

from2008 BA

Percent change in mortality compared to

	Study 7.1	Study 8.0	Study 6.0
Trinity	0.11	0.00	0.00
Feather	-0.07	-0.06	-0.12
American	-0.03	-1.61	-0.20
Stanislaus	-0.55	-0.07	-0.02
Sacramento Fall	-0.02	0.00	
Sacramento late fall	-0.01	0.00	-0.01
Total Central Valley fall and late fall production			

2019 calcs

Median change in survival or production

River and run	Upstream effects - Egg Mortality Model		
	median	97.5 %ile	2.5 %ile
Sacramento River winter-run			
Sacramento River spring-run			
Sacramento River fall-run			
Sacramento River late fall-run			
Clear Creek fall and spring-run			
American River fall-run	-0.0001	0.0389	-0.0333
Stanislaus River fall-run	0.0037	0.1542	-0.1042
Feather River fall and spring-run			
Other Sac Runs (spring)			
Other Sac Runs (fall)			
San Joaquin Basin			
Mokelumne			

Aggregate change in survival (and production) from COS to PA			
Upstream	Values scaled to CV-wide proportion		
	median	97.5 %ile	2.5 %ile
Sacramento River winter-run	lifecycle result for ocean abundance		
Sacramento River spring-run	0.00000	0.0464301	-0.03052036
Sacramento River fall-run	-0.00033	0.0071187	-0.01943586
Sacramento River late fall-run	-0.00018	0.0020933	-0.00204139
American River fall-run	-0.00002	0.0086853	-0.00743497
Stanislaus River fall-run	0.00004	0.0015268	-0.00103173
Feather River Fall/spring	upstream changes not quantified for these runs		
Other Sac Tribs -spring			
Other Sac Tribs - fall			
Upstream survival change	-0.00050	0.06585	-0.06046
Upstream survival compared to COS	0.99950	1.06585	0.93954

Delta Survival Change - Sac River Basin

River and run	median	97.5 %ile	2.5 %ile
Sacramento River spring-run	-0.000002	0.000005	-0.000004
Sacramento River fall-run	-0.000314	0.002105	-0.001646
Sacramento River late fall-run	-0.000059	0.000216	-0.001854
Sacramento River winter-run	IOS lifecycle model to ocean		
Clear Creek fall and spring-run	-0.000074	0.000494	-0.000386
American River fall-run	-0.000724	0.004847	-0.003789
Feather River Fall/spring	0.000777	0.004068	-0.005203
Other Sac Tribs -spring	-0.000110	0.000330	-0.000304
Other Sac Tribs - fall	-0.000945	0.006328	-0.004947
Delta Survival change	-0.001451	0.018393	-0.018135
Delta Survival compared to COS	0.998549	1.0183934	0.981865262
Natural fish in Bay baseline (COS)	7,213,294	7,345,971	7,212,754
Freshwater change (upstream X Delta)	0.99805	1.08546	0.92250
Natural fish in Bay in PA	7,199,260	7,829,734	6,654,245

	median	97.5 %ile	2.5 %ile
Natural Chinook smolts in Bay baseline (COS)	7,213,294	7,345,971	7,212,754
Natural Chinook smolts in Bay in PA	7,199,260	7,829,734	6,654,245
Hatchery juvenile Chinook total in Bay COS	16,831,019	19,710,070	16,082,252
Hatchery juvenile Chinook total in Bay PA	16,792,102	19,647,691	16,135,970
Total juvenile Chinook in Bay (COS)	24,044,313	27,056,041	23,295,006
Total juvenile Chinook in Bay (PA)	23,991,362	27,477,426	22,790,215
Bay to ocean adult survival	0.0189	0.0189	0.0189
Ocean Adult Chinook Abundance (COS), not including winter-run	454,052	510,925	439,902
Ocean Adult Chinook Abundance (PA), not including winter-run	453,052	518,882	430,369
Adjustment for winter-run from IOS model			
Winter-run Chinook COS (IOS model) *	3,293	9,345	446
Winter-run Chinook COS to PA (proportional IOS model changes)	0.106	0.501	-0.450
Winter-run Chinook PA (IOS model changes)	3,641	14,024	245
Ocean Adult Chinook Abundance (COS)	457,345	520,270	440,347
Ocean Adult Chinook Abundance (PA)	456,693	532,907	430,615
Change in median number of Adult Chinook in the Ocean COS to PA	-652	12,637	-9,733
Percent abundance change in adult Chinook in the Ocean from COS to PA	-0.14%	2.43%	-2.21%
Change in Chinook Biomass (pounds) COS to PA**	-11,005	213,435	-164,386

* The median winter-run Chinook ocean abundance for 2001-2018 was used as the baseline in COS and proportional changes over the IOS modeling period are applied to that value

** median adult weight of 16.89 pounds

Hatchery fish release, all runs combined, 2007-2013	35,059,237
Hatchery proportion, average all runs from 2012, 2013, 2014 run years	0.7 range = 65-75%
Smolt survival RBDD to the delta based on JPE (2013-2018 AT studies)	0.5

Study 7.0

20 year a	Production By River and Study		
Producti	Study 7.1	Study 8.0	Study 6.0
181,436	181,313	181,320	181,215
194,757	194,696	191,616	194,377
7,836	7,793	7,830	7,834
159,753	159,721	159,750	
30,290	30,287	30,289	30,288
852,413			

from COS to PA

Upstream effects - Salmod juvenile production			Delta effects - Delta Passage Model			Lifecycle effects - IOS			Proportion of CV Abundance
median	97.5 %ile	2.5 %ile	median	97.5 %ile	2.5 %ile	median	97.5 %ile	2.5 %ile	
						0.1058	0.50073	-0.4495	0.0141
-0.0108	151.8044	-99.787	-0.0051	0.015145	-0.014				0.0003
-0.0034	0.0734	-0.2004	-0.0032	0.021709	-0.017				0.0970
-0.0068	0.0807	-0.0787	-0.0023	0.008336	-0.0715				0.0259
			-0.0032	0.021709	-0.017				0.0228
			-0.0032	0.021709	-0.017				0.2233
									0.0099
			0.0032	0.016971	-0.0217				0.2397
			-0.0051	0.015145	-0.014				0.0218
			-0.0032	0.021709	-0.017				0.2915
not evaluated									0.0264
not evaluated									0.0284

Uses calculated baseline value

Hatchery annual Chinook releases	General goal	Proportion bay	Proportion in-river	Number in-river
Coleman fall	12,000,000	0	1	12,000,000
Coleman late fall	1,000,000	0	1	1,000,000
LSNFH Winter	200,000	0	1	200,000
Feather Fall	6,000,000	0.7	0.3	1,800,000
Feather Spring	2,000,000	0.5	0.5	1,000,000
Feather enhancement	2,000,000	1	0	0
Nimbus	4,000,000	0.33	0.67	2,680,000
Mokelumne	5,000,000	0.7	0.3	1,500,000
Mokelumne enhancement	2,000,000	1	0	0
Merced	300,000	0	1	300,000
Total release	34,500,000			
In-river release	20,480,000			
Proportion released in-river	0.59			

Actual total hatchery releases

from CFM reports - includes all CV hatcheries and runs

brood year	release year	2010 report	2011 report	2012 report	2013 report
	2006	2007	37,422,150		
	2007	2008	36,708,982	36,724,581	
	2008	2009	30,259,935	30,282,881	30,455,664
	2009	2010		32,531,876	31,712,426
	2010	2011		38,510,728	38,510,728
	2011	2012			37,812,217
	2012	2013			

Average release 07-13

Hatchery proportions

	2014			
	2014 run size	hatchery proporti	hatchery total	hatchery proportion
hatchery	62206	0.89	55142	0.886441822
natural area	268814	0.72	193308	0.719114332
inland sport	42413	0.74	31527	0.743333412
ocean sport CA	74840	0.69	51512	0.688295029
ocean sport OR	16174	0.51	8296	0.512921974
Ocean commercial CA	168283	0.59	99925	0.593791411
Ocean commercial OR	191914	0.5	96833	0.504564545

Sum California only 616556 431414 0.699715841

Average hatchery proportion average = 0.699728945

Total Hatchery Release	35,059,237
Proportion released in-river	0.59

Survival to Delta	0.5	Smolt survival RBDD to the delta based on JPE (2013-2018 AT studies)	
Hatchery fish to delta	10,405,988		
DPM results (fall-run)	median	97.5 percentile	2.5 percentile
COS DPM survival	0.248	0.525	0.176
PA DPM survival	0.245	0.519	0.182
COS hatchery fish to bay	2,583,758	5,462,809	1,834,991
PA Hatchery fish to bay	2,544,841	5,400,430	1,888,708
Change in hatchery fish to bay	-38,917	-62,378	53,718
Hatchery Bay release	14,247,261	14,247,261	14,247,261
Hatchery total in Bay COS	16,831,019	19,710,070	16,082,252
Hatchery total in Bay PA	16,792,102	19,647,691	16,135,970
Hatchery proportion	0.7	0.7	0.7
Total fish in Bay	24,044,313	28,157,242	22,974,645
natural fish in Bay baseline	7,213,294	8,447,173	6,892,394

delete last two columns rows

Ocean adult index baseline
(median 2001-2018) 454,052
Smolt to adult survival 0.018884
natural fish in bay 7,213,294
hatchery fish in ocean

