



Memorandum

Date: March 30, 2010

To: Mr. Dean Messer, Division Chief
Department of Water Resources
Division of Environmental Services
3500 Industrial Boulevard
West Sacramento, California 95691-6521

From: Charles Armor, Regional Manager, Department of Fish and Game, Post Office Box 47,
Yountville, California 94599

Subject: Mitigation Loss Calculations for the Four Pumps Agreement

The State Water Project (SWP) mitigation loss calculation for 2009 is complete as required by the Four Pumps Agreement between the Department of Water Resources and the Department of Fish and Game. As previously agreed, loss of striped bass under 21 mm is based on the mean loss from 1985 through 1995. The estimated mitigation losses for 2009, which are based on five-year mean values, are as follows:

<u>SPECIES</u>	<u>NUMBER OF EQUIVALENTS</u>
Striped bass	96,481 (yearlings)
Chinook salmon	48,126 (smolts)
Steelhead rainbow trout	6,845 (yearlings)

The attached table lists the annual SWP loss estimates for yearling-equivalent striped bass, smolt-equivalent Chinook salmon, and yearling-equivalent steelhead rainbow trout (Table 1). The five-year loss running averages are also attached (Table 2).

If you have any questions, please contact Geir Aasen, Associate Biologist, at (209) 948-7086, or Bob Fujimura, Senior Fisheries Biologist, at (209) 948-7097

Attachments

cc: Department of Water Resources, West Sacramento
Ms. Stephani Spaar, Branch Chief
Ms. Delores Brown, Office Chief
Mrs. Laura Flournoy, Staff Environmental Scientist ✓

Department of Fish and Game
Mr. Carl Wilcox, Sacramento
Mr. Fred Jurick, Sacramento
Mr. Bob Fujimura, Stockton

Table 1. Yearling-equivalent losses for striped bass and steelhead rainbow trout and smolt-equivalent losses for Chinook salmon for the State Water Project, 1984-2009.

YEAR	Yearling-Equivalent Striped Bass		Total Loss	Smolt-Equivalent Chinook Salmon		Total Loss	YOY	Yearling-Equivalent Steelhead		Total Loss
	<20 mm	>20 mm		YOY	Yearling			YOY	Yearling	
1984		873,853	873,853	290,696	947,503	1,238,199	0	1,713	1,713	1,713
1985	65,177	370,976	436,153	472,512	489,713	962,225	0	15,621	15,621	15,621
1986	35,315	944,061	979,376	1,147,249	2,300,866	3,448,115	0	15,663	15,663	15,663
1987	41,726	954,958	996,684	528,544	713,791	1,242,334	747	21,266	22,013	22,013
1988	59,625	874,055	933,680	409,103	747,953	1,157,056	0	25,080	25,080	25,080
1989	56,306	579,003	635,309	373,717	246,641	620,358	253	32,571	32,824	32,824
1990	7,717	401,353	409,070	90,098	188,228	278,326	0	19,187	19,187	19,187
1991	15,117	192,765	207,882	122,127	128,466	250,593	0	38,430	38,430	38,430
1992	13,452	299,687	313,139	21,341	224,603	245,944	275	39,931	40,206	40,206
1993	25,766	1,194,011	1,219,777	17,547	68,521	86,068	0	47,782	47,782	47,782
1994	2,253	122,656	124,909	8,217	25,073	33,290	0	1,738	1,738	1,738
1995	3,256	265,225	268,481	26,224	199,012	225,236	0	4,802	4,802	4,802
1996*	29,610	214,213	243,823	28,425	121,437	149,862	0	14,240	14,240	14,240
1997*	29,610	219,225	248,835	39,792	38,973	78,765	0	1,153	1,153	1,153
1998*	29,610	71,980	101,590	10,107	28,683	38,790	0	352	352	352
1999*	29,610	271,436	301,046	199,537	73,867	273,404	0	4,917	4,917	4,917
2000*	29,610	926,501	956,111	173,324	71,333	244,657	74	27,848	27,922	27,922
2001*	29,610	262,459	292,069	97,264	80,472	177,736	67	35,146	35,213	35,213
2002*	29,610	243,270	272,880	16,914	36,751	53,665	24	9,606	9,630	9,630
2003*	29,610	173,492	203,102	43,318	96,780	140,098	0	25,262	25,262	25,262
2004*	29,610	161,021	190,631	26,479	84,691	111,170	0	20,321	20,321	20,321
2005*	29,610	101,999	131,609	38,600	63,400	102,000	0	9,859	9,859	9,859
2006*	29,610	39,341	68,951	26,330	38,851	65,181	0	5,837	5,837	5,837
2007*	29,610	85,342	114,952	4,862	10,904	15,766	11	6855	6,866	6,866
2008*	29,610	62,853	92,463	12,876	27,618	40,494	0	8,721	8,721	8,721
2009*	29,610	44,822	74,432	7,563	9,627	17,190	0	2,942	2,942	2,942

