Interior Delta through Georgiana Slough and the Delta Cross Channel (Adjusted for Percentage Entering Sutter/Steamboat Sloughs) under All Scenarios, Estimated with the Delta Passage Model

Water Year[a]	Scenario[b]									
	EBC1	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**	**HOS_ELT**	**HOS_LLT**	**LOS_ELT**	**LOS_LLT**
1976 (C)	35%	29%	32%	34%	38%	33%	35%	33%	36%	33%
1977 (C)	47%	48%	43%	45%	41%	34%	41%	37%	42%	34%
1978 (AN)	41%	42%	42%	42%	39%	34%	39%	34%	39%	36%
1979 (BN)	45%	41%	41%	39%	40%	36%	41%	36%	41%	37%
1980 (AN)	36%	37%	38%	36%	37%	27%	32%	27%	37%	29%
1981 (D)	43%	42%	41%	41%	39%	35%	39%	35%	40%	34%
1982 (W)	32%	31%	31%	29%	28%	26%	29%	28%	30%	26%
1983 (W)	23%	23%	24%	26%	26%	26%	26%	26%	26%	26%
1984 (W)	20%	21%	23%	23%	24%	23%	24%	23%	24%	23%
1985 (D)	29%	29%	27%	26%	31%	27%	31%	27%	31%	29%
1986 (W)	42%	42%	42%	42%	39%	35%	39%	34%	37%	35%
1987 (D)	45%	41%	41%	38%	39%	34%	39%	34%	41%	37%
1988 (C)	38%	39%	39%	38%	36%	32%	38%	32%	37%	30%
1989 (D)	44%	44%	44%	42%	40%	36%	40%	36%	40%	36%
1990 (C)	44%	45%	41%	42%	35%	36%	40%	37%	33%	36%
1991 (C)	49%	48%	49%	48%	43%	37%	43%	38%	43%	38%
Average	38%	38%	37%	37%	36%	32%	36%	32%	36%	32%
Median	41%	41%	41%	39%	39%	34%	39%	34%	37%	34%

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.



Note: Each point represents 1 year for the paired comparison noted in the legend. Values below the 1:1 ratio indicate greater percentage of smolts entering Georgiana Slough and Delta Cross Channel under the EBC scenarios.

Figure 5C.5.3-140. Percentage of Late Fall-Run Chinook Salmon Smolts the Interior Delta through Georgiana Slough and the Delta Cross Channel (Adjusted for Percentage Entering Sutter/Steamboat Sloughs) Estimated with the Delta Passage Model, with Selected Paired Comparisons between EBC2, ESO, HOS, and LOS Scenarios

5C.5.3.8.5 Synthesis

5C.5.3.8.5.1 Further Exploration of Mechanisms

The results presented above indicated that, in comparison to the EBC2 scenarios, the ESO/HOS/LOS scenarios gave similar or lower (a) incidence of reversed flows in the Sacramento River below Georgiana Slough, (b) percentage of Sacramento River flow entering Georgiana Slough, (c) percentage of Sacramento River reversed flow entering Georgiana Slough, and (d) percentage of downstream-migrating Chinook salmon smolts entering the interior Delta through Georgiana Slough/DCC. This suggests that the bypass flow criteria that were included in the CALSIM modeling and the various operational rules implemented in DSM2 such as minimum sweeping velocity achieved the intended objective of avoiding exacerbation of reverse flows in the reach of the

Sacramento River where tidal hydrodynamics become considerably more influential. The results of the analyses presented above also suggest that there were appreciable effects of the assumed tidal natural communities and transitional uplands restoration under the BDCP, which result in less tidal influence in the vicinity of Georgiana Slough than under existing biological conditions.

Further exploration of the underlying mechanisms is possible by combining different sets of outputs from the physical modeling. The potential for less tidal range at the Sacramento River-Georgiana Slough divergence under the BDCP because of tidal energy being captured in the restoration areas, particularly within the Cache Slough ROA, is illustrated in Figure 5C.5.3-141, which shows mean monthly tidal range versus river flow below the north Delta intakes. Under all scenarios, tidal range is less with higher river flow, reflecting tidal muting by greater river flow. However, tidal muting is also caused by the restoration proposed by BDCP: thus, tidal range under ESO_ELT and ESO_LLT scenarios is approximately 0.5 feet (or more) less than the tidal range for the corresponding EBC2_ELT and EBC2_LLT scenarios at lower river flows (i.e., <20,000 cfs). The plot also illustrates the greater tidal range that was modeled to occur with sea level rise under the EBC2 scenarios, with tidal range under EBC2_LLT being around 0.3 feet greater than under EBC2 (Figure 5C.5.3-141).

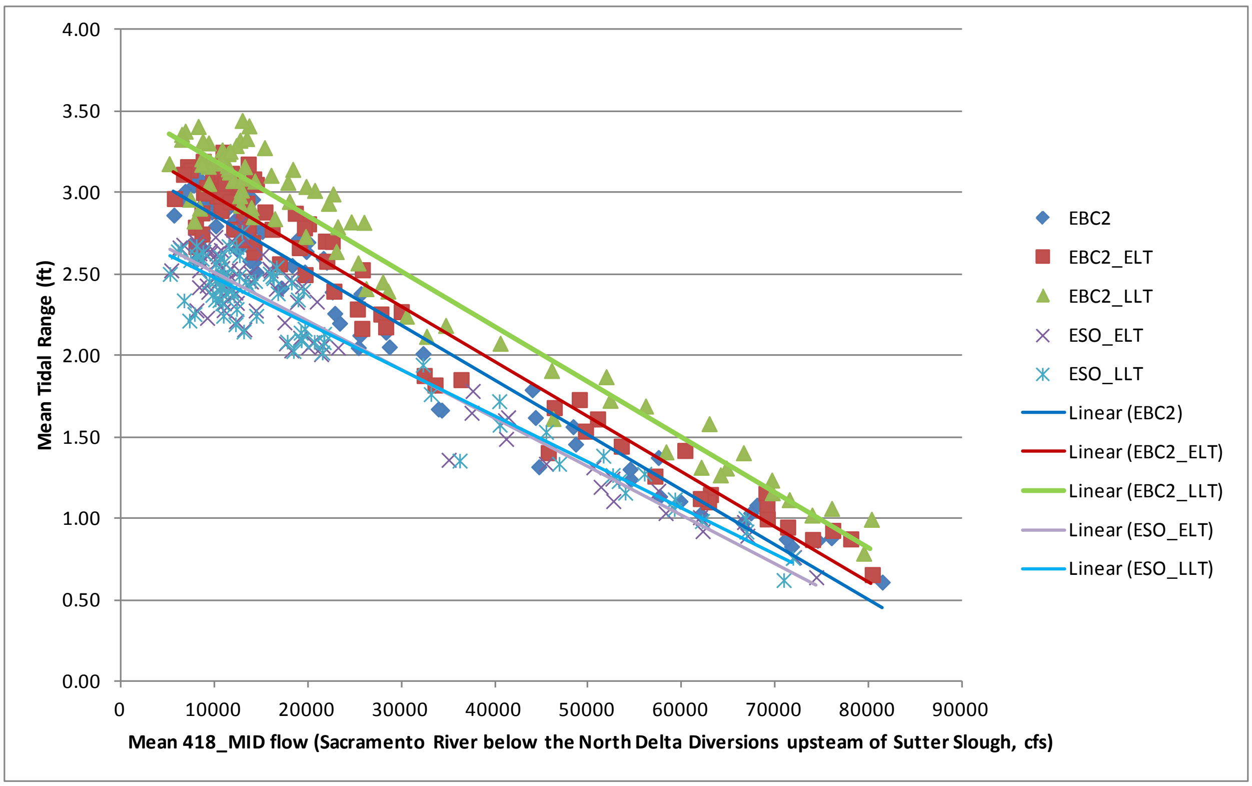


Figure 5C.5.3-141. DSM2-HYDRO-Modeled Mean Monthly Tidal Range (Daily Maximum – Daily Minimum Stage) at Sacramento River at Georgiana Slough (DSM2 Channel RSAC123) Versus Mean Monthly Flow in the Sacramento River Below the North Delta Diversions and Upstream of Sutter Slough (DSM2 Channel 418_MID), By Scenario, January–May 1976–1991

For a given magnitude of river flow downstream of the north Delta intakes, the lesser tidal energy under the BDCP restoration scenarios was modeled to result in a lower frequency of reverse flows. This is illustrated in Figure 5C.5.3-142, wherein the monthly percentage of reverse flows during December-June (from Tables 5C.3-103, 5C.3-104, 5C.3-105, 5C.3-106, and 5C.3-107, shown above) is paired with the monthly average CALSIM flow in the Sacramento River below the North Delta

Diversion (Channel C400). There are many points for the different scenarios, and so it is somewhat challenging to discern the most important patterns. Simplification of the patterns was achieved using a generalized additive model spline (with 4 degrees of freedom) to capture the basic shape of the reverse flow percentage's relationship to flows below the North Delta Diversion. This is shown in Figure 5C.5.3-143, which illustrates that the monthly incidence of reverse flows below Georgiana Slough is zero at Sacramento River flow below the North Delta Diversion of around 36,500 cfs or greater for EBC2, just over 37,000 cfs or greater for EBC2_ELT, and just over 38,000 cfs or greater for EBC2_LLT; the flow required to achieve no monthly incidence of reverse flows is greater in the ELT and LLT because of sea level rise and greater tidal influence in this area. In contrast, the monthly incidence of reverse flow for ESO_ELT is zero at just under 31,000 cfs or greater, and for ESO_LLT is zero at around 27,500 cfs or greater (Figure 5C.5.3-143). This suggests that the lessened tidal energy in the reach because of LLT tidal restoration in the Cache Slough ROA more than counteracts the greater tidal energy expected from sea level rise.

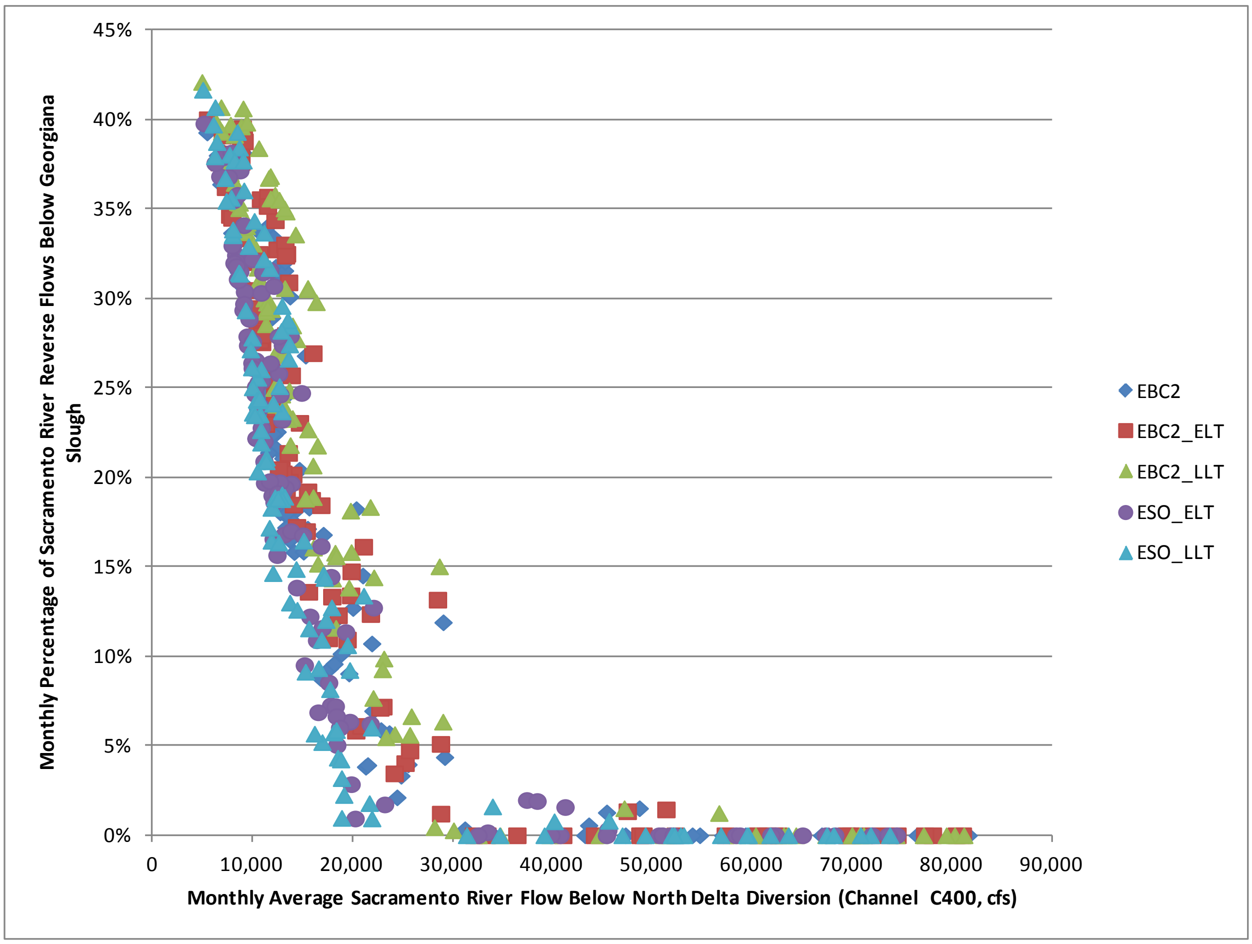


Figure 5C.5.3-142. DSM2-HYDRO-Modeled Percentage of Each Month With Reverse Flows at Sacramento River Below Georgiana Slough (DSM2 Channel 423 at 1000 feet; SAC_37) Versus Mean Monthly Flow in the Sacramento River Below the North Delta Diversions (CALSIM Channel C-400), By Scenario, December–June 1976–1991

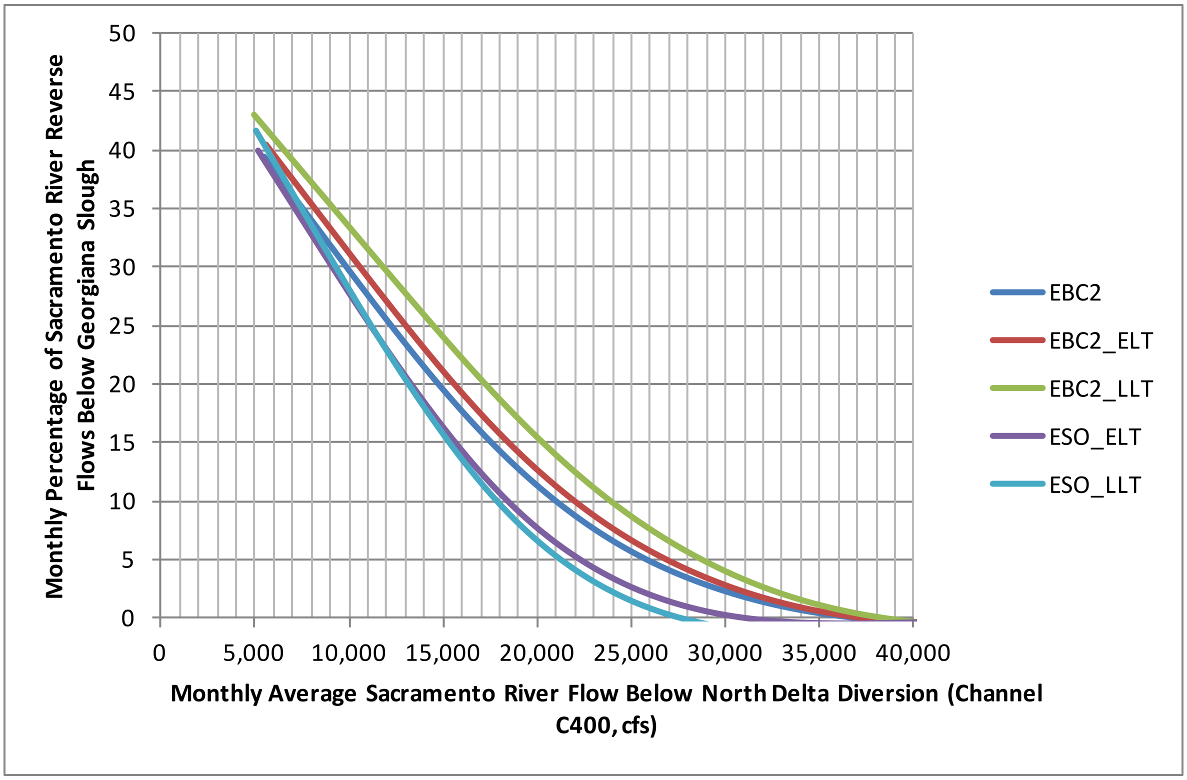


Figure 5C.5.3-143. Generalized Additive Model Splines of DSM2-HYDRO-Modeled Percentage of Each Month With Reverse Flows at Sacramento River Below Georgiana Slough (DSM2 Channel 423 at 1000 feet; SAC_37) Versus Mean Monthly Flow in the Sacramento River Below the North Delta Diversions (CALSIM Channel C-400), By Scenario, December–June 1976–1991

Flow entering Georgiana Slough basically is a function of the stage gradient between the Sacramento River and Georgiana Slough. This can be represented using DSM2-HYDRO outputs as the daily difference in average stage in the Sacramento River at Georgiana Slough (RSAC123) and the South Fork Mokelumne River (RSMKL008) (Figure 5C.5.3-144), noting that the South Fork Mokelumne River outputs are used instead of Georgiana Slough because the outputs were unavailable for Georgiana Slough. It is apparent that for a given Sacramento River flow below the North Delta Diversion (i.e., isolating the effect of exports from the North Delta Diversion), the average monthly stage gradient is less under the ESO_ELT and ESO_LLT scenarios, both across the full range of monthly flows (Figure 5C.5.3-144, for which linear trendlines are a reasonable representation of the patterns) and for flows below 20,000 cfs (Figure 5C.5.3-145, for which power trendlines capture the patterns). This again suggests a lessened tidal influence near the Georgiana Slough divergence, this time in relation to the tidal influence in the interior Delta.

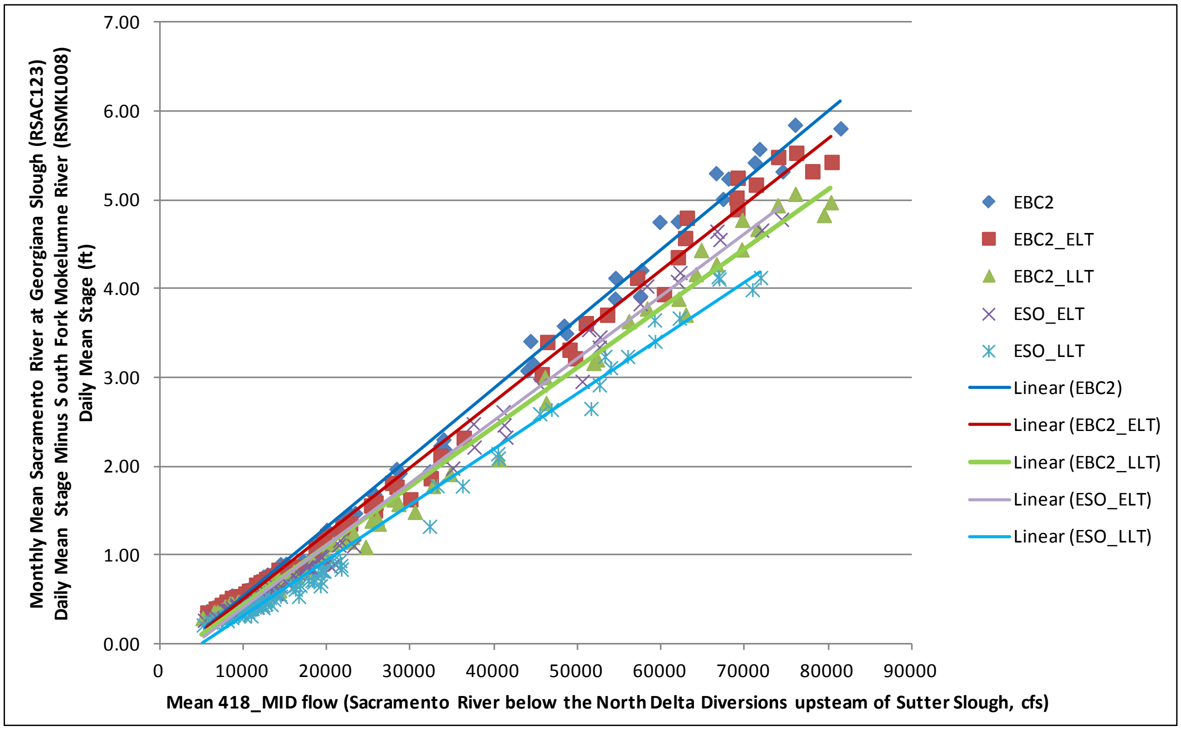


Figure 5C.5.3-144. Stage Gradient (Feet) Between Sacramento River at Georgiana Slough and the South Fork Mokelumne River In Relation to Sacramento River Below North Delta Diversion Flow, Based on Monthly Mean of Daily Data for January–May 1976–1991 from DSM2-HYDRO Modeling

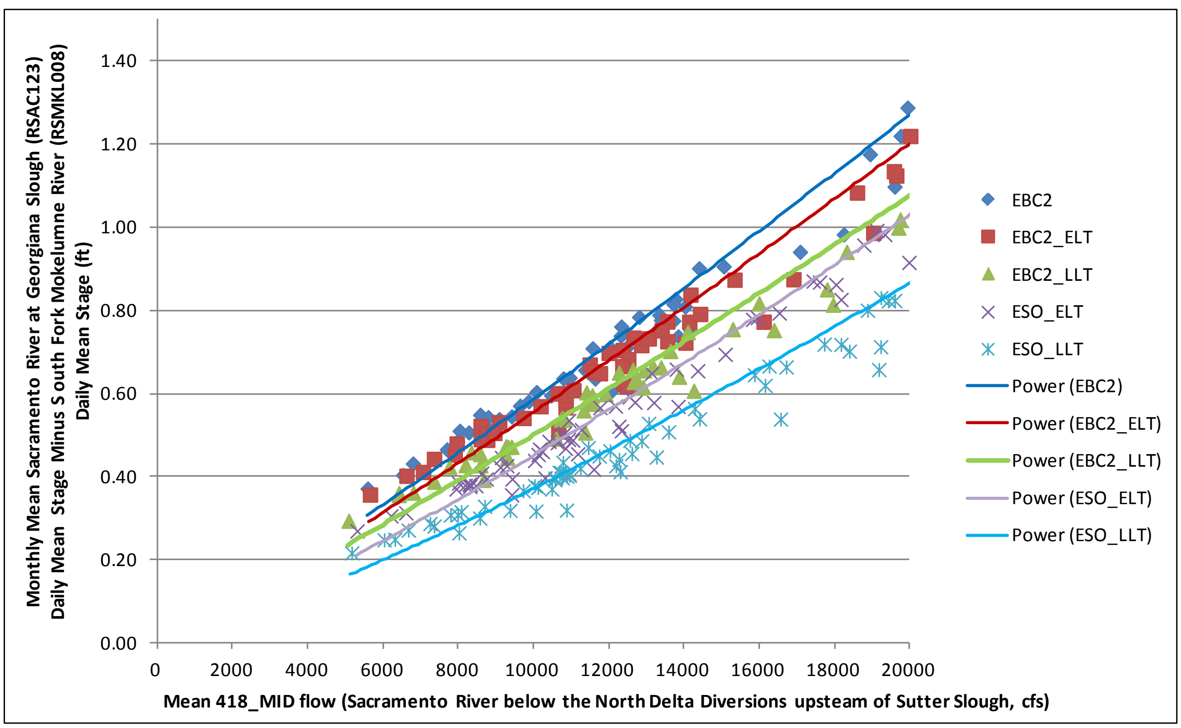


Figure 5C.5.3-145. Stage Gradient (Feet) Between Sacramento River at Georgiana Slough and the South Fork Mokelumne River In Relation to Sacramento River Below North Delta Diversion Flow, Based on Monthly Mean of Daily Data for January–May 1976–1991 from DSM2-HYDRO Modeling, Limited to Flows of 20,000 cfs and Lower

Confirmation that the hydrodynamic differences between the EBC and ESO scenarios are largely driven by tidal natural communities and transitional uplands restoration within the ROAs is provided by examining plots similar to Figure 5C.5.3-141 and Figure 5C.5.3-143 shown above, but with the addition of a scenario that includes no restoration assumptions (i.e., the same Plan Area channel configuration exists as for EBC2 scenarios), but with the same BDCP operating criteria for the ELT as assumed under ESO_ELT. This scenario is termed ESO_ELT (No ROA) and is illustrated in Figure 5C.5.3-146 and Figure 5C.5.3-147. It is evident from these plots that the average tidal range in the Sacramento River at Georgiana Slough (RSAC123) as a function of Sacramento River flow below the North Delta Diversion (418_MID) for the ESO_ELT (No ROA) scenario is very similar to the relationship between these variables shown by the EBC2_ELT scenario. It is also evident that the ESO_ELT (No ROA) relationship between CALSIM monthly average flows below the NDD (Channel C400) and the monthly percentage of reverse flows in the Sacramento River at Georgiana Slough is very similar to the relationship between these two variables for the EBC2_ELT scenario. This illustrates the important influence of tidal natural communities and transitional uplands restoration in changing the extent to which tidal flows are dispersed throughout the Plan Area, for without restoration assumptions, the ESO_ELT (No ROA) scenario has similar tidal range and reverse flow frequency for a given flow level as EBC2_ELT, with the same Delta configuration and sea level/climate change assumptions. It is important to note that the ESO_ELT (No ROA) is not a proposed BDCP alternative; it is included here only to illustrate the importance of tidal natural communities and transitional uplands restoration in changing the Plan Area hydrodynamics.

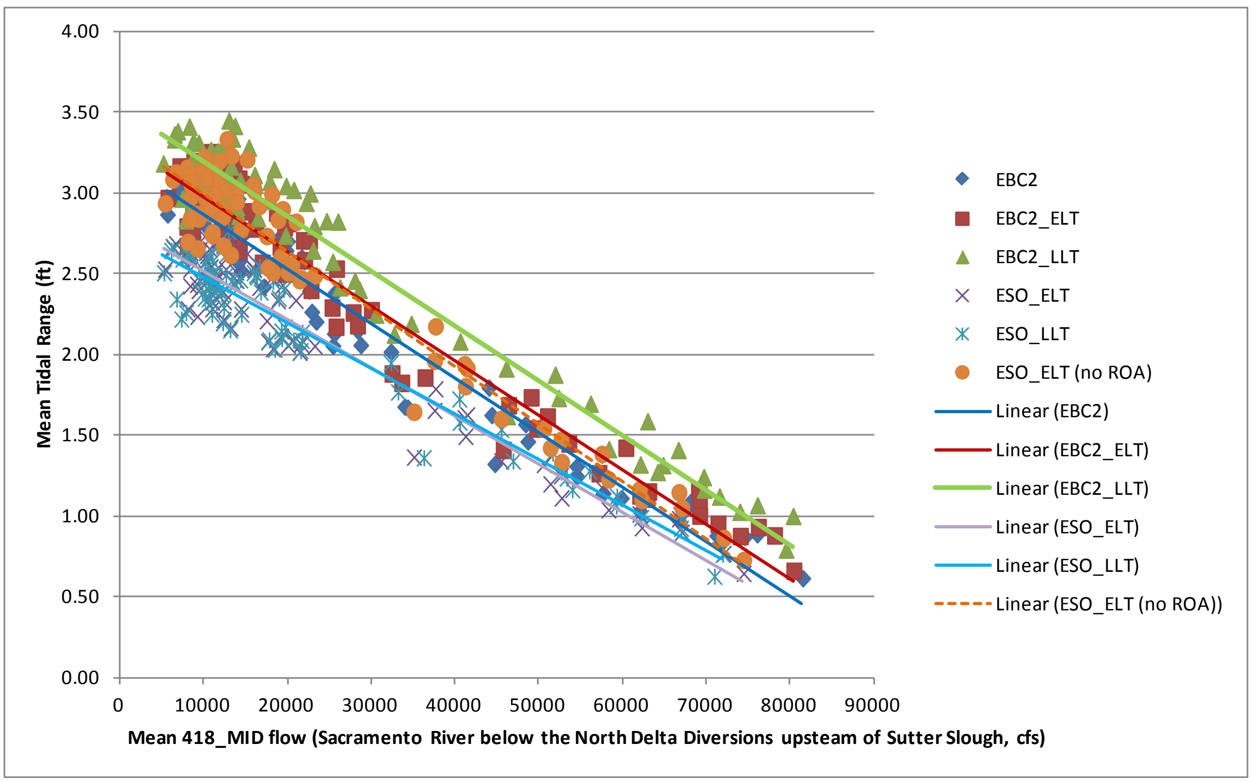


Figure 5C.5.3-146. DSM2-HYDRO-Modeled Mean Monthly Tidal Range (Daily Maximum – Daily Minimum Stage) at Sacramento River at Georgiana Slough (DSM2 Channel RSAC123) Versus Mean Monthly Flow in the Sacramento River Below the North Delta Diversions and Upstream of Sutter Slough (DSM2 Channel 418_MID), By Scenario (Including Illustrative ESO_ELT [No ROA] Scenario), January–May 1976–1991

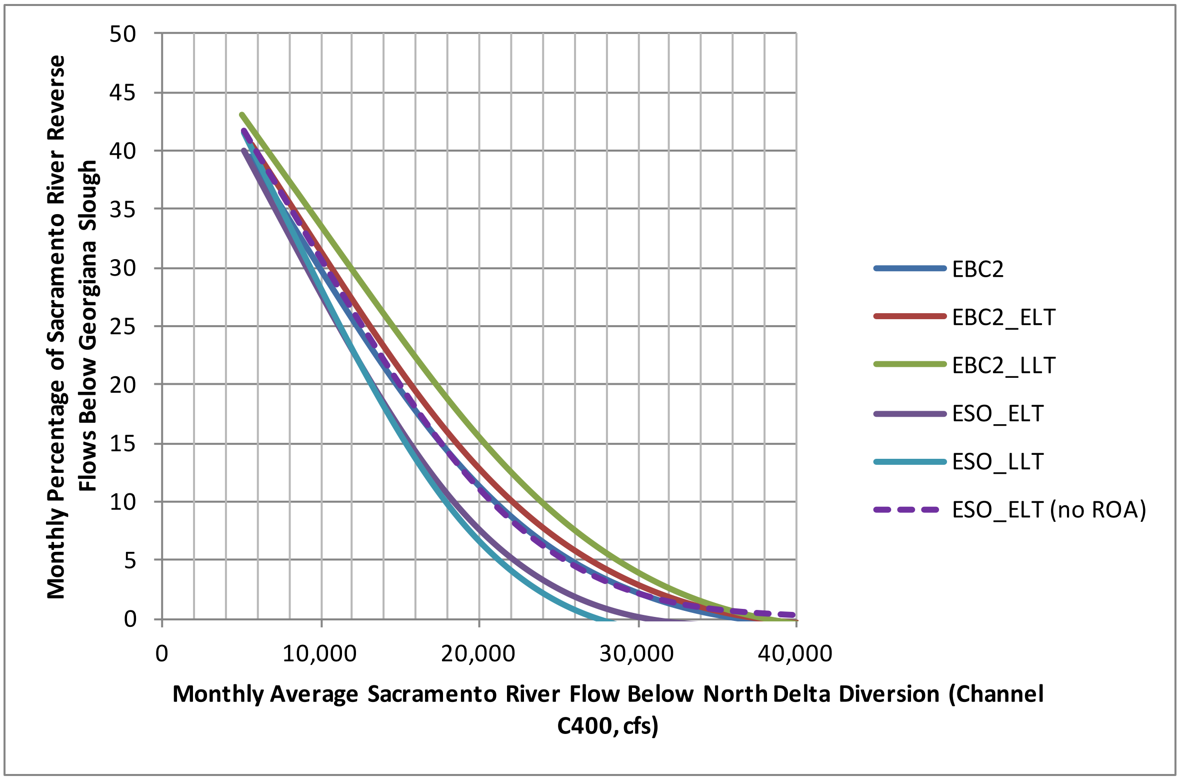


Figure 5C.5.3-147. Generalized Additive Model Splines of DSM2-HYDRO-Modeled Percentage of Each Month With Reverse Flows at Sacramento River Below Georgiana Slough (DSM2 Channel 423 at 1000 feet; SAC_37) Versus Mean Monthly Flow in the Sacramento River Below the North Delta Diversions (CALSIM Channel C-400), By Scenario (Including Illustrative ESO_ELT [No ROA] Scenario), December–June 1976–1991

5C.5.3.8.5.2 Ability of DSM2 To Simulate Changed Hydrodynamics

In considering the above results from DSM2 modeling, it is important to consider the ability of DSM2 to simulate Plan Area flows in the vicinity of Georgiana Slough. Simulation of the effects of sea level rise and the proposed restoration areas are integral parts of the physical modeling to understand the effects. The BDCP effects analysis is founded upon long-term analysis of hydrodynamics and water quality in the Delta resulting from the proposed physical and operational changes under the Plan. DSM2 is an appropriate model for this type of analysis. It has been successfully used in analyzing several projects in the Delta. However, DSM2 has a limited ability to simulate two-dimensional features such as tidal marshes and three-dimensional processes such as gravitational circulation, which is known to increase with sea level rise in the estuaries. Therefore, it is imperative that DSM2 be recalibrated or corroborated based on a dataset that accurately represents the Delta conditions under restoration and sea level rise.

Because the proposed conditions are hypothetical, the Delta hydrodynamics conditions under the proposed conditions were estimated by simulating higher dimensional models, which can resolve the two- and three-dimensional processes well, over a short time period. Results from these higher dimensional models provide data sets needed to corroborate or recalibrate DSM2 under the proposed conditions so that DSM2 can simulate the hydrodynamics in the Delta with reasonable accuracy. A detailed description of the corroboration process and results are included in the BDCP

EIR/EIS Appendix 5A. A brief summary of the most relevant aspects related to reverse flows in the vicinity of Georgiana Slough is provided here.

DSM2 was corroborated using results from the two-dimensional RMA Bay-Delta Model (RMA2) for two integrated restoration and sea level rise scenarios, representing the proposed restoration and assumed sea level rise in the Early Long-Term (ELT: 25,000 acres of restoration and 15 cm of sea level rise) and Late Long-Term (LLT: 65,000 acres of restoration and 45 cm of sea level rise). The DSM2 corroboration approach included adding the proposed physical changes in the DSM2 grid and ensuring the boundary conditions for stage, inflow, diversion and gate operations were consistent between DSM2 and RMA2. Once the consistency between the two model setups was confirmed, the results from RMA2 were used to fine-tune the DSM2 results. The corroboration was performed assuming historical boundary conditions over a portion of the 2002 and 2003 water years.

In ascertaining DSM2's ability to emulate RMA2 results, incremental changes between the baseline (current condition) and the future condition from DSM2 are compared to the incremental changes from RMA2. This incremental change represents the expected changes in the hydrodynamics under a future scenario compared to the baseline, and comparing the incremental changes minimizes any bias because of the differences between the simulated baseline conditions in the two models.

Figure 5C.5.3-148 shows a comparison of simulated tidal and net flows in Georgiana Slough at ELT from DSM2 and RMA2. The first and second plots compare the timeseries of the instantaneous and tidally-averaged flows from both models, respectively. The third and fourth plots compare the incremental change in the instantaneous and tidally-averaged flows from DSM2 and RMA2, respectively. Both models show greater tidal flow range at ELT compared to the baseline. Comparison of the incremental change in instantaneous flow shows that the increment in the tidal flow range predicted by DSM2 under ELT conditions is slightly lower compared to RMA2.

Both models show that net flows in Georgiana Slough are less at ELT compared to the baseline. The incremental change in net flows demonstrates the net flows in Georgiana Slough are reduced more under DSM2 compared to RMA2, during the times when DCC gates were open, whereas both models show similar change when the DCC gates are closed.

Table 5C.5.3-183 shows the performance metrics for the ELT time period. For Georgiana Slough, the mean incremental change between the baseline and ELT scenario for RMA2 is -159 cfs and for DSM2 is -218 cfs, which is a slightly greater reduction compared to RMA2. This reduction is primarily driven by the difference during the times when DCC gates were open. Comparing the relative differences between DSM2 and RMA2 results show the differences to be similar for both the baseline and the ELT scenarios. This ensures that the biases that may have existed under the baseline are similar at ELT.

Figure 5C.5.3-149 compares simulated tidal and net flows in the Sacramento River near Rio Vista at ELT from the DSM2 and RMA2 models. The incremental changes are similar between the two models for both tidal and net flows. In general the tidal flows near Rio Vista at ELT are similar to baseline. The net flows at ELT are greater than baseline under both models, especially when Sacramento River flow is low. The performance metrics in Table 5C.5.3-183 show that the mean incremental change between the baseline and ELT scenario for RMA is 720 cfs and for DSM2 is 799 cfs. As noted above for Georgiana Slough, the relative changes between DSM2 and RMA2 results are similar for both the baseline and ELT.

Table 5C.5.3-184 shows the results at LLT for Georgiana Slough and Rio Vista flows. While both models show greater tidal flow range in Georgiana Slough, DSM2 shows less of an increase compared to RMA2. Similarly, while both models show lower net flows in Georgiana Slough at LLT, DSM2 has less of a reduction in flow compared to RMA2. The differences are larger during the times when DCC gates were open and similar when the gates are closed. RMA and DSM2 show similar changes in the tidal and net flows at Rio Vista. Both models show that the tidal flows and net flows are increasing at LLT compared to the baseline.

In summary, the corroboration results showed that both the DSM2 and RMA2 models are predicting less net flows in Georgiana Slough under the ELT and LLT compared to baseline (existing configuration of the Plan Area), while the net flows in the Sacramento River downstream of Georgiana Slough, as shown at Rio Vista, are greater. Note that the corroboration was based on historical boundary conditions, i.e., the model results solely compare differences in hydrodynamics in the Plan Area because of sea level rise and tidal natural communities and transitional uplands restoration (and not changes in operations because of the proposed BDCP). In addition, the tidal flow range in Georgina Slough at ELT and LLT is greater than baseline, even though DSM2 is showing a slightly lower increment compared to RMA. The tidal flow range at Rio Vista is similar to baseline at ELT and greater than baseline at LLT. Overall, the results show that the DSM2 model, with consistent physical changes and boundary conditions representing the ELT and LLT scenarios, is capable of simulating similar incremental changes in the flows near Georgiana Slough as in the RMA model.

5C.5.3.8.5.3 Conclusion

Ongoing research is investigating links between the distribution of energy dissipation and the distribution of tidal prism within the context of Plan Area restoration and other factors (DeGeorge pers. comm.). There are a number of uncertainties related to large-scale restoration of tidal natural communities and transitional uplands within the Plan Area. For example, it is unknown whether the presently limiting conveyance capacity of a number of Delta channels for tidal flows may become enlarged by scouring in response to Plan Area changes in geometry resulting from habitat restoration. These factors may have consequences for the hydrodynamics at the Sacramento River-Georgiana Slough divergence and other locations. However, it is concluded, based on the currently available information presented above, that changes that may occur under the BDCP because of the North Delta Diversion and tidal restoration would result in neither a greater frequency of reverse flows nor a greater percentage of flow (and fish) entering the Interior Delta at this location, compared to EBC2_ELT and EBC2_LLT conditions.

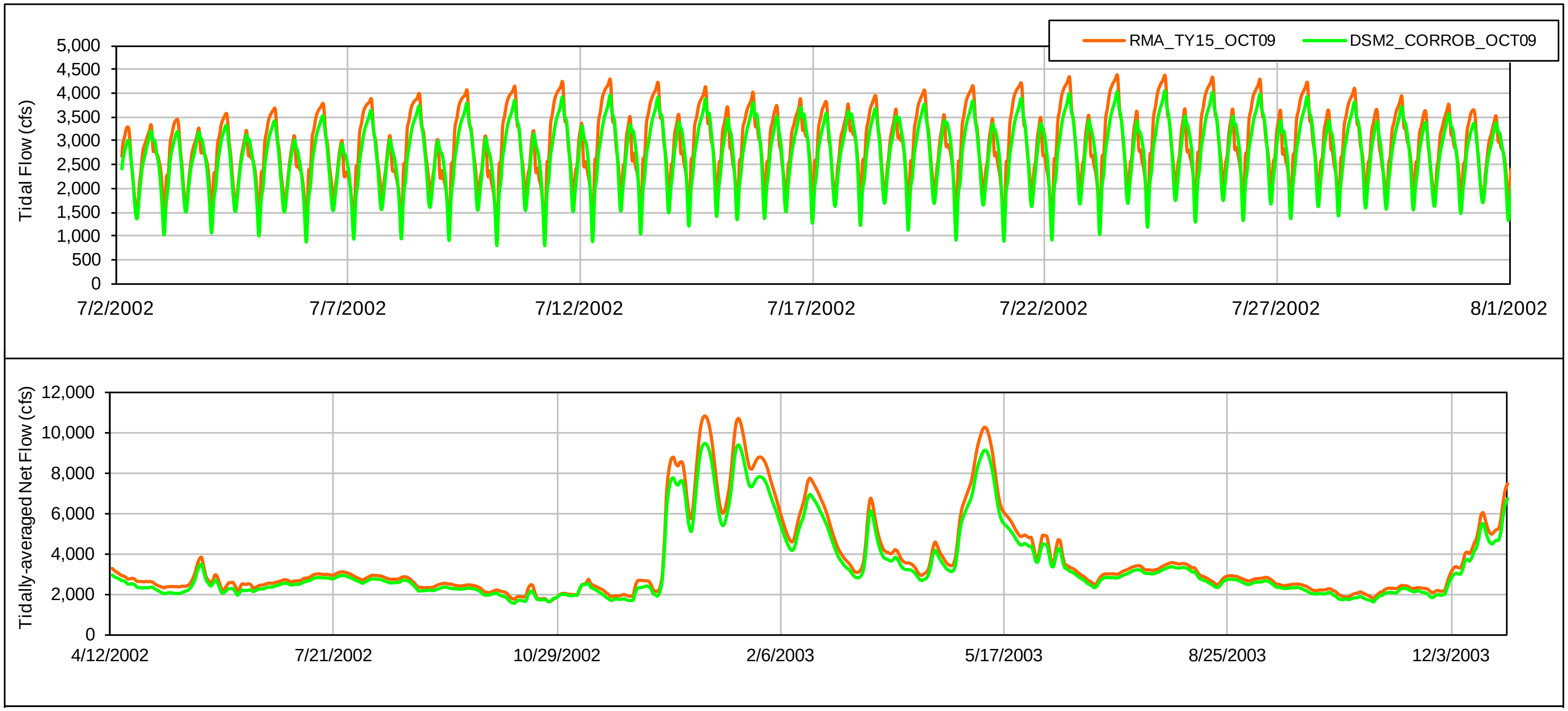


Figure 5C.5.3-148.A

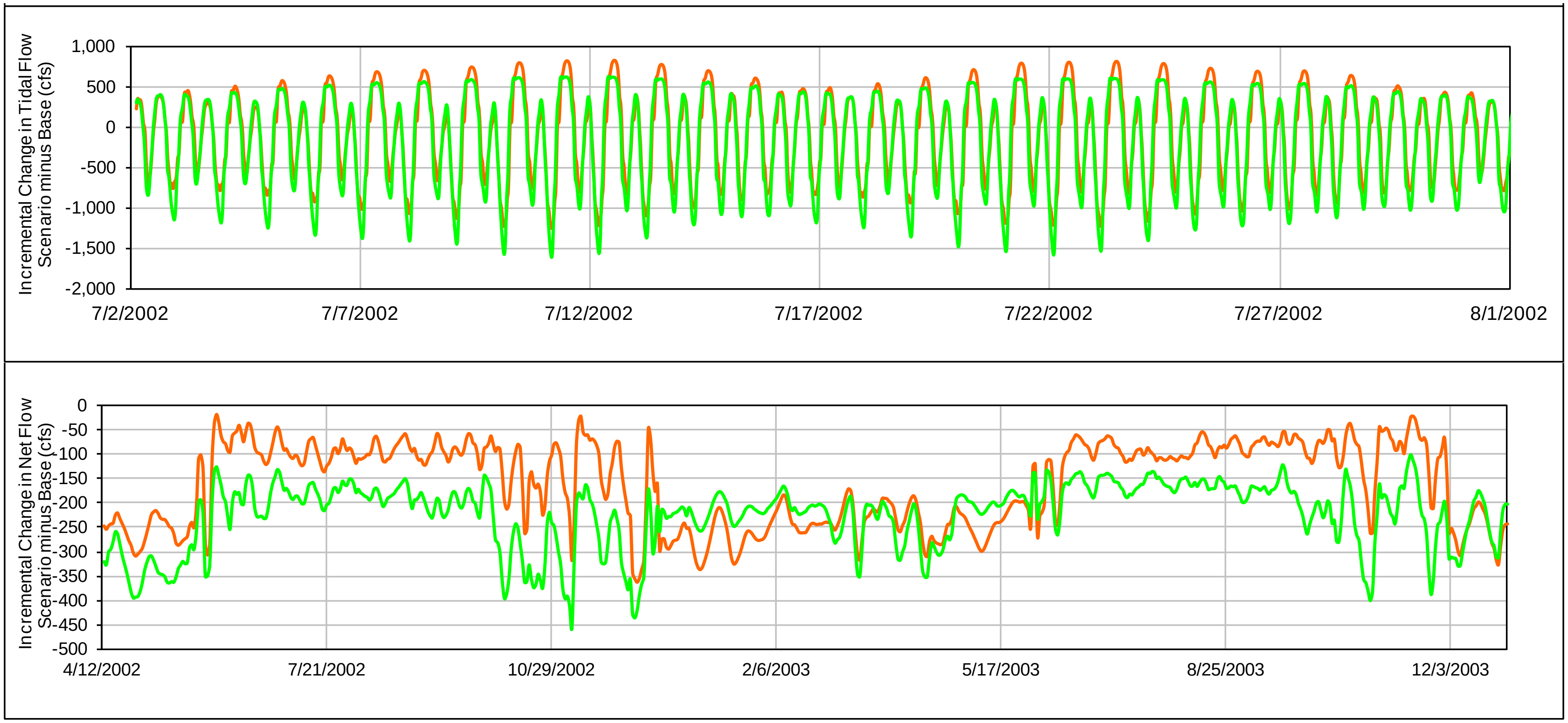


Figure 5C.5.3-148.B

Figure 5C.5.3-148. Comparison of Georgiana Slough (at Head) Tidal Flow, Tidally Averaged Daily Flow, Incremental Change in Tidal Flow, and the Incremental Change in the Daily Flow Between the Early Long-Term (25,000 Acres of Tidal Habitat Restoration and 15 cm of Sea Level Rise) and the Baseline (Current Plan Area Configuration and Sea Level) from DSM2 and RMA2 Models, Based on Historic Boundary Conditions for A Period During Water Years 2002 and 2003

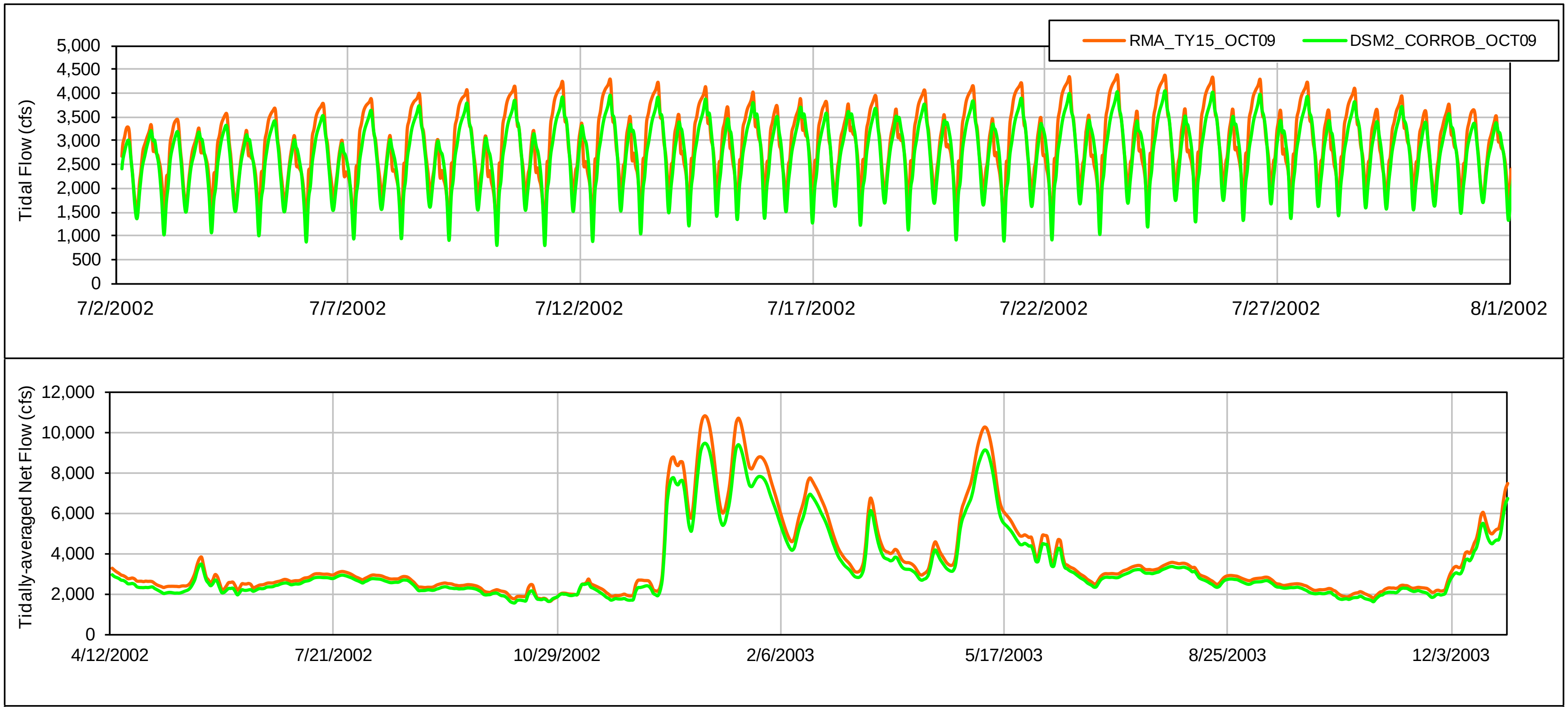


Figure 5C.5.3-149.A

Figure 5C.5.3-149.B

Figure 5C.5.3-149. Comparison of Sacramento River at Rio Vista Tidal Flow, Tidally Averaged Daily Flow, Incremental Change in Tidal Flow, and the Incremental Change in the Daily Flow Between the Early Long-Term (25,000 Acres of Tidal Habitat Restoration and 15 cm of Sea Level Rise) and the Baseline (Current Plan Area Configuration and Sea Level) from DSM2 and RMA2 Models, Based on Historic Boundary Conditions for A Period During Water Years 2002 and 2003

Table 5C.5.3-183. Comparison of Performance Metrics of RMA2 and DSM2 Simulations at ELT with 25,000 acres Tidal Restoration and 15 cm Sea-Level Rise

Location	Mean (cfs)				Mean Incremental Change (ELT–Base) (cfs)		Mean Error (DSM2–RMA) (cfs)		% Mean Error (DSM2–RMA)/(RMA)*100		RMSE (cfs)		% RMSE (RMSE/RMA)*100	
	Base		ELT											
	RMA	DSM2	RMA	DSM2	RMA	DSM2	Base	ELT	Base	ELT	Base	ELT	Base	ELT
SLGEO19 Georgiana Slough	3,978	3,964	3,819	3,476	-159	-218	-284	-343	-7.14	-8.98	427.77	429.79	10.75	11.25
RSAC101 Sacramento River at Rio Vista	16,308	16,763	17,028	17,562	720	799	455	534	2.79	3.13	662.33	683.58	4.06	4.01

Table 5C.5.3-184. Comparison of Performance Metrics of RMA2 and DSM2 Simulations at LLT with 65,000 acres Tidal Restoration and 45 cm Sea-Level Rise

Location	Mean (cfs)				Mean Incremental Change (LLT–Base) (cfs)		Mean Error (DSM2–RMA) (cfs)		% Mean Error (DSM2–RMA)/(RMA)*100		RMSE (cfs)		% RMSE (RMSE/RMA)*100	
	Base		LLT											
	RMA	DSM2	RMA	DSM2	RMA	DSM2	Base	LLT	Base	LLT	Base	LLT	Base	LLT
SLGEO19 Georgiana Slough	3,978	3,694	3,624	3,427	-354	-267	-284	-197	-7.13	-5.44	427.58	406.67	10.75	11.22
RSAC101 Sacramento River at Rio Vista	16,308	16,763	17,340	17,599	1,032	836	454	259	2.79	1.49	662.10	545.68	4.06	3.15

5C.5.3.9 Nonphysical Barriers

CM16 Nonphysical Fish Barriers proposes to install and test nonphysical fish barriers to deter downstream migrating juvenile fish (primarily salmonids) from entering the interior Delta where survival is lower than on the mainstem Sacramento and San Joaquin Rivers. As described above in the Delta Passage Model results, a simulated 67% proportional reduction in the number of Sacramento River-origin juvenile Chinook salmon entering Georgiana Slough on average generally gave 7–8% relatively greater survival through the Delta than without nonphysical barriers, depending on run analyzed, with the effect on average absolute through-Delta survival typically being around 2% greater than without nonphysical barriers assumed. The basic qualitative analysis applied in Appendix 5.B, *Entrainment*, in relation to effectiveness of nonphysical barriers in reducing entrainment at the entrances to Clifton Court Forebay and the Delta-Mendota Canal, also applies to the potential effectiveness of nonphysical barriers proposed for important channel divergences such as Sacramento River-Georgiana Slough. Considering water column position, hearing ability, and escape ability, barrier effectiveness has the potential to be high for salmonid juveniles and probably for Sacramento splittail, with effectiveness for smelt possibly being affected by water velocity characteristics near the barriers (Table 5C.5.3-185). There is no evidence that sturgeon and lamprey would respond to the acoustic stimuli of the barriers, although previous barrier studies in the Delta did not focus on these species. Ongoing studies in the Delta at Georgiana Slough and head of Old River will further inform the potential effectiveness of nonphysical barriers, particularly with respect to the possibility of predation by fish such as striped bass, and regarding the effectiveness of the barriers in relation to flow rate.

In contrast to nonphysical barriers at the entrances to Clifton Court Forebay and the Delta-Mendota Canal, nonphysical barriers located at channel divergences such as Sacramento River-Georgiana Slough have the potential to impede upstream migrating adults of covered fish species, e.g., Chinook salmon, steelhead. As with downstream migrating fish, the potential for effect on upstream migrants is species-specific, and the mechanisms of effect are the same. To coincide with the main period of downstream juvenile migration (winter–spring), installation of nonphysical barriers at important channel divergences may occur during upstream migration periods of adults from all of the covered fish species with the exception of fall-run Chinook salmon. The potential for negative effects (e.g., delay) may be low for species with low hearing ability (sturgeon and lamprey). Species such as adult salmonids may be migrating upstream following the channel thalweg (Quinn 2005), and, therefore, the potential for negative effect would depend on the portion of the water column covered by the nonphysical barrier. For example, preliminary testing at Georgiana Slough required the nonphysical barrier to be situated at the middle of the water column because the relatively deep water and strong flows would have dispersed the bubble curtain and dispersed the acoustic stimulus. In contrast, the shallower water and lower flows allowed most of the water column at the head of Old River to be covered by the bubble curtain and acoustic stimulus. The latter situation would have more potential for negative effects on upstream migrating fish with moderate or good hearing ability (e.g., adult salmonids, Sacramento splittail). Given that nonphysical barriers would be situated at the entrances to various channels leading to the interior Delta, the effects generally would be expected to be limited to the portion of the population moving upstream by these routes; fish moving upstream on the mainstems of the rivers would not be expected to be affected. Potential delays of nonphysical barriers on covered fish species will be monitored during testing periods.

Table 5C.5.3-185. Qualitative Assessment of Potential Effectiveness of Nonphysical Barriers for Guiding Covered Fish Species away from the Interior Delta

Species	Life Stage	Water Column Position	Hearing Ability	Escape Ability	Overall Potential Barrier Effectiveness
Chinook salmon (all races)	Juvenile	Upper	Moderate	High	High
Steelhead	Juvenile	Upper	Moderate	High	High
Delta smelt	Larva	Upper	Moderate	Low	Low
	Juvenile	Upper	Moderate	Low–Moderate	Moderate
	Adult	Upper	Moderate	Moderate	Moderate
Longfin smelt	Larva	Upper	Moderate	Low	Low
	Juvenile	Upper	Moderate	Low–Moderate	Moderate
	Adult	Upper	Moderate	Moderate	High
Sacramento splittail	Larva	Upper	High	Low	Low
	Juvenile	Middle	High	Moderate	High
	Adult	Middle	High	High	High
White sturgeon	Larva	Upper	Low	Low	Low
	Juvenile	Lower	Low	High	Low
Green sturgeon	Juvenile	Lower	Low	High	Low
Pacific lamprey	Macropthalmia	Upper	Low	Low	Low
	Adult	Upper	Low	Low	Low
River lamprey	Macropthalmia	Upper	Low	Low	Low
	Adult	Upper	Low	Low	Low

5C.5.3.10 Suisun Marsh Salinity Control Structure

Salinity standards in Suisun Marsh are maintained through management of outflow and the operations of the Suisun Marsh Salinity Control Gates (SMSCG) approximately 10–20 days per year in October through May. The facility consists of three radial gates, a boat lock structure, and a maintenance channel equipped with removable flashboards. When the SMSCG are in operation, the flashboards are installed at the maintenance channel and the gates are operated tidally. Current operations also include the full opening of the boat lock. The SMSCG induce approximately 2,800 cfs of flow into the Suisun Marsh during operation, resulting in decreased salinity in the marsh and movement of the X2 position upstream. Fish migrating through Montezuma Slough must pass through this structure, which extends across the full width of Montezuma Slough. Consequently, operation of the gates also can inhibit passage of migrating adult Central Valley anadromous salmonids and green sturgeon. The late winter and spring downstream migration of Central Valley salmonids also overlaps the operational period of the SMSCG. As adult Central Valley anadromous salmonids travel between the ocean and their natal Central Valley streams, Montezuma Slough provides an alternative route to their primary migration corridor through Suisun Bay.

CM1 Water Facilities and Operation includes coordination with the Suisun Marsh Charter Group over the term of the BDCP to seek amendments to the *Suisun Marsh Habitat Management, Preservation, and Restoration Plan* that will provide for reducing the long-term operation of the SMSCG. This action will allow more water to flow past Chipps Island and will improve access of covered fish species to existing and future restored intertidal marsh habitats. However, the evaluated starting operations also propose to restore significant areas of tidal marsh in Suisun Marsh (*CM4 Tidal Natural Community Restoration*), which can change the tidal hydraulics in a way that may result in changes in salinity in the marsh (actual amount and direction of change is complicated and depends on tides, upstream flow rates, and exact location). Assuming salinity standards in the marsh stay the same under the evaluated starting operations as under existing biological conditions, the BDCP would need to coordinate with the Suisun Marsh Charter Group to address potential changes in salinity caused by evaluated starting operations restoration to ensure that SMSCG operations are not increased. The analysis of passage at the SMSCG assumes that operations would stay the same or decrease, which is expected to result in passage similar to that which would occur without operation of the SMSCG.

Under current operations (with the boat lock held open and the flashboards in for 10–20 days), NMFS estimated that between 55% and 70% of the adult salmonids arriving at the SMSCG during its 10–20 days of annual operation will successfully pass upstream at the structure (National Marine Fisheries Service 2009). This rate of passage is virtually identical to the passage rate when the SMSCG is not operational (California Department of Water Resources and California Department of Fish and Game 2005). CDFW telemetry studies indicate 30% to 45% of the adult salmonids do not pass the structure even when the gates are not operating. Adult salmonids that do not continue upstream past the SMSCG are expected to return downstream by backtracking through Montezuma Slough to Suisun Bay, and they likely find the alternative upstream route to their natal Central Valley streams through Suisun and Honker Bays. This backtracking likely reduces survival of adult salmonids, although the extent to which survival is lowered is unknown.

Little is known about adult green sturgeon upstream passage at the SMSCG. Acoustic-tagging results from 2007 indicate adult green sturgeon migrate to the upper Sacramento River via Suisun and Honker Bays, not Montezuma Slough (Woodbury 2008, cited in National Marine Fisheries Service 2009), although the NMFS study's sample size was small (six adult sturgeon) and limited to 1 year of results. The results of the 2007 acoustic-tagging study also suggest that green sturgeon require 4 to 6 weeks to pass upstream from San Francisco Bay to the upper Sacramento River, and it was not uncommon for sturgeon to interrupt their migration and linger in the vicinity of Rio Vista for up to 2 weeks (National Marine Fisheries Service unpublished data).

When the SMSCG are operating, green sturgeon, like salmon, have an opportunity to pass upstream through the boat locks or through the open gates during ebb tide. Based on the results of salmon telemetry studies, the operation of the SMSCG also may delay the upstream passage of an actively migrating adult green sturgeon by 3 to 4 days. Fish likely are impeded by the flashboards of the SMSCG along the northern shoreline, and the tidally operated gates reduce the hydrodynamic effect of flood tides downstream of the structure. Many species of fish are known to synchronize their movements through estuaries with the ebb and flow of the tides (Gibson 1992). Kelly and others (2007) report subadult sturgeon in San Francisco and San Pablo Bays typically move in the same direction as the prevailing current. The results of the 2007 acoustic-tagging study indicate adult green sturgeon in the upper Delta and lower Sacramento River typically move against the prevailing tidal current (National Marine Fisheries Service unpublished data). Thus, adult green sturgeon are likely capable of continuing their upstream migration by navigating through the SMSCG on an ebb tide or through the continuously open boat lock when the SMSCG are being operated. The evaluated starting operations would maintain or improve this level of passage because operation of the gates would stay the same or decrease under the ESO.

5C.5.3.11 Passage Improvements at the Stockton Deep Water Ship Channel

The Deep Water Ship Channel has been identified as an impaired waterway by the State Water Resources Control Board (State Water Board) because of low dissolved oxygen concentrations during late summer and early fall. The waterway often fails to meet water quality objectives established by the Central Valley Regional Water Quality Control Board (Central Valley Water Board) for dissolved oxygen (Central Valley Regional Water Quality Control Board 2005, 2009). The combination of low flows, high loads of oxygen-demanding substances (algae from upstream, effluent from the City of Stockton Regional Wastewater Control Facility, and other unknown sources), and channel geometry contribute to low oxygen levels in the Deep Water Ship Channel (Central Valley Regional Water Quality Control Board 2005). The 7.5-mile low–dissolved oxygen area of the ship channel creates a barrier for upstream migration of adult fall-run Chinook salmon and Central Valley steelhead on the mainstem of the San Joaquin River (Hallock et al. 1970). Available data indicate that low dissolved oxygen that would affect salmonids is most likely to occur in September and October during the upstream migration period, and during June in the downstream migration period. This makes Chinook salmon more likely to be exposed to low dissolved oxygen levels than steelhead because peak migration for steelhead occurs outside of June, September, and October. Juvenile salmonids may be exposed to low dissolved oxygen periods during the end of their downstream migration period (primarily in June). Once spring-run Chinook salmon are reestablished in the San Joaquin River under the San Joaquin River Restoration Program, dissolved oxygen sags in the Deep Water Ship Channel likely will have similar effects on this run if sags were to occur during the adult migration period (expected to be approximately March through September). In addition, juvenile white sturgeon, which rear in the San Joaquin River, exhibit reduced foraging and growth rates at dissolved oxygen levels below 58% saturation (5.8 mg/L at 15°C) (Cech and Crocker 2002).

One potential solution to dissolved oxygen sags in the Deep Water Ship Channel, a dissolved oxygen aeration system, has been installed and is undergoing field testing by DWR. Results suggest that the aeration facility is effective at raising dissolved oxygen levels in much of the channel. Long-term funding for operations and maintenance has not yet been secured, and there are currently no mandates by the Central Valley Water Board that require contributors to the sag to fund the evaluated starting operations. Under *CM14 Stockton Deep Waater Ship Channel Dissolved Oxygen Levels*, the BDCP would share in funding the long-term operation and maintenance costs associated with the BDCP.

Studies conducted by DWR show that the aeration system can be effective at meeting the Basin Plan objectives for dissolved oxygen of 5 mg/L (or 6 mg/L from September through November) as long as the inflowing biochemical oxygen demand (BOD) does not exceed the capacity of the aeration facility to produce oxygen (California Department of Water Resources 2010). During periods when BOD is higher than the capacity of the aeration facility, the Basin Plan objectives may not be met, but the number of days that the objectives could be met is increased with the aeration facility. CM14 also includes adaptive management and monitoring to allow for future adjustments to the aeration facility operations to improve its effectiveness at meeting the Basin Plan objectives for dissolved oxygen in the Deep Water Ship Channel. Even without further improvements to the current aeration facility operations, the long-term funding for operations and maintenance would reduce the likelihood that migrating Chinook salmon, steelhead, and white sturgeon would experience a passage impediment in the San Joaquin River, lessen the number of stressors encountered by adults, and increase the likelihood of San Joaquin River fish returning to the San Joaquin River to spawn.

5C.5.3.12 Fremont Weir Adult Fish Passage (*CM 2 Yolo Bypass Fisheries Enhancement*)

Note that this section only considers changes in upstream passage in the Yolo Bypass at Fremont Weir and does not consider any biological changes in mainstem Sacramento River flow that may result from greater frequency of Yolo Bypass inundation (as well as operation of the north Delta diversions). Changes in flow are summarized in Section 5C.5.3.13, *Attraction and Migration Flows*.

5C.5.3.12.1 Records of Fish Rescued at Fremont Weir

Information about the number of upstream migrating adult anadromous fish that might become stranded at the Fremont Weir is limited. The existing fish ladder is thought to be largely ineffective. Few records were kept of adult and juvenile fish rescued from 1955 through 1968 by CDFW (California Department of Fish and Game undated report). Fish collected during this time period were mostly Chinook salmon and steelhead. Annual numbers of fish were generally in the tens or hundreds, and where age was noted, the majority were juveniles, with adults numbering in the tens or single digits. More recent data from 2002 onward indicate that Chinook salmon, steelhead, and sturgeon have been collected (California Department of Fish and Game undated report) (Table 5C.5.3-186). Note that sturgeon and salmonid rescue and mortality were largely unreported even in these later years. Green sturgeon are of particular interest because the adult population estimates are much lower than other species, yet appreciable numbers appear to be stranded at Fremont Weir and in the Yolo Bypass scour ponds. Of the green sturgeon rescued in 2011, all were sexually mature individuals (Healey and Vincik 2011). Based on molecular techniques, Israel and May (2010) estimated that at least 10–28 individual green sturgeon spawned in the upper Sacramento River, whereas somewhat older estimates by Moyle (2002) suggested 140–1,600 adults. These estimates suggest that a sizable percentage of the green sturgeon adult population may be stranded occasionally at Fremont Weir. Thomas et al. (2013) conducted a population viability analysis for green sturgeon and found that recurrent stranding—at both Fremont Weir, as well as Tisdale Weir in the Sutter Bypass—of the magnitude observed in 2011 could, over 50 years, reduce adult female green sturgeon abundance by 33% compared to a baseline condition with no stranding. Their modeling results suggested that fish rescue of the type employed in 2011 could have led to 7% lower abundance after 50 years compared to a no-stranding baseline scenario. CM2 also includes fish rescue in addition to improved fish passage at Fremont Weir.

Table 5C.5.3-186. Recent Numbers of Fish Rescued at Fremont Weir

Year	Date	Chinook Salmon		Steelhead		Sturgeon	
		Adult	Juvenile	Adult	Juvenile	Adult (Green)	Adult (White)
2002[a]	1/11	1	25–30	0	0	0	1
2004[a]	3/11–3/13	14	25	0	0	0	27
2005[a]	5/26	0	1	0	0	0	0
2006[a]	1/26	4	several	0	0	0	1
2006[a]	2/14, 2/16	1	>100	6	0	0	21
2011[b]	4/11–4/18	54 (includes Tisdale Weir)	75 (includes Tisdale Weir)	0	(Collected, abundance not documented)	16	18

Sources: [a] California Department of Fish and Game undated report; [b] Healey and Vincik 2011.

5C.5.3.12.2 DRERIP Evaluation of Fremont Weir and Yolo Bypass Inundation

The 2009 DRERIP evaluation of the Fremont Weir and Yolo Bypass inundation suggested there could be two main outcomes (one positive and one negative) of increased Yolo Bypass inundation and improved passage at the Fremont Weir and Sacramento Weir. The DRERIP evaluation suggested that the positive outcome from improving passage at the Fremont and Sacramento Weirs would far outweigh the potential increase in numbers of fish stranding at the weirs because the magnitude of the positive outcome to the population was 4 (high importance) in comparison with a magnitude of only 1 (low importance) for the negative outcome. The DRERIP evaluation summary was as follows:

1. Reduced losses due to stranding, illegal harvest, and blocked or delayed passage for Chinook salmon, steelhead, and green/white sturgeon (Positive outcome P6).
    a. Green and white sturgeon: Adult passage of white and green sturgeon is likely constrained in the Yolo Bypass (Harrell and Sommer 2003). Current configuration of Fremont and Sacramento Weirs creates stranding and poaching problems for white and green sturgeon (Sommer et al. 2005; Israel et al. 2009; Israel and Klimley 2008); hence, efforts to improve passage and redesign weirs would reduce poaching and stranding.
        1) Magnitude of outcome to the population = 4. Blocked passage and resulting legal and illegal harvest are substantial; loss of spawners is particularly harmful to the populations. Frequent poaching has been well documented by CDFW.
        2) Certainty of the outcome = 4: Studies within the Yolo Bypass have identified the problem (California Department of Fish and Game unpublished data; Harrell and Sommer 2003; Harrell et al. in prep.).
    b. Steelhead: Adult passage of salmon (and steelhead) likely is constrained in the Yolo Bypass (Harrell and Sommer 2003). Current Fremont and Sacramento Weirs create stranding problems for salmon (Sommer et al. 2005); hence, efforts to improve passage and redesign weirs would reduce poaching and stranding.
        1) Magnitude of outcome to the population = 4: Blocked passage is more of a problem than stranding.

2) Certainty of the outcome = 3: Studies within the Yolo Bypass have identified the stranding problem (California Department of Fish and Game unpublished data; Harrell and Sommer 2003; Harrell et al. in prep.), but it is less well-documented for steelhead because of relatively low catch of adults.

c. Chinook salmon (all races): Adult passage of salmon likely is constrained in the Yolo Bypass (Harrell and Sommer 2003). Current Fremont and Sacramento Weirs create stranding problems for salmon (Sommer et al. 2005); hence, efforts to improve passage and redesign weirs would reduce poaching and stranding. Williams (2006) indicates that water flowing through the Yolo Bypass attracts migrating adult salmon into this seasonal floodplain habitat; however, the Fremont Weir at the top of the bypass does not allow salmon passage. This barrier represents either a serious delay to upstream migration or a dead end.

1) Magnitude of outcome to the population = 4: A serious delay in salmon spawning has been documented. Blocked passage involved an extensive (~100 mile) increase in passage.

2) Certainty of the outcome = 3–4: Studies within the Yolo Bypass have identified the problem (California Department of Fish and Game unpublished data; Harrell and Sommer 2003; Harrell et al. in prep.). The certainty is lower for spring- and winter-run salmon because of lower numbers and lower catch rates in sampling.

2. Increased stranding of covered species (negative outcome)

a. Green and white sturgeon, steelhead, and Chinook salmon (all races)

1) Magnitude of outcome to the population = 1. Blocked passage would be minimal behind the modified weir as it will be designed to improve passage. There is some possibility of reduced passage if migrating salmon encounter the modified structure when it is closed or there is insufficient flow to allow passage.

2) Certainty of the outcome = 4: The assumption is that the problem of blocked passage will be resolved by the modifications to the weir (in the original DRERIP assessment, this conclusion was applied to the sturgeons but is equally applicable to adult salmonids).

5C.5.3.12.3 Experimental Ramps

CM2 Yolo Bypass Fisheries Enhancement includes an action to construct experimental ramps to allow for the effective passage of adult sturgeon and lamprey from the Yolo Bypass over Fremont Weir. A number of features to increase upstream passage of adult lamprey (e.g., reduced velocity, continuous attachment areas, rounding corners, and provision of ramp structures) have been implemented successfully in the Pacific Northwest (Moser and Mesa 2009; Moser et al. 2011). Therefore, experimental ramps under the evaluated starting operations that include such features will allow for improved passage of adult lamprey.

Laboratory studies have been conducted on experimental ramps on which adult white sturgeon could potentially pass (Webber et al. 2007). Although the entire design of such ramps that allows for successful passage has not yet been developed, specific attribute including energy-dissipating baffles have allowed for successful passage of white sturgeon. With additional research under CM2 to identify the additional key attributes that would allow for successful sturgeon passage, the evaluated starting operations should improve passage over Fremont Weir, although there is low certainty that this will occur because those attributes have not yet been identified.

5C.5.3.13 Attraction and Migration Flows

5C.5.3.13.1 Delta Region

5C.5.3.13.1.1 Summary of Flows within the Delta Region

CALSIM flow data for the Delta region averaged by water-year type, month, and scenario, together with average monthly differences between scenarios, are provided in Table 5C.5.3-1 through Table 5C.5.3-18 and Table 5C.5.3-187 through Table 5C.5.3-190. These data form the basis for the summary of changes in attraction and migration flows.

Table 5C.5.3-187. Mean Monthly Flows (cfs) in Sacramento River at Rio Vista for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	71,111	70,016	75,510	78,551	69,760	71,570
	AN	41,963	40,537	41,416	42,919	37,307	38,028
	BN	20,943	20,264	20,388	19,991	18,308	17,958
	D	14,895	14,766	15,032	14,927	13,636	13,330
	C	11,853	12,139	12,114	12,601	11,016	12,107
	All	37,268	36,610	38,556	39,721	35,310	36,022
Feb	W	80,958	79,915	87,232	89,989	80,514	84,018
	AN	52,542	50,466	53,615	55,363	50,586	50,962
	BN	30,159	29,018	30,231	29,442	26,458	26,223
	D	19,320	19,411	19,318	19,422	17,032	17,419
	C	12,247	12,437	12,074	11,956	11,488	11,275
	All	44,541	43,759	46,674	47,675	42,869	44,049
Mar	W	63,763	63,456	66,275	68,663	59,080	61,293
	AN	46,750	45,497	47,974	48,513	41,897	42,558
	BN	20,980	19,944	19,629	19,562	15,589	15,344
	D	17,656	17,428	17,341	17,679	14,771	14,923
	C	10,710	10,649	10,603	10,684	10,067	10,066
	All	36,084	35,567	36,744	37,655	32,241	33,031
Apr	W	38,214	38,344	38,692	38,422	32,848	32,540
	AN	22,726	22,759	22,234	21,855	17,186	17,208
	BN	14,652	14,471	14,295	14,207	11,845	12,240
	D	10,331	10,391	10,216	10,299	9,081	9,583
	C	7,665	7,654	7,520	7,816	7,283	7,437
	All	21,333	21,360	21,306	21,211	18,012	18,118
May	W	26,933	26,681	24,220	20,046	18,383	15,068
	AN	17,008	16,714	15,857	14,948	12,926	12,487
	BN	10,924	10,595	9,862	9,355	8,714	9,214
	D	8,135	7,919	7,840	8,564	7,525	8,835
	C	5,305	5,216	5,656	5,554	5,146	5,302
	All	15,456	15,217	14,232	12,833	11,613	10,893

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jun	W	16,557	16,350	12,993	11,418	8,934	8,500
	AN	9,887	9,964	8,634	9,220	6,665	7,412
	BN	7,001	6,873	6,677	7,241	6,652	6,839
	D	6,020	6,124	6,250	6,335	6,006	5,997
	C	4,333	4,340	4,304	4,513	3,939	4,101
	All	9,847	9,795	8,525	8,257	6,839	6,864
Jul	W	11,125	10,893	11,207	12,181	8,924	10,079
	AN	12,128	12,323	12,544	12,927	10,235	11,187
	BN	11,686	11,884	11,667	11,357	9,779	9,076
	D	10,523	10,390	10,105	10,307	8,156	6,721
	C	7,736	6,891	6,866	6,596	4,103	4,312
	All	10,739	10,575	10,604	10,921	8,388	8,488
Aug	W	8,507	8,541	8,527	8,650	4,595	4,670
	AN	8,538	8,877	9,013	9,648	6,205	5,872
	BN	8,371	8,428	8,062	8,753	6,146	5,963
	D	9,264	8,484	7,525	7,417	4,374	4,792
	C	4,390	4,250	3,823	3,615	3,710	3,308
	All	8,052	7,930	7,610	7,806	4,918	4,894
Sep	W	10,767	21,707	20,717	21,199	10,406	11,644
	AN	6,788	12,001	12,961	12,832	6,275	6,873
	BN	6,283	6,221	6,538	6,197	3,513	3,602
	D	6,116	5,415	4,432	3,644	3,014	3,864
	C	3,588	3,392	3,215	2,996	3,020	3,783
	All	7,348	11,386	11,025	10,896	5,921	6,715
Oct	W	8,718	8,036	7,867	8,287	4,943	5,931
	AN	6,183	5,292	5,518	7,207	3,656	5,964
	BN	6,258	5,898	5,416	6,976	3,918	5,908
	D	5,312	4,889	5,221	5,727	3,801	4,719
	C	5,215	4,745	4,684	4,969	3,805	4,978
	All	6,667	6,097	6,058	6,858	4,162	5,526
Nov	W	15,829	17,253	17,184	15,879	12,318	11,744
	AN	11,333	13,013	13,102	12,156	8,954	8,253
	BN	8,184	9,490	9,448	9,071	5,769	5,952
	D	8,733	8,630	8,539	8,061	5,930	5,935
	C	5,473	5,865	5,586	5,565	4,577	4,607
	All	10,793	11,748	11,671	10,946	8,172	7,925
Dec	W	43,367	40,285	44,292	40,431	40,630	37,564
	AN	19,040	19,570	20,375	19,936	18,884	18,525
	BN	13,987	14,169	15,099	14,049	13,882	13,237
	D	11,999	11,960	11,868	11,687	11,126	11,101
	C	8,131	7,681	7,341	7,186	7,372	7,603
	All	22,749	21,806	23,283	21,753	21,538	20,431

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-188. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Sacramento River at Rio Vista

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	-1352 (-1.9%)	458 (0.6%)	-256 (-0.4%)	1554 (2.2%)	-5751 (-7.6%)	-6982 (-8.9%)
	AN	-4656 (-11.1%)	-3935 (-9.4%)	-3231 (-8%)	-2510 (-6.2%)	-4109 (-9.9%)	-4891 (-11.4%)
	BN	-2635 (-12.6%)	-2984 (-14.3%)	-1956 (-9.7%)	-2306 (-11.4%)	-2080 (-10.2%)	-2033 (-10.2%)
	D	-1259 (-8.5%)	-1565 (-10.5%)	-1131 (-7.7%)	-1437 (-9.7%)	-1396 (-9.3%)	-1597 (-10.7%)
	C	-837 (-7.1%)	254 (2.1%)	-1123 (-9.3%)	-32 (-0.3%)	-1098 (-9.1%)	-494 (-3.9%)
	All	-1959 (-5.3%)	-1246 (-3.3%)	-1301 (-3.6%)	-588 (-1.6%)	-3247 (-8.4%)	-3699 (-9.3%)
Feb	W	-444 (-0.5%)	3060 (3.8%)	599 (0.7%)	4104 (5.1%)	-6718 (-7.7%)	-5971 (-6.6%)
	AN	-1957 (-3.7%)	-1581 (-3%)	120 (0.2%)	496 (1%)	-3029 (-5.6%)	-4401 (-7.9%)
	BN	-3701 (-12.3%)	-3936 (-13.1%)	-2560 (-8.8%)	-2795 (-9.6%)	-3773 (-12.5%)	-3220 (-10.9%)
	D	-2287 (-11.8%)	-1900 (-9.8%)	-2379 (-12.3%)	-1992 (-10.3%)	-2286 (-11.8%)	-2003 (-10.3%)
	C	-759 (-6.2%)	-972 (-7.9%)	-949 (-7.6%)	-1162 (-9.3%)	-586 (-4.9%)	-681 (-5.7%)
	All	-1672 (-3.8%)	-492 (-1.1%)	-891 (-2%)	289 (0.7%)	-3805 (-8.2%)	-3626 (-7.6%)
Mar	W	-4683 (-7.3%)	-2470 (-3.9%)	-4376 (-6.9%)	-2162 (-3.4%)	-7195 (-10.9%)	-7369 (-10.7%)
	AN	-4854 (-10.4%)	-4193 (-9%)	-3600 (-7.9%)	-2939 (-6.5%)	-6077 (-12.7%)	-5955 (-12.3%)
	BN	-5390 (-25.7%)	-5636 (-26.9%)	-4355 (-21.8%)	-4601 (-23.1%)	-4039 (-20.6%)	-4218 (-21.6%)
	D	-2885 (-16.3%)	-2733 (-15.5%)	-2657 (-15.2%)	-2505 (-14.4%)	-2570 (-14.8%)	-2755 (-15.6%)
	C	-644 (-6%)	-644 (-6%)	-582 (-5.5%)	-583 (-5.5%)	-536 (-5.1%)	-617 (-5.8%)
	All	-3843 (-10.7%)	-3053 (-8.5%)	-3326 (-9.4%)	-2536 (-7.1%)	-4503 (-12.3%)	-4624 (-12.3%)
Apr	W	-5365 (-14%)	-5674 (-14.8%)	-5496 (-14.3%)	-5805 (-15.1%)	-5844 (-15.1%)	-5883 (-15.3%)
	AN	-5540 (-24.4%)	-5518 (-24.3%)	-5573 (-24.5%)	-5550 (-24.4%)	-5048 (-22.7%)	-4647 (-21.3%)
	BN	-2808 (-19.2%)	-2412 (-16.5%)	-2626 (-18.1%)	-2231 (-15.4%)	-2450 (-17.1%)	-1967 (-13.8%)
	D	-1250 (-12.1%)	-748 (-7.2%)	-1310 (-12.6%)	-808 (-7.8%)	-1134 (-11.1%)	-715 (-6.9%)
	C	-382 (-5%)	-228 (-3%)	-371 (-4.8%)	-216 (-2.8%)	-237 (-3.2%)	-379 (-4.8%)
	All	-3322 (-15.6%)	-3216 (-15.1%)	-3348 (-15.7%)	-3243 (-15.2%)	-3294 (-15.5%)	-3094 (-14.6%)
May	W	-8550 (-31.7%)	-11865 (-44.1%)	-8298 (-31.1%)	-11613 (-43.5%)	-5837 (-24.1%)	-4978 (-24.8%)
	AN	-4082 (-24%)	-4521 (-26.6%)	-3788 (-22.7%)	-4227 (-25.3%)	-2931 (-18.5%)	-2461 (-16.5%)
	BN	-2210 (-20.2%)	-1710 (-15.7%)	-1882 (-17.8%)	-1382 (-13%)	-1148 (-11.6%)	-141 (-1.5%)
	D	-609 (-7.5%)	701 (8.6%)	-394 (-5%)	916 (11.6%)	-314 (-4%)	272 (3.2%)
	C	-159 (-3%)	-3 (-0.1%)	-70 (-1.3%)	86 (1.6%)	-510 (-9%)	-252 (-4.5%)
	All	-3843 (-24.9%)	-4562 (-29.5%)	-3603 (-23.7%)	-4323 (-28.4%)	-2619 (-18.4%)	-1940 (-15.1%)
Jun	W	-7622 (-46%)	-8057 (-48.7%)	-7415 (-45.4%)	-7850 (-48%)	-4059 (-31.2%)	-2918 (-25.6%)
	AN	-3223 (-32.6%)	-2475 (-25%)	-3299 (-33.1%)	-2551 (-25.6%)	-1969 (-22.8%)	-1808 (-19.6%)
	BN	-349 (-5%)	-162 (-2.3%)	-222 (-3.2%)	-34 (-0.5%)	-26 (-0.4%)	-402 (-5.5%)
	D	-14 (-0.2%)	-23 (-0.4%)	-117 (-1.9%)	-127 (-2.1%)	-244 (-3.9%)	-338 (-5.3%)
	C	-393 (-9.1%)	-232 (-5.3%)	-401 (-9.2%)	-240 (-5.5%)	-365 (-8.5%)	-412 (-9.1%)
	All	-3009 (-30.6%)	-2983 (-30.3%)	-2956 (-30.2%)	-2931 (-29.9%)	-1687 (-19.8%)	-1393 (-16.9%)
Jul	W	-2201 (-19.8%)	-1046 (-9.4%)	-1969 (-18.1%)	-814 (-7.5%)	-2283 (-20.4%)	-2103 (-17.3%)
	AN	-1893 (-15.6%)	-941 (-7.8%)	-2088 (-16.9%)	-1137 (-9.2%)	-2309 (-18.4%)	-1740 (-13.5%)
	BN	-1907 (-16.3%)	-2610 (-22.3%)	-2104 (-17.7%)	-2808 (-23.6%)	-1887 (-16.2%)	-2281 (-20.1%)
	D	-2368 (-22.5%)	-3803 (-36.1%)	-2234 (-21.5%)	-3669 (-35.3%)	-1950 (-19.3%)	-3586 (-34.8%)
	C	-3633 (-47%)	-3425 (-44.3%)	-2788 (-40.5%)	-2579 (-37.4%)	-2764 (-40.2%)	-2285 (-34.6%)
	All	-2352 (-21.9%)	-2251 (-21%)	-2187 (-20.7%)	-2087 (-19.7%)	-2216 (-20.9%)	-2433 (-22.3%)

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-3912 (-46%)	-3837 (-45.1%)	-3945 (-46.2%)	-3871 (-45.3%)	-3932 (-46.1%)	-3980 (-46%)
	AN	-2332 (-27.3%)	-2666 (-31.2%)	-2672 (-30.1%)	-3006 (-33.9%)	-2808 (-31.2%)	-3776 (-39.1%)
	BN	-2225 (-26.6%)	-2408 (-28.8%)	-2283 (-27.1%)	-2465 (-29.2%)	-1916 (-23.8%)	-2790 (-31.9%)
	D	-4890 (-52.8%)	-4473 (-48.3%)	-4110 (-48.4%)	-3692 (-43.5%)	-3151 (-41.9%)	-2625 (-35.4%)
	C	-680 (-15.5%)	-1082 (-24.7%)	-540 (-12.7%)	-942 (-22.2%)	-113 (-3%)	-307 (-8.5%)
	All	-3134 (-38.9%)	-3158 (-39.2%)	-3013 (-38%)	-3037 (-38.3%)	-2693 (-35.4%)	-2912 (-37.3%)
Sep	W	-361 (-3.4%)	877 (8.1%)	-11301 (-52.1%)	-10063 (-46.4%)	-10311 (-49.8%)	-9555 (-45.1%)
	AN	-513 (-7.6%)	85 (1.3%)	-5725 (-47.7%)	-5128 (-42.7%)	-6686 (-51.6%)	-5959 (-46.4%)
	BN	-2770 (-44.1%)	-2681 (-42.7%)	-2708 (-43.5%)	-2619 (-42.1%)	-3025 (-46.3%)	-2595 (-41.9%)
	D	-3102 (-50.7%)	-2252 (-36.8%)	-2401 (-44.3%)	-1551 (-28.6%)	-1417 (-32%)	220 (6%)
	C	-568 (-15.8%)	195 (5.4%)	-372 (-11%)	391 (11.5%)	-195 (-6.1%)	787 (26.3%)
	All	-1427 (-19.4%)	-633 (-8.6%)	-5465 (-48%)	-4671 (-41%)	-5104 (-46.3%)	-4181 (-38.4%)
Oct	W	-3775 (-43.3%)	-2787 (-32%)	-3093 (-38.5%)	-2105 (-26.2%)	-2923 (-37.2%)	-2356 (-28.4%)
	AN	-2527 (-40.9%)	-219 (-3.5%)	-1636 (-30.9%)	672 (12.7%)	-1861 (-33.7%)	-1243 (-17.2%)
	BN	-2340 (-37.4%)	-350 (-5.6%)	-1979 (-33.6%)	11 (0.2%)	-1498 (-27.7%)	-1068 (-15.3%)
	D	-1511 (-28.4%)	-593 (-11.2%)	-1088 (-22.3%)	-169 (-3.5%)	-1420 (-27.2%)	-1008 (-17.6%)
	C	-1410 (-27%)	-237 (-4.5%)	-940 (-19.8%)	233 (4.9%)	-880 (-18.8%)	9 (0.2%)
	All	-2504 (-37.6%)	-1140 (-17.1%)	-1934 (-31.7%)	-570 (-9.4%)	-1896 (-31.3%)	-1331 (-19.4%)
Nov	W	-3511 (-22.2%)	-4085 (-25.8%)	-4935 (-28.6%)	-5509 (-31.9%)	-4866 (-28.3%)	-4135 (-26%)
	AN	-2378 (-21%)	-3079 (-27.2%)	-4058 (-31.2%)	-4759 (-36.6%)	-4148 (-31.7%)	-3902 (-32.1%)
	BN	-2415 (-29.5%)	-2232 (-27.3%)	-3722 (-39.2%)	-3538 (-37.3%)	-3679 (-38.9%)	-3119 (-34.4%)
	D	-2803 (-32.1%)	-2798 (-32%)	-2700 (-31.3%)	-2695 (-31.2%)	-2609 (-30.6%)	-2126 (-26.4%)
	C	-897 (-16.4%)	-866 (-15.8%)	-1288 (-22%)	-1257 (-21.4%)	-1010 (-18.1%)	-958 (-17.2%)
	All	-2620 (-24.3%)	-2868 (-26.6%)	-3575 (-30.4%)	-3823 (-32.5%)	-3498 (-30%)	-3022 (-27.6%)
Dec	W	-2736 (-6.3%)	-5803 (-13.4%)	346 (0.9%)	-2720 (-6.8%)	-3662 (-8.3%)	-2867 (-7.1%)
	AN	-156 (-0.8%)	-515 (-2.7%)	-686 (-3.5%)	-1045 (-5.3%)	-1491 (-7.3%)	-1411 (-7.1%)
	BN	-105 (-0.8%)	-751 (-5.4%)	-287 (-2%)	-933 (-6.6%)	-1217 (-8.1%)	-812 (-5.8%)
	D	-873 (-7.3%)	-898 (-7.5%)	-834 (-7%)	-859 (-7.2%)	-742 (-6.3%)	-586 (-5%)
	C	-760 (-9.3%)	-528 (-6.5%)	-310 (-4%)	-78 (-1%)	31 (0.4%)	417 (5.8%)
	All	-1211 (-5.3%)	-2318 (-10.2%)	-268 (-1.2%)	-1375 (-6.3%)	-1745 (-7.5%)	-1322 (-6.1%)

[a] A negative value indicates higher mean flows in EBC than in ESO.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

1 **Table 5C.5.3-189. Mean Monthly Flows (cfs) for Delta Outflow for EBC and ESO Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	85,900	84,432	91,158	94,620	89,043	90,641
	AN	49,448	47,574	48,959	51,100	46,703	48,151
	BN	22,968	22,129	22,263	22,301	22,375	21,625
	D	14,736	14,587	14,754	14,732	15,504	15,382
	C	11,343	12,118	12,173	12,651	12,035	13,475
	All	43,289	42,487	44,889	46,372	44,053	44,827
Feb	W	96,835	95,560	104,533	107,085	103,486	106,277
	AN	62,321	60,457	64,163	65,873	64,434	64,056
	BN	36,766	35,439	37,266	36,084	34,727	34,067
	D	20,915	20,907	20,936	21,461	19,589	20,243
	C	12,991	13,053	12,553	12,798	12,582	12,528
	All	52,594	51,697	55,330	56,338	54,312	55,165
Mar	W	78,956	78,235	81,693	84,471	80,579	82,968
	AN	54,171	52,769	55,754	56,737	54,610	55,231
	BN	24,029	22,941	22,522	22,467	20,621	19,621
	D	19,880	19,489	19,388	19,985	17,153	17,463
	C	11,911	11,640	11,948	12,215	11,597	11,862
	All	43,172	42,427	43,911	45,097	42,524	43,308
Apr	W	54,394	54,471	54,860	54,562	49,230	48,976
	AN	31,975	31,907	31,183	30,576	25,378	25,403
	BN	21,928	21,726	21,218	20,641	18,426	18,412
	D	14,142	14,196	13,450	13,413	11,943	12,615
	C	9,053	9,012	8,881	9,294	8,635	8,887
	All	30,099	30,085	29,833	29,603	26,355	26,460
May	W	41,040	40,498	38,276	32,880	33,689	29,273
	AN	24,200	23,780	23,131	21,709	20,005	19,367
	BN	16,299	15,887	14,740	13,596	13,600	13,853
	D	10,487	10,211	9,737	10,375	9,412	11,035
	C	6,000	5,905	6,341	6,286	6,087	6,271
	All	22,517	22,139	21,103	19,121	18,888	17,821
Jun	W	23,451	23,008	18,080	15,640	17,768	15,740
	AN	11,801	11,836	10,177	10,676	10,825	11,054
	BN	8,004	8,046	8,067	8,943	8,824	9,653
	D	6,636	6,750	7,123	7,689	7,442	7,816
	C	5,322	5,322	5,345	5,632	5,332	5,320
	All	12,765	12,661	10,945	10,560	11,138	10,751
Jul	W	11,441	11,342	10,817	11,407	9,549	9,598
	AN	9,430	9,580	10,657	12,225	9,217	9,670
	BN	7,151	7,435	7,613	7,668	6,897	6,872
	D	5,024	5,103	5,548	6,448	5,462	5,494
	C	4,238	4,279	4,953	5,832	4,255	5,319
	All	7,951	8,014	8,232	8,984	7,376	7,616