2014 report DRAFT	Number to use	
	37,422,150	
	36,724,581	
	30,455,664	
	31,710,802	
38,510,728	38,510,728	34,701,129 from CFM r
37,812,217	37,812,217	33,836,489
32,778,520	32,778,520	
	35,059,237	

2013				2012
run size	hatchery prc	hatchery total	hatchery proportion	run size
116807		105335	0.901787	147250
476893		339062	0.710981	161157
66556		43962	0.660526	82425
116074		67262	0.579475	123926
28316		16428	0.580167	
297627		145717	0.489596	215585
110812		57918	0.522669	
1073957		701338	0.653041	730343

marking report

hatchery proportion	hatchery total	hatchery proportion
0.92	135470	
0.8	128925.6	
0.77	63467.25	
0.64	79312.64	
0.64	137974.4	
	545149.89	0.74643

2009 BO production values

River	88-07 20 year average	Proportion of Central Valley Production
Sacramento River Fall	159753	0.1874127
Sacramento River Late Fall	30290	0.0355344
Feather River	181436	0.2128499
American River	194757	0.2284773
Stanislaus River	7836	0.0091927
Total Central Valley adult fall and late fall-run Chinook production	852413	1

X Escapement 2001 - 2018 (jacks and inland harvest not include natural hatchery* Total Proportion of total fro

Trinity				
Feather	54,595	16,704	71,299	0.24
American	42,381	8,073	50,454	0.22
Stanislaus	2,840		2,840	0.01
Sacramento Fall natural areas	84,153	37,119	121,272	
Sacramento fall-run				0.10
Sacramento late fall	11,273		11,273	0.03
Sacramento winter	4,931		4,931	0.01
Sacramento spring	346		346	0.00
Sac Basin Fall	185,654		185,654	0.74 delete this
Total Central Valley fall production (SI)			559,700	
Total Central Valley	200,519	61,896	262,415	
Central Valley Escapement (198,300	62,100	252,500	
Feather River Spring-run	2,744			
Trinity Fall	20,447	7,904		

median exploitation rate = .54

for spring run used 2001 - 2007 counts through RBDD because no estimates after that.

Hatchery proportion = 0.70 from 2012-2014 CFM reports

*hatchery total for Sac River is from Coleman Hatchery

**use for 2019
from Chinookprod 2001-2017**

Production
Total Central Valley
American
Feather fall and spring
Sac Fall-run
Sac late fall-run

Sac spring-run
Sac winter-run
Clear Creek fall and spring
Stanislaus

Sac Basin fall-run
Sac Basin other runs
SJ Basin fall-run
Sac Basin spring-run (minus main:
Sac Basin other fall runs
Mokelumne

d)
m Chinprod 2001-2017

row probably

mean value Proportion of total

578,706	1.0000
129,209	0.2233
138,711	0.2397
56,126	0.0970
15,011	0.0259

177	0.0003
8,168	0.0141
13,177	0.0228
5,730	0.0099

505,918	
57,533	
15,255	0.0264
12,600	0.0218
168,695	0.2915
16,445	0.0284

TABLE 11-1. Harvest and abundance indices for adult Sacramento River fall Chinook (SRFC) in thousands of fish.

Year	Ocean Harvest south of cape falcon				River	Spawning Escapement	
	Troll	Sport	Non-Retb/	Total	Harvest	Natural	Hatchery
1983	246.6	86.3	0.0	332.9	18.0	91.7	18.6
1984	266.2	87.0	0.0	353.1	25.9	120.2	38.7
1985	355.5	158.9	0.0	514.4	39.1	210.1	29.3
1986	619.0	137.5	0.0	756.4	39.2	218.3	21.8
1987	686.1	173.1	0.0	859.2	31.8	175.2	19.8
1988	1,163.2	188.3	0.0	1,351.5	37.1	200.7	26.8
1989	602.8	157.1	0.0	759.9	24.9	127.6	24.9
1990	507.3	150.4	0.0	657.8	17.2	83.3	21.7
1991	300.1	89.6	0.0	389.7	26.0	92.8	26.0
1992	233.3	69.4	0.0	302.8	13.3	59.9	21.7
1993	342.8	115.3	0.0	458.1	27.7	112.8	24.6
1994	303.5	168.8	0.0	472.3	28.9	135.0	30.6
1995	730.7	390.4	0.0	1,121.0	48.2	253.8	41.5
1996	426.8	157.0	0.0	583.8	49.2	269.1	32.5
1997	579.7	210.3	0.0	790.0	56.3	281.6	63.3
1998	292.3	114.0	0.0	406.3	69.8	176.0	69.9
1999	289.1	76.2	0.0	365.3	68.9	357.6	42.2
2000	421.8	152.8	0.0	574.6	59.5	370.0	47.6
2001	284.4	93.4	0.0	377.9	97.4	539.4	57.4
2002	447.7	184.0	0.0	631.7	89.2	684.2	85.6
2003	501.6	106.4	0.0	608.0	85.4	414.6	108.4
2004	621.8	212.6	0.0	834.5	46.8	206.2	80.7
2005	367.9	127.0	0.0	494.9	64.6	214.9	181.1
2006	149.9	107.7	0.0	257.7	44.9	196.5	78.5
2007	120.0	32.0	0.0	152.0	14.3	70.1	21.3
2008	3.2	0.9	0.0	4.1	0.1	47.3	18.0
2009	0.0	0.2	0.1	0.3	0.0	24.9	15.9
2010	11.2	11.4	0.3	22.8	2.7	91.1	33.2
2011	46.6	22.8	0.0	69.4	18.2	77.9	41.5
2012	183.2	93.4	0.3	276.8	65.8	166.2	119.2
2013	290.9	114.3	0.0	405.2	57.5	305.6	101.2
2014	240.6	62.4	0.0	303.0	35.7	168.3	44.2
2015	100.1	24.5	0.0	124.6	16.9	74.8	39.3
2016	62.9	28.9	0.0	91.8	23.9 ^d	56.3	33.4
2017	38.7	31.9	0.0	70.7	22.1	18.0	24.8
2018	53.5	48.5	0.0	102.0	16.1	71.9	33.8
median (01-18)	135.0	55.5	0.0	204.9	29.8	166.2	42.9
Average (01-18)	195.8	72.4	0.0	268.2	39.0	198.3	62.1

a/ Ocean harvest for the period September 1 (t-1) through August 31 (t).

b/ Mortalities estimated from non-retention ocean fisheries (e.g., coho-only fisheries, non-retention GSI sampling). In 2008, there were 3

c/ The SI is the sum of (1) SRFC ocean fishery harvest south of Cape Falcon between September 1 and August 31, (2) SRFC impacts from ocean fisheries when they occur, (3) the recreational harvest of SRFC in the Sacramento River Basin, and (4) the SRFC spawner escapement

e/ Estimates derived from CDFW Sacramento River Basin angler survey. ^d Estimates not marked with a footnote are inferred from escapement data and the

mean river harvest rate estimate. ^{f/} A--elirinary.