* After the sampling program was eliminated, YE Striped Bass <20mm estimate is the average of 85-95 loss.

Table 2. Five year running averages for yearling-equivalent losses for striped bass and steelhead rainbow trout and smolt-equivalent losses for Chinook salmon for the State Water Project, 1984-2009.

Period	Yearling-Equivalent Striped Bass			Smolt-Equivalent Chinook Salmon			Yearling-Equivalent Steelhead			Total Loss
	<20 mm	>20 mm	Total Loss	YOY	Yearling	Total Loss	YOY	Yearling	Total Loss	
	Mean 84-88	50,461	803,581	854,041	569,621	1,039,965	1,609,586	149	15,869	
Mean 85-89	51,630	744,611	796,240	586,225	899,793	1,486,018	200	22,040	22,240	
Mean 86-90	40,138	750,686	790,824	509,742	839,496	1,349,238	200	22,753	22,953	
Mean 87-91	36,098	600,427	636,525	304,718	405,016	709,733	200	27,307	27,507	
Mean 88-92	30,443	469,373	499,816	203,277	307,178	510,455	106	31,040	31,145	
Mean 89-93	23,672	533,364	557,035	124,966	171,292	296,258	106	35,580	35,686	
Mean 90-94	12,861	442,094	454,955	51,866	126,978	178,844	55	29,414	29,469	
Mean 91-95	11,969	414,869	426,838	39,091	129,135	168,226	55	26,537	26,592	
Mean 92-96	14,867	419,158	434,026	20,351	127,729	148,080	55	21,699	21,754	
Mean 93-97	18,099	403,066	421,165	24,041	90,603	114,644	0	13,943	13,943	
Mean 94-98	18,868	178,660	197,528	22,553	82,636	105,189	0	4,457	4,457	
Mean 95-99	24,339	208,416	232,755	60,817	92,394	153,211	0	5,093	5,093	
Mean 96-00	29,610	340,671	370,281	90,237	66,859	157,096	15	9,702	9,717	
Mean 97-01	29,610	350,320	379,930	104,005	58,666	162,670	28	13,883	13,911	
Mean 98-02	29,610	355,129	384,739	99,429	58,221	157,650	33	15,574	15,607	
Mean 99-03	29,610	375,432	405,042	106,071	71,841	177,912	33	20,556	20,589	
Mean 00-04	29,610	353,349	382,959	71,460	74,005	145,465	33	23,637	23,670	
Mean 01-05	29,610	188,448	218,058	44,515	72,419	116,934	18	20,039	20,057	
Mean 02-06	29,610	143,825	173,435	30,328	64,095	94,423	5	14,177	14,182	
Mean 03-07	29,610	112,239	141,849	27,918	58,925	86,843	2	13,627	13,629	
Mean 04-08	29,610	90,111	119,721	21,829	45,093	66,922	2	10,319	10,321	
Mean 05-09	29,610	66,871	96,481	18,046	30,080	48,126	2	6,843	6,845	