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	5,341	5,032	4,412	4,308	4,203	4,000
	AN	4,000	4,000	4,009	4,713	4,012	4,152
	BN	4,000	4,000	4,120	5,129	3,927	4,449
	D	4,829	4,759	4,617	5,348	3,664	4,556
	C	4,077	4,484	4,141	4,433	3,634	3,983
	All	4,618	4,565	4,308	4,754	3,926	4,218
Sep	W	9,569	19,685	18,873	20,078	19,673	21,394
	AN	3,672	11,771	11,810	11,581	11,953	12,634
	BN	3,445	3,279	3,795	3,428	3,654	3,365
	D	3,350	3,165	3,067	3,021	3,000	4,201
	C	3,000	3,000	3,000	3,036	3,000	5,916
	All	5,334	9,658	9,473	9,754	9,708	10,995
Oct	W	6,487	7,509	8,133	9,520	8,960	10,426
	AN	4,021	5,273	6,500	8,982	7,361	9,706
	BN	4,477	5,420	6,206	8,054	7,775	10,040
	D	4,157	5,242	6,017	7,294	7,548	8,387
	C	4,158	4,682	4,969	6,607	6,742	8,393
	All	4,931	5,914	6,638	8,276	7,889	9,510
Nov	W	14,232	17,295	17,346	15,987	17,248	16,170
	AN	9,683	12,587	12,410	11,529	11,239	11,000
	BN	5,864	8,762	8,694	8,681	8,045	8,264
	D	6,943	8,651	8,375	8,052	7,967	7,912
	C	5,045	6,494	5,988	5,725	5,802	5,764
	All	9,193	11,671	11,515	10,844	11,085	10,728
Dec	W	48,185	44,649	49,759	45,191	48,031	44,012
	AN	18,014	18,190	19,384	19,119	19,348	19,129
	BN	11,950	11,724	13,284	12,231	13,111	12,206
	D	8,884	8,278	8,467	8,828	8,966	9,510
	C	5,531	5,283	5,505	6,560	5,290	6,430
	All	22,714	21,411	23,546	22,113	23,042	21,867

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

1 **Table 5C.5.3-190. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) for Delta**
2 **Outflow**

Month	Water-Year Type[b]	Scenarios[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	3144 (3.7%)	4741 (5.5%)	4611 (5.5%)	6209 (7.4%)	-2114 (-2.3%)	-3978 (-4.2%)
	AN	-2744 (-5.5%)	-1297 (-2.6%)	-871 (-1.8%)	577 (1.2%)	-2256 (-4.6%)	-2949 (-5.8%)
	BN	-594 (-2.6%)	-1343 (-5.8%)	245 (1.1%)	-504 (-2.3%)	112 (0.5%)	-676 (-3%)
	D	769 (5.2%)	646 (4.4%)	917 (6.3%)	795 (5.4%)	751 (5.1%)	649 (4.4%)
	C	693 (6.1%)	2132 (18.8%)	-83 (-0.7%)	1357 (11.2%)	-138 (-1.1%)	824 (6.5%)
	All	764 (1.8%)	1538 (3.6%)	1566 (3.7%)	2340 (5.5%)	-837 (-1.9%)	-1545 (-3.3%)
Feb	W	6650 (6.9%)	9441 (9.8%)	7925 (8.3%)	10716 (11.2%)	-1048 (-1%)	-809 (-0.8%)
	AN	2112 (3.4%)	1735 (2.8%)	3976 (6.6%)	3599 (6%)	271 (0.4%)	-1817 (-2.8%)
	BN	-2040 (-5.5%)	-2699 (-7.3%)	-712 (-2%)	-1372 (-3.9%)	-2540 (-6.8%)	-2017 (-5.6%)
	D	-1327 (-6.3%)	-673 (-3.2%)	-1318 (-6.3%)	-664 (-3.2%)	-1347 (-6.4%)	-1218 (-5.7%)
	C	-408 (-3.1%)	-463 (-3.6%)	-470 (-3.6%)	-525 (-4%)	30 (0.2%)	-270 (-2.1%)
	All	1718 (3.3%)	2571 (4.9%)	2615 (5.1%)	3468 (6.7%)	-1018 (-1.8%)	-1174 (-2.1%)
Mar	W	1624 (2.1%)	4012 (5.1%)	2344 (3%)	4733 (6%)	-1113 (-1.4%)	-1504 (-1.8%)
	AN	439 (0.8%)	1060 (2%)	1842 (3.5%)	2462 (4.7%)	-1144 (-2.1%)	-1507 (-2.7%)
	BN	-3408 (-14.2%)	-4408 (-18.3%)	-2320 (-10.1%)	-3321 (-14.5%)	-1901 (-8.4%)	-2846 (-12.7%)
	D	-2727 (-13.7%)	-2418 (-12.2%)	-2336 (-12%)	-2026 (-10.4%)	-2234 (-11.5%)	-2523 (-12.6%)
	C	-315 (-2.6%)	-49 (-0.4%)	-44 (-0.4%)	221 (1.9%)	-352 (-2.9%)	-353 (-2.9%)
	All	-647 (-1.5%)	137 (0.3%)	97 (0.2%)	882 (2.1%)	-1387 (-3.2%)	-1789 (-4%)
Apr	W	-5163 (-9.5%)	-5418 (-10%)	-5240 (-9.6%)	-5495 (-10.1%)	-5630 (-10.3%)	-5586 (-10.2%)
	AN	-6598 (-20.6%)	-6572 (-20.6%)	-6530 (-20.5%)	-6504 (-20.4%)	-5805 (-18.6%)	-5173 (-16.9%)
	BN	-3502 (-16%)	-3516 (-16%)	-3300 (-15.2%)	-3314 (-15.3%)	-2792 (-13.2%)	-2229 (-10.8%)
	D	-2199 (-15.5%)	-1527 (-10.8%)	-2253 (-15.9%)	-1580 (-11.1%)	-1507 (-11.2%)	-798 (-6%)
	C	-418 (-4.6%)	-166 (-1.8%)	-377 (-4.2%)	-125 (-1.4%)	-246 (-2.8%)	-406 (-4.4%)
	All	-3745 (-12.4%)	-3639 (-12.1%)	-3730 (-12.4%)	-3625 (-12%)	-3478 (-11.7%)	-3143 (-10.6%)
May	W	-7351 (-17.9%)	-11767 (-28.7%)	-6809 (-16.8%)	-11226 (-27.7%)	-4587 (-12%)	-3608 (-11%)
	AN	-4195 (-17.3%)	-4833 (-20%)	-3775 (-15.9%)	-4414 (-18.6%)	-3126 (-13.5%)	-2343 (-10.8%)
	BN	-2699 (-16.6%)	-2446 (-15%)	-2287 (-14.4%)	-2034 (-12.8%)	-1140 (-7.7%)	257 (1.9%)
	D	-1076 (-10.3%)	547 (5.2%)	-799 (-7.8%)	824 (8.1%)	-325 (-3.3%)	660 (6.4%)
	C	87 (1.5%)	271 (4.5%)	182 (3.1%)	366 (6.2%)	-254 (-4%)	-15 (-0.2%)
	All	-3629 (-16.1%)	-4696 (-20.9%)	-3251 (-14.7%)	-4318 (-19.5%)	-2215 (-10.5%)	-1300 (-6.8%)
Jun	W	-5682 (-24.2%)	-7710 (-32.9%)	-5239 (-22.8%)	-7267 (-31.6%)	-311 (-1.7%)	101 (0.6%)
	AN	-976 (-8.3%)	-747 (-6.3%)	-1011 (-8.5%)	-782 (-6.6%)	648 (6.4%)	378 (3.5%)
	BN	820 (10.2%)	1649 (20.6%)	778 (9.7%)	1608 (20%)	757 (9.4%)	710 (7.9%)
	D	806 (12.1%)	1181 (17.8%)	692 (10.3%)	1067 (15.8%)	319 (4.5%)	127 (1.7%)
	C	10 (0.2%)	-2 (0%)	10 (0.2%)	-2 (0%)	-14 (-0.3%)	-312 (-5.5%)
	All	-1626 (-12.7%)	-2014 (-15.8%)	-1523 (-12%)	-1910 (-15.1%)	193 (1.8%)	191 (1.8%)
Jul	W	-1892 (-16.5%)	-1842 (-16.1%)	-1793 (-15.8%)	-1743 (-15.4%)	-1268 (-11.7%)	-1808 (-15.9%)
	AN	-213 (-2.3%)	240 (2.5%)	-363 (-3.8%)	90 (0.9%)	-1440 (-13.5%)	-2554 (-20.9%)
	BN	-254 (-3.5%)	-279 (-3.9%)	-538 (-7.2%)	-563 (-7.6%)	-715 (-9.4%)	-796 (-10.4%)
	D	438 (8.7%)	471 (9.4%)	360 (7%)	392 (7.7%)	-85 (-1.5%)	-954 (-14.8%)
	C	17 (0.4%)	1081 (25.5%)	-24 (-0.6%)	1040 (24.3%)	-698 (-14.1%)	-514 (-8.8%)
	All	-576 (-7.2%)	-335 (-4.2%)	-638 (-8%)	-398 (-5%)	-856 (-10.4%)	-1368 (-15.2%)

Month	Water-Year Type[b]	Scenarios[c] EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-1138 (-21.3%)	-1341 (-25.1%)	-829 (-16.5%)	-1032 (-20.5%)	-208 (-4.7%)	-308 (-7.2%)
	AN	12 (0.3%)	152 (3.8%)	12 (0.3%)	152 (3.8%)	2 (0.1%)	-561 (-11.9%)
	BN	-73 (-1.8%)	449 (11.2%)	-73 (-1.8%)	449 (11.2%)	-193 (-4.7%)	-681 (-13.3%)
	D	-1164 (-24.1%)	-273 (-5.7%)	-1095 (-23%)	-204 (-4.3%)	-953 (-20.6%)	-792 (-14.8%)
	C	-443 (-10.9%)	-95 (-2.3%)	-850 (-19%)	-501 (-11.2%)	-507 (-12.2%)	-451 (-10.2%)
	All	-692 (-15%)	-400 (-8.7%)	-638 (-14%)	-347 (-7.6%)	-382 (-8.9%)	-536 (-11.3%)
Sep	W	10104 (105.6%)	11825 (123.6%)	-11 (-0.1%)	1709 (8.7%)	800 (4.2%)	1316 (6.6%)
	AN	8281 (225.5%)	8962 (244.1%)	182 (1.5%)	863 (7.3%)	143 (1.2%)	1053 (9.1%)
	BN	208 (6%)	-80 (-2.3%)	374 (11.4%)	86 (2.6%)	-142 (-3.7%)	-63 (-1.8%)
	D	-350 (-10.5%)	851 (25.4%)	-165 (-5.2%)	1035 (32.7%)	-67 (-2.2%)	1179 (39%)
	C	0 (0%)	2916 (97.2%)	0 (0%)	2916 (97.2%)	0 (0%)	2881 (94.9%)
	All	4374 (82%)	5661 (106.1%)	51 (0.5%)	1337 (13.8%)	236 (2.5%)	1241 (12.7%)
Oct	W	2474 (38.1%)	3939 (60.7%)	1451 (19.3%)	2917 (38.8%)	827 (10.2%)	906 (9.5%)
	AN	3340 (83.1%)	5685 (141.4%)	2088 (39.6%)	4433 (84.1%)	861 (13.2%)	724 (8.1%)
	BN	3298 (73.7%)	5563 (124.3%)	2354 (43.4%)	4620 (85.2%)	1568 (25.3%)	1986 (24.7%)
	D	3391 (81.6%)	4230 (101.7%)	2307 (44%)	3145 (60%)	1531 (25.4%)	1093 (15%)
	C	2584 (62.1%)	4235 (101.9%)	2060 (44%)	3711 (79.3%)	1773 (35.7%)	1787 (27%)
	All	2959 (60%)	4579 (92.9%)	1975 (33.4%)	3596 (60.8%)	1251 (18.9%)	1234 (14.9%)
Nov	W	3016 (21.2%)	1937 (13.6%)	-47 (-0.3%)	-1125 (-6.5%)	-98 (-0.6%)	182 (1.1%)
	AN	1556 (16.1%)	1317 (13.6%)	-1348 (-10.7%)	-1587 (-12.6%)	-1171 (-9.4%)	-528 (-4.6%)
	BN	2181 (37.2%)	2400 (40.9%)	-717 (-8.2%)	-498 (-5.7%)	-649 (-7.5%)	-417 (-4.8%)
	D	1024 (14.8%)	970 (14%)	-684 (-7.9%)	-739 (-8.5%)	-408 (-4.9%)	-140 (-1.7%)
	C	757 (15%)	719 (14.3%)	-691 (-10.6%)	-730 (-11.2%)	-186 (-3.1%)	39 (0.7%)
	All	1892 (20.6%)	1535 (16.7%)	-586 (-5%)	-943 (-8.1%)	-430 (-3.7%)	-116 (-1.1%)
Dec	W	-154 (-0.3%)	-4172 (-8.7%)	3382 (7.6%)	-637 (-1.4%)	-1728 (-3.5%)	-1178 (-2.6%)
	AN	1334 (7.4%)	1115 (6.2%)	1158 (6.4%)	939 (5.2%)	-36 (-0.2%)	10 (0.1%)
	BN	1161 (9.7%)	255 (2.1%)	1387 (11.8%)	482 (4.1%)	-174 (-1.3%)	-26 (-0.2%)
	D	82 (0.9%)	626 (7%)	688 (8.3%)	1232 (14.9%)	500 (5.9%)	682 (7.7%)
	C	-241 (-4.4%)	899 (16.3%)	7 (0.1%)	1148 (21.7%)	-216 (-3.9%)	-130 (-2%)
	All	327 (1.4%)	-847 (-3.7%)	1631 (7.6%)	456 (2.1%)	-505 (-2.1%)	-246 (-1.1%)

[a] A positive value indicates higher mean outflows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

5C.5.3.13.1.2 Steelhead

Juvenile

Hydrodynamic conditions in the interior Delta are thought to affect the value and availability of juvenile salmonid rearing habitat. Although the Delta is strongly influenced by natural tidal cycles, hydraulic residence time and net downstream flows are affected by south Delta water exports and the volume of water flowing into and through the Delta. Hydraulic residence time is an important attribute that affects primary and secondary production of food resources for fish within the Delta. Net downstream flow in the Delta is an important attribute that affects the movement and transport of fish and other organisms and organic material from upstream areas downstream to the low salinity zone of the estuary (e.g., Suisun Bay) where many of the species of juvenile fish rear. This attribute also affects the rate of downstream juvenile migration, which is assumed directly related to their survival rate. Two general indicators of habitat conditions in the interior Delta that have been used to assess changes in habitat conditions are OMR flows and Delta outflow. In addition, Sacramento River flow at Rio Vista has been used to assess migration rate and survival of the juveniles downstream of the proposed locations of the new north Delta intakes. Results of the CALSIM hydrologic model were used to evaluate potential changes in habitat conditions for juvenile salmonid rearing in the interior Delta. For purposes of this effects analysis it was assumed that juvenile rearing and migration by steelhead would occur within the Delta during the fall, winter, and spring months extending from October through May.

Results of a comparative analysis of the magnitude of OMR flows were used as one indicator of potential changes in habitat conditions in the interior Delta. For purposes of this effects analysis, it has been assumed that a reduction in OMR reverse flows (i.e., an increase in seaward flows) would contribute to improved rearing conditions for juvenile steelhead in the interior Delta. The behavioral response and effects of reducing OMR reverse flows on juvenile steelhead migration, rearing, survival, and growth are uncertain. Acoustic-tag experiments have been initiated in the Delta in recent years that will provide information in the future that can be used to further assess the response of juvenile salmonids to reductions in OMR reverse flows and other Delta hydrodynamic conditions. CALSIM model results for OMR reverse flows, by month and San Joaquin Valley (60-20-20) water-year type, over the period from October through May, for ESO and EBC1 and EBC2 conditions are summarized in Table 5C.5.3-11 and Table 5C.5.3-12. The effects analysis focuses on differences between EBC2_ELT and ESO_ELT and between EBC2_LLT and ESO_LLT to eliminate the confounding effect of climate change in assessing ESO effects.

Results of this analysis predict that there would be a substantial reduction in the magnitude of OMR reverse flows (i.e., an increase in magnitude of seaward OMR flow) in wet, above-normal, and below-normal water years under ESO (ESO_ELT and ESO_LLT) operations relative to EBC2 (EBC2_ELT and EBC2_LLT). The major reduction in OMR reverse flows under the evaluated starting operations reflects dual facility exports that result in water exports from the lower Sacramento River in the north Delta and a reduction in exports from the south Delta with a corresponding increase in positive OMR flows. The October through May OMR flows would be improved for ESO_ELT and ESO_LLT to a positive net flow of approximately 1,000 to 5,500 cfs in January through May of a wet year compared with approximately -1,800 to +2,750 cfs for EBC2_ELT and EBC2_LLT. OMR flows were negative under both EBC2 and ESO operations in October through December of wet years, although the flows were substantially less negative under ESO than EBC2 operations. This change in wet years represents a substantial improvement in the magnitude and direction of flows in the central and south Delta that would be expected to improve juvenile survival during downstream migration through the Delta. As noted above, however, the behavioral response of juvenile steelhead to more positive OMR flows and the effects on survival, growth, rearing, and migration are uncertain. The change in operations in above-normal water years would be expected to result in improved habitat conditions for January through March, with a reduction in OMR reverse flows (i.e., increase in average OMR flows) for the period from about -4,000 cfs for EBC2_ELT and EBC2_LLT to roughly -750 cfs for ESO_ELT and -900 cfs for ESO_LLT. These changes in south Delta hydrodynamics represent substantial improvement in habitat conditions for juvenile rearing and migration and improved juvenile survival. OMR flows in April and May of above-normal water years would be lower for ESO than for EBC2 operations, but the most negative (reverse) flow in either month is -180 cfs (for ESO_LLT in May). Such moderately negative (reverse) flows are not expected to adversely affect habitat or survival for the juveniles. The changes in OMR reverse flows for ESO operations in below-normal years would not be as great as observed in wetter years, but would contribute to a small incremental improvement in OMR reverse flows when compared with EBC2, while the changes in dry and critical water years would be even smaller and likely would not result in substantive changes in juvenile habitat or survival. The changes in OMR reverse flows under ESO operations would contribute to improved habitat and improved juvenile survival in wet, above-normal, and below-normal water years, resulting in net biological benefits. The improvement in net downstream flows in the central and south Delta would be expected to provide greater biological benefit to those juvenile steelhead migrating downstream from the San Joaquin, Cosumnes, and Mokelumne River systems, although juvenile steelhead migrating into the Delta from the Sacramento River system also would benefit from the reduction in OMR reverse flows.

Average Delta outflows generally declined from the EBC2 to ESO scenarios during October through May, the juvenile steelhead period of Delta rearing and migration, but the majority of reductions were less than 10% (Table 5C.5.3-189, Table 5C.5.3-190). Changes for individual months were generally greatest during October and November, ranging from a 1% increase for EBC2_LLT to ESO_LLT in November of wet years to a 9% reduction for EBC2_ELT to ESO_ELT in November of above-normal years. In contrast, the changes from EBC2_LLT to ESO_LLT in October were consistently positive, ranging from 8% for above-normal water-year types to 36% for critical water years.

Results of comparisons of CALSIM flow estimates for the Sacramento River at Rio Vista indicate that average October through May flows are reduced for ESO conditions relative to EBC2 in all water-year types except during May, October and December of dry or critical water years (Table 5C.5.3-187, Table 5C.5.3-188). Many of the reductions exceed 10% for both the early and late long-term scenarios. The biggest reductions are expected to occur in October and November of wet, above-normal, below-normal and dry water-year types.

Adult

DSM2-QUAL Fingerprinting Analysis

Percentage of Flows from Sacramento River

Adult steelhead use olfactory cues to return to their natal streams and rivers to spawn. For purposes of this analysis it is assumed that the strength at a location of the olfactory cue attracting adult steelhead into the Sacramento River would be directly related to the percentage of water at the location that originated from the Sacramento River. This percentage, as estimated for Collinsville, was used to represent the Sacramento River attraction flow. For purposes of this effects analysis, it was assumed that adult migration by adult steelhead would occur within the Delta during the fall and winter, extending from September through March, with peak migration occurring from December through February. Results of the fingerprinting analysis for water of Sacramento River origin, which estimates the mean percentage of water that originated in the Sacramento River, are summarized in Table 5C.5.3-191. The results show that the proportion (percentage) of flows originating in the Sacramento River were generally lower (up to 8% lower, expressed as the change in percentages rather than as the percent change) under ESO_ELT and ESO_LLT relative to EBC2_ELT and EBC2_LLT, respectively, depending on month and time period.

Table 5C.5.3-191. Monthly Average (With Range in Parentheses) Percentage of Water at Collinsville Originating in the Sacramento River during September–March under EBC and ESO Scenarios

Month	Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
September	60 (49-91)	67 (49-94)	65 (46-90)	65 (47-90)	61 (45-85)	63 (47-84)
October	60 (43-94)	65 (44-91)	64 (43-90)	68 (47-88)	65 (52-79)	67 (53-78)
November	60 (44-92)	65 (46-93)	64 (44-91)	66 (46-88)	63 (51-76)	63 (45-75)
December	67 (51-90)	68 (48-88)	67 (45-88)	66 (45-84)	65 (43-88)	66 (44-84)
January	76 (61-86)	77 (66-86)	75 (57-86)	75 (55-85)	73 (55-87)	73 (56-85)
February	75 (44-92)	76 (44-91)	74 (42-91)	72 (41-90)	69 (40-85)	68 (38-83)
March	78 (36-94)	78 (36-94)	77 (33-92)	76 (32-91)	69 (31-84)	68 (30-82)

Source: DSM2-QUAL fingerprinting analysis (monthly time step, October 1976–September 1991).
[a] See Table 5C.0-1 for definitions of scenarios.
[b] One standard deviation shown in parentheses.

Percentage of Flows from San Joaquin River

The results of the fingerprinting analysis for San Joaquin River–origin water at Collinsville showed very little (1% to 4%) difference between ESO and EBC scenarios, with very low proportions of San Joaquin River water for both scenarios and high variation within scenarios (Table 5C.5.3-192).

Table 5C.5.3-192. Monthly Average (With Range in Parentheses) Percentage of Water at Collinsville Originating in the San Joaquin River during September–March under EBC and ESO Scenarios

Month	Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
September	0.3 (0.0-3.1)	0.2 (0.0-1.5)	0.2 (0.0-1.8)	0.1 (0.0-1.4)	1.7 (0.0-17.1)	1.2 (0.0-8.6)
October	0.2 (0.0-1.5)	0.2 (0.0-1.2)	0.2 (0.0-1.4)	0.3 (0.0-1.9)	3.5 (0.0-17.2)	3.3 (0.0-15.0)
November	0.4 (0.0-3.0)	0.6 (0.0-3.3)	0.8 (0.0-5.2)	1.0 (0.0-5.1)	5.2 (0.1-31.7)	4.9 (0.1-21.7)
December	0.9 (0.0-8.9)	0.9 (0.0-6.7)	1.0 (0.0-7.3)	1.0 (0.0-8.0)	2.9 (0.0-19.0)	2.9 (0.0-15.5)
January	1.6 (0.0-14.4)	1.6 (0.0-13.7)	1.7 (0.0-13.1)	1.7 (0.0-12.8)	2.9 (0.0-19.7)	3.1 (0.0-19.5)
February	1.4 (0.0-7.1)	1.5 (0.0-7.1)	1.5 (0.0-7.9)	1.5 (0.0-7.5)	3.6 (0.0-24.3)	3.4 (0.0-23.8)
March	2.6 (0.0-13.8)	2.6 (0.0-13.8)	2.6 (0.0-14.8)	2.8 (0.0-15.6)	5.7 (0.3-21.2)	5.5 (0.2-21.3)

Source: DSM2-QUAL fingerprinting analysis (monthly time step, October 1976–September 1991).
[a] See Table 5C.0-1 for definitions of scenarios.
[b] One standard deviation shown in parentheses.

CALSIM Flow Analysis: Sacramento River at Rio Vista

In addition to percentage of water from different sources, the total amount of flow may influence attraction of adult steelhead, especially when there are large differences in total flow. Therefore, Sacramento River flow at Rio Vista was used to represent Sacramento River attraction flow. Rio Vista flow generally declines during the September through March adult migration period under the ESO scenarios relative to EBC2 scenarios, with reductions of greater than 10% in the majority of months and water-year types (Table 5C.5.3-187, Table 5C.5.3-188). Reductions are especially large for September of wet, above-normal, and below-normal years, ranging from 42% for the late long-term in below-normal years to 52% for the early long-term scenario in above-normal years. The flow reductions are likely to have the most impact when flows are already low, as is generally true in September. Based on these results, it was concluded that ESO operations would result in an incremental reduction in attraction flows in the lower Sacramento River, particularly for September of wetter years.

Kelt

Average flows into Georgiana Slough and the Delta Cross Channel during the January through April period of kelt migration are summarized, by month and water-year type, in Table 5C.5.3-15 and Table 5C.5.3-16. These flows under ESO operations were reduced from EBC2 in all water-year types, with the greatest reduction in wet and above-normal years. Average OMR flows by San Joaquin Valley water-year type (60-20-20) during the kelt migration period are summarized in Table 5C.5.3-11 and Table 5C.5.3-12. Positive OMR flows occurred in wet years under ESO operations throughout the January through April period. OMR under ESO scenarios was less negative thanor little different from OMR flows under EBC2 scenarios in the other year types, except in April. Delta outflows during the kelt migration period are summarized in Table 5C.5.3-189 and Table 5C.5.3-190. Delta outflows were generally lower under ESO operations than under EBC2 operations, although most of the reductions were less than 10%, except in April.

5C.5.3.13.1.3 Winter-Run Chinook Salmon

Juvenile

The biological significance of reduced flows in the tidally influenced reach of the lower Sacramento River on juvenile Chinook salmon migration and survival has been identified as an issue of concern in this effects analysis, although there is a high degree of uncertainty in the potential effect on survival. Average flows in the lower Sacramento River at Rio Vista, which is used to represent the lower Sacramento River, during the winter-run juvenile migration period of November through April, are shown by month and water-year type in Table 5C.5.3-187 and Table 5C.5.3-188. These results show that almost all of the flows during the November through April period are reduced under ESO operations when compared with EBC2 operations. Differences in average flows within individual months ranged from 39% lower flow under ESO_ELT compared with EBC2_ELT in November of below-normal years to 6% higher flow under ESO_LLT compared with EBC2_LLT in December of critical years. The DPM has been used to further assess the potential effect of flow reduction in the lower Sacramento River on juvenile winter-run salmon survival.

Adult

DSM2-QUAL Fingerprinting Analysis

Fingerprint analyses determined that attraction flow, as estimated by the percentage of Sacramento River water at Collinsville, declined from EBC2 to ESO operations by up to 10% at most during the December through June migration period for winter-run adults (Table 5C.5.3-193). The reductions in percentage are small in comparison with the magnitude of change in dilution reported to cause a significant change in migration by Fretwell (1989) and, therefore, are not expected to affect winter-run migration. However, uncertainty remains with regard to adult salmon behavioral response to anticipated changes in lower Sacramento River flow percentages.

Table 5C.5.3-193. Monthly Average (With Range in Parentheses) Percentage of Water at Collinsville Originating in the Sacramento River during December-June under EBC and ESO Scenarios

Month	Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
December	67 (51-90)	68 (48-88)	67 (45-88)	66 (45-84)	65 (43-88)	66 (44-84)
January	76 (61-86)	77 (66-86)	75 (57-86)	75 (55-85)	73 (55-87)	73 (56-85)
February	75 (44-92)	76 (44-91)	74 (42-91)	72 (41-90)	69 (40-85)	68 (38-83)
March	78 (36-94)	78 (36-94)	77 (33-92)	76 (32-91)	69 (31-84)	68 (30-82)
April	77 (56-92)	77 (56-92)	76 (55-92)	75 (55-92)	67 (46-82)	66 (43-81)
May	69 (55-84)	69 (54-84)	67 (51-85)	65 (48-85)	61 (42-82)	59 (42-80)
June	64 (50-75)	64 (50-74)	61 (48-72)	62 (49-73)	57 (44-72)	55 (45-69)

Source: DSM2-QUAL fingerprinting analysis (monthly time step, 1976–1991).
[a] See Table 5C.0-1 for definitions of scenarios.

CALSIM Flow Analysis: Sacramento River at Rio Vista

In addition to percentage of water from different sources, the total amount of flow may influence attraction of adult winter-run Chinook salmon, especially when there are large differences in total flow. Sacramento River flow at Rio Vista generally was lower during the December through June adult migration period under the ESO scenarios relative to EBC2 scenarios, except in December of critical years (Table 5C.5.3-187, Table 5C.5.3-188). The differences in mean monthly flows were greatest in wet, above normal, and below normal years during the months of March-June, when differences were around 10–30% less under ESO scenarios compared to EBC scenarios when comparing within the same time periods. Based on these results, it was concluded that the evaluated starting operations would result in a minor reduction in attraction flows in the lower Sacramento River.

5C.5.3.13.1.4 Spring-Run Chinook Salmon

Juvenile

The effects of changed flows on juvenile spring-run Chinook salmon survival (smolts) through the Delta are analyzed more fully in the section discussing the results of the DPM. CALSIM flow summaries for Rio Vista showed that average flows for ESO scenarios were up to 25% lower than EBC scenarios during the December through May juvenile migration period (Table 5C.5.3-187, Table 5C.5.3-188). There was less average difference between ESO and EBC scenarios for Delta outflow in December through May, although flows were slightly lower under ESO scenarios and there were differences in overall patterns between months (Table 5C.5.3-189, Table 5C.5.3-190).

Adult

DSM2-QUAL Fingerprinting Analysis

Percentage of Flows from Sacramento River

Results of fingerprint simulation modeling estimated that there would be a 9% reduction in olfactory cues in April and a 6% reduction in May both for ESO_ELT compared with EBC2_ELT and for ESO_LLT relative to EBC2_LLT (Table 5C.5.3-194). The percentage of water originating at Collinsville in EBC1/EBC2 was 8–11% greater than under ESO scenarios. The reduction in olfactory cues (percentage of Sacramento River water at Collinsville predicted using DSM2 modeling within the fingerprint analysis) is small in comparison with the magnitude of change in dilution reported to cause a significant change in migration by Fretwell (1989) and is expected to be within the broad range of olfactory cues and migration conditions that currently occur within the lower reach of the Sacramento River. There is, however, uncertainty in the adult behavioral response to anticipated changes in lower Sacramento River flows and olfactory cues that may result in greater upstream attraction delays as adults search for the cue within the Delta prior to migrating upstream into the river. Further, the change in olfactory cues in the lower Sacramento River and mixing of waters within the Delta under the future operations with the evaluated starting operations may have less of an adverse effect on adult attraction than current conditions of south Delta exports, OMR reverse flows, and blending of Sacramento and San Joaquin River water, and the blending of olfactory cues, under current conditions.

Table 5C.5.3-194. Monthly Average (With Range in Parentheses) Percentage of Water at Collinsville Originating in the Sacramento River during April-May under EBC and ESO Scenarios

Month	Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
April	77 (56-92)	77 (56-92)	76 (55-92)	75 (55-92)	67 (46-82)	66 (43-81)
May	69 (55-84)	69 (54-84)	67 (51-85)	65 (48-85)	61 (42-82)	59 (42-80)

Source: DSM2-QUAL fingerprinting analysis (monthly time step, 1976–1991).
[a] See Table 5C.0-1 for definitions of scenarios.

Percentage of Flows from San Joaquin River

The fingerprinting analysis showed that the proportion of flows originating in the San Joaquin River was greater for ESO scenarios relative to EBC scenarios (Table 5C.5.3-195), as is expected, because the north Delta intake structures would be diverting water from the Sacramento River with a reduction in water diversion from the south Delta. Although the relative change is substantial (i.e., close to double the percentage of flow in the San Joaquin under ESO scenarios than under EBC scenarios), the percentage of flow attributable to San Joaquin River water under all scenarios is quite low (less than 11%). This suggests that evaluated starting operations conditions would result in an incremental increase in olfactory cues associated with attraction flows in the lower San Joaquin River, but the increase in attraction flows and cues would be small.

Table 5C.5.3-195. Monthly Average (With Range in Parentheses) Percentage of Water at Collinsville Originating in the San Joaquin River during March-April under EBC and ESO Scenarios

Month	Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
March	2.6 (0.0-13.8)	2.6 (0.0-13.8)	2.6 (0.0-14.8)	2.8 (0.0-15.6)	5.7 (0.3-21.2)	5.5 (0.2-21.3)
April	6.3 (0.0-27.8)	6.2 (0.0-28.2)	6.2 (0.0-29.8)	6.6 (0.1-31.4)	10.3 (0.6-38.0)	10.3 (0.5-38.9)

Source: DSM2-QUAL fingerprinting analysis (monthly time step, 1976–1991).
[a] See Table 5C.0-1 for definitions of scenarios.

CALSIM Flows

Adult spring-run Chinook salmon attraction flows based on Sacramento River CALSIM model results for instream flows at Rio Vista during the upstream migration period (April and May) are summarized in Table 5C.5.3-187 and Table 5C.5.3-188.

Flow estimates for EBC1 generally were similar to those for EBC2. Flows originating in the Sacramento River were less for evaluated starting operations conditions relative to EBC scenarios, as is expected, because the north Delta intake structures would be diverting water from the Sacramento River upstream of Collinsville. The estimated level of average flow reduction between EBC2_ELT and ESO_ELT was greatest in wet and above-normal water years (15% and 24% reduction in April and May of wet years and 23% and 19% reduction in April and May of above-normal years). The estimated average reduction in below-normal years was 17% in April and 12% in May of ELT. In dry years the average reduction was estimated to be 11% in April and 4% in May. In critically dry years there was a 3% reduction in April and a 9% reduction in flows in May. Under late long-term operations the pattern was similar with the greatest flow average reductions under ESO_LLT in wet (15% in April and 25% in May) and above-normal years (21% in April and 16% in May). In below-normal years there was a 14% average reduction under ESO_LLT estimated in April and 2% reduction in May. In dry years there were estimated average reductions of 7% in April and 3% in May under ESO_LLT. In critically dry years there were reductions of 5% in both April and May under ESO_LLT.

5C.5.3.13.1.5 Fall-Run Chinook Salmon

Juvenile

CALSIM flow simulations for Rio Vista during the main fall-run migration period (February through May) estimated that flows under the ESO_ELT vs. EBC2_ELT would be lower in all months (5–24%). Under ESO_LLT vs. EBC2_LLT scenarios, flows would be lower in all months (1–25%) except for May in dry years (1% increase)(Table 5C.5.3-187, Table 5C.5.3-188).

Adult

DSM2-QUAL Fingerprinting Analysis

Percentage of Flows from Sacramento River

Results of fingerprint simulation modeling predicted that there would be a 4% reduction in olfactory cues for ESO_ELT compared with EBC2_ELT in September, and a 1% increase in October (Table 5C.5.3-196). The reduction in predicted olfactory cues for ESO_LLT relative to EBC2_LLT would be 2% in September and 1% in October. Based on results of the studies conducted by Fretwell (1989), it was concluded that a reduction in olfactory cues of 10% or less would not adversely affect adult attraction. The reduction in olfactory cues (percentage of Sacramento River water at Collinsville predicted using DSM2 modeling within the fingerprint analysis) is small in comparison with the magnitude of change in dilution reported to cause a significant change in migration by Fretwell (1989) and is expected to be within the broad range of olfactory cues and migration conditions that currently occur within the lower reach of the Sacramento River. There is, however, uncertainty in the adult behavioral response to anticipated changes in lower Sacramento River flows and olfactory cues that may result in greater upstream attraction delays as adults search for the cue within the Delta prior to migrating upstream into the river. Further, the change in olfactory cues in the lower Sacramento River and mixing of waters within the Delta under the future operations of the evaluated starting operations may have less of an adverse effect on adult attraction than current conditions of south Delta exports, OMR reverse flows, and blending of Sacramento and San Joaquin River water, and the blending of olfactory cues, under current conditions.

Table 5C.5.3-196. Monthly Average (With Range in Parentheses) Percentage of Water at Collinsville Originating in the Sacramento River during September–October under EBC and ESO Scenarios

Month	Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
September	60 (49-91)	67 (49-94)	65 (46-90)	65 (47-90)	61 (45-85)	63 (47-84)
October	60 (43-94)	65 (44-91)	64 (43-90)	68 (47-88)	65 (52-79)	67 (53-78)

Source: DSM2-QUAL fingerprinting analysis (monthly time step, 1976–1991).
[a] See Table 5C.0-1 for definitions of scenarios.

Percentage of Flows from San Joaquin River

Results of the fingerprint analysis showed a small increase in olfactory cues from the San Joaquin River passing downstream through the Delta under the evaluated starting operations (Table 5C.5.3-197). Olfactory cues are an important factor in adult attraction and migration (Quinn 2005). These results indicate that there would be a small benefit under the evaluated starting operations in improving olfactory signals from the San Joaquin River.

Table 5C.5.3-197. Monthly Average (With Range in Parentheses) Percentage of Water at Collinsville Originating in the San Joaquin River during September–November under EBC and ESO Scenarios

Month	Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
September	0.3 (0.0-3.1)	0.2 (0.0-1.5)	0.2 (0.0-1.8)	0.1 (0.0-1.4)	1.7 (0.0-17.1)	1.2 (0.0-8.6)
October	0.2 (0.0-1.5)	0.2 (0.0-1.2)	0.2 (0.0-1.4)	0.3 (0.0-1.9)	3.5 (0.0-17.2)	3.3 (0.0-15.0)
November	0.4 (0.0-3.0)	0.6 (0.0-3.3)	0.8 (0.0-5.2)	1.0 (0.0-5.1)	5.2 (0.1-31.7)	4.9 (0.1-21.7)

Source: DSM2-QUAL fingerprinting analysis (monthly time step, 1976–1991).
[a] See Table 5C.0-1 for definitions of scenarios.

CALSIM Flows

Attraction flows for upstream-migrating adult fall-run Chinook salmon based on CALSIM model results for instream flows modeled in the Sacramento River at Rio Vista during the migration period are summarized in Table 5C.5.3-187 and Table 5C.5.3-188.

Differences in the percentage of attraction flows that are less than 5% between existing biological conditions and the evaluated starting operations were assumed to be within the range of error of the simulation models and below the ability to detect actual differences that would be biologically meaningful. The analysis predicts that differences in flows originating in the Sacramento River would be reduced to a greater degree in September of wet, above-normal and below-normal years than under other conditions. In a comparison of ESO_ELT with EBC2_ELT flows, the change in lower Sacramento River flow for wet water-year types was estimated to be a reduction of 50% in September, 37% in October, and 28% in November. For above-normal water-year types the change was estimated to be a reduction of of 52% in September, 34% in October, and 32% in November.

The changes in flows in below-normal and dry year comparisons of ESO_ELT and EBC2_ELT were reduced by 53% in September, but were increased by 32% in October of wet years. In the ESO_LLT and EBC2_LLT comparisons, river flow was estimated to be reduced by 74% in September but increased by 23% in October of wet years. A similar pattern was observed in above-normal years with a reduction in September of 74% and an increase in October of 23%. In other water years, flow was reduced by 49% in September and increased by 32% in October of below-normal years; increased by 5% and 31% in September and October, respectively, in dry years; and increased by 21% and 81% in September and October, respectively, of critically dry years. This is expected, because the north Delta intake structures would be diverting water from the Sacramento River under the constraints of the bypass flow criteria. These results are similar to those of the fingerprint analysis in showing a significant reduction in attraction flows in September with the greatest change in wetter years. A significant reduction in flows also occurs under EBC1 conditions compared with EBC2 conditions in September during wet and above-normal water years. Based on these results, it was concluded that the evaluated starting operations would result in an incremental reduction in olfactory cues associated with attraction flows in the lower Sacramento River.

Straying Rate of Adult San Joaquin River Region Fall-Run Chinook Salmon (Marston et al. 2012)

The estimated straying rate of adult San Joaquin River Region fall-run Chinook salmon to the Sacramento River region averaged was appreciably greater under the EBC scenarios than under the various BDCP scenarios (ESO, HOS, and LOS) (Figure 5C.5.3-150, Figure 5C.5.3-151, Figure 5C.5.3-152; Table 5C.5.3-198 and Table 5C.5.3-199). Under EBC1, the overall average straying rate was 22% and water-year-type averages ranged from 18% in critical years to 25% in wet and above normal years (Table 5C.5.3-198). Under the EBC2 scenarios, straying rate averaged 12–16% and ranged from 11% (dry and critical years under EBC2_LLT) to 18% (above normal and wet years under EBC2). Straying rates were greater under EBC1 than under the EBC2 scenarios because EBC1 does not include the USFWS (2008) OCAP BiOp fall X2 requirement, which resulted in greater modeled south Delta exports during fall, compared to the EBC2 scenarios that do include the fall X2 requirement. Note that the summary of results does not classify water-year type based on the previous year's water-year type, so that the differences attributable to fall X2 are spread across all years and not limited to years following wet and above normal years.

Under the BDCP's ESO and HOS scenarios, straying rate averaged 4% across all water years and water-year averages ranged from 3% (HOS_ELT in wet years; HOS_LLT in below normal years) to 6% (ESO_ELT and HOS_ELT in critical years) (Table 5C.5.3-198). Straying rate under LOS scenarios averaged 6–7% across all water-year types and was higher than ESO and HOS scenarios because the LOS scenarios do not include the USFWS (2008) OCAP BiOp fall X2 requirement, which resulted in greater south Delta exports. All of the BDCP scenarios had appreciably lower straying than EBC scenarios because of operations assumptions that included no south Delta exports during the two-week pulse flow period required by D-1641.

The average estimated straying rate under the BDCP ESO scenarios was 18% lower than under EBC1, or ~80% less in relative terms (Table 5C.5.3-199), and there were no years in which estimated straying rate was greater under the ESO scenarios than under the EBC1 scenarios (Figure 5C.5.3-152). In comparison to the EBC2 scenarios, the average straying rate under the ESO and HOS scenarios was 8–12% less (67–74% in relative terms) across all water years, and water-year averages were 6–14% less (52–80% in relative terms) under the ESO/HOS scenarios than the EBC2 scenarios. Examining each of the 82 years, there were only a limited number of years for which ESO/HOS scenarios had a greater estimated straying rate than EBC2 scenarios, i.e., 4 years (5% of years) for EBC2_LLT vs. ESO_LLT, 2 years (2% of years) for EBC2_ELT vs. HOS_ELT, and 3 years (4% of years) for EBC2_LLT vs. HOS_LLT (Figure 5C.5.3-152). The LOS scenarios had an estimated average straying rate that was 9% lower (58% in relative terms) than EBC2 in the ELT and 6% (52%) lower than EBC2 in the LLT, with water-year-type averages ranging from 5% less (43%) to 11% less (66%) (Table 5C.5.3-199). LOS_ELT had a greater estimated straying rate than EBC2_ELT in 1 (1%) of the 82 simulated years, whereas LOS_LLT had a greater estimated straying rate than EBC2_LLT in 16 (20%) of the 82 simulated years.

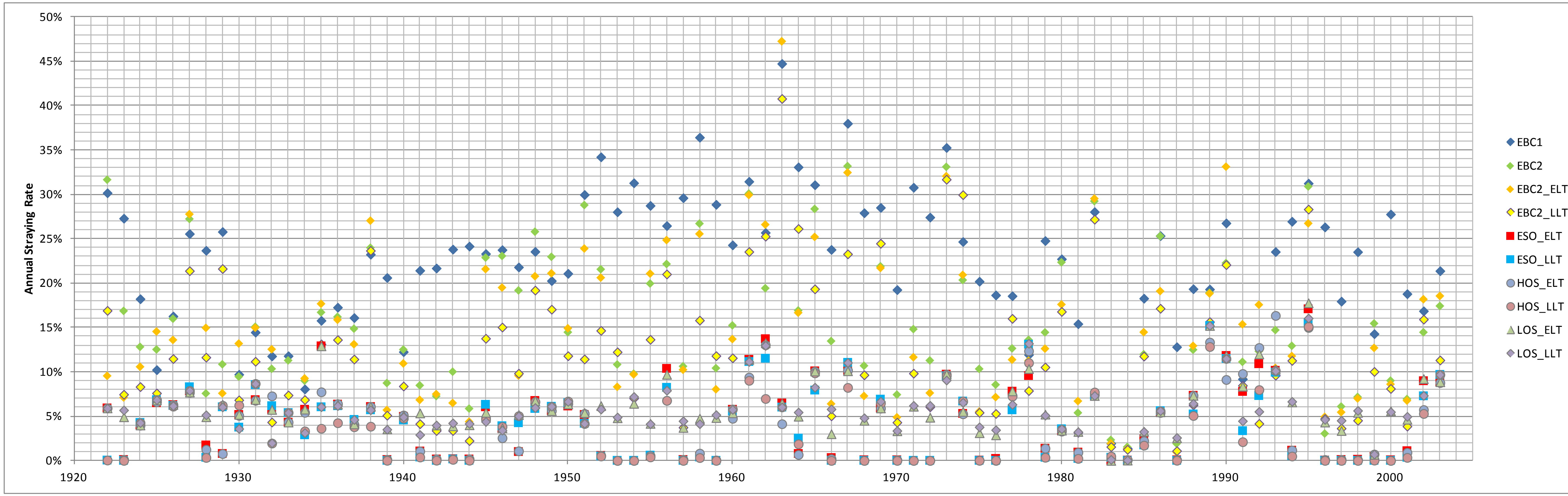
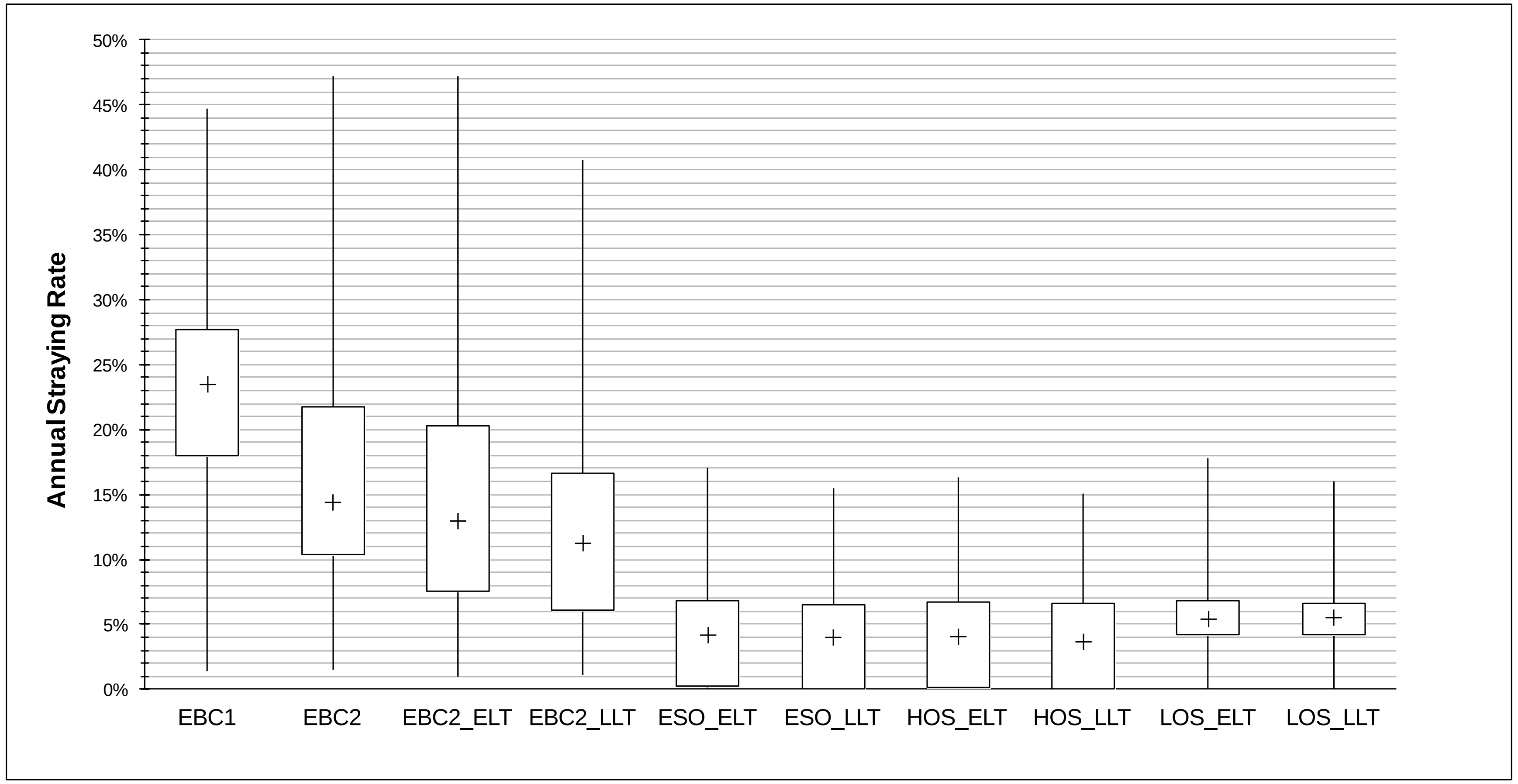


Figure 5C.5.3-150. Estimated Annual Straying Rate (%) of San Joaquin River Region Adult Fall-Run Chinook Salmon to the Sacramento River Region for the 1922–2003 CALSIM Simulation Period, Based on the Ratio of South Delta Exports to San Joaquin River at Vernalis Flow



Median is marked with "+," the boundaries of the box indicate 75th and 25th percentiles, upper and lower whiskers indicate maximum and minimum straying rate.

Figure 5C.5.3-151. Summary Statistics of Estimated Annual Straying Rate (%) of San Joaquin River Region Adult Fall-Run Chinook Salmon to the Sacramento River Region for the 1922–2003 CALSIM Simulation Period, Based on the Ratio of South Delta Exports to San Joaquin River at Vernalis Flow

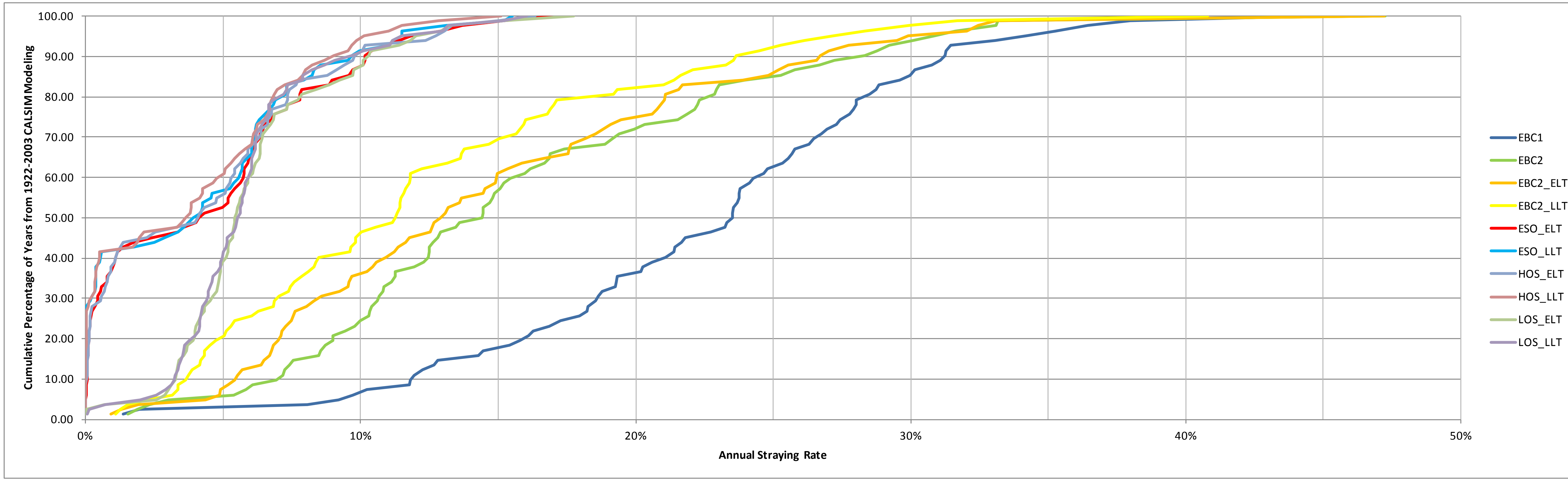


Figure 5C.5.3-152. Summary Statistics of Estimated Annual Straying Rate (%) of San Joaquin River Region Adult Fall-Run Chinook Salmon to the Sacramento River Region for the 1922–2003 CALSIM Simulation Period, Based on the Ratio of South Delta Exports to San Joaquin River at Vernalis Flow

Table 5C.5.3-198. Estimated Straying Rate (%) of San Joaquin River Region Adult Fall-Run Chinook Salmon to the Sacramento River Region for the 1922–2003 CALSIM Simulation Period, Based on the Ratio of South Delta Exports to San Joaquin River at Vernalis Flow, Averaged By Water-Year Type

Water-Year Type	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
All	22%	16%	15%	12%	4%	4%	4%	4%	6%	6%
Wet	25%	18%	17%	14%	4%	4%	3%	3%	6%	6%
Above Normal	25%	18%	15%	12%	5%	5%	6%	4%	7%	7%
Below Normal	23%	16%	14%	12%	4%	4%	4%	3%	6%	6%
Dry	20%	14%	13%	11%	4%	4%	4%	4%	6%	6%
Critical	18%	13%	13%	11%	6%	5%	6%	5%	7%	6%

Table 5C.5.3-199. Differences Between Water-Year-Type-Average Estimated Straying Rate (%) of San Joaquin River Region Adult Fall-Run Chinook Salmon to the Sacramento River Region for the 1922–2003 CALSIM Simulation Period, Based on the Ratio of South Delta Exports to San Joaquin River at Vernalis Flow

Water-Year Type	EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT	EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
All	-18% (-80%)	-18% (-82%)	-11% (-72%)	-12% (-74%)	-10% (-70%)	-8% (-67%)	-10% (-71%)	-9% (-69%)	-9% (-58%)	-6% (-52%)
Wet	-21% (-85%)	-21% (-86%)	-14% (-79%)	-14% (-80%)	-13% (-78%)	-11% (-76%)	-13% (-80%)	-11% (-77%)	-11% (-66%)	-9% (-62%)
Above Normal	-20% (-80%)	-20% (-82%)	-13% (-72%)	-13% (-74%)	-10% (-66%)	-7% (-62%)	-9% (-62%)	-8% (-63%)	-8% (-55%)	-5% (-43%)
Below Normal	-19% (-81%)	-20% (-84%)	-12% (-73%)	-13% (-78%)	-10% (-69%)	-9% (-70%)	-10% (-73%)	-9% (-77%)	-8% (-57%)	-6% (-52%)
Dry	-15% (-78%)	-15% (-78%)	-9% (-68%)	-9% (-68%)	-9% (-68%)	-6% (-59%)	-9% (-71%)	-7% (-63%)	-8% (-56%)	-5% (-47%)
Critical	-12% (-67%)	-12% (-71%)	-7% (-54%)	-8% (-60%)	-7% (-56%)	-6% (-53%)	-7% (-56%)	-6% (-52%)	-6% (-46%)	-5% (-44%)
Note: Negative values indicate lower average straying rate under BDCP scenarios than EBC scenarios. Relative differences are shown in parentheses.										

5C.5.3.13.1.6 Late Fall–Run Chinook Salmon

Juvenile

CALSIM flow simulations for Rio Vista during the main late fall–run migration period (January through March) estimated that flows under the ESO_ELT and ESO_LLT scenarios on average would be lower than flows in EBC2_ELT and EBC2_LLT by 7–11% in wet years, 6–11% in above-normal years, 10–22% in below-normal years, 9–16% in dry years, and 4–9% in critical years (Table 5C.5.3-187, Table 5C.5.3-188).

Adult

DSM2-QUAL Fingerprinting Analysis

Results of fingerprint simulation modeling predicted that there would be a 2% reduction in olfactory cues for ESO_ELT compared with EBC2_ELT in December, a 2% reduction in January, and a 5% reduction in February (Table 5C.5.3-200). The reduction in predicted olfactory cues for ESO_LLT relative to EBC2_LLT would be no change in December, 2% in January, and 4% in February. Based on results of the studies conducted by Fretwell (1989), it was concluded that a reduction in olfactory cues of 10% or less would not adversely affect adult attraction and that reductions greater than 20% would significantly affect adult attraction. The reduction in olfactory cues (percentage of Sacramento River water at Collinsville predicted using DSM2 modeling within the fingerprint analysis) is small (5% or less) in December, January, and February under both ELT and LLT operations. Based on results that show a 5% or less change in olfactory cues, which was below the 10% criterion based on results from Fretwell (1989), it was concluded that reduction in flow was not likely to adversely affect adult attraction. There is, however, uncertainty in the adult behavioral response to anticipated changes in lower Sacramento River flows and olfactory cues that may result in greater upstream attraction delays as adults search for the cue within the Delta prior to migrating upstream into the river. Further, the change in olfactory cues in the lower Sacramento River and mixing of waters within the Delta under the future operations of the evaluated starting operations may have less of an adverse effect on adult attraction than current conditions of south Delta exports, OMR reverse flows, and blending of Sacramento and San Joaquin River water, and the blending of olfactory cues, under current conditions.

Table 5C.5.3-200. Monthly Average (With Range in Parentheses) Percentage of Water at Collinsville Originating in the Sacramento River during September–October under EBC and ESO Scenarios

Month	Scenario[a]					
	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
December	67 (51-90)	68 (48-88)	67 (45-88)	66 (45-84)	65 (43-88)	66 (44-84)
January	76 (61-86)	77 (66-86)	75 (57-86)	75 (55-85)	73 (55-87)	73 (56-85)
February	75 (44-92)	76 (44-91)	74 (42-91)	72 (41-90)	69 (40-85)	68 (38-83)

Source: DSM2-QUAL fingerprinting analysis (monthly time step, 1976–1991).
[a] See Table 5C.0-1 for definitions of scenarios.

CALSIM Flows

Differences in the percentage of attraction flows that are less than 5% between existing biological conditions and the evaluated starting operations were assumed to be within the range of error of the simulation models and below the ability to detect actual differences that would be biologically meaningful. The analysis predicts that differences in flows originating in the Sacramento River typically would be reduced to a greater degree in February than in other months. For the ESO_ELT vs. EBC2_ELT comparison, the change in lower Sacramento River flow at Rio Vista was estimated to be a reduction of 8% for all three months in wet years, and a reduction of 6–10% in above-normal years, depending on month (Table 5C.5.3-187, Table 5C.5.3-188). Changes in flows for ESO_ELT vs. EBC2_ELT were similar in below-normal years (8–12%) and dry years (6–12%). In critically dry years, flows increased less than 1% in December and decreased in January and February by 9% and 5%, respectively. For the ESO_LLT vs. EBC2_LLT comparisons, river flow was estimated to be reduced by 7–9%, depending on month, in wet years. A similar pattern was observed in above-normal years with a reduction of 7–11%. The reduction in below-normal years ranged 6–11%, dry years ranged 5–11%, and in critically dry years the change in flows ranged from a decrease of 6% in February to an increase of 6% in December. The decreases are expected because the north Delta intake structures would be diverting water from the Sacramento River under the constraints of the bypass flow criteria. These results vary from the fingerprint analysis in that the reduction in flows in some months exceeded 10%. No relationship has been developed on the relationship between seasonal flows in the lower Sacramento River and adult late fall–run Chinook salmon attraction and upstream migration. Based on these results, it was concluded that the evaluated starting operations could result in an incremental reduction in cues associated with attraction flows in the lower Sacramento River.

5C.5.3.13.1.7 White Sturgeon

Note that in addition to the flow summary presented here, NMFS also requested specific analysis of the frequency of exceedance of a 25,000-cfs Delta outflow in April and May. This analysis is included with the analyses presented for the Sacramento River Region, wherein exceedances of thresholds for Wilkins Slough and Verona are also included.

Juvenile

Results of CALSIM modeling of Delta outflow during the late winter and spring (February through May) show a pattern of greatest outflows typically during the winter (February through March), with a declining trend in outflow through the spring (Table 5C.5.3-189, Table 5C.5.3-190). Delta outflow is greatest in wet years and declines substantially with reduced hydrology as conditions become dry and critically dry. Average Delta outflow differences between ESO and EBC scenarios were quite low in wet and critical years during January through March, but were larger (>10%) in April and May of wet years. On average, Delta outflows in above-normal, below-normal, and dry water years were 6% higher to 19% lower under ESO scenarios than EBC scenarios.

5C.5.3.13.1.8 Green Sturgeon

Adult

Differences in attraction flows between ESO and EBC scenarios for adult green sturgeon at Rio Vista were appreciable in most water-year types. Average differences in flows during the attraction period (November–July) ranged from around 6–32% lower under ESO scenarios in wet and above-normal years to 6% higher under ESO scenarios in critical years (Table 5C.5.3-187, Table 5C.5.3-188). There were considerable intermonth differences in flows, ranging from somewhat greater average flows under ESO scenarios (e.g., December of critical years) to average flows that were 40% or more lower under ESO scenarios compared with EBC scenarios (e.g., July of critical years).

5C.5.3.13.1.9 Pacific Lamprey

Macropthalmia

Estimated Sacramento River flows between December and May at Rio Vista are shown in Table 5C.5.3-187 and Figure 5C.5.3-153 through Figure 5C.5.3-158 and differences between ESO and EBC scenarios are shown in Table 5C.5.3-188. This location is downstream of the intakes such that lower flows are expected when water is exported at higher rates.

Predicted differences for model scenario ESO_ELT relative to EBC1 were all negative, with maximum reductions of 32% in wet years (May), 24% in above normal years (April and May), 26% in below normal years (March), 16% in dy years (March) and 9% in critical years (December). Predicted differences for ESO_LLT relative to EBC1 were mostly negative and all increases were less than 5%, except for a 9% increase in May of critical years. Maximum reductions were 44% in wet years (May), 27% in above normal years (May), 27% in below normal years (March), 16% in dry years (April) and 10% in critical years (December). Predicted differences for ESO_ELT relative to EBC2 were mostly negative and increases were all less than 5%. Maximum reductions were 31% in wet years (May), 25% in above normal years (April), 22% in below normal years (March), 15% in dry years (March) and 8% in critical years (February). Predicted differences for ESO_LLT relative to EBC2 were mostly negative and increases were less than 5%, except for a 5% increase in February of wet years and a 12% increase in May of dry years. Maximum reductions were 44% in wet years (May), 25% in above normal years (May), 23% in below normal years (March), 14% in dry years (March) and 6% in critical years (March).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, predicted differences for ESO_ELT relative to EBC2_ELT were mostly negative and all increases were less than 5%. Maximum reductions were 24% in wet years (May), 23% in above normal years (April), 21% in below normal years (March), 15% in dry years (March) and 9% in critical years (January and May). Late long-term predicted differences differences for ESO_LLT relative to EBC2_LLT were mostly negative and all increases were less than 5%, except for a 6% increase in December of critical years. Maximum reductions were 25% in wet years (May), 21% in above normal years (April), 22% in below normal years (March), 16% in dry years (March) and 6% in critical years (February and March).

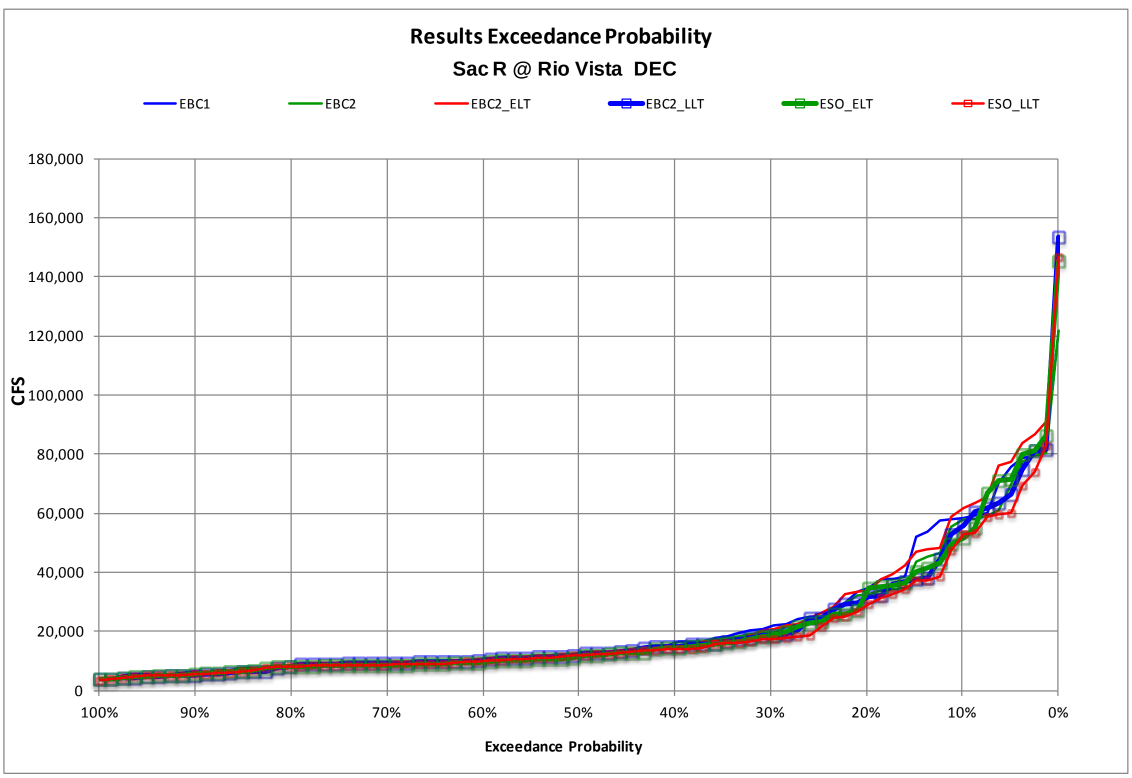


Figure 5C.5.3-153. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River at Rio Vista, December

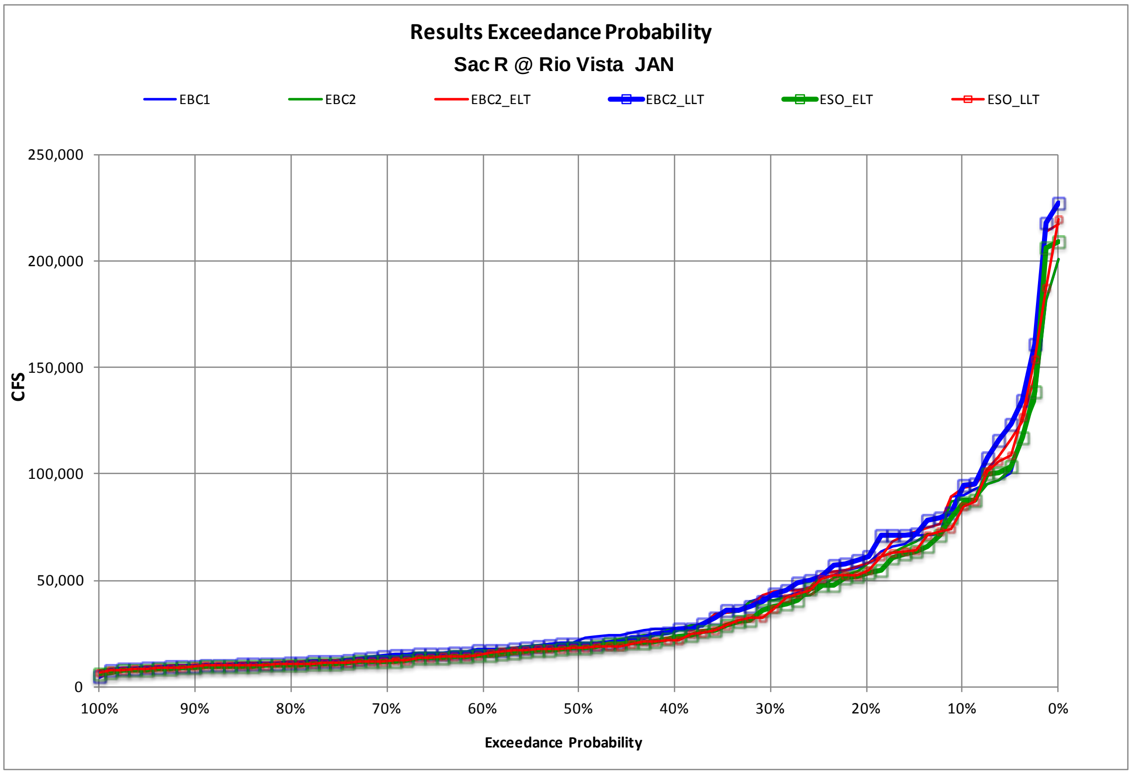


Figure 5C.5.3-154. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River at Rio Vista, January

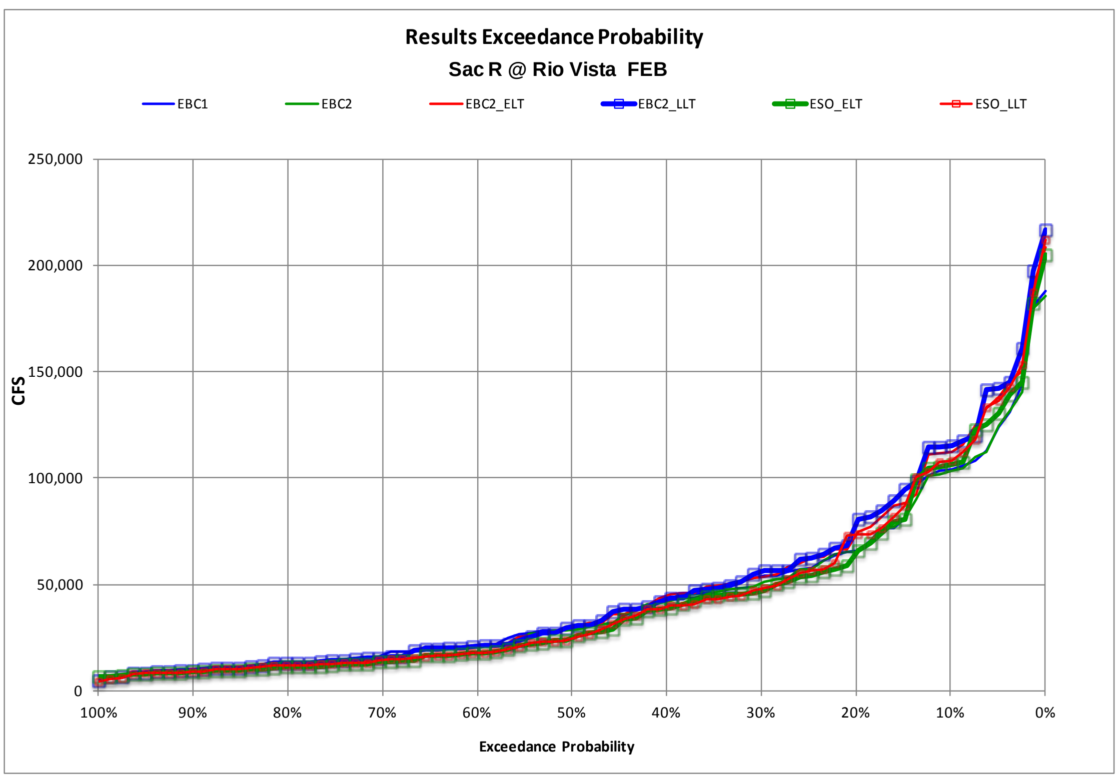


Figure 5C.5.3-155. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River at Rio Vista, February

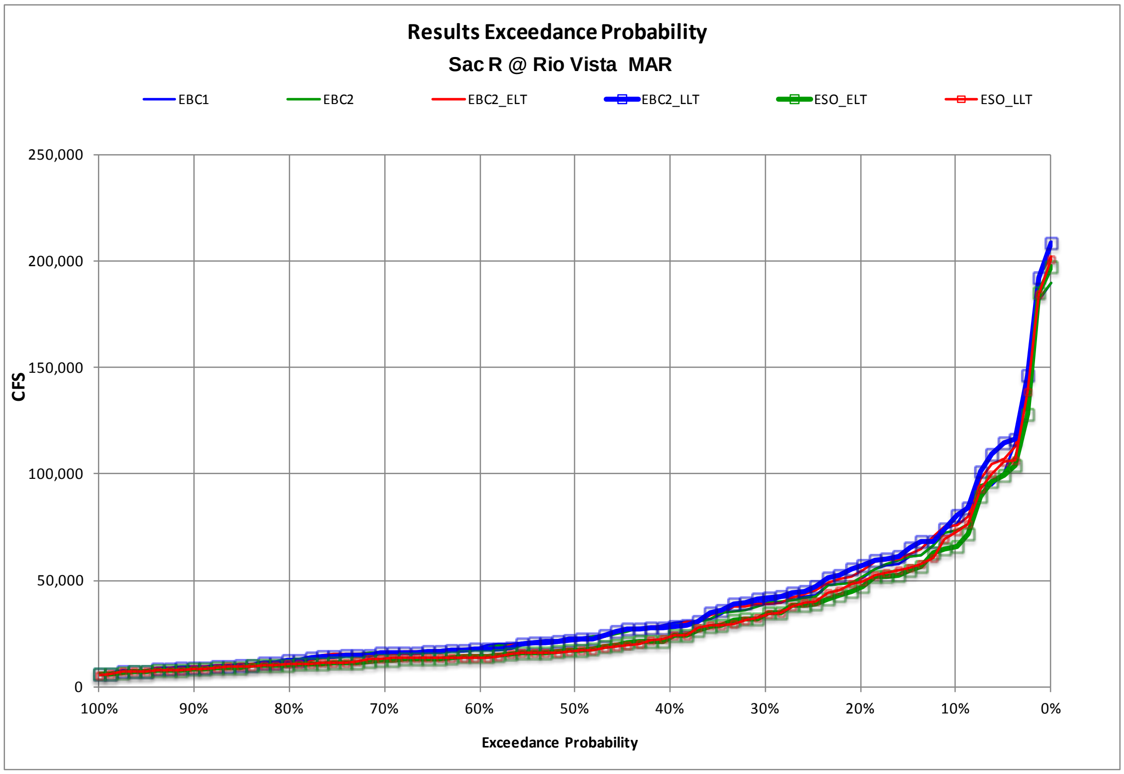


Figure 5C.5.3-156. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River at Rio Vista, March

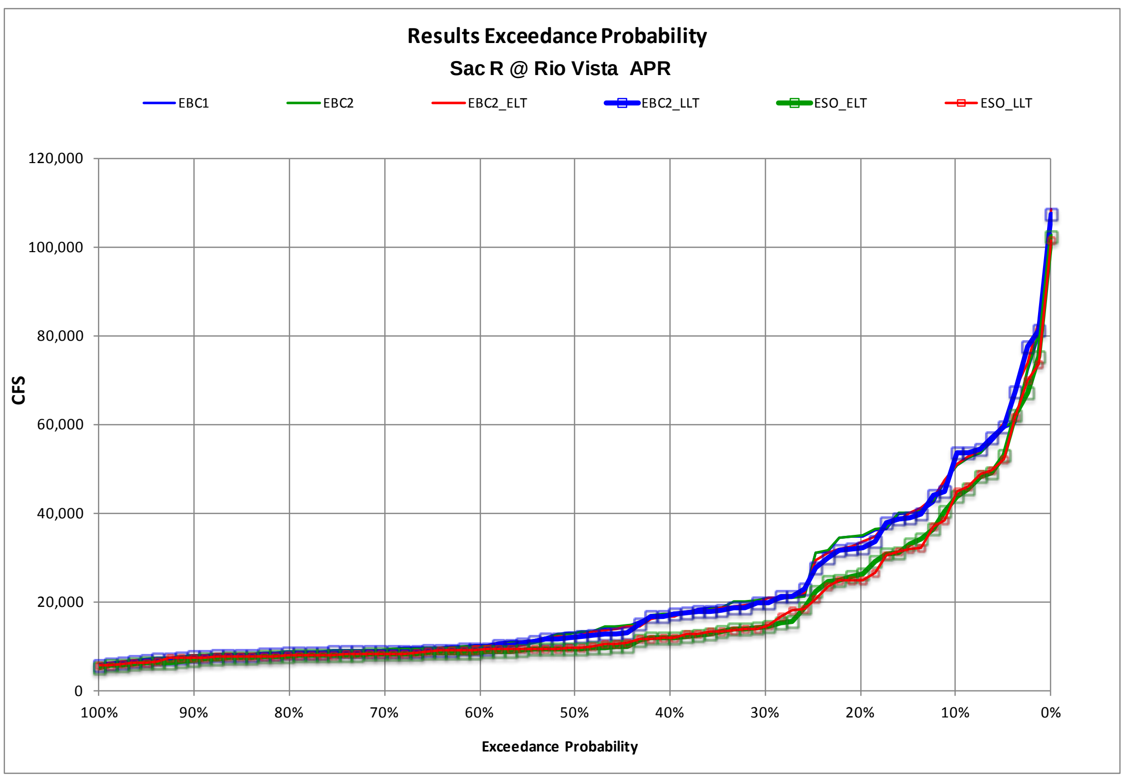


Figure 5C.5.3-157. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River at Rio Vista, April

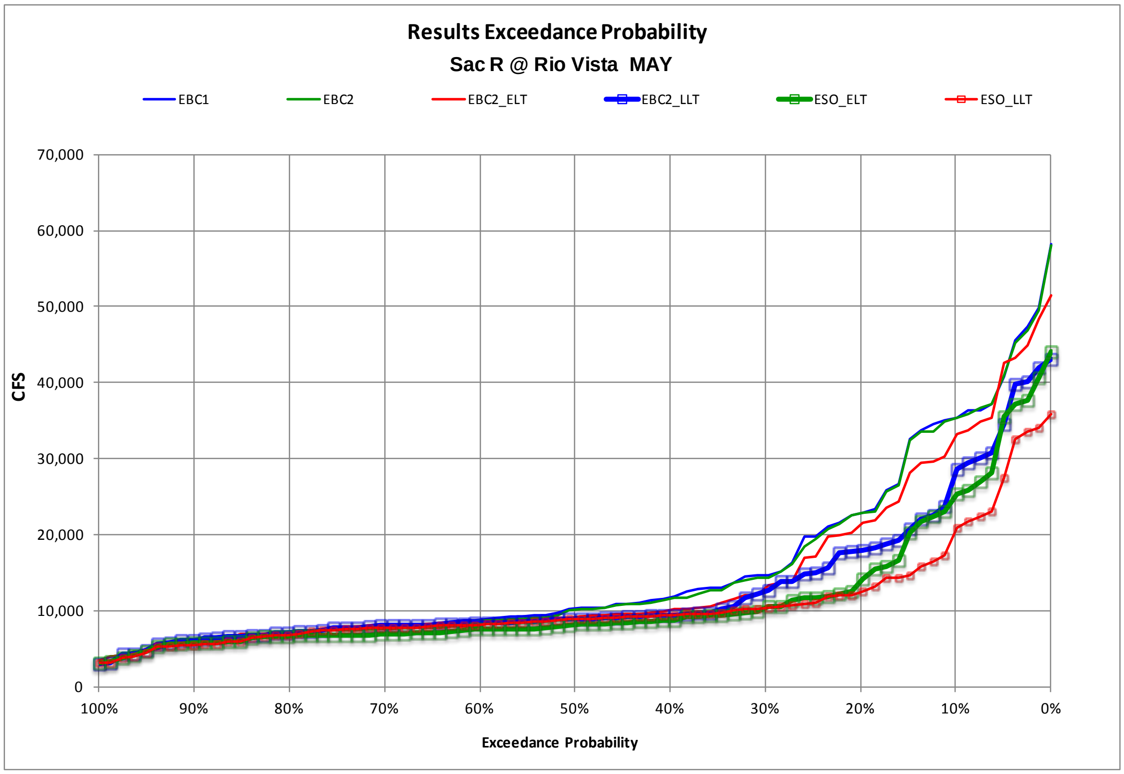


Figure 5C.5.3-158. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River at Rio Vista, May

Adult

It is hypothesized that lamprey are attracted to upstream spawning habitat by chemical cues, possibly by pheromones released by ammocoetes in silty backwaters near spawning grounds (Luzier et al. 2009). However, there is conflicting data supporting this (Clemens et al. 2010). The potential dependence on attraction cues suggests that flows may be important to upstream lamprey migration. The analysis assessed changes to predicted flows by evaluating the proportion of water at a key decision location, Collinsville, coming from the Sacramento River versus the San Joaquin River.

Sacramento River versus San Joaquin River Source Flows

DSM2 source-water fingerprinting was used to determine the average percent composition of water from the Sacramento and San Joaquin Rivers at the confluence (Collinsville) during the upstream migration period for Pacific lamprey (January through June) (Moyle 2002). Because inputs of this model are based on CALSIM outputs, the amount of model error is propagated, resulting in lower certainty of DSM2 model results than CALSIM results. All of the monthly average January through June changes in flow from the Sacramento and San Joaquin rivers constituted reductions of Sacramento River flow and increases of San Joaquin River flow (Figure 5C.5.3-159 and Table 5C.5.3-201).

Percentage of Flows from Sacramento River

The greatest differences in the percent composition of water from the Sacramento River during January through June for ESO_ELT and ESO_LLT relative to EBC1 and ESO_ELT and ESO_LLT relative to EBC2 occur in April (9.9% lower, 11.6% lower, 9.9% lower, and 11.6% lower, respectively) (Figure 5C.5.3-159 and Table 5C.5.3-201).

By comparing the EBC2 and evaluated starting operations in the two climate change scenarios, one can remove the effects of climate change and evaluate the effects of the evaluated starting operations. The greatest reductions in percent composition of water from the Sacramento River during January through June for ESO_ELT relative EBC2_ELT and for ESO_LLT relative to EBC2_LLT are also predicted to occur during April (9.2% lower and 9.7% lower, respectively).

These results indicate a small reduction in Sacramento River water that may have a small effect on the attraction ability of Pacific lamprey migrating into the Sacramento River.

Percentage of Flows from San Joaquin River

The greatest differences in the percent composition of water from the San Joaquin River during January through June for ESO_ELT relative to EBC1 and EBC2 occur in June (5.2% higher for both) (Figure 5C.5.3-159 and Table 5C.5.3-201). The greatest differences in the percent composition of water from the San Joaquin River during January through June for ESO_LLT relative to EBC1 and EBC2 occur in May (4.5% and 4.6% higher, respectively). With the effects of climate change removed, the greatest differences in percent composition of water from the San Joaquin River for ESO_ELT relative to EBC2_ELT is predicted to occur during April and June (4.1% higher), while the greatest difference for ESO_LLT relative to EBC2_LLT is predicted to occur in April 3.7% higher). Although the increases in the percent composition of flows from the San Joaquin River are small on an absolute scale, they represent very large percentage increases because the percent compositions from the San Joaquin River of the EBC1 and EBC2 scenarios are substantially smaller (Figure 5C.5.3-159). On a percentage basis, the increases range from 24% to 158% (Table 5C.5.3-201).

These results suggest a large proportional increase in San Joaquin River water in both the early and late long-term periods that is likely to increase greatly the attraction ability of Pacific lamprey migrating into the San Joaquin River.

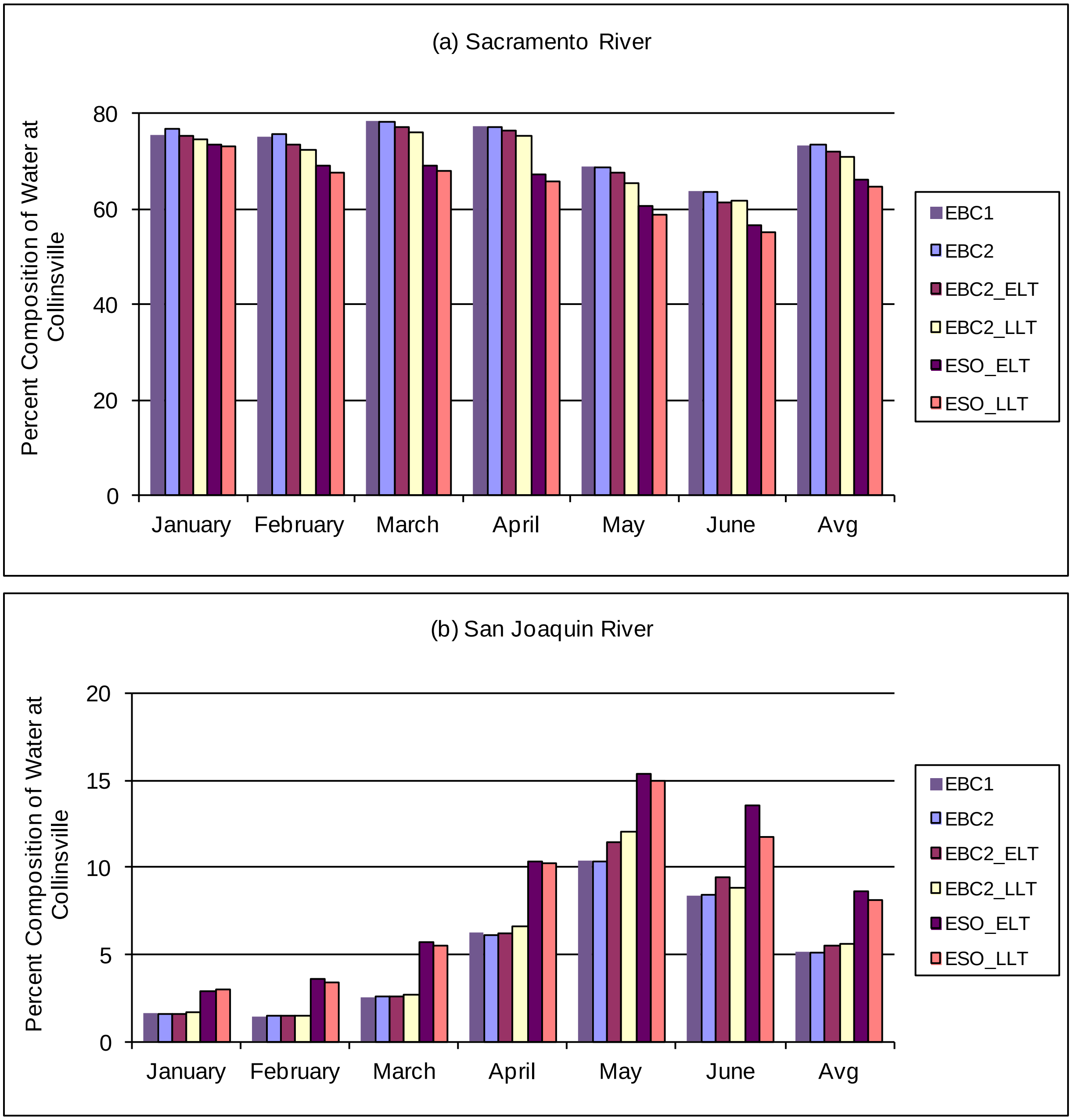


Figure 5C.5.3-159. Percent Composition of Water at Collinsville Originating from (a) the Sacramento River and (b) the San Joaquin River, for January through June

Table 5C.5.3-201. Differences between EBC and ESO Scenarios in Percent Composition of Water at Collinsville from Sacramento or San Joaquin Rivers, January through June

Month	Comparison[a]	Scenario[b]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Sacramento River							
January	Difference	-2.3	-2.6	-3.4	-3.6	-1.8	-1.5
	Percent difference	-3.0%	-3.4%	-4.4%	-4.7%	-2.4%	-2.1%
February	Difference	-5.9	-7.4	-6.5	-8.0	-4.4	-4.8
	Percent difference	-7.9%	-9.9%	-8.6%	-10.6%	-6.0%	-6.6%
March	Difference	-9.3	-10.6	-9.0	-10.3	-7.8	-8.1
	Percent difference	-11.9%	-13.5%	-11.6%	-13.2%	-10.2%	-10.7%
April	Difference	-9.9	-11.6	-9.9	-11.6	-9.2	-9.7
	Percent difference	-12.8%	-15.0%	-12.8%	-15.0%	-12.0%	-12.8%
May	Difference	-8.3	-10.2	-8.1	-10.0	-6.9	-6.6
	Percent difference	-12.1%	-14.8%	-11.8%	-14.6%	-10.2%	-10.1%
June	Difference	-7.3	-8.6	-7.0	-8.3	-4.9	-6.6
	Percent difference	-11.4%	-13.5%	-11.0%	-13.0%	-8.0%	-10.7%
San Joaquin River							
January	Difference	1.3	1.4	1.3	1.5	1.3	1.3
	Percent difference	80.3%	89.3%	84.1%	93.3%	76.4%	75.8%
February	Difference	2.2	2.0	2.2	1.9	2.2	1.8
	Percent difference	158.2%	139.6%	148.1%	130.2%	146.2%	121.7%
March	Difference	3.1	2.9	3.1	2.9	3.1	2.8
	Percent difference	121.3%	113.3%	118.1%	110.2%	116.5%	100.4%
April	Difference	4.0	4.0	4.2	4.1	4.1	3.7
	Percent difference	63.6%	62.8%	67.6%	66.8%	65.9%	55.4%
May	Difference	4.9	4.5	5.0	4.6	3.9	2.9
	Percent difference	47.5%	43.6%	48.9%	45.0%	34.5%	23.9%
June	Difference	5.2	3.3	5.2	3.3	4.1	3.0
	Percent difference	61.1%	39.4%	61.4%	39.7%	44.0%	33.5%

[a] Positive values indicate a higher value in the ESO than in the EBC.
[b] See Table 5C.0-1 for definitions of the scenarios.

5C.5.3.13.1.10 River Lamprey

Macropthalmia

See results for Pacific lamprey macropthalmia.

Adult

It is uncertain that river lamprey are attracted to spawning grounds based on chemical cues, although it is possible that they exhibit some large-scale homing behavior to some extent as has been hypothesized for sea lamprey (Li et al. 1995; Luzier et al. 2009). Therefore, although results of flow changes in rivers are quantified below, caution should be used in applying these conclusions because of the low certainty associated with them.

Sacramento River versus San Joaquin River Source Flows

DSM2 source-water fingerprinting was used to determine the average percent composition of water from the Sacramento and San Joaquin Rivers at the confluence (Collinsville) during the upstream migration period for river lamprey (September through November) (Moyle 2002). Because inputs of this model are based on CALSIM outputs, the amount of model error is propagated, resulting in lower certainty of DSM2 model results than CALSIM results.

Percentage of Flows from Sacramento River

The greatest differences in the percent composition of water from the Sacramento River during September through November for ESO_ELT and ESO_LLT relative to EBC1 are predicted to occur in October (5.2% and 7.2% higher, respectively) (Figure 5C.5.3-160 and Table 5C.5.3-202). The greatest differences for ESO_ELT and ESO_LLT relative to EBC2 are predicted to occur during September (6.1% and 3.6% lower, respectively).

By comparing the EBC2 and evaluated starting operations in the two climate change scenarios, one can remove the effects of climate change and evaluate the effects of the evaluated starting operations. The greatest difference in percent composition of water from the Sacramento River during January through June for ESO_ELT relative to EBC2_ELT is predicted to occurr during September (4.5% lower) and the greatest difference for ESO_LLT relative to EBC2_LLT is predicted to occur during November (2.8% lower).

These results suggest a reduction in Sacramento River water for most scenarios that may have a small effect on the attraction ability of river lamprey migrating into the Sacramento River.

Percentage of Flows from San Joaquin River

The greatest differences in the percent composition of water from the San Joaquin River during September through November for ESO_ELT and ESO_LLT relative to EBC1 and EBC2 occur in November (4.8%, 4.5%, 4.6%, and 4.3% higher, respectively) (Figure 5C.5.3-160 and Table 5C.5.3-202). With the effects of climate change removed, the greatest differences in percent composition of water from the San Joaquin River for ESO_ELT relative to EBC2_ELT and ESO_LLT relative to EBC2_LLT are also predicted to occur during November (4.4% and 3.9% higher, respectively). Although the increases in the percent composition of flows from the San Joaquin River are small on an absolute scale, they represent very large percentage increases because the percent compositions from the San Joaquin River of the EBC1 and EBC2 scenarios are much smaller (Figure 5C.5.3-160). On a percentage basis, the increases range from 304% to 2,073% (Table 5C.5.3-202).

These results suggest a large proportional increase in San Joaquin River water in both the early and late long-term periods that is likely to greatly increase the attraction ability of lamprey migrating into the San Joaquin River.