Adding in Other runs

Year	Fall Run	Fall run (Sac)	Late Fall adults	Spring / Winter Adults
1983	461.1	461,100		
1984	538.1	538,100		

1985	792.8	792,800				
1986	1035.7	1,035,700				
1987	1086.1	1,086,100				
1988	1616.1	1,616,100				
1989	937.3	937,300				
1990	780.0	780,000				
1991	534.6	534,600				
1992	397.6	397,600				
1993	623.2	623,200				
1994	666.7	666,700				
1995	1464.6	1,464,600				
1996	934.7	934,700				
1997	1191.1	1,191,100				
1998	722.1	722,100				
1999	834.0	834,000				
2000	1051.6	1,051,600	SJ Fall	Late Fall adults	Spring / Winter Adults	Exploitation F

2001	1072.0	1,072,000	29,435	20,614	26656	7,443	44
2002	1490.8	1,490,800	28,902	39,818	24610	7,047	48
2003	1216.3	1,216,300	20,019	8,122	30171	7,675	57
2004	1168.2	1,168,200	13,183	12,458	16949	5,786	75
2005	955.5	955,500	21,224	14,047	23151	14,684	59
2006	577.6	577,600	8,553	14,709	12721	16,911	52
2007	257.7	257,700	2,595	11,954	11846	2,402	65
2008	69.6	69,600	2,165	9,946	12999	2,623	6
2009	41.1	41,100	2,233	9,515	4384	4,483	1
2010	149.8	149,800	7,661	8,894	4606	1,554	17
2011	207.0	207,000	5,035	7,129	7378	637	42
2012	628.0	628,000	15,910	5,153	22204	2,527	55
2013	869.6	869,600	17,455	8,365	22754	5,622	53
2014	551.2	551,200	9,618	11,792	9726	2,688	61
2015	255.6	255,600	13,948	9,271	4319	3,382	55
2016	205.3	205,300	14,698	4,621	8053	924	56
2017	135.5	135,500	15,718	4,466	1372	490	68
2018	223.9	223,900	15,392	2,032	5000	1,884	53

winter-run 8.5% impact rate S of point arena target from review of 2018 harvest report

Year	Fall	Late fall	Spring
2001	#REF!	0	0
2002	#REF!	0	0
2003	#REF!	0	0
2004	#REF!	0	0
2005	#REF!	0	0
2006	#REF!	0	0
2007	#REF!	0	0
2008	#REF!	0	0
2009	#REF!	0	0
2010	#REF!	0	0
2011	#REF!	0	0
2012	#REF!	0	0
2013	#REF!	0	0
2014	#REF!	0	0
2015	#REF!	0	0
2016	#REF!	0	0
2017	#REF!	0	0
2018	#REF!	0	0
Average	#REF!	0	0
Median	#REF!	0	0

*2001 - 2005 was an average, 2008
Assumes 55% harvest for SJ fall, late

Total	Sacramento	Exploitation Rate	cohort replacement rate for SI		
	Index (SI)c	Rate (%)	6 year running average CRR		
				3-year running average C	
110.2	461.1	76			
159.0	538.1	70			
239.3	792.8	70	1.72		
240.1	1,035.7	77	1.92		
195.1	1,086.1	82	1.37		1.67
227.5	1,616.1	86	1.56		1.62
152.6	937.3	84	0.86		1.26
105.1	780.0	87	0.48	1.32	0.97
118.9	534.6	78	0.57	1.13	0.64
81.5	397.6	79	0.51	0.89	0.52
137.4	623.2	78	1.17	0.86	0.75
165.6	666.7	75	1.68	0.88	1.12
295.3	1,464.6	80	2.35	1.13	1.73
301.6	934.7	68	1.40	1.28	1.81
344.8	1,191.1	71	0.81	1.32	1.52
245.9	722.1	66	0.77	1.36	1.00
399.8	834.0	52	0.70	1.29	0.76
417.5	1,051.6	60	1.46	1.25	0.98
596.8	1,072.0	44	1.29	1.07	1.15
769.9	1,490.8	48	1.42	1.07	1.39
523.0	1,216.3	57	1.13	1.13	1.28
286.9	1,168.2	75	0.78	1.13	1.11
396.0	955.5	59	0.79	1.14	0.90
275.0	577.6	52	0.49	0.98	0.69
91.4	257.7	65	0.27	0.81	0.52
65.4	69.6	6	0.12	0.60	0.29
40.9	41.1	1	0.16	0.44	0.18
124.3	149.8	17	2.15	0.66	0.81
119.3	207.0	42	5.04	1.37	2.45
285.4	628.0	55	4.19	1.99	3.79
406.8	869.6	53	4.20	2.64	4.48
212.5	551.2	61	0.88	2.77	3.09
114.1	255.6	55	0.29	2.79	1.79
89.7	205.3	56	0.37	2.50	0.51
42.7	135.5	68	0.53	1.74	0.40
105.7	223.9	53	1.09	1.23	0.66
168.4	404.5	55.0	note: explo 0.8		
252.5	559.7	53.8	1.4		

Chinook Production Index, 1,000's

37 estimated mortalities as a result of non-retention fisheries that have been rounded to 0 in this table.

from non-retention

ment. d/ Total ocean harvest, non-retention ocean fishery mortalities, and river harvest of SRFC as a percentage of the SI.

Totals in Ocean

Assumes 55% harvest for SJ fall, late fall, and CV spring-run and 8.5% for winter-run

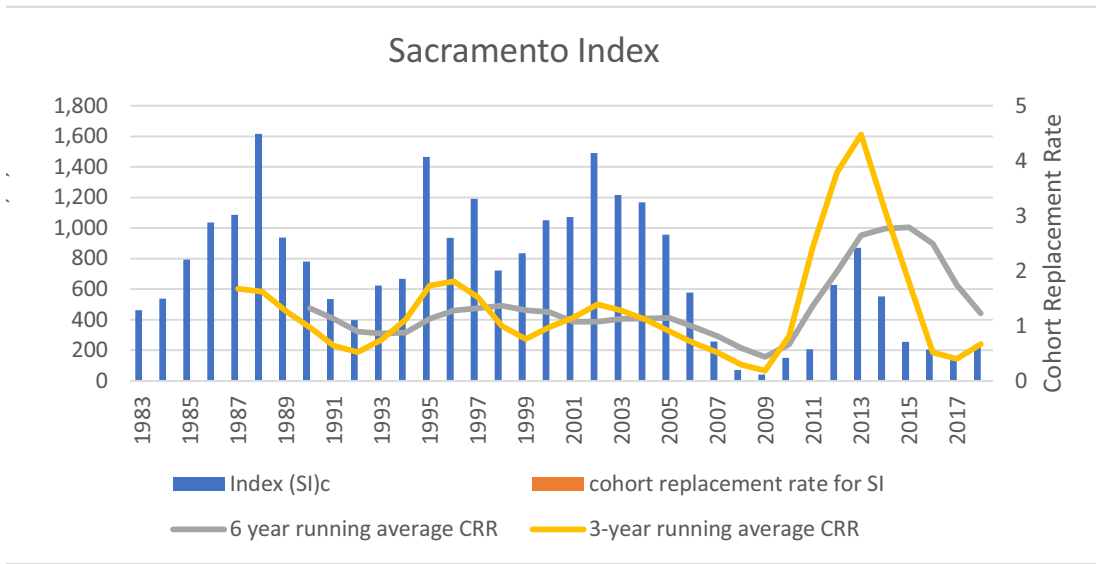
Year	Fall	Late fall	Spring	winter	Adult Ocean Central Valley Chinook, pre- harvest	CRR (Cohort Replacem	
2001	1,114,386	29,684	38,385	8,076	1,190,531	CRR	
2002	1,533,575	58,931	36,423	7,646	1,636,574		6-year running
2003	1,247,730	12,752	47,368	8,327	1,316,177	1.11	
2004	1,191,270	21,802	29,661	6,278	1,249,010	0.76	
2005	989,246	22,335	36,810	15,932	1,064,323	0.81	
2006	590,601	22,358	19,336	18,348	650,643	0.52	
2007	261,982	19,724	19,546	2,606	303,858	0.29	
2008	71,895	10,543	13,779	2,846	99,063	0.15	0.61
2009	43,355	9,610	4,428	4,864	62,257	0.20	0.46
2010	158,763	10,406	5,389	1,686	176,244	1.78	0.63
2011	214,150	10,123	10,477	691	235,441	3.78	1.12
2012	652,661	7,987	34,416	2,742	697,806	3.96	1.69
2013	896,306	12,798	34,814	6,100	950,018	4.04	2.32
2014	566,685	18,985	15,659	2,916	604,245	0.87	2.44
2015	277,219	14,370	6,694	3,669	301,953	0.32	2.46
2016	228,229	7,209	12,563	1,003	249,003	0.41	2.23
2017	161,906	7,503	2,305	532	172,246	0.57	1.69
2018	247,450	3,109	7,650	2,044	260,253	1.05	1.21
Average	580,412	16,679	20,872	5,350	623,314		
Median	421,952	12,775	17,497	3,293	454,052		

*2001 - 2005 was an average, 2008 and 2009 when no fishery occurred used 2001-2018 average
Assumes 55% harvest for SJ fall, late fall, and CV spring-run and 8.5% for winter-run

winter	Adult Ocean Central Valley Chinook, pre-harvest	CRR (Cohort Replacement Rate)			Dressed weight statewide season	live weight*	Total biomass (pounds)
0	#REF!	CRR			12.7	16.9	#REF!
0	#REF!		6-year running average CRR		12.7	16.9	#REF!
0	#REF!	#REF!		3-year running	12.7	16.9	#REF!
0	#REF!	#REF!			12.7	16.9	#REF!
0	#REF!	#REF!		#REF!	12.7	16.9	#REF!
0	#REF!	#REF!		#REF!	15	20.0	#REF!
0	#REF!	#REF!		#REF!	13.4	17.8	#REF!
0	#REF!	#REF!	#REF!	#REF!	12.8	17.0	#REF!
0	#REF!	#REF!	#REF!	#REF!	12.8	17.0	#REF!
0	#REF!	#REF!	#REF!	#REF!	15.1	20.1	#REF!
0	#REF!	#REF!	#REF!	#REF!	14.2	18.9	#REF!
0	#REF!	#REF!	#REF!	#REF!	11.7	15.6	#REF!
0	#REF!	#REF!	#REF!	#REF!	12.7	16.9	#REF!
0	#REF!	#REF!	#REF!	#REF!	13.4	17.8	#REF!
0	#REF!	#REF!	#REF!	#REF!	10.8	14.4	#REF!
0	#REF!	#REF!	#REF!	#REF!	11.2	14.9	#REF!
0	#REF!	#REF!	#REF!	#REF!	11.8	15.7	#REF!
0	#REF!	#REF!	#REF!	#REF!	11.8	15.7	#REF!
0	#REF!				12.79	17.01	#REF!
0	#REF!				12.70	16.89	#REF!