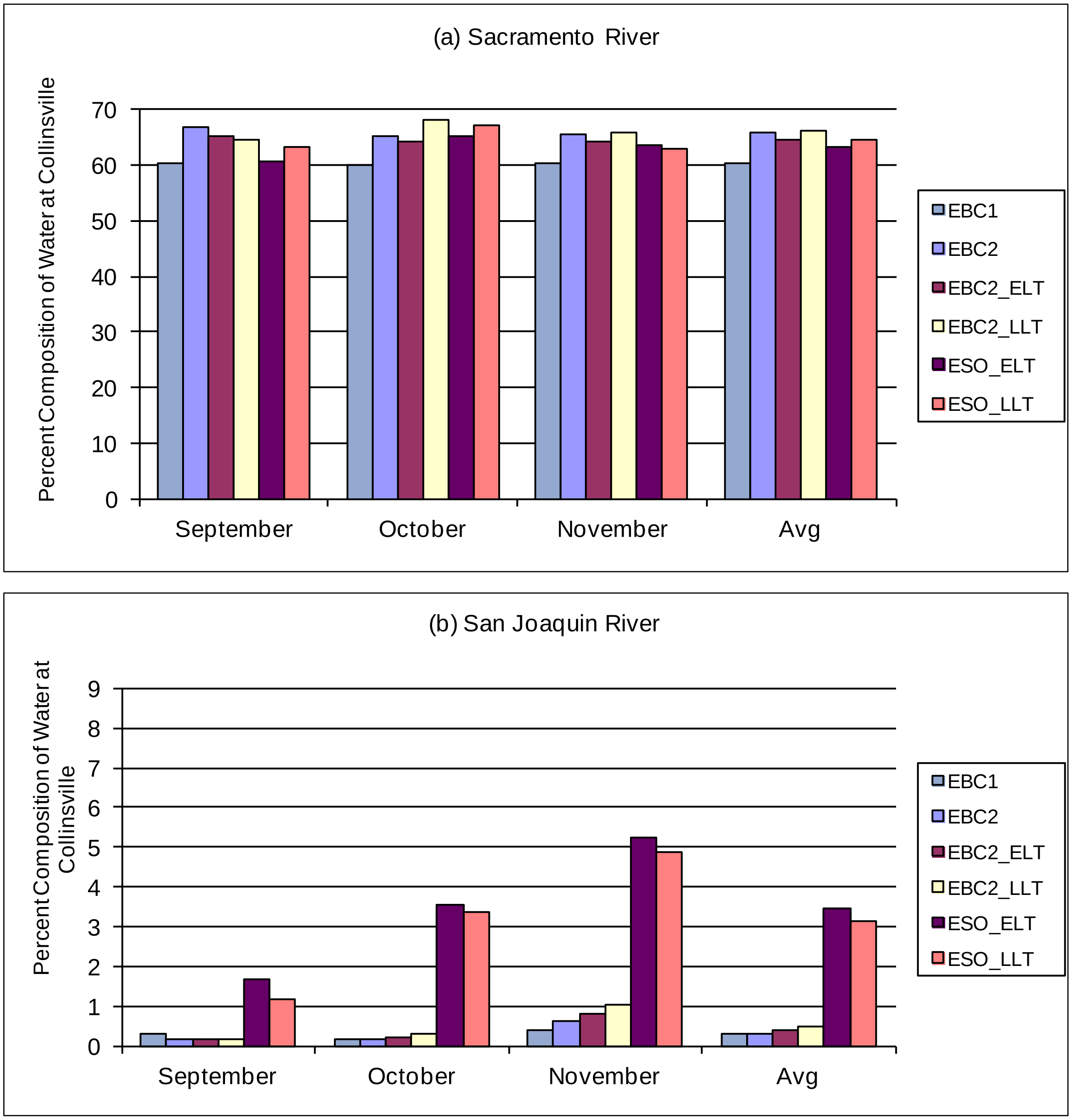


Figure 5C.5.3-160. Percent Composition of Water at Collinsville Originating from (a) the Sacramento River and (b) San Joaquin River, September through November

Table 5C.5.3-202. Differences between EBC and ESO Scenarios in Percent Composition of Water at Collinsville from Sacramento or San Joaquin Rivers, September through November

Month	Comparison[a]	Scenario[b]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC_LLT vs. ESO_LLT
Sacramento River							
September	Difference	0.3	2.8	-6.1	-3.6	-4.5	-1.5
	Percent Difference	0.6%	4.6%	-9.1%	-5.4%	-6.8%	-2.3%
October	Difference	5.2	7.2	0.1	2.1	0.9	-0.9
	Percent Difference	8.6%	12.1%	0.1%	3.3%	1.4%	-1.3%
November	Difference	3.2	2.8	-1.9	-2.4	-0.7	-2.8
	Percent Difference	5.4%	4.6%	-2.9%	-3.6%	-1.2%	-4.2%
San Joaquin River							
September	Difference	1.4	0.9	1.5	1.0	1.5	1.0
	Percent Difference	487.5%	304.1%	892.1%	582.3%	826.4%	684.9%
October	Difference	3.4	3.2	3.4	3.2	3.3	3.1
	Percent Difference	2073.2%	1959.8%	1988.4%	1879.4%	1749.4%	1076.6%
November	Difference	4.8	4.5	4.6	4.3	4.4	3.9
	Percent Difference	1188.8%	1107.0%	752.3%	698.2%	553.0%	372.6%

[a] Positive values indicate a higher value in the ESO than in the EBC.
[b] See Table 5C.0-1 for definitions of the scenarios.

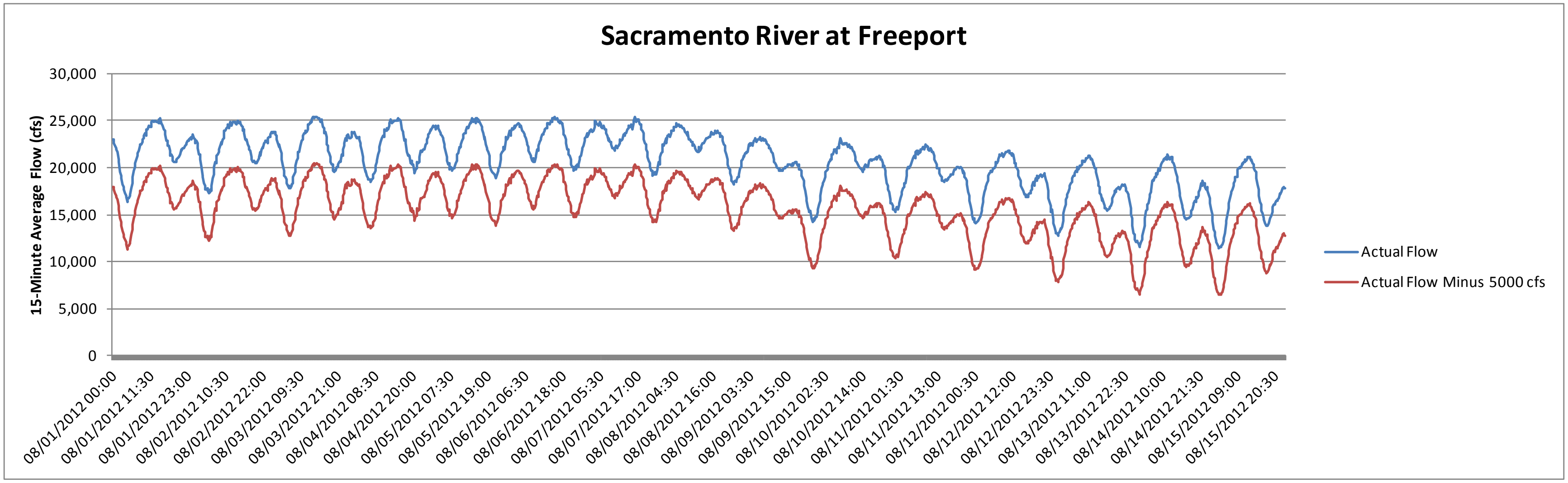
5C.5.3.13.1.11 Context for Monthly Average Flow Changes in Tidally Influenced Areas of the Plan Area (Delta Region)

The BDCP effects analysis includes many comparisons of average monthly CALSIM flows at various locations for the different baseline and project scenarios. CALSIM is the principal tool for assessing channel flows within the Plan Area and the broader Study Area. Caution should be applied when interpreting the results of the comparisons in tidally influenced areas, for average monthly net flows from CALSIM provide no representation of tidal oscillations, which may be of considerable magnitude relative to net flows and have important consequences on movement of organisms (Kimmerer 2004: 25).

Context for considering the results of CALSIM monthly average flow comparisons between scenarios is provided here by examining actual river flow data for three locations with varying tidal influence: Sacramento River at Freeport, Sacramento River below Georgiana Slough, and Sacramento River at Rio Vista. For each location, 15-minute flow data were assembled for August 2012. Figure 5C.5.3-161, Figure 5C.5.3-162, Figure 5C.5.3-163 show the data for the first half of the month. The actual flow data are represented by blue lines and red lines represent the same data reduced by 5,000 cfs. This reduction represents a hypothetical decrease in flow to illustrate features of net flow calculations. The reduction is not intended to represent BDCP scenarios. Differences between daily maximum and minimum flows ranged from around 6,000–10,000 cfs at Freeport, to 15,000–20,000 cfs below Georgiana Slough, to around 200,000 cfs at Rio Vista. The 5,000-cfs reduction in flows at each location is clearly visible at Freeport and Georgiana Slough (Figure 5C.5.3-161, Figure 5C.5.3-162), but is challenging to see for Rio Vista because of the scale of the tidal range in relation to the 5,000-cfs reduction (Figure 5C.5.3-163).

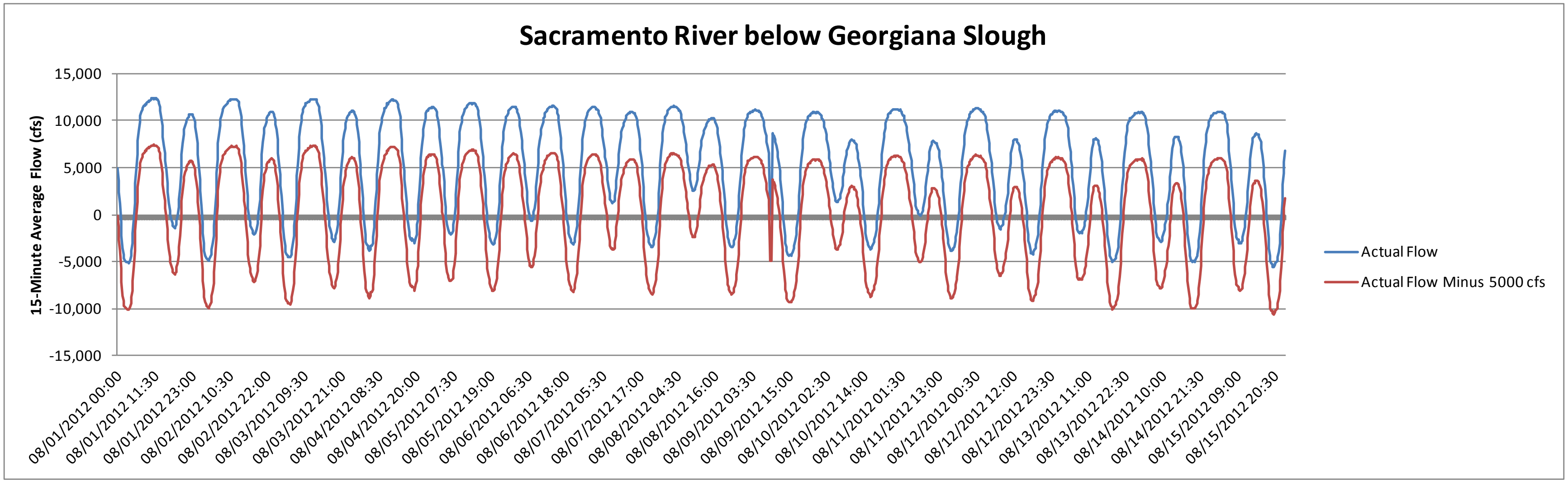
Calculation of daily average flows for the whole month, followed by calculation of the average monthly flow from the daily flow averages, yields interesting results when comparing the actual monthly average to the average reduced by 5,000 cfs (Table 5C.5.3-203). For Freeport, the monthly average of actual average daily flow reduced by 5,000 cfs is 28% less than actual flow. Below Georgiana Slough, the difference is 111%, because the 5,000-cfs reduction causes the monthly average to become negative. For Rio Vista, the monthly average of actual daily flow reduced by 5,000 cfs is over 60% less than actual flow. Comparison of the differences in the monthly maximum of daily average flow provides an interesting contrast to the comparison of averages: the difference between average maxima for Freeport is similar to the difference between the average of daily averages, at 23%. Below Georgiana Slough, the difference between average maxima is 44%, and at Rio Vista there is little difference between average maxima (4%).

These results emphasize that average flow comparisons must be undertaken cautiously when involving tidally influenced areas. For example, interpretation of the ~60% reduction in average monthly flow at Rio Vista needs to be taken in context of the scale of the tidal range. An upstream-migrating adult salmonid, for example, may not readily sense the flow difference given the large tidal range. This is not to diminish the potential importance of the quantity of water coming from a particular source that may act as a migration cue by olfactory stimulation. It is merely to point out that changes in river flow in tidal areas are very small in relation to the tidal oscillations that they mix with. The 23% reduction in flow in the less tidally influenced area at Freeport may have greater implications for migration, e.g., salmonid smolt downstream migration, than the >60% reduction in average flow at Rio Vista, because it is occurring in a unidirectional portion of the Plan Area. Perry (2010) found flow-survival relationships in upstream areas of the Plan Area, but did not find such relationships in downstream, tidally influenced portions of the Plan Area.



Source: California Data Exchange Center, Accessed September 6, 2012.
Note: Blue line is actual measured flow, red line is actual flow minus 5,000 cfs.

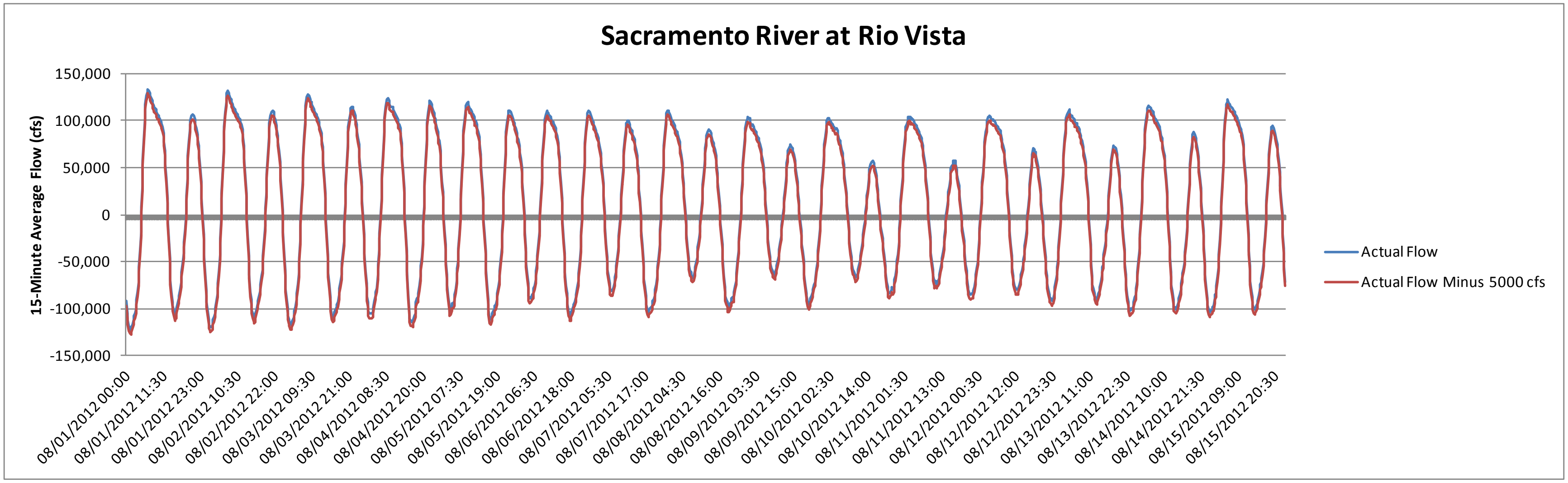
Figure 5C.5.3-161. Sacramento River Flow at Freeport, August 1–15, 2012 (cfs)



Source: California Data Exchange Center, Accessed September 6, 2012.

Note: Blue line is actual measured flow, red line is actual flow minus 5,000 cfs.

Figure 5C.5.3-162. Sacramento River Flow below Georgiana Slough, August 1–15, 2012 (cfs)



Source: California Data Exchange Center, Accessed September 6, 2012.
Note: Blue line is actual measured flow, red line is actual flow minus 5,000 cfs.

Figure 5C.5.3-163. Sacramento River Flow at Rio Vista, August 1–15, 2012 (cfs)

Table 5C.5.3-203. Monthly Average of Daily Mean and Daily Maximum Flow (cfs) at Sacramento River at Freeport, Sacramento River below Georgiana Slough, and Sacramento River at Rio VistaPlus a Comparison with Actual Flow Minus 5,000 cfs

Monthly Flow Statistic	Sacramento River at Freeport			Sacramento River below Georgiana Slough			Sacramento River at Rio Vista		
	Actual Flow (cfs)	Actual Flow Minus 5,000 cfs	Difference, cfs (%)	Actual Flow (cfs)	Actual Flow Minus 5,000 cfs	Difference, cfs (%)	Actual Flow (cfs)	Actual Flow Minus 5,000 cfs	Difference, cfs (%)
Average of Daily Mean	18,004	13,004	-5,000 (-28%)	4,514	-486	-5,000 (-111%)	8,207	3,207	-5,000 (-61%)
Average of Daily Maximum	21,712	16,587	-5,000 (-23%)	11,310	6,310	-5,000 (-44%)	117,379	112,379	-5,000 (4%)

5C.5.3.13.2 Sacramento River Region

5C.5.3.13.2.1 Summary of Flows in the Sacramento River Region (Excluding Tributary Subregions)

CALSIM flow data for the Sacramento River Region (excluding tributary subregions) averaged by water-year type, month, and scenario, together with average monthly differences between scenarios, are provided in Table 5C.5.3-204 to Table 5C.5.3-211. These form the basis for the summary of changes in attraction and migration flows.

Table 5C.5.3-204. Mean Monthly Flows (cfs) in Sacramento River at Keswick for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	16,526	15,889	17,330	18,233	17,764	18,545
	AN	8,318	7,634	7,776	8,205	8,471	7,795
	BN	4,502	4,285	4,340	4,184	4,918	4,342
	D	3,996	3,873	4,098	4,096	4,098	3,803
	C	3,490	3,673	3,794	4,238	3,516	4,364
	All	8,614	8,274	8,829	9,215	9,126	9,235
Feb	W	18,577	18,356	20,349	20,853	20,494	20,888
	AN	14,409	14,184	15,081	15,297	15,912	15,871
	BN	5,981	5,701	6,456	5,544	6,808	6,301
	D	3,684	3,738	3,447	3,410	3,506	3,407
	C	3,599	3,600	3,394	3,372	3,510	3,358
	All	10,355	10,217	11,015	11,039	11,272	11,261
Mar	W	16,200	16,195	16,399	17,065	16,408	17,139
	AN	9,131	8,429	8,662	8,818	9,205	8,803
	BN	5,200	4,756	4,306	4,318	4,472	4,252
	D	3,903	3,872	3,858	3,814	3,771	3,753
	C	3,487	3,617	3,608	3,583	3,802	3,842
	All	8,728	8,560	8,577	8,800	8,697	8,834
Apr	W	9,418	9,396	9,254	9,131	9,242	9,009
	AN	6,182	6,093	5,712	5,536	5,822	5,827
	BN	5,426	5,167	4,934	5,009	5,000	5,414
	D	5,803	5,578	5,497	5,533	5,633	5,776
	C	6,472	6,298	6,343	6,550	6,313	6,498
	All	7,038	6,899	6,748	6,733	6,797	6,852
May	W	9,508	9,450	8,183	7,149	8,191	7,541
	AN	7,709	7,692	7,307	7,783	8,189	8,971
	BN	7,193	6,954	6,411	6,272	6,810	7,169
	D	7,349	7,175	7,075	7,681	7,496	8,608
	C	6,715	6,639	6,900	7,316	6,920	7,499
	All	7,967	7,856	7,321	7,233	7,616	7,915

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jun	W	10,375	10,463	10,063	10,274	10,321	11,240
	AN	11,147	11,369	11,403	12,032	12,068	13,610
	BN	10,758	10,752	10,573	10,947	11,267	11,711
	D	11,224	11,251	11,464	11,898	12,141	12,648
	C	10,392	10,598	11,041	11,350	11,252	11,456
	All	10,742	10,838	10,797	11,160	11,274	12,008
Jul	W	12,779	12,947	13,477	14,098	13,698	14,230
	AN	14,056	14,313	14,541	15,098	14,615	14,940
	BN	12,965	13,021	13,195	13,177	13,673	13,020
	D	13,302	13,451	13,650	13,727	13,653	12,764
	C	12,849	12,597	12,124	11,935	12,471	11,605
	All	13,123	13,219	13,424	13,689	13,639	13,421
Aug	W	11,029	11,012	10,447	10,491	10,520	10,445
	AN	10,449	10,695	10,835	11,641	11,165	11,287
	BN	10,139	10,201	9,876	10,261	10,757	10,172
	D	10,627	10,775	10,464	10,986	9,380	9,420
	C	9,473	9,517	8,380	7,348	8,093	6,761
	All	10,476	10,557	10,108	10,269	10,049	9,757
Sep	W	9,385	12,374	12,012	12,833	11,720	13,194
	AN	5,862	8,183	9,209	9,898	7,834	9,315
	BN	5,492	5,472	5,677	5,601	5,156	4,836
	D	5,985	5,660	4,982	4,469	4,543	5,053
	C	5,563	5,276	4,827	4,368	4,717	5,239
	All	6,899	8,070	7,926	8,094	7,430	8,248
Oct	W	6,886	6,530	6,491	7,034	6,408	6,895
	AN	7,145	6,313	6,090	7,152	5,750	7,247
	BN	6,396	6,328	5,835	7,072	5,662	6,435
	D	6,128	5,922	5,899	6,494	5,862	6,326
	C	5,902	5,613	5,452	5,752	5,161	5,610
	All	6,530	6,196	6,038	6,752	5,882	6,555
Nov	W	6,672	7,721	7,620	7,539	6,493	6,369
	AN	6,224	6,917	7,357	7,134	5,716	5,469
	BN	5,088	5,783	5,926	5,936	4,553	4,845
	D	5,669	5,408	5,439	5,406	4,627	4,535
	C	4,822	4,874	4,789	4,710	4,437	4,413
	All	5,845	6,348	6,399	6,324	5,337	5,288
Dec	W	12,766	11,441	12,808	11,022	12,958	10,870
	AN	5,531	5,482	5,729	5,377	5,370	5,472
	BN	5,413	5,200	5,857	5,195	5,667	5,500
	D	4,215	3,915	3,883	3,936	3,877	3,973
	C	3,828	3,534	3,593	3,582	3,703	3,613
	All	7,267	6,694	7,278	6,557	7,255	6,587

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

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Table 5C.5.3-205. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Sacramento River at Keswick

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	1238 (7.5%)	2018 (12.2%)	1875 (11.8%)	2656 (16.7%)	434 (2.5%)	311 (1.7%)
	AN	154 (1.8%)	-522 (-6.3%)	837 (11%)	161 (2.1%)	695 (8.9%)	-409 (-5%)
	BN	416 (9.2%)	-160 (-3.5%)	632 (14.8%)	57 (1.3%)	577 (13.3%)	159 (3.8%)
	D	103 (2.6%)	-193 (-4.8%)	225 (5.8%)	-71 (-1.8%)	0 (0%)	-293 (-7.2%)
	C	26 (0.7%)	873 (25%)	-156 (-4.3%)	691 (18.8%)	-278 (-7.3%)	126 (3%)
	All	512 (5.9%)	622 (7.2%)	852 (10.3%)	961 (11.6%)	297 (3.4%)	20 (0.2%)
Feb	W	1917 (10.3%)	2311 (12.4%)	2139 (11.7%)	2532 (13.8%)	145 (0.7%)	34 (0.2%)
	AN	1503 (10.4%)	1461 (10.1%)	1728 (12.2%)	1686 (11.9%)	832 (5.5%)	574 (3.8%)
	BN	827 (13.8%)	320 (5.3%)	1107 (19.4%)	600 (10.5%)	352 (5.5%)	757 (13.7%)
	D	-178 (-4.8%)	-276 (-7.5%)	-232 (-6.2%)	-331 (-8.9%)	59 (1.7%)	-2 (-0.1%)
	C	-88 (-2.5%)	-241 (-6.7%)	-90 (-2.5%)	-242 (-6.7%)	116 (3.4%)	-15 (-0.4%)
	All	917 (8.9%)	905 (8.7%)	1056 (10.3%)	1044 (10.2%)	258 (2.3%)	221 (2%)
Mar	W	208 (1.3%)	939 (5.8%)	212 (1.3%)	944 (5.8%)	9 (0.1%)	73 (0.4%)
	AN	74 (0.8%)	-328 (-3.6%)	776 (9.2%)	374 (4.4%)	543 (6.3%)	-15 (-0.2%)
	BN	-727 (-14%)	-948 (-18.2%)	-284 (-6%)	-504 (-10.6%)	166 (3.8%)	-66 (-1.5%)
	D	-133 (-3.4%)	-150 (-3.9%)	-101 (-2.6%)	-119 (-3.1%)	-88 (-2.3%)	-61 (-1.6%)
	C	314 (9%)	355 (10.2%)	185 (5.1%)	226 (6.2%)	194 (5.4%)	259 (7.2%)
	All	-31 (-0.4%)	107 (1.2%)	137 (1.6%)	275 (3.2%)	120 (1.4%)	34 (0.4%)
Apr	W	-176 (-1.9%)	-409 (-4.3%)	-154 (-1.6%)	-387 (-4.1%)	-12 (-0.1%)	-122 (-1.3%)
	AN	-360 (-5.8%)	-355 (-5.7%)	-271 (-4.5%)	-267 (-4.4%)	110 (1.9%)	291 (5.3%)
	BN	-426 (-7.8%)	-12 (-0.2%)	-167 (-3.2%)	247 (4.8%)	66 (1.3%)	406 (8.1%)
	D	-169 (-2.9%)	-27 (-0.5%)	55 (1%)	198 (3.5%)	136 (2.5%)	243 (4.4%)
	C	-159 (-2.5%)	26 (0.4%)	15 (0.2%)	200 (3.2%)	-30 (-0.5%)	-53 (-0.8%)
	All	-242 (-3.4%)	-186 (-2.6%)	-103 (-1.5%)	-47 (-0.7%)	49 (0.7%)	119 (1.8%)
May	W	-1317 (-13.9%)	-1967 (-20.7%)	-1259 (-13.3%)	-1909 (-20.2%)	8 (0.1%)	392 (5.5%)
	AN	480 (6.2%)	1263 (16.4%)	496 (6.5%)	1279 (16.6%)	882 (12.1%)	1188 (15.3%)
	BN	-383 (-5.3%)	-24 (-0.3%)	-144 (-2.1%)	216 (3.1%)	398 (6.2%)	898 (14.3%)
	D	147 (2%)	1259 (17.1%)	321 (4.5%)	1433 (20%)	421 (5.9%)	927 (12.1%)
	C	205 (3%)	784 (11.7%)	281 (4.2%)	861 (13%)	19 (0.3%)	184 (2.5%)
	All	-351 (-4.4%)	-52 (-0.7%)	-240 (-3.1%)	59 (0.8%)	295 (4%)	682 (9.4%)
Jun	W	-54 (-0.5%)	865 (8.3%)	-141 (-1.4%)	778 (7.4%)	259 (2.6%)	966 (9.4%)
	AN	921 (8.3%)	2462 (22.1%)	699 (6.2%)	2241 (19.7%)	665 (5.8%)	1578 (13.1%)
	BN	509 (4.7%)	952 (8.9%)	515 (4.8%)	959 (8.9%)	693 (6.6%)	763 (7%)
	D	917 (8.2%)	1425 (12.7%)	890 (7.9%)	1398 (12.4%)	678 (5.9%)	750 (6.3%)
	C	860 (8.3%)	1064 (10.2%)	654 (6.2%)	858 (8.1%)	211 (1.9%)	106 (0.9%)
	All	532 (4.9%)	1266 (11.8%)	437 (4%)	1171 (10.8%)	477 (4.4%)	848 (7.6%)
Jul	W	919 (7.2%)	1451 (11.4%)	752 (5.8%)	1283 (9.9%)	222 (1.6%)	132 (0.9%)
	AN	559 (4%)	884 (6.3%)	302 (2.1%)	627 (4.4%)	74 (0.5%)	-158 (-1%)
	BN	708 (5.5%)	54 (0.4%)	653 (5%)	-1 (0%)	478 (3.6%)	-157 (-1.2%)
	D	351 (2.6%)	-538 (-4%)	202 (1.5%)	-687 (-5.1%)	4 (0%)	-963 (-7%)
	C	-379 (-2.9%)	-1245 (-9.7%)	-126 (-1%)	-992 (-7.9%)	347 (2.9%)	-330 (-2.8%)
	All	516 (3.9%)	298 (2.3%)	420 (3.2%)	202 (1.5%)	214 (1.6%)	-268 (-2%)

Month	Water-Year Type[b]	Scenario[c] EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-509 (-4.6%)	-584 (-5.3%)	-492 (-4.5%)	-567 (-5.1%)	73 (0.7%)	-45 (-0.4%)
	AN	716 (6.9%)	838 (8%)	470 (4.4%)	592 (5.5%)	330 (3%)	-354 (-3%)
	BN	617 (6.1%)	32 (0.3%)	555 (5.4%)	-29 (-0.3%)	880 (8.9%)	-89 (-0.9%)
	D	-1247 (-11.7%)	-1208 (-11.4%)	-1395 (-12.9%)	-1356 (-12.6%)	-1084 (-10.4%)	-1566 (-14.3%)
	C	-1380 (-14.6%)	-2712 (-28.6%)	-1425 (-15%)	-2757 (-29%)	-287 (-3.4%)	-587 (-8%)
	All	-427 (-4.1%)	-719 (-6.9%)	-507 (-4.8%)	-799 (-7.6%)	-58 (-0.6%)	-511 (-5%)
Sep	W	2335 (24.9%)	3809 (40.6%)	-654 (-5.3%)	820 (6.6%)	-292 (-2.4%)	361 (2.8%)
	AN	1971 (33.6%)	3452 (58.9%)	-349 (-4.3%)	1132 (13.8%)	-1376 (-14.9%)	-583 (-5.9%)
	BN	-336 (-6.1%)	-656 (-11.9%)	-315 (-5.8%)	-635 (-11.6%)	-521 (-9.2%)	-765 (-13.7%)
	D	-1442 (-24.1%)	-933 (-15.6%)	-1117 (-19.7%)	-608 (-10.7%)	-439 (-8.8%)	584 (13.1%)
	C	-846 (-15.2%)	-324 (-5.8%)	-559 (-10.6%)	-37 (-0.7%)	-109 (-2.3%)	871 (19.9%)
	All	531 (7.7%)	1349 (19.5%)	-639 (-7.9%)	178 (2.2%)	-495 (-6.2%)	154 (1.9%)
Oct	W	-478 (-6.9%)	9 (0.1%)	-123 (-1.9%)	364 (5.6%)	-84 (-1.3%)	-140 (-2%)
	AN	-1395 (-19.5%)	102 (1.4%)	-563 (-8.9%)	934 (14.8%)	-340 (-5.6%)	95 (1.3%)
	BN	-734 (-11.5%)	39 (0.6%)	-666 (-10.5%)	107 (1.7%)	-173 (-3%)	-637 (-9%)
	D	-266 (-4.3%)	198 (3.2%)	-60 (-1%)	404 (6.8%)	-37 (-0.6%)	-168 (-2.6%)
	C	-741 (-12.6%)	-293 (-5%)	-452 (-8%)	-3 (-0.1%)	-291 (-5.3%)	-142 (-2.5%)
	All	-648 (-9.9%)	25 (0.4%)	-314 (-5.1%)	359 (5.8%)	-156 (-2.6%)	-197 (-2.9%)
Nov	W	-180 (-2.7%)	-304 (-4.5%)	-1229 (-15.9%)	-1352 (-17.5%)	-1127 (-14.8%)	-1170 (-15.5%)
	AN	-508 (-8.2%)	-755 (-12.1%)	-1201 (-17.4%)	-1449 (-20.9%)	-1641 (-22.3%)	-1665 (-23.3%)
	BN	-534 (-10.5%)	-242 (-4.8%)	-1230 (-21.3%)	-938 (-16.2%)	-1373 (-23.2%)	-1090 (-18.4%)
	D	-1042 (-18.4%)	-1134 (-20%)	-781 (-14.4%)	-874 (-16.2%)	-812 (-14.9%)	-871 (-16.1%)
	C	-386 (-8%)	-410 (-8.5%)	-438 (-9%)	-462 (-9.5%)	-352 (-7.4%)	-297 (-6.3%)
	All	-508 (-8.7%)	-557 (-9.5%)	-1011 (-15.9%)	-1060 (-16.7%)	-1062 (-16.6%)	-1036 (-16.4%)
Dec	W	192 (1.5%)	-1896 (-14.9%)	1517 (13.3%)	-571 (-5%)	150 (1.2%)	-153 (-1.4%)
	AN	-161 (-2.9%)	-59 (-1.1%)	-112 (-2%)	-9 (-0.2%)	-359 (-6.3%)	95 (1.8%)
	BN	254 (4.7%)	87 (1.6%)	467 (9%)	300 (5.8%)	-190 (-3.3%)	306 (5.9%)
	D	-338 (-8%)	-242 (-5.7%)	-38 (-1%)	58 (1.5%)	-6 (-0.2%)	37 (0.9%)
	C	-125 (-3.3%)	-215 (-5.6%)	169 (4.8%)	79 (2.2%)	110 (3.1%)	31 (0.9%)
	All	-12 (-0.2%)	-679 (-9.3%)	561 (8.4%)	-107 (-1.6%)	-23 (-0.3%)	30 (0.5%)

[a] A positive value indicates higher average flows in the ESO than in the EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-206. Mean Monthly Flows (cfs) in Sacramento River Upstream of Red Bluff for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	28,036	27,416	29,368	30,390	29,799	30,699
	AN	16,725	16,067	16,267	16,885	16,960	16,472
	BN	9,381	9,215	9,267	9,146	9,842	9,299
	D	7,098	7,028	7,262	7,262	7,261	6,967
	C	6,143	6,389	6,497	6,942	6,222	7,077
	All	15,396	15,095	15,819	16,278	16,115	16,297
Feb	W	30,255	30,054	32,712	33,472	32,853	33,502
	AN	23,492	23,295	24,422	24,828	25,247	25,402
	BN	12,005	11,748	12,508	11,614	12,855	12,368
	D	8,947	9,030	8,785	8,790	8,843	8,788
	C	6,599	6,643	6,404	6,378	6,527	6,365
	All	18,010	17,899	18,947	19,092	19,203	19,312
Mar	W	25,004	25,034	25,473	26,210	25,481	26,282
	AN	16,599	15,943	16,222	16,428	16,753	16,409
	BN	9,333	8,924	8,438	8,474	8,598	8,402
	D	8,385	8,392	8,349	8,300	8,260	8,238
	C	5,999	6,175	6,126	6,101	6,323	6,362
	All	14,669	14,540	14,621	14,876	14,738	14,909
Apr	W	15,172	15,191	15,078	14,842	15,066	14,719
	AN	10,477	10,423	9,983	9,761	10,090	10,051
	BN	8,711	8,496	8,239	8,282	8,299	8,689
	D	7,948	7,763	7,654	7,661	7,789	7,902
	C	7,742	7,611	7,628	7,829	7,600	7,777
	All	10,709	10,610	10,445	10,376	10,493	10,494
May	W	12,541	12,504	11,224	10,073	11,232	10,464
	AN	10,012	10,017	9,623	10,047	10,502	11,230
	BN	8,781	8,580	8,030	7,875	8,423	8,768
	D	8,677	8,540	8,424	9,012	8,841	9,935
	C	7,746	7,721	7,956	8,348	7,975	8,533
	All	9,979	9,900	9,351	9,208	9,644	9,888
Jun	W	11,905	12,002	11,591	11,720	11,849	12,681
	AN	12,001	12,225	12,227	12,789	12,882	14,358
	BN	11,464	11,496	11,304	11,651	11,988	12,406
	D	11,777	11,834	12,028	12,441	12,699	13,183
	C	10,885	11,123	11,539	11,881	11,748	11,937
	All	11,666	11,783	11,723	12,046	12,196	12,881
Jul	W	13,255	13,418	13,937	14,525	14,157	14,651
	AN	14,129	14,381	14,594	15,142	14,662	14,975
	BN	13,011	13,090	13,272	13,258	13,741	13,098
	D	13,368	13,541	13,741	13,826	13,737	12,859
	C	13,005	12,771	12,344	12,149	12,632	11,851
	All	13,329	13,435	13,643	13,898	13,845	13,630

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	11,284	11,261	10,700	10,735	10,773	10,689
	AN	10,580	10,824	10,968	11,775	11,295	11,424
	BN	10,202	10,285	9,971	10,364	10,845	10,277
	D	10,747	10,913	10,610	11,143	9,524	9,582
	C	9,590	9,656	8,632	7,665	8,326	7,128
	All	10,630	10,719	10,292	10,464	10,229	9,962
Sep	W	9,856	12,843	12,494	13,312	12,202	13,674
	AN	6,279	8,606	9,634	10,320	8,255	9,739
	BN	5,821	5,824	6,038	5,963	5,510	5,201
	D	6,391	6,098	5,424	4,911	4,991	5,505
	C	5,887	5,645	5,279	4,838	5,112	5,727
	All	7,302	8,491	8,365	8,535	7,862	8,695
Oct	W	8,020	7,686	7,662	8,188	7,585	8,048
	AN	8,112	7,306	7,108	8,162	6,773	8,257
	BN	7,094	7,038	6,544	7,778	6,376	7,146
	D	6,903	6,716	6,690	7,287	6,648	7,107
	C	6,670	6,420	6,254	6,537	5,951	6,411
	All	7,432	7,122	6,971	7,675	6,815	7,478
Nov	W	9,876	11,032	10,966	10,821	9,839	9,653
	AN	8,144	8,918	9,362	9,098	7,725	7,430
	BN	6,791	7,565	7,710	7,682	6,338	6,597
	D	7,548	7,370	7,421	7,347	6,601	6,480
	C	5,811	5,905	5,805	5,703	5,456	5,416
	All	7,990	8,576	8,642	8,521	7,580	7,489
Dec	W	21,015	19,736	21,554	19,613	21,714	19,469
	AN	10,019	10,030	10,370	10,053	10,021	10,161
	BN	8,408	8,235	8,921	8,228	8,741	8,541
	D	7,292	7,053	7,044	7,091	7,046	7,137
	C	5,628	5,393	5,465	5,433	5,582	5,480
	All	11,989	11,469	12,221	11,446	12,207	11,487

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-207. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Sacramento River Upstream of Red Bluff

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	1762 (6.3%)	2663 (9.5%)	2383 (8.7%)	3284 (12%)	431 (1.5%)	309 (1%)
	AN	236 (1.4%)	-252 (-1.5%)	894 (5.6%)	405 (2.5%)	694 (4.3%)	-413 (-2.4%)
	BN	460 (4.9%)	-82 (-0.9%)	627 (6.8%)	84 (0.9%)	574 (6.2%)	153 (1.7%)
	D	163 (2.3%)	-131 (-1.8%)	233 (3.3%)	-62 (-0.9%)	-1 (0%)	-295 (-4.1%)
	C	79 (1.3%)	934 (15.2%)	-166 (-2.6%)	689 (10.8%)	-275 (-4.2%)	135 (1.9%)
	All	719 (4.7%)	901 (5.9%)	1020 (6.8%)	1202 (8%)	296 (1.9%)	19 (0.1%)
Feb	W	2598 (8.6%)	3247 (10.7%)	2799 (9.3%)	3448 (11.5%)	142 (0.4%)	30 (0.1%)
	AN	1756 (7.5%)	1910 (8.1%)	1952 (8.4%)	2106 (9%)	825 (3.4%)	574 (2.3%)
	BN	850 (7.1%)	363 (3%)	1106 (9.4%)	620 (5.3%)	346 (2.8%)	754 (6.5%)
	D	-104 (-1.2%)	-159 (-1.8%)	-187 (-2.1%)	-242 (-2.7%)	58 (0.7%)	-2 (0%)
	C	-72 (-1.1%)	-234 (-3.5%)	-116 (-1.7%)	-278 (-4.2%)	123 (1.9%)	-13 (-0.2%)
	All	1193 (6.6%)	1302 (7.2%)	1304 (7.3%)	1413 (7.9%)	255 (1.3%)	220 (1.2%)
Mar	W	478 (1.9%)	1279 (5.1%)	447 (1.8%)	1248 (5%)	8 (0%)	72 (0.3%)
	AN	154 (0.9%)	-190 (-1.1%)	809 (5.1%)	465 (2.9%)	530 (3.3%)	-20 (-0.1%)
	BN	-735 (-7.9%)	-931 (-10%)	-327 (-3.7%)	-523 (-5.9%)	160 (1.9%)	-72 (-0.8%)
	D	-125 (-1.5%)	-147 (-1.8%)	-132 (-1.6%)	-154 (-1.8%)	-89 (-1.1%)	-62 (-0.7%)
	C	324 (5.4%)	363 (6.1%)	148 (2.4%)	187 (3%)	197 (3.2%)	261 (4.3%)
	All	68 (0.5%)	240 (1.6%)	197 (1.4%)	368 (2.5%)	117 (0.8%)	32 (0.2%)
Apr	W	-106 (-0.7%)	-453 (-3%)	-125 (-0.8%)	-471 (-3.1%)	-12 (-0.1%)	-123 (-0.8%)
	AN	-387 (-3.7%)	-426 (-4.1%)	-333 (-3.2%)	-372 (-3.6%)	107 (1.1%)	290 (3%)
	BN	-411 (-4.7%)	-22 (-0.3%)	-197 (-2.3%)	193 (2.3%)	61 (0.7%)	406 (4.9%)
	D	-159 (-2%)	-46 (-0.6%)	26 (0.3%)	139 (1.8%)	135 (1.8%)	241 (3.1%)
	C	-142 (-1.8%)	34 (0.4%)	-11 (-0.1%)	166 (2.2%)	-28 (-0.4%)	-53 (-0.7%)
	All	-216 (-2%)	-215 (-2%)	-118 (-1.1%)	-116 (-1.1%)	48 (0.5%)	118 (1.1%)
May	W	-1308 (-10.4%)	-2077 (-16.6%)	-1272 (-10.2%)	-2040 (-16.3%)	8 (0.1%)	391 (3.9%)
	AN	490 (4.9%)	1218 (12.2%)	485 (4.8%)	1214 (12.1%)	879 (9.1%)	1184 (11.8%)
	BN	-358 (-4.1%)	-13 (-0.1%)	-157 (-1.8%)	188 (2.2%)	393 (4.9%)	893 (11.3%)
	D	164 (1.9%)	1258 (14.5%)	301 (3.5%)	1395 (16.3%)	417 (4.9%)	923 (10.2%)
	C	229 (3%)	787 (10.2%)	254 (3.3%)	812 (10.5%)	19 (0.2%)	185 (2.2%)
	All	-335 (-3.4%)	-91 (-0.9%)	-256 (-2.6%)	-12 (-0.1%)	293 (3.1%)	679 (7.4%)
Jun	W	-56 (-0.5%)	775 (6.5%)	-152 (-1.3%)	679 (5.7%)	259 (2.2%)	961 (8.2%)
	AN	881 (7.3%)	2357 (19.6%)	657 (5.4%)	2133 (17.4%)	655 (5.4%)	1568 (12.3%)
	BN	524 (4.6%)	942 (8.2%)	492 (4.3%)	911 (7.9%)	684 (6.1%)	756 (6.5%)
	D	922 (7.8%)	1406 (11.9%)	865 (7.3%)	1349 (11.4%)	671 (5.6%)	742 (6%)
	C	864 (7.9%)	1052 (9.7%)	626 (5.6%)	814 (7.3%)	210 (1.8%)	56 (0.5%)
	All	529 (4.5%)	1214 (10.4%)	413 (3.5%)	1098 (9.3%)	473 (4%)	834 (6.9%)
Jul	W	903 (6.8%)	1396 (10.5%)	739 (5.5%)	1233 (9.2%)	221 (1.6%)	126 (0.9%)
	AN	532 (3.8%)	846 (6%)	281 (2%)	595 (4.1%)	67 (0.5%)	-166 (-1.1%)
	BN	729 (5.6%)	87 (0.7%)	651 (5%)	8 (0.1%)	468 (3.5%)	-160 (-1.2%)
	D	369 (2.8%)	-509 (-3.8%)	197 (1.5%)	-681 (-5%)	-3 (0%)	-967 (-7%)
	C	-373 (-2.9%)	-1153 (-8.9%)	-139 (-1.1%)	-919 (-7.2%)	288 (2.3%)	-298 (-2.5%)
	All	515 (3.9%)	301 (2.3%)	409 (3%)	195 (1.5%)	201 (1.5%)	-268 (-1.9%)

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-511 (-4.5%)	-594 (-5.3%)	-488 (-4.3%)	-572 (-5.1%)	73 (0.7%)	-46 (-0.4%)
	AN	715 (6.8%)	843 (8%)	471 (4.4%)	599 (5.5%)	327 (3%)	-351 (-3%)
	BN	643 (6.3%)	75 (0.7%)	560 (5.4%)	-8 (-0.1%)	873 (8.8%)	-87 (-0.8%)
	D	-1223 (-11.4%)	-1165 (-10.8%)	-1390 (-12.7%)	-1332 (-12.2%)	-1086 (-10.2%)	-1561 (-14%)
	C	-1264 (-13.2%)	-2463 (-25.7%)	-1330 (-13.8%)	-2528 (-26.2%)	-306 (-3.5%)	-537 (-7%)
	All	-401 (-3.8%)	-668 (-6.3%)	-490 (-4.6%)	-757 (-7.1%)	-63 (-0.6%)	-502 (-4.8%)
Sep	W	2346 (23.8%)	3818 (38.7%)	-641 (-5%)	830 (6.5%)	-292 (-2.3%)	361 (2.7%)
	AN	1976 (31.5%)	3460 (55.1%)	-351 (-4.1%)	1133 (13.2%)	-1379 (-14.3%)	-581 (-5.6%)
	BN	-311 (-5.3%)	-620 (-10.6%)	-315 (-5.4%)	-623 (-10.7%)	-528 (-8.7%)	-762 (-12.8%)
	D	-1400 (-21.9%)	-886 (-13.9%)	-1107 (-18.2%)	-594 (-9.7%)	-433 (-8%)	594 (12.1%)
	C	-774 (-13.2%)	-160 (-2.7%)	-532 (-9.4%)	82 (1.5%)	-166 (-3.2%)	889 (18.4%)
	All	559 (7.7%)	1393 (19.1%)	-629 (-7.4%)	204 (2.4%)	-504 (-6%)	160 (1.9%)
Oct	W	-434 (-5.4%)	28 (0.4%)	-101 (-1.3%)	362 (4.7%)	-77 (-1%)	-140 (-1.7%)
	AN	-1339 (-16.5%)	145 (1.8%)	-533 (-7.3%)	951 (13%)	-335 (-4.7%)	95 (1.2%)
	BN	-718 (-10.1%)	52 (0.7%)	-662 (-9.4%)	108 (1.5%)	-168 (-2.6%)	-632 (-8.1%)
	D	-255 (-3.7%)	204 (3%)	-69 (-1%)	391 (5.8%)	-42 (-0.6%)	-180 (-2.5%)
	C	-719 (-10.8%)	-259 (-3.9%)	-469 (-7.3%)	-9 (-0.1%)	-302 (-4.8%)	-126 (-1.9%)
	All	-618 (-8.3%)	46 (0.6%)	-307 (-4.3%)	357 (5%)	-156 (-2.2%)	-196 (-2.6%)
Nov	W	-37 (-0.4%)	-223 (-2.3%)	-1192 (-10.8%)	-1378 (-12.5%)	-1127 (-10.3%)	-1168 (-10.8%)
	AN	-419 (-5.1%)	-714 (-8.8%)	-1194 (-13.4%)	-1488 (-16.7%)	-1637 (-17.5%)	-1668 (-18.3%)
	BN	-452 (-6.7%)	-194 (-2.9%)	-1227 (-16.2%)	-968 (-12.8%)	-1372 (-17.8%)	-1085 (-14.1%)
	D	-947 (-12.5%)	-1068 (-14.2%)	-768 (-10.4%)	-890 (-12.1%)	-820 (-11%)	-867 (-11.8%)
	C	-356 (-6.1%)	-395 (-6.8%)	-450 (-7.6%)	-489 (-8.3%)	-350 (-6%)	-287 (-5%)
	All	-410 (-5.1%)	-501 (-6.3%)	-997 (-11.6%)	-1087 (-12.7%)	-1062 (-12.3%)	-1032 (-12.1%)
Dec	W	698 (3.3%)	-1546 (-7.4%)	1978 (10%)	-267 (-1.4%)	159 (0.7%)	-144 (-0.7%)
	AN	2 (0%)	141 (1.4%)	-9 (-0.1%)	131 (1.3%)	-348 (-3.4%)	107 (1.1%)
	BN	333 (4%)	133 (1.6%)	506 (6.1%)	306 (3.7%)	-180 (-2%)	313 (3.8%)
	D	-246 (-3.4%)	-155 (-2.1%)	-7 (-0.1%)	84 (1.2%)	1 (0%)	45 (0.6%)
	C	-46 (-0.8%)	-148 (-2.6%)	188 (3.5%)	86 (1.6%)	117 (2.1%)	47 (0.9%)
	All	218 (1.8%)	-503 (-4.2%)	738 (6.4%)	18 (0.2%)	-14 (-0.1%)	40 (0.4%)

[a] A positive value indicates higher mean flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-208. Mean Monthly Flows (cfs) in Sacramento River at Wilkins Slough for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	19,145	19,105	19,250	19,320	19,275	19,359
	AN	17,084	16,512	16,521	16,593	16,611	16,553
	BN	12,521	12,400	12,322	12,143	12,640	12,270
	D	8,896	8,849	8,896	9,189	8,825	8,906
	C	7,858	8,081	8,152	8,586	7,860	8,744
	All	13,811	13,716	13,771	13,901	13,788	13,890
Feb	W	19,887	19,831	19,976	20,044	19,992	20,053
	AN	19,139	19,071	19,134	19,095	19,219	19,120
	BN	14,528	14,370	14,508	14,328	14,557	14,445
	D	11,520	11,580	11,451	11,473	11,451	11,471
	C	8,499	8,495	8,220	8,158	8,354	8,135
	All	15,359	15,317	15,327	15,309	15,373	15,331
Mar	W	18,223	18,261	18,325	18,323	18,323	18,324
	AN	17,696	17,632	17,638	17,537	17,712	17,686
	BN	12,208	12,011	11,505	11,534	11,673	11,462
	D	11,364	11,392	11,289	11,191	11,264	11,337
	C	8,101	8,272	8,201	8,166	8,386	8,426
	All	14,132	14,132	14,034	13,997	14,095	14,077
Apr	W	13,392	13,400	13,312	13,119	13,315	13,032
	AN	10,264	10,199	10,038	9,783	10,063	10,072
	BN	7,152	7,022	6,795	6,858	6,847	7,262
	D	5,319	5,201	5,082	5,112	5,217	5,342
	C	4,164	4,127	4,136	4,331	4,097	4,264
	All	8,746	8,686	8,571	8,518	8,608	8,642
May	W	10,467	10,345	9,445	8,435	9,447	8,826
	AN	7,318	7,244	6,978	7,500	7,820	8,652
	BN	5,638	5,423	4,981	4,871	5,315	5,712
	D	4,669	4,507	4,454	5,088	4,817	5,974
	C	3,998	3,936	4,155	4,528	4,177	4,728
	All	6,962	6,832	6,452	6,383	6,716	7,043
Jun	W	6,503	6,421	6,226	6,435	6,467	7,353
	AN	5,781	5,873	5,958	6,530	6,523	8,036
	BN	5,243	5,257	5,205	5,628	5,811	6,330
	D	5,245	5,297	5,586	6,075	6,212	6,758
	C	5,140	5,343	5,753	6,253	5,957	6,129
	All	5,707	5,738	5,803	6,205	6,233	6,968
Jul	W	6,685	6,592	7,162	7,771	7,367	7,838
	AN	6,971	7,039	7,307	7,892	7,304	7,667
	BN	6,122	6,147	6,503	6,560	6,873	6,378
	D	6,788	6,947	7,240	7,474	7,172	6,435
	C	7,162	6,872	6,577	6,649	6,708	6,366
	All	6,723	6,700	7,002	7,353	7,134	7,041

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	6,287	6,030	5,492	5,537	5,548	5,482
	AN	5,498	5,578	5,765	6,610	6,063	6,280
	BN	5,138	5,156	4,984	5,462	5,755	5,350
	D	5,833	5,952	5,723	6,356	4,574	4,799
	C	5,551	5,569	4,963	4,719	4,578	4,524
	All	5,768	5,730	5,419	5,741	5,303	5,286
Sep	W	9,338	12,208	11,904	12,737	11,624	13,105
	AN	5,631	7,841	8,877	9,546	7,485	8,995
	BN	5,128	5,054	5,291	5,216	4,733	4,453
	D	5,636	5,281	4,629	4,114	4,269	4,783
	C	5,200	4,904	4,689	4,354	4,514	5,303
	All	6,658	7,758	7,679	7,866	7,187	8,058
Oct	W	7,347	6,909	6,876	7,382	6,840	7,240
	AN	6,799	5,904	5,809	6,927	5,523	6,943
	BN	5,987	5,847	5,344	6,570	5,196	5,935
	D	5,688	5,382	5,411	6,040	5,386	5,809
	C	5,642	5,314	5,205	5,572	4,902	5,531
	All	6,421	6,012	5,892	6,617	5,764	6,409
Nov	W	9,644	10,899	10,843	10,889	9,684	9,709
	AN	8,210	9,033	9,465	9,141	7,845	7,467
	BN	6,793	7,538	7,688	7,588	6,308	6,539
	D	7,407	7,310	7,354	7,227	6,528	6,394
	C	5,118	5,185	5,081	4,986	4,722	4,679
	All	7,794	8,428	8,494	8,402	7,419	7,376
Dec	W	17,881	17,447	17,819	17,257	17,877	17,141
	AN	10,809	10,876	10,921	10,755	10,833	10,981
	BN	8,505	8,283	8,283	8,258	8,306	8,458
	D	8,950	8,707	8,665	8,725	8,633	8,813
	C	6,229	5,947	5,989	5,981	6,122	6,010
	All	11,580	11,319	11,441	11,246	11,463	11,300

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

1 **Table 5C.5.3-209. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in**
2 **Sacramento River at Wilkins Slough**

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	130 (0.7%)	214 (1.1%)	170 (0.9%)	253 (1.3%)	25 (0.1%)	38 (0.2%)
	AN	-473 (-2.8%)	-531 (-3.1%)	100 (0.6%)	41 (0.2%)	90 (0.5%)	-41 (-0.2%)
	BN	119 (1%)	-251 (-2%)	241 (1.9%)	-130 (-1%)	318 (2.6%)	127 (1%)
	D	-70 (-0.8%)	11 (0.1%)	-24 (-0.3%)	57 (0.6%)	-71 (-0.8%)	-282 (-3.1%)
	C	3 (0%)	886 (11.3%)	-221 (-2.7%)	663 (8.2%)	-292 (-3.6%)	158 (1.8%)
	All	-23 (-0.2%)	79 (0.6%)	72 (0.5%)	174 (1.3%)	17 (0.1%)	-11 (-0.1%)
Feb	W	104 (0.5%)	166 (0.8%)	161 (0.8%)	222 (1.1%)	16 (0.1%)	9 (0%)
	AN	80 (0.4%)	-19 (-0.1%)	149 (0.8%)	49 (0.3%)	85 (0.4%)	24 (0.1%)
	BN	30 (0.2%)	-83 (-0.6%)	187 (1.3%)	75 (0.5%)	49 (0.3%)	117 (0.8%)
	D	-68 (-0.6%)	-49 (-0.4%)	-129 (-1.1%)	-109 (-0.9%)	0 (0%)	-2 (0%)
	C	-145 (-1.7%)	-364 (-4.3%)	-141 (-1.7%)	-360 (-4.2%)	134 (1.6%)	-24 (-0.3%)
	All	14 (0.1%)	-28 (-0.2%)	56 (0.4%)	14 (0.1%)	46 (0.3%)	22 (0.1%)
Mar	W	101 (0.6%)	101 (0.6%)	63 (0.3%)	63 (0.3%)	-1 (0%)	1 (0%)
	AN	17 (0.1%)	-10 (-0.1%)	80 (0.5%)	54 (0.3%)	75 (0.4%)	149 (0.9%)
	BN	-535 (-4.4%)	-745 (-6.1%)	-338 (-2.8%)	-549 (-4.6%)	168 (1.5%)	-72 (-0.6%)
	D	-100 (-0.9%)	-27 (-0.2%)	-128 (-1.1%)	-55 (-0.5%)	-25 (-0.2%)	146 (1.3%)
	C	285 (3.5%)	325 (4%)	114 (1.4%)	154 (1.9%)	185 (2.3%)	260 (3.2%)
	All	-37 (-0.3%)	-55 (-0.4%)	-38 (-0.3%)	-55 (-0.4%)	61 (0.4%)	80 (0.6%)
Apr	W	-77 (-0.6%)	-360 (-2.7%)	-85 (-0.6%)	-368 (-2.7%)	3 (0%)	-87 (-0.7%)
	AN	-200 (-1.9%)	-191 (-1.9%)	-135 (-1.3%)	-127 (-1.2%)	25 (0.3%)	290 (3%)
	BN	-305 (-4.3%)	109 (1.5%)	-174 (-2.5%)	240 (3.4%)	52 (0.8%)	404 (5.9%)
	D	-103 (-1.9%)	22 (0.4%)	15 (0.3%)	141 (2.7%)	134 (2.6%)	229 (4.5%)
	C	-67 (-1.6%)	100 (2.4%)	-30 (-0.7%)	137 (3.3%)	-39 (-1%)	-67 (-1.5%)
	All	-138 (-1.6%)	-104 (-1.2%)	-77 (-0.9%)	-43 (-0.5%)	37 (0.4%)	124 (1.5%)
May	W	-1019 (-9.7%)	-1641 (-15.7%)	-898 (-8.7%)	-1519 (-14.7%)	3 (0%)	391 (4.6%)
	AN	502 (6.9%)	1334 (18.2%)	575 (7.9%)	1407 (19.4%)	841 (12.1%)	1152 (15.4%)
	BN	-323 (-5.7%)	74 (1.3%)	-109 (-2%)	289 (5.3%)	334 (6.7%)	841 (17.3%)
	D	148 (3.2%)	1305 (28%)	309 (6.9%)	1467 (32.5%)	363 (8.2%)	887 (17.4%)
	C	179 (4.5%)	730 (18.3%)	241 (6.1%)	792 (20.1%)	22 (0.5%)	200 (4.4%)
	All	-246 (-3.5%)	81 (1.2%)	-116 (-1.7%)	211 (3.1%)	264 (4.1%)	660 (10.3%)
Jun	W	-36 (-0.6%)	849 (13.1%)	46 (0.7%)	932 (14.5%)	241 (3.9%)	917 (14.3%)
	AN	742 (12.8%)	2255 (39%)	649 (11.1%)	2163 (36.8%)	565 (9.5%)	1506 (23.1%)
	BN	568 (10.8%)	1087 (20.7%)	554 (10.5%)	1073 (20.4%)	606 (11.6%)	702 (12.5%)
	D	967 (18.4%)	1513 (28.8%)	915 (17.3%)	1461 (27.6%)	626 (11.2%)	683 (11.3%)
	C	817 (15.9%)	988 (19.2%)	614 (11.5%)	786 (14.7%)	205 (3.6%)	-124 (-2%)
	All	526 (9.2%)	1262 (22.1%)	495 (8.6%)	1231 (21.5%)	430 (7.4%)	763 (12.3%)
Jul	W	682 (10.2%)	1154 (17.3%)	774 (11.7%)	1246 (18.9%)	204 (2.9%)	67 (0.9%)
	AN	333 (4.8%)	696 (10%)	265 (3.8%)	628 (8.9%)	-3 (0%)	-225 (-2.8%)
	BN	751 (12.3%)	256 (4.2%)	727 (11.8%)	231 (3.8%)	370 (5.7%)	-182 (-2.8%)
	D	385 (5.7%)	-352 (-5.2%)	226 (3.2%)	-511 (-7.4%)	-68 (-0.9%)	-1039 (-13.9%)
	C	-454 (-6.3%)	-795 (-11.1%)	-164 (-2.4%)	-506 (-7.4%)	131 (2%)	-283 (-4.3%)
	All	411 (6.1%)	318 (4.7%)	434 (6.5%)	340 (5.1%)	132 (1.9%)	-312 (-4.2%)

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-739 (-11.8%)	-805 (-12.8%)	-481 (-8%)	-548 (-9.1%)	56 (1%)	-54 (-1%)
	AN	565 (10.3%)	782 (14.2%)	486 (8.7%)	703 (12.6%)	299 (5.2%)	-330 (-5%)
	BN	617 (12%)	213 (4.1%)	599 (11.6%)	195 (3.8%)	770 (15.5%)	-112 (-2%)
	D	-1259 (-21.6%)	-1034 (-17.7%)	-1379 (-23.2%)	-1153 (-19.4%)	-1149 (-20.1%)	-1557 (-24.5%)
	C	-973 (-17.5%)	-1027 (-18.5%)	-991 (-17.8%)	-1045 (-18.8%)	-385 (-7.8%)	-195 (-4.1%)
	All	-465 (-8.1%)	-482 (-8.3%)	-427 (-7.5%)	-444 (-7.7%)	-115 (-2.1%)	-455 (-7.9%)
Sep	W	2287 (24.5%)	3768 (40.4%)	-584 (-4.8%)	897 (7.4%)	-279 (-2.3%)	368 (2.9%)
	AN	1853 (32.9%)	3363 (59.7%)	-357 (-4.5%)	1153 (14.7%)	-1393 (-15.7%)	-551 (-5.8%)
	BN	-395 (-7.7%)	-675 (-13.2%)	-321 (-6.4%)	-601 (-11.9%)	-558 (-10.6%)	-763 (-14.6%)
	D	-1367 (-24.2%)	-853 (-15.1%)	-1012 (-19.2%)	-498 (-9.4%)	-360 (-7.8%)	669 (16.3%)
	C	-686 (-13.2%)	103 (2%)	-391 (-8%)	398 (8.1%)	-175 (-3.7%)	949 (21.8%)
	All	528 (7.9%)	1399 (21%)	-571 (-7.4%)	300 (3.9%)	-492 (-6.4%)	191 (2.4%)
Oct	W	-507 (-6.9%)	-107 (-1.5%)	-69 (-1%)	331 (4.8%)	-36 (-0.5%)	-142 (-1.9%)
	AN	-1277 (-18.8%)	143 (2.1%)	-381 (-6.5%)	1039 (17.6%)	-286 (-4.9%)	16 (0.2%)
	BN	-790 (-13.2%)	-51 (-0.9%)	-651 (-11.1%)	88 (1.5%)	-148 (-2.8%)	-635 (-9.7%)
	D	-302 (-5.3%)	121 (2.1%)	5 (0.1%)	427 (7.9%)	-25 (-0.5%)	-231 (-3.8%)
	C	-739 (-13.1%)	-111 (-2%)	-412 (-7.7%)	217 (4.1%)	-303 (-5.8%)	-41 (-0.7%)
	All	-657 (-10.2%)	-11 (-0.2%)	-248 (-4.1%)	397 (6.6%)	-128 (-2.2%)	-208 (-3.1%)
Nov	W	40 (0.4%)	65 (0.7%)	-1215 (-11.2%)	-1190 (-10.9%)	-1159 (-10.7%)	-1180 (-10.8%)
	AN	-365 (-4.4%)	-742 (-9%)	-1188 (-13.2%)	-1566 (-17.3%)	-1620 (-17.1%)	-1673 (-18.3%)
	BN	-485 (-7.1%)	-254 (-3.7%)	-1230 (-16.3%)	-999 (-13.3%)	-1380 (-17.9%)	-1049 (-13.8%)
	D	-880 (-11.9%)	-1013 (-13.7%)	-782 (-10.7%)	-916 (-12.5%)	-826 (-11.2%)	-833 (-11.5%)
	C	-396 (-7.7%)	-439 (-8.6%)	-464 (-8.9%)	-506 (-9.8%)	-360 (-7.1%)	-306 (-6.1%)
	All	-375 (-4.8%)	-418 (-5.4%)	-1009 (-12%)	-1052 (-12.5%)	-1074 (-12.6%)	-1026 (-12.2%)
Dec	W	-4 (0%)	-740 (-4.1%)	431 (2.5%)	-306 (-1.8%)	58 (0.3%)	-116 (-0.7%)
	AN	24 (0.2%)	173 (1.6%)	-43 (-0.4%)	105 (1%)	-88 (-0.8%)	227 (2.1%)
	BN	-199 (-2.3%)	-48 (-0.6%)	23 (0.3%)	174 (2.1%)	23 (0.3%)	199 (2.4%)
	D	-316 (-3.5%)	-137 (-1.5%)	-73 (-0.8%)	106 (1.2%)	-32 (-0.4%)	88 (1%)
	C	-107 (-1.7%)	-219 (-3.5%)	175 (2.9%)	63 (1.1%)	134 (2.2%)	29 (0.5%)
	All	-117 (-1%)	-280 (-2.4%)	144 (1.3%)	-19 (-0.2%)	22 (0.2%)	54 (0.5%)

[a] A positive value indicates higher mean flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

1 **Table 5C.5.3-210. Mean Monthly Flows (cfs) in Sacramento River at Verona for EBC and ESO Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		3	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	44,589	44,222	45,074	45,567	43,368	43,978
	AN	34,120	32,683	32,939	33,671	31,498	31,703
	BN	20,175	19,166	19,324	19,121	17,820	17,594
	D	14,756	14,410	14,643	14,782	14,042	13,967
	C	12,085	12,116	12,331	13,051	11,618	12,837
	All	27,583	27,013	27,430	27,795	26,185	26,532
Feb	W	49,892	49,358	50,745	51,326	49,193	50,214
	AN	39,162	38,278	39,631	39,749	38,675	38,602
	BN	26,429	25,327	25,717	25,341	23,861	24,153
	D	18,402	18,272	18,079	18,090	17,146	17,163
	C	12,822	12,706	12,387	12,325	12,073	11,881
	All	31,979	31,446	32,062	32,192	30,862	31,200
Mar	W	43,455	43,320	44,098	44,624	42,020	42,403
	AN	39,477	38,721	39,691	39,687	37,948	37,875
	BN	21,484	20,234	19,717	19,448	18,292	17,809
	D	17,868	17,665	17,411	17,649	16,398	16,658
	C	11,903	11,767	11,765	11,789	11,745	11,736
	All	28,888	28,456	28,700	28,877	27,318	27,402
Apr	W	32,219	32,298	32,102	31,636	29,808	29,403
	AN	22,250	22,228	21,717	21,313	20,331	20,197
	BN	14,459	14,169	13,834	13,857	13,363	14,249
	D	11,113	11,051	10,967	10,903	11,113	11,498
	C	9,420	9,374	9,304	9,489	9,388	9,555
	All	19,759	19,710	19,488	19,298	18,522	18,634
May	W	26,193	26,069	23,714	20,229	23,617	20,855
	AN	17,079	16,918	16,427	16,002	18,037	17,899
	BN	11,451	11,175	10,653	10,534	11,070	12,319
	D	9,283	9,116	9,086	9,841	9,621	10,969
	C	7,125	7,030	7,408	7,611	7,148	7,671
	All	15,840	15,679	14,820	13,828	15,176	14,865
Jun	W	18,367	18,331	15,664	15,304	17,607	18,346
	AN	13,590	13,754	12,877	13,574	16,073	17,972
	BN	11,062	11,101	10,888	11,320	14,747	14,742
	D	10,429	10,681	10,702	10,780	12,174	11,870
	C	8,911	9,132	9,441	9,827	9,315	9,578
	All	13,295	13,401	12,441	12,576	14,488	14,971
Jul	W	16,253	16,417	17,144	17,965	16,859	17,237
	AN	17,488	17,919	18,014	18,338	18,091	18,003
	BN	16,698	16,871	16,823	16,598	16,747	15,348
	D	16,352	16,474	16,245	16,465	14,669	12,407
	C	14,476	13,644	13,348	12,457	10,570	9,749
	All	16,271	16,321	16,464	16,651	15,619	14,871

Month	Water-Year Type[a]	Scenario[b]					
		3	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	12,464	12,763	13,393	14,016	12,720	12,540
	AN	13,691	14,088	14,684	15,828	14,626	14,064
	BN	13,389	13,543	13,098	14,074	13,438	12,640
	D	14,688	13,865	13,057	13,018	10,148	10,109
	C	9,207	9,262	8,300	8,085	8,359	7,776
	All	12,813	12,820	12,713	13,204	11,919	11,549
Sep	W	14,279	23,282	22,873	23,592	20,732	22,522
	AN	10,537	17,532	18,667	19,044	15,782	16,665
	BN	9,961	10,138	10,768	10,576	8,819	8,446
	D	10,542	9,828	8,618	7,664	7,884	8,385
	C	7,764	7,552	7,264	6,832	7,287	8,062
	All	11,220	14,941	14,777	14,755	13,186	14,042
Oct	W	11,503	10,891	10,681	11,232	10,829	11,049
	AN	9,381	8,866	8,617	9,890	8,462	10,231
	BN	9,867	9,327	8,868	10,146	8,865	9,468
	D	8,681	8,342	8,515	8,989	8,949	9,138
	C	8,543	7,996	7,862	8,104	7,556	8,534
	All	9,861	9,344	9,181	9,900	9,256	9,872
Nov	W	15,307	16,396	16,176	15,754	15,027	14,453
	AN	11,792	12,842	13,177	12,817	11,449	10,873
	BN	9,852	10,604	10,676	10,437	9,186	9,306
	D	10,157	9,877	10,024	9,731	9,185	8,924
	C	7,341	7,438	7,283	7,223	6,884	6,760
	All	11,565	12,145	12,146	11,846	11,032	10,711
Dec	W	33,840	31,867	33,224	31,254	31,091	29,513
	AN	17,572	18,022	18,415	18,481	17,617	17,667
	BN	13,099	13,270	13,257	13,028	13,009	12,914
	D	12,685	12,540	12,465	12,532	12,298	12,285
	C	9,770	9,084	8,724	8,627	8,974	9,443
	All	19,752	19,089	19,506	18,852	18,670	18,227

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-211. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Sacramento River at Verona

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	-1221 (-2.7%)	-611 (-1.4%)	-854 (-1.9%)	-244 (-0.6%)	-1706 (-3.8%)	-1589 (-3.5%)
	AN	-2623 (-7.7%)	-2417 (-7.1%)	-1185 (-3.6%)	-980 (-3%)	-1441 (-4.4%)	-1968 (-5.8%)
	BN	-2355 (-11.7%)	-2582 (-12.8%)	-1346 (-7%)	-1573 (-8.2%)	-1504 (-7.8%)	-1527 (-8%)
	D	-714 (-4.8%)	-789 (-5.3%)	-367 (-2.5%)	-442 (-3.1%)	-601 (-4.1%)	-815 (-5.5%)
	C	-467 (-3.9%)	752 (6.2%)	-498 (-4.1%)	721 (5.9%)	-713 (-5.8%)	-214 (-1.6%)
	All	-1398 (-5.1%)	-1051 (-3.8%)	-828 (-3.1%)	-481 (-1.8%)	-1245 (-4.5%)	-1263 (-4.5%)
Feb	W	-699 (-1.4%)	322 (0.6%)	-165 (-0.3%)	856 (1.7%)	-1552 (-3.1%)	-1112 (-2.2%)
	AN	-487 (-1.2%)	-560 (-1.4%)	397 (1%)	324 (0.8%)	-956 (-2.4%)	-1147 (-2.9%)
	BN	-2568 (-9.7%)	-2276 (-8.6%)	-1466 (-5.8%)	-1174 (-4.6%)	-1857 (-7.2%)	-1188 (-4.7%)
	D	-1256 (-6.8%)	-1239 (-6.7%)	-1125 (-6.2%)	-1109 (-6.1%)	-932 (-5.2%)	-927 (-5.1%)
	C	-749 (-5.8%)	-941 (-7.3%)	-633 (-5%)	-825 (-6.5%)	-315 (-2.5%)	-444 (-3.6%)
	All	-1117 (-3.5%)	-778 (-2.4%)	-584 (-1.9%)	-246 (-0.8%)	-1200 (-3.7%)	-992 (-3.1%)
Mar	W	-1435 (-3.3%)	-1052 (-2.4%)	-1301 (-3%)	-917 (-2.1%)	-2078 (-4.7%)	-2221 (-5%)
	AN	-1530 (-3.9%)	-1603 (-4.1%)	-773 (-2%)	-846 (-2.2%)	-1744 (-4.4%)	-1813 (-4.6%)
	BN	-3192 (-14.9%)	-3675 (-17.1%)	-1942 (-9.6%)	-2425 (-12%)	-1425 (-7.2%)	-1639 (-8.4%)
	D	-1470 (-8.2%)	-1210 (-6.8%)	-1267 (-7.2%)	-1007 (-5.7%)	-1012 (-5.8%)	-991 (-5.6%)
	C	-158 (-1.3%)	-168 (-1.4%)	-22 (-0.2%)	-32 (-0.3%)	-20 (-0.2%)	-54 (-0.5%)
	All	-1570 (-5.4%)	-1486 (-5.1%)	-1139 (-4%)	-1054 (-3.7%)	-1382 (-4.8%)	-1475 (-5.1%)
Apr	W	-2411 (-7.5%)	-2817 (-8.7%)	-2490 (-7.7%)	-2895 (-9%)	-2293 (-7.1%)	-2233 (-7.1%)
	AN	-1919 (-8.6%)	-2053 (-9.2%)	-1896 (-8.5%)	-2031 (-9.1%)	-1386 (-6.4%)	-1116 (-5.2%)
	BN	-1096 (-7.6%)	-210 (-1.5%)	-807 (-5.7%)	79 (0.6%)	-471 (-3.4%)	392 (2.8%)
	D	0 (0%)	385 (3.5%)	62 (0.6%)	447 (4%)	146 (1.3%)	595 (5.5%)
	C	-32 (-0.3%)	135 (1.4%)	15 (0.2%)	182 (1.9%)	84 (0.9%)	66 (0.7%)
	All	-1237 (-6.3%)	-1125 (-5.7%)	-1189 (-6%)	-1077 (-5.5%)	-966 (-5%)	-664 (-3.4%)
May	W	-2576 (-9.8%)	-5338 (-20.4%)	-2452 (-9.4%)	-5214 (-20%)	-96 (-0.4%)	626 (3.1%)
	AN	958 (5.6%)	819 (4.8%)	1120 (6.6%)	981 (5.8%)	1610 (9.8%)	1897 (11.9%)
	BN	-381 (-3.3%)	867 (7.6%)	-105 (-0.9%)	1144 (10.2%)	417 (3.9%)	1784 (16.9%)
	D	337 (3.6%)	1685 (18.2%)	505 (5.5%)	1852 (20.3%)	535 (5.9%)	1127 (11.5%)
	C	23 (0.3%)	546 (7.7%)	118 (1.7%)	641 (9.1%)	-260 (-3.5%)	60 (0.8%)
	All	-664 (-4.2%)	-975 (-6.2%)	-503 (-3.2%)	-814 (-5.2%)	356 (2.4%)	1037 (7.5%)
Jun	W	-760 (-4.1%)	-21 (-0.1%)	-724 (-3.9%)	15 (0.1%)	1943 (12.4%)	3043 (19.9%)
	AN	2483 (18.3%)	4382 (32.2%)	2319 (16.9%)	4218 (30.7%)	3196 (24.8%)	4398 (32.4%)
	BN	3685 (33.3%)	3680 (33.3%)	3646 (32.8%)	3641 (32.8%)	3859 (35.4%)	3422 (30.2%)
	D	1746 (16.7%)	1441 (13.8%)	1494 (14%)	1189 (11.1%)	1472 (13.8%)	1089 (10.1%)
	C	404 (4.5%)	667 (7.5%)	183 (2%)	446 (4.9%)	-126 (-1.3%)	-248 (-2.5%)
	All	1194 (9%)	1677 (12.6%)	1087 (8.1%)	1570 (11.7%)	2047 (16.5%)	2395 (19%)
Jul	W	606 (3.7%)	984 (6.1%)	442 (2.7%)	820 (5%)	-285 (-1.7%)	-728 (-4.1%)
	AN	603 (3.4%)	515 (2.9%)	173 (1%)	84 (0.5%)	77 (0.4%)	-335 (-1.8%)
	BN	50 (0.3%)	-1349 (-8.1%)	-124 (-0.7%)	-1523 (-9%)	-76 (-0.4%)	-1250 (-7.5%)
	D	-1683 (-10.3%)	-3945 (-24.1%)	-1805 (-11%)	-4067 (-24.7%)	-1576 (-9.7%)	-4058 (-24.6%)
	C	-3906 (-27%)	-4726 (-32.7%)	-3075 (-22.5%)	-3895 (-28.5%)	-2778 (-20.8%)	-2708 (-21.7%)
	All	-652 (-4%)	-1401 (-8.6%)	-702 (-4.3%)	-1451 (-8.9%)	-844 (-5.1%)	-1781 (-10.7%)

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	256 (2.1%)	76 (0.6%)	-43 (-0.3%)	-223 (-1.7%)	-673 (-5%)	-1476 (-10.5%)
	AN	935 (6.8%)	372 (2.7%)	538 (3.8%)	-25 (-0.2%)	-57 (-0.4%)	-1764 (-11.1%)
	BN	49 (0.4%)	-749 (-5.6%)	-105 (-0.8%)	-903 (-6.7%)	340 (2.6%)	-1434 (-10.2%)
	D	-4540 (-30.9%)	-4579 (-31.2%)	-3717 (-26.8%)	-3756 (-27.1%)	-2909 (-22.3%)	-2909 (-22.3%)
	C	-849 (-9.2%)	-1431 (-15.5%)	-904 (-9.8%)	-1486 (-16%)	59 (0.7%)	-309 (-3.8%)
	All	-894 (-7%)	-1264 (-9.9%)	-901 (-7%)	-1270 (-9.9%)	-794 (-6.2%)	-1655 (-12.5%)
Sep	W	6453 (45.2%)	8243 (57.7%)	-2550 (-11%)	-760 (-3.3%)	-2140 (-9.4%)	-1070 (-4.5%)
	AN	5245 (49.8%)	6129 (58.2%)	-1751 (-10%)	-867 (-4.9%)	-2885 (-15.5%)	-2378 (-12.5%)
	BN	-1141 (-11.5%)	-1515 (-15.2%)	-1318 (-13%)	-1692 (-16.7%)	-1949 (-18.1%)	-2130 (-20.1%)
	D	-2658 (-25.2%)	-2156 (-20.5%)	-1944 (-19.8%)	-1442 (-14.7%)	-734 (-8.5%)	722 (9.4%)
	C	-477 (-6.1%)	298 (3.8%)	-264 (-3.5%)	510 (6.8%)	23 (0.3%)	1230 (18%)
	All	1966 (17.5%)	2822 (25.2%)	-1755 (-11.7%)	-899 (-6%)	-1591 (-10.8%)	-712 (-4.8%)
Oct	W	-674 (-5.9%)	-454 (-3.9%)	-61 (-0.6%)	158 (1.5%)	149 (1.4%)	-183 (-1.6%)
	AN	-919 (-9.8%)	850 (9.1%)	-404 (-4.6%)	1365 (15.4%)	-156 (-1.8%)	341 (3.4%)
	BN	-1002 (-10.2%)	-399 (-4%)	-462 (-5%)	141 (1.5%)	-3 (0%)	-678 (-6.7%)
	D	268 (3.1%)	457 (5.3%)	606 (7.3%)	796 (9.5%)	434 (5.1%)	149 (1.7%)
	C	-987 (-11.6%)	-9 (-0.1%)	-440 (-5.5%)	538 (6.7%)	-305 (-3.9%)	431 (5.3%)
	All	-605 (-6.1%)	11 (0.1%)	-89 (-1%)	527 (5.6%)	74 (0.8%)	-28 (-0.3%)
Nov	W	-280 (-1.8%)	-854 (-5.6%)	-1369 (-8.4%)	-1943 (-11.9%)	-1150 (-7.1%)	-1302 (-8.3%)
	AN	-343 (-2.9%)	-919 (-7.8%)	-1393 (-10.8%)	-1969 (-15.3%)	-1728 (-13.1%)	-1944 (-15.2%)
	BN	-666 (-6.8%)	-546 (-5.5%)	-1418 (-13.4%)	-1298 (-12.2%)	-1489 (-13.9%)	-1132 (-10.8%)
	D	-972 (-9.6%)	-1232 (-12.1%)	-692 (-7%)	-952 (-9.6%)	-840 (-8.4%)	-807 (-8.3%)
	C	-457 (-6.2%)	-581 (-7.9%)	-555 (-7.5%)	-678 (-9.1%)	-399 (-5.5%)	-463 (-6.4%)
	All	-533 (-4.6%)	-854 (-7.4%)	-1113 (-9.2%)	-1434 (-11.8%)	-1114 (-9.2%)	-1135 (-9.6%)
Dec	W	-2749 (-8.1%)	-4327 (-12.8%)	-775 (-2.4%)	-2354 (-7.4%)	-2133 (-6.4%)	-1741 (-5.6%)
	AN	45 (0.3%)	95 (0.5%)	-405 (-2.2%)	-355 (-2%)	-798 (-4.3%)	-813 (-4.4%)
	BN	-90 (-0.7%)	-185 (-1.4%)	-261 (-2%)	-356 (-2.7%)	-248 (-1.9%)	-114 (-0.9%)
	D	-387 (-3%)	-400 (-3.2%)	-242 (-1.9%)	-255 (-2%)	-166 (-1.3%)	-247 (-2%)
	C	-796 (-8.2%)	-327 (-3.4%)	-110 (-1.2%)	359 (4%)	250 (2.9%)	816 (9.5%)
	All	-1082 (-5.5%)	-1525 (-7.7%)	-419 (-2.2%)	-862 (-4.5%)	-835 (-4.3%)	-626 (-3.3%)

[a] A positive value indicates higher average flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

5C.5.3.13.2.2 Steelhead

Juvenile

Sacramento River flow upstream of Red Bluff is used to represent flow conditions in the mainstem of the upper river below Keswick Dam. Although there were substantial differences for individual months and water-year types between ESO and EBC scenarios in flows upstream of Red Bluff during the juvenile steelhead migration period (October through May) (Table 5C.5.3-206, Table 5C.5.3-207), increases and decreases in flows were generally similar. Differences in average flows ranged from 18% lower flower under ESO_LLT compared to EBC2_LLT in November of above-normal years to 12% higher flow under ESO_LLT compared to EBC2_LLT in May of above-normal years. Based on these results, it was concluded that effects of flow conditions on migration of steelhead juveniles in the Sacramento River under ESO operations would be generally similar to those under EBC2 operations.

Adult

Instream flows in the mainstem Sacramento River affect habitat quantity and value for adult steelhead upstream migration and holding prior to spawning. For purposes of this analysis, instream flows upstream of Red Bluff were compared monthly over the period from September through March under EBC and proposed ESO operations (Table 5C.5.3-206, Table 5C.5.3-207). Differences in average flows within individual months ranged from 18% lower flow under ESO_LLT compared to EBC2_LLT in November of above-normal years to 18% higher flow under ESO_ELT compared to EBC2_ELT in September of critical years. Based on these results, it was concluded that effects of flow conditions on migration of steelhead adults in the Sacramento River under ESO operations would be generally similar to those under EBC2 operations.

Kelt

Specific instream flow needs within Central Valley rivers for kelt migration have not been determined. Flows in the Sacramento River and other Central Valley rivers where steelhead spawn that would potentially be affected by the evaluated starting operations are typically within the range that would be considered to be suitable for kelt migration. Average Sacramento River flows upstream of Red Bluff during March and April and differences between scenarios are shown in Table 5C.5.3-206 and Table 5C.5.3-207. Comparison of instream flows accounting for climate change (i.e., ESO_ELT vs, EBC2_ELT and ESO_LLT vs, EBC2_LLT) showed that habitat (e.g., water depth, velocity) would be similar (less than 5% difference for ESO relative to EBC2), although instream flows were generally greater for ESO conditions. Differences in average flows in March and April ranged from -1% lower flow under ESO_ELT compared to EBC2_ELT in March of dry years to 5% higher flow under ESO_LLT compared to EBC2_LLT in April of below-normal years. Based on these results it was concluded that instream habitat conditions for upstream migration of steelhead kelts in the upper reaches of the Sacramento River under ESO operations would be similar to those under EBC2 operations.

5C.5.3.13.2.3 Winter-Run Chinook Salmon

Juvenile

Although there were substantial differences for individual months and water-year types between ESO and EBC scenarios in flows upstream of Red Bluff during the juvenile winter-run Chinook salmon migration period (July through November) (Table 5C.5.3-206, Table 5C.5.3-207), increases and decreases in flows were generally similar. Differences in average flows would range from 18% lower flow under ESO_LLT compared to EBC2_LLT in November of above-normal water years to 18% higher flow under ESO_LLT compared to EBC2_LLT in September of critical water years. Based on these results, it was concluded that effects of flow conditions on migration of winter-run Chinook salmon juveniles in the Sacramento River under ESO operations would generally be similar to those under EBC2 operations during the late long-term implementation period.

Adult

The average flows in the Sacramento River upstream of Red Bluff during the adult winter-run Chinook salmon migration period (December through August) are shown in Table 5C.5.3-206 and Table 5C.5.3-207. Flows would largely be similar between EBC2_LLT and ESO_LLT during all months except May and June, in which flows would be up to 12% greater under ESO_LLT depending on water-year type. Based on these results, it was concluded that flow conditions for migration of winter-run Chinook salmon adults in the Sacramento River under ESO operations would generally be similar to or greater than those under EBC2 operations during the late long-term implementation period.

5C.5.3.13.2.4 Spring-Run Chinook Salmon

Juvenile

Average flows in the Sacramento River upstream of Red Bluff during the juvenile spring-run Chinook salmon migration period (December through May) are shown in Table 5C.5.3-206 and Table 5C.5.3-207. Average flows upstream of Red Bluff generally are estimated to be comparable between EBC and ESO scenarios, or somewhat greater under ESO scenarios.

Adult

The average flows in the Sacramento River upstream of Red Bluff during the adult spring-run Chinook salmon upstream migration period (April through May) were similar in wet and critical years, whereas in other water-year types average flows under ESO were modestly greater (up to 12% in May of above-normal years for comparisons accounting for climate change) than flows under EBC scenarios (Table 5C.5.3-206, Table 5C.5.3-207). There was some variability between ESO scenarios and EBC scenarios across different water-year types and months.

5C.5.3.13.2.5 Fall-Run Chinook Salmon

Juvenile

Average migration flows for juvenile fall-run Chinook salmon in February through May upstream of Red Bluff were generally quite comparable between ESO and EBC scenarios or slightly greater under ESO scenarios (Table 5C.5.3-206, Table 5C.5.3-207).

Adult

Flows in the Sacramento River upstream of Red Bluff during the adult fall-run Chinook salmon upstream migration period (September and October) are presented in Table 5C.5.3-206 and Table 5C.5.3-207. There was little difference between ESO_ELT and EBC2_ELT in wet years, with a 2% decrease in September and a 1% decrease in October. In above-normal water-year types, the differences between ESO_ELT and EBC2_ELT scenarios were 14% lower in September and 5% lower in October. In below-normal water-year types, the differences between ESO_ELT and EBC2_ELT scenarios were 9% lower in September and 3% lower in October. In dry years there is an 8% decrease in September and a 1% decrease in October and in critically dry years there were 3% and 5% decreases. Average differences for the migration period in ESO_ELT and EBC2_ELT scenarios ranged from a 2% decrease in wet years to a 10% decrease in above-normal years ESO_LLT vs. EBC2_LLT scenarios in wet years have a 3% increase in flows during September and a 2 % decrease in flows in October. In above-normal years there is a a 6% decrease in September and a 1% increase in October. Below-normal years show larger differences, with decreases of 13% in September and 8% in October. In dry years there is an increase of 12% in September and a decrease of 2% in October. Critically dry years have a similar pattern, with an increase of 18% in September and a decrease of 2% in October.

5C.5.3.13.2.6 Late Fall–Run Chinook Salmon

Juvenile

See discussion for fall-run Chinook salmon above.

Adult

Flows in the Sacramento River upstream of Red Bluff during the adult late fall–run Chinook salmon upstream migration period (December–February) are presented in Table 5C.5.3-206 and Table 5C.5.3-207. In wet years, flows were about 1% higher in December through February under ESO_ELT vs. EBC2_ELT scenarios. In above-normal water-year types, the differences between ESO_ELT and EBC2_ELT scenarios were 3% lower in December and 3–4% higher in January and February. In below-normal years there is a 2% increase in December and a 3–6% increase in January and February. In dry years there is no change in December and a 0–1% increase in January and February. In critically dry years it is a 2% increase December, a 4% decrease in January, and a 2% increase in February. ESO_LLT vs. EBC2_LLT scenarios in wet years have a 1% decrease in flows during December and 1% and <1% increases in flows in January and February. In above-normal years there is a 1% increase in December and a 2% decrease in January followed by a 2% increase in February. Below-normal years show an increase of 4% in December, an increase of 2% in January, and a 6% increase in February. In dry years there is an increase of 1% in December and decreases of 4% and <1% in January and February. Critically dry years have an increase of 1% in December, an increase of 2% in January, and a decrease of <1% in February.

5C.5.3.13.2.7 White Sturgeon

Larva

Downstream migration of larval white sturgeon is assisted by higher flows, although it is unclear whether elevated flows may increase recruitment to less-suitable rearing habitat (Israel et al. 2009). Fish (2010) found significant correlations between Delta outflow averaged over various months and white sturgeon year-class strength from Bay otter trawling. The present analysis relied on the 1995 USFWS Anadromous Fish Restoration Program Plan, which indicated that flows of 31,000 cfs at Verona and 17,700 cfs at Grimes (Wilkins Slough used as surrogate) from February through May are ideal for adult access, spawning habitat conditions, and downstream larval transport during wet and above normal years, when sturgeon recruitment is greatest. In addition, the analysis compared exceedances above 15,000 cfs, 20,000 cfs, and 25,000 cfs in Delta outflow during April and May of wet and above-normal years per recommendations by the Anadromous Fish Restoration Program (U.S. Fish and Wildlife Service 1995). These Sacrmaneto River and Delta outflow thresholds were not included in the *Final Restoration Plan for AFRP* (U.S. Fish and Wildlife Service 1997). Although we assessed the exceedance of the thresholds by each model scenario, their utility was considered limited in drawing conclusions about flow effects on white sturgeon. Israel and coauthors (2009) indicate that spring flows are important for downstream migrating larval white sturgeon in the Sacramento River although no specific criteria were provided. February through May CALSIM flow outputs were reviewed at Verona and Wilkins Slough for all water-year types, with an examination of the average number of months per year exceeding the thresholds.

The analysis showed that there was little or no difference (<0.1 months) between ESO and EBC scenarios in the average number of months per year exceeding the 17,700 cfs flow threshold in the Sacramento River at Wilkins Slough in any water-year type (Table 5C.5.3-212). Likewise, there would be little or no difference (<2%) between ESO and EBC scenarios in the exceedance of the 17,700 cfs threshold using February to May average flows (Figure 5C.5.3-164).

A similar different pattern was evident at Verona. There was little difference between EBC and ESO scenarios in any water-year type in the average number of months per year (<0.2 month difference) exceeding the 31,000 cfs flow threshold (Table 5C.5.3-213) or in the exceedance of the 31,000 cfs flow threshold using February through May average flows (<3% difference) (Figure 5C.5.3-165).

Table 5C.5.3-212. Average Number of Months per Year (February through May) Exceeding a Flow Threshold for White Sturgeon Larval Transport of 17,700 cfs in Sacramento River at Wilkins Slough

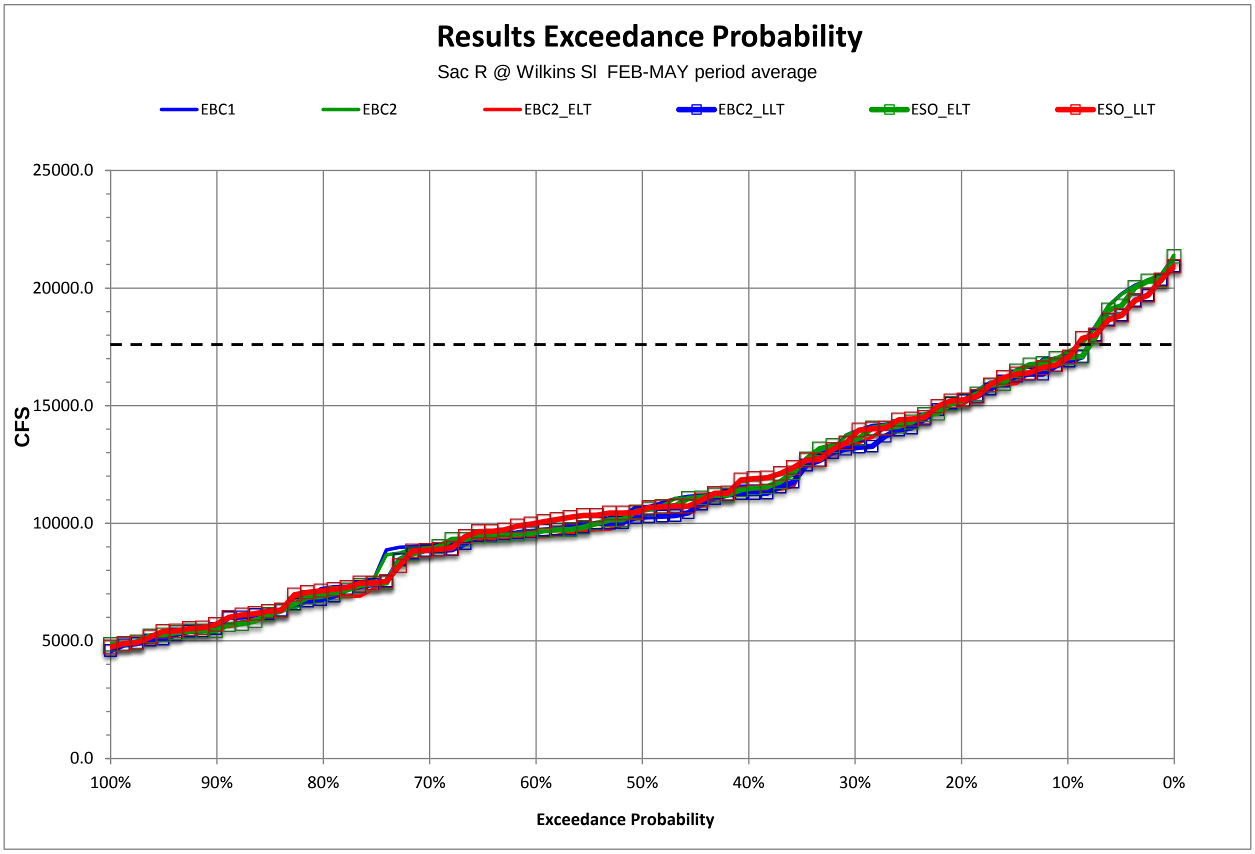
	Scenario[a]					
Water-Year Type	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**
Wet	1.9	1.8	1.8	1.8	1.8	1.8
Above Normal	1.4	1.6	1.5	1.6	1.6	1.7
Below Normal	0.6	0.4	0.4	0.4	0.4	0.4
Dry	0.3	0.3	0.3	0.3	0.3	0.3
Critical	0.1	0.1	0.1	0.1	0.1	0.1

[a] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-213. Average Number of Months per Year (February through May) Exceeding a Flow Threshold for White Sturgeon Larval Transport of 31,000 cfs in Sacramento River at Verona

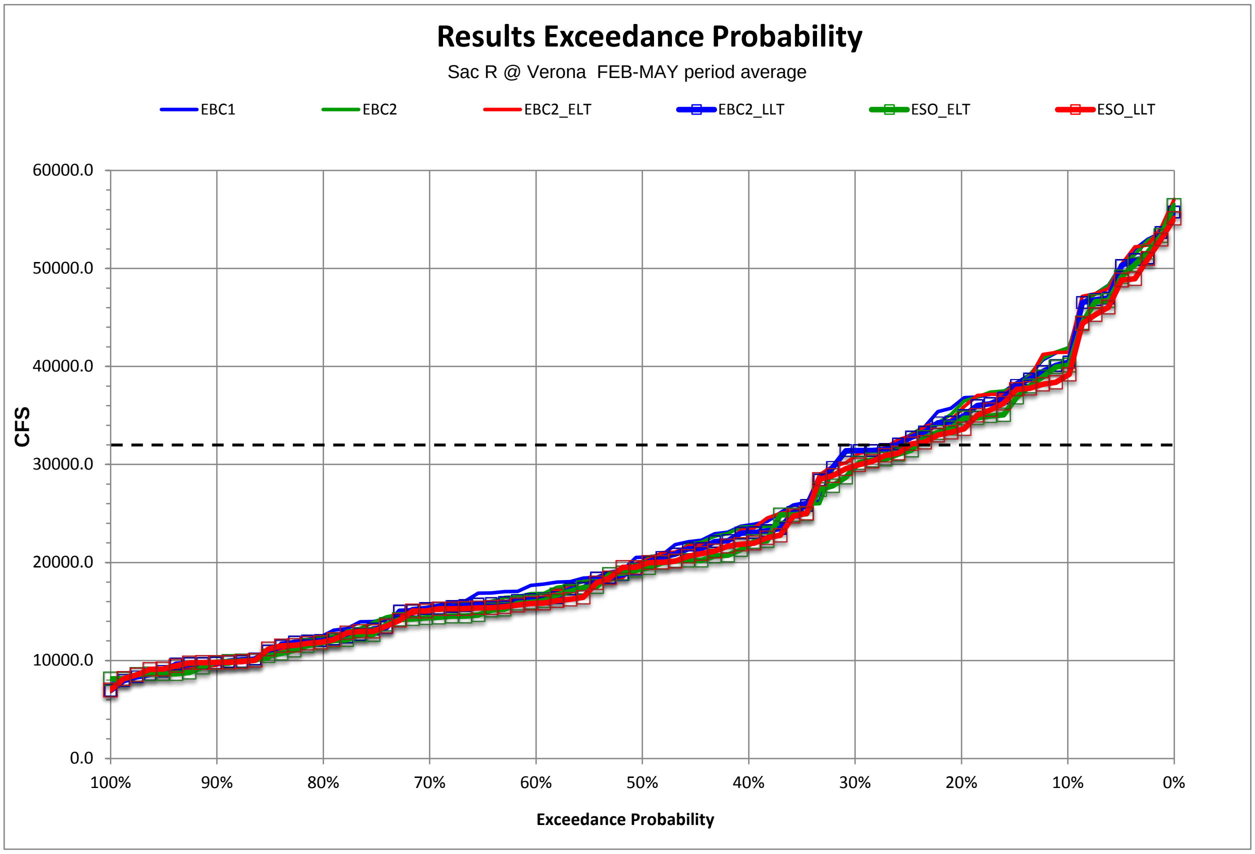
	Scenario[a]					
Water-Year Type	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**
Wet	2.6	2.6	2.3	2.2	2.2	2.0
Above Normal	1.7	1.7	1.7	1.5	1.5	1.5
Below Normal	0.5	0.4	0.4	0.4	0.4	0.3
Dry	0.3	0.3	0.2	0.2	0.2	0.1
Critical	0.0	0.0	0.0	0.0	0.0	0.0

[a] See Table 5C.0-1 for definitions of scenarios.