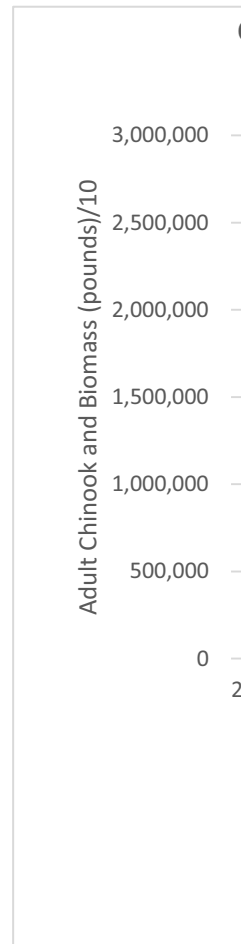
and 2009 when no fishery occurred used 2001-2018 average
 e fall, and CV spring-run and 8.5% for winter-run

RR

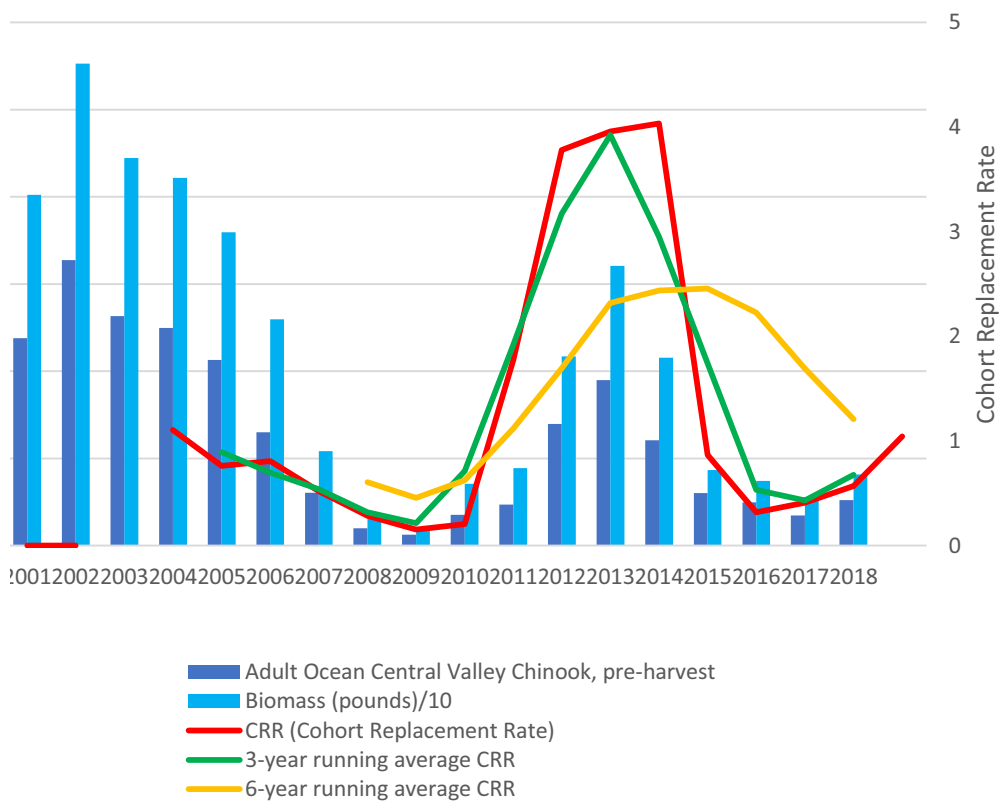


ent Rate)	Dressed weight statewide season	live weight*	Total biomass (pounds)	Biomass (pounds)/10
	12.7	16.9	20,109,257	2,010,926
g average CRR	12.7	16.9	27,643,378	2,764,338
3-year running	12.7	16.9	22,231,549	2,223,155
	12.7	16.9	21,097,033	2,109,703
0.89	12.7	16.9	17,977,482	1,797,748
0.70	15	20.0	12,980,320	1,298,032
0.54	13.4	17.8	5,415,356	541,536
0.32	12.8	17.0	1,686,441	168,644
0.21	12.8	17.0	1,059,870	105,987
0.71	15.1	20.1	3,539,517	353,952
1.92	14.2	18.9	4,446,535	444,653
3.17	11.7	15.6	10,858,554	1,085,855
3.93	12.7	16.9	16,046,756	1,604,676
2.95	13.4	17.8	10,768,862	1,076,886
1.74	10.8	14.4	4,337,258	433,726
0.53	11.2	14.9	3,709,147	370,915
0.43	11.8	15.7	2,703,224	270,322
0.68	11.8	15.7	4,084,408	408,441
	12.79	17.01	10,594,164	
	12.70	16.89	8,092,109	

verage



California Central Valley Chinook Salmon Ocean Abundance
All runs combined



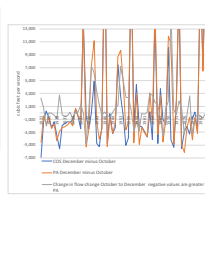
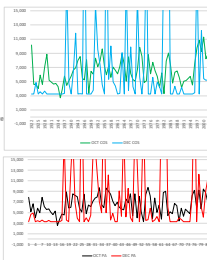
CO2 December Flow Data Before Research Dev - CS FLOW CHANNEL (EUS)

YEAR	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
2002	9839	7233	1200	3250	1200	4961	11333	10310	6762	10781	6520
2003	4394	7987	3200	3250	3250	3250	3250	3250	3250	3250	3250
2004	4688	4232	4232	4232	4232	4232	4232	4232	4232	4232	4232
2005	5401	1025	3237	3250	3250	4443	3250	3250	3250	3250	3250
2006	4688	4232	4232	4232	4232	4232	4232	4232	4232	4232	4232
2007	4688	4232	4232	4232	4232	4232	4232	4232	4232	4232	4232
2008	7098	4822	3445	3250	3250	3250	3250	3250	3250	3250	3250
2009	4688	4232	4232	4232	4232	4232	4232	4232	4232	4232	4232
2010	4688	4232	4232	4232	4232	4232	4232	4232	4232	4232	4232
2011	4688	4232	4232	4232	4232	4232	4232	4232	4232	4232	4232
2012	4442	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2013	4722	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2014	4322	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2015	3888	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2016	3888	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2017	3888	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2018	4442	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2019	4442	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2020	4442	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2021	4442	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250
2022	4442	3250	3250	3250	3250	3250	3250	3250	3250	3250	3250

PA December Flow Data Before Research Dev - CS FLOW CHANNEL (EUS)

YEAR	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
2002	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2003	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2004	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2005	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2006	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2007	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2008	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2009	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2010	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2011	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2012	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2013	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2014	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2015	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2016	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2017	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2018	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2019	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2020	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2021	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863
2022	1342	4863	4863	4863	4863	4863	4863	4863	4863	4863	4863

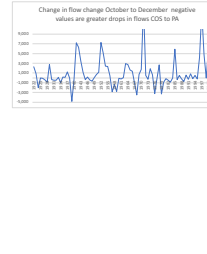
Change in Flow (mg)



Change in flow change October to December negative values are greater drops in flow CO2 is PA

Mean	Std Error	Median	Mode	Standard Deviation	Skewness	Kurtosis	Maximum	Minimum	Count	Log10(E)	Log10(S)	Collisions	Level1_0	Level1_1	Level1_2	
486.344	348.389	50.822		354.749	952722		487474	2.3443	20764	10	10	10	10	10	10	10
486.344	348.389	50.822		354.749	952722		487474	2.3443	20764	10	10	10	10	10	10	10

Change in flow change October to December negative values are greater drops in flow CO2 is PA



Change in flow change October to December negative values are greater drops in flow CO2 is PA

Mean	Std Error	Median	Mode	Standard Deviation	Skewness	Kurtosis	Maximum	Minimum	Count	Log10(E)	Log10(S)	Collisions	Level1_0	Level1_1	Level1_2	
486.344	348.389	50.822		354.749	952722		487474	2.3443	20764	10	10	10	10	10	10	10
486.344	348.389	50.822		354.749	952722		487474	2.3443	20764	10	10	10	10	10	10	10

TABLE D-1. California monthly troll Chinook and coho average dressed weights (pounds) by area of landing. (Page 3 of 3)

Year	Apr.	May	June	July	Aug.	Sept.	Oct.	Season
CHINOOK								
Monterey								
1981-1985		7.3	8.6	9.6	10.4	11.1	10.2 -	9.3
1986-1990	-		10.3	11.3	12.2	12.3	11.7 -	11.1
1991-1995	-		9.4	10.9	11.3	11.7	11.1 -	10.6
1996-2000		11.1	10.3	11.0	12.4	11.8	10.1 -	10.8
2001-2005	-		12.1	13.1	13.7	14.0	13.8 -	12.7
2006 -			12.4	12.6	16.2	13.3	15.7 -	12.6
2007 -			14.1	13.2	13.6	14.1	17.6 -	14.0
2008 -	-	-	-	-	-	-	-	-
2009 -	-	-	-	-	-	-	-	-
2010 -	-	-			14.2 -	-	-	14.2
2011 -			14.9	14.4	14.5	12.5	12.6 -	14.6
2012 -			10.7	13.3	13.9	12.5	11.6 -	12.2
2013 -			12.4	13.6	16.0	14.7	12.3 -	13.3
2014 -			11.2	13.7	14.4	14.4 -	-	12.6
2015 -			9.8	10.5	11.4	12.5 -	-	10.4
2016 -			9.6	10.8 -	-	-	-	9.9
2017 -			10.5	12.8 -	-	-	-	11.8
2018b/	-		11.1	13.2 -	-	-	-	12.7
Total Statewidea/								
1981-1985		7.1	8.5	9.7	10.0	10.2	10.0 -	9.5
1986-1990	-		9.5	10.2	10.3	11.1	10.8	9.6
1991-1995	-		9.0	9.9	10.5	11.1	11.2	17.7
1996-2000		10.3	10.0	10.4	11.5	12.3	12.1 -	10.7
2001-2005		11.1	12.1	13.1	12.7	13.4	13.0	13.8
2006 -			12.4	12.6	15.1	14.4	16.4	18.0
2007		12.5	12.2	13.2	13.2	15.3	13.7	19.0
2008 -	-	-	-	-	-	-	-	-
2009 -	-	-	-	-	-	-	-	-
2010 -	-	-			15.4	14.6 -	-	15.1
2011 -			13.8	13.5	14.2	14.6	12.8	15.0
2012 -			10.5	12.3	12.1	12.5	12.0	12.9
2013 -			11.6	13.1	13.2	13.5	12.5	13.7
2014 -			11.2	13.7	13.8	14.9	13.5	13.7
2015 -			10.0	10.6	11.0	12.7	11.8	11.8
2016 -			9.6	10.6 -		12.5	11.6	12.5
2017 -			10.5	12.8 -		11.8	11.6	12.5
2018b/	-		10.5	12.6	12.2	11.4	12.0	12.1

a/ Total statewide and season averages includes minor landings from Oregon prior to 2005.

b/ Preliminary.

Habitat Restoration

Sacramento

Spawning: Reclamation proposes to create additional spawning habitat by injecting 40–55 tons of gravel into th

Rearing: Reclamation and the Sacramento River Settlement Contractors propose to create 40– 60 acres of side

Small Screen Program: As part of adaptive management, Reclamation and DWR propose to continue to work w American

Spawning and Rearing Habitat Named Projects: Pursuant to CVPIA 3406(b)(13), Reclamation proposes to impler Reclamation proposes to continue maintenance activities at Nimbus Basin, Upper Sailor Bar, and River Bend res Stanislaus

Spawning Habitat: Under the CVPIA (b)(13) program, Reclamation’s annual goal of gravel placement is approxin

Rearing Habitat: Reclamation proposes to construct an additional 50 acres of rearing habitat adjacent to the Sta

Temperature Management: Reclamation will study approaches to improving temperature for listed species on 1

CVPIA SIT values rearing habitat = 56 adults from one acre

River	acres new habitat by 2030	annual new rearing habitat acres	new fish in ocean annually
Sacramento River	60	6	336
American River	40	4	224
Stanislaus River	50	5	280
Total	150	15	840

new fish in ocean assuming 55% ocean harvest

Year	new habitat acres	cumulative increase in escapement	cumulative increase in ocean abundance
2021	15	840	1,527
2022	15	1,680	3,055
2023	15	2,520	4,582
2024	15	3,360	6,109
2025	15	4,200	7,636
2026	15	5,040	9,164
2027	15	5,880	10,691
2028	15	6,720	12,218
2029	15	7,560	13,745
2030	15	8,400	15,273

the Sacramento River by 2030, using the following sites: Salt Creek Gravel Injection Site, Keswick Dam Gravel channel habitat at approximately 10 sites in Shasta and Tehama County by 2030, including Cypress Avenue within existing authorities (e.g., Anadromous Fish Screen Program) to screen small diversions throughout

implement the Cordova Creek Phase II and Carmichael Creek Restoration projects, and increase woody material restoration sites.

approximately 4,500 tons in the Stanislaus River.

Stanislaus River by 2030.

the lower Stanislaus River, to include evaluating the utility of conducting temperature measurements/pr

56 spawning = 650 adults spawn on one acre 650

3360 6,109

2240 4,073

2800 5,091

8400 15272.73

gravel Injection Site, South Shea Levee, Shea Levee, and Tobiasson Island Side Channel.
Levee, Shea Island, Anderson River Park; South Sand Slough; Rancheria Island; Tobiasson Side Channel; and
Central Valley CVP/SWP streams and the Bay-Delta.

material in the American River. Reclamation also proposes to conduct gravel augmentation and floodplain wo

profiles in New Melones Reservoir.

nd Turtle Bay.

rk at: Paradise Beach, Howe Ave, Howe Avenue to Watt Avenue, William Pond Outlet, Upper River Benc

l, Ancil Hoffman, Sacramento Bar—North, El Manto, Sacramento Bar—South, Lower Sunrise, Sunrise, Uç

Upper Sunrise, Lower Sailor Bar, Nimbus main channel and side channel, Discovery Park, and Sunrise Strar

ding Reduction.

TABLE II-1.

Sacramento River natural area and hatchery adult fall Chinook escapem

Year or Average	Upper Rivera/			Low er River			Total	
	Hatchery	Naturalb/	Subtotal	Hatchery	Naturalb/	Subtotal	Hatchery	Naturalb/
1981-85	11,557	57,913	69,470	16,917	81,880	98,797	28,475	139,793
1986-90	11,507	87,396	98,903	11,521	73,633	85,154	23,028	161,029
1991-95	11,948	60,151	72,099	16,951	70,691	87,642	28,899	130,842
1996-00	29,965	153,777	183,742	21,137	137,071	158,207	51,102	290,848
2001-05	72,122	197,215c/	269,337	30,520	214,652	245,172	102,643	411,867
2006	56,819	89,933	146,752	21,722	106,556	128,278	78,541	196,489
2007	11,543	36,079	47,622	9,759	33,993	43,752	21,302	70,072
2008	10,181	36,274	46,455	7,867	11,042	18,909	18,048	47,316
2009	5,433	12,277	17,710	10,492	12,671	23,163	15,925	24,948
2010	8,666	25,688	34,354	24,484	65,438	89,922	33,150	91,126
2011	19,312	20,466	39,778	22,176	57,388	79,564	41,488	77,854
2012	77,318	67,190	144,508	41,878	99,043	140,921	119,196	166,233
2013	67,758	90,119	157,877	33,453	215,516	248,969	101,211	305,635
2014	18,280	80,056	98,336	25,872	88,260	114,132	44,152	168,316
2015	13,819	40,687	54,506	25,484	34,095	59,579	39,303	74,782
2016	8,306	10,563	18,869	25,096	45,734	70,830	33,402	56,297
2017	1,316	1,526	2,842	23,437	16,435	39,872	24,753	17,961
2018d/	8,780	17,824	26,604	25,035	54,100	79,135	33,815	71,924

Goale/

a/ Above the Feather River; 1971-1985 estimates include Tehama-Colusa Spaw ning Channel.

b/ Fish spaw ning in natural areas are the result of hatchery and natural production; estimates generally based on c surveys.

c/ Estimation methodology for 2002 w as changed due to an extremely high Battle Creek escapement.

d/ Preliminary.

e/ Sacramento River fall Chinook SMSY.

ent in numbers of fish.