Note: Dashed line indicates the 17,700 cfs flow threshold.

Figure 5C.5.3-164. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Flow in the Sacramento River at Wilkins Slough, February through May Period Average



Note: Dashed line indicates the 31,000 cfs flow threshold.

Figure 5C.5.3-165. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Flow in the Sacramento River at Verona, February through May Period Average

The percent of years above the three Anadromous Fish Restoration Program Delta outflow thresholds from USFWS (1995) under ESO_ELT and ESO_LLT were similar to moderately lower (4% to 33%) than EBC2_ELT and EBC2_LLT in April (Table 5C.5.3-214, Figure 5C.5.3-166 through Figure 5C.5.3-171). Exceedances during May under the evaluated starting operations were either similar or moderately lower (by up to 25%) than EBC2 within the same time period, depending on flow threshold and water-year type. Further, exceedances during the April-May period averaged under the evaluated starting operations were either similar or moderately lower (by up to 25%) than EBC2 under the same time period, depending on flow threshold and water-year type. The results for the ESO_ELT and ESO_LLT indicate that under these scenarios, the Anadromous Fish Restoration Program Delta outflow thresholds for white sturgeon were met less often than for EBC scenarios.

Results for the LOS scenarios were essentially the same as for the ESO scenarios (Table 5C.5.3-215), but the HOS scenarios had a greater percentage of years exceeding the Delta outflow thresholds than the EBC2_ELT and EBC2_LLT scenarios (Table 5C.5.3-215). The HOS scenarios met the 15,000-cfs and 20,000-cfs April thresholds in all wet years, compared to 85–96% of years for the EBC2_ELT and EBC2_LLT scenarios. The 25,000-cfs threshold in April was met in around 90% of wet years under the HOS scenarios, compared to around 80% of wet years under the EBC2_ELT and EBC2_LLT scenarios. There was similar exceedance of the 15,000-cfs threshold in above normal years for the EBC2 and HOS scenarios at 92%, whereas the 20,000-cfs and 25,000-cfs thresholds were exceeded around 20–30% more under the HOS scenarios than the EBC2 scenarios (Table 5C.5.3-215). For May, there was little difference between HOS and EBC2 scenarios in the number of years exceeding the 25,000-cfs threshold. The largest May differences between the HOS and EBC2 scenarios was for above normal years: the 15,000-cfs threshold was exceeded in 83–92% of years under HOS scenarios compared to 58–75% for EBC2 scenarios, and the 20,000-cfs threshold was exceeded in 58–67% of years under the HOS scenarios compared to 33% of years under the EBC2 scenarios. Exceedance of these two thresholds ranged from similar (EBC2_LLT vs. HOS_LLT for the 20,000-cfs threshold) up to 10% greater under HOS scenarios for the other thresholds (Table 5C.5.3-215).

Averaging April and May Delta outflow together showed that the HOS scenarios exceeded the 15,000-cfs threshold in all or nearly all wet and above normal years compared to around 90-100% of wet years for EBC2_ELT and EBC2_LLT (Table 5C.5.3-215). The 20,000-cfs threshold was exceeded in nearly all wet years for the HOS scenarios compared to 85–88% for EBC2 scenarios, whereas in above normal years the HOS scenarios exceeded this threshold in 20–30% more years than EBC2 scenarios. The 25,000-cfs threshold was exceeded to a similar or slightly greater level by the HOS scenarios (70–80%) in wet years, whereas in above normal years the 67–75% exceedance by HOS scenarios was appreciable greater than the 50-% exceedance by EBC2 scenarios (Table 5C.5.3-215).

Table 5C.5.3-214. Percentage of Months in which Average Delta Outflow is Predicted to Exceed 15,000, 20,000, and 25,000 cfs in April and May of Wet and Above-Normal Water Years, under EBC and ESO Scenarios

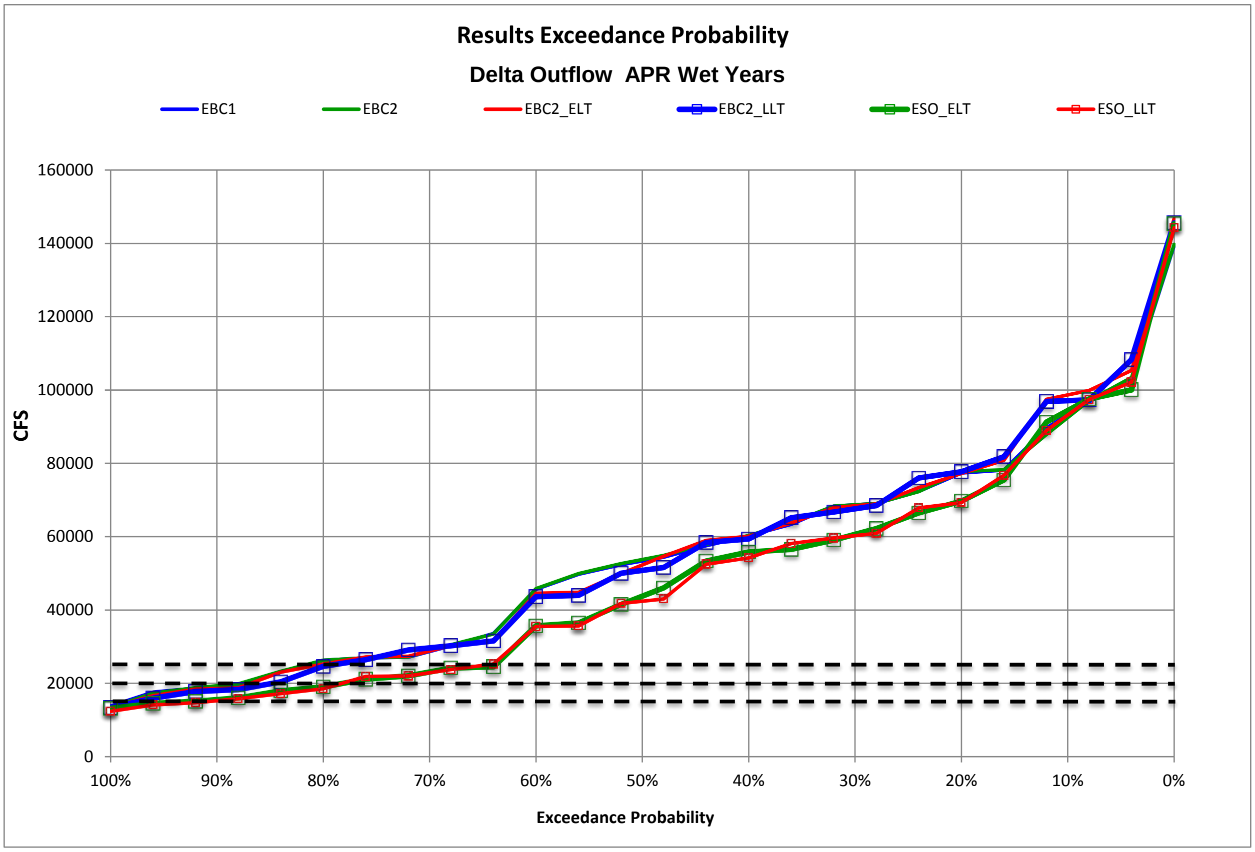
		Scenario[a]					
Flow	**Water-Year Type**	**EBC1**	**EBC2**	**EBC2_ELT**	**EBC2_LLT**	**ESO_ELT**	**ESO_LLT**
April							
15,000 cfs	Wet	96	96	96	96	92	88
	Above Normal	92	92	92	92	75	75
20,000 cfs	Wet	85	85	85	85	77	77
	Above Normal	75	75	75	67	42	50
25,000 cfs	Wet	81	81	81	77	62	65
	Above Normal	58	58	58	50	42	42
May							
15,000 cfs	Wet	88	88	88	81	77	81
	Above Normal	83	83	75	58	50	67
20,000 cfs	Wet	85	85	73	62	58	50
	Above Normal	42	42	33	33	25	25
25,000 cfs	Wet	69	69	62	58	50	42
	Above Normal	33	25	33	25	17	17
April–May Average							
15,000 cfs	Wet	96	96	92	88	88	88
	Above Normal	100	100	100	92	83	75
20,000 cfs	Wet	88	88	88	85	73	69
	Above Normal	67	67	58	50	50	50
25,000 cfs	Wet	81	81	73	69	62	62
	Above Normal	50	50	50	50	33	25

[a] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-215. Percentage of Months in which Average Delta Outflow is Predicted to Exceed 15,000, 20,000, and 25,000 cfs in April and May of Wet and Above-Normal Water Years, For EBC, HOS, and LOS Scenarios

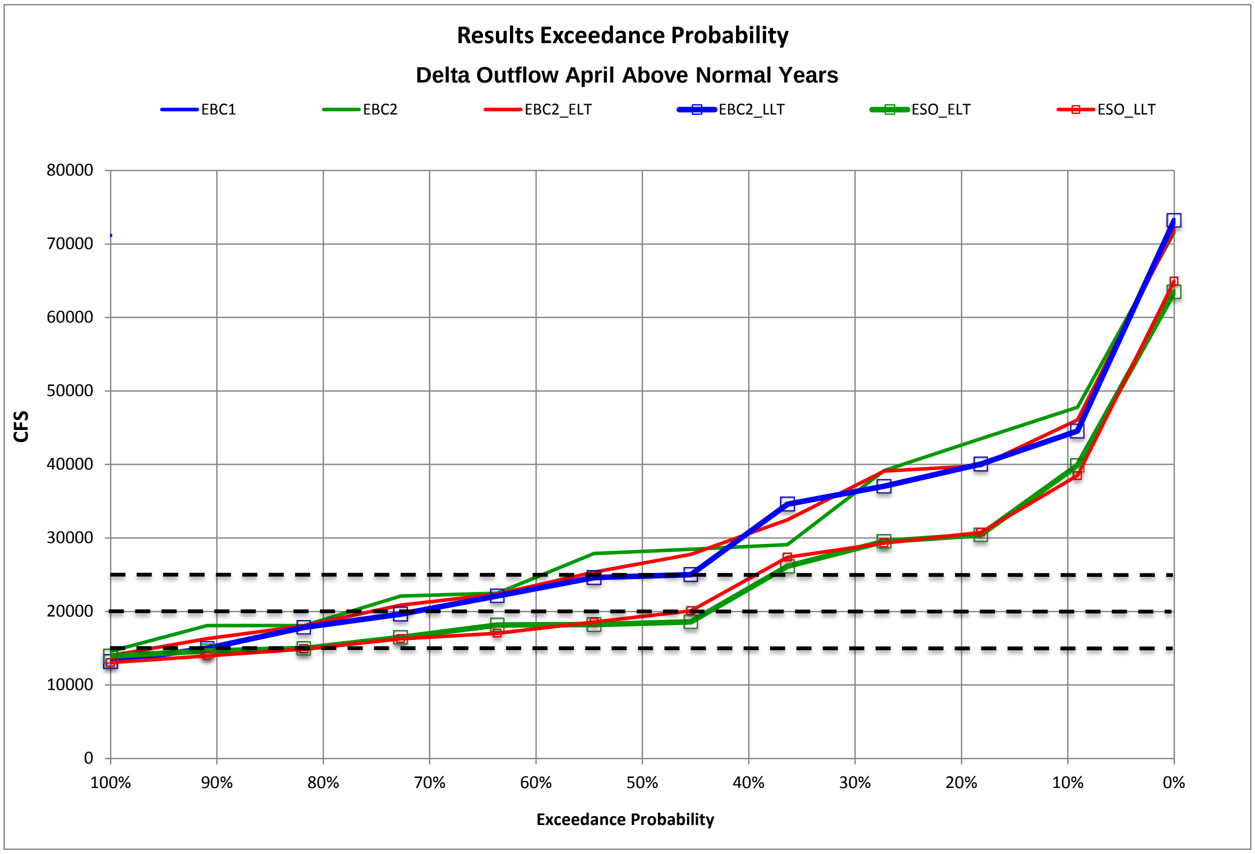
		Scenario[a]					
Flow	**Water-Year Type**	**EBC2_ELT**	**EBC2_LLT**	**HOS_ELT**	**HOS_LLT**	**LOS_ELT**	**LOS_LLT**
April							
15,000 cfs	Wet	96	96	100	100	92	88
	Above Normal	92	92	92	92	83	75
20,000 cfs	Wet	85	85	100	100	77	77
	Above Normal	75	67	83	92	42	50
25,000 cfs	Wet	81	77	92	88	62	65
	Above Normal	58	50	83	83	42	42
May							
15,000 cfs	Wet	88	81	96	92	77	77
	Above Normal	75	58	83	92	50	58
20,000 cfs	Wet	73	62	81	65	58	50
	Above Normal	33	33	67	58	25	25
25,000 cfs	Wet	62	58	62	58	50	42
	Above Normal	33	25	33	17	17	17
April–May Average							
15,000 cfs	Wet	92	88	100	100	88	88
	Above Normal	100	92	100	92	83	75
20,000 cfs	Wet	88	85	96	96	73	69
	Above Normal	58	50	83	83	50	50
25,000 cfs	Wet	73	69	81	69	62	62
	Above Normal	50	50	75	67	33	25

[a] See Table 5C.0-1 for definitions of scenarios.



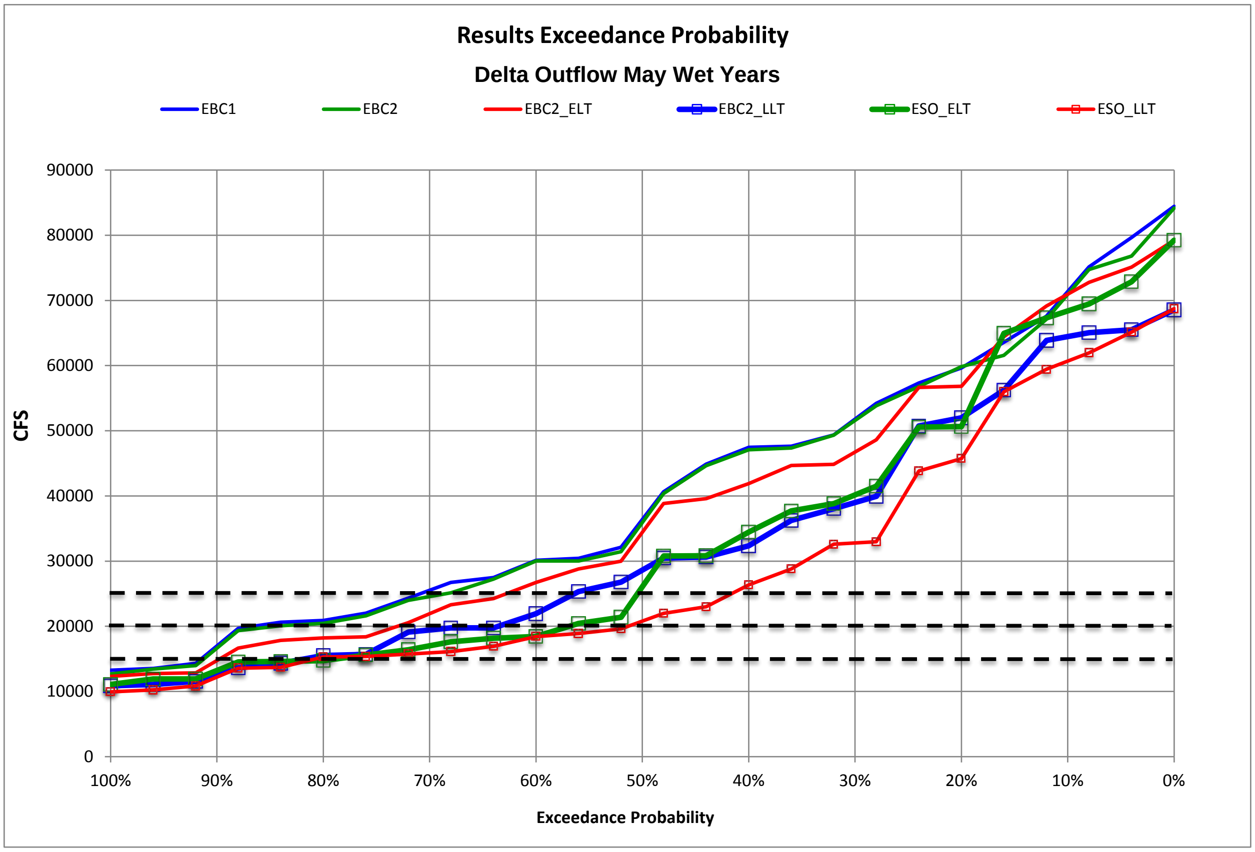
Note: Dashed lines indicates the 15,000, 20,000, and 25,000 cfs flow thresholds.

Figure 5C.5.3-166. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Delta Outflow in April of Wet Water Years



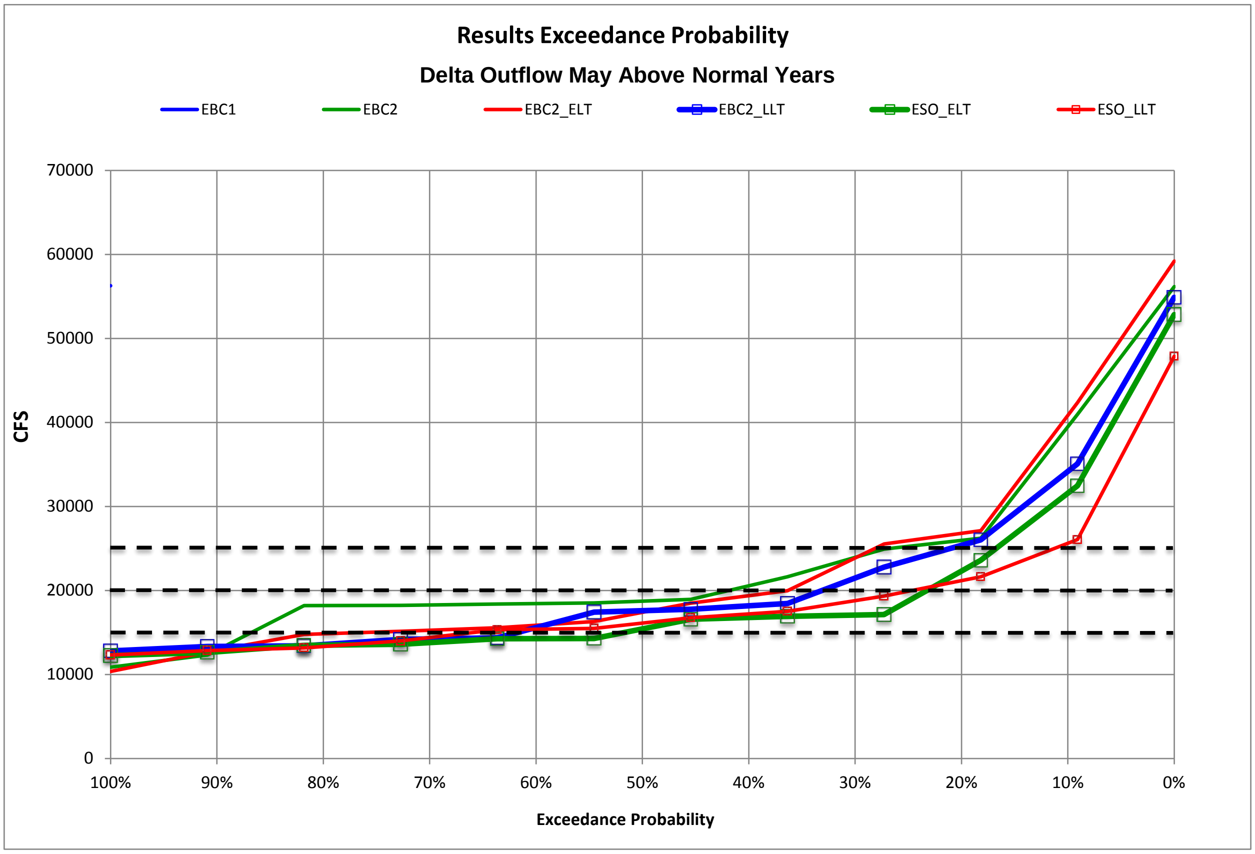
Note: Dashed lines indicates the 15,000, 20,000, and 25,000 cfs flow thresholds.

Figure 5C.5.3-167. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Delta Outflow in April of Above Normal Water Years



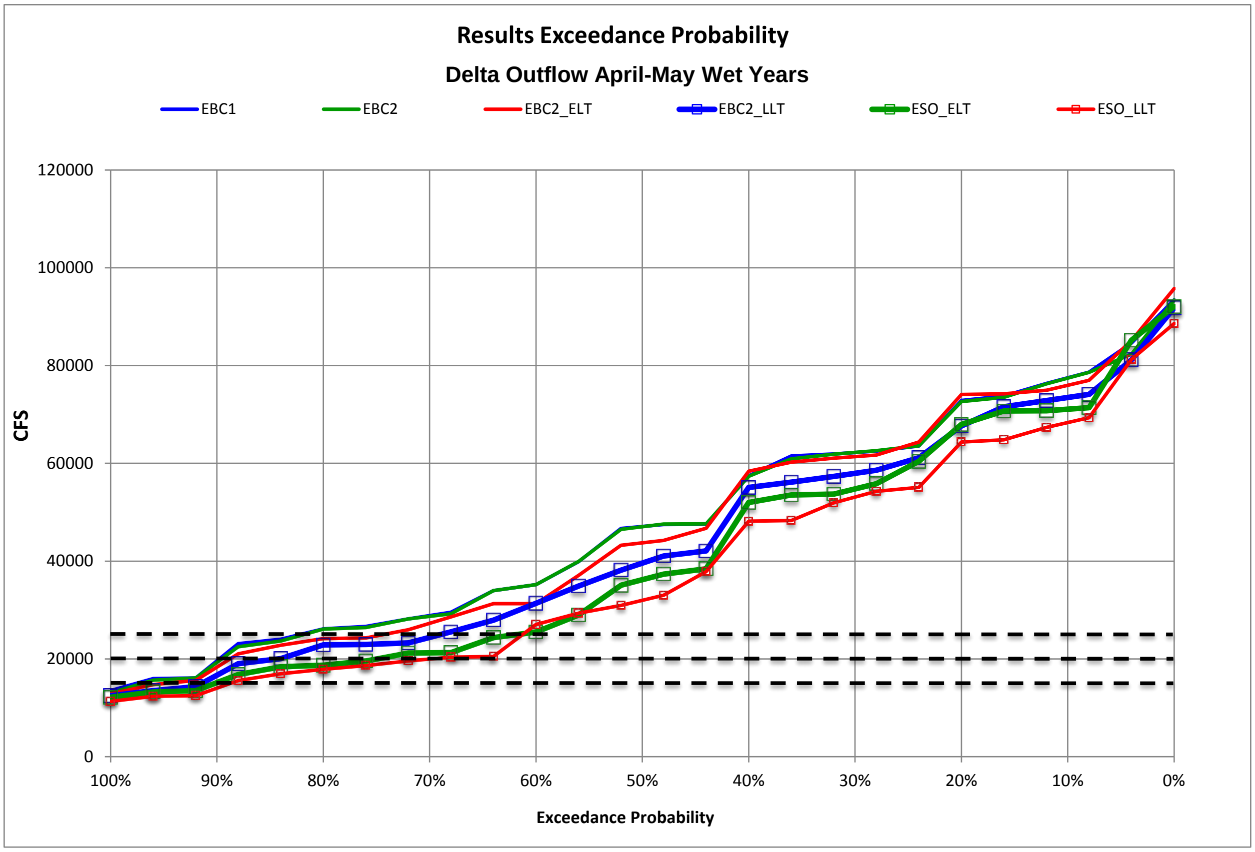
Note: Dashed lines indicates the 15,000, 20,000, and 25,000 cfs flow thresholds.

Figure 5C.5.3-168. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Delta Outflow in May of Wet Water Years



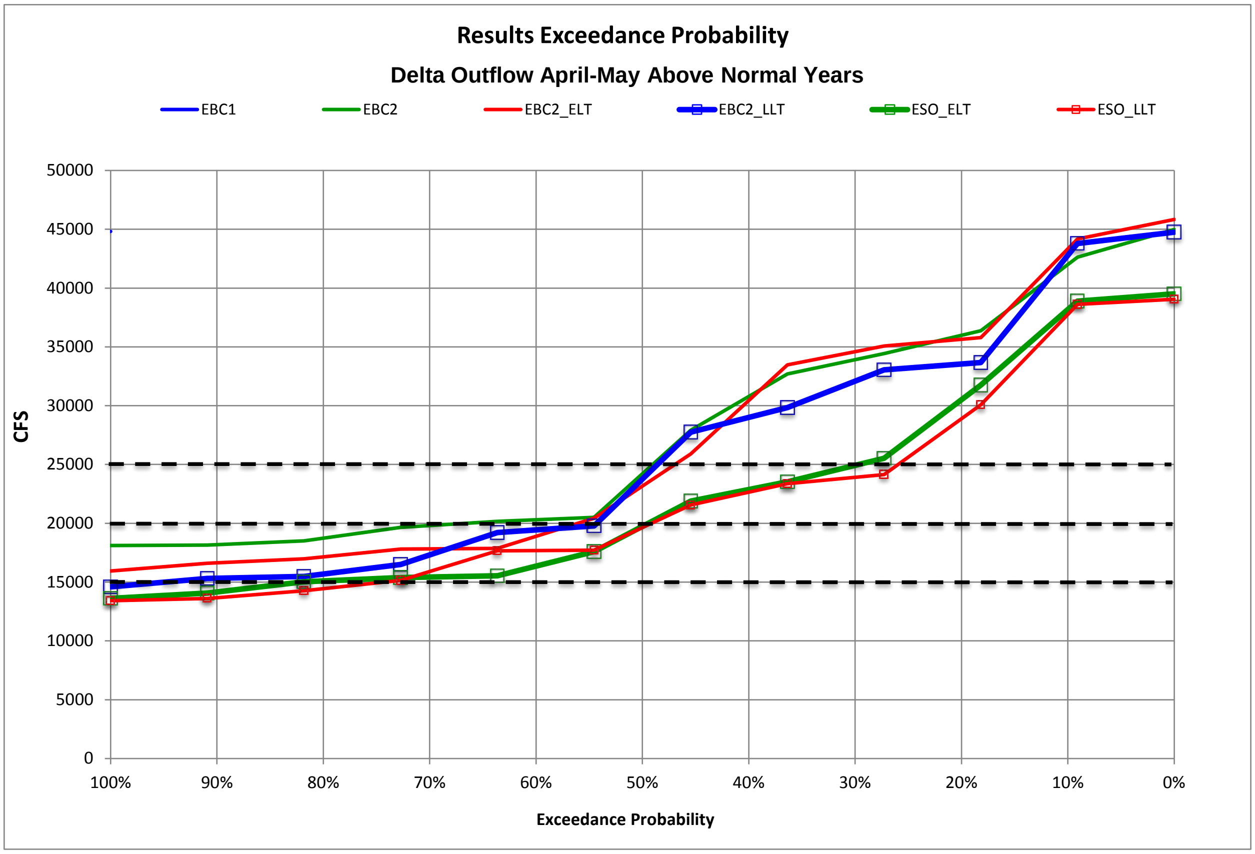
Note: Dashed lines indicates the 15,000, 20,000, and 25,000 cfs flow thresholds.

Figure 5C.5.3-169. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Delta Outflow in May of Above Normal Water Years



Note: Dashed lines indicates the 15,000, 20,000, and 25,000 cfs flow thresholds.

Figure 5C.5.3-170. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Delta Outflow in April and May of Wet Water Years



Note: Dashed lines indicates the 15,000, 20,000, and 25,000 cfs flow thresholds.

Figure 5C.5.3-171. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Delta Outflow in April and May of Above Normal Water Years

Juvenile

Flow in the Sacramento River at Verona during the juvenile white sturgeon migration period (June through September) varied substantiallty between ESO and EBC2 scenarios (Table 5C.5.3-210, Table 5C.5.3-211). In June, the average flow was moderately higher under the ESO scenarios for all but critical years, and was >30% higher in above-normal and below-normal water-year types. In the later months, the difference in flows between ESO scenarios and EBC2 scenarios was greatest in below-normal, dry and critical years, with average flow >20% lower under ESO scenarios in July of dry years (LLT scenario, only) and critical years (both climate change scenarios), August of dry years (both scenarios), and September of below-normal years (LLT scenario).

Adult

There were substantial differences between flows under ESO and EBC scenarios during the November through May adult white sturgeon migration period at Wilkins Slough and Verona (Figure 5C.5.3-172, Table 5C.5.3-208, Table 5C.5.3-209; Table 5C.5.3-210, Table 5C.5.3-211).. Average flows under ESO scenarios were up to 18% lower in November (at Wilkins Slough) compared to EBC scenarios, whereas flows in May under ESO_LLT were appreciably higher (up to 17%) than under EBC2_LLT in below-normal and dry years (at Wilkins Slough and Verona).

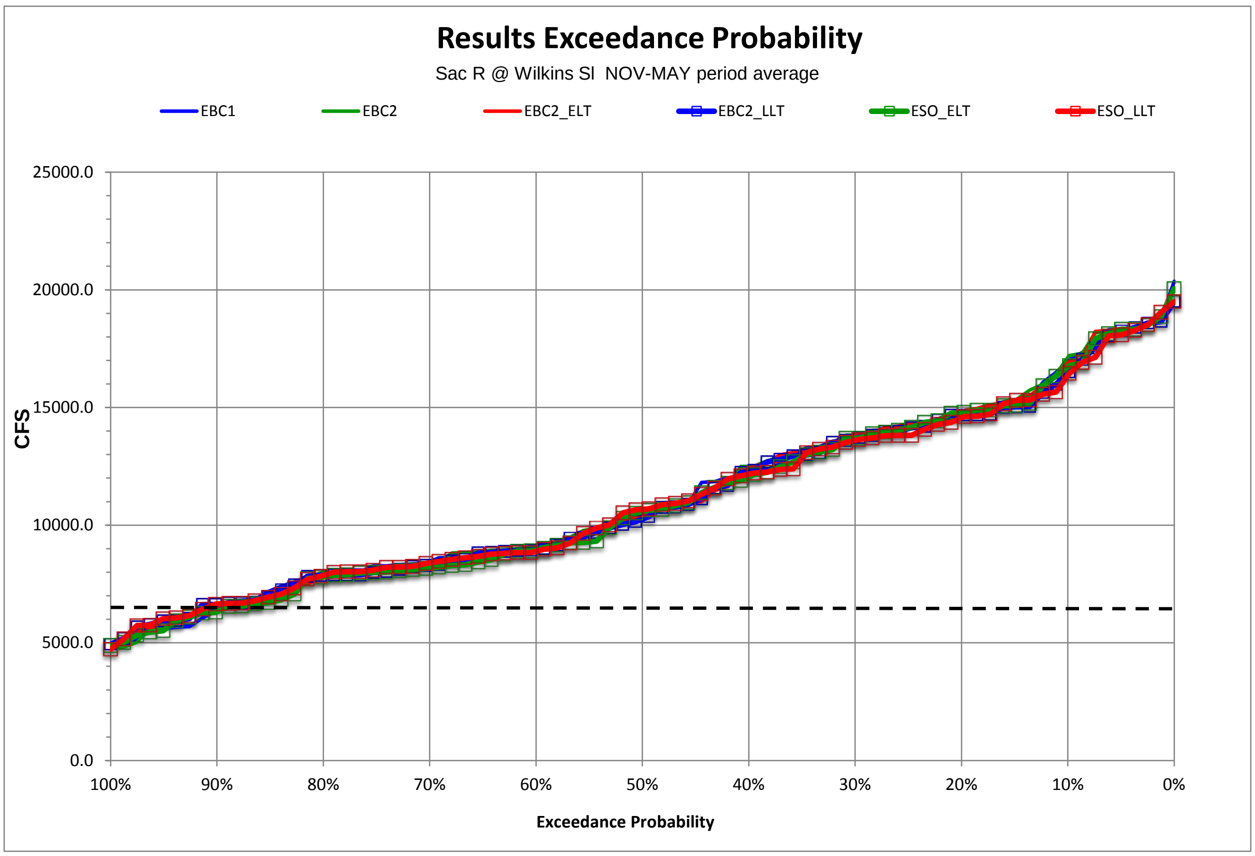
There was little difference between ESO and EBC scenarios in the average number of months per year exceeding the flow threshold of 5,300 cfs proposed for Knights Landing attraction flows

(Wilkins Slough was used as a proxy in the present analysis) by Shaffter (1997), regardless of water-year type (Table 5C.5.3-216).

Table 5C.5.3-216. Average Number of Months per Year (November through May) Exceeding White Sturgeon Adult Attraction Flow Threshold of 5,300 cfs in Sacramento River at Wilkins Slough under EBC and ESO Scenarios

	Scenario[a]					
Water-Year Type	EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Wet	6.7	6.7	6.7	6.5	6.7	6.5
Above Normal	6.5	6.3	6.3	6.2	6.3	6.3
Below Normal	5.2	4.9	4.9	4.9	5.0	5.5
Dry	4.9	4.9	4.8	5.2	4.8	5.3
Critical	3.5	3.5	3.6	3.6	3.5	3.7

[a] See Table 5C.0-1 for definitions of scenarios.



Note: Dashed line indicates the 5,300 cfs flow threshold.

Figure 5C.5.3-172. Probability of Exceedance Plot for Model Scenarios of Mean Monthly Flow in the Sacramento River at Wilkins Slough, November through May Period Average

5C.5.3.13.2.8 Green Sturgeon

Larva

Trends in flows during the green sturgeon larval transport period (August through October) were essentially the same in the Sacramento River at Keswick, Red Bluff, and Wilkins Slough. Flows under ESO scenarios were generally lower than under EBC scenarios in above-normal and dry years, as well as below-normal years in the late long-term (Table 5C.5.3-204, Table 5C.5.3-205; Table 5C.5.3-206, Table 5C.5.3-207; Table 5C.5.3-208,Table 5C.5.3-209). There was more variability between months for wet and critical years, with slightly greater decreases of flow under ESO scenarios in the early long-term and slightly greater increases in the late long-term .

Juvenile

This analysis was conducted to investigate the flows in the middle and lower Sacramento River during periods of downstream migrating young-of-the-year (YOY) juvenile green sturgeon. CALSIM locations selected for the analysis of this portion of the Sacramento River included Wilkins Slough and Verona. Israel and Klimley (2008) indicates that the duration of this downstream migration, notably for YOY green sturgeon, is from August through March. As some larger juveniles may occur in this portion of the river in April, May, and June, an additional review was completed of this period. In the absence of flow threshold criteria during this downstream migration, the analysis focuses on the percent change in flow during this period. Reduced flows during this period may result in biological effects on this life stage, including downstream migration delays.

For YOY juveniles in August through March, differences in flows between ESO and EBC2 scenarios at Wilkins Slough and Verona for comparisons accounting for climate change varied greatly, but were most often lower for ESO scenarios in all year types (Table 5C.5.3-208, Table 5C.5.3-209; Table 5C.5.3-210, Table 5C.5.3-211). Many differences in flows at Wilkins Slough were less than 5%, although flows under ESO scenarios would be up to 25% lower in some water-year types during August through November. Decreases at Verona were also greatest during August through November, with the greatest reductions in August of dry years. For older juveniles in April through June, average flows under ESO scenarios were frequently substantially higher (up to 35%) than under EBC2 scenarios, especially in above-normal, below-normal and dry years in May and June.

Adult

There was little difference between ESO and EBC2 scenarios, when accounting for climate change, in attraction flows for adult green sturgeon at Keswick from November through June for the majority of months and year types (Table 5C.5.3-204, Table 5C.5.3-205). Differences in average flows within individual months ranged from 23% lower flow under ESO_LLT compared to EBC2_LLT in November of above-normal years and under ESO_ELT compared to EBC2_ELT in November of below-normal years to 15% higher flow under ESO_LLT compared to EBC2_LLT in May of above-normal years.

As with Keswick, flows at the Sacramento River at Verona during the November through June green sturgeon attraction flow period were not greatly different between ESO and EBC scenarios for the majority of months and year types (Table 5C.5.3-210, Table 5C.5.3-211). There were some months with lower or higher average flows under ESO scenarios relative to EBC scenarios, e.g., lower flows under ESO scenarios during November and higher flows under ESO scenarios in May and June.

However, these increases and decreases would not be biologically meaningful due to their small magnitude and low frequency.

5C.5.3.13.2.9 Pacific Lamprey

Macropthalmia

Predicted average monthly flow rates in the Sacramento River upstream of Red Bluff between December and May are presented in Table 5C.5.3-206, and differences between model scenarios are presented in Table 5C.5.3-207. Exceedance plots by month are presented in Figure 5C.5.3-173 through Figure 5C.5.3-178.

Predicted differences for model scenario ESO_ELT relative to EBC1 were generally small, with maximum differences of -10% in wet years (May), 7% in above normal years (February), -8% in below normal years (March), -3% in dry years (December) and 5% in critical years (March). Predicted differences for ESO_LLT relative to EBC1 were also generally small, although typically larger than the ESO_ELT relative to EBC1 differences, with maximum differences of -17% in wet years (May), 12% in above normal years (May), -10% in below normal years (March), 14% in dry years (May) and 15% in critical years (January). Predicted differences for ESO_ELT relative to EBC2 were generally similar to differences of ESO_ELT relative to EBC1, with maximum differences of -10% in wet years (May), 8% in above normal years (February), 9% in below normal years (February), 4% in dry years (January) and 4% in critical years (December). Predicted differences for ESO_LLT relative to EBC2 were generally similar to differences of ESO_LLT relative to EBC1, with maximum differences of -16% in wet years (May), 12% in above normal years (May), -6% in below normal years (March), 16% in dry years (May) and 10% in critical years (January).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, predicted differences for ESO_ELT relative to EBC2_ELT were generally small, with maximum differences of 1% in wet years (January), 9% in above normal years (May), 6% in below normal years (January), 5% in dry years (May) and -4% in critical years (January). Predicted differences for ESO_LLT relative to EBC2_LLT were also generally small, with maximum differences of 4% in wet years (May), 12% in above normal years (May), 11% in below normal years (May), 10% in dry years (May) and 4% in critical years (March).

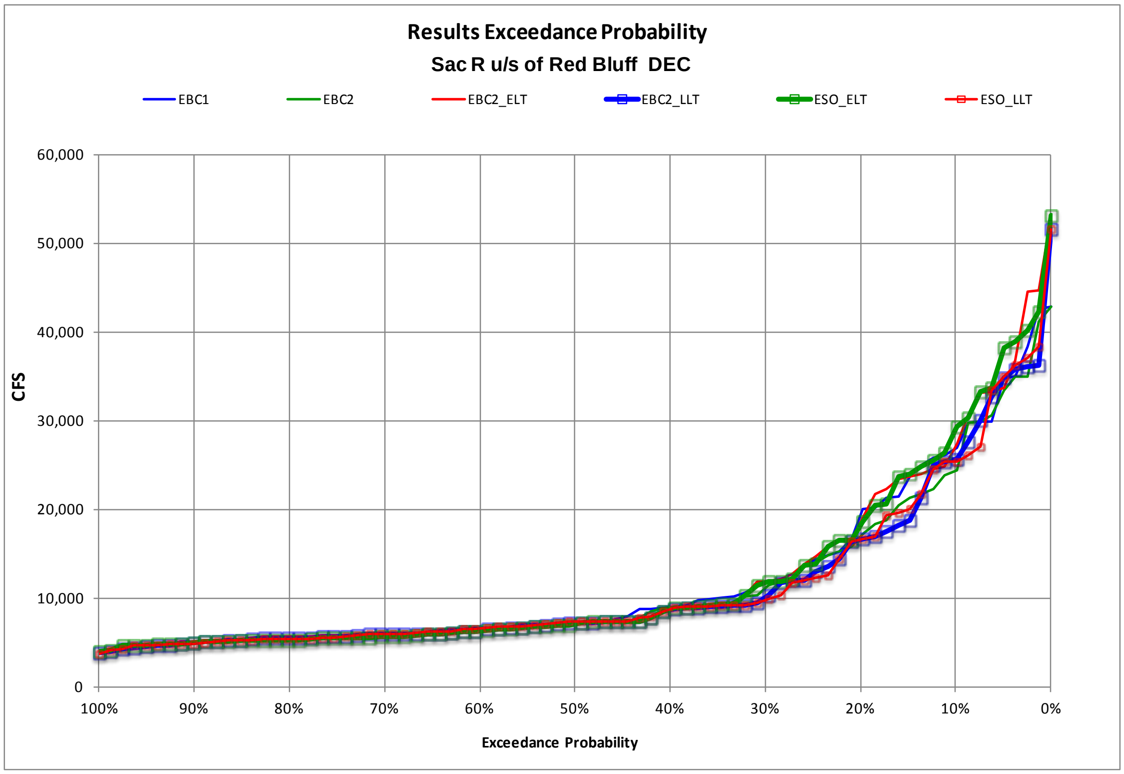


Figure 5C.5.3-173. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, December

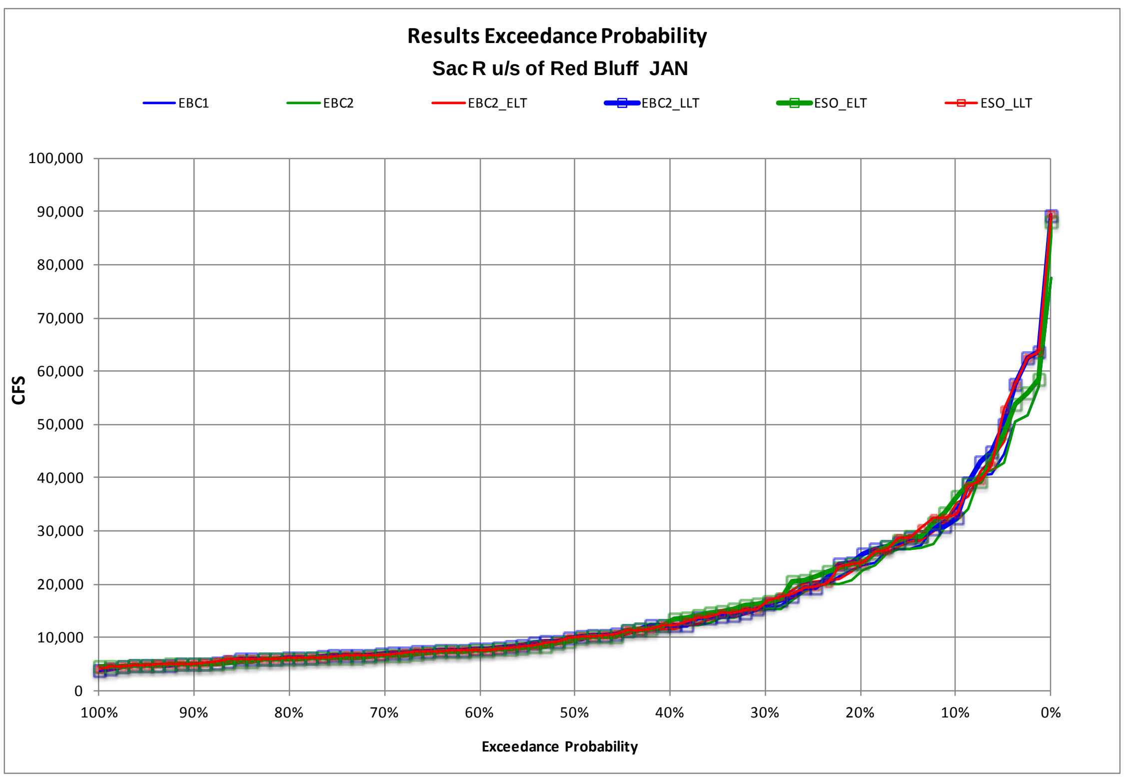


Figure 5C.5.3-174. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, January

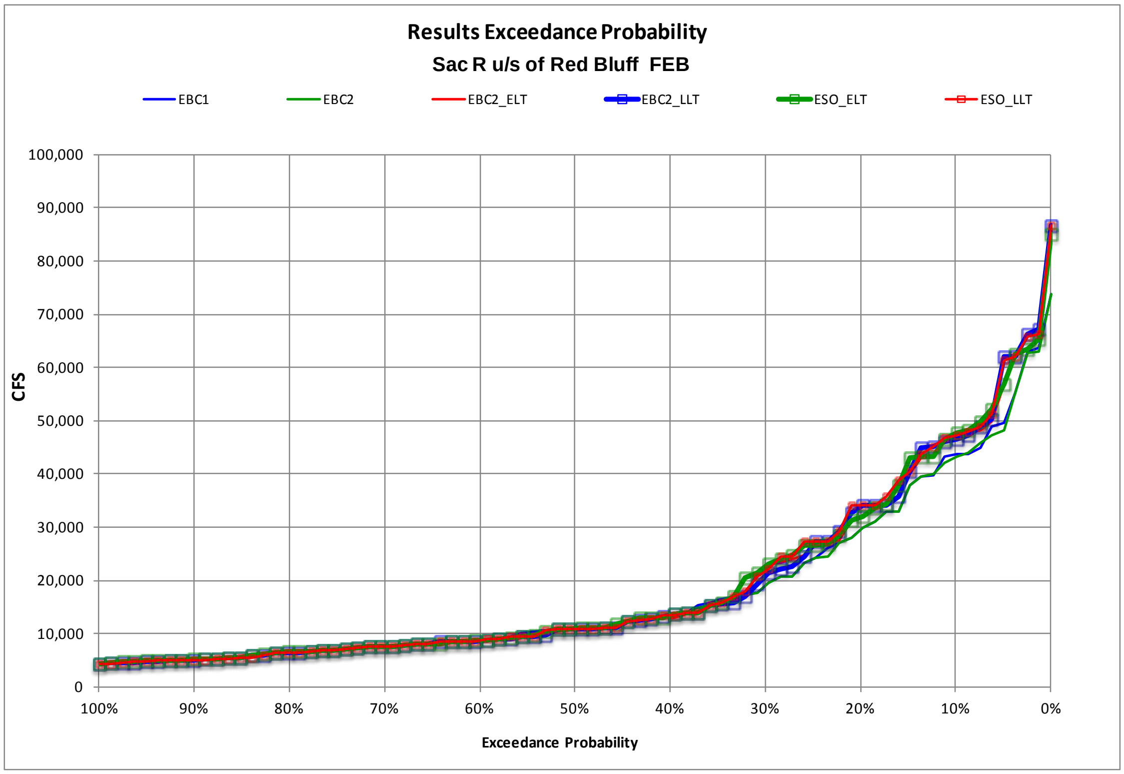


Figure 5C.5.3-175. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, February

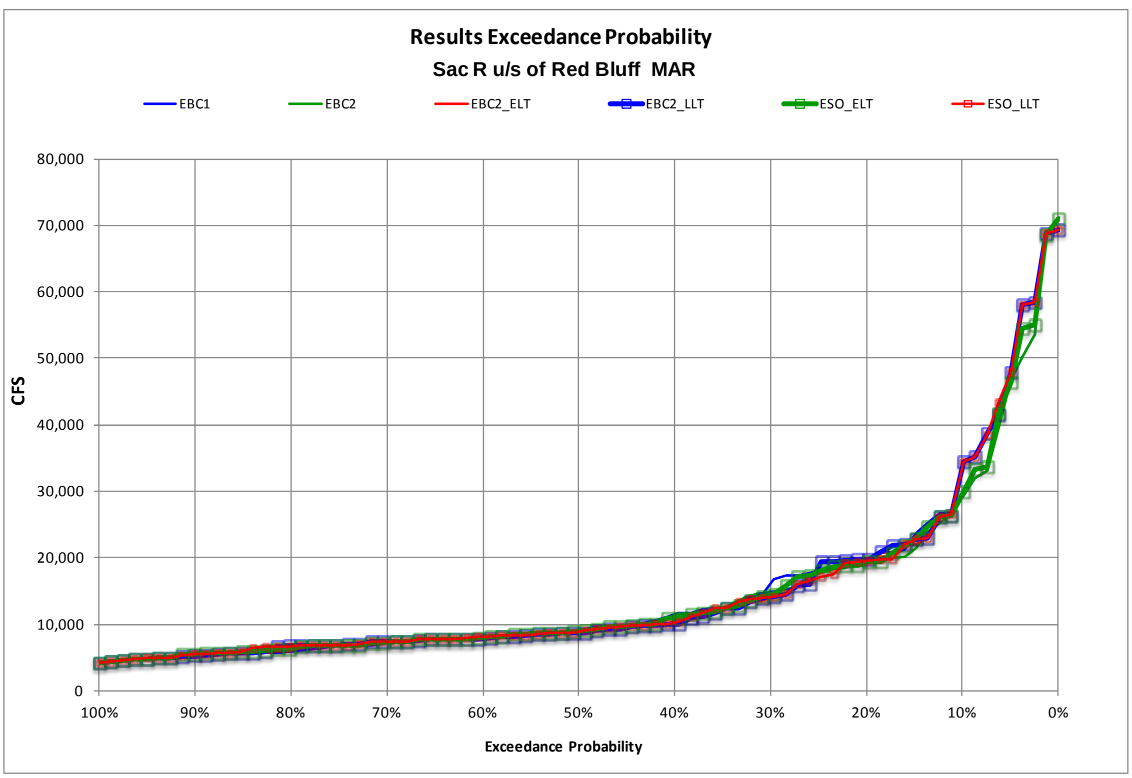


Figure 5C.5.3-176. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, March

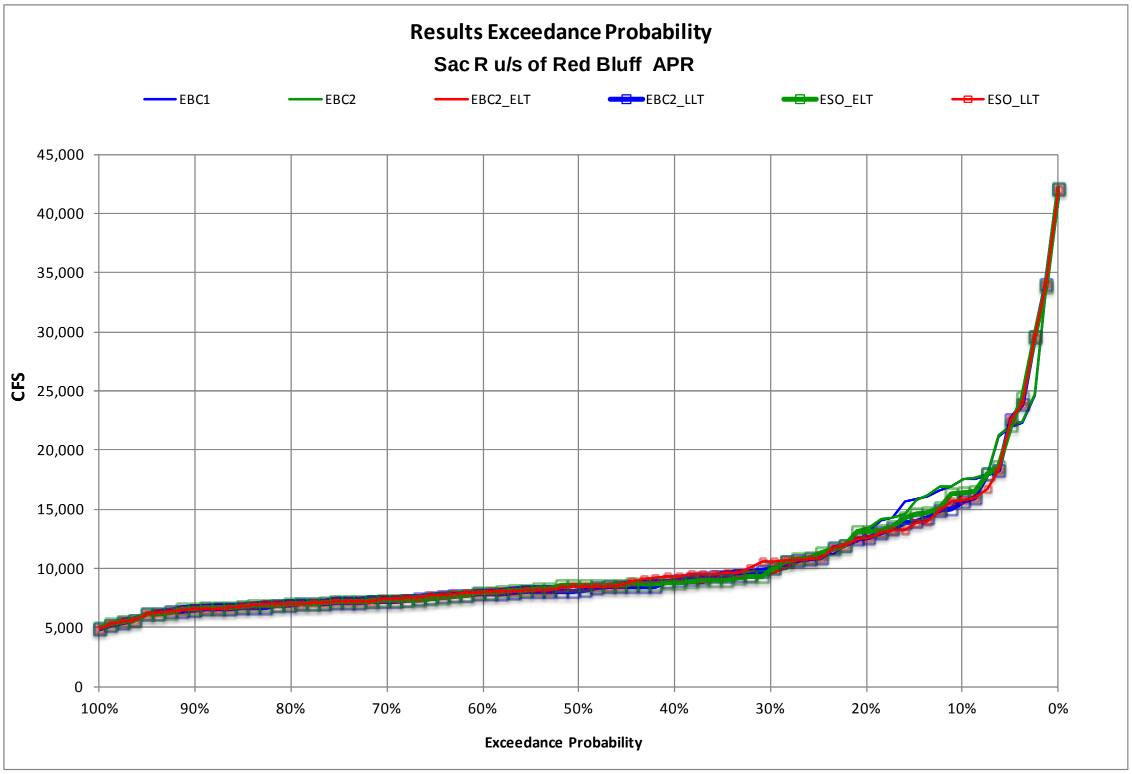


Figure 5C.5.3-177. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, April

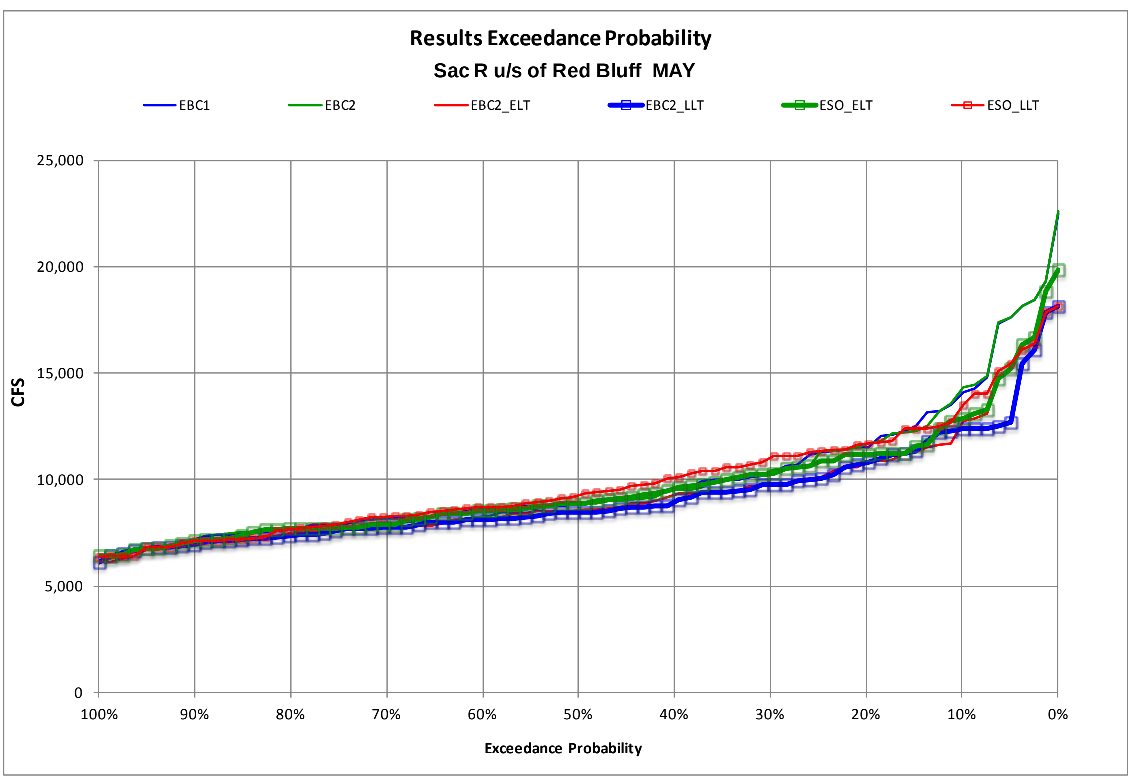


Figure 5C.5.3-178. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, May

Adult

There are no fingerprinting tools available to evaluate the relative contribution of smaller tributaries to overall flows upstream of the Delta. However, an evaluation of flow rates from CALSIM outputs along the likely migration pathways of Pacific lamprey during January through June provides information on how the evaluated starting operations is predicted to affect adult attraction flows.

Flows in the Sacramento River upstream of Red Bluff for each model scenario between January and June are presented in Table 5C.5.3-206, and differences between model scenarios in mean flows are presented in Table 5C.5.3-207.

Predicted differences for model scenario ESO_ELT relative to EBC1 were generally small, with maximum differences of -10% in wet years (May), 7% in above normal years (February), -8% in below normal years (March), 8% in dry and criticial years (June). Predicted differences for ESO_LLT relative to EBC1 were also generally small, although typically larger than the ESO_ELT relative to EBC1 differences, with maximum differences of -17% in wet years (May), 20% in above normal years (June), -10% in below normal years (March), 14% in dry years (May) and 15% in critical years (January). Predicted differences for ESO_ELT relative to EBC2 were generally similar to differences of ESO_ELT relative to EBC1, with maximum differences of -10% in wet years (May), 8% in above normal years (February), 9% in below normal years (February), 7% in dry years (June) and 6% in critical years (June). Predicted differences for ESO_LLT relative to EBC2 were generally similar to differences of ESO_LLT relative to EBC1, with maximum differences of -16% in wet years (May), 17% in above normal years (June), 8% in below normal years (June), 16% in dry years (May) and 10% in critical years (January).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, predicted differences for ESO_ELT relative to EBC2_ELT were generally small, with maximum differences of 2% in wet years (June), 9% in above normal years (May), 6% in below normal years (January), 6% in dry years (June) and -4% in critical years (January). Predicted differences for ESO_LLT relative to EBC2_LLT were also generally small, with maximum differences of 8% in wet years (June), 12% in above normal years (June), 11% in below normal years (May), 10% in dry years (May) and 4% in critical years (March).

Other than during May and June, the differences for comparisons accounting for climate change are very minor. During May and June, these differences are considered a small benefit to Pacific lamprey adult attraction flows if lamprey are attracted to upstream olfactory cues.

5C.5.3.13.2.10 River Lamprey

Macropthalmia

See results for Pacific lamprey macropthalmia.

Adult

Exceedance plots for flows in the Sacramento River upstream of Red Bluff for each model scenario between September and November are presented in Figure 5C.5.3-179, Figure 5C.5.3-180, and Figure 5C.5.3-181, and differences between model scenarios in mean flows are presented in Table 5C.5.3-207.

Predicted differences for ESO relative to EBC scenarios were highly variable, with large increases and large reductions. Maximum predicted differences for model scenario ESO_ELT relative to EBC1 were 24% in wet years (September), 31% in above normal years (September), -10% in below normal years (October), -22% in dry years (September) and -13% in critical years (September). Maximum predicted differences for ESO_LLT relative to EBC1 were -39% in wet years (September), 55% in above normal years (September), -11% in below normal years (September), -14% in dry years (November) and -7% in critical years (November). Maximum predicted differences for ESO_ELT relative to EBC2 were -11% in wet years (November), -13% in above normal years (November), -16% in below normal years (November), -18% in dry years (September) and -9% in critical years (September). Maximum predicted differences for ESO_LLT relative to EBC2 all occurred in November and were -12% in wet years, -17% in above normal years, -13% in below normal years, -12% in dry years and -8% in critical years.

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, maximum predicted differences for ESO_ELT relative to EBC2_ELT all occurred in November. They were -11% in wet years, -17% in above normal years, -18% in below normal years, -11% in dry years and -6% in critical years. Maximum predicted differences for ESO_LLT relative to EBC2_LLT were -11% in wet years (November), -18% in above normal years (November), -14% in below normal years (November), 12% in dry years (September) and 18% in critical years (September).

These results suggest that the evaluated starting operations would have a small to moderate adverse effect on river lamprey adult attraction flows if lamprey are attracted to upstream olfactory cues.

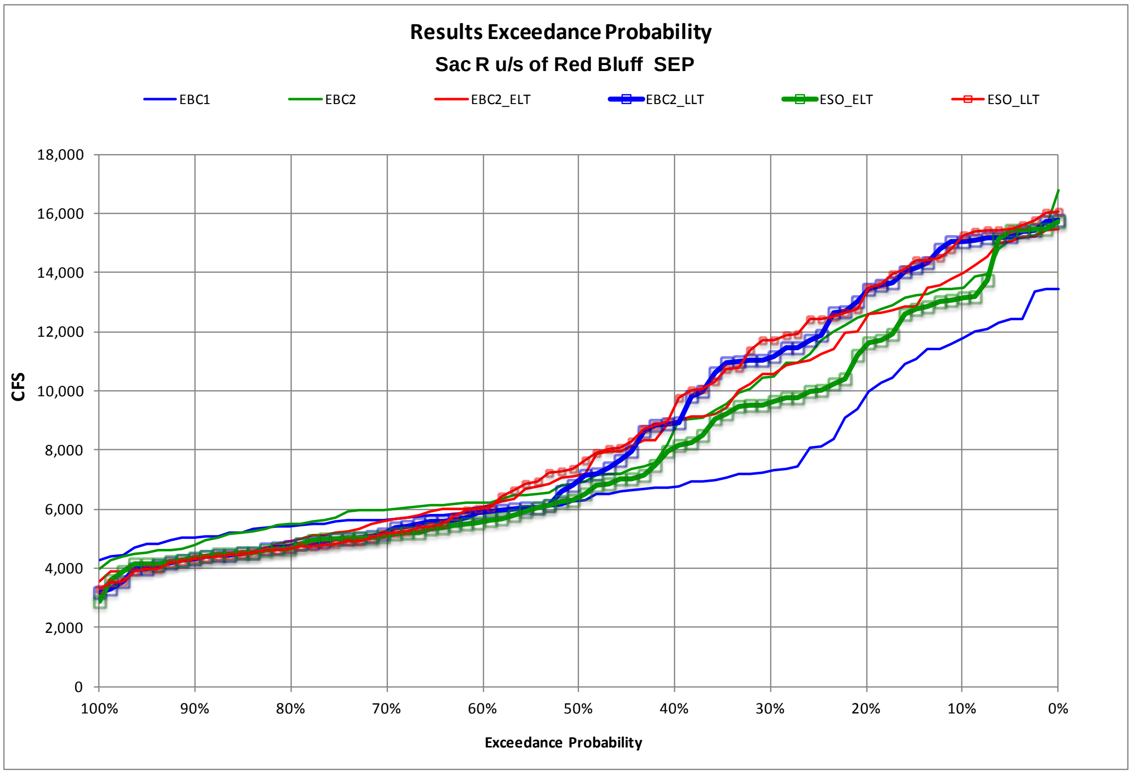


Figure 5C.5.3-179. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, September

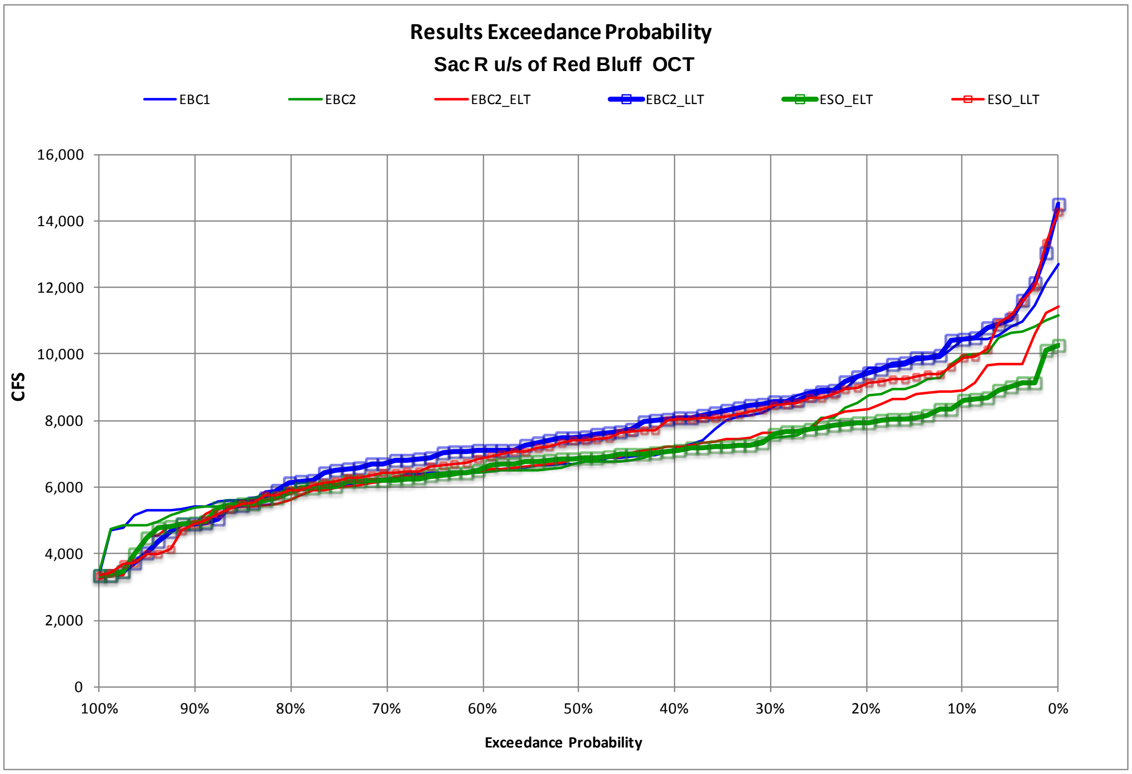


Figure 5C.5.3-180. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, October

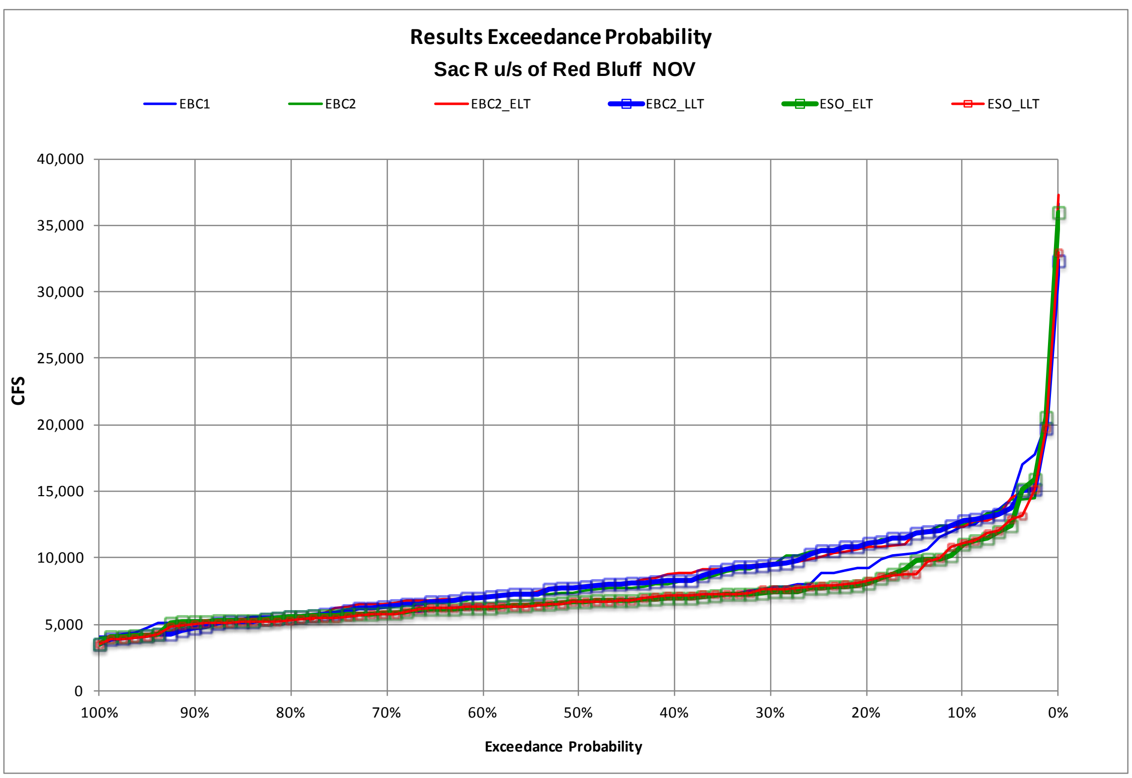


Figure 5C.5.3-181. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Sacramento River Upstream of Red Bluff, November

5C.5.3.13.3 Trinity River Subregion

5C.5.3.13.3.1 Summary of Flows

CALSIM flow data for the Trinity River subregion (Trinity River below Lewiston) averaged by water-year type, month, and scenario, together with average monthly differences between scenarios, are provided in Table 5C.5.3-217 and Table 5C.5.3-218. These data form the basis for the summary of changes in attraction and migration flows.

Table 5C.5.3-217. Mean Monthly Flows (cfs) in Trinity River below Lewiston for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	1,440	1,396	1,570	1,518	1,606	1,416
	AN	300	316	300	300	300	300
	BN	358	300	300	300	300	300
	D	300	300	300	300	300	300
	C	300	300	300	287	300	275
	All	671	650	703	684	714	650
Feb	W	1,056	1,026	1,209	1,495	1,288	1,480
	AN	689	813	773	784	855	767
	BN	517	517	559	568	559	662
	D	300	300	300	300	300	300
	C	300	300	300	300	300	300
	All	634	642	702	795	739	804
Mar	W	1,209	1,141	1,335	1,385	1,409	1,385
	AN	436	436	475	519	475	519
	BN	319	319	302	300	300	300
	D	300	300	300	300	300	300
	C	300	300	300	300	300	300
	All	611	590	654	676	677	676
Apr	W	721	721	740	844	738	844
	AN	469	469	561	513	467	458
	BN	507	507	508	504	508	504
	D	529	529	529	529	529	529
	C	575	575	580	580	580	580
	All	584	584	605	630	590	622
May	W	4,636	4,636	4,620	4,620	4,620	4,620
	AN	4,462	4,462	4,450	4,416	4,450	4,416
	BN	3,774	3,774	3,763	3,865	3,763	3,865
	D	3,216	3,216	3,216	3,216	3,216	3,216
	C	2,092	2,092	1,973	1,973	1,973	1,973
	All	3,779	3,779	3,753	3,766	3,753	3,766
Jun	W	3,371	3,371	3,613	3,560	3,613	3,560
	AN	2,488	2,488	2,663	3,188	2,663	3,188
	BN	1,672	1,672	1,767	1,767	1,767	1,767
	D	1,251	1,251	1,251	1,251	1,251	1,251
	C	783	783	783	783	783	783
	All	2,108	2,108	2,226	2,286	2,226	2,286

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jul	W	1,289	1,289	1,161	1,103	1,161	1,103
	AN	1,048	1,048	1,048	1,048	1,048	1,048
	BN	869	869	916	916	916	916
	D	667	667	667	667	667	667
	C	450	450	450	413	450	450
	All	923	923	890	866	890	872
Aug	W	450	450	450	450	450	450
	AN	450	450	450	450	450	450
	BN	450	450	450	450	450	450
	D	450	450	450	450	450	450
	C	450	450	413	338	413	300
	All	450	450	445	434	445	428
Sep	W	450	450	450	450	450	450
	AN	450	450	450	450	450	450
	BN	450	450	450	450	450	450
	D	450	450	450	450	450	450
	C	450	450	356	265	375	248
	All	450	450	436	423	439	420
Oct	W	373	373	373	373	373	373
	AN	373	373	337	311	312	332
	BN	346	346	346	346	346	346
	D	373	373	352	346	352	352
	C	373	373	342	311	342	280
	All	368	368	354	344	350	344
Nov	W	489	491	510	414	461	365
	AN	300	275	275	275	275	275
	BN	300	300	300	300	300	300
	D	300	300	283	283	283	283
	C	300	300	263	225	275	225
	All	360	357	354	318	340	302
Dec	W	1,072	1,022	1,281	837	1,379	926
	AN	300	300	300	300	300	300
	BN	300	300	300	300	300	300
	D	300	300	300	300	300	298
	C	300	300	300	275	300	272
	All	545	529	611	466	642	494

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-218. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Trinity River below Lewiston

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	167 (11.6%)	-24 (-1.6%)	210 (15.1%)	20 (1.4%)	37 (2.3%)	-102 (-6.7%)
	AN	0 (0%)	0 (0%)	-16 (-4.9%)	-16 (-4.9%)	0 (0%)	0 (0%)
	BN	-58 (-16.3%)	-58 (-16.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	-25 (-8.3%)	0 (0%)	-25 (-8.3%)	0 (0%)	-12 (-4.3%)
	All	43 (6.4%)	-21 (-3.2%)	64 (9.9%)	0 (0.1%)	12 (1.7%)	-34 (-5%)
Feb	W	231 (21.9%)	424 (40.1%)	262 (25.5%)	454 (44.3%)	79 (6.5%)	-14 (-1%)
	AN	166 (24%)	78 (11.2%)	42 (5.1%)	-46 (-5.7%)	82 (10.6%)	-17 (-2.2%)
	BN	43 (8.2%)	145 (28.1%)	42 (8.2%)	145 (28.1%)	0 (0%)	94 (16.5%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	105 (16.6%)	171 (26.9%)	96 (15%)	162 (25.2%)	37 (5.3%)	9 (1.1%)
Mar	W	200 (16.5%)	176 (14.6%)	268 (23.5%)	244 (21.4%)	73 (5.5%)	0 (0%)
	AN	39 (8.9%)	83 (19.1%)	39 (8.9%)	83 (19.1%)	0 (0%)	0 (0%)
	BN	-19 (-5.8%)	-19 (-5.8%)	-19 (-5.8%)	-19 (-5.8%)	-2 (-0.7%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	66 (10.8%)	65 (10.6%)	87 (14.8%)	86 (14.7%)	23 (3.5%)	0 (0%)
Apr	W	17 (2.4%)	122 (17%)	17 (2.4%)	122 (17%)	-2 (-0.2%)	0 (0%)
	AN	-3 (-0.6%)	-11 (-2.3%)	-3 (-0.6%)	-11 (-2.3%)	-95 (-16.9%)	-54 (-10.6%)
	BN	1 (0.2%)	-3 (-0.7%)	1 (0.2%)	-3 (-0.7%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	5 (0.9%)	5 (0.9%)	5 (0.9%)	5 (0.9%)	0 (0%)	0 (0%)
	All	6 (1%)	37 (6.4%)	6 (1%)	37 (6.4%)	-14 (-2.4%)	-8 (-1.3%)
May	W	-16 (-0.3%)	-16 (-0.3%)	-16 (-0.3%)	-16 (-0.3%)	0 (0%)	0 (0%)
	AN	-12 (-0.3%)	-46 (-1%)	-12 (-0.3%)	-46 (-1%)	0 (0%)	0 (0%)
	BN	-12 (-0.3%)	90 (2.4%)	-12 (-0.3%)	90 (2.4%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	-119 (-5.7%)	-119 (-5.7%)	-119 (-5.7%)	-119 (-5.7%)	0 (0%)	0 (0%)
	All	-26 (-0.7%)	-14 (-0.4%)	-26 (-0.7%)	-14 (-0.4%)	0 (0%)	0 (0%)
Jun	W	242 (7.2%)	189 (5.6%)	242 (7.2%)	189 (5.6%)	0 (0%)	0 (0%)
	AN	175 (7%)	700 (28.1%)	175 (7%)	700 (28.1%)	0 (0%)	0 (0%)
	BN	96 (5.7%)	96 (5.7%)	96 (5.7%)	96 (5.7%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	119 (5.6%)	179 (8.5%)	119 (5.6%)	179 (8.5%)	0 (0%)	0 (0%)
Jul	W	-128 (-9.9%)	-185 (-14.4%)	-128 (-9.9%)	-185 (-14.4%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	47 (5.4%)	47 (5.4%)	47 (5.4%)	47 (5.4%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	37 (9.1%)
	All	-33 (-3.5%)	-51 (-5.5%)	-33 (-3.5%)	-51 (-5.5%)	0 (0%)	5 (0.6%)

Month	Water-Year Type[b]	Scenario[c] EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	-38 (-8.3%)	-150 (-33.3%)	-38 (-8.3%)	-150 (-33.3%)	0 (0%)	-37 (-11.1%)
	All	-5 (-1.2%)	-22 (-4.9%)	-5 (-1.2%)	-22 (-4.9%)	0 (0%)	-5 (-1.3%)
Sep	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	-75 (-16.7%)	-202 (-44.9%)	-75 (-16.7%)	-202 (-44.9%)	19 (5.5%)	-17 (-6.6%)
	All	-11 (-2.4%)	-30 (-6.6%)	-11 (-2.4%)	-30 (-6.6%)	3 (0.7%)	-3 (-0.6%)
Oct	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	-61 (-16.4%)	-41 (-11.1%)	-61 (-16.4%)	-41 (-11.1%)	-25 (-7.6%)	21 (6.7%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	-21 (-5.6%)	-21 (-5.6%)	-21 (-5.6%)	-21 (-5.6%)	0 (0%)	6 (1.9%)
	C	-31 (-8.3%)	-93 (-25%)	-31 (-8.3%)	-93 (-25%)	0 (0%)	-31 (-10%)
	All	-18 (-4.9%)	-24 (-6.6%)	-18 (-4.9%)	-24 (-6.6%)	-4 (-1.1%)	0 (0%)
Nov	W	-28 (-5.7%)	-123 (-25.2%)	-30 (-6.2%)	-125 (-25.5%)	-49 (-9.7%)	-49 (-11.7%)
	AN	-25 (-8.3%)	-25 (-8.3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	-17 (-5.6%)	-17 (-5.6%)	-17 (-5.6%)	-17 (-5.6%)	0 (0%)	0 (0%)
	C	-25 (-8.3%)	-75 (-25%)	-25 (-8.3%)	-75 (-25%)	12 (4.5%)	0 (0%)
	All	-20 (-5.5%)	-57 (-15.9%)	-17 (-4.7%)	-54 (-15.2%)	-14 (-3.9%)	-15 (-4.8%)
Dec	W	307 (28.7%)	-146 (-13.6%)	357 (35%)	-96 (-9.4%)	98 (7.6%)	89 (10.7%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	-2 (-0.7%)	0 (0%)	-2 (-0.7%)	0 (0%)	-2 (-0.7%)
	C	0 (0%)	-28 (-9.3%)	0 (0%)	-28 (-9.3%)	0 (0%)	-3 (-0.9%)
	All	97 (17.9%)	-51 (-9.3%)	113 (21.4%)	-35 (-6.6%)	31 (5.1%)	27 (5.9%)

[a] A positive value indicates higher mean flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

5C.5.3.13.4 Clear Creek Subregion

CALSIM flow data for the Clear Creek subregion (Clear Creek below Whiskeytown) averaged by water-year type, month, and scenario, together with average monthly differences between scenarios, are provided in Table 5C.5.3-219 and Table 5C.5.3-220. Based on these results, no appreciable effects of the evaluated starting operations on migration or attraction flows are expected in this subregion.

Table 5C.5.3-219. Mean Monthly Flows (cfs) in Clear Creek below Whiskeytown for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	220	220	309	339	309	339
	AN	192	192	192	192	192	192
	BN	189	189	189	189	189	189
	D	184	192	192	192	192	192
	C	155	168	166	159	171	171
	All	193	197	225	233	225	235
Feb	W	220	220	249	257	249	257
	AN	197	196	196	196	196	196
	BN	189	189	189	189	189	189
	D	184	192	192	192	192	192
	C	155	168	166	168	171	171
	All	194	197	206	209	207	210
Mar	W	200	200	207	259	207	258
	AN	197	205	203	196	196	196
	BN	189	189	192	202	189	201
	D	186	192	192	192	192	192
	C	155	168	166	168	171	171
	All	188	193	194	212	194	212
Apr	W	200	200	200	200	200	200
	AN	197	196	196	196	196	196
	BN	189	189	192	189	189	189
	D	188	192	192	192	192	192
	C	155	168	166	168	171	171
	All	189	191	191	191	191	191
May	W	277	277	277	277	277	277
	AN	277	277	277	277	277	277
	BN	263	269	269	269	269	269
	D	264	264	264	264	264	264
	C	211	224	224	224	224	224
	All	262	265	265	265	265	265
Jun	W	200	200	200	200	200	200
	AN	200	200	200	200	200	200
	BN	181	186	186	186	186	186
	D	180	180	180	180	180	180
	C	115	120	120	131	120	120
	All	180	181	181	183	181	181
Jul	W	85	85	85	85	85	85
	AN	85	85	85	85	85	85
	BN	85	85	85	85	85	85
	D	85	85	85	85	85	85
	C	85	85	99	85	85	85
	All	85	85	87	85	85	85

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	85	85	85	85	85	85
	AN	85	85	85	85	85	85
	BN	85	85	85	85	85	85
	D	85	85	85	85	85	85
	C	94	94	85	71	94	71
	All	86	86	85	83	86	83
Sep	W	150	150	150	150	150	150
	AN	150	150	150	150	150	150
	BN	150	150	150	150	150	150
	D	144	150	150	150	150	150
	C	133	133	121	96	108	96
	All	146	148	146	142	144	142
Oct	W	198	198	198	198	198	198
	AN	183	183	183	183	183	183
	BN	189	179	179	182	179	189
	D	175	183	183	183	175	180
	C	150	167	165	142	154	142
	All	182	185	185	182	181	182
Nov	W	198	198	198	198	198	198
	AN	185	185	180	182	180	182
	BN	184	189	189	189	189	189
	D	177	184	184	177	176	177
	C	155	168	158	145	158	158
	All	183	187	185	182	183	184
Dec	W	198	198	198	198	198	198
	AN	185	192	192	192	192	192
	BN	189	189	189	189	189	189
	D	177	189	189	189	189	189
	C	155	168	166	156	171	171
	All	184	189	189	187	190	190

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

1 **Table 5C.5.3-220. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Clear**
2 **Creek below Whiskeytown**

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	88 (40.1%)	118 (53.6%)	88 (40.1%)	118 (53.6%)	0 (0%)	0 (-0.1%)
	AN	0 (-0.1%)	0 (-0.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	7 (3.9%)	7 (3.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	16 (10.2%)	16 (10.2%)	3 (1.5%)	2 (1.5%)	5 (2.9%)	12 (7.4%)
	All	32 (16.5%)	41 (21.4%)	28 (14.4%)	38 (19.2%)	1 (0.3%)	2 (0.7%)
Feb	W	29 (13.3%)	38 (17.1%)	29 (13.3%)	38 (17.1%)	0 (0%)	0 (-0.1%)
	AN	-1 (-0.4%)	-1 (-0.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	7 (3.9%)	7 (3.9%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	16 (10.2%)	16 (10.2%)	3 (1.5%)	2 (1.5%)	5 (2.9%)	3 (1.7%)
	All	13 (6.7%)	16 (8.1%)	10 (4.9%)	12 (6.2%)	1 (0.3%)	0 (0.2%)
Mar	W	7 (3.3%)	58 (29.2%)	7 (3.3%)	58 (29.1%)	0 (0%)	0 (-0.1%)
	AN	-1 (-0.4%)	-1 (-0.4%)	-10 (-4.6%)	-10 (-4.6%)	-7 (-3.7%)	0 (0%)
	BN	0 (0%)	12 (6.1%)	0 (0%)	12 (6.1%)	-3 (-1.4%)	-1 (-0.4%)
	D	6 (3.2%)	6 (3.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	16 (10.2%)	16 (10.2%)	3 (1.5%)	2 (1.5%)	5 (2.9%)	3 (1.7%)
	All	6 (3%)	24 (12.8%)	1 (0.5%)	19 (10.1%)	-1 (-0.4%)	0 (0.1%)
Apr	W	0 (0%)	0 (0%)	0 (-0.1%)	0 (-0.1%)	0 (0%)	0 (-0.1%)
	AN	-1 (-0.4%)	-1 (-0.4%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	-3 (-1.4%)	0 (0%)
	D	3 (1.7%)	3 (1.7%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	16 (10.2%)	16 (10.2%)	3 (1.5%)	2 (1.5%)	5 (2.9%)	3 (1.7%)
	All	3 (1.5%)	3 (1.5%)	0 (0.2%)	0 (0.2%)	0 (0.1%)	0 (0.2%)
May	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	6 (2.2%)	6 (2.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	13 (6.2%)	13 (6.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	3 (1.1%)	3 (1.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Jun	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	5 (2.6%)	5 (2.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	5 (4.7%)	5 (4.7%)	0 (0%)	0 (0%)	0 (0%)	-11 (-8.2%)
	All	2 (0.9%)	2 (0.9%)	0 (0%)	0 (0%)	0 (0%)	-2 (-0.9%)
Jul	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)	-14 (-13.8%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)	-2 (-2.3%)	0 (0%)

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (-0.3%)	-23 (-24.9%)	0 (-0.3%)	-23 (-24.9%)	9 (10.6%)	0 (0%)
	All	0 (0%)	-3 (-4%)	0 (0%)	-3 (-4%)	1 (1.6%)	0 (0%)
Sep	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	6 (3.8%)	6 (3.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	-25 (-18.7%)	-37 (-28.1%)	-25 (-18.7%)	-37 (-28.1%)	-13 (-10.3%)	0 (0%)
	All	-2 (-1.7%)	-4 (-2.9%)	-4 (-2.5%)	-5 (-3.7%)	-2 (-1.3%)	0 (0%)
Oct	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	-11 (-5.7%)	0 (0%)	0 (0%)	11 (6%)	0 (0%)	7 (4.1%)
	D	0 (0%)	5 (2.8%)	-8 (-4.5%)	-3 (-1.9%)	-8 (-4.5%)	-3 (-1.9%)
	C	4 (2.8%)	-8 (-5.6%)	-13 (-7.5%)	-25 (-15%)	-11 (-6.5%)	0 (0%)
	All	-1 (-0.7%)	0 (-0.1%)	-4 (-2%)	-3 (-1.4%)	-3 (-1.8%)	1 (0.3%)
Nov	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	-5 (-2.8%)	-3 (-1.8%)	-5 (-2.7%)	-3 (-1.7%)	0 (0%)	0 (0%)
	BN	6 (3.1%)	6 (3.1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	-1 (-0.6%)	-1 (-0.3%)	-8 (-4.5%)	-8 (-4.2%)	-8 (-4.5%)	0 (0.1%)
	C	3 (2.2%)	3 (1.9%)	-10 (-5.9%)	-10 (-6.2%)	0 (0%)	12 (8.6%)
	All	0 (0.3%)	1 (0.4%)	-4 (-2.1%)	-4 (-2%)	-2 (-1%)	2 (1%)
Dec	W	0 (0%)	0 (0%)	0 (-0.1%)	0 (-0.1%)	0 (-0.1%)	0 (0%)
	AN	7 (3.6%)	7 (3.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	12 (6.6%)	12 (6.6%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	16 (10.2%)	16 (10.2%)	3 (1.5%)	2 (1.5%)	5 (2.9%)	15 (9.7%)
	All	6 (3.2%)	6 (3.2%)	0 (0.2%)	0 (0.2%)	1 (0.4%)	2 (1.2%)

[a] A positive value indicates higher mean flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

5C.5.3.13.5 Feather River Subregion

CALSIM flow data for the Feather River subregion averaged by water-year type, month, and scenario, together with average monthly differences between scenarios, are provided in Table 5C.5.3-221 through Table 5C.5.3-224. These form the basis for the summary of changes in attraction and migration flows.

1 **Table 5C.5.3-221. Mean Monthly Flows (cfs) in Feather River at Thermalito for EBC and ESO Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	11,257	10,642	11,528	11,896	11,518	11,023
	AN	4,434	3,470	3,419	2,838	3,138	2,874
	BN	2,640	1,703	1,692	1,441	1,411	1,419
	D	1,798	1,448	1,477	1,459	1,527	1,556
	C	1,459	1,222	1,378	1,648	1,359	1,721
	All	5,277	4,669	4,970	4,995	4,886	4,751
Feb	W	12,466	11,548	13,732	14,787	14,169	16,276
	AN	7,411	5,403	5,793	5,809	7,546	6,955
	BN	3,916	2,797	2,280	1,897	2,029	2,145
	D	1,817	1,620	1,642	1,659	1,608	1,636
	C	1,610	1,477	1,467	1,482	1,442	1,516
	All	6,340	5,502	6,166	6,444	6,507	7,126
Mar	W	12,895	12,392	13,977	14,772	13,839	14,401
	AN	7,733	6,950	8,568	8,568	8,860	9,456
	BN	3,373	2,441	2,347	1,985	2,052	1,598
	D	2,017	1,701	1,521	1,762	1,679	1,930
	C	1,697	1,478	1,590	1,634	1,755	1,729
	All	6,487	5,953	6,653	6,902	6,660	6,900
Apr	W	6,472	6,510	6,652	6,408	6,669	6,399
	AN	2,251	2,257	2,240	2,170	2,234	2,180
	BN	1,205	1,119	1,132	1,203	1,131	1,728
	D	1,286	1,328	1,448	1,470	1,653	2,036
	C	1,389	1,375	1,384	1,407	1,608	1,637
	All	3,073	3,078	3,150	3,084	3,233	3,330
May	W	7,528	7,539	6,380	4,740	6,369	5,060
	AN	3,340	3,262	3,342	3,101	4,190	3,929
	BN	1,205	1,149	1,316	1,749	1,479	2,780
	D	1,591	1,586	1,862	2,223	2,120	2,563
	C	1,574	1,520	1,877	1,790	1,694	1,762
	All	3,661	3,635	3,420	3,005	3,599	3,475
Jun	W	5,062	5,139	3,659	4,211	5,427	6,423
	AN	3,301	3,385	3,107	3,930	5,824	7,008
	BN	2,707	2,752	3,153	3,552	6,490	6,365
	D	3,134	3,352	3,432	3,284	4,378	3,790
	C	2,695	2,700	2,812	2,666	2,587	2,648
	All	3,632	3,725	3,318	3,628	5,021	5,368
Jul	W	6,490	6,748	7,835	8,577	7,444	7,849
	AN	8,757	9,113	9,434	9,488	9,550	9,427
	BN	8,981	9,094	8,936	8,833	8,575	7,843
	D	8,294	8,266	7,980	8,099	6,454	5,117
	C	6,703	6,040	6,144	5,217	3,221	2,618
	All	7,674	7,724	8,041	8,157	7,110	6,714

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	3,308	3,906	5,462	6,228	4,965	5,037
	AN	6,042	6,384	6,948	7,346	6,639	5,955
	BN	6,295	6,448	6,348	6,868	5,848	5,550
	D	7,036	6,106	5,633	4,990	3,890	3,743
	C	2,613	2,625	2,236	2,163	2,748	2,116
	All	4,935	4,998	5,396	5,634	4,800	4,547
Sep	W	2,280	8,458	8,400	8,327	6,656	7,049
	AN	2,253	7,021	7,172	6,899	5,742	5,142
	BN	2,466	2,710	3,161	3,068	1,824	1,790
	D	2,366	1,999	1,473	1,052	1,194	1,266
	C	1,421	1,529	1,451	1,345	1,814	1,638
	All	2,201	4,835	4,788	4,601	3,790	3,811
Oct	W	3,456	3,204	3,025	3,051	3,243	3,087
	AN	2,386	2,770	2,577	2,741	2,779	3,163
	BN	3,183	2,801	2,820	2,862	3,030	2,895
	D	2,688	2,667	2,786	2,652	3,323	3,101
	C	2,472	2,267	2,233	2,102	2,311	2,656
	All	2,940	2,817	2,756	2,747	3,020	3,006
Nov	W	3,292	2,992	2,812	2,470	2,878	2,391
	AN	1,824	2,003	1,915	2,119	1,916	1,916
	BN	2,101	2,043	1,950	1,900	1,930	1,904
	D	1,859	1,733	1,729	1,664	1,806	1,782
	C	1,854	1,860	1,803	1,876	1,866	1,829
	All	2,349	2,243	2,148	2,058	2,192	2,022
Dec	W	7,157	5,414	5,543	3,948	5,259	4,456
	AN	2,951	3,328	3,344	3,344	3,484	2,864
	BN	2,176	2,515	2,096	2,102	2,140	2,029
	D	2,364	2,343	2,202	2,229	2,366	2,221
	C	2,609	2,152	1,781	1,694	2,025	2,610
	All	3,973	3,462	3,349	2,837	3,358	3,048

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-222. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Feather River at Thermalito

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	261 (2.3%)	-235 (-2.1%)	877 (8.2%)	381 (3.6%)	-9 (-0.1%)	-873 (-7.3%)
	AN	-1296 (-29.2%)	-1559 (-35.2%)	-332 (-9.6%)	-596 (-17.2%)	-281 (-8.2%)	36 (1.3%)
	BN	-1229 (-46.6%)	-1221 (-46.3%)	-292 (-17.2%)	-284 (-16.7%)	-282 (-16.6%)	-22 (-1.6%)
	D	-272 (-15.1%)	-242 (-13.5%)	79 (5.4%)	108 (7.5%)	50 (3.4%)	97 (6.7%)
	C	-100 (-6.9%)	262 (17.9%)	137 (11.2%)	499 (40.8%)	-19 (-1.3%)	73 (4.4%)
	All	-391 (-7.4%)	-526 (-10%)	217 (4.6%)	82 (1.8%)	-84 (-1.7%)	-243 (-4.9%)
Feb	W	1703 (13.7%)	3810 (30.6%)	2620 (22.7%)	4728 (40.9%)	436 (3.2%)	1489 (10.1%)
	AN	135 (1.8%)	-456 (-6.2%)	2143 (39.7%)	1552 (28.7%)	1753 (30.3%)	1146 (19.7%)
	BN	-1887 (-48.2%)	-1771 (-45.2%)	-768 (-27.5%)	-652 (-23.3%)	-251 (-11%)	248 (13.1%)
	D	-209 (-11.5%)	-181 (-9.9%)	-12 (-0.8%)	15 (1%)	-34 (-2.1%)	-23 (-1.4%)
	C	-169 (-10.5%)	-94 (-5.9%)	-35 (-2.4%)	39 (2.6%)	-25 (-1.7%)	34 (2.3%)
	All	167 (2.6%)	785 (12.4%)	1005 (18.3%)	1624 (29.5%)	341 (5.5%)	682 (10.6%)
Mar	W	944 (7.3%)	1506 (11.7%)	1447 (11.7%)	2009 (16.2%)	-138 (-1%)	-371 (-2.5%)
	AN	1128 (14.6%)	1723 (22.3%)	1911 (27.5%)	2506 (36.1%)	292 (3.4%)	888 (10.4%)
	BN	-1322 (-39.2%)	-1775 (-52.6%)	-390 (-16%)	-843 (-34.5%)	-295 (-12.6%)	-387 (-19.5%)
	D	-338 (-16.8%)	-87 (-4.3%)	-23 (-1.3%)	228 (13.4%)	158 (10.4%)	168 (9.5%)
	C	58 (3.4%)	32 (1.9%)	278 (18.8%)	251 (17%)	166 (10.4%)	95 (5.8%)
	All	173 (2.7%)	412 (6.4%)	707 (11.9%)	947 (15.9%)	7 (0.1%)	-3 (0%)
Apr	W	196 (3%)	-73 (-1.1%)	159 (2.4%)	-111 (-1.7%)	17 (0.3%)	-9 (-0.1%)
	AN	-18 (-0.8%)	-71 (-3.2%)	-24 (-1.1%)	-77 (-3.4%)	-7 (-0.3%)	10 (0.5%)
	BN	-74 (-6.1%)	523 (43.4%)	12 (1%)	608 (54.3%)	-1 (-0.1%)	524 (43.6%)
	D	367 (28.6%)	750 (58.3%)	325 (24.5%)	708 (53.3%)	205 (14.2%)	565 (38.4%)
	C	219 (15.7%)	248 (17.9%)	233 (16.9%)	262 (19.1%)	224 (16.2%)	230 (16.3%)
	All	160 (5.2%)	257 (8.3%)	154 (5%)	251 (8.2%)	82 (2.6%)	246 (8%)
May	W	-1159 (-15.4%)	-2468 (-32.8%)	-1170 (-15.5%)	-2479 (-32.9%)	-11 (-0.2%)	320 (6.7%)
	AN	850 (25.4%)	589 (17.6%)	928 (28.5%)	668 (20.5%)	848 (25.4%)	828 (26.7%)
	BN	274 (22.7%)	1575 (130.6%)	331 (28.8%)	1631 (142%)	163 (12.4%)	1032 (59%)
	D	529 (33.2%)	972 (61.1%)	534 (33.6%)	977 (61.6%)	259 (13.9%)	340 (15.3%)
	C	120 (7.6%)	187 (11.9%)	175 (11.5%)	242 (15.9%)	-183 (-9.7%)	-28 (-1.6%)
	All	-63 (-1.7%)	-187 (-5.1%)	-36 (-1%)	-160 (-4.4%)	179 (5.2%)	469 (15.6%)
Jun	W	365 (7.2%)	1361 (26.9%)	288 (5.6%)	1284 (25%)	1767 (48.3%)	2212 (52.5%)
	AN	2523 (76.4%)	3707 (112.3%)	2439 (72%)	3623 (107%)	2717 (87.4%)	3079 (78.3%)
	BN	3783 (139.8%)	3658 (135.2%)	3738 (135.8%)	3613 (131.3%)	3337 (105.8%)	2813 (79.2%)
	D	1244 (39.7%)	657 (21%)	1026 (30.6%)	439 (13.1%)	946 (27.6%)	506 (15.4%)
	C	-108 (-4%)	-47 (-1.7%)	-113 (-4.2%)	-52 (-1.9%)	-225 (-8%)	-18 (-0.7%)
	All	1388 (38.2%)	1736 (47.8%)	1295 (34.8%)	1643 (44.1%)	1702 (51.3%)	1741 (48%)
Jul	W	954 (14.7%)	1359 (20.9%)	696 (10.3%)	1101 (16.3%)	-391 (-5%)	-728 (-8.5%)
	AN	793 (9.1%)	670 (7.7%)	438 (4.8%)	314 (3.5%)	116 (1.2%)	-61 (-0.6%)
	BN	-406 (-4.5%)	-1138 (-12.7%)	-519 (-5.7%)	-1251 (-13.8%)	-361 (-4%)	-989 (-11.2%)
	D	-1841 (-22.2%)	-3177 (-38.3%)	-1812 (-21.9%)	-3149 (-38.1%)	-1526 (-19.1%)	-2981 (-36.8%)
	C	-3482 (-51.9%)	-4085 (-60.9%)	-2819 (-46.7%)	-3422 (-56.7%)	-2923 (-47.6%)	-2599 (-49.8%)
	All	-564 (-7.4%)	-960 (-12.5%)	-614 (-8%)	-1010 (-13.1%)	-931 (-11.6%)	-1444 (-17.7%)

Month	Water-Year Type[b]	Scenario[c] EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	1657 (50.1%)	1729 (52.3%)	1059 (27.1%)	1131 (28.9%)	-497 (-9.1%)	-1191 (-19.1%)
	AN	596 (9.9%)	-87 (-1.4%)	255 (4%)	-429 (-6.7%)	-309 (-4.5%)	-1391 (-18.9%)
	BN	-447 (-7.1%)	-745 (-11.8%)	-600 (-9.3%)	-898 (-13.9%)	-500 (-7.9%)	-1318 (-19.2%)
	D	-3147 (-44.7%)	-3294 (-46.8%)	-2216 (-36.3%)	-2363 (-38.7%)	-1743 (-30.9%)	-1248 (-25%)
	C	134 (5.1%)	-497 (-19%)	123 (4.7%)	-509 (-19.4%)	512 (22.9%)	-47 (-2.2%)
	All	-135 (-2.7%)	-388 (-7.9%)	-198 (-4%)	-451 (-9%)	-596 (-11%)	-1087 (-19.3%)
Sep	W	4376 (191.9%)	4769 (209.2%)	-1802 (-21.3%)	-1409 (-16.7%)	-1744 (-20.8%)	-1278 (-15.3%)
	AN	3490 (154.9%)	2889 (128.3%)	-1279 (-18.2%)	-1879 (-26.8%)	-1429 (-19.9%)	-1757 (-25.5%)
	BN	-642 (-26%)	-675 (-27.4%)	-886 (-32.7%)	-920 (-33.9%)	-1337 (-42.3%)	-1278 (-41.6%)
	D	-1171 (-49.5%)	-1100 (-46.5%)	-805 (-40.3%)	-734 (-36.7%)	-279 (-18.9%)	214 (20.3%)
	C	394 (27.7%)	218 (15.3%)	286 (18.7%)	109 (7.2%)	363 (25%)	294 (21.8%)
	All	1589 (72.2%)	1610 (73.2%)	-1045 (-21.6%)	-1024 (-21.2%)	-998 (-20.8%)	-791 (-17.2%)
Oct	W	-213 (-6.2%)	-369 (-10.7%)	40 (1.2%)	-117 (-3.6%)	218 (7.2%)	36 (1.2%)
	AN	393 (16.5%)	777 (32.5%)	9 (0.3%)	393 (14.2%)	202 (7.8%)	422 (15.4%)
	BN	-153 (-4.8%)	-287 (-9%)	229 (8.2%)	94 (3.4%)	210 (7.5%)	34 (1.2%)
	D	635 (23.6%)	413 (15.4%)	656 (24.6%)	434 (16.3%)	537 (19.3%)	449 (16.9%)
	C	-161 (-6.5%)	184 (7.5%)	44 (1.9%)	389 (17.2%)	77 (3.5%)	554 (26.3%)
	All	80 (2.7%)	65 (2.2%)	204 (7.2%)	189 (6.7%)	264 (9.6%)	258 (9.4%)
Nov	W	-415 (-12.6%)	-902 (-27.4%)	-114 (-3.8%)	-601 (-20.1%)	66 (2.3%)	-79 (-3.2%)
	AN	92 (5%)	92 (5.1%)	-87 (-4.4%)	-87 (-4.3%)	1 (0%)	-203 (-9.6%)
	BN	-171 (-8.1%)	-197 (-9.4%)	-113 (-5.5%)	-139 (-6.8%)	-20 (-1%)	4 (0.2%)
	D	-53 (-2.9%)	-78 (-4.2%)	73 (4.2%)	48 (2.8%)	77 (4.5%)	117 (7.1%)
	C	12 (0.7%)	-25 (-1.4%)	6 (0.3%)	-31 (-1.7%)	63 (3.5%)	-47 (-2.5%)
	All	-157 (-6.7%)	-327 (-13.9%)	-51 (-2.3%)	-221 (-9.8%)	44 (2%)	-35 (-1.7%)
Dec	W	-1898 (-26.5%)	-2701 (-37.7%)	-155 (-2.9%)	-958 (-17.7%)	-284 (-5.1%)	508 (12.9%)
	AN	534 (18.1%)	-87 (-2.9%)	156 (4.7%)	-464 (-13.9%)	140 (4.2%)	-480 (-14.3%)
	BN	-36 (-1.7%)	-147 (-6.7%)	-375 (-14.9%)	-486 (-19.3%)	43 (2.1%)	-73 (-3.5%)
	D	2 (0.1%)	-142 (-6%)	23 (1%)	-122 (-5.2%)	164 (7.5%)	-8 (-0.4%)
	C	-583 (-22.4%)	2 (0.1%)	-127 (-5.9%)	458 (21.3%)	244 (13.7%)	916 (54.1%)
	All	-615 (-15.5%)	-925 (-23.3%)	-104 (-3%)	-414 (-12%)	10 (0.3%)	211 (7.4%)

[a] A positive value indicates higher mean flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-223. Mean Monthly Flows (cfs) in Feather River at the Confluence with the Sacramento River for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	23,533	22,926	24,852	26,106	24,851	25,241
	AN	12,430	11,484	11,755	11,953	11,475	11,993
	BN	6,499	5,581	5,658	5,575	5,377	5,556
	D	4,621	4,292	4,390	4,412	4,437	4,510
	C	3,646	3,429	3,551	3,837	3,530	3,921
	All	11,938	11,346	12,049	12,509	11,967	12,271
Feb	W	27,039	26,129	29,508	31,065	29,950	32,560
	AN	14,818	12,840	14,119	14,599	15,877	15,749
	BN	9,153	8,053	8,081	7,892	7,835	8,144
	D	4,402	4,223	4,365	4,436	4,329	4,413
	C	3,237	3,118	3,086	3,096	3,063	3,130
	All	13,744	12,922	14,212	14,761	14,556	15,446
Mar	W	24,172	23,698	25,585	26,784	25,453	26,416
	AN	19,990	19,240	21,173	21,490	21,464	22,379
	BN	8,136	7,237	7,175	6,882	6,893	6,480
	D	5,073	4,794	4,626	4,940	4,792	5,103
	C	2,933	2,620	2,695	2,756	2,895	2,844
	All	13,521	13,001	13,846	14,300	13,864	14,294
Apr	W	15,897	15,955	16,056	15,852	16,081	15,852
	AN	9,832	9,848	9,733	9,585	9,733	9,598
	BN	5,401	5,328	5,232	5,189	5,238	5,722
	D	4,152	4,198	4,233	4,137	4,441	4,705
	C	3,298	3,280	3,195	3,185	3,423	3,418
	All	8,796	8,811	8,805	8,689	8,893	8,941
May	W	14,387	14,390	12,987	10,385	12,984	10,713
	AN	8,068	7,986	7,777	6,884	8,633	7,718
	BN	4,704	4,642	4,534	4,509	4,703	5,541
	D	3,652	3,642	3,660	3,767	3,920	4,106
	C	2,389	2,332	2,492	2,321	2,309	2,282
	All	7,697	7,665	7,198	6,237	7,382	6,708
Jun	W	10,222	10,273	7,790	7,199	9,571	9,407
	AN	6,391	6,454	5,485	5,598	8,206	8,637
	BN	4,495	4,524	4,346	4,342	7,688	7,154
	D	3,853	4,055	3,776	3,367	4,723	3,873
	C	2,782	2,778	2,678	2,522	2,449	2,504
	All	6,197	6,271	5,236	4,951	6,943	6,685
Jul	W	8,177	8,423	8,536	8,734	8,064	7,923
	AN	9,322	9,657	9,442	9,223	9,527	9,107
	BN	9,380	9,492	8,985	8,725	8,613	7,709
	D	8,290	8,241	7,690	7,674	6,164	4,658
	C	6,450	5,878	5,831	4,891	2,927	2,296
	All	8,322	8,374	8,164	8,009	7,203	6,519

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	4,923	5,478	6,656	7,222	5,922	5,801
	AN	7,080	7,395	7,790	8,089	7,425	6,652
	BN	7,236	7,365	7,098	7,570	6,628	6,239
	D	7,711	6,760	6,185	5,487	4,425	4,161
	C	2,841	2,849	2,408	2,340	2,922	2,306
	All	5,941	5,977	6,172	6,313	5,495	5,129
Sep	W	4,351	10,549	10,426	10,329	8,688	9,057
	AN	4,194	8,970	9,070	8,773	7,662	7,030
	BN	4,252	4,508	4,896	4,786	3,596	3,501
	D	4,179	3,831	3,281	2,848	2,996	2,991
	C	2,054	2,138	2,052	1,964	2,349	2,296
	All	3,937	6,581	6,490	6,289	5,491	5,490
Oct	W	4,176	3,919	3,741	3,746	3,968	3,795
	AN	2,630	2,999	2,839	2,988	3,052	3,409
	BN	3,754	3,362	3,394	3,437	3,619	3,467
	D	3,033	3,002	3,139	2,987	3,675	3,447
	C	2,938	2,727	2,701	2,566	2,780	3,123
	All	3,446	3,314	3,266	3,243	3,536	3,507
Nov	W	4,697	4,467	4,407	3,825	4,476	3,750
	AN	3,065	3,310	3,220	3,186	3,209	2,982
	BN	2,687	2,668	2,589	2,455	2,573	2,464
	D	2,342	2,253	2,284	2,125	2,362	2,243
	C	2,084	2,118	2,073	2,107	2,127	2,045
	All	3,216	3,161	3,115	2,873	3,158	2,838
Dec	W	12,409	10,699	11,909	10,246	11,629	10,755
	AN	5,193	5,602	6,005	6,000	6,148	5,523
	BN	3,079	3,441	3,342	3,249	3,390	3,181
	D	2,838	2,844	2,787	2,811	2,952	2,800
	C	2,975	2,540	2,152	2,054	2,399	2,973
	All	6,279	5,796	6,152	5,599	6,165	5,811

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-224. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in Feather River at the Confluence with the Sacramento River

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	1318 (5.6%)	1708 (7.3%)	1925 (8.4%)	2315 (10.1%)	-1 (0%)	-865 (-3.3%)
	AN	-955 (-7.7%)	-437 (-3.5%)	-9 (-0.1%)	509 (4.4%)	-280 (-2.4%)	40 (0.3%)
	BN	-1122 (-17.3%)	-944 (-14.5%)	-204 (-3.7%)	-26 (-0.5%)	-281 (-5%)	-20 (-0.4%)
	D	-184 (-4%)	-111 (-2.4%)	145 (3.4%)	219 (5.1%)	47 (1.1%)	98 (2.2%)
	C	-117 (-3.2%)	275 (7.5%)	101 (2.9%)	493 (14.4%)	-22 (-0.6%)	85 (2.2%)
	All	29 (0.2%)	332 (2.8%)	621 (5.5%)	924 (8.1%)	-82 (-0.7%)	-238 (-1.9%)
Feb	W	2911 (10.8%)	5521 (20.4%)	3821 (14.6%)	6431 (24.6%)	442 (1.5%)	1495 (4.8%)
	AN	1058 (7.1%)	930 (6.3%)	3037 (23.7%)	2909 (22.7%)	1758 (12.4%)	1149 (7.9%)
	BN	-1318 (-14.4%)	-1009 (-11%)	-218 (-2.7%)	90 (1.1%)	-246 (-3%)	251 (3.2%)
	D	-73 (-1.7%)	11 (0.3%)	106 (2.5%)	190 (4.5%)	-36 (-0.8%)	-23 (-0.5%)
	C	-174 (-5.4%)	-107 (-3.3%)	-54 (-1.7%)	12 (0.4%)	-23 (-0.7%)	34 (1.1%)
	All	812 (5.9%)	1701 (12.4%)	1634 (12.6%)	2524 (19.5%)	344 (2.4%)	685 (4.6%)
Mar	W	1281 (5.3%)	2245 (9.3%)	1756 (7.4%)	2719 (11.5%)	-132 (-0.5%)	-367 (-1.4%)
	AN	1474 (7.4%)	2389 (12%)	2224 (11.6%)	3139 (16.3%)	291 (1.4%)	890 (4.1%)
	BN	-1243 (-15.3%)	-1656 (-20.4%)	-343 (-4.7%)	-757 (-10.5%)	-282 (-3.9%)	-402 (-5.8%)
	D	-281 (-5.5%)	30 (0.6%)	-2 (0%)	309 (6.4%)	165 (3.6%)	163 (3.3%)
	C	-37 (-1.3%)	-88 (-3%)	275 (10.5%)	224 (8.6%)	200 (7.4%)	88 (3.2%)
	All	343 (2.5%)	772 (5.7%)	863 (6.6%)	1293 (9.9%)	18 (0.1%)	-6 (0%)
Apr	W	184 (1.2%)	-45 (-0.3%)	127 (0.8%)	-102 (-0.6%)	25 (0.2%)	1 (0%)
	AN	-99 (-1%)	-234 (-2.4%)	-116 (-1.2%)	-250 (-2.5%)	0 (0%)	13 (0.1%)
	BN	-162 (-3%)	321 (5.9%)	-89 (-1.7%)	394 (7.4%)	7 (0.1%)	533 (10.3%)
	D	289 (7%)	554 (13.3%)	243 (5.8%)	507 (12.1%)	208 (4.9%)	569 (13.7%)
	C	125 (3.8%)	120 (3.6%)	143 (4.4%)	138 (4.2%)	228 (7.1%)	233 (7.3%)
	All	98 (1.1%)	145 (1.7%)	82 (0.9%)	130 (1.5%)	88 (1%)	252 (2.9%)
May	W	-1403 (-9.7%)	-3674 (-25.5%)	-1406 (-9.8%)	-3677 (-25.6%)	-3 (0%)	328 (3.2%)
	AN	565 (7%)	-350 (-4.3%)	647 (8.1%)	-268 (-3.4%)	856 (11%)	835 (12.1%)
	BN	-1 (0%)	837 (17.8%)	61 (1.3%)	900 (19.4%)	169 (3.7%)	1033 (22.9%)
	D	268 (7.3%)	454 (12.4%)	278 (7.6%)	464 (12.7%)	260 (7.1%)	338 (9%)
	C	-79 (-3.3%)	-106 (-4.5%)	-22 (-1%)	-49 (-2.1%)	-182 (-7.3%)	-39 (-1.7%)
	All	-315 (-4.1%)	-989 (-12.9%)	-283 (-3.7%)	-957 (-12.5%)	184 (2.6%)	471 (7.6%)
Jun	W	-651 (-6.4%)	-815 (-8%)	-702 (-6.8%)	-865 (-8.4%)	1781 (22.9%)	2208 (30.7%)
	AN	1815 (28.4%)	2246 (35.1%)	1752 (27.1%)	2183 (33.8%)	2721 (49.6%)	3040 (54.3%)
	BN	3192 (71%)	2659 (59.1%)	3164 (69.9%)	2630 (58.1%)	3341 (76.9%)	2812 (64.8%)
	D	870 (22.6%)	20 (0.5%)	667 (16.5%)	-183 (-4.5%)	946 (25.1%)	506 (15%)
	C	-333 (-12%)	-278 (-10%)	-329 (-11.8%)	-274 (-9.9%)	-229 (-8.5%)	-18 (-0.7%)
	All	746 (12%)	488 (7.9%)	672 (10.7%)	414 (6.6%)	1708 (32.6%)	1734 (35%)
Jul	W	-113 (-1.4%)	-254 (-3.1%)	-359 (-4.3%)	-500 (-5.9%)	-473 (-5.5%)	-812 (-9.3%)
	AN	205 (2.2%)	-216 (-2.3%)	-130 (-1.3%)	-551 (-5.7%)	85 (0.9%)	-116 (-1.3%)
	BN	-767 (-8.2%)	-1672 (-17.8%)	-879 (-9.3%)	-1783 (-18.8%)	-372 (-4.1%)	-1016 (-11.6%)
	D	-2126 (-25.6%)	-3632 (-43.8%)	-2077 (-25.2%)	-3583 (-43.5%)	-1527 (-19.9%)	-3016 (-39.3%)
	C	-3524 (-54.6%)	-4154 (-64.4%)	-2951 (-50.2%)	-3582 (-60.9%)	-2905 (-49.8%)	-2595 (-53.1%)
	All	-1119 (-13.4%)	-1803 (-21.7%)	-1171 (-14%)	-1854 (-22.1%)	-961 (-11.8%)	-1490 (-18.6%)

Month	Water-Year Type[b]	Scenario[c] EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	998 (20.3%)	878 (17.8%)	444 (8.1%)	323 (5.9%)	-735 (-11%)	-1421 (-19.7%)
	AN	345 (4.9%)	-428 (-6%)	30 (0.4%)	-743 (-10%)	-365 (-4.7%)	-1437 (-17.8%)
	BN	-608 (-8.4%)	-996 (-13.8%)	-737 (-10%)	-1125 (-15.3%)	-470 (-6.6%)	-1330 (-17.6%)
	D	-3286 (-42.6%)	-3550 (-46%)	-2334 (-34.5%)	-2599 (-38.4%)	-1759 (-28.4%)	-1326 (-24.2%)
	C	81 (2.9%)	-534 (-18.8%)	72 (2.5%)	-543 (-19.1%)	514 (21.4%)	-34 (-1.4%)
	All	-446 (-7.5%)	-812 (-13.7%)	-483 (-8.1%)	-848 (-14.2%)	-678 (-11%)	-1184 (-18.8%)
Sep	W	4337 (99.7%)	4705 (108.1%)	-1860 (-17.6%)	-1492 (-14.1%)	-1738 (-16.7%)	-1273 (-12.3%)
	AN	3468 (82.7%)	2835 (67.6%)	-1308 (-14.6%)	-1941 (-21.6%)	-1408 (-15.5%)	-1744 (-19.9%)
	BN	-656 (-15.4%)	-751 (-17.7%)	-912 (-20.2%)	-1007 (-22.3%)	-1301 (-26.6%)	-1285 (-26.9%)
	D	-1183 (-28.3%)	-1188 (-28.4%)	-836 (-21.8%)	-841 (-21.9%)	-286 (-8.7%)	143 (5%)
	C	295 (14.4%)	242 (11.8%)	211 (9.9%)	158 (7.4%)	297 (14.5%)	332 (16.9%)
	All	1554 (39.5%)	1553 (39.4%)	-1090 (-16.6%)	-1090 (-16.6%)	-998 (-15.4%)	-798 (-12.7%)
Oct	W	-208 (-5%)	-381 (-9.1%)	49 (1.2%)	-125 (-3.2%)	227 (6.1%)	49 (1.3%)
	AN	421 (16%)	779 (29.6%)	53 (1.8%)	410 (13.7%)	212 (7.5%)	421 (14.1%)
	BN	-135 (-3.6%)	-287 (-7.6%)	257 (7.7%)	105 (3.1%)	225 (6.6%)	29 (0.9%)
	D	643 (21.2%)	414 (13.6%)	673 (22.4%)	444 (14.8%)	536 (17.1%)	460 (15.4%)
	C	-158 (-5.4%)	184 (6.3%)	53 (1.9%)	395 (14.5%)	79 (2.9%)	557 (21.7%)
	All	91 (2.6%)	62 (1.8%)	223 (6.7%)	194 (5.8%)	271 (8.3%)	265 (8.2%)
Nov	W	-221 (-4.7%)	-946 (-20.2%)	10 (0.2%)	-716 (-16%)	69 (1.6%)	-75 (-2%)
	AN	145 (4.7%)	-83 (-2.7%)	-101 (-3.1%)	-329 (-9.9%)	-11 (-0.3%)	-205 (-6.4%)
	BN	-115 (-4.3%)	-223 (-8.3%)	-96 (-3.6%)	-204 (-7.6%)	-17 (-0.6%)	10 (0.4%)
	D	19 (0.8%)	-99 (-4.2%)	109 (4.8%)	-10 (-0.4%)	78 (3.4%)	118 (5.6%)
	C	43 (2%)	-40 (-1.9%)	9 (0.4%)	-73 (-3.4%)	54 (2.6%)	-62 (-3%)
	All	-58 (-1.8%)	-378 (-11.8%)	-3 (-0.1%)	-323 (-10.2%)	42 (1.4%)	-35 (-1.2%)
Dec	W	-780 (-6.3%)	-1654 (-13.3%)	931 (8.7%)	57 (0.5%)	-279 (-2.3%)	509 (5%)
	AN	955 (18.4%)	329 (6.3%)	547 (9.8%)	-79 (-1.4%)	143 (2.4%)	-477 (-8%)
	BN	310 (10.1%)	102 (3.3%)	-52 (-1.5%)	-260 (-7.6%)	48 (1.4%)	-68 (-2.1%)
	D	114 (4%)	-37 (-1.3%)	107 (3.8%)	-44 (-1.5%)	164 (5.9%)	-11 (-0.4%)
	C	-577 (-19.4%)	-2 (-0.1%)	-141 (-5.6%)	433 (17%)	246 (11.4%)	918 (44.7%)
	All	-114 (-1.8%)	-467 (-7.4%)	369 (6.4%)	16 (0.3%)	13 (0.2%)	212 (3.8%)

[a] A positive value indicates higher average flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

5C.5.3.13.5.1 Steelhead

Juvenile

Feather River flow at the confluence with the Sacramento River is used to represent flow conditions in the mainstem of this river. Differences in monthly average Feather River flow between ESO and EBC scenarios during the juvenile steelhead migration period (October through May) were frequently greater than 10%, with increases in flow under ESO operations for all such differences (Table 5C.5.3-223, Table 5C.5.3-224). Differences in the average flows ranged from 8% lower flow under ESO_LLT compared to EBC2_LLT in December of above-normal years to 45% higher flow under ESO_LLT compared to EBC2_LLT in December of critical years. Based on these results, it was concluded that flow conditions for migration of steelhead juveniles in the Feather River under ESO operations would be better than those under EBC2 operations.

Adult

No specific criteria exist for assessing the potential effects of a change in olfactory cues that affect the attraction of migrating adult steelhead to the Feather River. In the absence of such criteria, it is assumed that the larger the increase in the flow of the Feather River at the Sacramento River confluence during the adult upstream migration period, the greater the attraction to the river. Average Feather River flows at the confluence with the Sacramento River during the September through March migration period are summarized in Table 5C.5.3-223 and Table 5C.5.3-224.

Differences in average monthly flows between September and March ranged from 27% lower flow under both ESO_ELT compared to EBC2_ELT and ESO_LLT compared to EBC2_LLT in September of below-normal years to 45% higher flow under ESO_LLT compared to EBC2_LLT in December of critical years. Based on these results, it was concluded that attraction flow conditions for upstream migration of steelhead adults in the Feather River under ESO operations generally would be better than those under EBC2 operations.

Differences in the attraction flows that are less than 5% between ESO and EBC2 are assumed to be within the range of error of the simulation models and below the ability to detect actual differences that would be biologically significant. The results of the attraction flow analysis showed that in most months and water-year types attraction flows in the Feather River at the confluence with the Sacramento River were greater for ESO_ELT and ESO_LLT relative to EBC2_ELT and EBC2_LLT, respectively. The September–March attraction flows in wet years for ESO conditions compared to EBC2 conditions ranged from 17% and 12% lower in September for ELT and LLT conditions, respectively, to 6% higher in October for ELT conditions. The flows in above-normal years ranged from 16% and 20% lower in September for ELT and LLT conditions respectively to 14% higher in October for LLT conditions. The flows in below-normal years ranged from 27% lower in September for both ELT and LLT conditions respectively to 7% higher in October for ELT conditions. The flows in dry years ranged from 9% lower in September for ELT conditions to 17% and 15% higher in October for ELT and LLT conditions, respectively. The flows in critical years ranged from 3% lower in November for LLT conditions to 45% higher in December for LLT conditions. No information is available, however, to quantify the relationship between Feather River flow and attraction and upstream migration by adult steelhead. Although there is no quantitative information available on the behavioral response of adult steelhead to attraction flows in the lower Feather River, it was concluded based on best professional judgment that the increase in flows would contribute to an incremental increase in attraction, particularly for dry and critical years, but there is a high degree of uncertainty regarding the magnitude of potential benefit to adult steelhead or the effects of increased attraction cues on subsequent reproductive success and abundance of steelhead produced in the Feather River.

Kelt

Migration habitat for downstream passage by steelhead kelts on the Feather River is expected to be within a range that would be suitable for kelt migration. Flows in the Feather River at the confluence with the Sacramento River were compared for the period from January through April to represent the period of kelt migration. Results of the comparison of CALSIM simulation model results for model scenarios, by month and water-year type, are shown in Table 5C.5.3-223 and Table 5C.5.3-224.

Although there is seasonal variation in the water temperatures and instream flows during the period of kelt migration under ESO and EBC2, habitat conditions for EBC2 and ESO conditions in the Feather River are considered to be suitable for kelt migration. Comparison of instream flows in individual months showed that habitat (e.g., water depth, velocity) would be similar or greater for kelt migration in response to the generally greater instream flows for ESO relative to EBC2. Most differencers for individual months and water-year types were less than 5%, and of the eight differences that were greater than 5%, all but one showed increases from EBC2 to ESO conditions (Table 5C.5.3-224). Based on these results, it was concluded that instream habitat conditions for downstream migration of steelhead kelts in the Feather River would be unchanged or better under ESO conditions, depending on month and water-year type, than those estimated for EBC2. The increases in instream flows for ESO conditions would be expected to contribute to an incremental improvement in habitat for steelhead kelts. No information is available, however, to quantify the potential benefits of increased instream flows on kelt migration or survival. Because instream flows are substantial for ESO and EBC2, the incremental increase in flows is not likely to have substantive benefits to the steelhead population. Therefore, ESO_ELT and ESO_LLT conditions are expected to provide a little or no incremental benefit of improved habitat conditions for kelt migration relative to EBC2_ELT and EBC2_LLT.

5C.5.3.13.5.2 Spring-Run Chinook Salmon

Juvenile

For all water-year types, average flows in the Feather River at the confluence with the Sacramento River during the spring-run Chinook salmon juvenile migration period (December through May) under ESO conditions were generally similar (i.e., <5% difference) to the average flows under EBC2 scenarios, when accounting for climate change (Table 5C.5.3-223, Table 5C.5.3-224). Eight of the month and water-year type combinations had differences >10%, all of which were increases under ESO conditions, including a 45% increase in December of critical years for ESO_LLT compared to EBC2_LLT.

Adult

Flows in the Feather River at the confluence with the Sacramento River during the adult spring-run Chinook salmon migration period (April through May) generally were similar (<5% different) between ESO and EBC scenarios or modestly higher under ESO conditions in both months and all water-year types, except May in critical years, when average flow was 7% lower under ESO_ELT than EBC2_ELT (Table 5C.5.3-223, Table 5C.5.3-224). The greatest difference was a 23% increase from EBC2_LLT to ESO_LLT in May of below-normal years.

5C.5.3.13.5.3 Fall-Run Chinook Salmon

Juvenile

Flows in the Feather River at the confluence with the Sacramento River during the fall-run juvenile migration period (February through May) are presented in Table 5C.5.3-223. There was little difference in flow between ESO and EBC scenarios in wet years (Table 5C.5.3-224). Flows under ESO scenarios were generally similar or slightly greater under ESO scenarios in other water-year types.

Adult

The analysis of Feather River flows at the confluence with the Sacramento River during the September through October fall-run Chinook salmon adult migration period (Table 5C.5.3-223, Table 5C.5.3-224) shows moderate reductions in flows (12–27%) in September of wet, above-normal, and below-normal years under ESO_ELT and ESO_LLT conditions compared with the corresponding EBC2 conditions. Flows for September in dry years were slightly reduced under ELT conditions, but were slightly increased under LLT conditions. For September in critical years, flows were more than 10% higher under both ESO_ ELT and ESO_LLT conditions as compared to the corresponding EBC2 conditions. In October, flows were similar or higher under ESO conditions in all water-year types, reaching a maximum of 22% higher in critical years under LLT conditions. No relationships have been developed that quantify the attraction of adult fall-run Chinook salmon and flows in the lower Feather River. The reduction in flow in wet, above-normal and below normal Septembers has the potential to result in delayed upstream migration and increased risk of straying. Such an effect, if it occurred, might be moderated to some degree by the relatively high flows occurring in those water-year types. Flows in Octobers are generally greater for ESO_LLT compared to EBC2 conditions.

5C.5.3.13.5.4 Green Sturgeon

Larva

The differences in average flows between ESO and EBC scenarios (LLT) during the larval transport flow period (August through October) were similar for the two analyzed sites on the Feather River (Feather River at the confluence with the Sacramento River and Feather River at Thermalito) (Table 5C.5.3-221, Table 5C.5.3-222; Table 5C.5.3-223, Table 5C.5.3-224), as would be expected given the sites' proximity to each other. However, differences at the individual sites are as great as 50% lower under ESO in specific water-year types. Given the benthic nature of green sturgeon and that these flows are consistent with the flow schedule provided by NMFS during the BDCP planning process, these reductions in summer flows are not expected to have a substantial effect on green sturgeon in the Feather River. Average flows at both sites in August and September of wet, above-normal, below-normal and dry years under the ESO scenarios were substantially lower than under EBC2 scenarios, when accounting for climate change (by considering only ELT and LLT comparisons), except for September in dry years under LLT conditions, when the average flow was higher at both sites. In critical years for all three months, the averages were similar or moderately higher (up to 26% higher) under ESO conditions. In October the average flows at both sites were similar or moderately higher under the ESO scenarios than under EBC2 scenarios.

Adult

Most of the November through June green sturgeon adult attraction flows at the confluence of the Feather River with the Sacramento River would be similar or greater under ESO scenarios than EBC2 scenarios, when accounting for climate change (Table 5C.5.3-223, Table 5C.5.3-224). The increases for the ESO_ELT and ESO_LLT scenarios would be especially large for June of all water-year types except critical years.

5C.5.3.13.5.5 Pacific Lamprey

Macropthalmia

Average monthly flow rates in the Feather River at the confluence with the Sacramento River between December and May are presented in Table 5C.5.3-223, and differences between model scenarios are presented in Table 5C.5.3-224. Exceedance plots by scenario are presented in Figure 5C.5.3-182 through Figure 5C.5.3-187.

Predicted differences for model scenario ESO_ELT relative to EBC1 were generally small to moderate, with maximum differences of 10% in wet years (February), 18% in above normal years (December), -17% in below normal years (January), 7% in dry years (May) and -19% in critical years (December). Predicted differences for ESO_LLT relative to EBC1 were generally slightly larger than the ESO_ELT relative to EBC1 differences, with maximum differences of -26% in wet years (May), 12% in above normal years (March), -20% in below normal years (March), 13% in dry years (April) and 8% in critical years (January). Predicted differences for ESO_ELT relative to EBC2 were generally small, with maximum differences of 14% in wet years (February), 24% in above normal years (February), -5% in below normal years (March), 8% in dry years (May) and 10% in critical years (March). Predicted differences for ESO_LLT relative to EBC2 were largely similar to differences of ESO_LLT relative to EBC1, with maximum differences of -26% in wet years (May), 23% in above normal years (February), 19% in below normal years (May), 13% in dry years (May) and 17% in critical years (December).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, predicted differences for ESO_ELT relative to EBC2_ELT were generally small, with maximum differences of -2% in wet years (December), 12% in above normal years (February), -5% in below normal years (January), 7% in dry years (May) and 11% in critical years (December). Predicted differences for ESO_LLT relative to EBC2_LLT were also generally small, but with some important exceptions. Maximum predicted differences were 5% in wet years (December), 12% in above normal years (May), 23% in below normal years (May), 14% in dry years (April) and 45% in critical years (December).

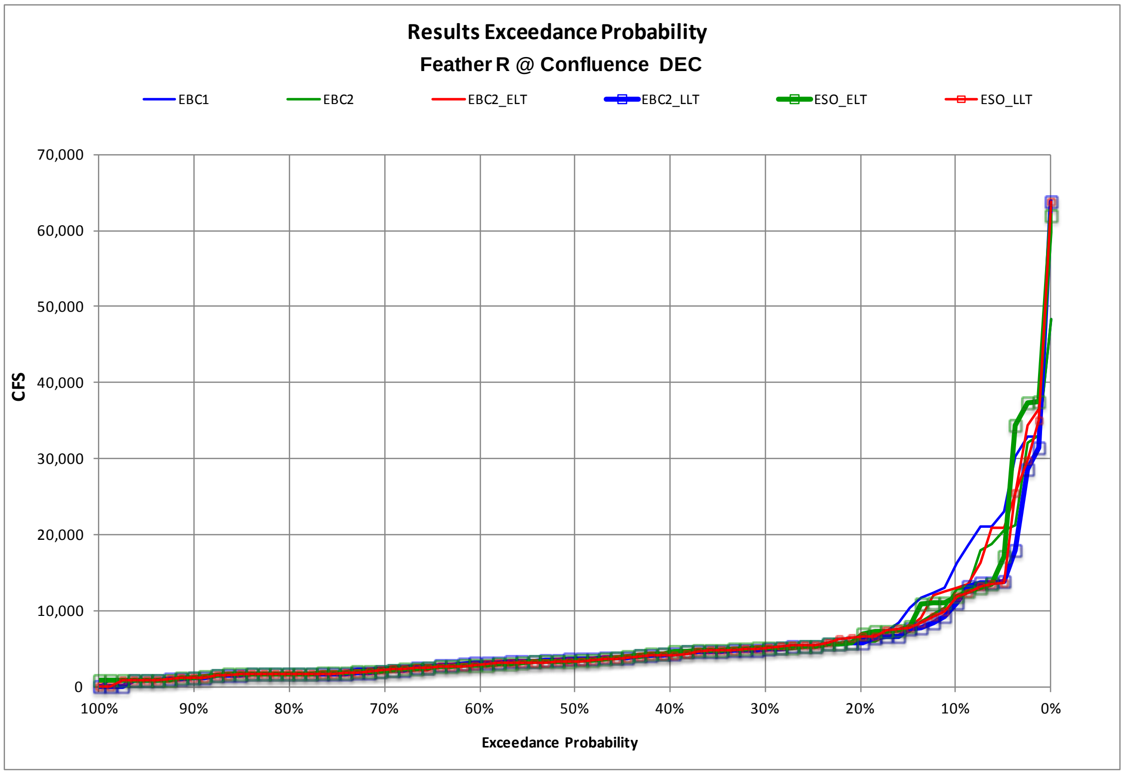


Figure 5C.5.3-182. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, December

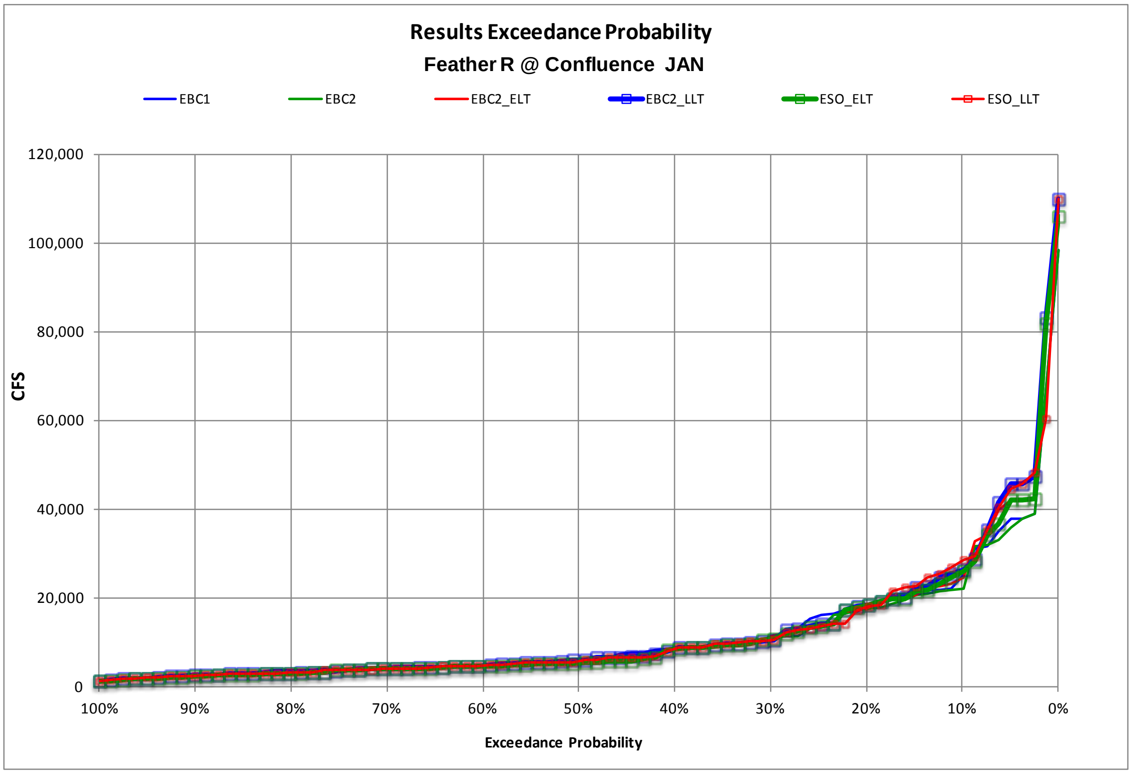


Figure 5C.5.3-183. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, January

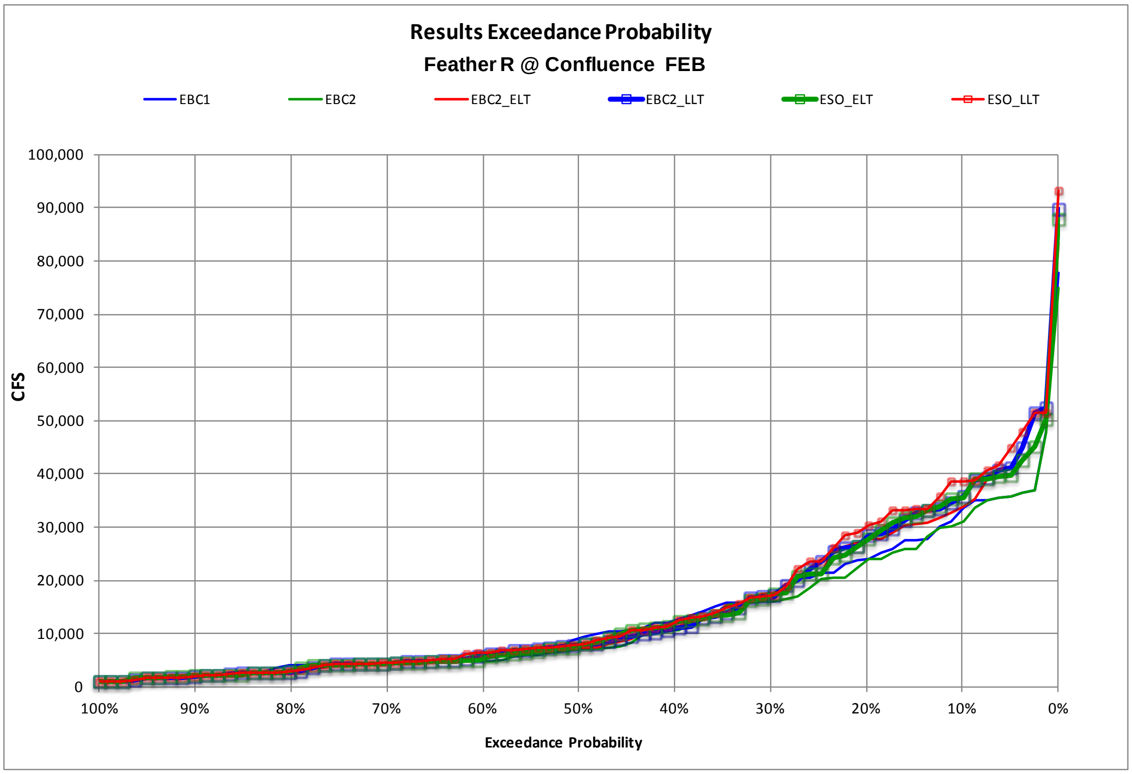


Figure 5C.5.3-184. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, February

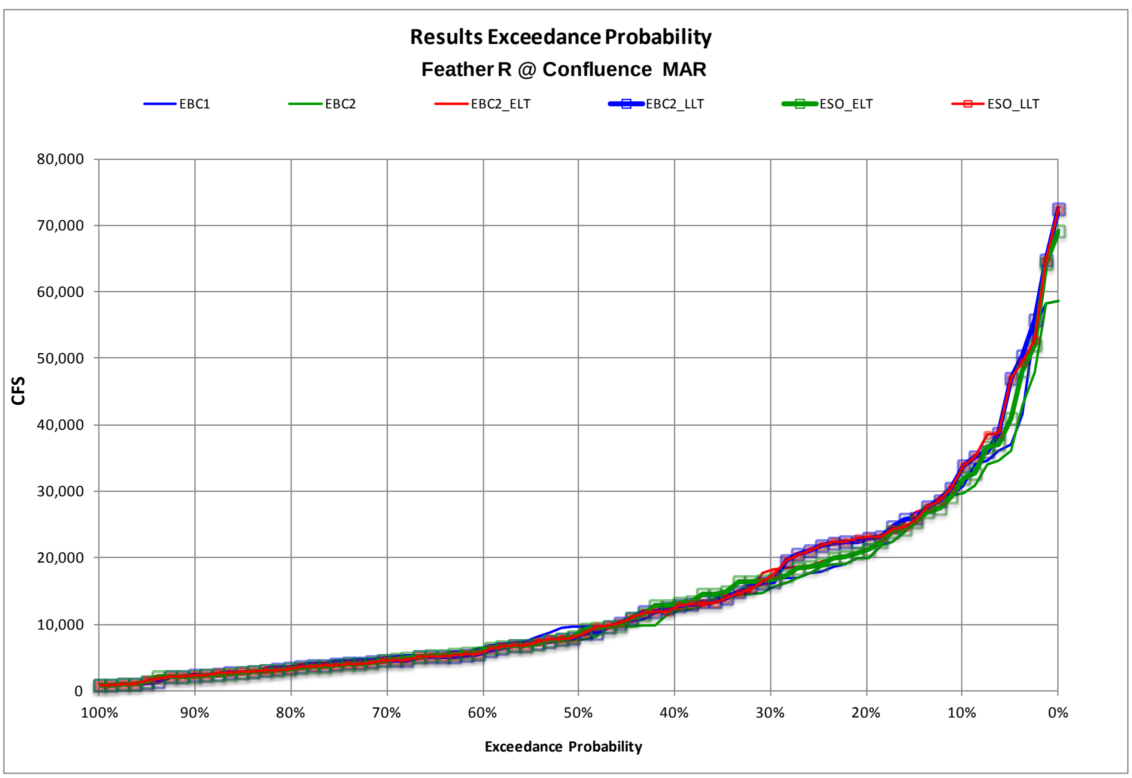


Figure 5C.5.3-185. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, March

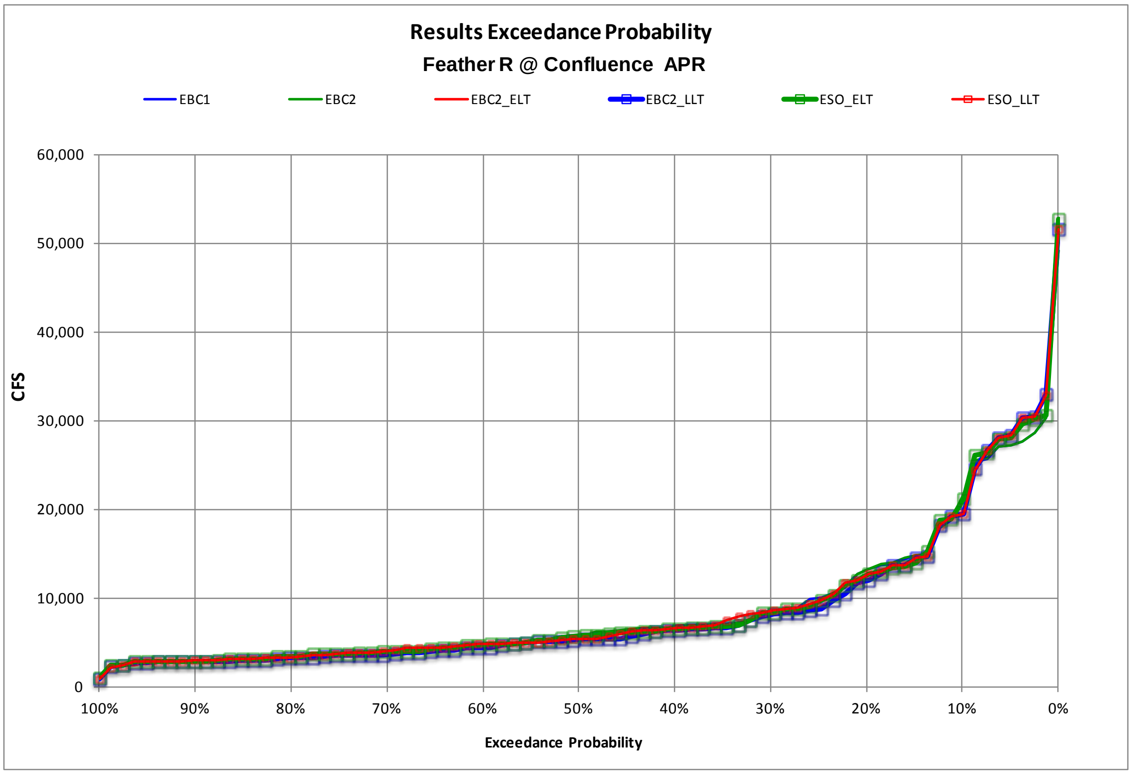


Figure 5C.5.3-186. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, April

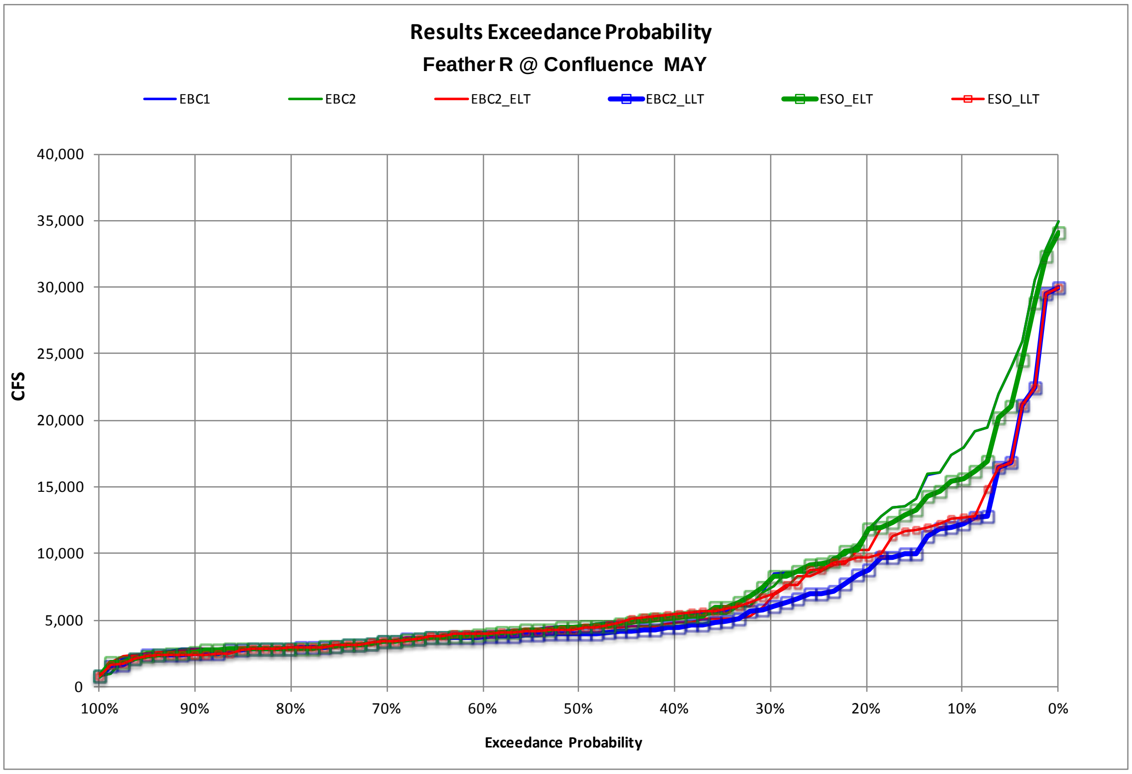


Figure 5C.5.3-187. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, May

Adult

Average flows in the Feather River at the confluence with the Sacramento River for each model scenario for the Pacific lamprey upstream migration period between January and June are presented in Table 5C.5.3-223, and differences between model scenarios in mean flows are presented in Table 5C.5.3-224.

Predicted differences for the ESO scenarios relative to the EBC scenarios were highly variable, including a number of large differences (>20%). All but three of the 24 predicted differences that were >20% were increases of the ESO scenarios relative to the EBC2 scenarios and most of these were predicted to occur during June. The maximum predicted differences for ESO_ELT relative to EBC1 were 11% in wet years (February), 28% in above normal years (June), 71% in below normal years (June), 23% in dry years (June), and -12% in critical years (June). Maximum predicted differences for ESO_LLT relative to EBC1 were -26% in wet years (May), 35% in above normal years (June), 59% in below normal years (June), 13% in dry years (April) and -10% in critical years (June). Predicted differences for ESO_ELT relative to EBC2 were generally similar to differences of ESO_ELT relative to EBC1, with maximum differences of 15% in wet years (February), 27% in above normal years (June), 70% in below normal years (June), -12% in dry years (June) and 16% in critical years (June). Maxiimum predicted differences for ESO_LLT relative to EBC2 were -26% in wet years (May), 34% in above normal years (June), 58% in below normal years (June), 13% in dry years (May) and 14% in critical years (January).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, maximum predicted differences for ESO_ELT relative to EBC2_ELT were 23% in wet years (June), 50% in above normal years (June), 77% in below normal years (June), 25% in dry years (June) and -9% in critical years (June). Maximum predicted differences for ESO_LLT relative to EBC2_LLT were 31% in wet years (June), 54% in above normal years (June), 65% in below normal years (June), 15% in dry years (June) and 7% in critical years (April).

These results suggest that, other than in June, there are no effects of the evaluated starting operations on Pacific lamprey attraction in the Feather River. In June, when accounting for climate change, there is an appreciable benefit of the evaluated starting operations on Pacific lamprey attraction in the Feather River, assuming lamprey are attracted to upstream olfactory cues.

5C.5.3.13.5.6 River Lamprey

Macropthalmia

See results for Pacific lamprey macropthalmia.

Adult

Average flows during the September through November river lamprey adult migration period in the Feather River at the confluence with the Sacramento River are presented in Table 5C.5.3-223, and differences between scenarios are presented in Table 5C.5.3-224; exceedance plots are presented in Figure 5C.5.3-188 through Figure 5C.5.3-190.

Predicted differences for ESO relative to EBC scenarios were highly variable, with large increases and large reductions. Maximum predicted differences for model scenario ESO_ELT relative to EBC1 all occurred during September, with 100% in wet years, 83% in above normal years, -15% in below normal years, -28% in dry years and 14% in critical years. Maximum predicted differences for

ESO_LLT relative to EBC1 all occurred during September, with 108% in wet years, 68% in above normal years, -18% in below normal years, -28% in dry years and 12% in critical years. Maximum predicted differences for ESO_ELT relative to EBC2 were -18% in wet years (September), -15% in above normal years (September), -20% in below normal years (September), 22% in dry years (October) and 10% in critical years (September). Maximum predicted differences for ESO_LLT relative to EBC2 were -16% in wet years (November), -22% in above normal years (September), -22% in below normal years (September), -22% in dry years (September) and 15% in critical years (October).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, maximum predicted differences for ESO_ELT relative to EBC2_ELT were -17% in wet years (September), -16% in above normal years (September), -27% in below normal years (September), 17% in dry years (October) and 14% in critical years (September). Maximum predicted differences for ESO_LLT relative to EBC2_LLT were -12% in wet years (September), -20% in above normal years (September), -27% in below normal years (September), 15% in dry years (October) and 22% in critical years (October).

These results suggest that effects of the evaluated starting operations on river lamprey upstream attraction flows are highly variable among months, ranging from moderate adverse effects in September to small benefits in October.

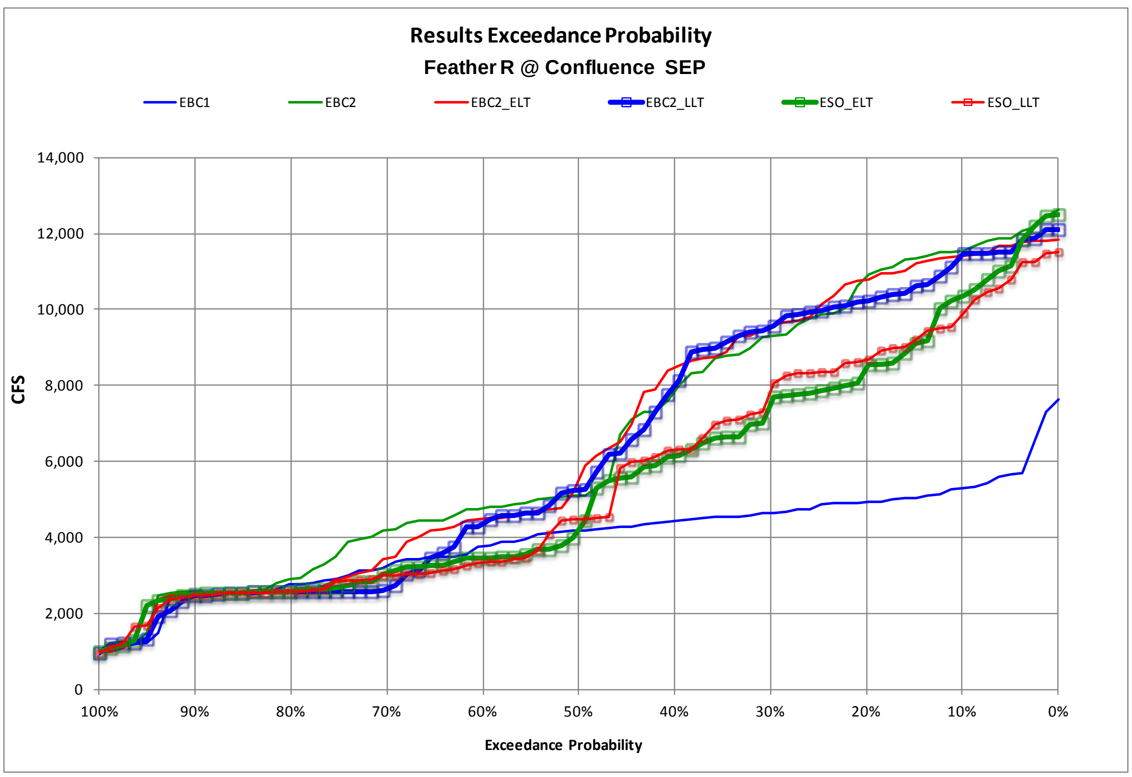


Figure 5C.5.3-188. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, September

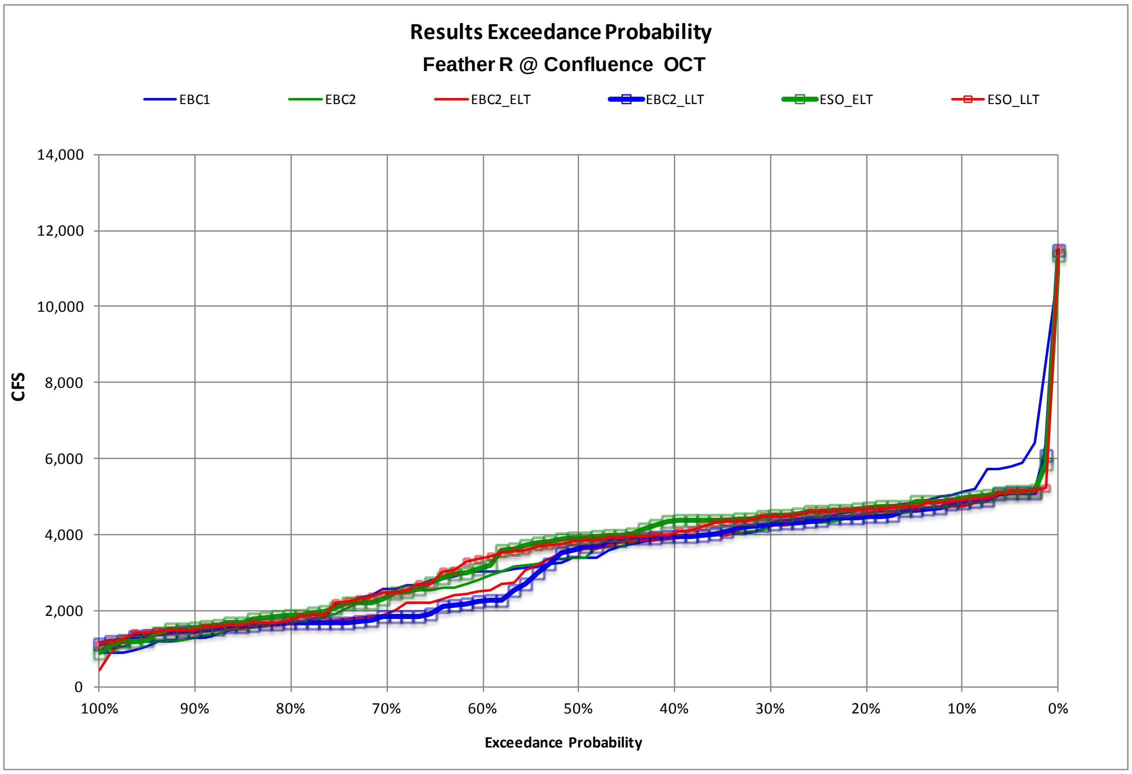


Figure 5C.5.3-189. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, October

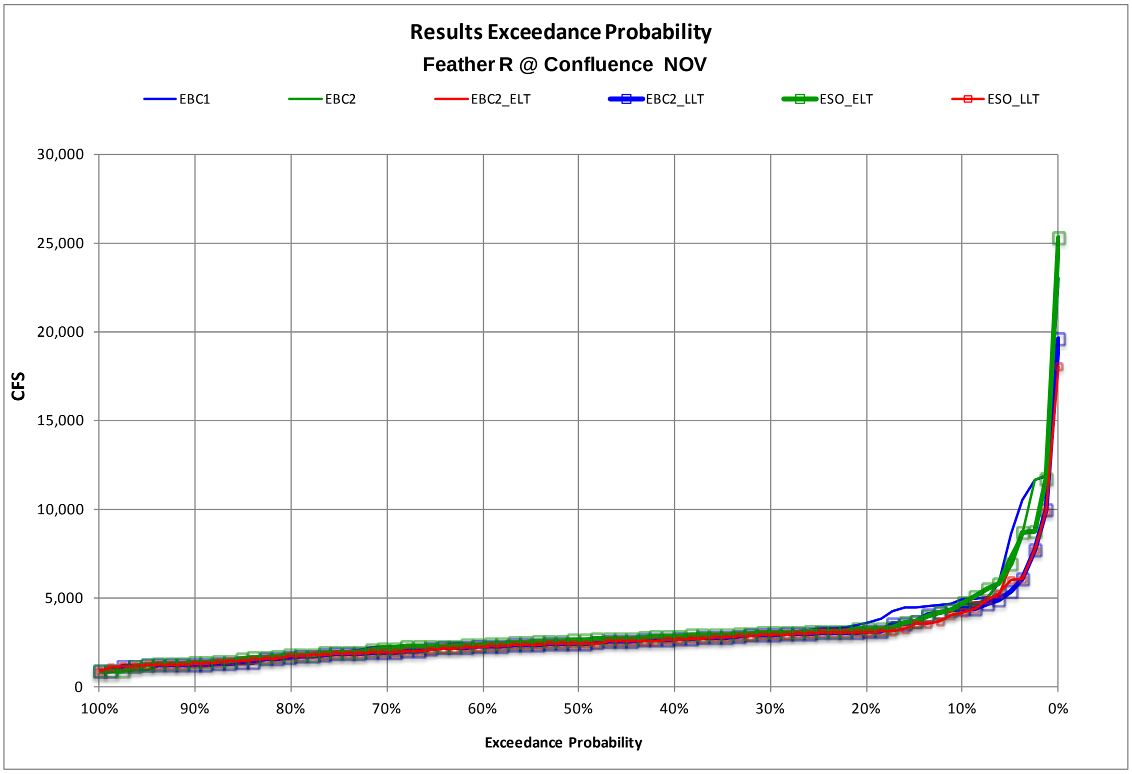


Figure 5C.5.3-190. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the Feather River at the Confluence with the Sacramento River, November

5C.5.3.13.6 American River Subregion

CALSIM flow data for the American River subregion averaged by water-year type, month, and scenario, together with average monthly differences between scenarios, are provided in Table 5C.5.3-225, Table 5C.5.3-226, Table 5C.5.3-227, and Table 5C.5.3-228. These data form the basis for the summary of changes in attraction and migration flows.

Table 5C.5.3-225. Mean Monthly Flows (cfs) in American River below Nimbus for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	8,806	8,633	10,113	11,036	10,103	11,040
	AN	4,833	4,527	4,941	5,805	4,989	5,753
	BN	2,392	2,264	2,334	2,073	2,085	2,026
	D	1,723	1,650	1,620	1,506	1,561	1,417
	C	1,474	1,468	1,241	1,095	1,315	1,258
	All	4,502	4,363	4,865	5,194	4,825	5,184
Feb	W	9,294	9,117	10,422	11,102	10,460	11,107
	AN	6,469	6,207	7,220	8,153	7,484	8,243
	BN	4,360	4,133	4,706	4,961	4,896	4,934
	D	1,852	1,776	1,769	1,844	1,709	1,972
	C	1,185	1,165	1,073	1,007	1,120	1,036
	All	5,218	5,065	5,710	6,112	5,787	6,155
Mar	W	6,089	6,054	6,454	6,992	6,454	6,987
	AN	5,454	5,336	5,762	5,790	5,815	5,811
	BN	2,429	2,386	2,622	2,794	2,648	2,842
	D	2,191	2,058	2,184	2,314	2,277	2,194
	C	939	948	888	938	868	872
	All	3,762	3,698	3,947	4,187	3,976	4,160
Apr	W	5,300	5,197	5,368	5,508	5,368	5,517
	AN	3,546	3,454	3,356	3,298	3,353	3,301
	BN	3,126	2,977	3,117	2,970	3,141	2,952
	D	1,837	1,883	1,761	1,888	1,800	1,884
	C	1,156	1,188	1,091	1,255	1,244	1,270
	All	3,305	3,249	3,271	3,334	3,306	3,336
May	W	6,157	5,968	5,673	4,592	5,672	4,674
	AN	3,885	3,649	3,148	2,521	3,259	2,775
	BN	2,930	2,798	2,466	1,969	2,658	2,381
	D	1,790	1,717	1,629	1,686	1,711	2,029
	C	1,182	1,196	1,319	992	1,332	1,002
	All	3,587	3,456	3,231	2,676	3,300	2,886
Jun	W	6,003	5,774	4,521	3,694	4,760	4,373
	AN	3,346	3,270	2,855	3,022	3,451	3,597
	BN	2,863	2,646	2,558	2,883	3,089	3,517
	D	2,506	2,417	2,564	2,596	3,131	2,815
	C	1,824	1,656	1,297	1,025	1,289	1,226
	All	3,699	3,534	3,041	2,825	3,417	3,311

Month	Water-Year Type[a]	Scenario[b] EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jul	W	4,108	3,896	3,571	3,860	3,972	3,706
	AN	4,638	4,425	4,634	4,927	4,644	4,738
	BN	4,744	4,835	4,544	4,328	4,647	4,198
	D	3,577	3,270	3,091	3,143	3,142	2,771
	C	1,784	1,476	1,670	2,022	1,693	2,070
	All	3,838	3,642	3,509	3,670	3,670	3,496
Aug	W	3,520	3,265	2,576	2,132	2,381	2,118
	AN	2,542	2,604	2,200	1,944	2,086	1,971
	BN	2,495	2,445	2,313	2,324	2,197	1,757
	D	2,613	2,313	1,779	1,620	1,412	1,369
	C	1,500	1,326	1,308	1,100	1,088	855
	All	2,707	2,535	2,115	1,874	1,905	1,685
Sep	W	4,025	4,307	3,982	3,622	3,361	3,026
	AN	2,764	3,106	2,645	2,044	2,187	1,819
	BN	2,370	2,106	1,915	1,605	1,492	1,377
	D	1,856	1,574	1,373	1,182	1,360	1,228
	C	1,164	1,055	761	594	703	662
	All	2,663	2,680	2,389	2,068	2,042	1,827
Oct	W	1,723	1,620	1,700	1,634	1,594	1,491
	AN	1,706	1,422	1,609	1,732	1,546	1,663
	BN	1,602	1,530	1,517	1,767	1,765	2,001
	D	1,468	1,341	1,479	1,258	1,414	1,430
	C	1,461	1,405	1,375	1,655	1,679	1,650
	All	1,605	1,483	1,559	1,592	1,589	1,613
Nov	W	3,527	3,475	3,436	2,612	2,984	2,508
	AN	3,181	3,486	3,187	2,554	2,878	2,406
	BN	2,067	2,233	1,985	1,716	1,696	1,593
	D	2,176	2,063	1,725	1,424	1,694	1,494
	C	1994	1,966	1,707	1,608	1,653	1,490
	All	2706	2,734	2,523	2,043	2,271	1,965
Dec	W	6302	5,691	6,671	6,171	6,798	6,090
	AN	3137	2,995	3,089	2,933	3,030	2,927
	BN	2676	2,519	2,857	2,527	3,009	2,591
	D	1741	1,696	1,643	1,351	1,606	1,340
	C	1524	1,463	1,374	1,251	1,442	1,315
	All	3519	3,259	3,617	3,297	3,676	3,288

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-226. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in American River below Nimbus

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	1297 (14.7%)	2233 (25.4%)	1470 (17%)	2407 (27.9%)	-10 (-0.1%)	3 (0%)
	AN	156 (3.2%)	921 (19%)	462 (10.2%)	1226 (27.1%)	48 (1%)	-51 (-0.9%)
	BN	-307 (-12.8%)	-366 (-15.3%)	-178 (-7.9%)	-237 (-10.5%)	-248 (-10.6%)	-47 (-2.2%)
	D	-162 (-9.4%)	-306 (-17.7%)	-89 (-5.4%)	-233 (-14.1%)	-59 (-3.6%)	-89 (-5.9%)
	C	-159 (-10.8%)	-216 (-14.7%)	-153 (-10.4%)	-211 (-14.3%)	74 (6%)	163 (14.9%)
	All	323 (7.2%)	682 (15.1%)	461 (10.6%)	820 (18.8%)	-41 (-0.8%)	-10 (-0.2%)
Feb	W	1167 (12.6%)	1814 (19.5%)	1344 (14.7%)	1991 (21.8%)	38 (0.4%)	5 (0%)
	AN	1015 (15.7%)	1774 (27.4%)	1277 (20.6%)	2036 (32.8%)	264 (3.7%)	90 (1.1%)
	BN	536 (12.3%)	574 (13.2%)	763 (18.5%)	801 (19.4%)	190 (4%)	-27 (-0.5%)
	D	-143 (-7.7%)	120 (6.5%)	-66 (-3.7%)	197 (11.1%)	-59 (-3.3%)	128 (7%)
	C	-66 (-5.5%)	-149 (-12.6%)	-45 (-3.9%)	-128 (-11%)	46 (4.3%)	30 (2.9%)
	All	569 (10.9%)	937 (18%)	722 (14.3%)	1090 (21.5%)	77 (1.3%)	43 (0.7%)
Mar	W	365 (6%)	898 (14.8%)	400 (6.6%)	933 (15.4%)	0 (0%)	-5 (-0.1%)
	AN	362 (6.6%)	358 (6.6%)	479 (9%)	475 (8.9%)	53 (0.9%)	21 (0.4%)
	BN	219 (9%)	413 (17%)	262 (11%)	456 (19.1%)	26 (1%)	48 (1.7%)
	D	85 (3.9%)	3 (0.1%)	219 (10.6%)	136 (6.6%)	92 (4.2%)	-121 (-5.2%)
	C	-71 (-7.6%)	-68 (-7.2%)	-80 (-8.4%)	-76 (-8%)	-20 (-2.3%)	-66 (-7.1%)
	All	214 (5.7%)	398 (10.6%)	278 (7.5%)	462 (12.5%)	29 (0.7%)	-27 (-0.6%)
Apr	W	68 (1.3%)	217 (4.1%)	171 (3.3%)	320 (6.2%)	0 (0%)	9 (0.2%)
	AN	-193 (-5.4%)	-245 (-6.9%)	-102 (-2.9%)	-154 (-4.4%)	-3 (-0.1%)	2 (0.1%)
	BN	15 (0.5%)	-174 (-5.6%)	164 (5.5%)	-25 (-0.8%)	24 (0.8%)	-18 (-0.6%)
	D	-38 (-2%)	47 (2.5%)	-84 (-4.4%)	1 (0%)	39 (2.2%)	-4 (-0.2%)
	C	88 (7.6%)	115 (9.9%)	56 (4.7%)	82 (6.9%)	153 (14%)	15 (1.2%)
	All	0 (0%)	30 (0.9%)	57 (1.8%)	87 (2.7%)	35 (1.1%)	1 (0%)
May	W	-485 (-7.9%)	-1483 (-24.1%)	-296 (-5%)	-1294 (-21.7%)	-1 (0%)	82 (1.8%)
	AN	-626 (-16.1%)	-1110 (-28.6%)	-390 (-10.7%)	-874 (-24%)	111 (3.5%)	254 (10.1%)
	BN	-272 (-9.3%)	-549 (-18.7%)	-140 (-5%)	-417 (-14.9%)	192 (7.8%)	412 (20.9%)
	D	-78 (-4.4%)	240 (13.4%)	-6 (-0.3%)	312 (18.2%)	82 (5%)	343 (20.4%)
	C	151 (12.7%)	-180 (-15.2%)	137 (11.4%)	-194 (-16.2%)	13 (1%)	10 (1%)
	All	-287 (-8%)	-700 (-19.5%)	-156 (-4.5%)	-569 (-16.5%)	68 (2.1%)	210 (7.9%)
Jun	W	-1244 (-20.7%)	-1630 (-27.1%)	-1014 (-17.6%)	-1401 (-24.3%)	239 (5.3%)	680 (18.4%)
	AN	105 (3.2%)	252 (7.5%)	181 (5.5%)	327 (10%)	596 (20.9%)	575 (19%)
	BN	226 (7.9%)	654 (22.8%)	443 (16.8%)	872 (33%)	531 (20.8%)	635 (22%)
	D	625 (25%)	310 (12.4%)	714 (29.5%)	398 (16.5%)	566 (22.1%)	219 (8.4%)
	C	-535 (-29.3%)	-598 (-32.8%)	-367 (-22.2%)	-430 (-26%)	-8 (-0.6%)	201 (19.6%)
	All	-281 (-7.6%)	-388 (-10.5%)	-117 (-3.3%)	-223 (-6.3%)	377 (12.4%)	486 (17.2%)
Jul	W	-137 (-3.3%)	-402 (-9.8%)	76 (2%)	-189 (-4.9%)	401 (11.2%)	-154 (-4%)
	AN	6 (0.1%)	100 (2.2%)	219 (5%)	314 (7.1%)	9 (0.2%)	-189 (-3.8%)
	BN	-97 (-2%)	-547 (-11.5%)	-188 (-3.9%)	-638 (-13.2%)	103 (2.3%)	-131 (-3%)
	D	-435 (-12.2%)	-807 (-22.5%)	-128 (-3.9%)	-500 (-15.3%)	51 (1.6%)	-373 (-11.9%)
	C	-92 (-5.1%)	286 (16%)	216 (14.7%)	594 (40.2%)	22 (1.3%)	48 (2.4%)
	All	-168 (-4.4%)	-341 (-8.9%)	28 (0.8%)	-146 (-4%)	160 (4.6%)	-174 (-4.7%)

Month	Water-Year Type[b]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-1139 (-32.4%)	-1402 (-39.8%)	-884 (-27.1%)	-1147 (-35.1%)	-195 (-7.6%)	-14 (-0.7%)
	AN	-456 (-17.9%)	-571 (-22.5%)	-517 (-19.9%)	-633 (-24.3%)	-114 (-5.2%)	26 (1.4%)
	BN	-298 (-11.9%)	-738 (-29.6%)	-248 (-10.1%)	-688 (-28.1%)	-116 (-5%)	-568 (-24.4%)
	D	-1201 (-46%)	-1244 (-47.6%)	-901 (-39%)	-944 (-40.8%)	-367 (-20.6%)	-251 (-15.5%)
	C	-412 (-27.4%)	-645 (-43%)	-238 (-17.9%)	-471 (-35.5%)	-219 (-16.8%)	-245 (-22.3%)
	All	-803 (-29.6%)	-1022 (-37.7%)	-631 (-24.9%)	-850 (-33.5%)	-211 (-10%)	-189 (-10.1%)
Sep	W	-663 (-16.5%)	-998 (-24.8%)	-946 (-22%)	-1281 (-29.7%)	-621 (-15.6%)	-596 (-16.5%)
	AN	-577 (-20.9%)	-945 (-34.2%)	-919 (-29.6%)	-1287 (-41.4%)	-457 (-17.3%)	-225 (-11%)
	BN	-879 (-37.1%)	-994 (-41.9%)	-614 (-29.2%)	-729 (-34.6%)	-423 (-22.1%)	-228 (-14.2%)
	D	-496 (-26.7%)	-628 (-33.9%)	-213 (-13.6%)	-346 (-22%)	-13 (-1%)	46 (3.9%)
	C	-462 (-39.6%)	-503 (-43.2%)	-352 (-33.4%)	-393 (-37.3%)	-58 (-7.6%)	68 (11.5%)
	All	-621 (-23.3%)	-836 (-31.4%)	-638 (-23.8%)	-852 (-31.8%)	-348 (-14.5%)	-241 (-11.6%)
Oct	W	-129 (-7.5%)	-232 (-13.5%)	-26 (-1.6%)	-129 (-8%)	-106 (-6.2%)	-143 (-8.8%)
	AN	-160 (-9.4%)	-43 (-2.5%)	124 (8.7%)	241 (17%)	-63 (-3.9%)	-68 (-4%)
	BN	163 (10.2%)	399 (24.9%)	235 (15.4%)	471 (30.8%)	248 (16.4%)	235 (13.3%)
	D	-54 (-3.7%)	-38 (-2.6%)	73 (5.4%)	88 (6.6%)	-65 (-4.4%)	172 (13.6%)
	C	219 (15%)	189 (13%)	275 (19.5%)	245 (17.4%)	304 (22.1%)	-5 (-0.3%)
	All	-16 (-1%)	8 (0.5%)	106 (7.2%)	130 (8.8%)	30 (1.9%)	22 (1.4%)
Nov	W	-543 (-15.4%)	-1019 (-28.9%)	-491 (-14.1%)	-967 (-27.8%)	-452 (-13.2%)	-104 (-4%)
	AN	-303 (-9.5%)	-774 (-24.3%)	-608 (-17.5%)	-1080 (-31%)	-309 (-9.7%)	-148 (-5.8%)
	BN	-371 (-18%)	-475 (-23%)	-537 (-24.1%)	-641 (-28.7%)	-289 (-14.6%)	-124 (-7.2%)
	D	-482 (-22.2%)	-682 (-31.3%)	-369 (-17.9%)	-569 (-27.6%)	-30 (-1.8%)	70 (4.9%)
	C	-341 (-17.1%)	-504 (-25.3%)	-313 (-15.9%)	-476 (-24.2%)	-54 (-3.1%)	-118 (-7.3%)
	All	-436 (-16.1%)	-741 (-27.4%)	-463 (-16.9%)	-769 (-28.1%)	-252 (-10%)	-77 (-3.8%)
Dec	W	497 (7.9%)	-211 (-3.4%)	1107 (19.5%)	399 (7%)	127 (1.9%)	-81 (-1.3%)
	AN	-107 (-3.4%)	-209 (-6.7%)	35 (1.2%)	-67 (-2.2%)	-60 (-1.9%)	-5 (-0.2%)
	BN	333 (12.5%)	-85 (-3.2%)	490 (19.4%)	71 (2.8%)	152 (5.3%)	64 (2.5%)
	D	-135 (-7.7%)	-401 (-23%)	-90 (-5.3%)	-356 (-21%)	-37 (-2.3%)	-11 (-0.8%)
	C	-82 (-5.4%)	-209 (-13.7%)	-21 (-1.4%)	-148 (-10.1%)	68 (4.9%)	64 (5.1%)
	All	157 (4.5%)	-231 (-6.6%)	417 (12.8%)	29 (0.9%)	59 (1.6%)	-8 (-0.3%)

[a] A positive value indicates higher mean flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-227. Mean Monthly Flows (cfs) in American River at the Confluence with the Sacramento River for EBC and ESO Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	8,748	8,560	10,031	10,960	10,021	10,964
	AN	4,806	4,482	4,895	5,760	4,944	5,709
	BN	2,326	2,179	2,246	1,988	1,997	1,941
	D	1,654	1,565	1,535	1,424	1,477	1,336
	C	1,403	1,379	1,152	1,008	1,226	1,176
	All	4,443	4,287	4,786	5,118	4,745	5,109
Feb	W	9,183	8,982	10,275	10,947	10,313	10,952
	AN	6,422	6,139	7,148	8,073	7,412	8,163
	BN	4,309	4,058	4,631	4,888	4,824	4,862
	D	1,781	1,686	1,679	1,756	1,621	1,886
	C	1,119	1,074	985	921	1,030	956
	All	5,142	4,967	5,607	6,007	5,685	6,051
Mar	W	5,979	5,915	6,304	6,837	6,303	6,831
	AN	5,364	5,224	5,641	5,661	5,692	5,681
	BN	2,340	2,271	2,503	2,672	2,527	2,721
	D	2,121	1,968	2,095	2,224	2,187	2,102
	C	864	843	785	836	764	782
	All	3,672	3,583	3,826	4,063	3,855	4,038
Apr	W	5,156	4,997	5,164	5,300	5,164	5,309
	AN	3,383	3,238	3,136	3,079	3,132	3,081
	BN	2,984	2,788	2,927	2,778	2,950	2,760
	D	1,672	1,673	1,550	1,677	1,588	1,673
	C	996	985	886	1,059	1,040	1,075
	All	3,152	3,046	3,066	3,128	3,100	3,130
May	W	5,959	5,711	5,415	4,332	5,414	4,414
	AN	3,700	3,411	2,911	2,285	3,022	2,540
	BN	2,733	2,555	2,222	1,726	2,413	2,138
	D	1,605	1,484	1,399	1,454	1,480	1,797
	C	1,014	992	1,118	790	1,129	800
	All	3,398	3,217	2,993	2,438	3,061	2,648
Jun	W	5,743	5,456	4,206	3,388	4,445	4,068
	AN	3,103	2,973	2,562	2,736	3,158	3,309
	BN	2,631	2,358	2,274	2,603	2,803	3,234
	D	2,282	2,140	2,289	2,320	2,855	2,536
	C	1,621	1,412	1,052	793	1,044	994
	All	3,462	3,244	2,753	2,545	3,129	3,028
Jul	W	3,844	3,578	3,264	3,560	3,663	3,400
	AN	4,399	4,131	4,344	4,635	4,348	4,441
	BN	4,509	4,548	4,257	4,038	4,356	3,902
	D	3,347	2,987	2,807	2,858	2,852	2,484
	C	1,568	1,218	1,421	1,784	1,439	1,829
	All	3,597	3,349	3,221	3,385	3,378	3,207

Month	Water-Year Type[a]	Scenario[b]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Aug	W	3,295	2,990	2,304	1,858	2,106	1,845
	AN	2,313	2,327	1,921	1,663	1,807	1,691
	BN	2,265	2,164	2,035	2,048	1,918	1,482
	D	2,395	2,049	1,516	1,357	1,149	1,112
	C	1,314	1,094	1,097	899	893	649
	All	2,488	2,268	1,852	1,612	1,643	1,425
Sep	W	3,846	4,090	3,771	3,415	3,151	2,819
	AN	2,594	2,894	2,437	1,838	1,980	1,613
	BN	2,205	1,902	1,712	1,402	1,290	1,179
	D	1,691	1,371	1,177	987	1,167	1,035
	C	1,011	877	591	427	535	494
	All	2,495	2,474	2,189	1,870	1,844	1,631
Oct	W	1,607	1,479	1,561	1,499	1,458	1,357
	AN	1,597	1,291	1,481	1,613	1,421	1,539
	BN	1,472	1,376	1,364	1,617	1,617	1,862
	D	1,344	1,190	1,333	1,114	1,271	1,289
	C	1,342	1,260	1,232	1,517	1,537	1,521
	All	1,486	1,338	1,418	1,454	1,451	1,479
Nov	W	3,472	3,402	3,363	2,540	2,912	2,437
	AN	3,100	3,389	3,089	2,455	2,780	2,308
	BN	1,990	2,137	1,889	1,618	1,598	1,492
	D	2,094	1,964	1,624	1,326	1,594	1,395
	C	1,897	1,849	1,590	1,489	1,534	1,371
	All	2,632	2,641	2,430	1,950	2,177	1,872
Dec	W	6,255	5,627	6,607	6,115	6,739	6,035
	AN	3,072	2,909	3,007	2,856	2,950	2,852
	BN	2,609	2,433	2,774	2,445	2,928	2,511
	D	1,675	1,614	1,564	1,275	1,527	1,264
	C	1,443	1,364	1,278	1,158	1,346	1,222
	All	3,457	3,179	3,539	3,224	3,600	3,216

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-228. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in American River at the Confluence with the Sacramento River

Month	Water-Year Type[a]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	1274 (14.6%)	2217 (25.3%)	1461 (17.1%)	2404 (28.1%)	-10 (-0.1%)	4 (0%)
	AN	138 (2.9%)	903 (18.8%)	462 (10.3%)	1227 (27.4%)	49 (1%)	-52 (-0.9%)
	BN	-330 (-14.2%)	-385 (-16.6%)	-182 (-8.4%)	-238 (-10.9%)	-249 (-11.1%)	-47 (-2.4%)
	D	-178 (-10.7%)	-318 (-19.2%)	-88 (-5.6%)	-229 (-14.6%)	-58 (-3.8%)	-88 (-6.2%)
	C	-177 (-12.6%)	-227 (-16.2%)	-153 (-11.1%)	-203 (-14.7%)	73 (6.4%)	168 (16.7%)
	All	303 (6.8%)	666 (15%)	458 (10.7%)	821 (19.2%)	-41 (-0.9%)	-9 (-0.2%)
Feb	W	1131 (12.3%)	1769 (19.3%)	1331 (14.8%)	1970 (21.9%)	38 (0.4%)	5 (0%)
	AN	989 (15.4%)	1740 (27.1%)	1273 (20.7%)	2024 (33%)	264 (3.7%)	90 (1.1%)
	BN	515 (11.9%)	553 (12.8%)	765 (18.9%)	803 (19.8%)	193 (4.2%)	-27 (-0.5%)
	D	-160 (-9%)	105 (5.9%)	-65 (-3.9%)	200 (11.8%)	-59 (-3.5%)	130 (7.4%)
	C	-88 (-7.9%)	-163 (-14.5%)	-44 (-4.1%)	-118 (-11%)	45 (4.6%)	35 (3.8%)
	All	543 (10.6%)	909 (17.7%)	718 (14.5%)	1085 (21.8%)	77 (1.4%)	44 (0.7%)
Mar	W	324 (5.4%)	852 (14.2%)	389 (6.6%)	917 (15.5%)	-1 (0%)	-5 (-0.1%)
	AN	327 (6.1%)	316 (5.9%)	468 (9%)	457 (8.8%)	51 (0.9%)	20 (0.3%)
	BN	187 (8%)	381 (16.3%)	256 (11.3%)	450 (19.8%)	25 (1%)	48 (1.8%)
	D	66 (3.1%)	-18 (-0.9%)	219 (11.1%)	134 (6.8%)	93 (4.4%)	-122 (-5.5%)
	C	-100 (-11.6%)	-82 (-9.5%)	-79 (-9.4%)	-61 (-7.2%)	-21 (-2.6%)	-54 (-6.5%)
	All	183 (5%)	365 (9.9%)	272 (7.6%)	455 (12.7%)	29 (0.8%)	-25 (-0.6%)
Apr	W	8 (0.2%)	153 (3%)	167 (3.3%)	312 (6.2%)	0 (0%)	9 (0.2%)
	AN	-250 (-7.4%)	-301 (-8.9%)	-105 (-3.3%)	-157 (-4.8%)	-4 (-0.1%)	2 (0.1%)
	BN	-33 (-1.1%)	-224 (-7.5%)	162 (5.8%)	-29 (-1%)	24 (0.8%)	-18 (-0.7%)
	D	-85 (-5.1%)	1 (0.1%)	-85 (-5.1%)	1 (0%)	38 (2.4%)	-3 (-0.2%)
	C	45 (4.5%)	79 (8%)	56 (5.6%)	90 (9.2%)	154 (17.3%)	15 (1.5%)
	All	-52 (-1.6%)	-22 (-0.7%)	55 (1.8%)	85 (2.8%)	34 (1.1%)	2 (0.1%)
May	W	-545 (-9.1%)	-1545 (-25.9%)	-297 (-5.2%)	-1297 (-22.7%)	-1 (0%)	82 (1.9%)
	AN	-677 (-18.3%)	-1160 (-31.4%)	-389 (-11.4%)	-872 (-25.6%)	111 (3.8%)	254 (11.1%)
	BN	-320 (-11.7%)	-595 (-21.8%)	-142 (-5.5%)	-417 (-16.3%)	191 (8.6%)	412 (23.9%)
	D	-125 (-7.8%)	193 (12%)	-4 (-0.3%)	313 (21.1%)	82 (5.8%)	343 (23.6%)
	C	116 (11.4%)	-214 (-21.1%)	138 (13.9%)	-192 (-19.4%)	11 (1%)	9 (1.2%)
	All	-337 (-9.9%)	-750 (-22.1%)	-156 (-4.9%)	-569 (-17.7%)	68 (2.3%)	210 (8.6%)
Jun	W	-1298 (-22.6%)	-1675 (-29.2%)	-1012 (-18.5%)	-1389 (-25.5%)	239 (5.7%)	679 (20%)
	AN	54 (1.7%)	205 (6.6%)	185 (6.2%)	336 (11.3%)	595 (23.2%)	573 (20.9%)
	BN	172 (6.5%)	603 (22.9%)	445 (18.8%)	875 (37.1%)	529 (23.3%)	631 (24.2%)
	D	573 (25.1%)	254 (11.1%)	714 (33.4%)	395 (18.5%)	566 (24.7%)	216 (9.3%)
	C	-578 (-35.6%)	-627 (-38.7%)	-368 (-26.1%)	-418 (-29.6%)	-8 (-0.8%)	201 (25.4%)
	All	-333 (-9.6%)	-434 (-12.5%)	-115 (-3.5%)	-216 (-6.7%)	376 (13.7%)	484 (19%)
Jul	W	-182 (-4.7%)	-444 (-11.5%)	85 (2.4%)	-177 (-5%)	399 (12.2%)	-160 (-4.5%)
	AN	-50 (-1.1%)	43 (1%)	218 (5.3%)	311 (7.5%)	4 (0.1%)	-194 (-4.2%)
	BN	-154 (-3.4%)	-607 (-13.5%)	-192 (-4.2%)	-645 (-14.2%)	98 (2.3%)	-136 (-3.4%)
	D	-495 (-14.8%)	-863 (-25.8%)	-134 (-4.5%)	-503 (-16.8%)	46 (1.6%)	-375 (-13.1%)
	C	-129 (-8.2%)	261 (16.7%)	221 (18.2%)	611 (50.2%)	19 (1.3%)	46 (2.6%)
	All	-219 (-6.1%)	-389 (-10.8%)	29 (0.9%)	-142 (-4.2%)	157 (4.9%)	-178 (-5.3%)

Month	Water-Year Type[a]	Scenario[c]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-1189 (-36.1%)	-1449 (-44%)	-884 (-29.6%)	-1145 (-38.3%)	-198 (-8.6%)	-13 (-0.7%)
	AN	-506 (-21.9%)	-622 (-26.9%)	-519 (-22.3%)	-635 (-27.3%)	-114 (-5.9%)	28 (1.7%)
	BN	-347 (-15.3%)	-783 (-34.6%)	-246 (-11.4%)	-682 (-31.5%)	-117 (-5.7%)	-566 (-27.7%)
	D	-1246 (-52%)	-1283 (-53.6%)	-900 (-43.9%)	-937 (-45.7%)	-367 (-24.2%)	-245 (-18%)
	C	-421 (-32%)	-664 (-50.6%)	-201 (-18.4%)	-445 (-40.7%)	-204 (-18.6%)	-250 (-27.8%)
	All	-845 (-34%)	-1063 (-42.7%)	-625 (-27.6%)	-843 (-37.2%)	-210 (-11.3%)	-187 (-11.6%)
Sep	W	-694 (-18.1%)	-1027 (-26.7%)	-938 (-22.9%)	-1271 (-31.1%)	-619 (-16.4%)	-596 (-17.5%)
	AN	-614 (-23.7%)	-981 (-37.8%)	-914 (-31.6%)	-1281 (-44.3%)	-456 (-18.7%)	-225 (-12.2%)
	BN	-915 (-41.5%)	-1026 (-46.5%)	-612 (-32.2%)	-723 (-38%)	-422 (-24.6%)	-223 (-15.9%)
	D	-524 (-31%)	-656 (-38.8%)	-205 (-14.9%)	-336 (-24.5%)	-10 (-0.8%)	48 (4.9%)
	C	-476 (-47.1%)	-517 (-51.1%)	-342 (-39%)	-383 (-43.7%)	-56 (-9.4%)	67 (15.7%)
	All	-651 (-26.1%)	-864 (-34.6%)	-631 (-25.5%)	-844 (-34.1%)	-346 (-15.8%)	-240 (-12.8%)
Oct	W	-149 (-9.3%)	-250 (-15.6%)	-20 (-1.4%)	-122 (-8.2%)	-103 (-6.6%)	-142 (-9.4%)
	AN	-176 (-11%)	-58 (-3.6%)	130 (10.1%)	248 (19.2%)	-60 (-4.1%)	-74 (-4.6%)
	BN	145 (9.9%)	390 (26.5%)	241 (17.5%)	486 (35.3%)	253 (18.6%)	245 (15.1%)
	D	-72 (-5.4%)	-55 (-4.1%)	81 (6.8%)	99 (8.3%)	-61 (-4.6%)	175 (15.7%)
	C	196 (14.6%)	179 (13.3%)	277 (22%)	260 (20.7%)	305 (24.8%)	4 (0.2%)
	All	-35 (-2.4%)	-7 (-0.5%)	112 (8.4%)	140 (10.5%)	33 (2.3%)	25 (1.7%)
Nov	W	-560 (-16.1%)	-1035 (-29.8%)	-490 (-14.4%)	-965 (-28.4%)	-451 (-13.4%)	-102 (-4%)
	AN	-320 (-10.3%)	-792 (-25.5%)	-609 (-18%)	-1082 (-31.9%)	-309 (-10%)	-147 (-6%)
	BN	-392 (-19.7%)	-498 (-25%)	-539 (-25.2%)	-645 (-30.2%)	-291 (-15.4%)	-126 (-7.8%)
	D	-500 (-23.9%)	-700 (-33.4%)	-370 (-18.8%)	-570 (-29%)	-30 (-1.8%)	68 (5.2%)
	C	-363 (-19.2%)	-526 (-27.7%)	-316 (-17.1%)	-479 (-25.9%)	-56 (-3.6%)	-118 (-7.9%)
	All	-454 (-17.3%)	-760 (-28.9%)	-464 (-17.6%)	-769 (-29.1%)	-253 (-10.4%)	-78 (-4%)
Dec	W	484 (7.7%)	-220 (-3.5%)	1112 (19.8%)	408 (7.3%)	131 (2%)	-80 (-1.3%)
	AN	-121 (-4%)	-219 (-7.1%)	41 (1.4%)	-57 (-2%)	-57 (-1.9%)	-4 (-0.1%)
	BN	319 (12.2%)	-99 (-3.8%)	495 (20.3%)	77 (3.2%)	154 (5.6%)	65 (2.7%)
	D	-148 (-8.8%)	-411 (-24.5%)	-87 (-5.4%)	-350 (-21.7%)	-37 (-2.4%)	-11 (-0.9%)
	C	-97 (-6.7%)	-221 (-15.3%)	-18 (-1.3%)	-142 (-10.4%)	68 (5.3%)	64 (5.6%)
	All	143 (4.1%)	-241 (-7%)	421 (13.2%)	37 (1.2%)	61 (1.7%)	-8 (-0.2%)

[a] A positive value indicates higher mean flows in ESO than in EBC.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

5C.5.3.13.6.1 Steelhead

Juvenile

American River flow at the confluence with the Sacramento River is used to represent flow conditions in the mainstem of this river. Most differences in American River flow between ESO and EBC2 scenarios during the juvenile steelhead migration period (October through May), when accounting for climate change, were low, generally 5% or less (Table 5C.5.3-227, Table 5C.5.3-228). Differences in average flows within individual months ranged from 15% lower flow under ESO_ELT compared to EBC2_ELT in November of below-normal years to 25% higher flow under ESO_ELT compared to EBC2_ELT in October of critical years. The average flow was 24% higher under ESO_LLT compared to EBC2_LLT in May of below-normal and dry years. Based on these results, it was concluded that flow conditions for migration of steelhead juveniles in the American River under ESO operations would be similar to those under EBC2 operations.