Grand Total

- 168,268
- 184,057
- 159,741
- 341,949
- 514,510
- 275,030
- 91,374
- 65,364
- 40,873
- 124,276
- 119,342
- 285,429
- 406,846
- 212,468
- 114,085
- 89,699
- 42,714
- 105,739
- 122,000

arcass

TABLE B-1.

Year or Average	Sacramento River fall Chinook salmon escapement in numbers of fish a/b/																											
	Upper Sacramento				Lower Sacramento Natural Areas/								Natural Area				Sacramento Hatcheries				Hatchery Totals				Sacramento Totals			
	Natural Areas/d/e/		Feather River		Yuba River		American River/f/		Totalsc/		Coleman		Feather River		Nimbus		Hatchery Totals		Sacramento Totals									
Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks					
1981-1985	57,913	22,432	36,252	5,243	12,825	5,142	32,803	5,142	139,793	37,963	11,557	3,734	6,845	884	10,072	2,257	29,832	7,689	169,625	45,651								
1986-1990	87,396	17,244	38,709	6,426	9,261	2,444	25,663	3,917	161,029	30,031	11,507	2,288	5,837	1,947	5,685	1,349	23,028	5,584	184,057	35,616								
1991-1995	60,151	11,496	32,578	4,355	8,309	2,131	29,804	4,367	130,842	22,350	11,948	2,295	10,537	2,762	6,414	1,447	28,899	6,505	159,741	28,855								
1996-2000	153,777	8,383	54,225h/	6,806	20,233	4,600	62,613	10,061	290,848	29,851	29,965	3,001	13,342	1,497	7,795	1,407	51,102	5,905	341,949	35,756								
2001	179,198	11,853	169,588	9,114	21,567	1,825	169,023	16,144	539,376	38,936	23,710	988	24,001	871	9,688	1,956	57,399	3,815	596,775	42,751								
2002	474,812	11,259	93,766	11,397	18,406	4,796	97,242	15,195	684,226	42,647	61,895	4,029	17,516	2,991	6,231	3,586	85,642	10,606	769,868	53,253								
2003	164,802	4,402	85,578	4,369	26,820	1,489	137,444	13,647	414,644	23,907	82,882	5,352	13,615	1,352	11,875	3,012	108,372	9,716	523,016	33,623								
2004	70,548	7,220	48,580	5,591	9,260	5,208	77,842	21,505	206,230	39,524	52,145	17,027	15,769	5,535	12,741	13,659	80,655	36,221	286,885	75,745								
2005	96,716	3,267	43,738	4,848	16,251	987	58,155	4,499	214,860	13,601	139,979	2,694	20,597	1,787	20,569	1,780	181,145	6,261	396,005	19,862								
2006	89,933	2,874	75,545	1,869	7,891	230	23,120	1,420	196,489	6,393	56,819	1,013	13,400	634	8,322	406	78,541	2,053	275,030	8,446								
2007	36,079	978	21,541	321	2,523	81	9,929	144	70,072	1,524	11,543	201	5,169	172	4,590	7	21,302	380	91,374	1,904								
2008	36,274	2,074	5,703	236	3,084	424	2,255	259	47,316	2,993	10,181	458	5,031	323	2,836	348	18,048	1,129	65,364	4,122								
2009	12,277	1,624	3,950	897	3,992	803	4,729	1,047	24,948	4,371	5,433	719	6,240	3,723	4,252	654	15,925	5,096	40,873	9,467								
2010	25,688	6,872	40,981	3,933	12,074	1,023	12,383	2,305	91,126	14,133	8,666	8,572	17,215	2,757	7,269	1,826	33,150	13,155	124,276	27,288								
2011	20,466	15,096	35,656	11,633	6,917	2,204	14,815	10,422	77,854	39,355	19,312	23,068	15,925	16,691	6,251	6,429	41,488	46,188	119,342	85,543								
2012	67,190	7,125	57,507	6,142	6,009	1,722	35,527	3,296	166,233	18,285	77,318	8,198	33,628	8,533	8,250	1,007	119,196	17,738	285,429	36,023								
2013	90,119	6,253	145,650	5,559	13,830	1,050	56,036	2,192	305,635	15,054	67,758	2,103	25,152	2,470	8,301	775	101,211	5,348	406,846	20,402								
2014	80,056	7,359	55,480	5,241	9,885	1,819	22,895	3,580	168,316	17,999	18,280	976	18,824	4,596	7,048	1,295	44,152	6,867	212,468	24,866								
2015	40,687	3,350	18,069	2,497	4,131	3,419	11,895	3,844	74,782	13,110	13,819	1,895	18,081	2,707	7,403	2,419	39,303	7,021	114,085	20,131								
2016	10,563	803	34,054	4,727	2,143	1,422	9,537	4,936	56,297	11,888	8,306	225	17,594	2,962	7,502	1,922	33,402	5,109	89,699	16,997								
2017	1,526	4,015	8,120	2,414	1,145	471	7,170	2,716	17,961	9,616	1,316	5,080	15,736	8,009	7,701	1,661k/	24,753	14,750	42,714	24,366								
2018j/	17,824	11,414	39,210	6,616	2,024	1,032	12,866	8,225	71,924	27,287	8,780	5,393	20,549	6,778	4,486	1,726	33,815	13,897	105,739	41,184								
GOALS	-	-	-	-	-	-	-	-	-	12,000l/	-	6,000l/	-	4,000l/	-	22,000l/	-	122,000m/	-	-	-							
2001 - 2018 average	84,153	5,991	54,595	4,856	9,331	1,667	42,381	6,410	190,461	18,924	37,119	4,888	16,891	4,050	8,073	2,518	62,083	11,408	252,544	30,332								

a/ In 2004, CDFW reviewed and updated 1971-2003 escapement estimates to reflect final project reports.
 b/ Chinook spawning during the fall; may include spring run fish in some survey areas.
 c/ Most natural area estimates based on carcass surveys with a jack length cut-off.
 d/ Upper Sacramento mainstem estimates generally based on carcass surveys with a jack length cut-off, however, jack estimates from Red Bluff Diversion Dam (RBDD) reports have occasionally been used. Early (pre-2001) mainstem Sacramento River adult and jack estimates based on RBDD passage.
 e/ Upper Sacramento River escapement includes Sacramento River mainstem; Battle, Clear, Mill, Deer, Butte, Cottonwood, and Cow creeks; and other small tributaries when surveys were conducted. Specific escapement estimates by tributary can be found at www.calfish.org.
 f/ American River adult and jack escapement estimates include fish taken at Nimbus Weir, 1979-current. In previous versions of this table, fish taken at Nimbus Weir were included in the Nimbus Fish Hatchery counts.
 g/ Total adults in Sacramento hatcheries include Tehama-Colusa Fish Facility escapements, 1971-1985.
 h/ Survey methodology was variable for 1998-99; may not be comparable to other surveys.
 i/ Change in estimation methodology due to extremely high Battle Creek escapement.
 j/ Preliminary.
 k/ Nimbus Fish Hatchery opened three weeks early to collect anticipated stray Chinook originating from Coleman National Fish Hatchery. During this time, 2,886 fish were collected.
 l/ Current hatchery-specific goals, not PFMC goals.
 m/ Sacramento River fall Chinook SMSY.

TABLE B-2.

San Joaquin River fall Chinook salmon escapement in nur

San Joaquin Natural Areasb/

Year or Average	Mokelumne River		Stanislaus River		Tuolumne River		Merced River		
	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	
1981-1985		7,346	394	4,649	633	12,902	5,143	9,749	4,551
1986-1990		1,294	162	4,174	824	2,951	2,910	2,414	480
1991-1995		865	281	472	123	264	139	1,026	360
1996-2000		2,334	791	3,536	802	7,144	2,160	3,838	873
2001		1,755	467	6,140	719	7,852	1,369	8,084	1,133
2002		2,244	596	5,848	952	6,192	1,008	7,568	1,232
2003		1,571	552	6,707	889	2,620	234	3,621	489
2004		1,175	413	2,848	1,220	1,029	605	2,197	1,073
2005		9,574	832	2,984	332	647	72	1,900	211
2006		1,555	177	1,718	205	457	105	1,262	167
2007		461	9	368	75	193	31	446	49
2008		83	90	1,253	139	358	14	316	73
2009		320	360	554	194	130	70	390	64
2010		1,640	280	793	293	329	211	501	150
2011		705	1,962	433	630	231	647	640	975
2012		3,836	1,635	3,550	456	485	298	1,947	310
2013		5,806	1,265	2,562	283	1,798	128	2,673	153
2014		1,973	1,324	1,837	1,227	150	56	611	249
2015		3,090	1,514	4,050	2,086	42	71	860	387
2016		1,279	705	5,231	3,961	661	696	1,232	2,099
2017		4,626	1,018	2,225	1,274	690	428	2,349	832
2018e/		6,609	3,685	2,026	361	738	346	347	528
GOALSf/	-	-	-	-	-	-	-	-	-

a/ In 2004, CDFW review ed and updated 1971-2003 escapement estimates to reflect final project reports.