Adult

Attraction flows for upstream migrating adult steelhead based on CALSIM model results for instream flows modeled on the American River at the confluence with the Sacramento River during the September through March migration period are summarized, by month and water-year type, in Table 5C.5.3-227 and Table 5C.5.3-228.

No specific criteria exist for assessing the potential effects of a change in olfactory cues that affect the attraction of migrating adult steelhead to the American River. In the absence of such criteria, it is assumed that the larger the increase in the flow of the American River at the Sacramento River confluence during the adult upstream migration period, the greater the attraction to the river. Average American River flows at the confluence with the Sacramento River during the September through March migration period are summarized in Table 5C.5.3-227.

Most differences in in American River between September and March were 5% or below for all water-year types. Differences in flows ranged from 25% lower flow under ESO_ELT compared to EBC2_ELT in September of below-normal years to 25% higher flow under ESO_ELT compared to EBC2_ELT in October of critical years. Based on these results, it was concluded that attraction flow conditions for upstream migration of steelhead adults in the American River under ESO operations generally would be similar to those under EBC2 operations.

Kelt

Flows in the American River at the confluence with the Sacramento River were compared for the period from January through April to represent the period of kelt migration (Table 5C.5.3-227, Table 5C.5.3-228).

Most differences among scenarios in American flows between January and April were low, generally 5% or less, for all water-year types (Table 5C.5.3-227). Differences No flow differences exceeded 10% except for an 11% decreased flow under ESO_ELT compared to EBC2_ELT in Januuary of below-normal years, a 17% increased flow under ESO_LLT compared to EBC2_LLT in January of critical years, and a 17% higher flow under ESO_ELT compared to EBC2_ELT in April of critical years. Based on these results, it was concluded that instream habitat conditions for upstream migration of steelhead kelts in the American River under ESO operations generally would be similar to those under EBC2 operations.

5C.5.3.13.6.2 Fall-Run Chinook Salmon

Juvenile

Downstream migration flows for juvenile fall-run Chinook salmon produced in the American River from February through May generally were estimated to be similar between ESO and EBC scenarios, with the monthly flows generally higher, but in most cases less than about 5% higher, under ESO scenarios for all water-year types (Table 5C.5.3-227, Table 5C.5.3-228). The largest increases, 24%, were predicted to occur in May of below normal and dry years under late long-term conditions.

Adult

American River flows at the confluence with the Sacramento River during the September through October adult fall-run Chinook salmon migration period show appreciable reductions in flows in September of wet, above-normal, and below-normal years under evaluated starting operations conditions compared with EBC conditions (Table 5C.5.3-227, Table 5C.5.3-228). Flows in critically dry years were greater in September for ESO_LLT operations, but were lower for ESO_ELT operations. During October, flows under ESO operations were similar to or higher than flows under EBC2 operations in all water-year types except wet years. Flows in September under ESO_ELT operations were reduced 16% in wet years, 19% in above-normal years, 25% in below-normal years, and 1% in dry years and 9% in critically dry years. Flows in September under ESO_LLT operations had reductions of 18% in wet years, 12% in above-normal years, and 16% in below-normal years. Flows increased in dry and critically dry years, with increases of 5% and 16%, respectively. No relationships have been developed that quantify the attraction of adult fall-run Chinook salmon and flows in the lower American River. The substantial reduction in flow in September has the potential to result in delayed upstream migration and increased risk of straying. The increase in flow in the drier water years in October has the potential to increase adult attraction and upstream migration.

5C.5.3.13.6.3 Pacific Lamprey

Macropthalmia

Average monthly flow rates in the American River at the confluence with the Sacramento River between December and May are presented in Table 5C.5.3-227 and Figure 5C.5.3-191 through Figure 5C.5.3-196, and differences between model scenarios are presented in Table 5C.5.3-228.

Predicted differences for model scenario ESO_ELT relative to EBC1 were generally small, with maximum differences of 15% in wet years (January), -18% in above normal years (May), -14% in below normal years (January), -11% in dry years (January) and -13% in critical years (January). Predicted differences for ESO_LLT relative to EBC1 were highly variable, with reductions in flow generally larger than increases. The maximum predicted differences were -26% in wet years (February), -31% in above normal years (May), -22% in below normal years (May), -25% in dry years (December) and -21% in critical years (May). Predicted differences for ESO_ELT relative to EBC2 were largely similar to the ESO_ELT relative to EBC1 differences, with maximum differences of 20% in wet years (December), 21% in above normal years (February), 20% in below normal years (December), 11% in dry years (March) and 14% in critical years (May). Predicted differences for ESO_LLT relative to EBC2 were variable to differences of ESO_LLT relative to EBC1, with maximum differences of 28% in wet years (January), 33% in above normal years (February), 19% in below normal years (March), -22% in dry years (December) and -19% in critical years (May).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, predicted differences for ESO_ELT relative to EBC2_ELT were generally small, with maximum differences of 2% in wet years (December), 4% in above normal years (May), -11% in below normal years (January), 6% in dry years (May) and 17% in critical years (April). Predicted differences for ESO_LLT relative to EBC2_LLT were also generally small, but with some important exceptions. Maximum predicted differences were 2% in wet years (May), 11% in above normal years (May), 23% in below normal years (May), 24% in dry years (May) and 17% in critical years (January).

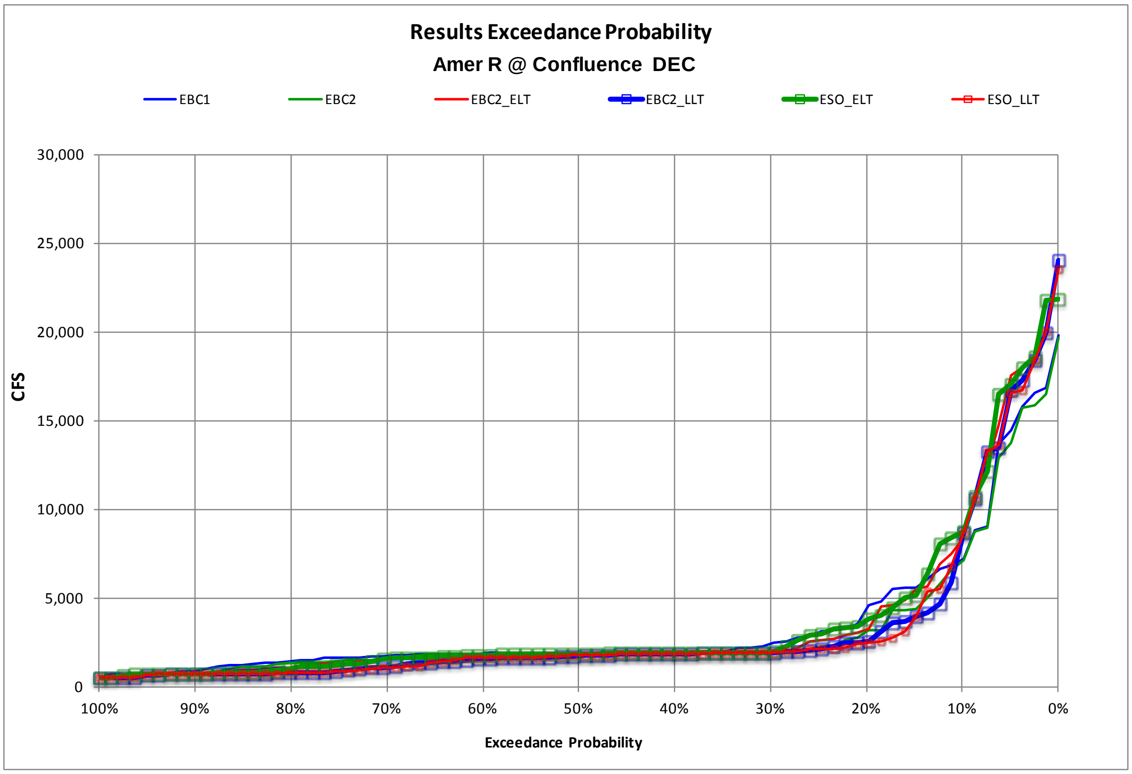


Figure 5C.5.3-191. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, December

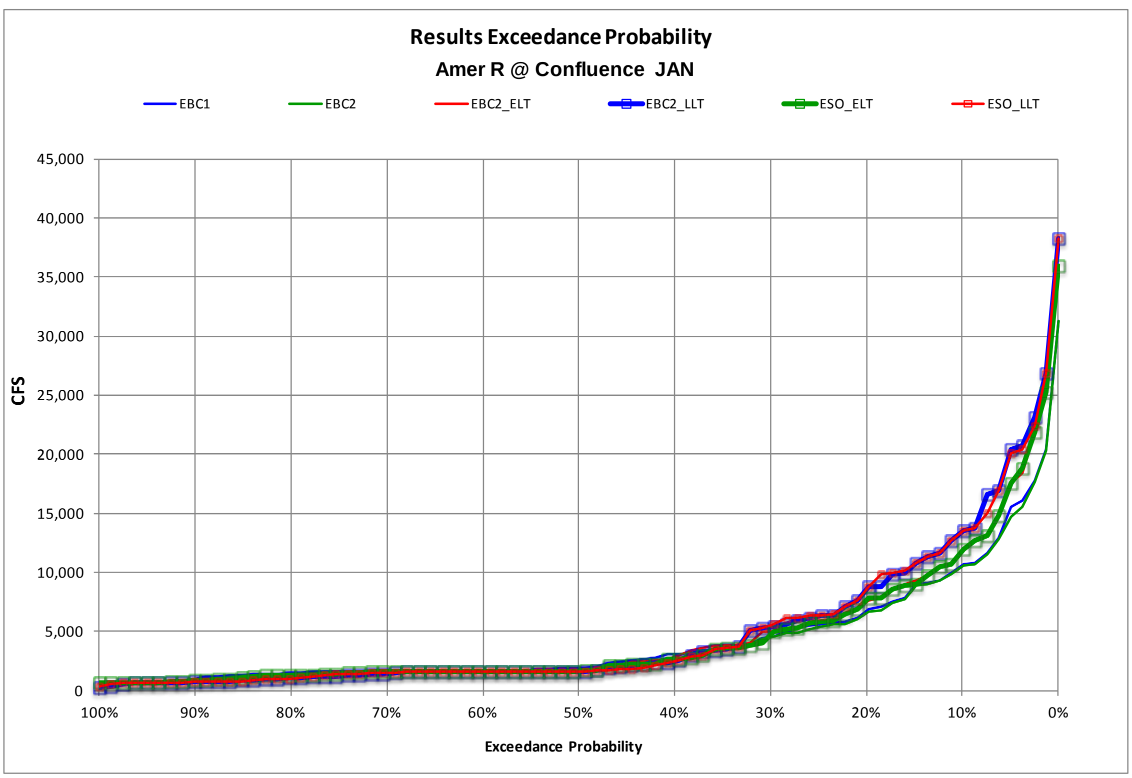


Figure 5C.5.3-192. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, January

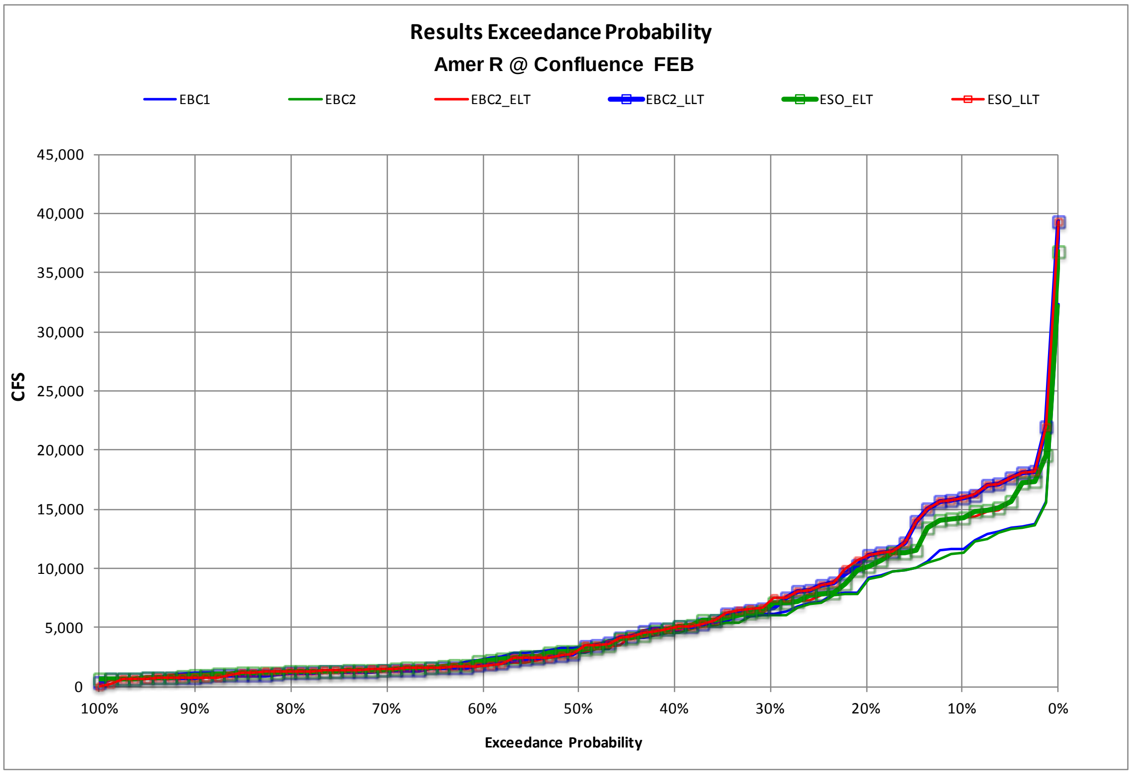


Figure 5C.5.3-193. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, February

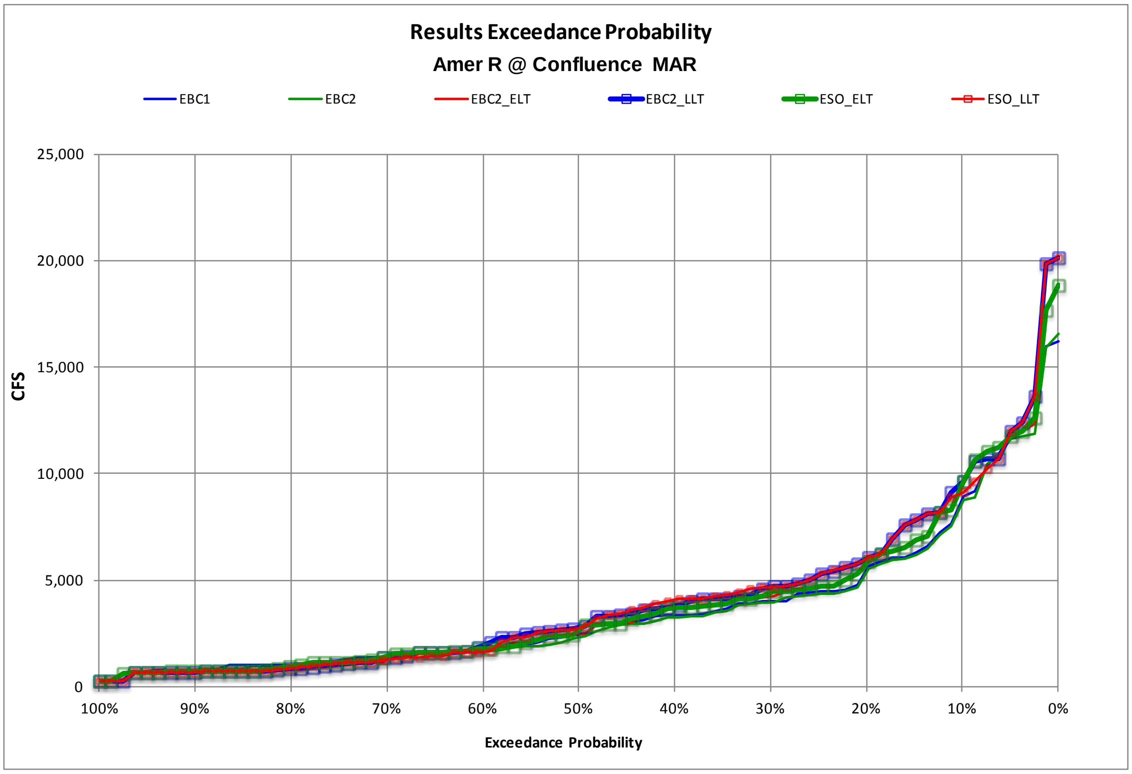


Figure 5C.5.3-194. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, March

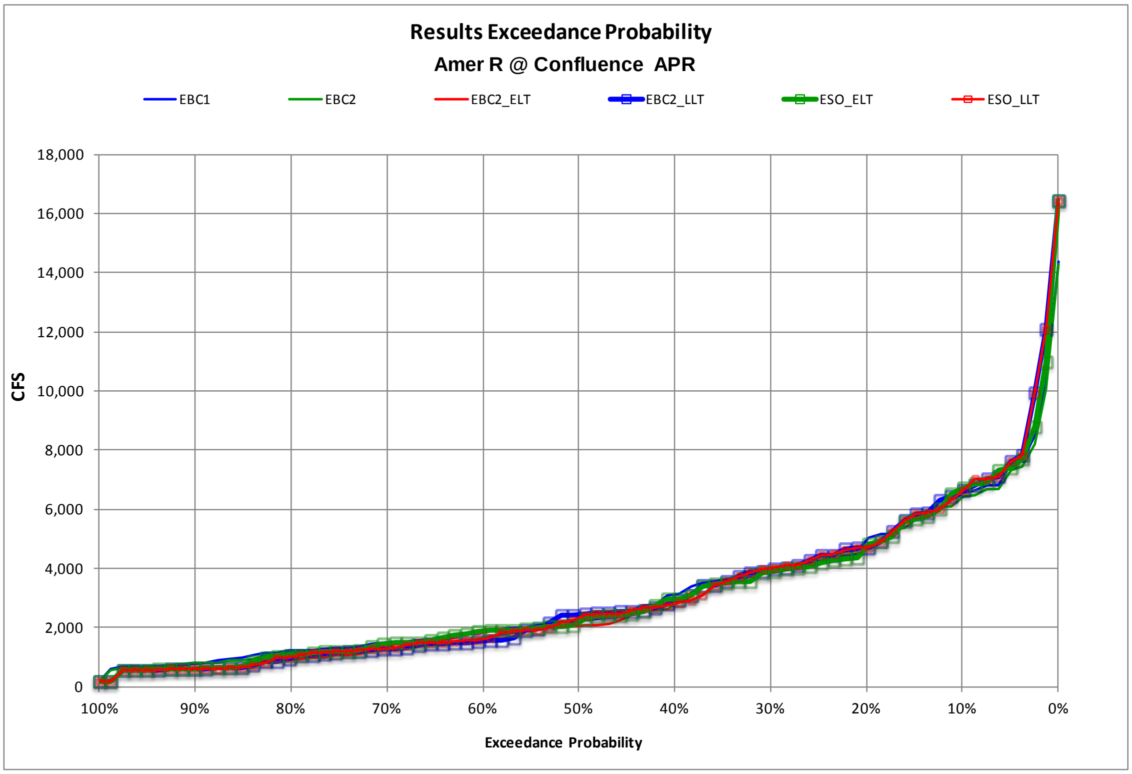


Figure 5C.5.3-195. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, April

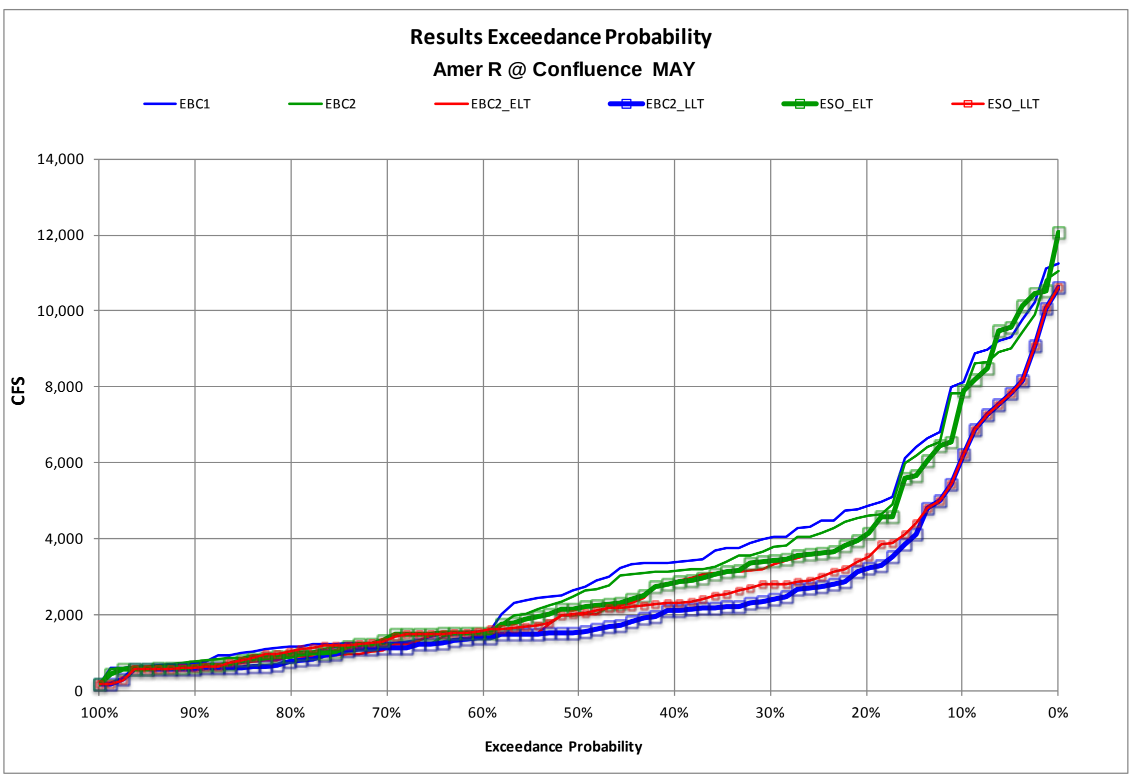


Figure 5C.5.3-196. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, May

Adult

Exceedance plots for flows in the American River at the confluence with the Sacramento River for each model scenario between January and June are presented in Table 5C.5.3-227 and differences between model scenarios in mean flows are presented in Table 5C.5.3-228.

Predicted differences for the ESO scenarios relative to the EBC scenarios were highly variable, including a number of large differences (>20%). The majority of the 34 predicted differences that were >20% were predicted to occur in June, and about 60% of them were increases of the ESO scenarios relative to the EBC2 scenarios. Most of the large reductions were predicted to occur in June of wet and critical years for comparisons that did not take into account effects of climate change. The maximum predicted differences for ESO_ELT relative to EBC1 were -23% in wet years (June), -18% in above normal years (May), -14% in below normal years (January), 25% in dry years (June), and -36% in critical years (June). Maximum predicted differences for ESO_LLT relative to EBC1 were -29% in wet years (June), -31% in above normal years (May), 23% in below normal years (June), -19% in dry years (January) and -39% in critical years (June). Maximum predicted differences for ESO_ELT relative to EBC2 were -18% in wet years (June), 21% in above normal years (February), 19% in below normal years (February), 33% in dry years (June) and -26% in critical years (June). Maximum predicted differences for ESO_LLT relative to EBC2 were 28% in wet years (January), 33% in above normal years (February), 37% in below normal years (June), 21% in dry years (May) and -30% in critical years (June).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, maximum predicted differences for ESO_ELT relative to EBC2_ELT were 6% in wet years (June), 23% in above normal years (June), 23% in below normal years (June), 25% in dry years (June) and 17% in critical years (April). Maximum predicted differences for ESO_LLT relative to EBC2_LLT were 20% in wet years (June), 21% in above normal years (June), 24% in below normal years (June), 24% in dry years (May) and 25% in critical years (June).

These results suggest that, other than in May and June, there are negligible effects of the evaluated starting operations, when climate change is accounted for, on Pacific lamprey attraction in the American River if lamprey are attracted to upstream olfactory cues. In May under LLT conditions and in June under ELT conditions and LLT conditions, flow increases due to the evaluated starting operations are expected to provide a small benefit to adult attraction flows if lamprey are attracted to upstream olfactory cues.

5C.5.3.13.6.4 River Lamprey

Macropthalmia

See results for Pacific lamprey macropthalmia.

Adult

Exceedance plots for flows in the American River at the confluence with the Sacramento River for each model scenario between September and November are presented in Figure 5C.5.3-197, Figure 5C.5.3-198, and Figure 5C.5.3-199, and differences between model scenarios in mean flows are presented in Table 5C.5.3-228.

Predicted differences for ESO relative to EBC scenarios were highly variable, with large increases and even larger reductions. The largest differences in most cases were predicted to occur in

September. Maximum predicted differences for model scenario ESO_ELT relative to EBC1 all occurred during September, with -18% in wet years, -24% in above normal years, -42% in below normal years, -31% in dry years and -47% in critical years. Maximum predicted differences for ESO_LLT relative to EBC1 were with -30% in wet years (November), -38% in above normal years (September), -47% in below normal years (September), -39% in dry years (September) and -51% in critical years (September). Maximum predicted differences for ESO_ELT relative to EBC2 were -23% in wet years (September), -32% in above normal years (September), -32% in below normal years (September), -19% in dry years (November) and -39% in critical years (September). Maximum predicted differences for ESO_LLT relative to EBC2 were -31% in wet years (September), -44% in above normal years (September), -38% in below normal years (September), -29% in dry years (November) and -44% in critical years (September).

Isolating the effect of the evaluated starting operations from the effects of climate change in the early long-term, maximum predicted differences for ESO_ELT relative to EBC2_ELT were -16% in wet years (September), -19% in above normal years (September), -25% in below normal years (September), -5% in dry years (October) and 25% in critical years (October). Maximum predicted differences for ESO_LLT relative to EBC2_LLT were -17% in wet years (September), -12% in above normal years (September), -16% in below normal years (September), 16% in dry years (October) and 16% in critical years (September).

These results suggest that effects of the evaluated starting operations on river lamprey upstream attraction flows are variable among months, ranging from moderate adverse effects to no effects.

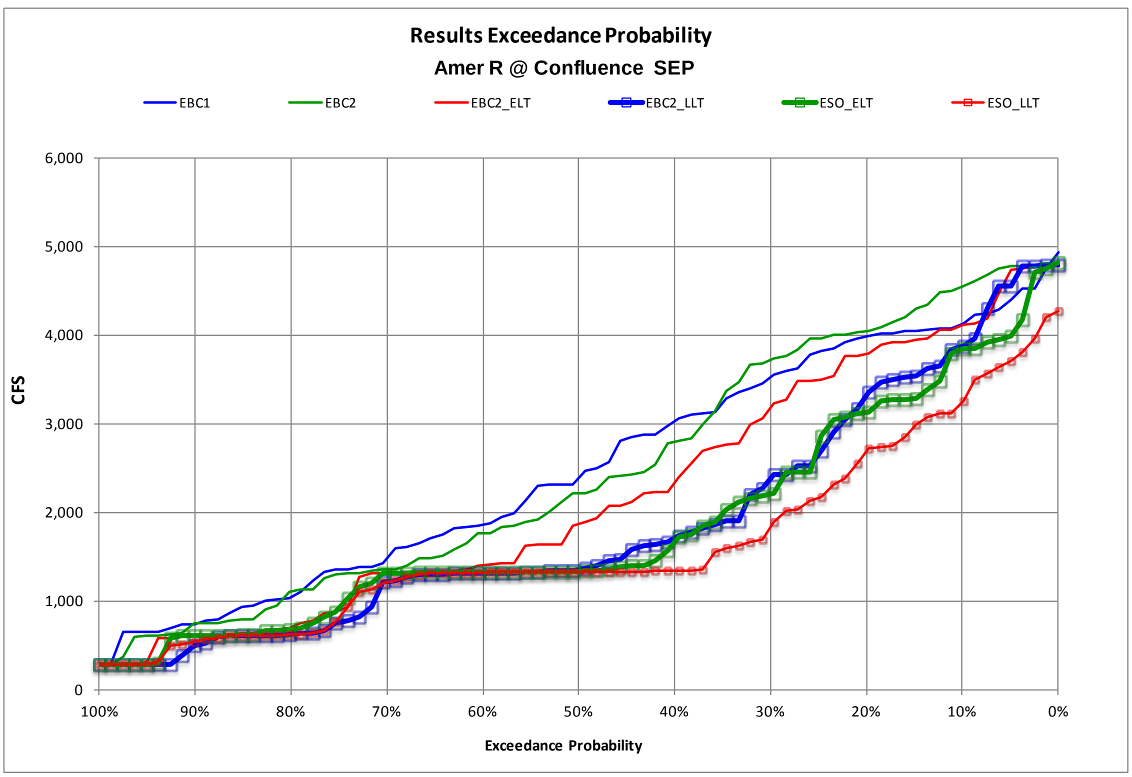


Figure 5C.5.3-197. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, September

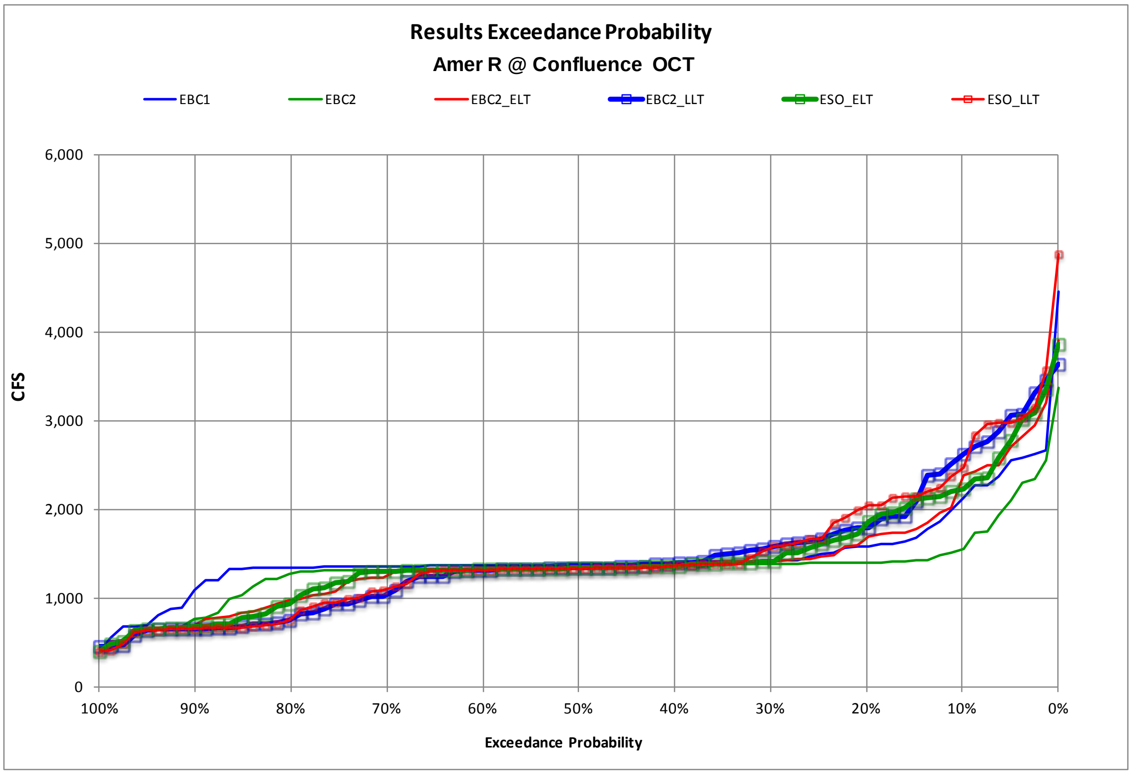


Figure 5C.5.3-198. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, October

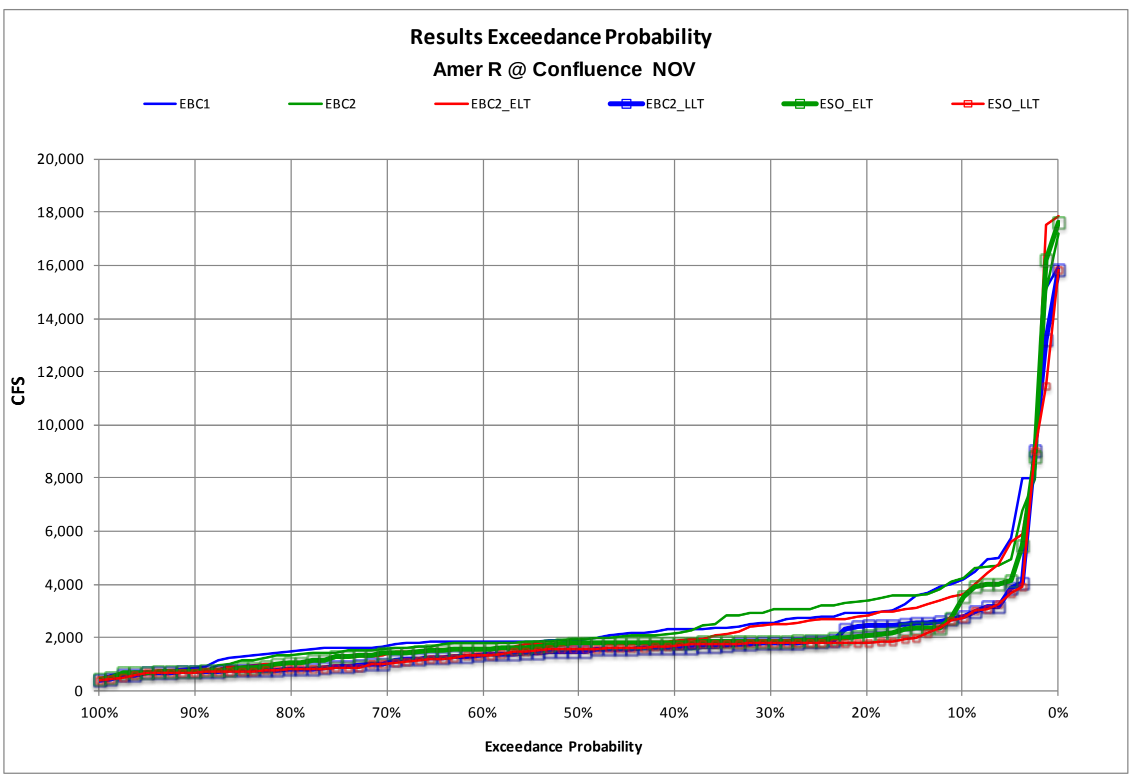


Figure 5C.5.3-199. Probability of Exceedance Plot for EBC and ESO Scenarios of Mean Monthly Flow Rate of the American River at the Confluence with the Sacramento River, November

5C.5.3.13.7 Stanislaus River Subregion

CALSIM flow data for the Stanislaus River subregion (Stanislaus River at the confluence with the San Joaquin River) averaged by water-year type, month, and scenario, together with average monthly differences between scenarios, are provided in Table 5C.5.3-229 and Table 5C.5.3-230. Based on these results, no appreciable effects of the evaluated starting operations on migration or attraction flows are expected in this subregion.

Table 5C.5.3-229. Mean Monthly Flows (cfs) in the Stanislaus River at the Confluence with the San Joaquin River for EBC and ESO Scenarios

Month	Water-Year Type[a,b]	Sceanrio[c]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
Jan	W	956	945	968	885	968	885
	AN	843	833	911	963	912	963
	BN	416	403	382	369	382	369
	D	403	403	393	366	393	366
	C	314	296	278	265	278	265
	All	635	624	638	615	638	615
Feb	W	1,285	1,271	1,500	1,236	1,500	1,227
	AN	917	887	985	858	985	858
	BN	551	527	522	438	522	437
	D	562	504	411	359	410	359
	C	490	364	349	348	349	348
	All	827	780	847	723	847	721
Mar	W	2,063	2,055	2,259	2,217	2,259	2,217
	AN	1,295	1,299	1,108	956	1,108	956
	BN	732	718	642	548	642	548
	D	559	533	431	390	431	390
	C	541	445	445	444	445	444
	All	1,167	1,140	1,134	1,071	1,134	1,071
Apr	W	2,054	2,063	2,047	1,965	2,047	1,965
	AN	1,719	1,719	1,605	1,535	1,605	1,535
	BN	1,494	1,470	1,344	1,211	1,344	1,211
	D	1,438	1,415	1,320	1,199	1,320	1,199
	C	823	791	720	670	720	669
	All	1,562	1,551	1,475	1,387	1,475	1,387
May	W	1,653	1,675	1,688	1,613	1,688	1,614
	AN	1,389	1,395	1,292	1,243	1,294	1,243
	BN	1,238	1,227	1,094	898	1,093	898
	D	1,140	1,105	1,039	916	1,039	916
	C	715	672	648	627	648	626
	All	1,271	1,263	1,211	1,125	1,211	1,125
Jun	W	1,608	1,618	1,786	1,763	1,785	1,761
	AN	1,134	1,142	1,087	985	1,085	984
	BN	663	654	609	568	607	567
	D	447	418	383	364	385	364
	C	332	307	308	296	308	292

Month	Water-Year Type[a,b]	Sceanrio[c]					
		EBC1	EBC2	EBC2_ELT	EBC2_LLT	ESO_ELT	ESO_LLT
	All	932	926	952	914	952	912
Jul	W	1,064	1,120	1,070	1,080	1,069	1,080
	AN	489	484	456	454	456	454
	BN	450	430	427	425	427	425
	D	398	345	355	359	355	360
	C	337	329	318	310	318	311
	All	607	610	588	590	588	590
Aug	W	930	937	843	717	843	717
	AN	476	476	455	454	455	454
	BN	423	423	422	418	422	418
	D	387	387	384	382	384	382
	C	341	360	341	338	341	339
	All	560	566	530	491	530	492
Sep	W	1,040	1,028	965	863	965	863
	AN	502	503	477	474	477	474
	BN	417	417	413	407	413	407
	D	395	396	392	390	392	390
	C	324	340	327	317	327	330
	All	595	594	567	533	567	536
Oct	W	897	908	869	845	869	846
	AN	873	872	844	822	844	825
	BN	903	903	851	844	851	844
	D	984	984	980	925	980	925
	C	689	687	670	612	670	614
	All	867	869	840	808	840	809
Nov	W	426	424	427	408	427	408
	AN	580	574	591	524	591	524
	BN	341	341	341	334	341	334
	D	345	345	337	321	337	321
	C	325	326	311	308	311	308
	All	410	409	409	386	409	386
Dec	W	512	530	526	429	526	441
	AN	722	711	767	697	767	697
	BN	331	331	331	353	331	353
	D	317	317	310	294	310	294
	C	289	290	275	272	275	272
	All	450	453	459	417	459	421

[a] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

1 **Table 5C.5.3-230. Differences[a] between EBC and ESO Scenarios in Mean Monthly Flows (cfs) in**
2 **Stanislaus River at the Confluence with the San Joaquin River**

Month	Water-Year Type[b,c]	Scenario[d]					
		EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Jan	W	12 (1.2%)	-71 (-7.4%)	23 (2.4%)	-60 (-6.3%)	0 (0%)	0 (0%)
	AN	70 (8.3%)	120 (14.3%)	79 (9.5%)	130 (15.6%)	1 (0.1%)	0 (0%)
	BN	-34 (-8.2%)	-47 (-11.3%)	-21 (-5.2%)	-34 (-8.4%)	0 (0%)	0 (0%)
	D	-10 (-2.4%)	-37 (-9.1%)	-10 (-2.4%)	-37 (-9.1%)	0 (0%)	0 (0%)
	C	-36 (-11.5%)	-49 (-15.6%)	-18 (-6.1%)	-31 (-10.4%)	0 (0%)	0 (0%)
	All	3 (0.5%)	-20 (-3.2%)	14 (2.2%)	-9 (-1.5%)	0 (0%)	0 (0%)
Feb	W	215 (16.8%)	-58 (-4.5%)	229 (18%)	-44 (-3.5%)	0 (0%)	-9 (-0.7%)
	AN	68 (7.4%)	-59 (-6.4%)	98 (11.1%)	-29 (-3.3%)	0 (0%)	0 (0%)
	BN	-30 (-5.4%)	-114 (-20.7%)	-6 (-1.1%)	-90 (-17.1%)	0 (0%)	-1 (-0.2%)
	D	-152 (-27%)	-203 (-36.1%)	-93 (-18.5%)	-145 (-28.8%)	0 (0%)	0 (0%)
	C	-141 (-28.8%)	-142 (-29%)	-15 (-4.2%)	-16 (-4.5%)	0 (0%)	0 (0%)
	All	20 (2.4%)	-106 (-12.9%)	68 (8.7%)	-59 (-7.6%)	0 (0%)	-3 (-0.4%)
Mar	W	196 (9.5%)	154 (7.4%)	205 (10%)	162 (7.9%)	0 (0%)	0 (0%)
	AN	-187 (-14.4%)	-339 (-26.2%)	-190 (-14.7%)	-342 (-26.4%)	0 (0%)	0 (0%)
	BN	-90 (-12.4%)	-185 (-25.2%)	-76 (-10.6%)	-170 (-23.7%)	0 (0%)	0 (0%)
	D	-127 (-22.8%)	-168 (-30.1%)	-102 (-19.1%)	-143 (-26.8%)	0 (0%)	0 (0%)
	C	-96 (-17.7%)	-97 (-17.9%)	0 (-0.1%)	-2 (-0.4%)	0 (0%)	0 (0%)
	All	-32 (-2.8%)	-96 (-8.2%)	-6 (-0.5%)	-69 (-6.1%)	0 (0%)	0 (0%)
Apr	W	-7 (-0.3%)	-89 (-4.3%)	-16 (-0.8%)	-98 (-4.7%)	0 (0%)	0 (0%)
	AN	-114 (-6.6%)	-184 (-10.7%)	-114 (-6.6%)	-184 (-10.7%)	0 (0%)	0 (0%)
	BN	-149 (-10%)	-283 (-18.9%)	-126 (-8.6%)	-260 (-17.7%)	0 (0%)	0 (0%)
	D	-118 (-8.2%)	-240 (-16.7%)	-95 (-6.7%)	-216 (-15.3%)	0 (0%)	0 (0%)
	C	-103 (-12.5%)	-153 (-18.6%)	-71 (-9%)	-122 (-15.4%)	0 (0%)	0 (0%)
	All	-87 (-5.5%)	-175 (-11.2%)	-76 (-4.9%)	-164 (-10.6%)	0 (0%)	0 (0%)
May	W	35 (2.1%)	-39 (-2.4%)	13 (0.8%)	-61 (-3.6%)	0 (0%)	1 (0%)
	AN	-95 (-6.8%)	-146 (-10.5%)	-101 (-7.2%)	-152 (-10.9%)	2 (0.1%)	0 (0%)
	BN	-145 (-11.7%)	-340 (-27.5%)	-134 (-10.9%)	-329 (-26.8%)	-1 (-0.1%)	0 (0%)
	D	-101 (-8.8%)	-224 (-19.7%)	-66 (-5.9%)	-190 (-17.1%)	0 (0%)	0 (0%)
	C	-67 (-9.4%)	-89 (-12.5%)	-24 (-3.6%)	-47 (-6.9%)	0 (0%)	-1 (-0.2%)
	All	-60 (-4.7%)	-147 (-11.6%)	-52 (-4.1%)	-139 (-11%)	0 (0%)	0 (0%)
Jun	W	178 (11.1%)	154 (9.6%)	168 (10.4%)	143 (8.9%)	0 (0%)	-2 (-0.1%)
	AN	-49 (-4.3%)	-150 (-13.2%)	-58 (-5%)	-159 (-13.9%)	-2 (-0.2%)	-1 (-0.1%)
	BN	-56 (-8.4%)	-96 (-14.4%)	-47 (-7.1%)	-87 (-13.3%)	-2 (-0.3%)	-1 (-0.1%)
	D	-62 (-13.8%)	-82 (-18.4%)	-33 (-7.8%)	-53 (-12.8%)	2 (0.6%)	0 (0%)
	C	-23 (-7.1%)	-40 (-11.9%)	1 (0.4%)	-15 (-4.8%)	0 (0%)	-3 (-1.1%)
	All	19 (2.1%)	-20 (-2.2%)	26 (2.8%)	-14 (-1.5%)	0 (0%)	-1 (-0.2%)
Jul	W	6 (0.5%)	16 (1.5%)	-51 (-4.5%)	-40 (-3.6%)	0 (0%)	0 (0%)
	AN	-33 (-6.8%)	-35 (-7.2%)	-29 (-5.9%)	-31 (-6.3%)	0 (0%)	0 (0%)
	BN	-23 (-5.1%)	-25 (-5.5%)	-3 (-0.6%)	-5 (-1.1%)	0 (0%)	0 (0%)
	D	-43 (-10.7%)	-38 (-9.7%)	10 (2.9%)	14 (4.1%)	0 (0.1%)	0 (0.1%)
	C	-19 (-5.5%)	-25 (-7.5%)	-11 (-3.4%)	-18 (-5.5%)	0 (0%)	1 (0.3%)
	All	-19 (-3.1%)	-17 (-2.8%)	-21 (-3.5%)	-20 (-3.2%)	0 (0%)	0 (0%)

Month	Water-Year Type[b,c]	Scenario[d] EBC1 vs. ESO_ELT	EBC1 vs. ESO_LLT	EBC2 vs. ESO_ELT	EBC2 vs. ESO_LLT	EBC2_ELT vs. ESO_ELT	EBC2_LLT vs. ESO_LLT
Aug	W	-86 (-9.3%)	-212 (-22.8%)	-94 (-10%)	-220 (-23.5%)	0 (0%)	0 (0%)
	AN	-21 (-4.4%)	-22 (-4.6%)	-21 (-4.4%)	-22 (-4.6%)	0 (0%)	0 (0%)
	BN	-1 (-0.2%)	-4 (-1%)	-1 (-0.3%)	-5 (-1.1%)	0 (0%)	0 (0%)
	D	-3 (-0.7%)	-5 (-1.2%)	-3 (-0.8%)	-5 (-1.3%)	0 (0%)	0 (0%)
	C	0 (0.1%)	-2 (-0.6%)	-19 (-5.3%)	-22 (-6%)	0 (0%)	1 (0.3%)
	All	-30 (-5.3%)	-68 (-12.2%)	-36 (-6.4%)	-74 (-13.1%)	0 (0%)	0 (0%)
Sep	W	-76 (-7.3%)	-177 (-17%)	-63 (-6.1%)	-165 (-16%)	-1 (-0.1%)	0 (0%)
	AN	-25 (-5%)	-28 (-5.6%)	-25 (-5%)	-28 (-5.6%)	0 (0%)	0 (0%)
	BN	-4 (-0.9%)	-10 (-2.4%)	-4 (-0.9%)	-10 (-2.4%)	0 (0%)	0 (0%)
	D	-3 (-0.7%)	-5 (-1.3%)	-3 (-0.8%)	-5 (-1.3%)	0 (0%)	0 (0%)
	C	3 (0.9%)	5 (1.6%)	-12 (-3.7%)	-10 (-3%)	0 (0%)	13 (4.1%)
	All	-27 (-4.6%)	-59 (-9.9%)	-27 (-4.5%)	-58 (-9.8%)	0 (0%)	3 (0.5%)
Oct	W	-28 (-3.2%)	-52 (-5.8%)	-39 (-4.3%)	-62 (-6.8%)	0 (0%)	0 (0.1%)
	AN	-29 (-3.3%)	-48 (-5.5%)	-28 (-3.3%)	-48 (-5.5%)	0 (0%)	2 (0.3%)
	BN	-52 (-5.7%)	-59 (-6.5%)	-52 (-5.7%)	-59 (-6.5%)	0 (0%)	0 (0%)
	D	-4 (-0.4%)	-59 (-6%)	-4 (-0.4%)	-59 (-6%)	0 (0%)	0 (0%)
	C	-19 (-2.8%)	-75 (-10.9%)	-18 (-2.6%)	-73 (-10.7%)	0 (0%)	1 (0.2%)
	All	-27 (-3.1%)	-58 (-6.7%)	-29 (-3.4%)	-61 (-7%)	0 (0%)	1 (0.1%)
Nov	W	1 (0.3%)	-18 (-4.3%)	3 (0.6%)	-17 (-3.9%)	0 (0%)	0 (0%)
	AN	11 (1.9%)	-56 (-9.7%)	17 (3%)	-50 (-8.7%)	0 (0%)	0 (0%)
	BN	0 (0%)	-8 (-2.3%)	0 (0%)	-8 (-2.3%)	0 (0%)	0 (0%)
	D	-8 (-2.2%)	-23 (-6.7%)	-8 (-2.2%)	-23 (-6.7%)	0 (0%)	0 (0%)
	C	-14 (-4.2%)	-16 (-5.1%)	-15 (-4.5%)	-18 (-5.4%)	0 (0%)	0 (0%)
	All	-1 (-0.3%)	-24 (-5.9%)	0 (0%)	-23 (-5.6%)	0 (0%)	0 (0%)
Dec	W	14 (2.7%)	-72 (-14%)	-3 (-0.7%)	-89 (-16.7%)	0 (0%)	12 (2.8%)
	AN	44 (6.2%)	-25 (-3.5%)	56 (7.9%)	-14 (-1.9%)	0 (0%)	0 (0%)
	BN	0 (0%)	23 (6.8%)	0 (0%)	23 (6.8%)	0 (0%)	0 (0%)
	D	-8 (-2.4%)	-23 (-7.3%)	-8 (-2.4%)	-23 (-7.3%)	0 (0%)	0 (0%)
	C	-13 (-4.7%)	-16 (-5.7%)	-15 (-5.1%)	-18 (-6.1%)	0 (0%)	0 (0%)
	All	9 (2%)	-29 (-6.5%)	6 (1.3%)	-32 (-7.1%)	0 (0%)	3 (0.8%)

[a] A positive value indicates higher average flows in ESO than in EBC.
[b] Water-year type was determined using the San Joaquin Valley (60-20-20) Water-Year Type Classification.
[c] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[d] See Table 5C.0-1 for definitions of scenarios.

5C.5.3.13.8 San Joaquin River Subregion (San Joaquin River at Vernalis)

CALSIM flow data for the San Joaquin River at Vernalis averaged by water-year type, month, and scenario, together with average monthly differences between scenarios, are provided in Table 5C.5.3-9 and Table 5C.5.3-10. This location is technically within the south Delta subregion but is taken to represent the flows from the San Joaquin River subregion. Based on these results, no appreciable effects of the evaluated starting operations on migration or attraction flows are expected in this subregion.

5C.5.3.14 Select HOS and LOS Comparisons for the Sacramento, Feather, American, and Trinity Rivers

This section provides select comparisons of flow differences between HOS/LOS and EBC2 scenarios, and shows how these differences compare to the differences between ESO and EBC2 scenarios. All comparisons use the climate change scenarios (i.e., ELT and LLT). Table 5C.5.3-231 through Table 5C.5.3-242 summarize average monthly HOS_ELT/LLT, LOS_ELT/LLT and EBC2_ELT/LLT flows and differences in flows from CALSIM modeling.

Figure 5C.5.3-200 through Figure 5C.5.3-235, at the end of this section, show how changes in flow between the EBC2 scenarios and the HOS and LOS scenarios differ from those between the EBC2 and ESO scenarios at various locations in the Sacramento, Feather, American and Trinity rivers. All comparisons use the climate change scenarios (i.e., ELT and LLT). The X-axis in each of the figures shows the percent change in flow from the EBC2_ELT/LLT to ESO_ELT/LLT scenarios, with positive values indicating an increase from the EBC2 to the ESO scenarios. The Y-axis shows the difference between the percent change from EBC2_ELT/LLT to ESO_ELT/LLT scenarios and the percent change from EBC2_ELT/LLT to HOS_ELT/LLT or LOS_ELT/LLT scenarios, with positive values indicating that the EBC2 to HOS or LOS changes are more positive than the EBC2 to ESO changes. Note that this difference is equivalent to the flow difference between the HOS or LOS and the ESO scenarios, scaled by the flow of the EBC2 scenario. Note also that Y-axis values may be positive even if the changes from EBC2 to ESO and EBC2 to HOS or LOS are negative, as long as the EBC2 to HOS or LOS changes are less negative than the EBC2 to ESO changes. In considering the X- and Y-axes in combination, values that are positive on both axes indicate that flows increase from the EBC2 to ESO scenarios and increase still more from the EBC2 to the HOS or LOS scenarios, or equivalently, flows increase from the ESO to the HOS or LOS scenarios. Values that are negative on both axes indicate decreases in flow from the EBC2 to ESO scenarios and further decreases from the ESO to the HOS or LOS scenarios. Values that are positive on the X-axis but negative on the Y-axis indicate increases in flow from the EBC2 to ESO scenarios, but decreases from the ESO to the HOS or LOS scenarios. Finally, values that are negative on the X-axis but positive on the Y-axis indicate decreases in flow from the EBC2 to ESO scenarios, but increases from the ESO to the HOS or LOS scenarios.

Figure 5C.5.3-200 through Figure 5C.5.3-223 plot the differences for flows averaged by month and water year. There are four figures for each river location: one each for HOS_ELT, LOS_ELT, HOS_LLT and LOS_LLT. Figure 5C.5.3-224 through Figure 5C.5.3-235 plot the differences for average flows by water-year type for the periods (months) of migration or transport of the species and life stages identified. There are only two species figures for each river location because each pair of ELT results and each pair of LLT results are plotted on the same graphs, using different symbols for the two scenarios (filled circles for HOS and open circles for LOS). Data points in each figure that show the greatest differences in percent change are identified with labels.

The following provides a discussion of the results for each of the river locations analyzed. The locations are the Sacramento River upstream of Red Bluff, the Sacramento River at Freeport, the Sacramento River at Rio Vista, the Feather River and the American rivers at their confluences with the Sacramento River, and the Trinity River downstream of Lewiston Dam.

5C.5.3.14.1 Sacramento River Upstream of Red Bluff

CALSIM flow data for the Sacramento River upstream of Red Bluff averaged by water-year type, month, and scenario (HOS_ELT/LLT, LOS_ELT/LLT and EBC2_ELT/LLT), together with average monthly differences between scenarios, are provided in Table 5C.5.3-231 and Table 5C.5.3-232.

Table 5C.5.3-231. Mean Monthly Flows (cfs) in the Sacramento River Upstream of Red Bluff for EBC2, HOS, and LOS Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	29,368	30,390	29,702	30,731	30,146	31,643
	AN	16,267	16,885	16,858	16,376	17,374	18,262
	BN	9,267	9,146	9,623	9,502	9,782	10,082
	D	7,262	7,262	7,260	6,930	7,393	7,202
	C	6,497	6,942	6,216	6,220	6,869	7,484
	All	15,819	16,278	16,031	16,194	16,399	17,103
Feb	W	32,712	33,472	32,967	33,520	32,937	33,983
	AN	24,422	24,828	25,018	25,243	26,040	26,470
	BN	12,508	11,614	12,758	12,729	12,891	13,144
	D	8,785	8,790	8,662	8,828	8,703	8,792
	C	6,404	6,378	6,410	6,443	6,411	6,474
	All	18,947	19,092	19,132	19,376	19,304	19,771
Mar	W	25,473	26,210	25,482	26,280	25,504	26,313
	AN	16,222	16,428	16,522	16,149	16,844	16,920
	BN	8,438	8,474	8,532	8,320	8,975	9,035
	D	8,349	8,300	8,235	8,477	8,085	8,231
	C	6,126	6,101	6,162	6,226	6,305	6,461
	All	14,621	14,876	14,664	14,888	14,781	15,114
Apr	W	15,078	14,842	15,047	14,716	15,091	14,865
	AN	9,983	9,761	10,094	10,086	10,133	10,056
	BN	8,239	8,282	8,467	8,192	8,611	8,671
	D	7,654	7,661	7,618	7,628	7,818	7,897
	C	7,628	7,829	7,546	7,706	7,642	7,772
	All	10,445	10,376	10,470	10,343	10,572	10,536
May	W	11,224	10,073	11,204	10,220	11,227	10,509
	AN	9,623	10,047	10,205	10,982	10,511	11,010
	BN	8,030	7,875	8,056	7,988	8,843	8,976
	D	8,424	9,012	8,661	9,230	8,927	10,043
	C	7,956	8,348	8,031	8,395	8,243	8,538
	All	9,351	9,208	9,498	9,466	9,774	9,930
Jun	W	11,591	11,720	11,606	11,929	11,853	12,828
	AN	12,227	12,789	11,927	12,611	12,960	14,280
	BN	11,304	11,651	11,387	11,393	12,132	12,615
	D	12,028	12,441	12,042	12,383	12,544	13,193
	C	11,539	11,881	11,485	11,590	11,746	11,754
	All	11,723	12,046	11,693	11,987	12,199	12,927

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jul	W	13,937	14,525	14,003	14,668	14,184	14,748
	AN	14,594	15,142	14,701	14,774	14,654	15,122
	BN	13,272	13,258	13,297	12,924	13,415	13,156
	D	13,741	13,826	13,424	13,090	13,942	13,203
	C	12,344	12,149	11,972	12,066	12,446	11,659
	All	13,643	13,898	13,560	13,659	13,814	13,740
Aug	W	10,700	10,735	10,867	11,092	10,817	10,625
	AN	10,968	11,775	11,504	12,099	11,129	11,561
	BN	9,971	10,364	10,766	10,869	10,542	10,057
	D	10,610	11,143	10,971	10,818	9,559	9,637
	C	8,632	7,665	8,661	8,026	8,202	7,915
	All	10,292	10,464	10,643	10,692	10,157	10,052
Sep	W	12,494	13,312	12,488	14,028	8,461	7,588
	AN	9,634	10,320	9,369	10,572	7,258	6,629
	BN	6,038	5,963	5,423	5,881	6,343	5,878
	D	5,424	4,911	5,246	5,667	5,516	5,608
	C	5,279	4,838	5,156	5,683	5,430	5,660
	All	8,365	8,535	8,163	9,075	6,833	6,439
Oct	W	7,662	8,188	7,730	7,889	7,640	7,612
	AN	7,108	8,162	7,430	9,241	7,161	7,905
	BN	6,544	7,778	6,764	7,029	6,730	7,269
	D	6,690	7,287	6,830	7,562	6,614	7,456
	C	6,254	6,537	6,468	6,553	6,386	6,965
	All	6,971	7,675	7,139	7,673	7,006	7,467
Nov	W	10,966	10,821	9,743	9,787	9,512	9,070
	AN	9,362	9,098	8,101	8,071	7,074	6,522
	BN	7,710	7,682	6,556	6,432	6,120	5,925
	D	7,421	7,347	6,548	6,540	6,635	6,193
	C	5,805	5,703	5,261	5,250	5,324	5,280
	All	8,642	8,521	7,601	7,586	7,332	6,974
Dec	W	21,554	19,613	21,823	19,771	22,690	21,152
	AN	10,370	10,053	10,208	10,004	9,935	10,146
	BN	8,921	8,228	8,876	8,292	8,698	8,757
	D	7,044	7,091	6,925	6,893	7,509	7,478
	C	5,465	5,433	5,429	5,441	5,640	5,647
	All	12,221	11,446	12,243	11,458	12,607	12,155

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

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Table 5C.5.3-232. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly Flows (cfs) in Sacramento River Upstream of Red Bluff

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	334 (1.1%)	341 (1.1%)	778 (2.6%)	1253 (4.1%)
	AN	591 (3.6%)	-510 (-3%)	1107 (6.8%)	1377 (8.2%)
	BN	355 (3.8%)	356 (3.9%)	515 (5.6%)	935 (10.2%)
	D	-2 (-0.02%)	-331 (-4.6%)	132 (1.8%)	-60 (-0.8%)
	C	-281 (-4.3%)	-722 (-10.4%)	371 (5.7%)	542 (7.8%)
	All	212 (1.3%)	-84 (-0.5%)	580 (3.7%)	825 (5.1%)
Feb	W	256 (0.8%)	49 (0.1%)	225 (0.7%)	512 (1.5%)
	AN	596 (2.4%)	415 (1.7%)	1617 (6.6%)	1643 (6.6%)
	BN	250 (2%)	1115 (9.6%)	383 (3.1%)	1530 (13.2%)
	D	-123 (-1.4%)	38 (0.4%)	-82 (-0.9%)	3 (0.03%)
	C	5 (0.1%)	64 (1%)	7 (0.1%)	96 (1.5%)
	All	185 (1%)	284 (1.5%)	356 (1.9%)	679 (3.6%)
Mar	W	9 (0.03%)	69 (0.3%)	31 (0.1%)	103 (0.4%)
	AN	300 (1.8%)	-279 (-1.7%)	622 (3.8%)	492 (3%)
	BN	95 (1.1%)	-154 (-1.8%)	538 (6.4%)	562 (6.6%)
	D	-114 (-1.4%)	177 (2.1%)	-264 (-3.2%)	-69 (-0.8%)
	C	36 (0.6%)	125 (2%)	179 (2.9%)	360 (5.9%)
	All	43 (0.3%)	12 (0.1%)	161 (1.1%)	238 (1.6%)
Apr	W	-31 (-0.2%)	-126 (-0.9%)	13 (0.1%)	23 (0.2%)
	AN	112 (1.1%)	325 (3.3%)	150 (1.5%)	295 (3%)
	BN	228 (2.8%)	-91 (-1.1%)	373 (4.5%)	389 (4.7%)
	D	-36 (-0.5%)	-33 (-0.4%)	164 (2.1%)	235 (3.1%)
	C	-83 (-1.1%)	-124 (-1.6%)	14 (0.2%)	-57 (-0.7%)
	All	26 (0.2%)	-33 (-0.3%)	128 (1.2%)	160 (1.5%)
May	W	-20 (-0.2%)	147 (1.5%)	3 (0.03%)	437 (4.3%)
	AN	582 (6%)	935 (9.3%)	888 (9.2%)	963 (9.6%)
	BN	26 (0.3%)	113 (1.4%)	814 (10.1%)	1101 (14%)
	D	237 (2.8%)	218 (2.4%)	503 (6%)	1031 (11.4%)
	C	76 (0.9%)	47 (0.6%)	287 (3.6%)	189 (2.3%)
	All	146 (1.6%)	258 (2.8%)	422 (4.5%)	721 (7.8%)
Jun	W	15 (0.1%)	209 (1.8%)	262 (2.3%)	1108 (9.5%)
	AN	-300 (-2.5%)	-178 (-1.4%)	733 (6%)	1491 (11.7%)
	BN	83 (0.7%)	-258 (-2.2%)	828 (7.3%)	964 (8.3%)
	D	14 (0.1%)	-58 (-0.5%)	516 (4.3%)	752 (6%)
	C	-54 (-0.5%)	-291 (-2.4%)	208 (1.8%)	-127 (-1.1%)
	All	-30 (-0.3%)	-59 (-0.5%)	475 (4.1%)	881 (7.3%)
Jul	W	66 (0.5%)	143 (1%)	247 (1.8%)	224 (1.5%)
	AN	107 (0.7%)	-368 (-2.4%)	60 (0.4%)	-20 (-0.1%)
	BN	25 (0.2%)	-334 (-2.5%)	143 (1.1%)	-102 (-0.8%)
	D	-317 (-2.3%)	-736 (-5.3%)	201 (1.5%)	-623 (-4.5%)
	C	-372 (-3%)	-83 (-0.7%)	102 (0.8%)	-490 (-4%)
	All	-83 (-0.6%)	-239 (-1.7%)	171 (1.3%)	-158 (-1.1%)

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	167 (1.6%)	357 (3.3%)	117 (1.1%)	-110 (-1%)
	AN	536 (4.9%)	324 (2.8%)	161 (1.5%)	-215 (-1.8%)
	BN	795 (8%)	505 (4.9%)	571 (5.7%)	-307 (-3%)
	D	361 (3.4%)	-325 (-2.9%)	-1051 (-9.9%)	-1506 (-13.5%)
	C	29 (0.3%)	361 (4.7%)	-430 (-5%)	251 (3.3%)
	All	351 (3.4%)	228 (2.2%)	-136 (-1.3%)	-413 (-3.9%)
Sep	W	-6 (-0.05%)	716 (5.4%)	-4033 (-32.3%)	-5724 (-43%)
	AN	-264 (-2.7%)	251 (2.4%)	-2376 (-24.7%)	-3692 (-35.8%)
	BN	-615 (-10.2%)	-82 (-1.4%)	306 (5.1%)	-85 (-1.4%)
	D	-178 (-3.3%)	756 (15.4%)	91 (1.7%)	697 (14.2%)
	C	-123 (-2.3%)	845 (17.5%)	151 (2.9%)	822 (17%)
	All	-203 (-2.4%)	539 (6.3%)	-1532 (-18.3%)	-2096 (-24.6%)
Oct	W	68 (0.9%)	-298 (-3.6%)	-22 (-0.3%)	-576 (-7%)
	AN	322 (4.5%)	1079 (13.2%)	53 (0.7%)	-257 (-3.1%)
	BN	219 (3.4%)	-750 (-9.6%)	185 (2.8%)	-509 (-6.5%)
	D	140 (2.1%)	275 (3.8%)	-76 (-1.1%)	169 (2.3%)
	C	214 (3.4%)	16 (0.2%)	132 (2.1%)	428 (6.6%)
	All	168 (2.4%)	-2 (-0.03%)	35 (0.5%)	-207 (-2.7%)
Nov	W	-1223 (-11.2%)	-1034 (-9.6%)	-1454 (-13.3%)	-1751 (-16.2%)
	AN	-1261 (-13.5%)	-1027 (-11.3%)	-2287 (-24.4%)	-2576 (-28.3%)
	BN	-1155 (-15%)	-1250 (-16.3%)	-1590 (-20.6%)	-1757 (-22.9%)
	D	-874 (-11.8%)	-807 (-11%)	-786 (-10.6%)	-1153 (-15.7%)
	C	-545 (-9.4%)	-453 (-7.9%)	-481 (-8.3%)	-423 (-7.4%)
	All	-1041 (-12%)	-935 (-11%)	-1310 (-15.2%)	-1547 (-18.2%)
Dec	W	269 (1.2%)	159 (0.8%)	1136 (5.3%)	1539 (7.8%)
	AN	-162 (-1.6%)	-49 (-0.5%)	-434 (-4.2%)	93 (0.9%)
	BN	-45 (-0.5%)	64 (0.8%)	-223 (-2.5%)	529 (6.4%)
	D	-120 (-1.7%)	-199 (-2.8%)	464 (6.6%)	387 (5.5%)
	C	-36 (-0.7%)	8 (0.1%)	176 (3.2%)	214 (3.9%)
	All	22 (0.2%)	12 (0.1%)	386 (3.2%)	708 (6.2%)

[a] A positive value indicates higher mean flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

Figure 5C.5.3-200 shows that the greatest increases from the ESO_ELT flow to the HOS_ELT flow (scaled by the EBC2_ELT flow) for the Sacramento River upstream of Red Bluff occur during the months of August in dry years, September in above-normal years, and October in above normal, below-normal and critical years. Figure 5C.5.3-224 shows (closed circles) that these differences are expected to create slightly improved flow conditions for upstream migrating fall-run Chinook salmon adults, which migrate primarily in September and October, and green sturgeon larvae, which are transported downstream primarily during August–October. Figure 5C.5.3-200 shows that the greatest reductions from the ESO to HOS flows occur during June and July, months during which there is little fish migration and, therefore, little effect on fish (Figure 5C.5.3-224).

Figure 5C.5.3-201 shows that the greatest positive differences in flows between the ESO_ELT and LOS_ELT scenarios occur during September of below-normal, dry and critical years, October of above-normal, below-normal and critical years, and January of critical years. Figure 5C.5.3-225 shows (open circles) that these differences are expected to slightly improve flow conditions for upstream migrating fall-run Chinook salmon adults in below-normal and critical years and downstream transported green sturgeon larvae in above-normal and dry years. The greatest negative difference (-30%) between the ESO and LOS flow changes occurs during September of wet years. This difference affects white sturgeon juveniles in wet years, which migrate from June to September, and green sturgeon larvae and fall-run Chinook salmon adults, also in wet years (Figure 5C.5.3-224).

Figure 5C.5.3-202 shows that the greatest positive differences between the ESO and HOS flows for the LLT climate change conditions occur during August of above-normal, below normal, dry and critical years, September of above-normal and below-normal years, and October of above-normal and dry years, which primarily affects fall-run Chinook salmon adults in above-normal years and green sturgeon larvae in above-normal, dry and critical years (Figure 5C.5.3-225, closed circles). The greatest negative differences between the ESO and LOS flows occur during January of critical years, April of below-normal years, May of below-normal and dry years, and June of above-normal, below-normal, dry and critical years. These differences are primarily expected to affect spring-run Chinook salmon adults (migrate April–May) and green sturgeon older juveniles (migrate April–June) (Figure 5C.5.3-225). Winter-run and late fall–run Chinook salmon adults and late fall–run juveniles all have migration periods that include January, which shows a -12.4% reduction for HOS_LLT (Figure 5C.5.3-202), but the reductions for the species' migration periods, which include other months beside January, are slightly greater (less negative) than -5% and therefore are not labeled in the figure.

Figure 5C.5.3-203 shows that the greatest increases between the ESO and LOS flows for the LLT climate change conditions occur during August and September of critical and below-normal years, respectively, January of above-normal, below-normal and critical years, February and March of below-normal years, and December of wet years. The August–September differences primarily affect fall-run Chinook salmon adults and green sturgeon larvae, whereas the December–March differences affect winter-run and late fall–run Chinook salmon adults (both migrate December–February), winter-run juveniles (migrate January–March), late fall–run juveniles (migrate November–April), and steelhead kelts (migrate January–April) (Figure 5C.5.3-205, open circles).

The greatest negative differences between the ESO_LLT and LOS_LLT changes occur during October and November, and most especially during September of above-normal and wet years (Figure 5C.5.3-203). These differences, which are similar to those for the LOS_ELT differences (Figure 5C.5.3-201), are primarily expected to affect fall-run Chinook salmon adults, green sturgeon larvae, white sturgeon juveniles (migrate June – September) and river lamprey adults (migrate September–November) (Figure 5C.5.3-225).

5C.5.3.14.2 Sacramento River at Freeport

CALSIM flow data for the Sacramento River at Freeport averaged by water-year type, month, and scenario (HOS_ELT/LLT, LOS_ELT/LLT and EBC2_ELT/LLT), together with average monthly differences between scenarios, are provided in Table 5C.5.3-233 and Table 5C.5.3-234.

Table 5C.5.3-233. Mean Monthly Flows (cfs) in Sacramento River at Freeport for EBC2, HOS, and LOS Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	51,801	52,716	50,459	50,819	50,823	52,108
	AN	38,821	40,339	37,715	38,220	38,179	40,038
	BN	23,033	22,575	21,456	21,244	21,479	21,537
	D	17,373	17,404	16,779	16,263	16,920	16,964
	C	14,499	15,056	13,804	13,755	15,532	15,245
	All	31,974	32,496	30,885	30,916	31,356	32,013
Feb	W	58,786	59,754	57,076	58,286	57,312	58,857
	AN	46,803	47,678	45,588	46,706	46,980	47,178
	BN	31,635	31,522	30,626	30,710	30,520	31,125
	D	20,994	21,083	19,874	20,199	19,919	20,203
	C	14,442	14,311	14,135	14,060	14,085	13,940
	All	37,612	38,028	36,428	37,051	36,692	37,355
Mar	W	50,217	51,011	48,097	48,940	48,293	48,981
	AN	45,138	45,122	42,950	42,766	43,726	44,403
	BN	23,039	22,944	21,977	21,606	22,156	22,107
	D	20,311	20,677	19,301	19,580	19,327	19,597
	C	13,098	13,190	12,911	12,978	12,971	13,223
	All	32,837	33,164	31,414	31,662	31,635	32,040
Apr	W	37,928	37,588	38,269	38,200	35,618	35,473
	AN	25,455	24,993	27,039	27,423	24,134	23,971
	BN	17,319	17,199	22,236	20,814	17,257	17,625
	D	12,910	12,978	12,964	13,156	13,060	13,688
	C	10,128	10,460	10,118	10,313	10,467	10,640
	All	23,024	22,892	24,214	24,076	22,170	22,326
May	W	29,176	24,615	32,067	27,278	29,066	25,285
	AN	19,822	18,772	24,061	21,787	21,176	20,652
	BN	13,139	12,531	15,646	14,206	14,075	14,687
	D	10,737	11,558	11,372	12,315	11,412	13,109
	C	8,281	8,156	7,962	8,181	8,021	8,253
	All	17,964	16,422	20,021	18,163	18,397	17,632
Jun	W	19,961	18,807	19,459	19,100	22,169	22,358
	AN	15,378	16,266	15,502	16,152	19,189	21,112
	BN	13,345	14,112	14,263	16,248	18,708	18,746
	D	12,764	12,882	12,537	13,006	14,858	14,159
	C	10,075	10,369	9,697	9,875	10,038	10,293
	All	15,134	15,098	15,045	15,494	17,762	17,994
Jul	W	20,548	21,644	18,941	19,155	20,542	20,577
	AN	22,403	22,945	19,332	18,837	22,321	22,376
	BN	21,174	20,734	19,260	18,018	20,253	18,863
	D	18,894	19,182	16,059	14,856	18,348	15,523
	C	14,406	14,003	11,226	11,701	11,603	11,173
	All	19,665	20,020	17,291	16,880	18,963	18,062

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	16,030	16,212	13,347	13,489	14,945	14,572
	AN	16,729	17,635	14,272	14,533	16,475	15,965
	BN	15,393	16,382	14,702	13,938	15,679	14,300
	D	14,651	14,498	12,497	12,536	11,846	11,773
	C	9,445	9,143	9,478	9,281	8,733	9,022
	All	14,757	15,039	12,961	12,893	13,705	13,303
Sep	W	26,940	27,309	24,228	26,036	14,418	12,767
	AN	21,323	21,102	17,636	18,466	13,558	12,239
	BN	12,876	12,399	9,892	10,122	11,213	10,591
	D	9,840	8,713	9,301	10,332	9,873	9,976
	C	7,781	7,386	7,938	9,458	7,931	8,889
	All	17,159	16,857	15,155	16,338	11,798	11,138
Oct	W	12,860	13,355	12,587	12,815	13,128	12,962
	AN	10,507	11,937	10,700	12,466	10,989	11,948
	BN	10,666	12,208	10,993	11,279	11,111	12,141
	D	10,315	10,572	10,119	10,442	10,659	11,228
	C	9,475	10,051	10,012	10,796	10,245	11,187
	All	11,087	11,857	11,120	11,685	11,507	12,033
Nov	W	20,502	19,308	18,859	17,994	18,448	17,353
	AN	16,909	15,972	15,194	14,320	14,069	12,817
	BN	13,603	13,094	12,039	11,865	11,497	11,080
	D	12,549	11,964	11,407	11,218	11,551	10,722
	C	9,518	9,364	9,023	8,896	9,141	8,713
	All	15,445	14,692	14,083	13,591	13,744	12,898
Dec	W	39,300	36,987	37,973	35,745	38,856	37,097
	AN	22,691	22,622	22,073	21,205	21,842	22,206
	BN	17,187	16,708	16,886	16,382	17,109	17,584
	D	15,411	15,185	14,922	14,622	15,449	15,165
	C	10,901	10,694	10,939	10,904	11,604	11,783
	All	23,694	22,789	23,030	22,039	23,527	23,067

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-234. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly Flows (cfs) in Sacramento River at Freeport

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	-1343 (-2.6%)	-1897 (-3.6%)	-978 (-1.9%)	-608 (-1.2%)
	AN	-1106 (-2.9%)	-2119 (-5.3%)	-642 (-1.7%)	-301 (-0.7%)
	BN	-1577 (-6.8%)	-1331 (-5.9%)	-1554 (-6.7%)	-1038 (-4.6%)
	D	-594 (-3.4%)	-1141 (-6.6%)	-453 (-2.6%)	-440 (-2.5%)
	C	-695 (-4.8%)	-1300 (-8.6%)	1033 (7.1%)	189 (1.3%)
	All	-1089 (-3.4%)	-1580 (-4.9%)	-618 (-1.9%)	-483 (-1.5%)
Feb	W	-1710 (-2.9%)	-1467 (-2.5%)	-1474 (-2.5%)	-897 (-1.5%)
	AN	-1216 (-2.6%)	-972 (-2%)	177 (0.4%)	-501 (-1.1%)
	BN	-1009 (-3.2%)	-812 (-2.6%)	-1115 (-3.5%)	-396 (-1.3%)
	D	-1120 (-5.3%)	-884 (-4.2%)	-1075 (-5.1%)	-880 (-4.2%)
	C	-308 (-2.1%)	-252 (-1.8%)	-358 (-2.5%)	-371 (-2.6%)
	All	-1183 (-3.1%)	-977 (-2.6%)	-920 (-2.4%)	-673 (-1.8%)
Mar	W	-2119 (-4.2%)	-2071 (-4.1%)	-1923 (-3.8%)	-2030 (-4%)
	AN	-2188 (-4.8%)	-2356 (-5.2%)	-1412 (-3.1%)	-719 (-1.6%)
	BN	-1063 (-4.6%)	-1338 (-5.8%)	-883 (-3.8%)	-837 (-3.6%)
	D	-1010 (-5%)	-1097 (-5.3%)	-985 (-4.8%)	-1080 (-5.2%)
	C	-187 (-1.4%)	-212 (-1.6%)	-127 (-1%)	33 (0.3%)
	All	-1423 (-4.3%)	-1502 (-4.5%)	-1202 (-3.7%)	-1124 (-3.4%)
Apr	W	341 (0.9%)	612 (1.6%)	-2310 (-6.1%)	-2115 (-5.6%)
	AN	1585 (6.2%)	2430 (9.7%)	-1321 (-5.2%)	-1022 (-4.1%)
	BN	4917 (28.4%)	3615 (21%)	-62 (-0.4%)	425 (2.5%)
	D	54 (0.4%)	178 (1.4%)	150 (1.2%)	709 (5.5%)
	C	-10 (-0.1%)	-147 (-1.4%)	340 (3.4%)	180 (1.7%)
	All	1190 (5.2%)	1184 (5.2%)	-854 (-3.7%)	-566 (-2.5%)
May	W	2891 (9.9%)	2663 (10.8%)	-109 (-0.4%)	670 (2.7%)
	AN	4239 (21.4%)	3016 (16.1%)	1354 (6.8%)	1880 (10%)
	BN	2507 (19.1%)	1676 (13.4%)	936 (7.1%)	2157 (17.2%)
	D	635 (5.9%)	757 (6.5%)	675 (6.3%)	1551 (13.4%)
	C	-319 (-3.9%)	25 (0.3%)	-261 (-3.1%)	97 (1.2%)
	All	2058 (11.5%)	1742 (10.6%)	433 (2.4%)	1211 (7.4%)
Jun	W	-503 (-2.5%)	293 (1.6%)	2208 (11.1%)	3551 (18.9%)
	AN	124 (0.8%)	-114 (-0.7%)	3811 (24.8%)	4847 (29.8%)
	BN	917 (6.9%)	2136 (15.1%)	5362 (40.2%)	4634 (32.8%)
	D	-227 (-1.8%)	124 (1%)	2094 (16.4%)	1277 (9.9%)
	C	-378 (-3.8%)	-493 (-4.8%)	-37 (-0.4%)	-75 (-0.7%)
	All	-90 (-0.6%)	396 (2.6%)	2628 (17.4%)	2896 (19.2%)
Jul	W	-1607 (-7.8%)	-2489 (-11.5%)	-6 (-0.03%)	-1067 (-4.9%)
	AN	-3071 (-13.7%)	-4108 (-17.9%)	-83 (-0.4%)	-569 (-2.5%)
	BN	-1914 (-9%)	-2716 (-13.1%)	-922 (-4.4%)	-1871 (-9%)
	D	-2835 (-15%)	-4326 (-22.6%)	-546 (-2.9%)	-3659 (-19.1%)
	C	-3179 (-22.1%)	-2302 (-16.4%)	-2803 (-19.5%)	-2830 (-20.2%)
	All	-2373 (-12.1%)	-3141 (-15.7%)	-701 (-3.6%)	-1958 (-9.8%)

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	-2683 (-16.7%)	-2723 (-16.8%)	-1085 (-6.8%)	-1640 (-10.1%)
	AN	-2458 (-14.7%)	-3102 (-17.6%)	-254 (-1.5%)	-1670 (-9.5%)
	BN	-691 (-4.5%)	-2444 (-14.9%)	286 (1.9%)	-2082 (-12.7%)
	D	-2154 (-14.7%)	-1962 (-13.5%)	-2805 (-19.1%)	-2725 (-18.8%)
	C	33 (0.4%)	138 (1.5%)	-712 (-7.5%)	-121 (-1.3%)
	All	-1796 (-12.2%)	-2145 (-14.3%)	-1052 (-7.1%)	-1736 (-11.5%)
Sep	W	-2712 (-10.1%)	-1273 (-4.7%)	-12522 (-46.5%)	-14541 (-53.2%)
	AN	-3687 (-17.3%)	-2636 (-12.5%)	-7765 (-36.4%)	-8864 (-42%)
	BN	-2984 (-23.2%)	-2277 (-18.4%)	-1664 (-12.9%)	-1808 (-14.6%)
	D	-539 (-5.5%)	1619 (18.6%)	32 (0.3%)	1263 (14.5%)
	C	157 (2%)	2072 (28.1%)	150 (1.9%)	1503 (20.3%)
	All	-2004 (-11.7%)	-519 (-3.1%)	-5362 (-31.2%)	-5719 (-33.9%)
Oct	W	-273 (-2.1%)	-541 (-4%)	268 (2.1%)	-394 (-2.9%)
	AN	193 (1.8%)	529 (4.4%)	482 (4.6%)	11 (0.1%)
	BN	326 (3.1%)	-928 (-7.6%)	445 (4.2%)	-66 (-0.5%)
	D	-196 (-1.9%)	-130 (-1.2%)	344 (3.3%)	656 (6.2%)
	C	537 (5.7%)	745 (7.4%)	770 (8.1%)	1137 (11.3%)
	All	33 (0.3%)	-172 (-1.5%)	419 (3.8%)	176 (1.5%)
Nov	W	-1643 (-8%)	-1314 (-6.8%)	-2054 (-10%)	-1954 (-10.1%)
	AN	-1715 (-10.1%)	-1652 (-10.3%)	-2840 (-16.8%)	-3155 (-19.8%)
	BN	-1564 (-11.5%)	-1229 (-9.4%)	-2106 (-15.5%)	-2015 (-15.4%)
	D	-1141 (-9.1%)	-746 (-6.2%)	-998 (-8%)	-1242 (-10.4%)
	C	-495 (-5.2%)	-468 (-5%)	-377 (-4%)	-651 (-7%)
	All	-1362 (-8.8%)	-1100 (-7.5%)	-1701 (-11%)	-1793 (-12.2%)
Dec	W	-1327 (-3.4%)	-1242 (-3.4%)	-444 (-1.1%)	109 (0.3%)
	AN	-618 (-2.7%)	-1417 (-6.3%)	-849 (-3.7%)	-416 (-1.8%)
	BN	-301 (-1.8%)	-326 (-1.9%)	-78 (-0.5%)	876 (5.2%)
	D	-489 (-3.2%)	-564 (-3.7%)	38 (0.2%)	-20 (-0.1%)
	C	38 (0.4%)	210 (2%)	703 (6.4%)	1089 (10.2%)
	All	-664 (-2.8%)	-750 (-3.3%)	-167 (-0.7%)	278 (1.2%)

[a] A negative value indicates lower mean flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

Figure 5C.5.3-204 shows that the greatest increases between the ESO HOS flows (scaled by EBC2 flows) for the Sacramento River at Freeport with ELT climate change conditions occur during April and May of below-normal, above-normal and wet years. These increases are primarily expected to affect spring-run Chinook salmon adults (migrate April–May), fall-run juveniles (migrate February–May), white sturgeon adults (migrate November–May), steelhead kelts (migrate January–April), and green sturgeon older juveniles (migrate April–June) (Figure 5C.5.3-226). The greatest negative differences between the ESO and HOS flows occur during June–August of all except critical years (Figure 5C.5.3-204), which is expected to primarily affect white sturgeon juveniles (migrate June–September) (Figure 5C.5.3-226).

Figure 5C.5.3-205 shows relatively small positive differences between the ESO and LOS flows with ELT climate change conditions during January of critical years, September of below-normal and dry years, and October of above-normal and critical years. Because the differences are small, they are expected to have little effect on fish migration flows (Figure 5C.5.3-226). Large negative differences between the ESO and LOS percent flow changes occur during September of above-normal and wet years. The difference for wet years is -36%. These reductions, which are similar to the LOS_ELT and LOS_LLT reductions for the Sacramento River upstream of Red Bluff (Figure 5C.5.3-201 and Figure 5C.5.3-203), are expected to most affect fall-run adults and green sturgeon larvae and to more moderately affect white sturgeon juveniles and river lamprey adults (Figure 5C.5.3-226).

Figure 5C.5.3-206 shows the greatest positive differences between the ESO and HOS flows with LLT climate change conditions during April of wet, above-normal and below normal years, May of wet years, and during August and September of dry and critical years. The April–May differences are expected to increase spring-run Chinook salmon adults migration flows in wet, above normal and below-normal years and the August–September differences are expected to affect green sturgeon larvae in dry and critical years (Figure 5C.5.3-227). Large negative differences between the ESO and HOS flows occur primarily during June of wetter year types and during July of above-normal years (Figure 5C.5.3-206). These changes are only expected to affect white sturgeon juveniles and green sturgeon older juveniles, which are the only species and life stages that migrate during June (Figure 5C.5.3-227).

Figure 5C.5.3-207 shows relatively small positive differences between the ESO and LOS flows with LLT climate change conditions during September, October and December. The changes were too small for any expected effects on any fish species (Figure 5C.5.3-227). Large negative differences between the ESO and LOS flows occur during September of above-normal and wet years, with the magnitude of differences similar to those found for the LOS_ELT differences (Figure 5C.5.3-205) and for both the LOS_ELT and LOS_LLT differences in the Sacramento River upstream of Red Bluff (Figure 5C.5.3-201 and Figure 5C.5.3-203), with the same fish species and life stages affected: fall-run adults, green sturgeon larvae, white sturgeon juveniles, and river lamprey adults (Figure 5C.5.3-227).

5C.5.3.14.3 Sacramento River at Rio Vista

CALSIM flow data for the Sacramento River at Rio Vista averaged by water-year type, month, and scenario (HOS_ELT/LLT, LOS_ELT/LLT and EBC2_ELT/LLT), together with average monthly differences between scenarios, are provided in Table 5C.5.3-235 and Table 5C.5.3-236.

Table 5C.5.3-235. Mean Monthly Flows (cfs) in Sacramento River at Rio Vista for EBC2, HOS, and LOS Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	75,510	78,551	70,028	72,741	71,191	74,943
	AN	41,416	42,919	38,272	38,395	38,135	40,415
	BN	20,388	19,991	18,521	18,402	18,490	18,460
	D	15,032	14,927	13,719	13,082	13,843	13,734
	C	12,114	12,601	10,935	10,923	12,647	12,258
	All	38,556	39,721	35,579	36,295	36,200	37,637
Feb	W	87,232	89,989	79,960	83,252	80,556	84,456
	AN	53,615	55,363	49,308	51,496	52,182	52,751
	BN	30,231	29,442	27,535	27,124	27,287	27,323
	D	19,318	19,422	16,987	17,431	17,002	17,322
	C	12,074	11,956	11,461	11,386	11,329	11,257
	All	46,674	47,675	42,676	44,057	43,227	44,613
Mar	W	66,275	68,663	60,485	62,982	59,431	61,821
	AN	47,974	48,513	42,862	42,880	42,387	43,722
	BN	19,629	19,562	17,484	16,995	15,951	15,848
	D	17,341	17,679	15,259	15,569	14,787	15,087
	C	10,603	10,684	9,941	9,996	9,983	10,171
	All	36,744	37,655	33,240	34,027	32,477	33,506
Apr	W	38,692	38,422	36,940	36,752	33,029	32,733
	AN	22,234	21,855	21,809	22,857	17,243	17,162
	BN	14,295	14,207	18,027	16,574	12,104	12,214
	D	10,216	10,299	9,627	9,930	9,089	9,652
	C	7,520	7,816	7,122	7,330	7,369	7,513
	All	21,306	21,211	21,138	21,080	18,136	18,194
May	W	24,220	20,046	22,265	18,187	18,395	15,090
	AN	15,857	14,948	16,353	14,528	12,738	12,337
	BN	9,862	9,355	10,765	9,935	8,866	9,140
	D	7,840	8,564	7,623	8,502	7,566	8,870
	C	5,656	5,554	5,085	5,274	5,134	5,335
	All	14,232	12,833	13,708	12,227	11,623	10,878
Jun	W	12,993	11,418	8,163	7,287	8,971	8,452
	AN	8,634	9,220	5,831	5,890	6,671	7,370
	BN	6,677	7,241	5,872	6,686	6,623	6,957
	D	6,250	6,335	5,380	5,594	6,136	6,021
	C	4,304	4,513	3,799	3,913	3,970	4,127
	All	8,525	8,257	6,181	6,114	6,879	6,872
Jul	W	11,207	12,181	7,492	8,563	8,704	9,672
	AN	12,544	12,927	8,791	8,421	10,098	12,036
	BN	11,667	11,357	8,734	8,291	9,188	8,655
	D	10,105	10,307	6,890	6,548	8,978	7,358
	C	6,866	6,596	4,408	4,514	4,331	4,045
	All	10,604	10,921	7,311	7,461	8,411	8,513

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	8,527	8,650	4,289	4,401	4,232	4,292
	AN	9,013	9,648	5,034	5,207	6,264	5,892
	BN	8,062	8,753	6,079	6,261	6,133	5,698
	D	7,525	7,417	5,633	5,864	4,566	4,968
	C	3,823	3,615	3,828	3,779	3,465	3,586
	All	7,610	7,806	4,931	5,066	4,815	4,811
Sep	W	20,717	21,199	10,432	11,592	3,529	3,288
	AN	12,961	12,832	5,564	6,896	4,335	3,847
	BN	6,538	6,197	3,167	3,937	3,348	3,254
	D	4,432	3,644	3,112	4,600	3,080	4,046
	C	3,215	2,996	3,163	4,094	3,021	3,787
	All	11,025	10,896	5,809	6,966	3,443	3,603
Oct	W	7,867	8,287	5,081	5,902	5,103	6,391
	AN	5,518	7,207	3,768	6,673	3,652	6,462
	BN	5,416	6,976	3,840	4,818	3,861	6,301
	D	5,221	5,727	3,844	4,508	3,789	5,127
	C	4,684	4,969	3,720	4,986	3,918	5,717
	All	6,058	6,858	4,206	5,390	4,217	6,010
Nov	W	17,184	15,879	12,197	11,767	11,391	10,845
	AN	13,102	12,156	9,246	8,533	7,556	6,882
	BN	9,448	9,071	5,775	6,020	5,104	4,855
	D	8,539	8,061	5,789	5,853	5,730	5,336
	C	5,586	5,565	4,433	4,683	4,361	4,070
	All	11,671	10,946	8,126	7,978	7,485	7,042
Dec	W	44,292	40,431	41,863	38,547	43,015	39,856
	AN	20,375	19,936	19,062	17,760	18,961	18,791
	BN	15,099	14,049	13,804	12,916	13,798	14,021
	D	11,868	11,687	10,846	10,631	11,375	11,300
	C	7,341	7,186	7,047	7,042	7,634	7,917
	All	23,283	21,753	21,832	20,391	22,384	21,420

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-236. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly Flows (cfs) in Sacramento River at Rio Vista

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	-5482 (-7.3%)	-5810 (-7.4%)	-4319 (-5.7%)	-3608 (-4.6%)
	AN	-3144 (-7.6%)	-4524 (-10.5%)	-3281 (-7.9%)	-2504 (-5.8%)
	BN	-1867 (-9.2%)	-1589 (-7.9%)	-1897 (-9.3%)	-1530 (-7.7%)
	D	-1312 (-8.7%)	-1845 (-12.4%)	-1189 (-7.9%)	-1193 (-8%)
	C	-1179 (-9.7%)	-1679 (-13.3%)	533 (4.4%)	-344 (-2.7%)
	All	-2978 (-7.7%)	-3426 (-8.6%)	-2356 (-6.1%)	-2084 (-5.2%)
Feb	W	-7272 (-8.3%)	-6737 (-7.5%)	-6676 (-7.7%)	-5533 (-6.1%)
	AN	-4307 (-8%)	-3866 (-7%)	-1433 (-2.7%)	-2612 (-4.7%)
	BN	-2696 (-8.9%)	-2319 (-7.9%)	-2944 (-9.7%)	-2120 (-7.2%)
	D	-2331 (-12.1%)	-1991 (-10.3%)	-2316 (-12%)	-2101 (-10.8%)
	C	-613 (-5.1%)	-569 (-4.8%)	-745 (-6.2%)	-699 (-5.8%)
	All	-3998 (-8.6%)	-3618 (-7.6%)	-3447 (-7.4%)	-3062 (-6.4%)
Mar	W	-5790 (-8.7%)	-5680 (-8.3%)	-6844 (-10.33%)	-6842 (-10%)
	AN	-5111 (-10.65%)	-5633 (-11.6%)	-5586 (-11.6%)	-4791 (-9.9%)
	BN	-2144 (-10.9%)	-2567 (-13.1%)	-3678 (-18.7%)	-3714 (-19%)
	D	-2082 (-12%)	-2110 (-11.9%)	-2554 (-14.7%)	-2591 (-14.7%)
	C	-662 (-6.2%)	-687 (-6.4%)	-620 (-5.8%)	-513 (-4.8%)
	All	-3504 (-9.5%)	-3627 (-9.6%)	-4267 (-11.6%)	-4148 (-11%)
Apr	W	-1753 (-4.5%)	-1670 (-4.3%)	-5663 (-14.64%)	-5689 (-14.81%)
	AN	-425 (-1.9%)	1002 (4.6%)	-4992 (-22.4%)	-4693 (-21.5%)
	BN	3733 (26.1%)	2367 (16.7%)	-2191 (-15.3%)	-1993 (-14%)
	D	-589 (-5.8%)	-368 (-3.6%)	-1127 (-11%)	-646 (-6.3%)
	C	-398 (-5.3%)	-487 (-6.2%)	-151 (-2%)	-303 (-3.9%)
	All	-168 (-0.8%)	-131 (-0.6%)	-3170 (-14.9%)	-3017 (-14.2%)
May	W	-1955 (-8.07%)	-1858 (-9.3%)	-5824 (-24.05%)	-4956 (-24.7%)
	AN	496 (3.1%)	-420 (-2.8%)	-3118 (-19.7%)	-2611 (-17.5%)
	BN	903 (9.2%)	580 (6.2%)	-995 (-10.1%)	-215 (-2.3%)
	D	-217 (-2.8%)	-62 (-0.7%)	-273 (-3.5%)	306 (3.6%)
	C	-571 (-10.1%)	-280 (-5%)	-522 (-9.2%)	-219 (-4%)
	All	-524 (-3.7%)	-606 (-4.7%)	-2609 (-18.3%)	-1955 (-15.2%)
Jun	W	-4830 (-37.2%)	-4131 (-36.2%)	-4023 (-31%)	-2966 (-26%)
	AN	-2803 (-32.5%)	-3330 (-36.1%)	-1963 (-22.7%)	-1850 (-20.1%)
	BN	-806 (-12.1%)	-554 (-7.7%)	-55 (-0.8%)	-283 (-3.9%)
	D	-870 (-13.9%)	-741 (-11.7%)	-114 (-1.8%)	-314 (-5%)
	C	-506 (-11.7%)	-600 (-13.3%)	-334 (-7.8%)	-386 (-8.5%)
	All	-2344 (-27.5%)	-2143 (-25.9%)	-1646 (-19.3%)	-1385 (-16.8%)
Jul	W	-3715 (-33.1%)	-3618 (-29.7%)	-2503 (-22.3%)	-2509 (-20.6%)
	AN	-3753 (-29.9%)	-4507 (-34.9%)	-2446 (-19.5%)	-891 (-6.9%)
	BN	-2932 (-25.1%)	-3066 (-27%)	-2479 (-21.2%)	-2702 (-23.8%)
	D	-3215 (-31.8%)	-3759 (-36.5%)	-1127 (-11.2%)	-2949 (-28.6%)
	C	-2458 (-35.8%)	-2082 (-31.6%)	-2536 (-36.9%)	-2551 (-38.7%)
	All	-3293 (-31.1%)	-3460 (-31.7%)	-2193 (-20.7%)	-2408 (-22.1%)

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	-4239 (-49.7%)	-4249 (-49.1%)	-4295 (-50.4%)	-4358 (-50.4%)
	AN	-3979 (-44.1%)	-4440 (-46%)	-2749 (-30.5%)	-3756 (-38.9%)
	BN	-1983 (-24.6%)	-2492 (-28.5%)	-1929 (-23.9%)	-3055 (-34.9%)
	D	-1892 (-25.1%)	-1553 (-20.9%)	-2959 (-39.3%)	-2449 (-33%)
	C	5 (0.1%)	164 (4.5%)	-358 (-9.4%)	-29 (-0.8%)
	All	-2679 (-35.2%)	-2740 (-35.1%)	-2795 (-36.7%)	-2995 (-38.4%)
Sep	W	-10285 (-49.6%)	-9607 (-45.3%)	-17188 (-83%)	-17911 (-84.5%)
	AN	-7398 (-57.1%)	-5936 (-46.3%)	-8626 (-66.6%)	-8985 (-70%)
	BN	-3371 (-51.6%)	-2260 (-36.5%)	-3189 (-48.8%)	-2944 (-47.5%)
	D	-1320 (-29.8%)	956 (26.2%)	-1351 (-30.5%)	401 (11%)
	C	-51 (-1.6%)	1098 (36.7%)	-194 (-6%)	791 (26.4%)
	All	-5216 (-47.3%)	-3930 (-36.1%)	-7582 (-68.8%)	-7293 (-66.9%)
Oct	W	-2786 (-35.4%)	-2385 (-28.8%)	-2764 (-35.1%)	-1897 (-22.9%)
	AN	-1749 (-31.7%)	-534 (-7.4%)	-1866 (-33.8%)	-745 (-10.3%)
	BN	-1577 (-29.1%)	-2158 (-30.9%)	-1556 (-28.7%)	-675 (-9.7%)
	D	-1377 (-26.4%)	-1219 (-21.3%)	-1432 (-27.4%)	-600 (-10.5%)
	C	-964 (-20.6%)	17 (0.3%)	-766 (-16.4%)	747 (15%)
	All	-1852 (-30.6%)	-1468 (-21.4%)	-1841 (-30.4%)	-848 (-12.4%)
Nov	W	-4987 (-29%)	-4112 (-25.9%)	-5793 (-33.7%)	-5034 (-31.7%)
	AN	-3856 (-29.4%)	-3622 (-29.8%)	-5547 (-42.3%)	-5274 (-43.4%)
	BN	-3673 (-38.9%)	-3051 (-33.6%)	-4344 (-46%)	-4216 (-46.5%)
	D	-2750 (-32.2%)	-2208 (-27.4%)	-2808 (-32.9%)	-2725 (-33.8%)
	C	-1154 (-20.6%)	-882 (-15.9%)	-1225 (-21.9%)	-1495 (-26.9%)
	All	-3545 (-30.4%)	-2969 (-27.1%)	-4186 (-35.9%)	-3905 (-35.7%)
Dec	W	-2429 (-5.5%)	-1884 (-4.7%)	-1277 (-2.9%)	-576 (-1.4%)
	AN	-1313 (-6.4%)	-2176 (-10.9%)	-1414 (-6.9%)	-1145 (-5.7%)
	BN	-1295 (-8.6%)	-1133 (-8.1%)	-1301 (-8.6%)	-29 (-0.2%)
	D	-1022 (-8.6%)	-1056 (-9%)	-493 (-4.2%)	-388 (-3.3%)
	C	-294 (-4%)	-144 (-2%)	293 (4%)	732 (10.2%)
	All	-1451 (-6.2%)	-1362 (-6.3%)	-899 (-3.9%)	-333 (-1.5%)

[a] A negative value indicates lower mean flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

Figure 5C.5.3-208 shows that the greatest increases from the ESO to HOS flows (scaled by the EBC2 flows) for the Sacramento River at Rio Vista with ELT climate change conditions occur during April and May of below-normal, above-normal and wet years, and August of dry years. This is the same pattern that occurs in the Sacramento River at Freeport for the HOS-ELT comparison (Figure 5C.5.3-204). These differences are primarily expected to affect spring-run Chinook salmon adults, green sturgeon older juveniles, fall-run juveniles, steelhead kelts, and white sturgeon adults (Figure 5C.5.3-228), as was found for the HOS_ELT comparisons (Figure 5C.5.3-226). The differences are also expected to provide slightly improved migration flows for spring-run juveniles (migrate December–May), steelhead juveniles (October–May), winter-run juveniles (migrate November–April), and green sturgeon adults (migrate November–July) (Figure 5C.5.3-228). The largest negative differences between the ESO and HOS flows occur primarily during June and July of all but critical year (Figure 5C.5.3-208). These differences, which are relatively small, are expected to slightly affect white sturgeon juveniles and green sturgeon larvae (Figure 5C.5.3-228).

Figure 5C.5.3-209 shows relatively small increases from ESO to LOS flows with ELT climate change conditions during January of critical years, July of dry years and December of wet years. The January difference is expected to have a small affect on winter-run and late fall–run Chinook salmon adult migrations in critical years (Figure 5C.5.3-228), which occur during December–February. Large negative differences between the ESO and LOS flows occur during September of above-normal and wet years, as seen previously for the LOS_ELT and LOS_LLT comparisons for the Sacramento River at Freeport (Figure 5C.5.3-205 and Figure 5C.5.3-207) and upstream of Red Bluff (Figure 5C.5.3-201 and Figure 5C.5.3-203). As was true for those comparisons, the primary species and life stages to be affected are fall-run adults, green sturgeon larvae, white sturgeon juveniles, and river lamprey adults (Figure 5C.5.3-228).

Figure 5C.5.3-210 shows the greatest positive differences between the ESO_LLT and HOS_LLT flows during April and May of below-normal, above-normal and wet years, and during August and September of dry and critical years. The April–May differences are expected to primarily affect spring-run adults and juveniles, green sturgeon older juveniles, fall-run juveniles, steelhead kelts, winter-run juveniles, and green sturgeon adults (Figure 5C.5.3-229). The August–September increases are expected to affect fall-run adults and green sturgeon larvae (Figure 5C.5.3-229). Large negative differences between the ESO and HOS flows occur primarily during June and July of wet and above normal years, October of below-normal years, and December and January of critical years (Figure 5C.5.3-210). The June–July differences are expected to affect white sturgeon juveniles, the October difference is expected to affect fall-run adults, and the December–January differences are expected to affect winter-run and late fall–run adults, which migrate during December–February (Figure 5C.5.3-229).

Figure 5C.5.3-211 shows relatively small increases in flow between the ESO and LOS scenarios with LLT climate change conditions during October of every year type, including a relatively large increase (15%) for October of critical years, and smaller increases for July–September and December of various year types. The differences were generally too small for any expected effects on fish species, but the October increase for critical years resulted in minor increases for fall-run adults and green sturgeon larvae (Figure 5C.5.3-229). Large decreases in flow between the ESO and LOS scenarios occur during September of above-normal and wet years, with the magnitude of differences very similar to those found for all the other September LOS differences in the Sacramento River (Figure 5C.5.3-201, Figure 5C.5.3-203, Figure 5C.5.3-205, Figure 5C.5.3-207, and Figure 5C.5.3-209), and with the same fish species and life stages affected: fall-run adults, green sturgeon larvae, white sturgeon juveniles, and river lamprey adults (Figure 5C.5.3-229).

5C.5.3.14.4 Feather River at Confluence

CALSIM flow data for the Feather River at confluence averaged by water-year type, month, and scenario (HOS_ELT/LLT, LOS_ELT/LLT and EBC2_ELT/LLT), together with average monthly differences between scenarios, are provided in Table 5C.5.3-237 and Table 5C.5.3-238.

Table 5C.5.3-237. Mean Monthly Flows (cfs) in Feather River at the Confluence with the Sacramento River for EBC2, HOS, and LOS Scenarios

		Scenario[b]					
Month	**Water-Year Type[a]**	**EBC2_ELT**	**EBC2_LLT**	**HOS_ELT**	**HOS_LLT**	**LOS_ELT**	**LOS_LLT**
Jan	W	24,852	26,106	25,262	26,310	26,147	27,778
	AN	11,755	11,953	12,431	12,810	12,039	12,792
	BN	5,658	5,575	5,655	5,737	5,655	5,522
	D	4,390	4,412	4,364	4,471	4,546	4,768
	C	3,551	3,837	3,486	3,806	4,535	3,875
	All	12,049	12,509	12,263	12,735	12,679	13,236
Feb	W	29,508	31,065	29,179	31,504	29,895	32,444
	AN	14,119	14,599	14,875	16,347	16,770	16,400
	BN	8,081	7,892	8,999	8,755	8,905	8,764
	D	4,365	4,436	4,301	4,328	4,325	4,453
	C	3,086	3,096	3,110	3,113	3,107	3,019
	All	14,212	14,761	14,364	15,282	14,857	15,603
Mar	W	25,585	26,784	25,455	26,811	25,796	26,873
	AN	21,173	21,490	21,540	21,385	21,925	23,191
	BN	7,175	6,882	7,507	7,024	7,360	6,970
	D	4,626	4,940	4,898	4,962	4,928	5,127
	C	2,695	2,756	2,927	2,938	2,837	2,907
	All	13,846	14,300	14,008	14,349	14,141	14,655
Apr	W	16,056	15,852	19,335	19,220	16,057	15,853
	AN	9,733	9,585	13,422	13,420	9,732	9,696
	BN	5,232	5,189	11,437	11,424	5,369	5,755
	D	4,233	4,137	4,656	4,766	4,383	4,805
	C	3,195	3,185	3,263	3,258	3,470	3,514
	All	8,805	8,689	11,547	11,531	8,902	8,997
May	W	12,987	10,385	15,985	13,542	12,986	10,676
	AN	7,777	6,884	11,549	9,747	8,271	7,704
	BN	4,534	4,509	7,182	6,312	4,696	5,290
	D	3,660	3,767	4,134	4,188	3,868	4,182
	C	2,492	2,321	2,355	2,306	2,359	2,310
	All	7,198	6,237	9,237	8,055	7,324	6,672
Jun	W	7,790	7,199	7,327	6,899	9,601	9,022
	AN	5,485	5,598	6,150	6,120	8,210	8,594
	BN	4,346	4,342	5,436	5,537	8,202	7,095
	D	3,776	3,367	3,911	3,401	4,960	3,959
	C	2,678	2,522	2,389	2,350	2,558	2,423
	All	5,236	4,951	5,360	5,119	7,109	6,553
Jul	W	8,536	8,734	6,655	6,446	8,006	7,694
	AN	9,442	9,223	6,338	5,560	9,467	8,922
	BN	8,985	8,725	7,222	6,380	8,263	7,631
	D	7,690	7,674	5,169	4,231	6,738	5,101
	C	5,831	4,891	3,523	2,851	2,955	2,573
	All	8,164	8,009	5,921	5,293	7,246	6,544

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	6,656	7,222	3,897	4,116	5,676	5,763
	AN	7,790	8,089	4,720	4,739	7,515	6,629
	BN	7,098	7,570	5,303	4,625	6,998	6,442
	D	6,185	5,487	3,765	3,560	4,842	4,704
	C	2,408	2,340	3,407	2,841	2,879	2,214
	All	6,172	6,313	4,157	3,985	5,579	5,254
Sep	W	10,426	10,329	8,120	8,469	3,359	3,212
	AN	9,070	8,773	6,022	5,989	4,663	4,207
	BN	4,896	4,786	3,031	2,970	3,481	3,418
	D	3,281	2,848	3,037	3,269	3,272	3,465
	C	2,052	1,964	2,750	2,994	2,123	2,485
	All	6,490	6,289	5,043	5,225	3,371	3,342
Oct	W	3,741	3,746	3,490	3,486	4,077	3,967
	AN	2,839	2,988	2,879	3,162	3,403	3,543
	BN	3,394	3,437	3,363	3,562	3,421	3,535
	D	3,139	2,987	2,872	2,628	3,523	3,320
	C	2,701	2,566	2,940	3,638	3,137	3,357
	All	3,266	3,243	3,163	3,286	3,607	3,600
Nov	W	4,407	3,825	4,344	3,848	4,277	4,121
	AN	3,220	3,186	3,039	2,956	3,104	2,949
	BN	2,589	2,455	2,431	2,447	2,488	2,424
	D	2,284	2,125	2,176	2,141	2,289	2,254
	C	2,073	2,107	2,267	2,264	2,290	2,038
	All	3,115	2,873	3,046	2,872	3,073	2,945
Dec	W	11,909	10,246	12,819	11,520	13,250	11,590
	AN	6,005	6,000	6,164	5,673	6,155	6,021
	BN	3,342	3,249	3,217	3,097	3,244	3,768
	D	2,787	2,811	2,757	2,669	2,808	2,644
	C	2,152	2,054	2,197	2,332	2,678	2,991
	All	6,152	5,599	6,443	5,939	6,664	6,217

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-238. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly Flows (cfs) in Feather River at the Confluence with the Sacramento River

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	410 (1.6%)	205 (0.8%)	1296 (5.2%)	1672 (6.4%)
	AN	676 (5.8%)	857 (7.2%)	284 (2.4%)	838 (7%)
	BN	-3 (-0.05%)	162 (2.9%)	-3 (-0.1%)	-53 (-1%)
	D	-26 (-0.6%)	59 (1.3%)	156 (3.5%)	356 (8.1%)
	C	-65 (-1.8%)	-31 (-0.8%)	983 (27.7%)	39 (1%)
	All	213 (1.8%)	226 (1.8%)	630 (5.2%)	728 (5.8%)
Feb	W	-330 (-1.1%)	439 (1.4%)	386 (1.3%)	1379 (4.4%)
	AN	756 (5.4%)	1748 (12%)	2651 (18.8%)	1801 (12.3%)
	BN	918 (11.4%)	862 (10.9%)	823 (10.2%)	871 (11%)
	D	-63 (-1.5%)	-108 (-2.4%)	-40 (-0.9%)	17 (0.4%)
	C	24 (0.8%)	17 (0.5%)	20 (0.7%)	-78 (-2.5%)
	All	152 (1.1%)	521 (3.5%)	645 (4.5%)	842 (5.7%)
Mar	W	-131 (-0.5%)	27 (0.1%)	211 (0.8%)	89 (0.3%)
	AN	367 (1.7%)	-104 (-0.5%)	752 (3.6%)	1701 (7.9%)
	BN	332 (4.6%)	142 (2.1%)	185 (2.6%)	88 (1.3%)
	D	272 (5.9%)	22 (0.4%)	301 (6.5%)	187 (3.8%)
	C	231 (8.6%)	182 (6.6%)	142 (5.3%)	151 (5.5%)
	All	162 (1.2%)	49 (0.3%)	295 (2.1%)	355 (2.5%)
Apr	W	3280 (20.4%)	3368 (21.2%)	1 (0.01%)	1 (0.01%)
	AN	3689 (37.9%)	3835 (40%)	-1 (-0.01%)	111 (1.2%)
	BN	6205 (118.6%)	6235 (120.2%)	138 (2.6%)	566 (10.9%)
	D	423 (10%)	629 (15.2%)	150 (3.6%)	669 (16.2%)
	C	68 (2.1%)	73 (2.3%)	275 (8.6%)	329 (10.3%)
	All	2742 (31.1%)	2843 (32.7%)	97 (1.1%)	308 (3.5%)
May	W	2999 (23.1%)	3157 (30.4%)	-1 (-0.005%)	292 (2.8%)
	AN	3772 (48.5%)	2864 (41.6%)	494 (6.4%)	821 (11.9%)
	BN	2648 (58.4%)	1803 (40%)	162 (3.6%)	781 (17.3%)
	D	474 (13%)	421 (11.2%)	208 (5.7%)	415 (11%)
	C	-137 (-5.5%)	-14 (-0.6%)	-132 (-5.3%)	-11 (-0.5%)
	All	2039 (28.3%)	1818 (29.2%)	126 (1.8%)	435 (7%)
Jun	W	-463 (-5.9%)	-300 (-4.2%)	1811 (23.2%)	1823 (25.3%)
	AN	664 (12.1%)	523 (9.3%)	2725 (49.7%)	2997 (53.5%)
	BN	1090 (25.1%)	1195 (27.5%)	3856 (88.7%)	2753 (63.4%)
	D	134 (3.6%)	34 (1%)	1184 (31.3%)	592 (17.6%)
	C	-289 (-10.8%)	-172 (-6.8%)	-120 (-4.5%)	-99 (-3.9%)
	All	124 (2.4%)	168 (3.4%)	1874 (35.8%)	1602 (32.4%)
Jul	W	-1881 (-22%)	-2288 (-26.2%)	-531 (-6.2%)	-1041 (-11.9%)
	AN	-3104 (-32.9%)	-3663 (-39.7%)	25 (0.3%)	-300 (-3.3%)
	BN	-1763 (-19.6%)	-2345 (-26.9%)	-722 (-8%)	-1094 (-12.5%)
	D	-2522 (-32.8%)	-3443 (-44.9%)	-952 (-12.4%)	-2573 (-33.5%)
	C	-2308 (-39.6%)	-2040 (-41.7%)	-2876 (-49.3%)	-2319 (-47.4%)
	All	-2243 (-27.5%)	-2716 (-33.9%)	-918 (-11.2%)	-1465 (-18.3%)

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	-2760 (-41.5%)	-3106 (-43%)	-980 (-14.7%)	-1459 (-20.2%)
	AN	-3070 (-39.4%)	-3350 (-41.4%)	-275 (-3.5%)	-1460 (-18%)
	BN	-1795 (-25.3%)	-2945 (-38.9%)	-100 (-1.4%)	-1128 (-14.9%)
	D	-2419 (-39.1%)	-1928 (-35.1%)	-1342 (-21.7%)	-783 (-14.3%)
	C	999 (41.5%)	501 (21.4%)	471 (19.6%)	-126 (-5.4%)
	All	-2016 (-32.7%)	-2328 (-36.9%)	-594 (-9.6%)	-1059 (-16.8%)
Sep	W	-2307 (-22.1%)	-1860 (-18%)	-7067 (-67.8%)	-7117 (-68.9%)
	AN	-3048 (-33.6%)	-2785 (-31.7%)	-4407 (-48.6%)	-4567 (-52.1%)
	BN	-1865 (-38.1%)	-1816 (-37.9%)	-1416 (-28.9%)	-1368 (-28.6%)
	D	-244 (-7.4%)	421 (14.8%)	-9 (-0.3%)	617 (21.7%)
	C	698 (34%)	1031 (52.5%)	70 (3.4%)	521 (26.5%)
	All	-1447 (-22.3%)	-1064 (-16.9%)	-3119 (-48.1%)	-2947 (-46.9%)
Oct	W	-250 (-6.7%)	-259 (-6.9%)	336 (9%)	222 (5.9%)
	AN	40 (1.4%)	174 (5.8%)	563 (19.8%)	554 (18.6%)
	BN	-31 (-0.9%)	124 (3.6%)	27 (0.8%)	97 (2.8%)
	D	-268 (-8.5%)	-359 (-12%)	383 (12.2%)	334 (11.2%)
	C	239 (8.8%)	1072 (41.8%)	436 (16.2%)	792 (30.9%)
	All	-103 (-3.1%)	43 (1.3%)	342 (10.5%)	357 (11%)
Nov	W	-63 (-1.4%)	23 (0.6%)	-130 (-2.9%)	296 (7.7%)
	AN	-181 (-5.6%)	-230 (-7.2%)	-116 (-3.6%)	-238 (-7.5%)
	BN	-159 (-6.1%)	-8 (-0.3%)	-102 (-3.9%)	-31 (-1.3%)
	D	-108 (-4.7%)	16 (0.8%)	5 (0.2%)	129 (6.1%)
	C	194 (9.4%)	157 (7.5%)	217 (10.5%)	-69 (-3.3%)
	All	-69 (-2.2%)	-1 (-0.04%)	-43 (-1.4%)	72 (2.5%)
Dec	W	910 (7.6%)	1274 (12.4%)	1342 (11.3%)	1344 (13.1%)
	AN	158 (2.6%)	-327 (-5.5%)	149 (2.5%)	21 (0.3%)
	BN	-125 (-3.7%)	-152 (-4.7%)	-98 (-2.9%)	519 (16%)
	D	-30 (-1.1%)	-143 (-5.1%)	20 (0.7%)	-167 (-6%)
	C	45 (2.1%)	277 (13.5%)	525 (24.4%)	936 (45.6%)
	All	290 (4.7%)	339 (6.1%)	512 (8.3%)	618 (11%)

[a] A positive value indicates higher mean flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

The differences between the ESO and HOS or LOS flows expected for the Feather River are generally larger than those expected for the other rivers. Note that because the Feather River data include a large number of cases with differences between the ESO and HOS or LOS changes that are >5% but <10%, the data points within the 5–10% range are not labeled in Figure 5C.5.3-212 through Figure 5C.5.3-215 and Figure 5C.5.3-230 and Figure 5C.5.3-231 as they are for all other figures. For Figure 5C.5.3-212 through Figure 5C.5.3-215 and Figure 5C.5.3-230 through Figure 5C.5.3-231 only data point for differences >10% are labeled.

Figure 5C.5.3-212 shows that the greatest positive differences between the ESO_ELT and HOS_ELT flows (scaled by EBC2 flows) for the Feather River occur during April and May of below-normal, above-normal and wet years, and July–September of critical years. The below normal year increases in April and May are particularly large: 55% for May and 118% for April. Note that large increases also occurred in April and May of wetter years in the Sacramento River at Freeport and Rio Vista, the two locations downstream of the Feather River confluence (Figure 5C.5.3-204, Figure 5C.5.3-206, Figure 5C.5.3-208, and Figure 5C.5.3-210). These differences are primarily expected to affect spring-run Chinook salmon adults, green sturgeon older juveniles, fall-run juveniles, spring-run juveniles, steelhead juveniles and kelts, and green sturgeon adults (Figure 5C.5.3-230). The expected increase for spring-run adults in below-normal years is especially large (89%). The largest negative differences between the ESO and HOS flows occur primarily during June–October of all except critical year types (Figure 5C.5.3-212). These differences are expected to affect fall-run adults and green sturgeon larvae (Figure 5C.5.3-230).

Figure 5C.5.3-213 shows a relatively large increase (28%) between the ESO_ELT and LOS_ELT flow changes during January of critical years, but the other notable increases, during February, June, October and December, were less than 15%. These increases were expected to have little effect on fish migration and transport flows (Figure 5C.5.3-230). As is true for all the Sacramento River LOS_ELT and LOS_LLT comparisons, the largest decreases in LOS_ELT flow change relative to ESO_ELT flow change occur during September of above-normal and wet years. Correspondingly, the primary species and life stages to be affected are fall-run adults, green sturgeon larvae and river lamprey adults (Figure 5C.5.3-230).

Figure 5C.5.3-214 shows the greatest increases from ESO to HOS flows with LLT climate change conditions during April and May of wet, above-normal and below-normal years, and during July–November of critical years. The increase for April of below-normal years is particularly large (110%). The April–May increases are expected to primarily affect spring-run adults, especially in below-normal years, spring-run juveniles, green sturgeon older juveniles, fall-run juveniles, and steelhead juveniles and kelts (Figure 5C.5.3-231). The July–November increases are expected to affect fall-run adults and green sturgeon larvae (Figure 5C.5.3-231). Large decreases between the ESO and HOS flows occur primarily during June–September of wetter year types, October of dry years, and December of critical years (Figure 5C.5.3-214). The June–September differences are expected to affect green sturgeon larvae and fall-run adults and the October difference for dry years is also expected to affect green sturgeon larvae (Figure 5C.5.3-231).

Figure 5C.5.3-215 shows few notable differences between the ESO and LOS flows with LLT climate change conditions, except for large decreases during September of above normal and wet years, which are similar to the previously noted LOS_ELT and LOS_LLT September differences of the Sacramento and Feather rivers. For the fish species, the result of the September reductions are expected decreases for river lamprey adults and for fall-run adults and green sturgeon larvae in above-normal and wet years and (Figure 5C.5.3-231).

5C.5.3.14.5 American River at Confluence

CALSIM flow data for the American River at confluence averaged by water-year type, month, and scenario (HOS_ELT/LLT, LOS_ELT/LLT and EBC2_ELT/LLT), together with average monthly differences between scenarios, are provided in Table 5C.5.3-239 and Table 5C.5.3-240.

Table 5C.5.3-239. Mean Monthly Flows (cfs) in American River at the Confluence with the Sacramento River for EBC2, HOS, and LOS Scenarios

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	10,031	10,960	10,068	10,930	10,020	11,064
	AN	4,895	5,760	5,054	5,683	4,987	5,925
	BN	2,246	1,988	2,117	2,051	2,033	2,011
	D	1,535	1,424	1,608	1,363	1,449	1,331
	C	1,152	1,008	1,215	1,065	1,256	1,068
	All	4,786	5,118	4,824	5,103	4,756	5,167
Feb	W	10,275	10,947	10,326	10,962	10,338	11,007
	AN	7,148	8,073	7,318	8,144	7,585	8,244
	BN	4,631	4,888	4,815	5,069	4,749	4,956
	D	1,679	1,756	1,648	1,763	1,642	1,802
	C	985	921	1,062	1,003	1,050	989
	All	5,607	6,007	5,684	6,067	5,713	6,083
Mar	W	6,304	6,837	6,303	6,829	6,302	6,826
	AN	5,641	5,661	5,642	5,622	5,688	5,789
	BN	2,503	2,672	2,506	2,679	2,542	2,711
	D	2,095	2,224	2,009	2,150	2,139	2,109
	C	785	836	763	762	738	764
	All	3,826	4,063	3,804	4,029	3,842	4,049
Apr	W	5,164	5,300	5,164	5,313	5,162	5,301
	AN	3,136	3,079	3,132	3,084	3,132	3,100
	BN	2,927	2,778	2,912	2,784	2,901	2,803
	D	1,550	1,677	1,603	1,606	1,573	1,703
	C	886	1,059	995	1,047	1,089	1,075
	All	3,066	3,128	3,090	3,117	3,095	3,144
May	W	5,415	4,332	5,414	4,343	5,414	4,395
	AN	2,911	2,285	2,967	2,478	3,019	2,522
	BN	2,222	1,726	2,217	1,766	2,419	2,192
	D	1,399	1,454	1,468	1,632	1,499	1,725
	C	1,118	790	927	802	819	807
	All	2,993	2,438	2,987	2,517	3,020	2,633
Jun	W	4,206	3,388	4,231	3,607	4,456	4,166
	AN	2,562	2,736	2,502	2,589	3,120	3,316
	BN	2,274	2,603	2,137	2,762	3,180	3,756
	D	2,289	2,320	2,044	2,295	2,832	2,464
	C	1,052	793	1,088	1,270	1,101	1,322
	All	2,753	2,545	2,680	2,684	3,195	3,182
Jul	W	3,264	3,560	3,567	3,500	3,647	3,422
	AN	4,344	4,635	4,505	4,321	4,351	4,400
	BN	4,257	4,038	4,263	3,773	4,196	3,566
	D	2,807	2,858	2,864	2,483	3,059	2,526
	C	1,421	1,784	1,259	1,720	1,782	1,419
	All	3,221	3,385	3,331	3,183	3,442	3,100

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	2,304	1,858	2,237	1,963	2,136	1,849
	AN	1,921	1,663	2,054	1,791	1,819	1,692
	BN	2,035	2,048	2,439	2,036	1,966	1,521
	D	1,516	1,357	1,516	1,279	1,219	1,086
	C	1,097	899	734	818	727	661
	All	1,852	1,612	1,867	1,632	1,653	1,429
Sep	W	3,771	3,415	3,519	3,395	2,413	1,753
	AN	2,437	1,838	2,238	1,831	1,568	1,309
	BN	1,712	1,402	1,335	1,330	1,302	1,172
	D	1,177	987	1,162	1,121	1,148	978
	C	591	427	536	471	749	539
	All	2,189	1,870	2,005	1,887	1,579	1,241
Oct	W	1,561	1,499	1,528	1,312	1,485	1,429
	AN	1,481	1,613	1,468	1,356	1,397	1,468
	BN	1,364	1,617	1,602	1,618	1,647	1,927
	D	1,333	1,114	1,393	1,176	1,385	1,310
	C	1,232	1,517	1,527	1,438	1,514	1,395
	All	1,418	1,454	1,502	1,359	1,482	1,488
Nov	W	3,363	2,540	3,017	2,452	3,001	2,410
	AN	3,089	2,455	2,880	2,294	2,682	2,186
	BN	1,889	1,618	1,757	1,480	1,609	1,511
	D	1,624	1,326	1,566	1,453	1,606	1,241
	C	1,590	1,489	1,583	1,377	1,617	1,484
	All	2,430	1,950	2,253	1,886	2,208	1,832
Dec	W	6,607	6,115	6,748	6,261	6,841	6,397
	AN	3,007	2,856	3,031	2,969	2,941	2,873
	BN	2,774	2,445	2,867	2,526	3,053	2,726
	D	1,564	1,275	1,530	1,324	1,485	1,341
	C	1,278	1,158	1,390	1,227	1,371	1,224
	All	3,539	3,224	3,612	3,321	3,647	3,388

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

Table 5C.5.3-240. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly Flows (cfs) in American River at the Confluence with the Sacramento River

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	37 (0.4%)	-30 (-0.3%)	-11 (-0.1%)	104 (0.9%)
	AN	159 (3.3%)	-77 (-1.3%)	92 (1.9%)	164 (2.8%)
	BN	-129 (-5.7%)	63 (3.2%)	-213 (-9.5%)	23 (1.1%)
	D	73 (4.8%)	-61 (-4.3%)	-86 (-5.6%)	-93 (-6.6%)
	C	63 (5.5%)	57 (5.7%)	103 (9%)	60 (6%)
	All	38 (0.8%)	-15 (-0.3%)	-30 (-0.6%)	49 (1%)
Feb	W	51 (0.5%)	15 (0.1%)	63 (0.6%)	60 (0.6%)
	AN	170 (2.4%)	71 (0.9%)	437 (6.1%)	171 (2.1%)
	BN	184 (4%)	181 (3.7%)	118 (2.5%)	67 (1.4%)
	D	-31 (-1.8%)	7 (0.4%)	-37 (-2.2%)	46 (2.6%)
	C	77 (7.8%)	82 (8.9%)	65 (6.6%)	68 (7.4%)
	All	77 (1.4%)	60 (1%)	106 (1.9%)	76 (1.3%)
Mar	W	-1 (-0.01%)	-8 (-0.1%)	-2 (-0.03%)	-11 (-0.2%)
	AN	1 (0.01%)	-39 (-0.7%)	47 (0.8%)	128 (2.3%)
	BN	3 (0.1%)	6 (0.2%)	39 (1.6%)	39 (1.5%)
	D	-86 (-4.1%)	-74 (-3.3%)	45 (2.1%)	-115 (-5.2%)
	C	-22 (-2.8%)	-74 (-8.9%)	-47 (-6%)	-72 (-8.7%)
	All	-22 (-0.6%)	-34 (-0.8%)	16 (0.4%)	-14 (-0.3%)
Apr	W	0 (0%)	13 (0.3%)	-2 (-0.04%)	1 (0.03%)
	AN	-4 (-0.1%)	5 (0.2%)	-4 (-0.1%)	21 (0.7%)
	BN	-15 (-0.5%)	6 (0.2%)	-25 (-0.9%)	25 (0.9%)
	D	54 (3.5%)	-71 (-4.2%)	23 (1.5%)	26 (1.6%)
	C	109 (12.3%)	-12 (-1.2%)	203 (22.9%)	15 (1.4%)
	All	25 (0.8%)	-11 (-0.4%)	29 (1%)	16 (0.5%)
May	W	-1 (-0.02%)	11 (0.2%)	-1 (-0.03%)	62 (1.4%)
	AN	55 (1.9%)	192 (8.4%)	108 (3.7%)	236 (10.3%)
	BN	-5 (-0.2%)	40 (2.3%)	197 (8.9%)	466 (27%)
	D	69 (4.9%)	178 (12.3%)	100 (7.2%)	271 (18.6%)
	C	-191 (-17.1%)	12 (1.5%)	-299 (-26.7%)	17 (2.2%)
	All	-6 (-0.2%)	79 (3.3%)	27 (0.9%)	196 (8%)
Jun	W	26 (0.6%)	219 (6.5%)	250 (5.9%)	778 (23%)
	AN	-61 (-2.4%)	-147 (-5.4%)	558 (21.8%)	581 (21.2%)
	BN	-138 (-6.1%)	159 (6.1%)	906 (39.8%)	1153 (44.3%)
	D	-245 (-10.7%)	-25 (-1.1%)	543 (23.7%)	144 (6.2%)
	C	36 (3.4%)	477 (60.1%)	49 (4.7%)	529 (66.7%)
	All	-73 (-2.6%)	139 (5.5%)	442 (16.1%)	638 (25.1%)
Jul	W	303 (9.3%)	-60 (-1.7%)	383 (11.7%)	-138 (-3.9%)
	AN	161 (3.7%)	-314 (-6.8%)	7 (0.2%)	-236 (-5.1%)
	BN	6 (0.1%)	-266 (-6.6%)	-61 (-1.4%)	-473 (-11.7%)
	D	58 (2.1%)	-376 (-13.1%)	253 (9%)	-332 (-11.6%)
	C	-161 (-11.4%)	-64 (-3.6%)	361 (25.4%)	-365 (-20.5%)
	All	110 (3.4%)	-202 (-6%)	220 (6.8%)	-285 (-8.4%)

Month	Water-Year Type[b]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	-67 (-2.9%)	105 (5.6%)	-168 (-7.3%)	-9 (-0.5%)
	AN	133 (6.9%)	128 (7.7%)	-103 (-5.3%)	29 (1.7%)
	BN	405 (19.9%)	-12 (-0.6%)	-69 (-3.4%)	-527 (-25.7%)
	D	0 (0%)	-77 (-5.7%)	-297 (-19.6%)	-270 (-19.9%)
	C	-363 (-33.1%)	-82 (-9.1%)	-370 (-33.7%)	-238 (-26.5%)
	All	14 (0.8%)	21 (1.3%)	-199 (-10.8%)	-183 (-11.3%)
Sep	W	-252 (-6.7%)	-20 (-0.6%)	-1358 (-36%)	-1662 (-48.7%)
	AN	-199 (-8.2%)	-7 (-0.4%)	-868 (-35.6%)	-529 (-28.8%)
	BN	-377 (-22%)	-72 (-5.2%)	-410 (-24%)	-230 (-16.4%)
	D	-15 (-1.2%)	134 (13.5%)	-29 (-2.4%)	-9 (-0.9%)
	C	-55 (-9.3%)	44 (10.4%)	159 (26.8%)	112 (26.2%)
	All	-185 (-8.4%)	16 (0.9%)	-611 (-27.9%)	-630 (-33.7%)
Oct	W	-34 (-2.2%)	-186 (-12.4%)	-76 (-4.9%)	-70 (-4.7%)
	AN	-13 (-0.9%)	-256 (-15.9%)	-84 (-5.7%)	-145 (-9%)
	BN	238 (17.4%)	1 (0.1%)	283 (20.7%)	310 (19.2%)
	D	60 (4.5%)	62 (5.6%)	52 (3.9%)	196 (17.6%)
	C	295 (23.9%)	-79 (-5.2%)	282 (22.9%)	-122 (-8.1%)
	All	84 (5.9%)	-94 (-6.5%)	65 (4.6%)	35 (2.4%)
Nov	W	-346 (-10.3%)	-88 (-3.5%)	-362 (-10.8%)	-130 (-5.1%)
	AN	-209 (-6.8%)	-161 (-6.5%)	-406 (-13.2%)	-269 (-10.9%)
	BN	-133 (-7%)	-138 (-8.6%)	-280 (-14.8%)	-107 (-6.6%)
	D	-58 (-3.6%)	127 (9.6%)	-18 (-1.1%)	-85 (-6.4%)
	C	-7 (-0.5%)	-112 (-7.5%)	27 (1.7%)	-6 (-0.4%)
	All	-177 (-7.3%)	-63 (-3.3%)	-222 (-9.1%)	-118 (-6.1%)
Dec	W	141 (2.1%)	146 (2.4%)	233 (3.5%)	282 (4.6%)
	AN	24 (0.8%)	113 (4%)	-66 (-2.2%)	17 (0.6%)
	BN	94 (3.4%)	81 (3.3%)	279 (10.1%)	281 (11.5%)
	D	-34 (-2.2%)	49 (3.8%)	-79 (-5.1%)	66 (5.1%)
	C	112 (8.8%)	69 (6%)	94 (7.3%)	67 (5.8%)
	All	73 (2.1%)	97 (3%)	108 (3.1%)	164 (5.1%)

[a] A positive value indicates higher mean flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

The largest differences between the ESO and HOS or LOS flowsexpected for the American River are generally smaller than those expected for the Feather River, but somewhat larger than those expected for the Sacramento River locations. Figure 5C.5.3-216 shows that the greatest positive differences between the ESO_ELT and HOS_ELT flows(scaled by EBC2 flows) for the American River occur during August of above-normal, below-normal and dry years and September of wet and above-normal years. These increases are primarily expected to affect fall-run Chinook salmon adults, which migrate September–October, in wet and above-normal years (Figure 5C.5.3-232). The largest negative differences between the ESO and HOS flows occur primarily during June of above-normal, below-normal and dry years, May of below-normal and critical years, and July and August of critical years. These differences are expected to affect fall-run juveniles, which migrate February–May, in critical years (Figure 5C.5.3-232).

Figure 5C.5.3-217 shows relatively large positive differences between the ESO and LOS flows with ELT climate change conditions during July and September of critical years and June of below-normal years. The September increase results in an increase for fall-run adults in critical years (Figure 5C.5.3-232). The largest negative differences between the ESO and LOS flows occur during May and August of critical years and September of above-normal and wet years. The September decreases are similar, though smaller than, those seen previously for the LOS_ELT and LOS_LLT comparisons for the Sacramento and Feather rivers (Figure 5C.5.3-201, Figure 5C.5.3-203, Figure 5C.5.3-205, Figure 5C.5.3-207, Figure 5C.5.3-209, Figure 5C.5.3-211, Figure 5C.5.3-213, and Figure 5C.5.3-215). As was true for those comparisons, the primary species and life stages to be affected is fall-run adults (Figure 5C.5.3-232). Green sturgeon larvae, which were affected by the September decreases in the Sacramento and Feather rivers, do not occur in the American River.

Figure 5C.5.3-218 shows the greatest increases from ESO to HOS flows with LLT climate change conditions during June of critical years, August of below-normal, dry and critical years, and September of wet, above-normal, below-normal and dry years. The large increase for September of wet years results in an increase for fall-run adults in wet years (Figure 5C.5.3-233). Large negative differences between the ESO and HOS flows occur primarily during May of below-normal and dry years, June of wet, above-normal, below-normal and dry years, October of above-normal, below-normal, dry and critical years, and September, July, and January of critical years. Only the September and October decreases in critical years are expected to affect fish migrations, resulting in a small reduction for fall-run adults in critical years (Figure 5C.5.3-233).

Figure 5C.5.3-219 shows relatively large increases between the ESO_LLT and LOS_LLT flows only during June of below-normal and critical years, which resulted in no appreciable increases for the fish migration flows (Figure 5C.5.3-233). June is generally not an important month for fish migrations in the American River. Large decreases between the ESO and LOS flows occur during July of critical years and September of above-normal and wet years, with the magnitude of the September decreases smaller than those found for the September LOS differences in the Sacramento and Feather rivers, but with similar fish species and life stages affected: fall-run adults and river lamprey adults (Figure 5C.5.3-233). None of the American River species migrate during July.

5C.5.3.14.6 Trinity River Downstream of Lewiston Dam

CALSIM flow data for the Trinity River downstream of Lewiston Dam averaged by water-year type, month, and scenario (HOS_ELT/LLT, LOS_ELT/LLT and EBC2_ELT/LLT), together with average monthly differences between scenarios, are provided in Table 5C.5.3-241 and Table 5C.5.3-242.

1 **Table 5C.5.3-241. Mean Monthly Flows (cfs) in the Trinity River Downstream of Lewiston Dam for**
2 **EBC2, HOS, and LOS Scenarios**

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Jan	W	1,570	1,518	1,581	1,474	1,632	1,474
	AN	300	300	300	300	381	405
	BN	300	300	300	300	454	300
	D	300	300	300	300	300	300
	C	300	287	300	278	300	287
	All	703	684	706	669	761	686
Feb	W	1,209	1,495	1,333	1,448	1,340	1,617
	AN	773	784	843	533	842	1,043
	BN	559	568	559	662	559	662
	D	300	300	300	300	300	300
	C	300	300	300	300	300	300
	All	702	795	751	760	753	888
Mar	W	1,335	1,385	1,376	1,385	1,468	1,438
	AN	475	519	475	519	475	519
	BN	302	300	300	300	302	300
	D	300	300	300	300	300	300
	C	300	300	300	300	300	300
	All	654	676	667	676	696	693
Apr	W	740	844	727	844	746	844
	AN	561	513	467	458	467	458
	BN	508	504	508	504	508	504
	D	529	529	529	529	529	529
	C	580	580	580	580	580	580
	All	605	630	587	622	593	622
May	W	4,620	4,620	4,620	4,620	4,620	4,620
	AN	4,450	4,416	4,450	4,416	4,450	4,416
	BN	3,763	3,865	3,763	3,865	3,763	3,865
	D	3,216	3,216	3,216	3,216	3,216	3,216
	C	1,973	1,973	1,973	1,973	1,973	1,973
	All	3,753	3,766	3,753	3,766	3,753	3,766
Jun	W	3,613	3,560	3,613	3,560	3,613	3,560
	AN	2,663	3,188	2,663	3,188	2,663	3,188
	BN	1,767	1,767	1,767	1,767	1,767	1,767
	D	1,251	1,251	1,251	1,251	1,251	1,251
	C	783	783	783	783	783	783
	All	2,226	2,286	2,226	2,286	2,226	2,286
Jul	W	1,161	1,103	1,161	1,103	1,161	1,103
	AN	1,048	1,048	1,048	1,048	1,048	1,048
	BN	916	916	916	916	916	916
	D	667	667	667	667	667	667
	C	450	413	450	450	450	450
	All	890	866	890	872	890	872

Month	Water-Year Type[a]	Scenario[b]					
		EBC2_ELT	EBC2_LLT	HOS_ELT	HOS_LLT	LOS_ELT	LOS_LLT
Aug	W	450	450	450	450	450	450
	AN	450	450	450	450	450	450
	BN	450	450	450	450	450	450
	D	450	450	450	450	450	450
	C	413	338	413	375	413	300
	All	445	434	445	439	445	428
Sep	W	450	450	450	450	450	450
	AN	450	450	450	450	450	450
	BN	450	450	450	450	450	450
	D	450	450	450	450	450	450
	C	356	265	413	315	382	225
	All	436	423	445	430	440	417
Oct	W	373	373	373	373	373	373
	AN	337	311	373	332	342	332
	BN	346	346	346	346	346	346
	D	352	346	373	352	352	352
	C	342	311	373	311	342	280
	All	354	344	368	349	355	344
Nov	W	510	414	478	365	461	365
	AN	275	275	300	275	275	275
	BN	300	300	300	300	300	300
	D	283	283	283	283	283	283
	C	263	225	275	225	275	225
	All	354	318	349	302	340	302
Dec	W	1,281	837	1,378	938	1,384	1,151
	AN	300	300	300	300	300	300
	BN	300	300	300	300	300	300
	D	300	300	300	300	300	299
	C	300	275	300	272	300	272
	All	611	466	642	498	644	566

[a] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[b] See Table 5C.0-1 for definitions of scenarios.

1 **Table 5C.5.3-242. Differences[a] between EBC2 Scenarios and HOS and LOS Scenarios in Mean Monthly**
2 **Flows (cfs) in Trinity River Downstream of Lewiston Dam**

Month	Water-Year Type[a]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Jan	W	11 (0.7%)	-45 (-2.9%)	63 (4%)	-44 (-2.9%)
	AN	0 (0%)	0 (0%)	81 (26.9%)	105 (35%)
	BN	0 (0%)	0 (0%)	154 (51.3%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	-9 (-3.1%)	0 (0%)	0 (0%)
	All	4 (0.5%)	-15 (-2.3%)	58 (8.3%)	1 (0.2%)
Feb	W	124 (10.3%)	-47 (-3.2%)	131 (10.9%)	122 (8.2%)
	AN	70 (9%)	-251 (-32%)	69 (9%)	260 (33.1%)
	BN	0 (0%)	94 (16.5%)	0 (0%)	94 (16.5%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	50 (7.1%)	-36 (-4.5%)	52 (7.4%)	93 (11.7%)
Mar	W	41 (3.1%)	0 (0%)	133 (10%)	53 (3.8%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	-2 (-0.7%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	13 (1.9%)	0 (0%)	42 (6.5%)	17 (2.5%)
Apr	W	-13 (-1.8%)	0 (0%)	7 (0.9%)	0 (0%)
	AN	-95 (-16.9%)	-54 (-10.6%)	-95 (-16.9%)	-54 (-10.6%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	-18 (-3%)	-8 (-1.3%)	-12 (-1.9%)	-8 (-1.3%)
May	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Jun	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	All	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Jul	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	37 (9.1%)	0 (0%)	37 (9.1%)
	All	0 (0%)	5 (0.6%)	0 (0%)	5 (0.6%)

Month	Water-Year Type[a]	Scenario[c]			
		EBC2_ELT vs. HOS_ELT	EBC2_LLT vs. HOS_LLT	EBC2_ELT vs. LOS_ELT	EBC2_LLT vs. LOS_LLT
Aug	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	0 (0%)	38 (11.1%)	0 (0%)	-37 (-11.1%)
	All	0 (0%)	5 (1.3%)	0 (0%)	-5 (-1.3%)
Sep	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	57 (16%)	50 (18.9%)	26 (7.3%)	-40 (-15.1%)
	All	8 (1.9%)	7 (1.7%)	4 (0.9%)	-6 (-1.4%)
Oct	W	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	AN	36 (10.6%)	21 (6.7%)	5 (1.4%)	21 (6.7%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	21 (5.9%)	6 (1.9%)	0 (0%)	6 (1.9%)
	C	31 (9.1%)	0 (0%)	0 (0%)	-31 (-10%)
	All	14 (4%)	4 (1.3%)	1 (0.2%)	0 (0%)
Nov	W	-32 (-6.2%)	-49 (-11.7%)	-48 (-9.5%)	-49 (-11.7%)
	AN	25 (9.1%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	C	12 (4.5%)	0 (0%)	12 (4.5%)	0 (0%)
	All	-5 (-1.3%)	-15 (-4.8%)	-14 (-3.8%)	-15 (-4.8%)
Dec	W	97 (7.6%)	101 (12.1%)	103 (8%)	315 (37.6%)
	AN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	BN	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	D	0 (0%)	0 (0%)	0 (0%)	-1 (-0.4%)
	C	0 (0%)	-3 (-0.9%)	0 (0%)	-3 (-0.9%)
	All	31 (5%)	32 (6.8%)	33 (5.3%)	99 (21.3%)

[a] A positive value indicates higher mean flows in HOS or LOS than in EBC2.
[b] Water-year types: W = wet; AN = above normal; BN = below normal; D = dry; C = critical.
[c] See Table 5C.0-1 for definitions of scenarios.

Figure 5C.5.3-220 shows that the greatest positive differences between the ESO_ELT and HOS_ELT flows (scaled by EBC2 flows) for the Trinity River occur during October of above-normal, dry and critical years and September of critical years. These increases are expected to affect fall-run Chinook salmon in above-normal and critical years. There are no large flow decreases between the ESO and HOS scenarios (Figure 5C.5.3-220) and, correspondingly, no large decreases in fish migration flow changes (Figure 5C.5.3-234).

Figure 5C.5.3-221 shows large increases between the ESO_ELT and LOS_ELT flows during January of below-normal and above-normal years, which result in increase for steelhead adults (migrate September–March) and kelts (migrate January–April) in below-normal years (Figure 5C.5.3-234).

There are almost no negative differences between the ESO and HOS flows (Figure 5C.5.3-221) and, correspondingly, there are no decreases in fish migration flow changes(Figure 5C.5.3-234).

Figure 5C.5.3-222 shows the only notable increases in flow between the ESO and HOS sceanrios with LLT climate change conditions occur during August–October of critical years, which results in increases for fall-run and steelhead adults in critical years (Figure 5C.5.3-235). The only large decrease between the ESO and HOS flows occurs during February of above-normal, which is expected to affect steelhead adults and kelts (Figure 5C.5.3-235).

Figure 5C.5.3-223 shows relatively large increases between the ESO_LLT and LOS_LLT flows during January and February of above-normal years and February and December of wet years. These increases are expected to affect migration flows for steelhead adults, kelts and juveniles (the juveniles migrate October–May) and spring-run Chinook salmon juveniles (migrate December–May) in above-normal years, as well as steelhead adults in wet years (Figure 5C.5.3-233). The only decrease between the ESO and LOS flows occurs during September of critical years, but it is relatively small and has no effect on differences in migration flows (Figure 5C.5.3-235).

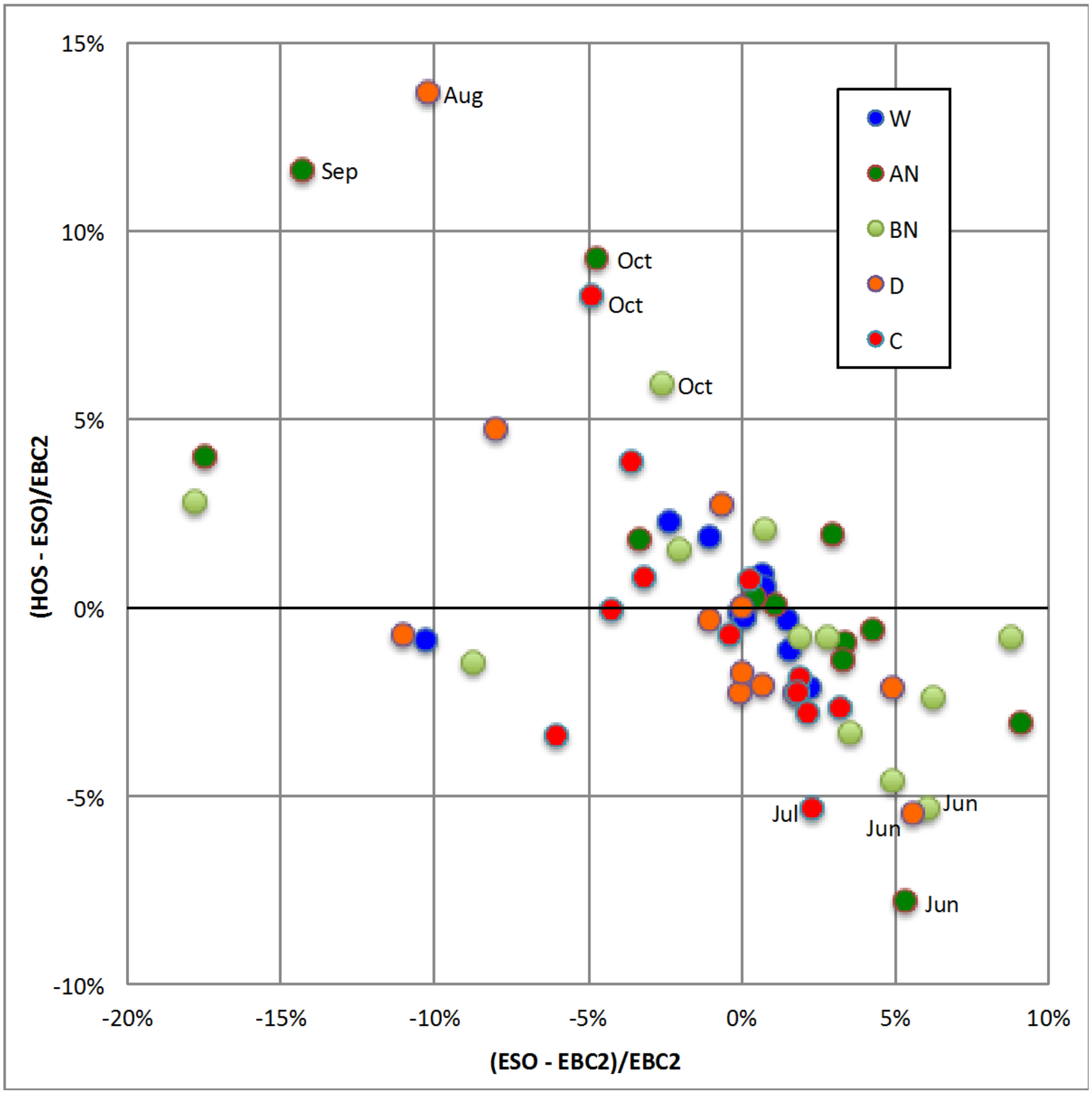

Figure 5C.5.3-200. Incremental Relative Effect of HOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River Upstream of Red Bluff, All Months and Water-Year Types

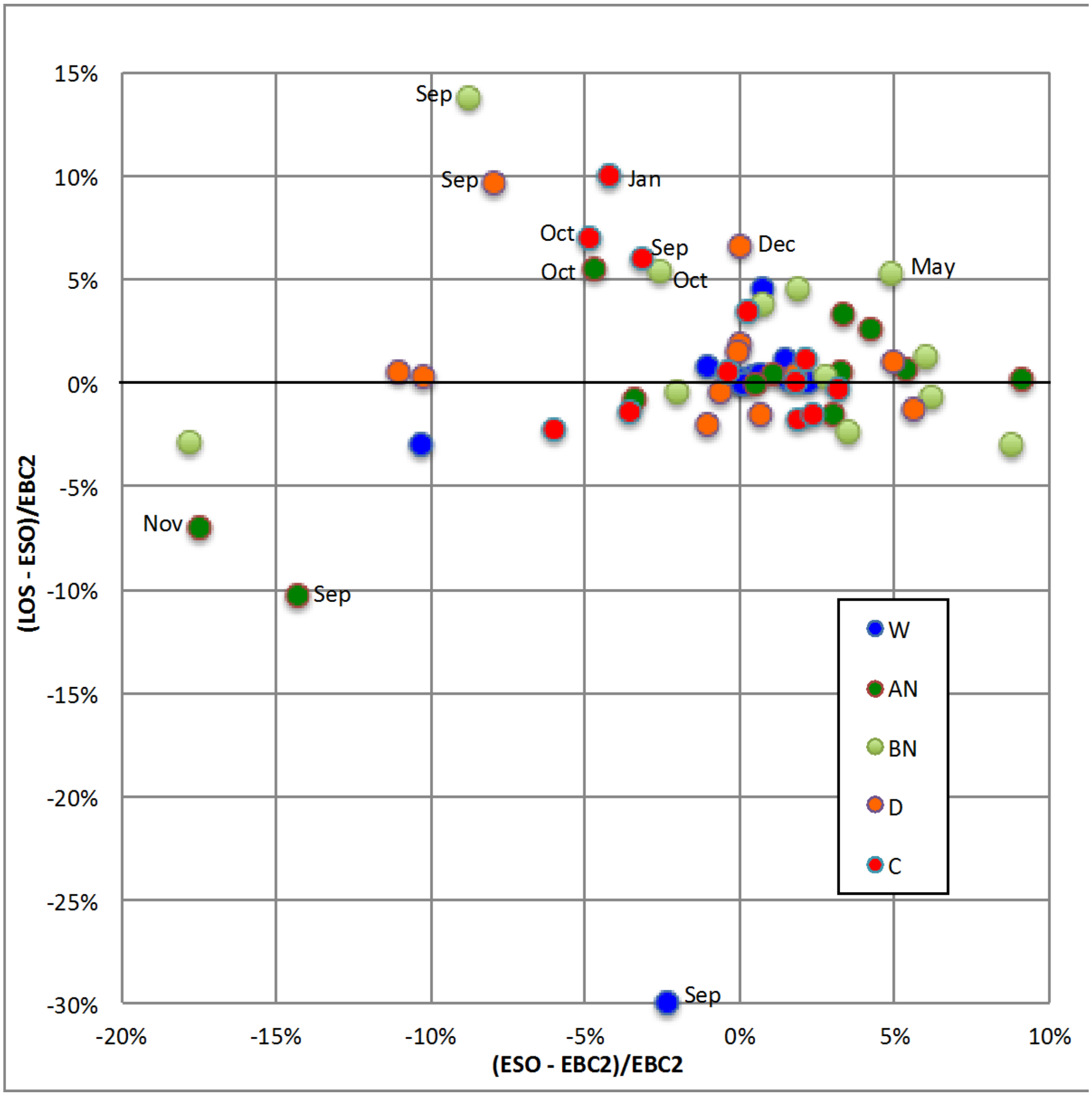

Figure 5C.5.3-201. Incremental Relative Effect of LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River Upstream of Red Bluff, All Months and Water-Year Types

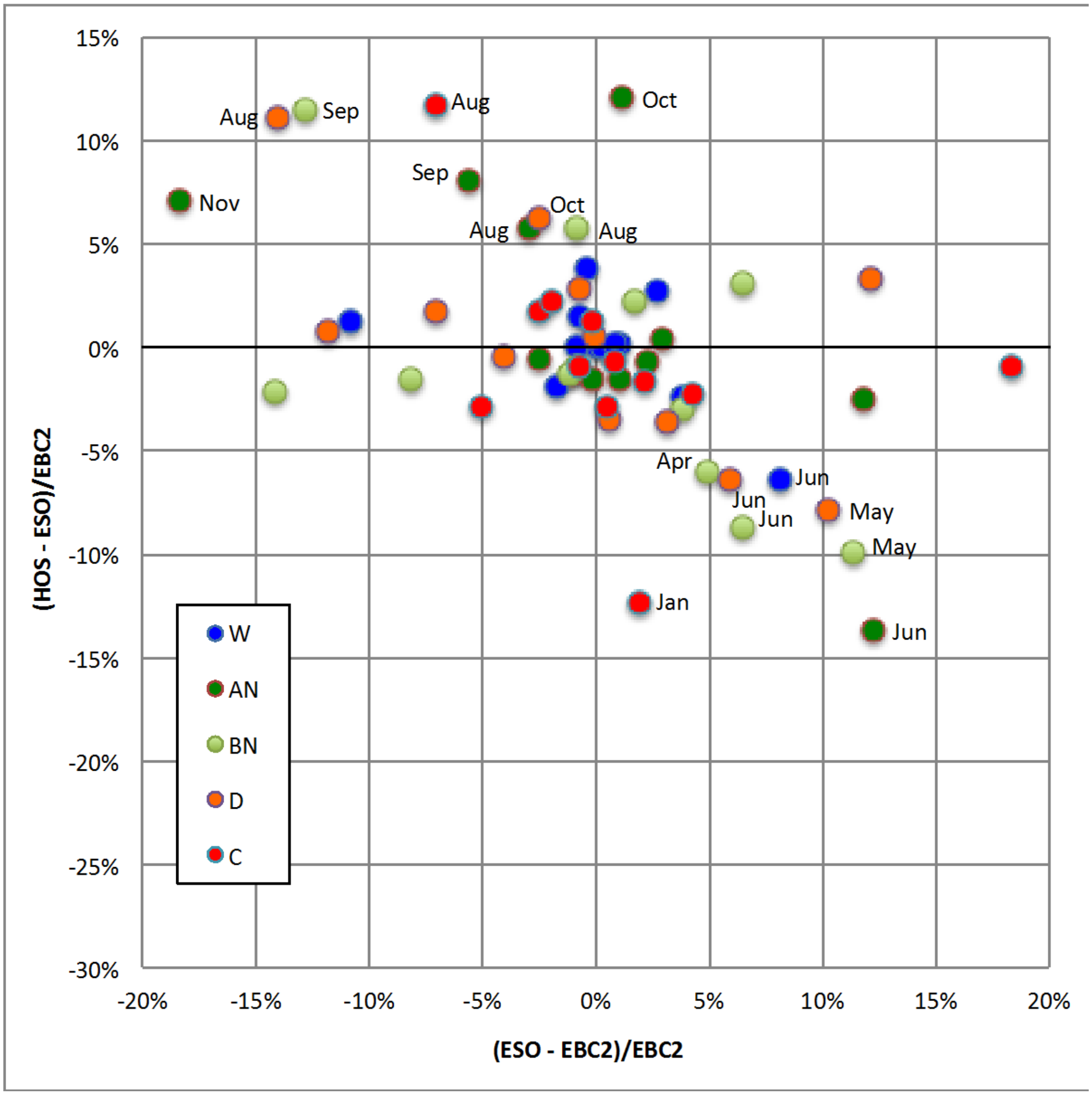

Figure 5C.5.3-202. Incremental Relative Effect of HOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River Upstream of Red Bluff, All Months and Water-Year Types

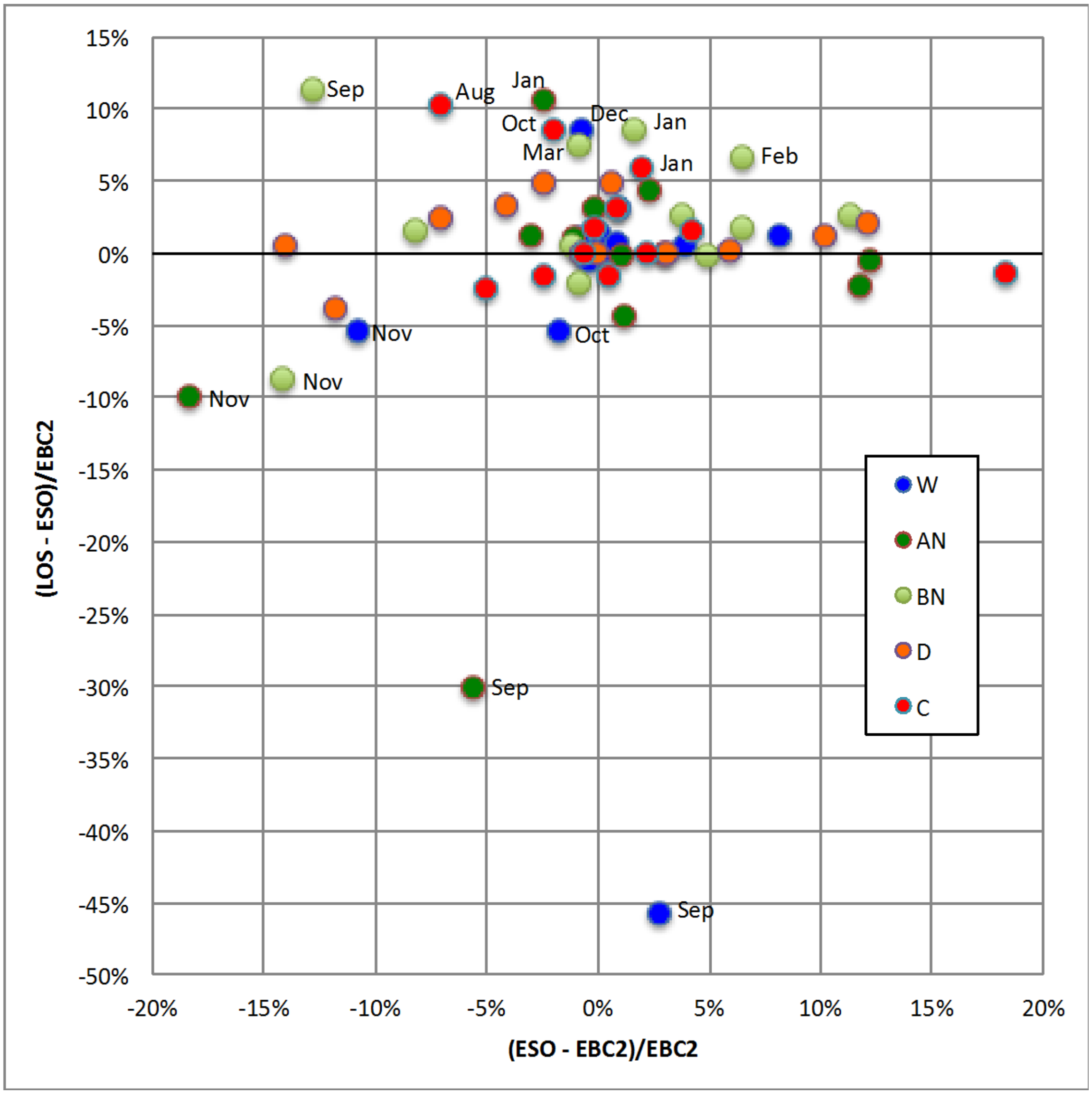

Figure 5C.5.3-203. Incremental Relative Effect of LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River Upstream of Red Bluff, All Months and Water-Year Types

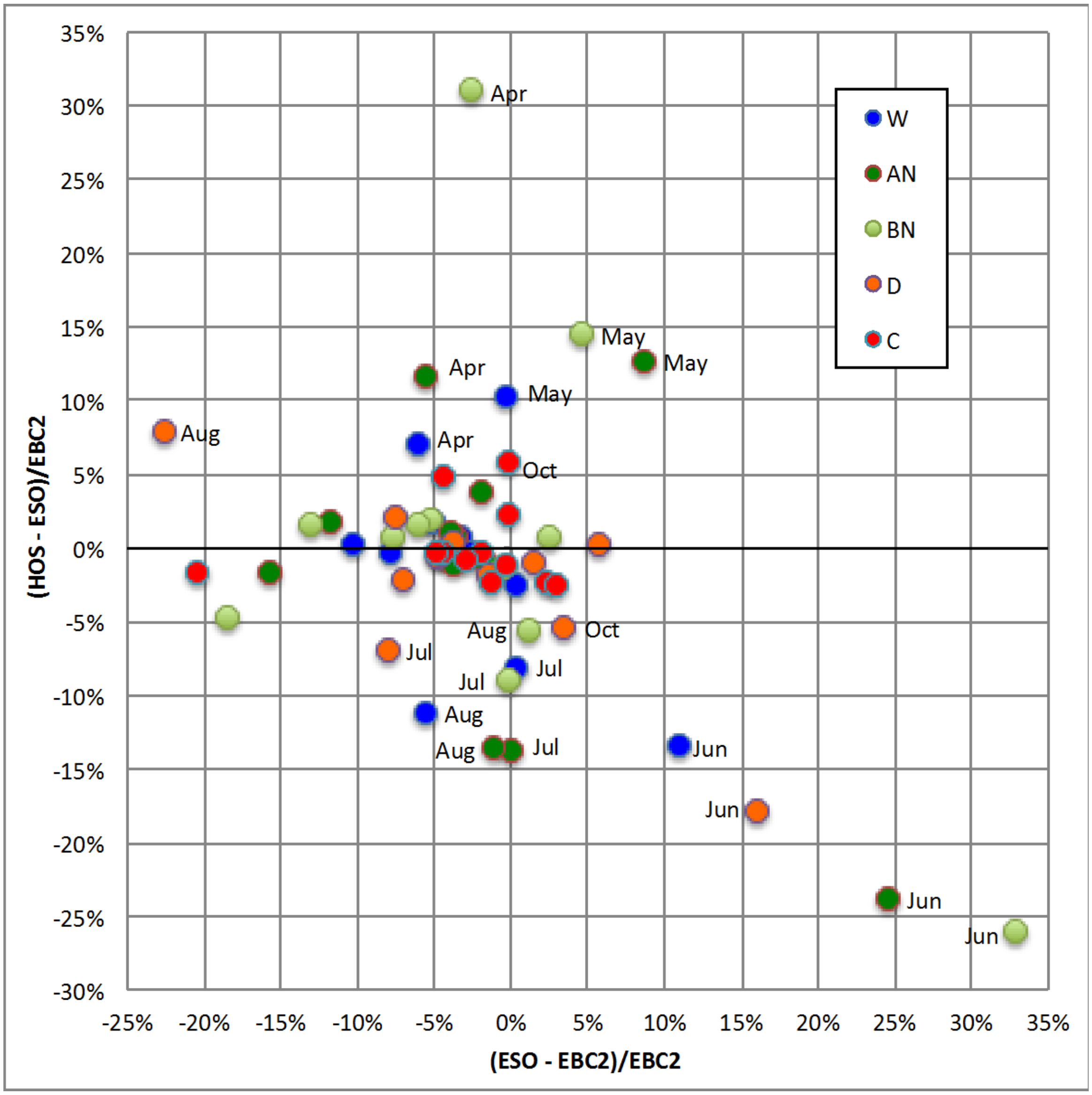

Figure 5C.5.3-204. Incremental Relative Effect of HOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River at Freeport, All Months and Water-Year Types

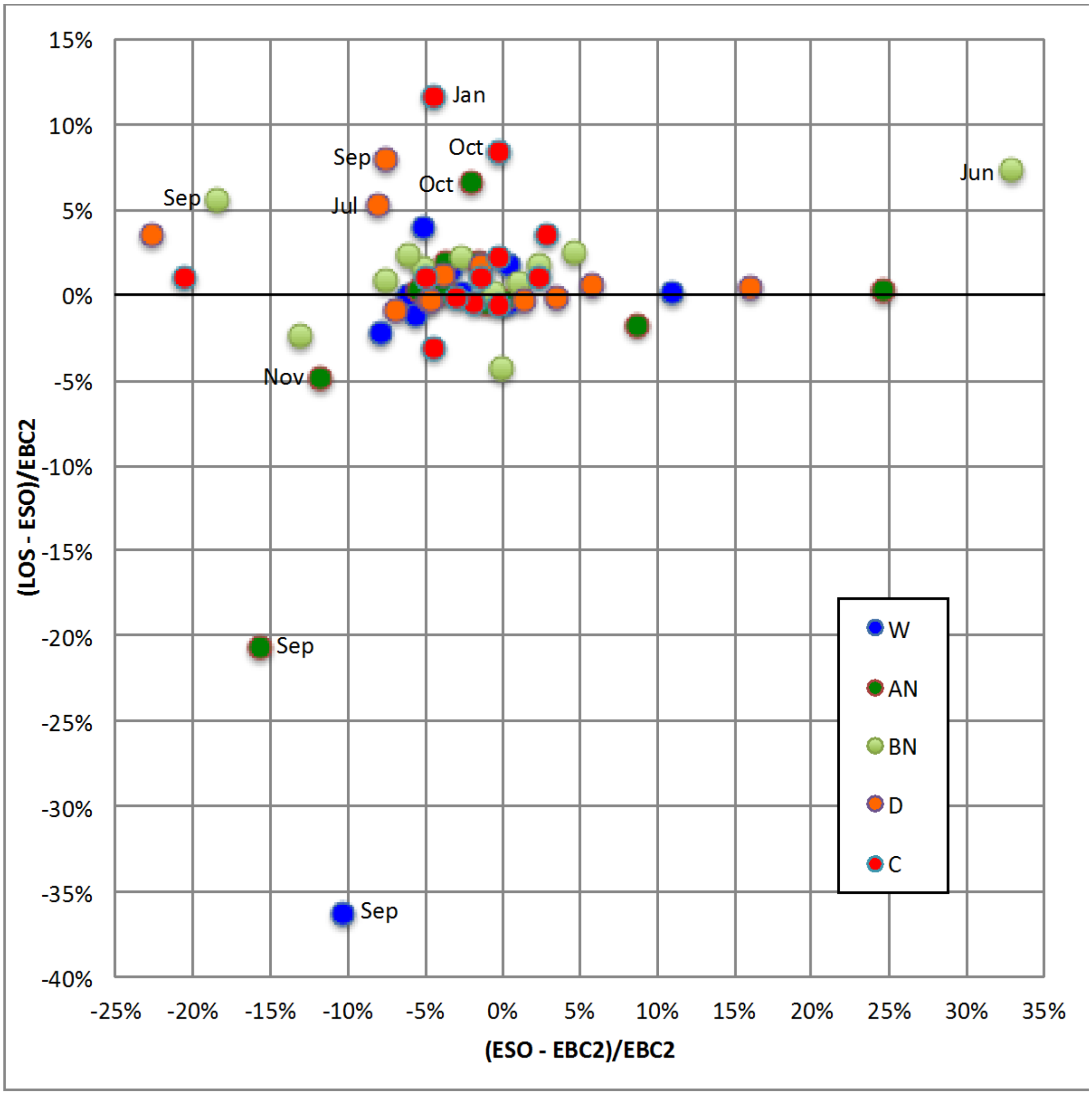

Figure 5C.5.3-205. Incremental Relative Effect of LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River at Freeport, All Months and Water-Year Types

Figure 5C.5.3-206. Incremental Relative Effect of HOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River at Freeport, All Months and Water-Year Types

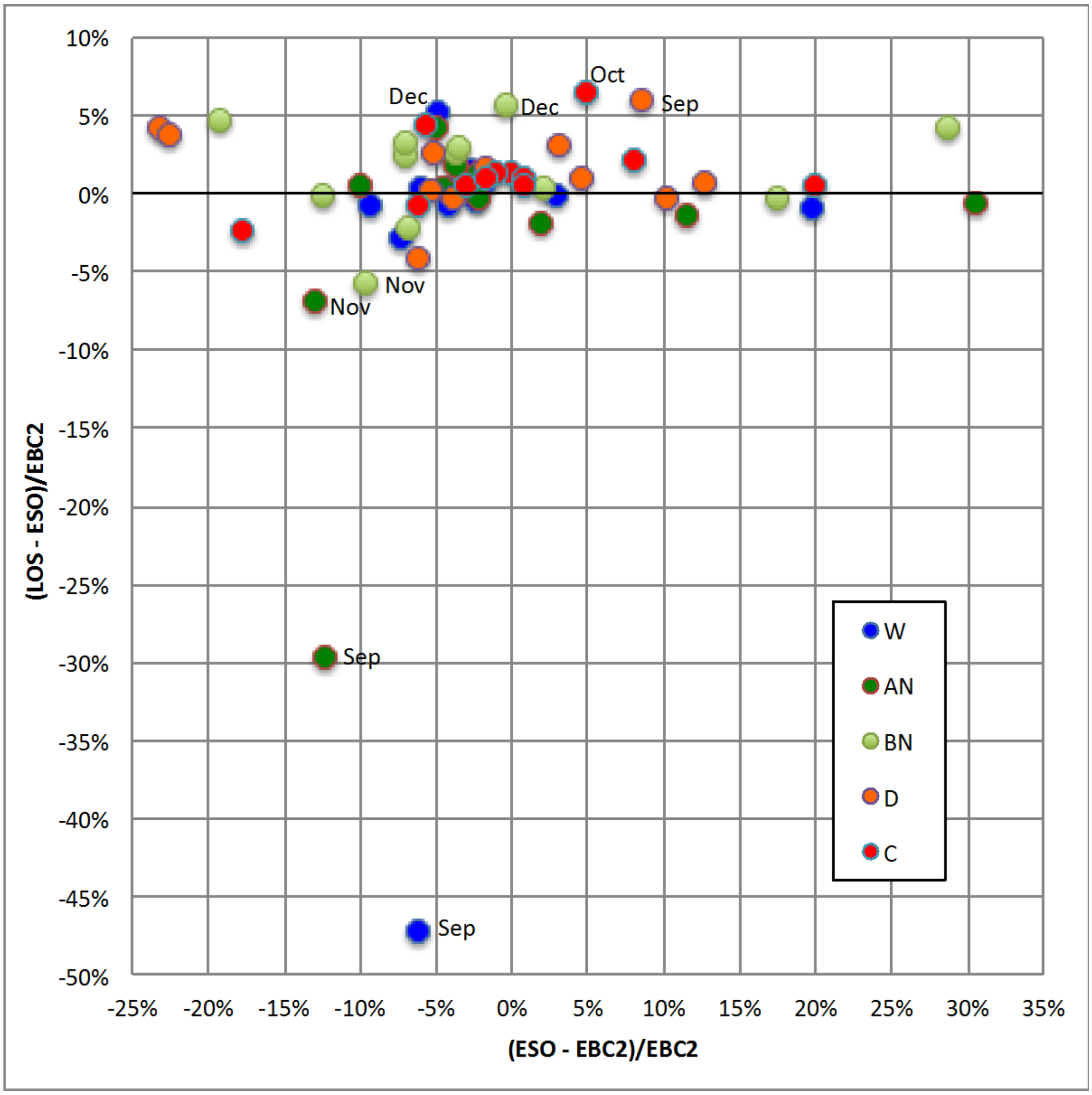

Figure 5C.5.3-207. Incremental Relative Effect of LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River at Freeport, All Months and Water-Year Types

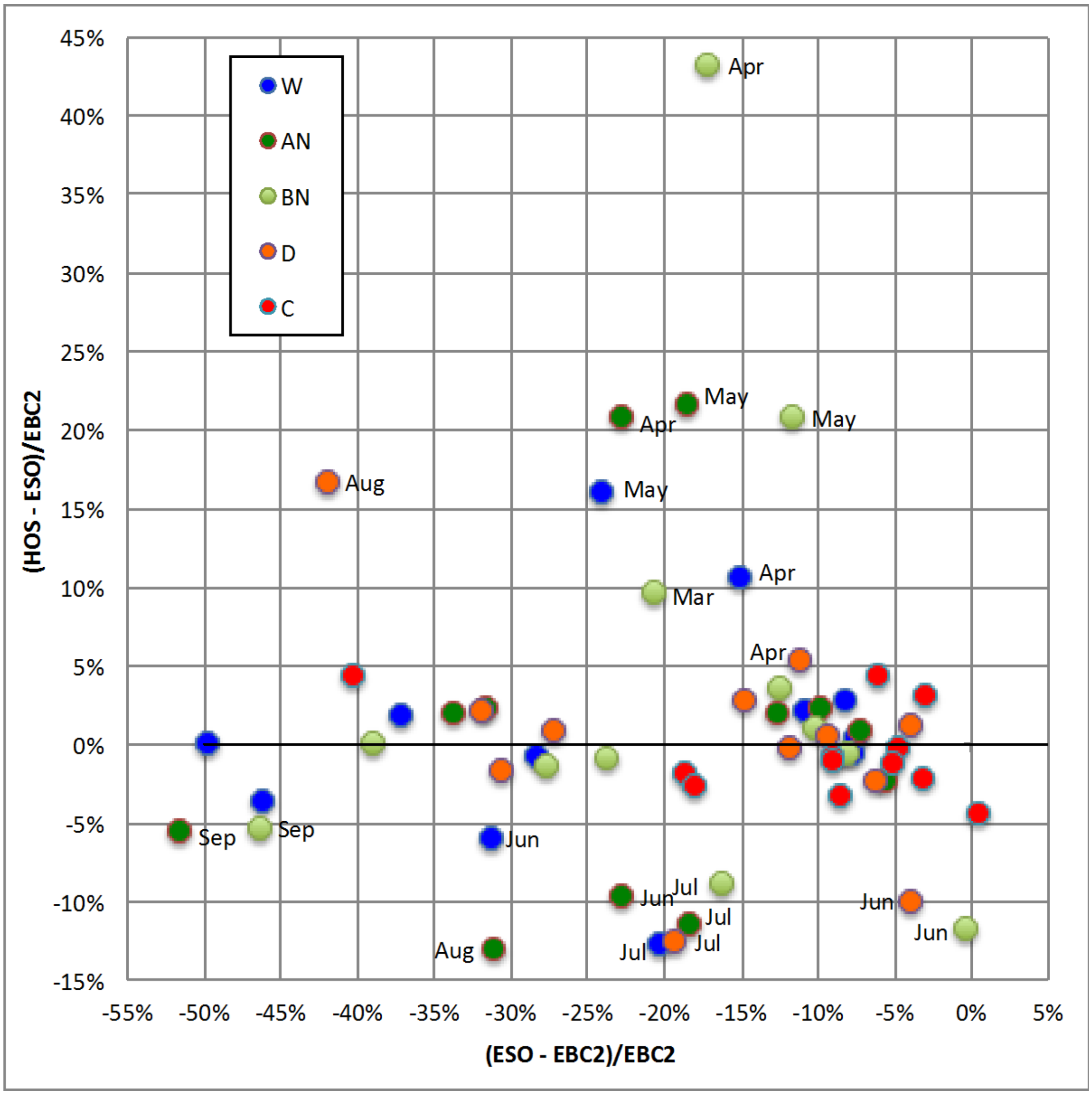

Figure 5C.5.3-208. Incremental Relative Effect of HOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River at Rio Vista, All Months and Water-Year Types

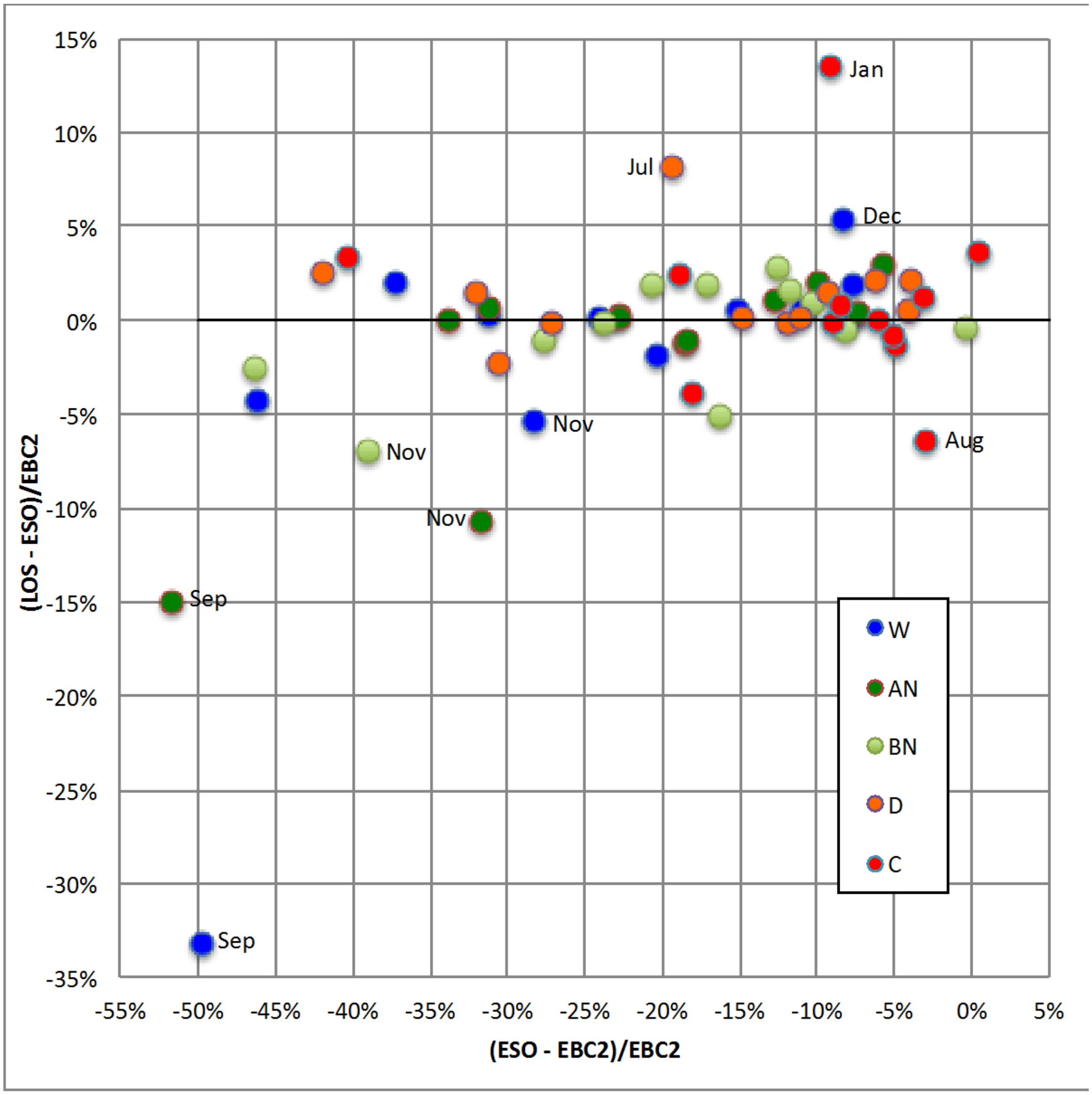

Figure 5C.5.3-209. Incremental Relative Effect of LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River at Rio Vista, All Months and Water-Year Types

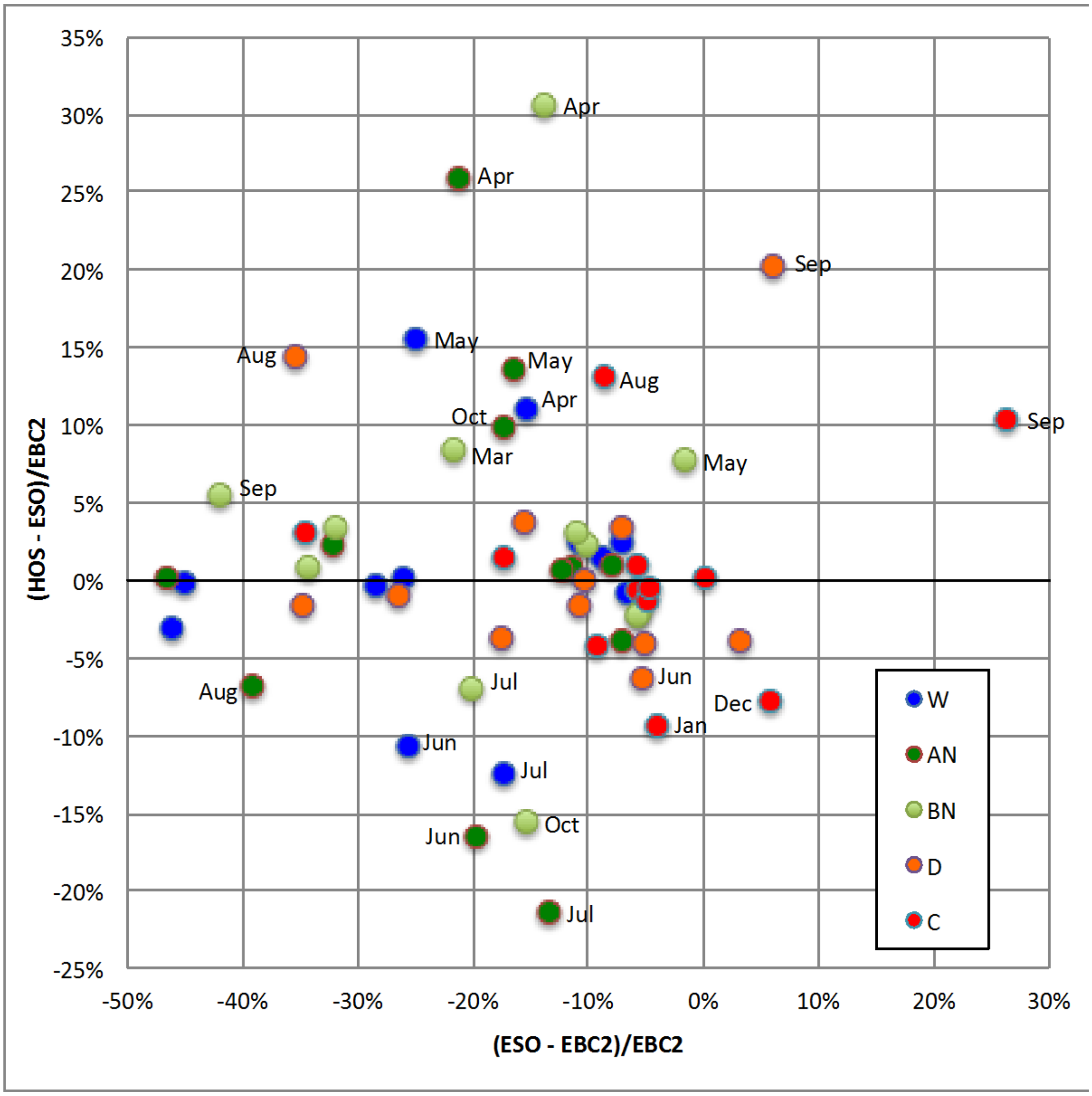

Figure 5C.5.3-210. Incremental Relative Effect of HOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River at Rio Vista, All Months and Water-Year Types