b/ Most natural area estimates based on carcass surveys w ith a jack length cut-off.

c/ Other San Joaquin tributary escapement includes Cosumnes and Calaveras Rivers w hen surveys w ere conducted. In some ye

d/ Calculating jack proportions w as not possible in some years due to sampling and/or environmental limitations. In those years je

e/ Preliminary.

f / Current hatchery-specific goals, not PFMC goals.

g/ Due to modernization of the hatchery facility and improved efficiencies, the Mokelumne Hatchery escapement goal w as reduce

Numbers of fish.a/

Other Tributaries/c/d/		Totals		Mokelumne River		San Joaquin Hatcheries		Totals	
Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks	Adults	Jacks
284	0	34,930	10,721	759	734	797	449	1,556	
20	0	10,853	4,377	278	286	299	140	577	
0	0	2,626	904	1,077	554	239	233	1,316	
0	0	16,853	4,626	3,413	1,052	769	525	4,182	
0	0	23,831	3,688	4,467	1,427	1,137	523	5,604	
0	0	21,852	3,788	5,800	2,119	1,250	588	7,050	
0	0	14,519	2,164	5,108	3,009	392	157	5,500	
0	0	7,250	3,310	5,477	4,879	456	594	5,933	
738	130	15,843	1,577	5,035	528	346	75	5,381	
630	15	5,622	669	2,801	1,338	130	20	2,931	
53	0	1,521	164	1,004	40	70	9	1,074	
0	0	2,010	316	116	123	39	37	155	
0	0	1,394	688	730	823	109	137	839	
740	0	4,003	934	3,543	1,733	115	31	3,658	
518	0	2,527	4,214	2,409	13,513	99	338	2,508	
1,034	149	10,852	2,848	4,430	2,190	628	372	5,058	
0	0	12,839	1,829	3,698	1,483	918	180	4,616	
401	0	4,972	2,856	4,417	4,403	229	582	4,646	
180	0	8,222	4,058	5,170	3,128	556	642	5,726	
986	262	9,389	7,723	3,314	3,573	1,995	970	5,309	
575	95	10,465	3,647	4,651	9,668	602	1,099	5,253	
630	158	10,350	5,078	4,778	2,403	264	639	5,042	
-	-	-	-	3,000g/	-	1,000	-	4,000	

Years no survey was conducted due to logistical or environmental limitations.

Jacks are included in the adult escapement values.

Changed from 5,000 to 3,000 adults in 2010.

San Joaquin

Totals

Jacks	Adults	Jacks
1,183	36,486	11,904
426	11,430	4,803
788	3,943	1,691
1,576	21,035	6,203
1,950	29,435	5,638
2,707	28,902	6,495
3,166	20,019	5,330
5,473	13,183	8,783
603	21,224	2,180
1,358	8,553	2,027
49	2,595	213
160	2,165	476
960	2,233	1,648
1,764	7,661	2,698
13,851	5,035	18,065
2,562	15,910	5,410
1,663	17,455	3,492
4,985	9,618	7,841
3,770	13,948	7,828
4,543	14,698	12,266
10,767	15,718	14,414
3,042	15,392	8,120

- - -

TABLE B-3. Sacramento River late-fall, winter, and spring Chinook salmon spawning escapement in numbers of fish.

Upper Sacramento River

Year or Average	Late-Fall/a/b/c/		RBDDa/		Winter/c/d/		Spring	
	Adults	Jacks	Adults	Jacks	Carcass	Survey	Tributary/e/	Sacramento R
1981-1985	8,102	1,746	5,027		921	--	1,061	9,798
1986-1990	10,047	1,761	1,369		390	--	1,658	8,795
1991-1995	3,844	383	586		78	--	2,813	410
1996-2000	16,061	2,478	940		1,032	--	7,768	242
2001	20,614	1,199	1,696		3,827	7,443	781	21,623
2002	39,818	765	7,614		1,555	7,047	417	20,198
2003	8,122	613	6,172		3,585	7,675	543	21,798
2004	12,458	1,574	2,588		4,604	5,786	2,083	12,556
2005	14,047	2,141	3,521		1,778	14,684	1,155	21,319
2006	14,709	351	4,792		2,623	16,911	379	10,669
2007	11,954	714	3,004		3,140	2,402	139	8,951
2008	9,946	381	1,504		2,131	2,623	207	11,943
2009	9,515	460	l/	l/		4,483	54	3,517
2010	8,894	1,001	l/	l/		1,554	42	2,951
2011	7,129	1,161	l/	l/		637	187	5,547
2012	5,153	909	m/	m/		2,527	144	18,694
2013	8,365	644	m/	m/		5,622	462	18,507
2014	11,792	1,453	m/	m/		2,688	327	7,127
2015	9,271	135	m/	m/		3,382	57	1,039
2016	4,621	959	m/	m/		924	622	6,458
2017	4,466	389	m/	m/		490	485	1,055
2018 ^{o/}	2,032	3,199	m/	m/		1,884	754	3,130

a/ Jacks and adults based on sampling at Red Bluff Diversion Dam (RBDD) from unpublished CDFW data. Beginning in 1987 for

on historical run patterns and partial counts at RBDD due to raising of dam gates during the last part of the late-fall run and first part

b/ Since 1998, late-fall adult and jack estimates are based on carcass counts of natural spawners plus fish spawned at Coleman

c/ Estimates of late-fall and winter run includes Chinook trapped at Keswick Dam for use as broodstock at Coleman or Livingston

d/ RBDD and carcass survey estimates represent alternative methods for determining winter run Chinook escapement.

e/ Natural spawning spring run which are isolated from fall run; primarily Mill Creek, Deer Creek, and Butte Creek escapement.

f/ Sacramento River spring run estimates are the total RBDD counts minus the spring run numbers in the upper Sacramento River. If equal to zero, the upper Sacramento River spring run estimates are zero.

g/ Feather River spring run estimates are primarily fish returning to Feather River Hatchery. Spring run are not distinguished from fall surveys and are reported in the fall run natural escapement numbers.

h/ Jack proportion could not be determined.

i/ Primarily number of spawners at Coleman National Fish Hatchery 1991-97. No data available for natural spawning with the late-fall run.

j/ Methodology change from using snorkel survey to carcass survey for Butte Creek spring run estimates.

k/ Methodology change for distinguishing spring run Chinook at Feather River Hatchery in 2005. Fish arriving prior to the spring and returned to the river. Spring Chinook escapement estimate is the number of these tagged fish that subsequently returned during period.

l/ RBDD did not go into operation until June 15, a month later than normal; thus RBDD winter and spring run estimates are una-

m/ RBDD gates were permanently removed on September 1, 2012; thus RBDD winter and spring run estimates are no longer

n/ Includes 47 adults that were transferred from the Colusa Basin Drain to Livingston Stone National Fish Hatchery for use as brood-

o/ Preliminary.

Winters	Feather River g	Jac ks	Spring total adults
Jac ks	Adults	Jac ks	
4,241	1,446	133	12,305
1,930	2,884	406	13,337
165	3,441	465	6,664
160	4,393	503	12,403
0	4,052	83	26,656
53	3,982	207	24,610
0	8,373	389	30,171
326	3,630	572	16,949
9	1,811	24k/	23,151
0	2,052	9 k/	12,721
22	2,669	5 k/	11,846
0	1,056	10k/	12,999
l/	867	122k/	4,384
l/	1,655	6 k/	4,606
l/	1,831	138k/	7,378
m/	3,510	228k/	22,204
m/	4,247	44k/	22,754
m/	2,599	177k/	9,726
m/	3,280	51k/	4,319
m/	1,595	55k/	8,053
m/	317	375k/	1,372
m/	1,870	240k/	5,000

late-fall and winter run, estimates based
 part of the winter run.

National Fish Hatchery.

1 Stone National Fish Hatcheries.

ment to tributaries. If this number is less than or

fall run in the natural spawning

runners, RBDD gates were raised during time coinciding

spring Chinook spawning period were tagged

ing the spring Chinook spawning

available.

are available.

odstock.

TABLE B-4.