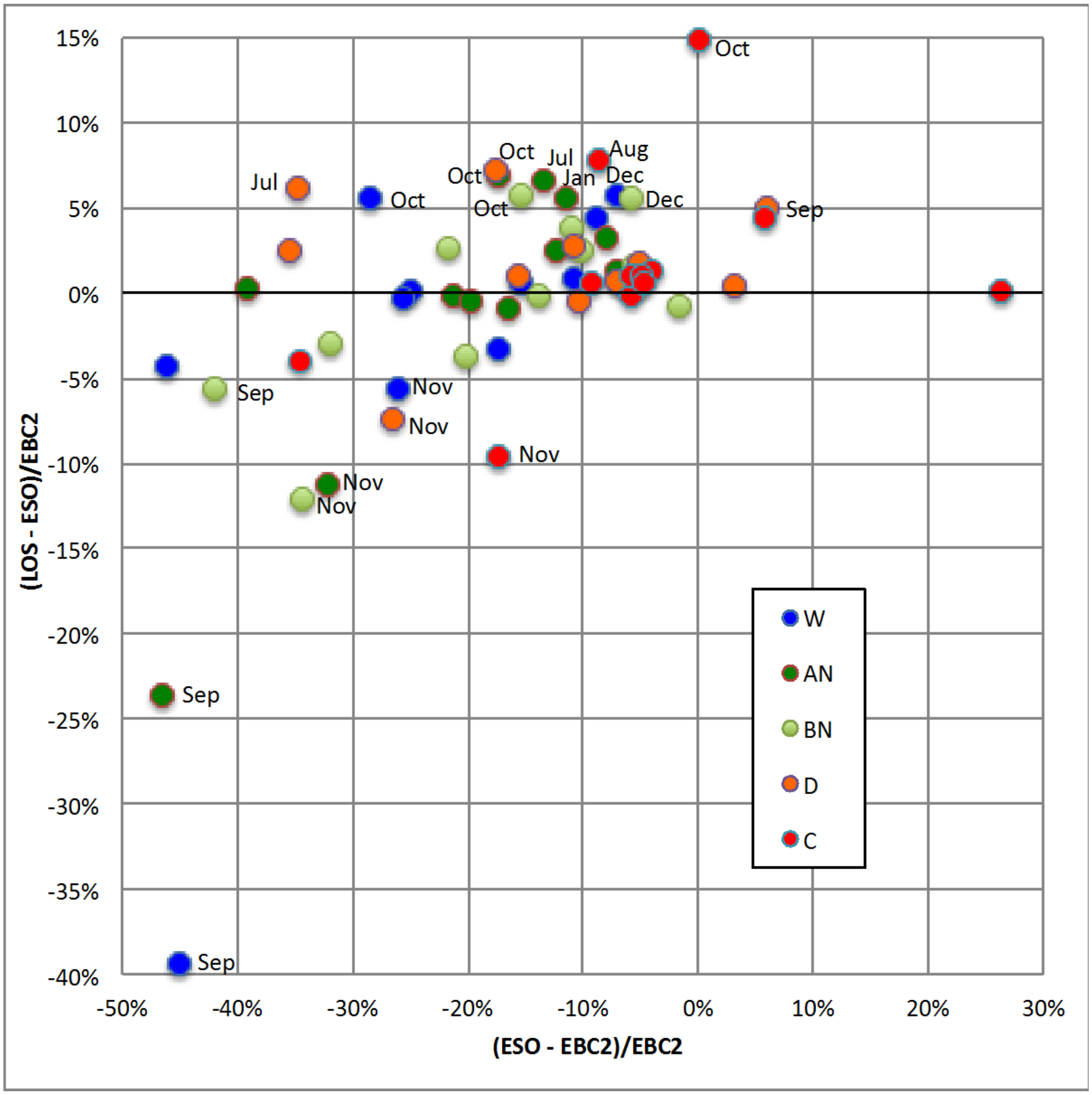

Figure 5C.5.3-211. Incremental Relative Effect of LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River at Rio Vista, All Months and Water-Year Types

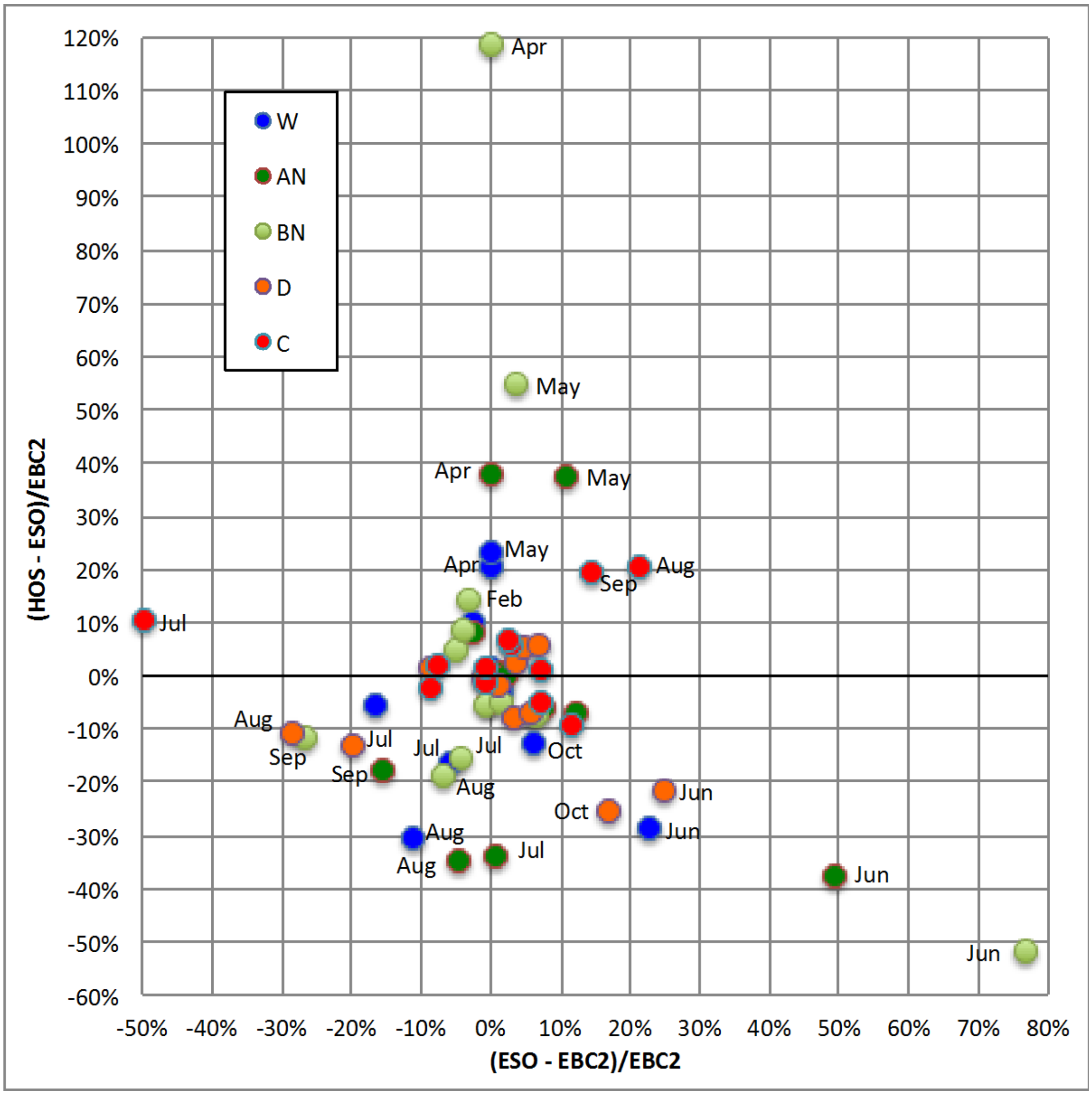

Figure 5C.5.3-212. Incremental Relative Effect of HOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Feather River at Confluence, All Months and Water-Year Types

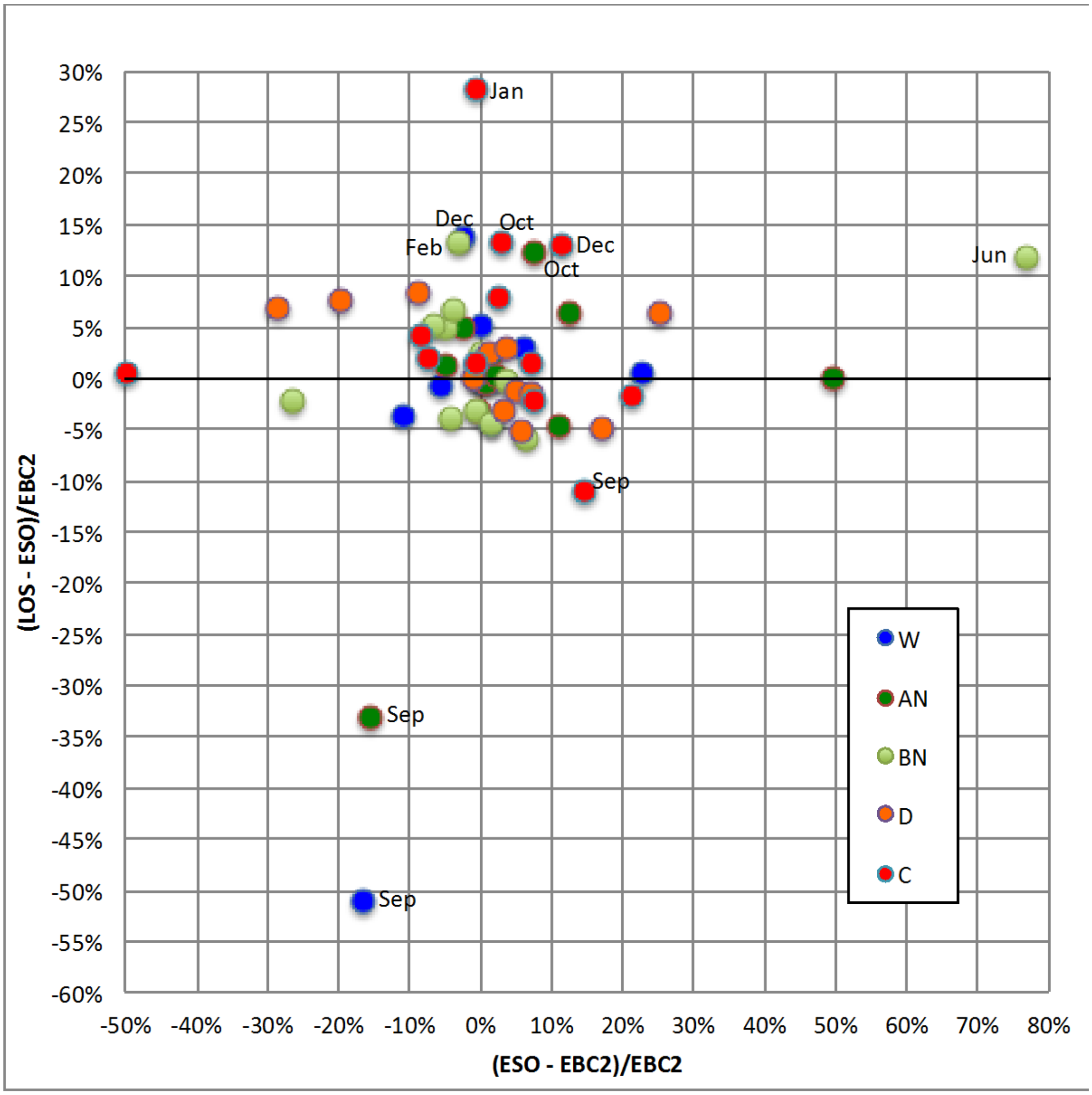

Figure 5C.5.3-213. Incremental Relative Effect of LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Feather River at Confluence, All Months and Water-Year Types

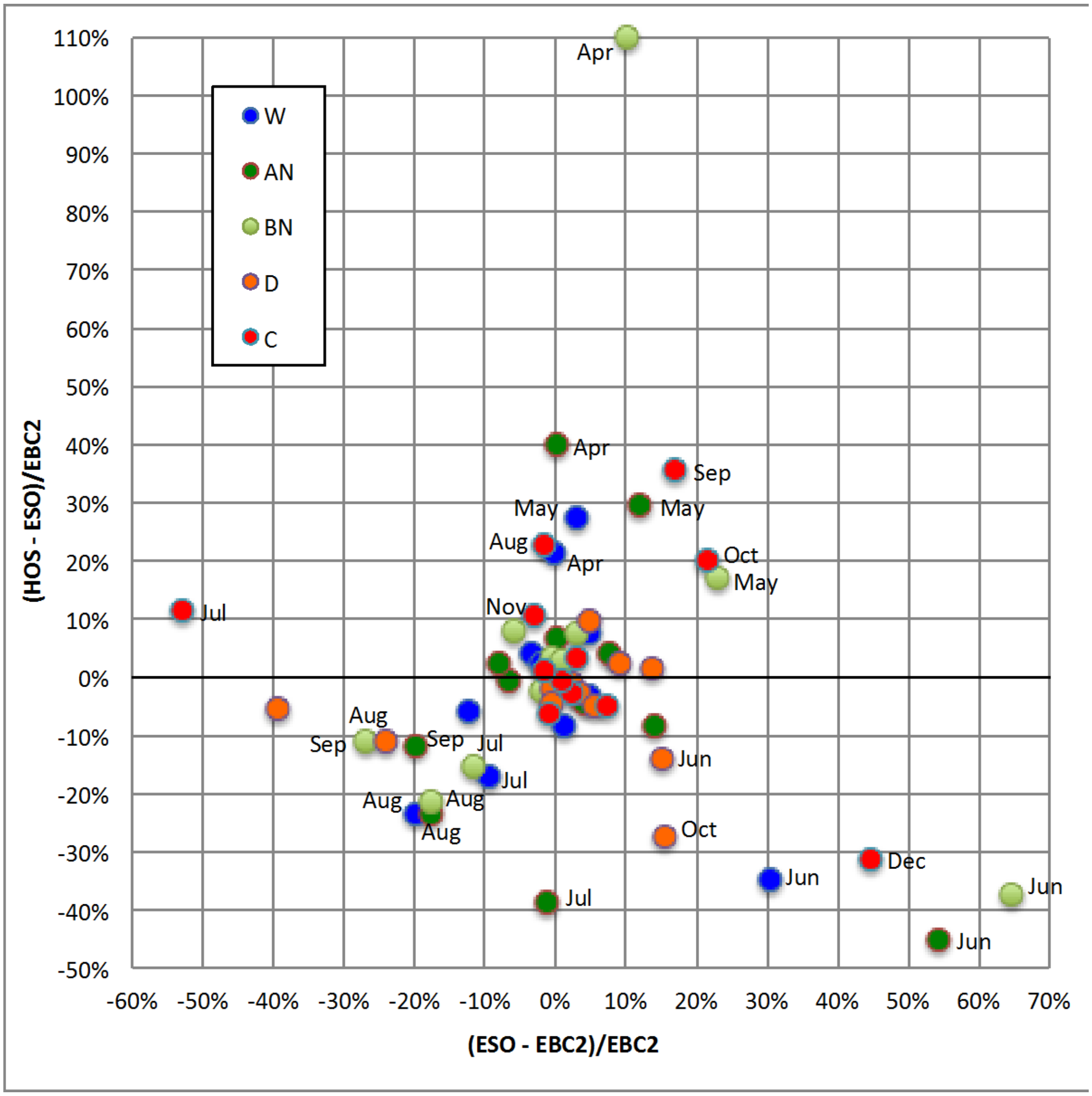

Figure 5C.5.3-214. Incremental Relative Effect of HOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Feather River at Confluence, All Months and Water-Year Types

Figure 5C.5.3-215. Incremental Relative Effect of LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Feather River at Confluence, All Months and Water-Year Types

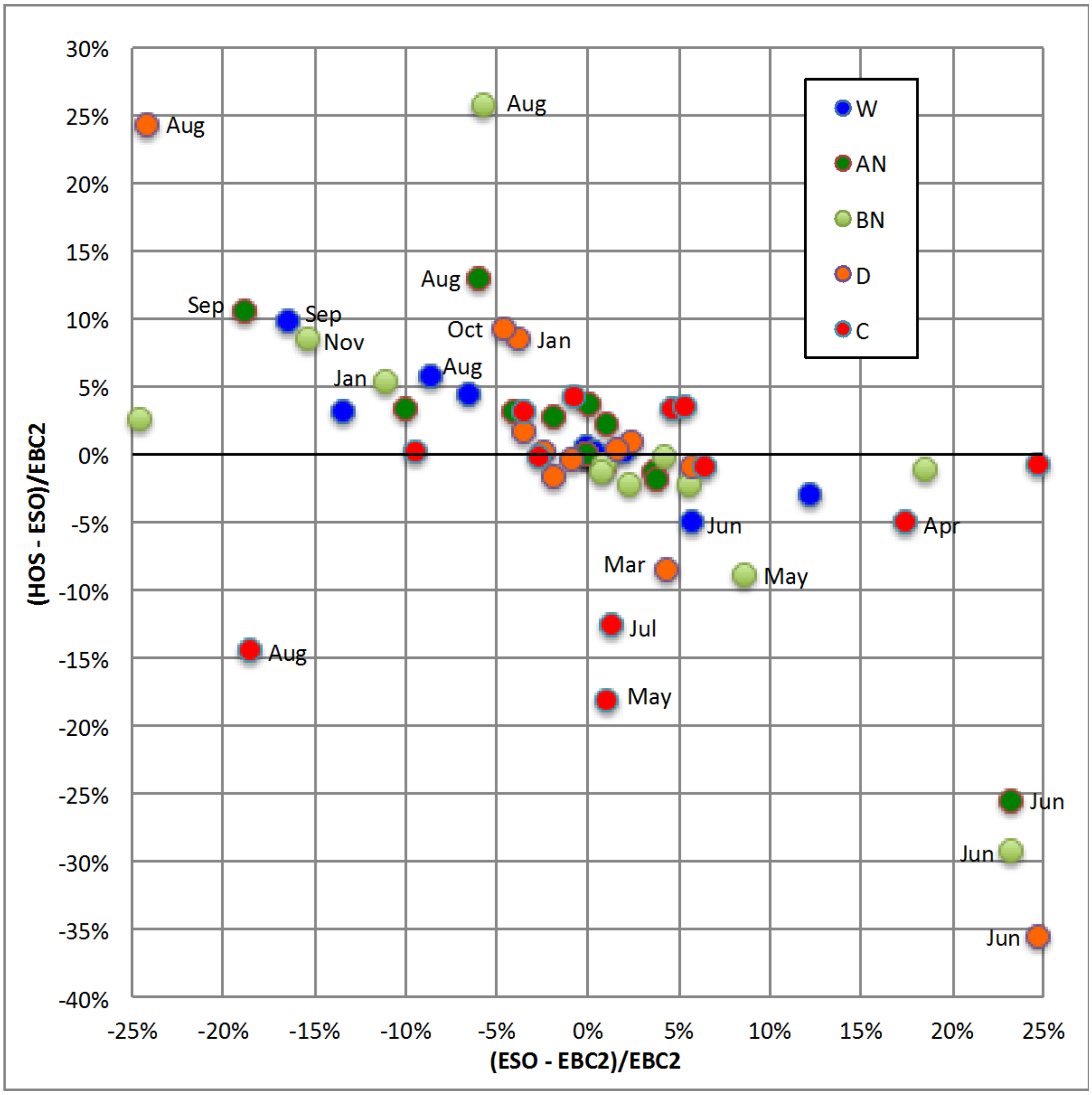

Figure 5C.5.3-216. Incremental Relative Effect of HOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the American River at Confluence, All Months and Water-Year Types

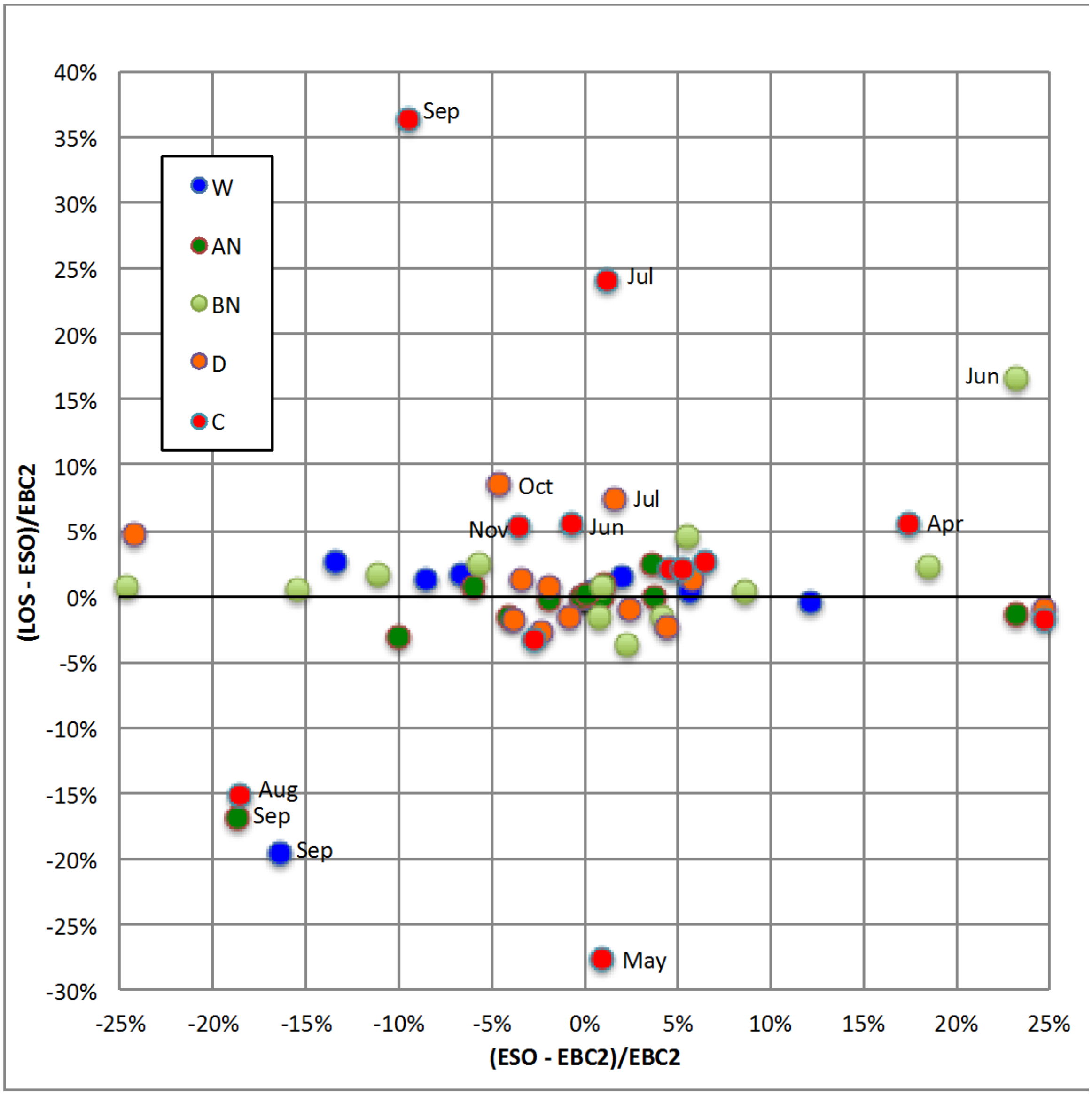

Figure 5C.5.3-217. Incremental Relative Effect of LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the American River at Confluence, All Months and Water-Year Types

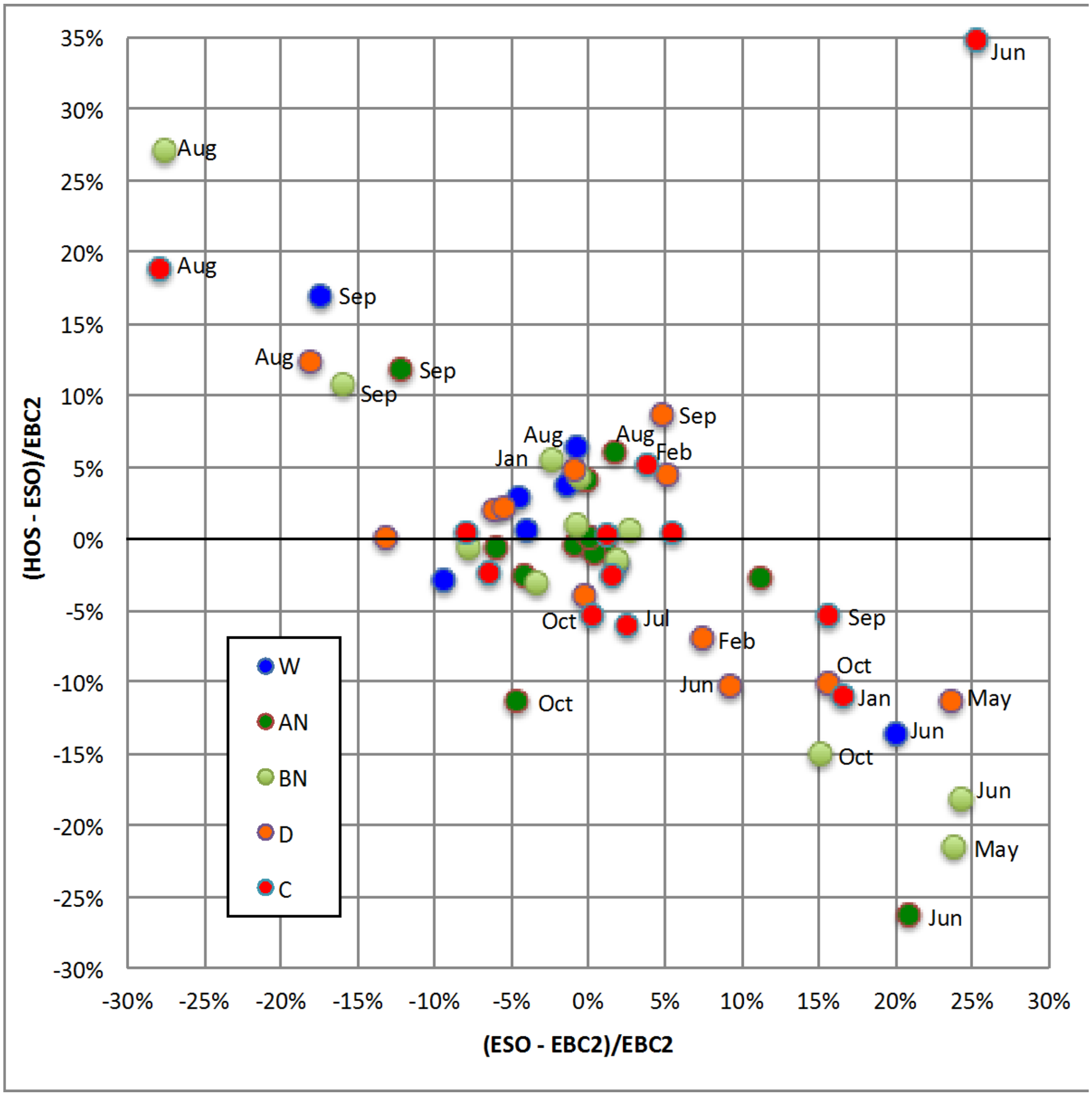

Figure 5C.5.3-218. Incremental Relative Effect of HOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the American River at Confluence, All Months and Water-Year Types

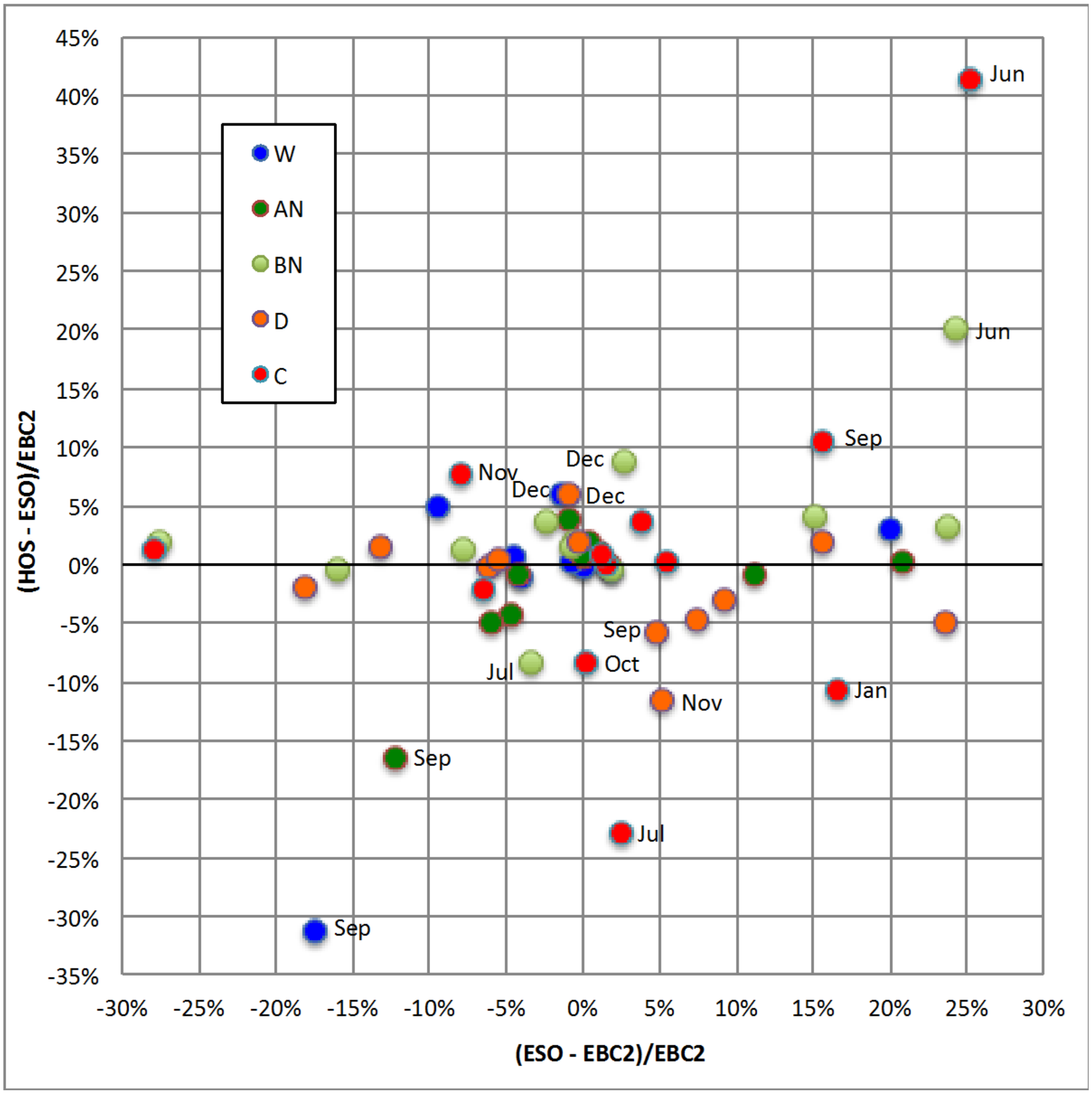

Figure 5C.5.3-219. Incremental Relative Effect of LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the American River at Confluence, All Months and Water-Year Types

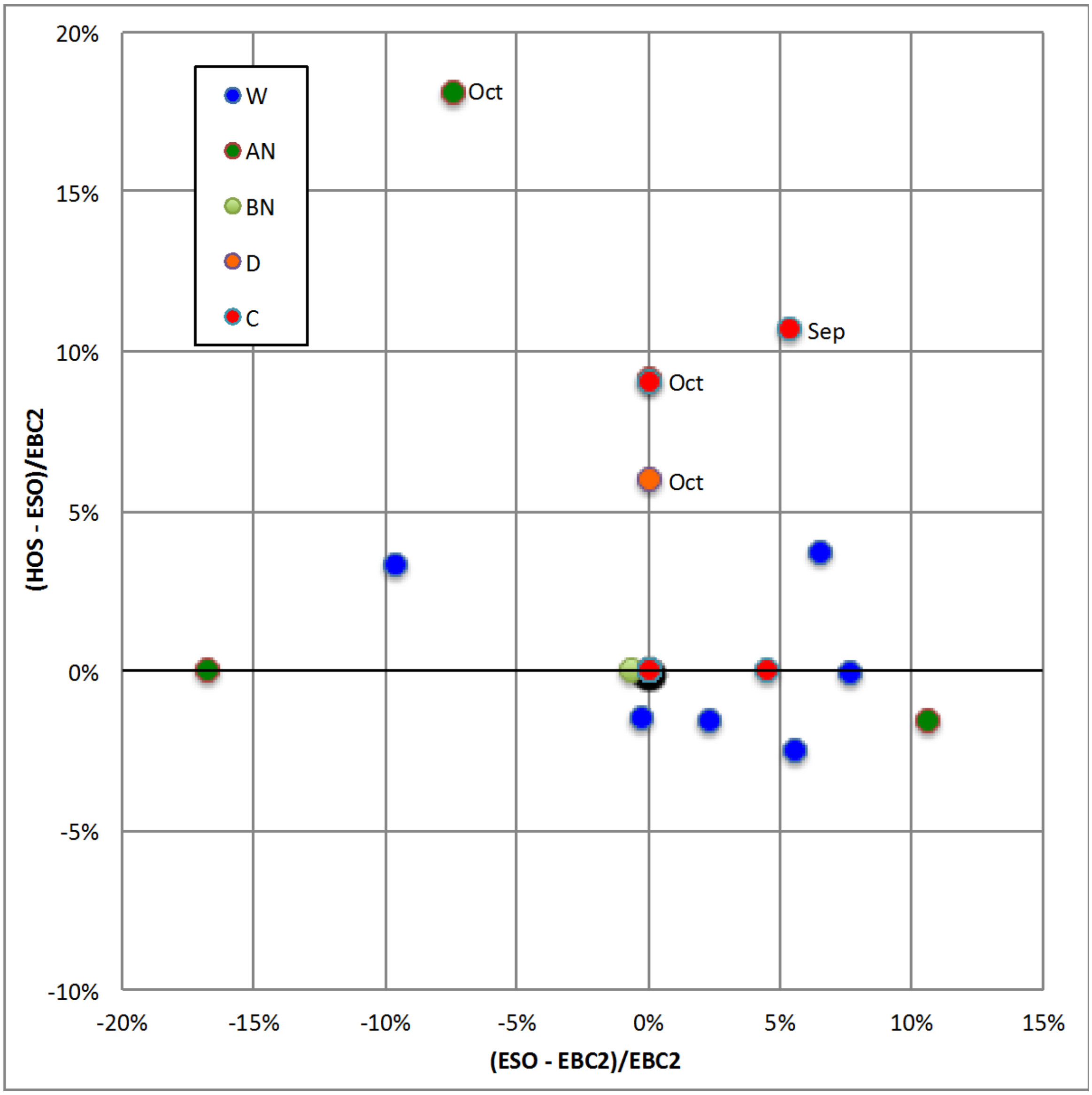

Figure 5C.5.3-220. Incremental Relative Effect of HOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Trinity River Downstream of Lewiston, All Months and Water-Year Types

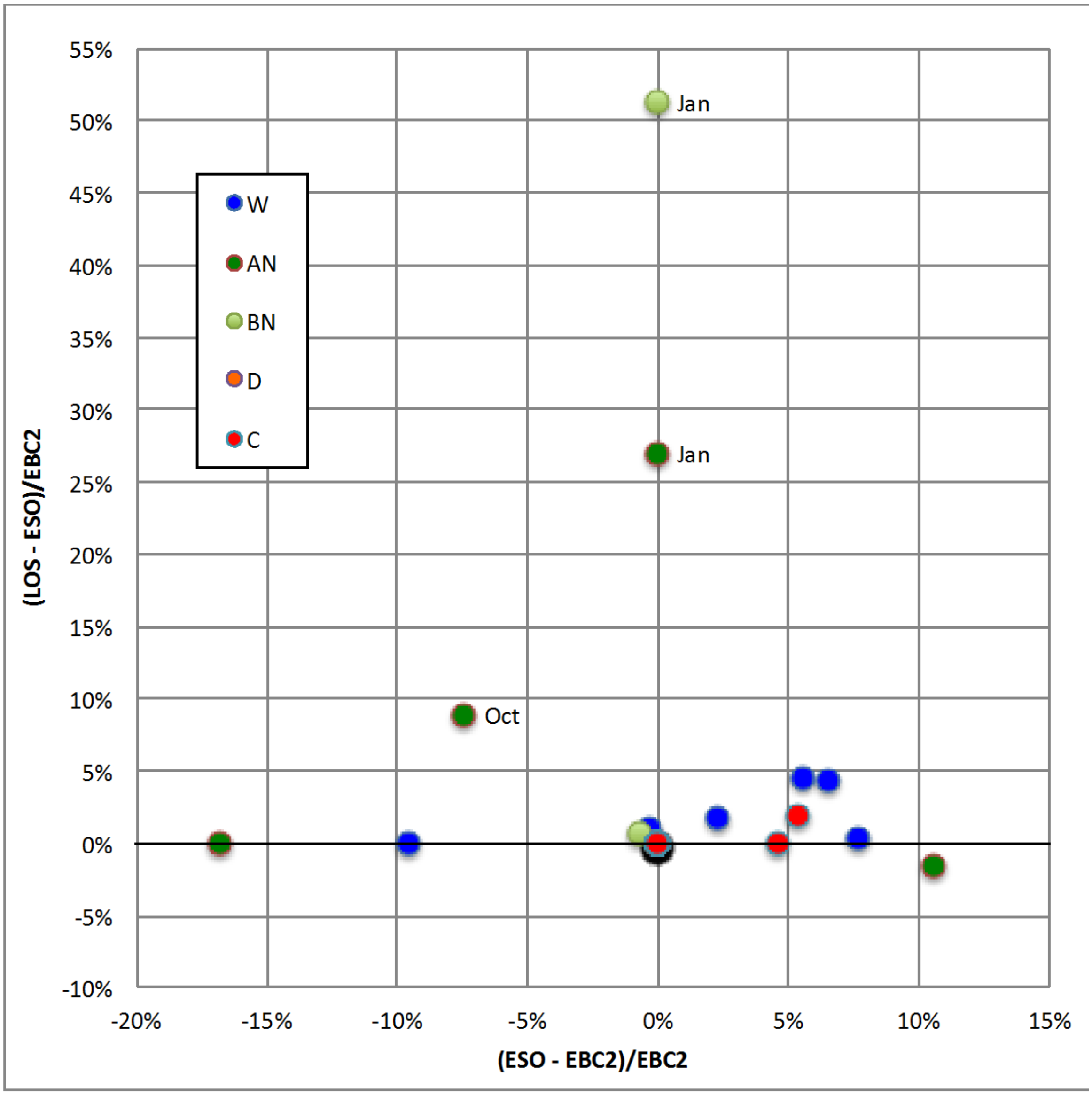

Figure 5C.5.3-221. Incremental Relative Effect of LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Trinity River Downstream of Lewiston, All Months and Water-Year Types

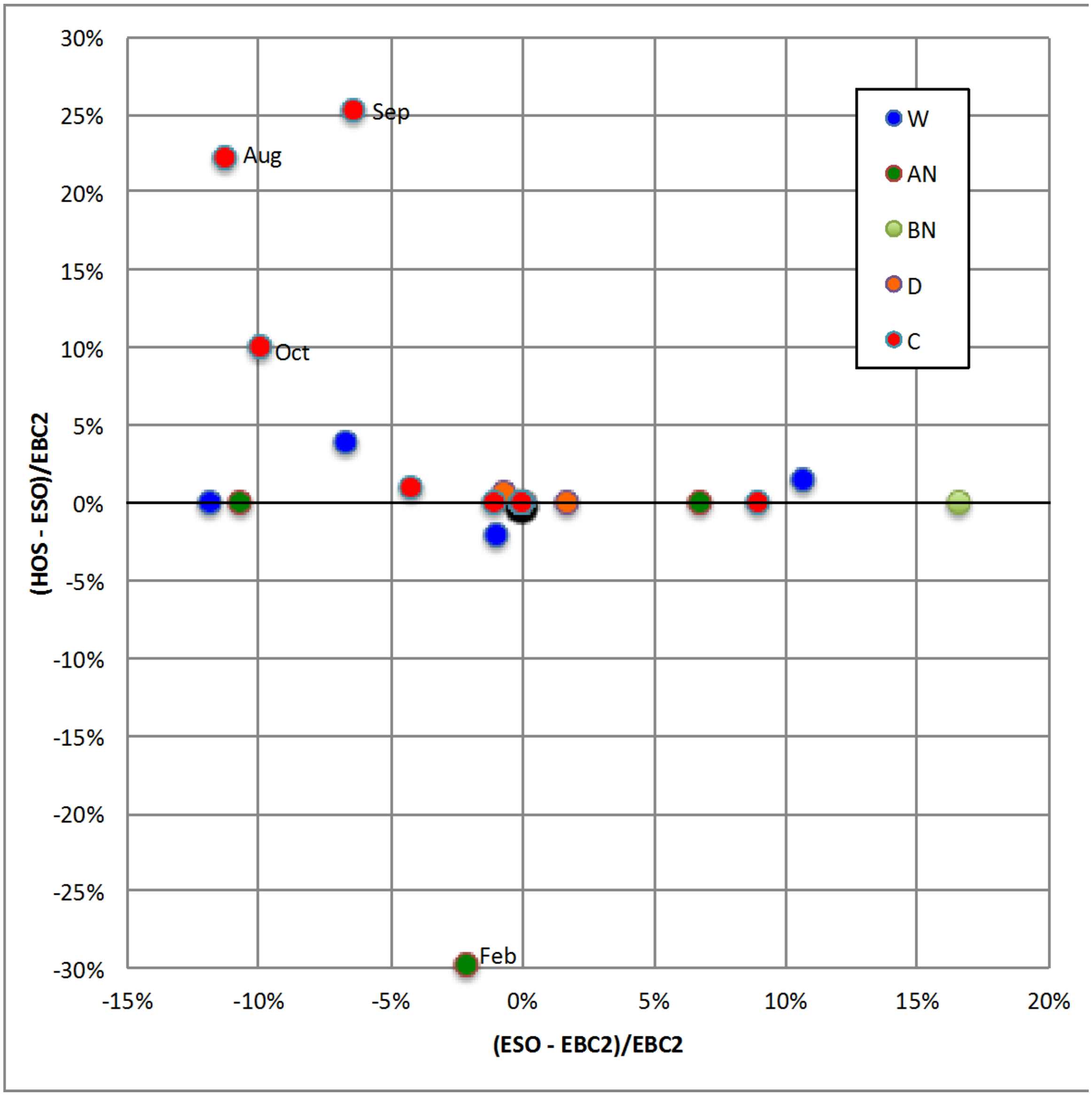

Figure 5C.5.3-222. Incremental Relative Effect of HOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Trinity River Downstream of Lewiston, All Months and Water-Year Types

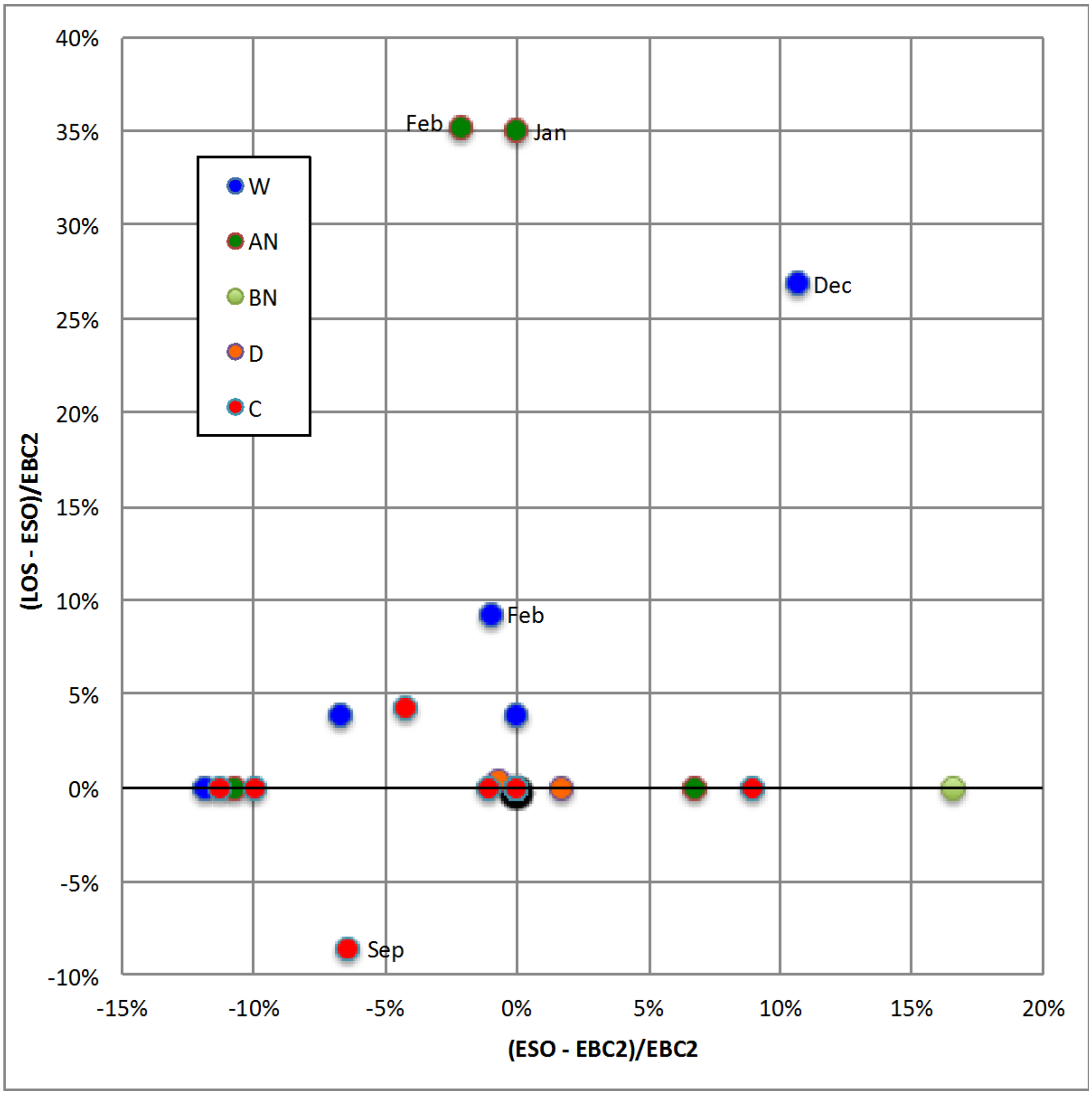

Figure 5C.5.3-223. Incremental Relative Effect of LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Trinity River Downstream of Lewiston, All Months and Water-Year Types

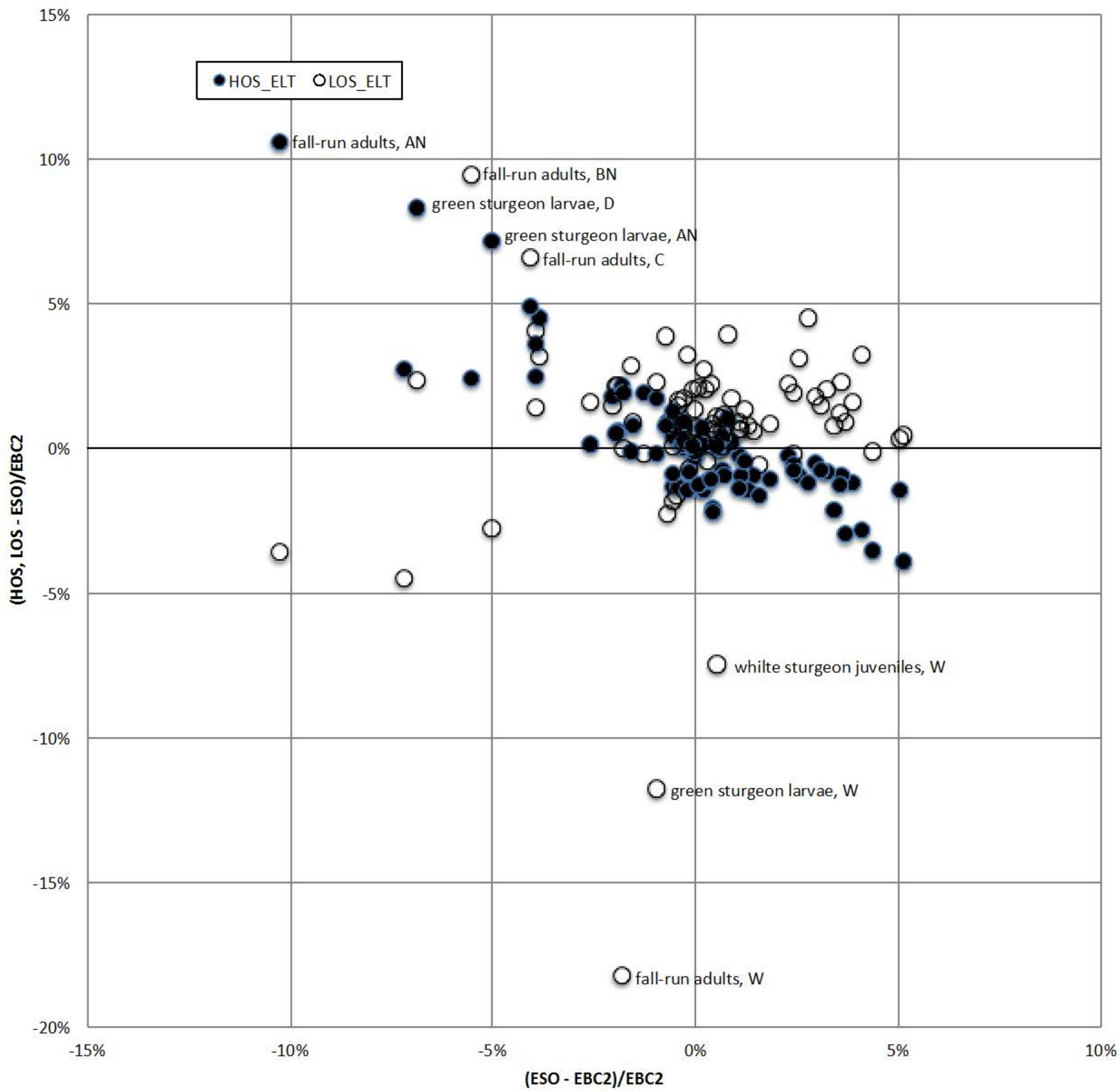

Figure 5C.5.3-224. Incremental Relative Effect of HOS_ELT/LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River Upstream of Red Bluff, All Water-Year Types during Months of Migration Period Only

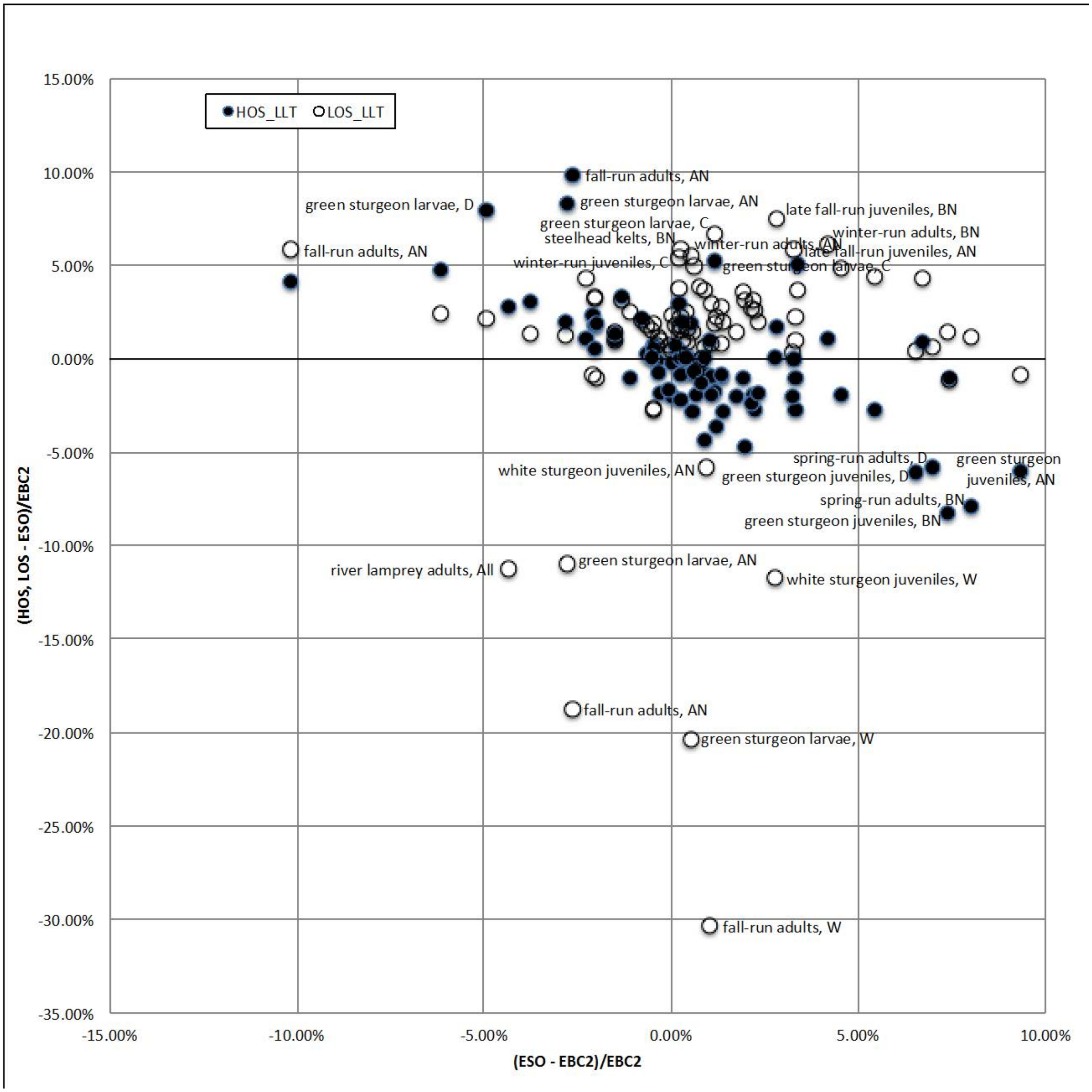

Figure 5C.5.3-225. Incremental Relative Effect of HOS_LLT/LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River Upstream of Red Bluff, All Water-Year Types during Months of Migration Period Only

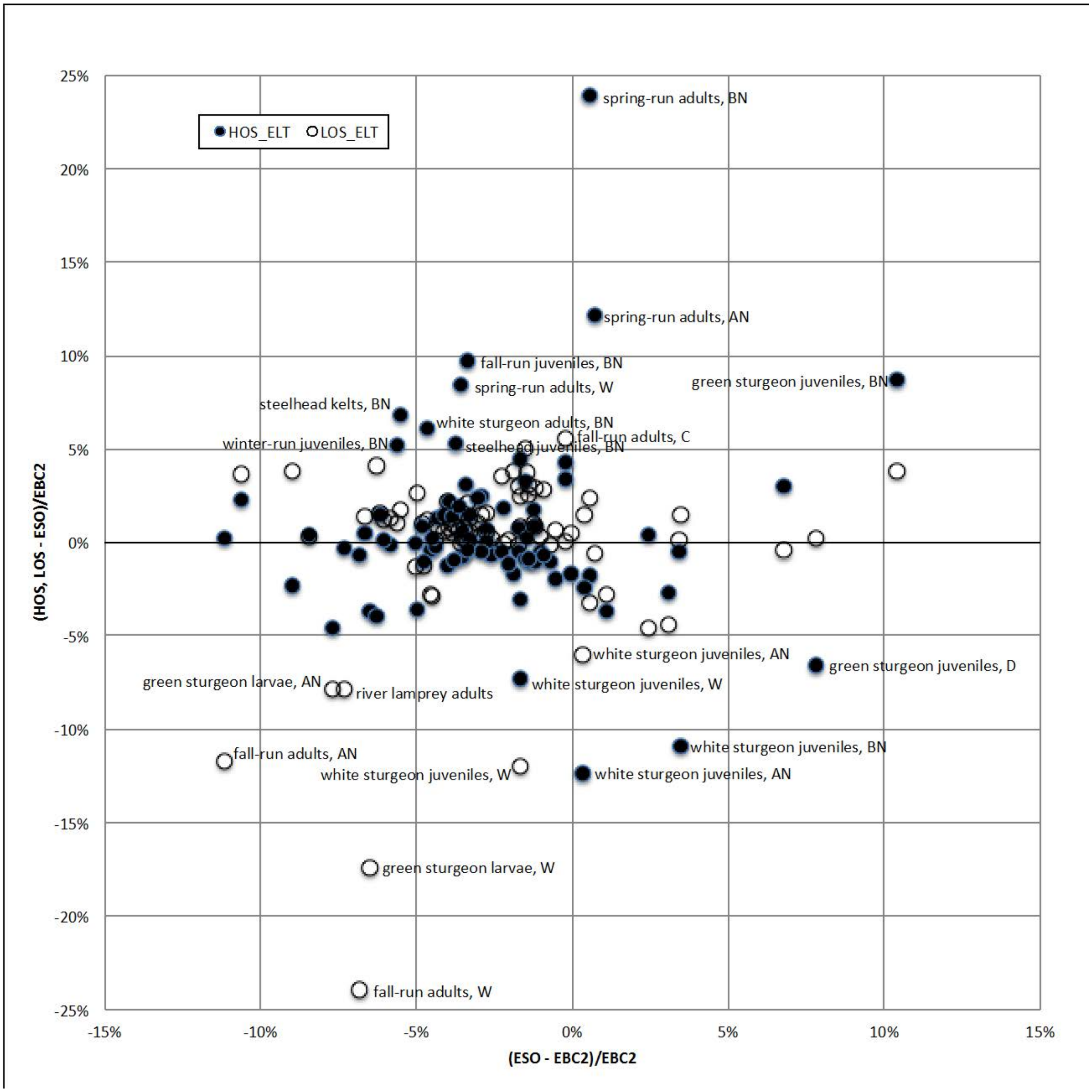

Figure 5C.5.3-226. Incremental Relative Effect of HOS_ELT/LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River at Freeport, All Water-Year Types during Months of Migration Period Only

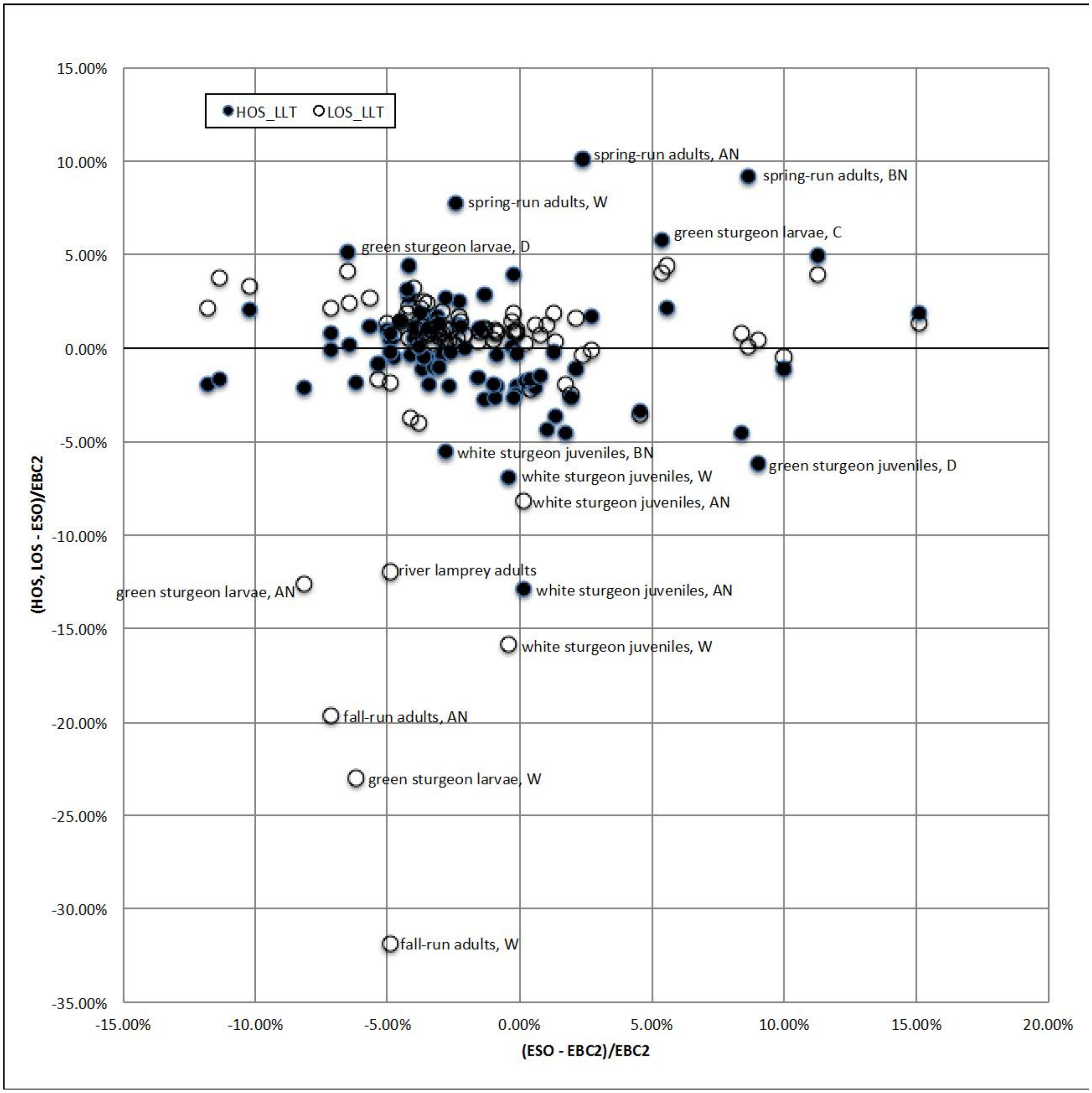

Figure 5C.5.3-227. Incremental Relative Effect of HOS_LLT/LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River at Freeport, All Water-Year Types during Months of Migration Period Only

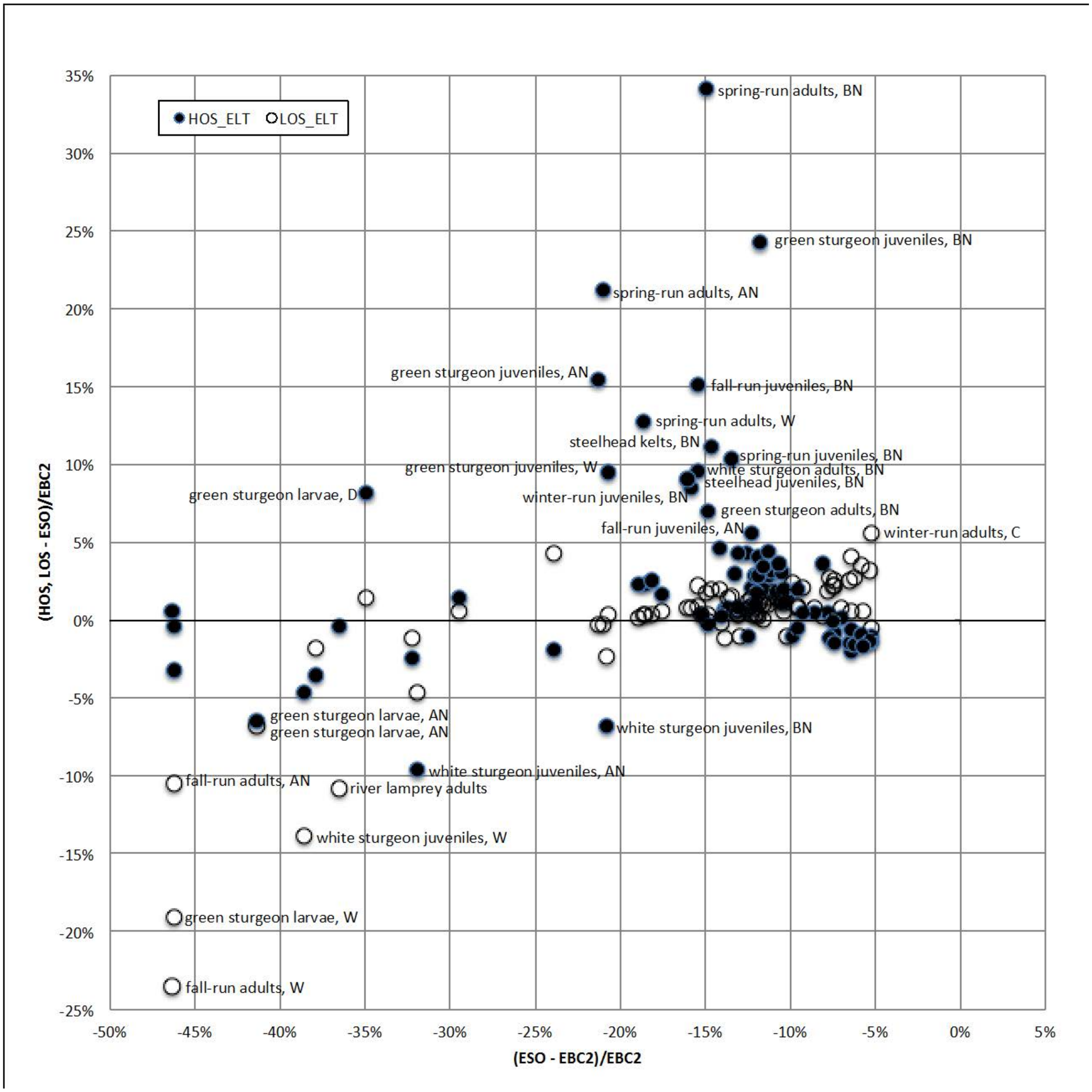

Figure 5C.5.3-228. Incremental Relative Effect of HOS_ELT/LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Sacramento River at Rio Vista, All Water-Year Types during Months of Migration Period Only

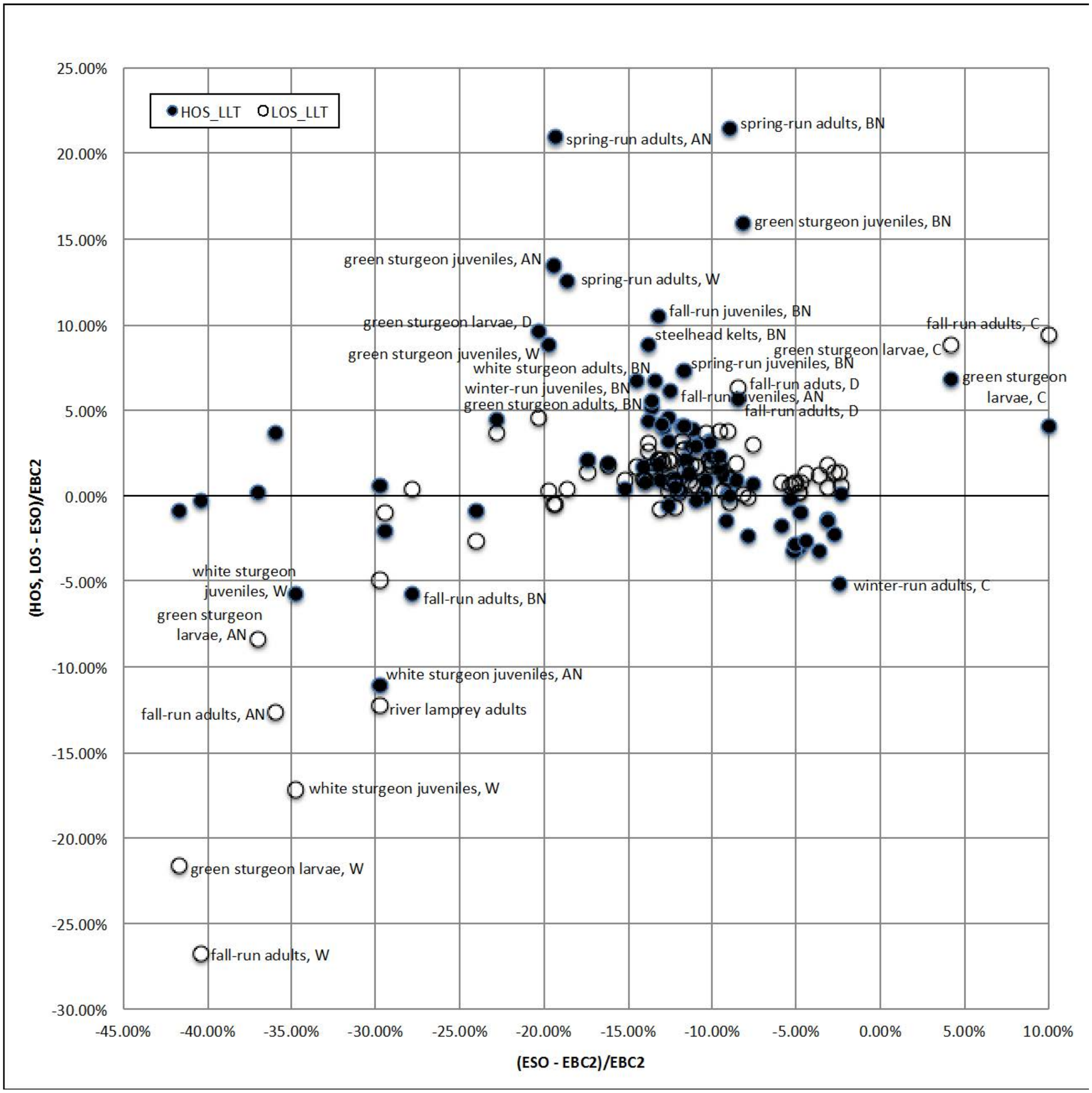

Figure 5C.5.3-229. Incremental Relative Effect of HOS_LLT/LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Sacramento River at Rio Vista, All Water-Year Types during Months of Migration Period Only

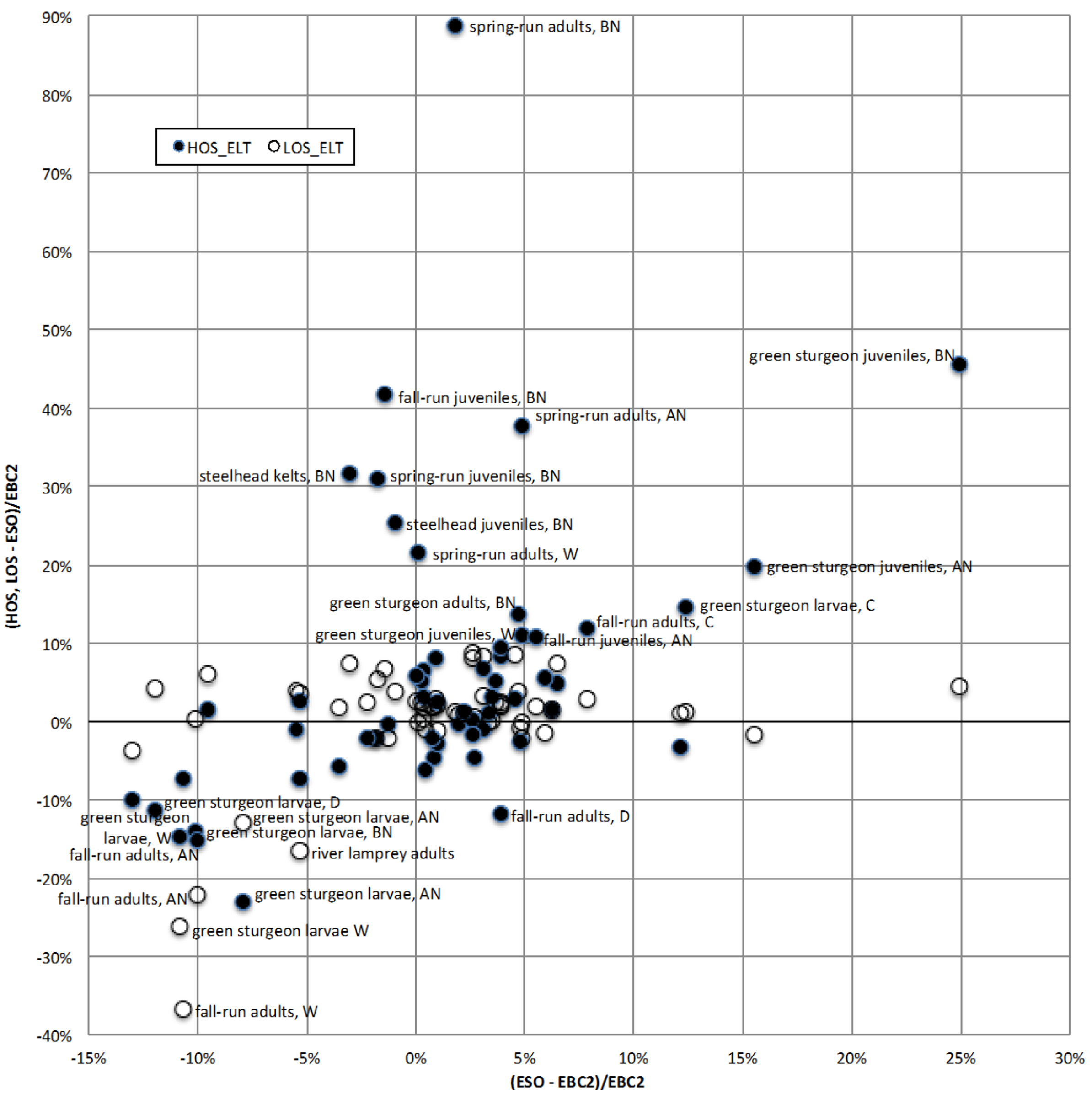

Figure 5C.5.3-230. Incremental Relative Effect of HOS_ELT/LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Feather River at Confluence, All Water-Year Types during Months of Migration Period Only

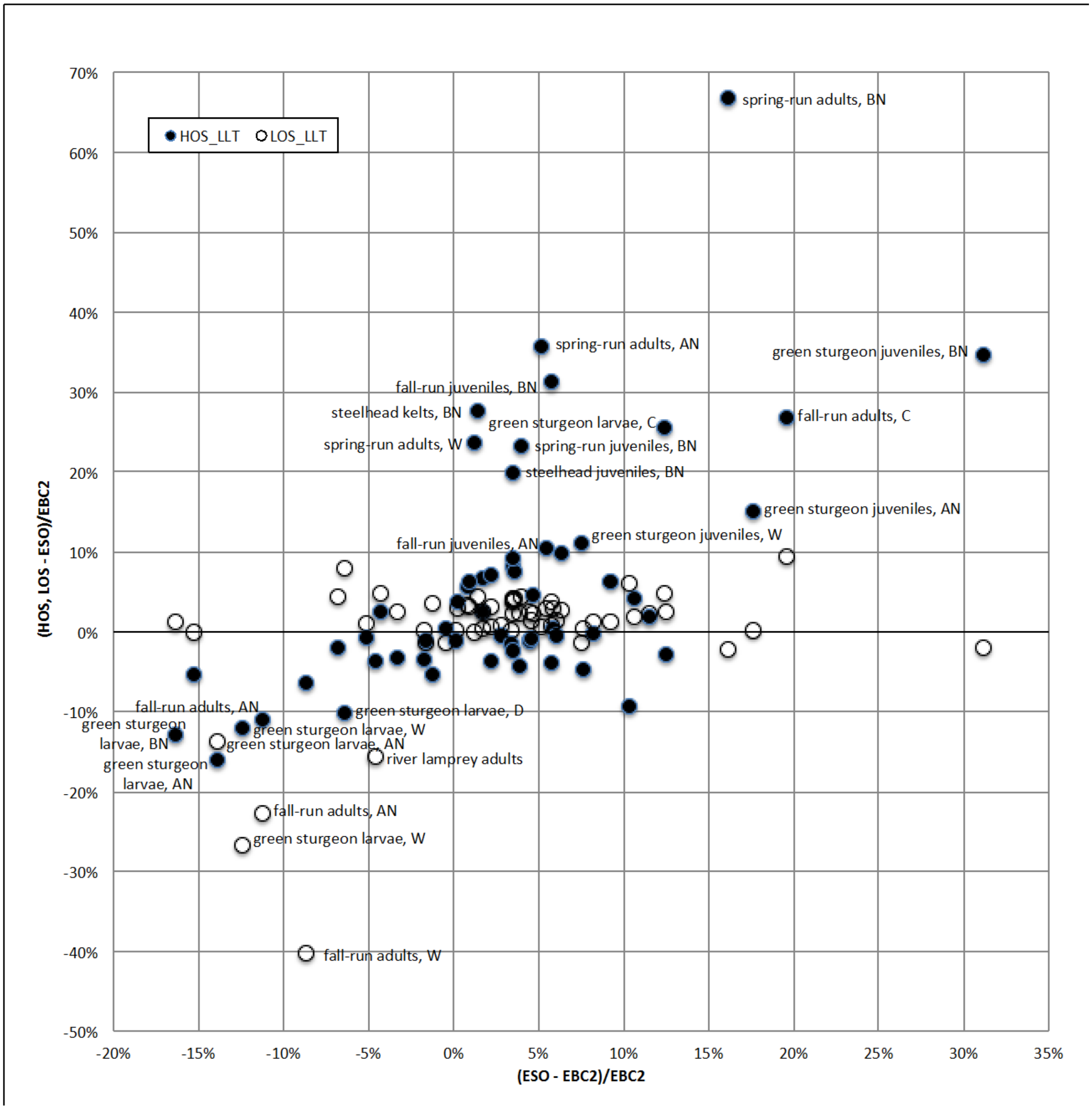

Figure 5C.5.3-231. Incremental Relative Effect of HOS_LLT/LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Feather River at Confluence, All Water-Year Types during Months of Migration Period Only

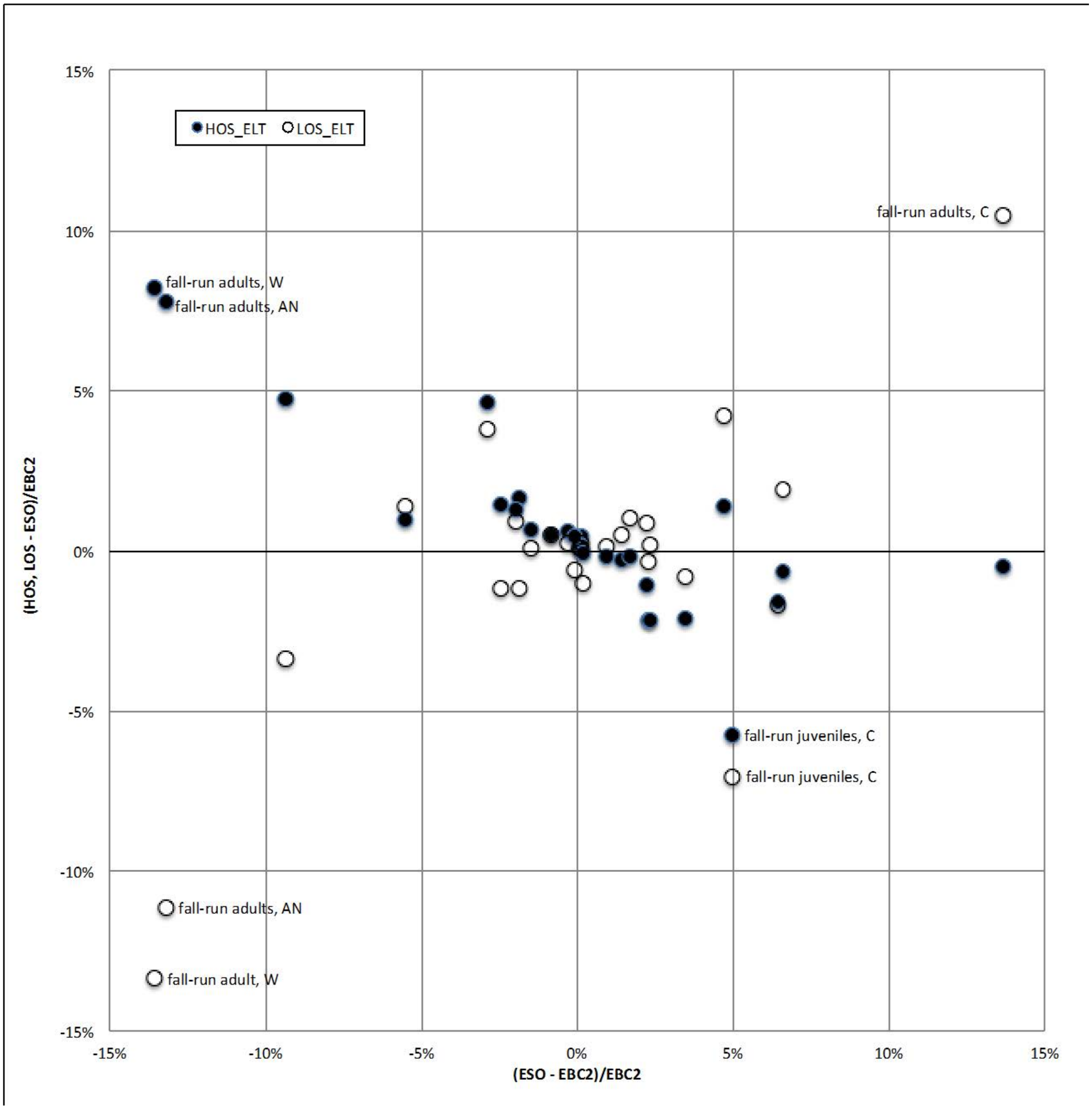

Figure 5C.5.3-232. Incremental Relative Effect of HOS_ELT/LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the American River at Confluence, All Water-Year Types during Months of Migration Period Only

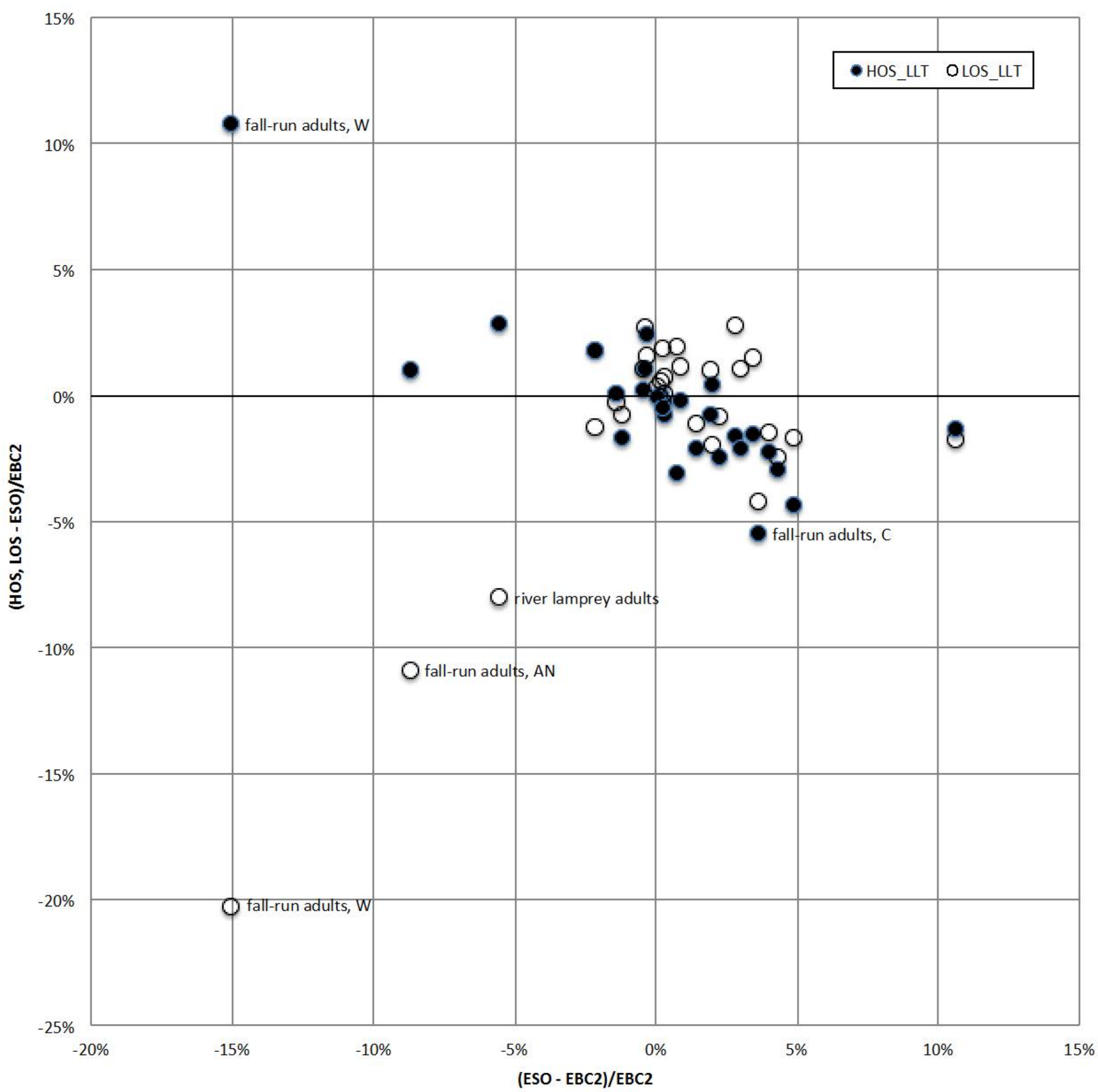

Figure 5C.5.3-233. Incremental Relative Effect of HOS_LLT/LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the American River at Confluence, All Water-Year Types during Months of Migration Period Only

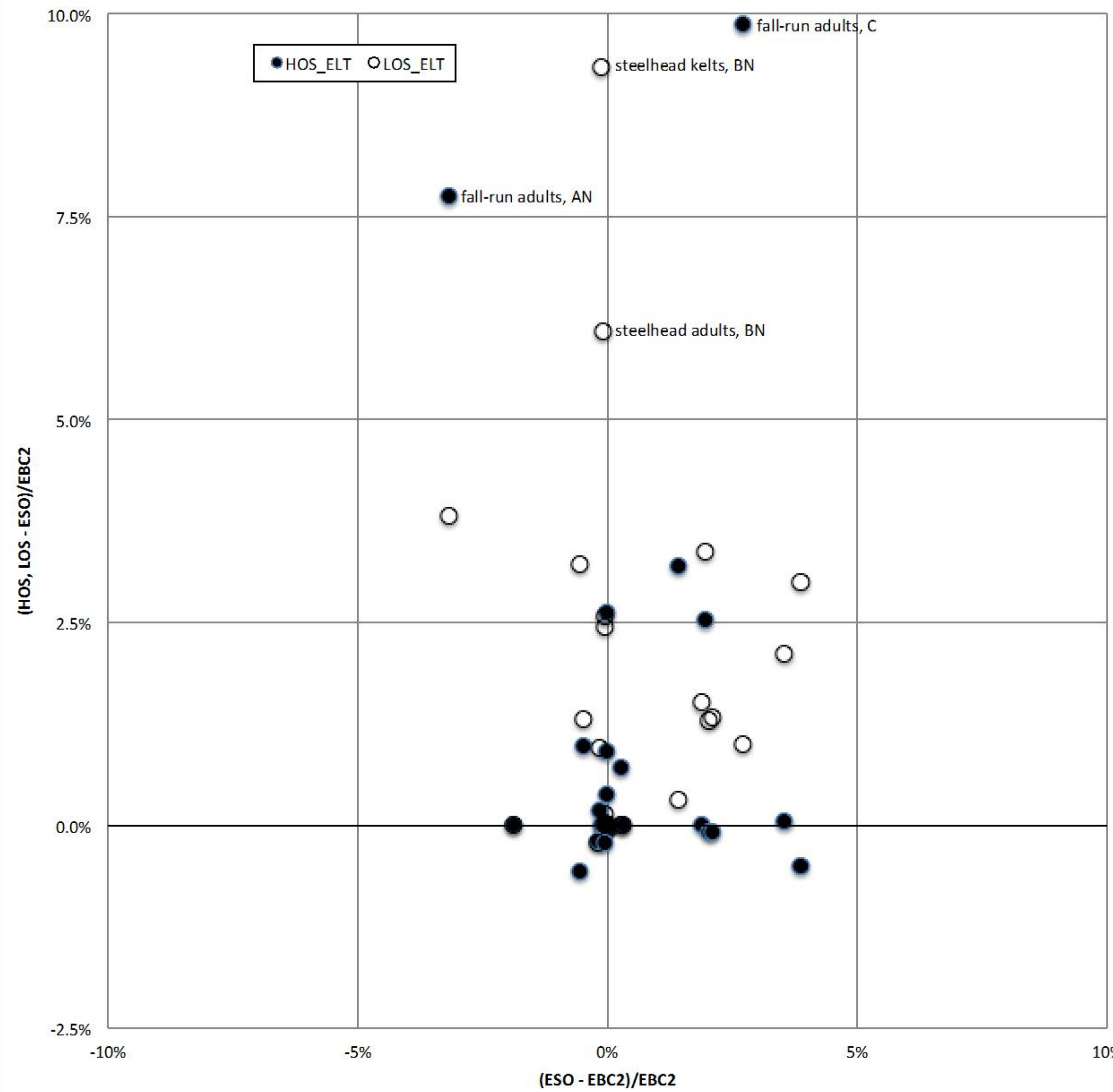

Figure 5C.5.3-234. Incremental Relative Effect of HOS_ELT/LOS_ELT as a Function of Relative Effect of ESO_ELT, Scaled by EBC2_ELT, on Flows in the Trinity River Downstream of Lewiston, All Water-Year Types during Months of Migration Period Only

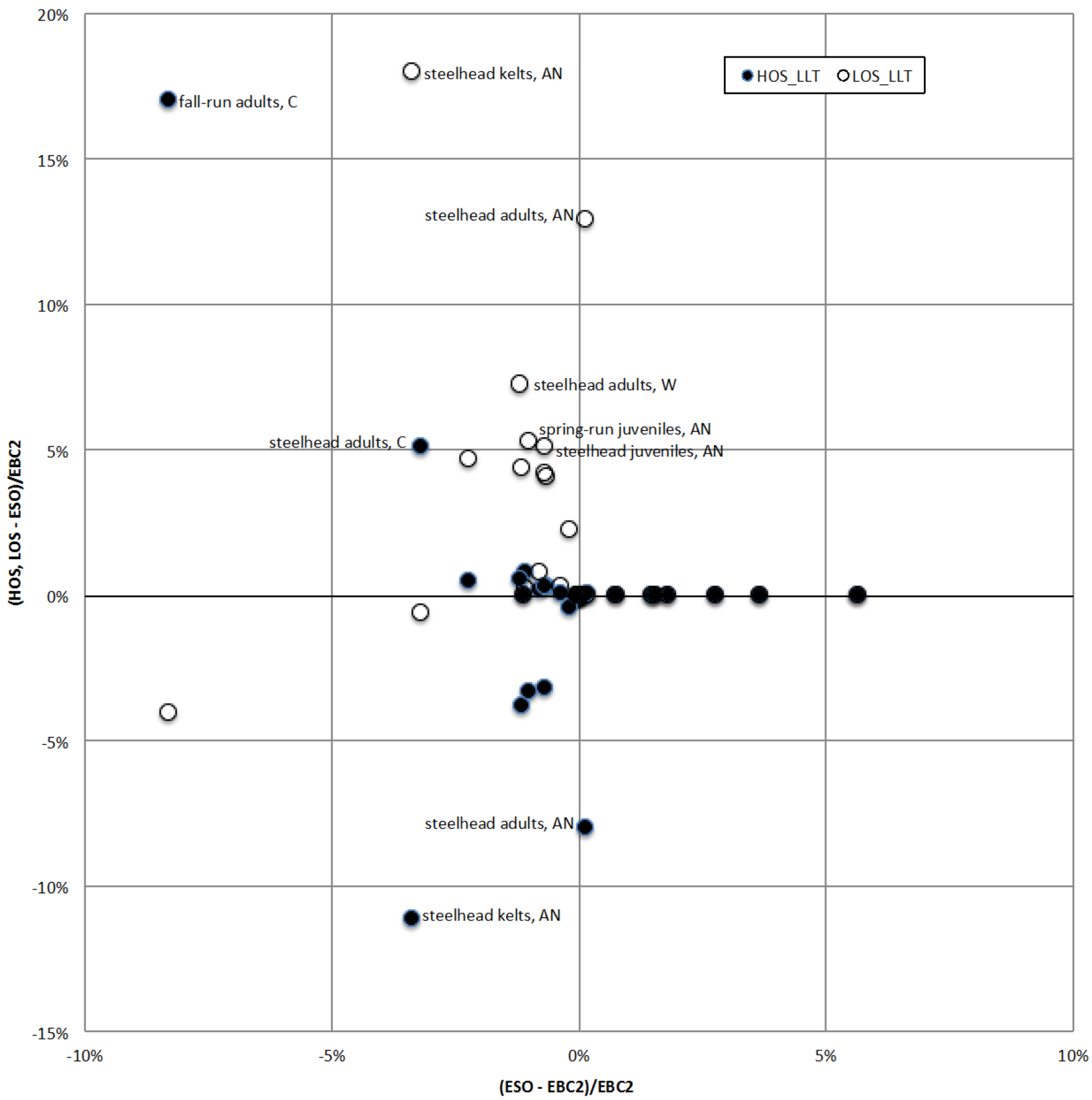

Figure 5C.5.3-235. Incremental Relative Effect of HOS_LLT/LOS_LLT as a Function of Relative Effect of ESO_LLT, Scaled by EBC2_LLT, on Flows in the Trinity River Downstream of Lewiston, All Water-Year Types during Months of Migration Period Only