Summary of Klamath River fall Chinook salmon estimates

Year or Average	Category	Total Run	Inriver	Nonlanded				
				Indian	Sport	Harvest Total	Fishery Mortality	Hatchery
1981-1985	Adults	63,230		17,128	5,096	22,224	1,593	8,812
	Jacks	29,811		1,287	6,447	7,734	243	1,162
1986-1990	Adults	151,203		36,669	15,145	51,814	3,498	13,194
	Jacks	20,227		446	4,924	5,370	139	1,009
1991-1995	Adults	80,666		10,574	3,094	13,668	983	12,980
	Jacks	12,038		291	2,741	3,032	81	1,140
1996-2000a/	Adults	123,856		24,565	6,817	31,382	2,275	24,549
	Jacks	10,332		170	1,805	1,976	52	1,413
2001-2005	Adults	136,848		25,414	7,659	33,074	2,366	23,476
	Jacks	7,271		161	1,391	1,552	43	785
2006	Adults	61,374		10,283	62	10,345	1,344	11,604
	Jacks	26,935		415	5,527	5,942	149	2,386
2007	Adults	132,131		27,573	6,312	33,885	2,526	16,969
	Jacks	1,684		21	369	390	10	180
2008	Adults	70,554		22,259	1,919	24,178	1,974	9,101
	Jacks	25,247		641	4,308	4,949	144	2,130
2009	Adults	100,644		28,387	5,651	34,038	2,583	12,263
	Jacks	11,914		178	2,214	2,392	60	1,229
2010	Adults	90,860		29,887	3,035	32,922	2,661	10,278
	Jacks	16,640		428	1,831	2,259	74	1,069
2011	Adults	101,977		26,353	4,147	30,500	2,377	8,490
	Jacks	84,895		1,322	9,981	11,303	319	9,549
2012	Adults	295,322		95,386	13,876	109,262	8,578	38,478
	Jacks	21,433		177	3,875	4,052	94	1,537
2013	Adults	165,025		63,036	19,800	82,836	5,885	13,431
	Jacks	14,356		259	2,260	2,519	69	1,323
2014	Adults	160,396		25,967	5,386	31,353	2,392	24,300
	Jacks	22,321		348	3,364	3,712	100	1,039
2015	Adults	77,821		28,048	7,842	35,890	2,611	7,956
	Jacks	6,094		496	1,605	2,101	76	220
2016	Adults	24,582		5,160	1,310	6,470	486	2,436
	Jacks	2,787		160	162	322	17	151
2017	Adults	33,232		1,880	71	1,951	164	7,443
	Jacks	20,318		266	42	308	17	3,193
2018c/	Adults	92,293		14,769	4,075	18,844	1,261	11,425
	Jacks	11,114		308	2,206	2,514	57	435

GOAL Adults

a/ Total inriver run includes an estimated 30,550 fish that died prior to spawning in September 2002.

b/ Total inriver run includes fish collected from the Klamath and Trinity rivers by the Yurok and Hoopa Valley tribes, respectively, to *multifiliis* during the following years: 2014 - 282 fish; 2015 - 124 fish; 2016 - 113 fish.

c/ Preliminary.

d/ In December 2011, Amendment 16 to the Salmon Fishery Management Plan was approved, which replaced the 35,000 spawning

of 40,700 natural area adult spaw ners. The 35,000 spaw ner floor w as in effect from 1989-2007 and in 2011. In 2008-2010, fishe
escapement of 40,700 adults under requirements of a rebuilding plan.

e/ Annual escapement goals may be more or less than SMSY in some years due to meeting SACL requirements and de minimis fi

in numbers of adults and jacks.

Klamath Riv er		Spaw ning Escapement			Trinity Riv er		Total	
Natural	Total	Hatc hery	Natural	Total	Hatc hery	Natural	Total	
16,313	25,125	2,934	11,354	14,288	11,746	27,667	39,413	
6,227	7,389	4,888	9,556	14,444	6,050	15,783	21,833	
21,543	34,737	11,912	49,242	61,154	25,106	70,785	95,891	
3,460	4,469	2,285	7,964	10,248	3,294	11,423	14,718	
26,594	39,574	5,104	21,339	26,442	18,084	47,932	66,016	
3,216	4,356	1,134	3,435	4,569	2,274	6,651	8,925	
32,279	56,828	11,421	21,950	33,371	35,970	54,229	90,199	
2,628	4,042	872	3,391	4,262	2,285	6,019	8,304	
34,971	58,447	15,476	21,375	36,851	38,952	56,346	95,298	
2,000	2,785	596	1,894	2,490	1,381	3,894	5,275	
14,264	25,868	7,918	15,899	23,817	19,522	30,163	49,685	
6,516	8,902	4,076	7,866	11,942	6,462	14,382	20,844	
21,292	38,261	18,081	39,378	57,459	35,050	60,670	95,720	
232	412	33	839	872	213	1,071	1,284	
19,020	28,121	4,451	11,830	16,281	13,552	30,850	44,402	
9,425	11,555	801	7,798	8,599	2,931	17,223	20,154	
27,743	40,006	7,351	16,666	24,017	19,614	44,409	64,023	
1,948	3,177	143	6,142	6,285	1,372	8,090	9,462	
15,170	25,448	7,774	22,055	29,829	18,052	37,225	55,277	
1,811	2,880	1,432	9,995	11,427	2,501	11,806	14,307	
17,973	26,463	13,847	28,790	42,637	22,337	46,763	69,100	
24,746	34,295	1,875	37,103	38,978	11,424	61,849	73,273	
72,786	111,264	17,461	48,757	66,218	55,939	121,543	177,482	
8,289	9,826	92	7,369	7,461	1,629	15,658	17,287	
31,711	45,142	3,717	27,445	31,162	17,148	59,156	76,304	
3,274	4,597	135	7,036	7,171	1,458	10,310	11,768	
70,709	95,009	6,975	24,395	31,370	31,276	95,104	126,380	
10,520	11,559	221	6,719	6,940	1,259	17,239	18,498	
23,273	31,229	3,129	4,839	7,968	11,085	28,112	39,197	
748	968	224	2,724	2,948	444	3,472	3,916	
10,376	12,812	1,142	3,561	4,703	3,578	13,937	17,515	
554	705	401	1,340	1,741	552	1,894	2,446	
13,832	21,275	3,770	6,072	9,842	11,213	19,904	31,117	
10,621	13,814	1,863	4,316	6,179	5,056	14,937	19,993	
37,503	48,928	7,139	16,121	23,260	18,564	53,624	72,188	
3,490	3,925	171	4,447	4,618	606	7,937	8,543	

d/e/

≥40,700

o test for the presence of the parasite Ichthyophthirius

ning escapement floor w ith an SMSY management objective

ries were managed for a natural area spawning

shing provisions.

Pasted values, not linked to calculations

	River and r Upstream effects - Egg Mortality M			Upstream effects - Salmod juvenili			Delta effect
	median	97.5 %ile	2.5 %ile	median	97.5 %ile	2.5 %ile	median
Sacramento River winter-run							
Sacramento River spring-run				-0.0108	151.8044	-99.7871	-0.00507
Sacramento River fall-run				-0.0034	0.0734	-0.2004	-0.00324
Sacramento River late fall-run				-0.0068	0.0807	-0.0787	-0.00228
Clear Creek							-0.00324
American F	-0.0001	0.0389	-0.0333				-0.00324
Stanislaus F	0.0037	0.1542	-0.1042				
Feather River Fall/spring							0.003242
Other Sac Runs (spring)							-0.00507
Other Sac Runs (fall)							-0.00324
San Joaquir	not evaluated						
Mokelumn	not evaluated						

Aggregate change in survival (and production) from COS to PA

Upstream Values scaled to CV-wide proportion

	median	97.5 %ile	2.5 %ile
Sacramento lifecycle result for ocean abundance			
Sacramento	-3.3E-06	0.04643	-0.03052
Sacramento	-0.00033	0.007119	-0.01944
Sacramento	-0.00018	0.002093	-0.00204
American F	-2.2E-05	0.008685	-0.00743
Stanislaus F	3.66E-05	0.001527	-0.00103
Feather Riv	upstream changes not quantified		
Other Sac Runs (spring)			
Other Sac Runs (fall)			
Upstream s	-0.0005	0.065854	-0.06046
Upstream s	0.999505	1.065854	0.939536

Hatchery a General go Proportion Proportion Number in-river

Coleman fa	12000000	0	1	12000000
Coleman la	1000000	0	1	1000000
LSNFH Win	200000	0	1	200000
Feather Fal	6000000	0.7	0.3	1800000
Feather Spi	2000000	0.5	0.5	1000000
Feather en	2000000	1	0	0

Nimbus	4000000	0.33	0.67	2680000
Mokelum	5000000	0.7	0.3	1500000
Mokelum	2000000	1	0	0
Merced	300000	0	1	300000
Total relea:	34500000			
In-river rel	20480000			
Proportion	0.593623			

Total Hatch	35059237			
Proportion	0.593623			
Survival to	0.5	Smolt survival RBDD to the delta based on JPE (2013-2018 AT studies)		
Hatchery fi	10405988			
DPM result median	97.5	perce	2.5	percentile
COS DPM s	0.248295	0.524968	0.17634	
PA DPM su	0.244555	0.518973	0.181502	
COS hatche	2583758	5462809	1834991	
PA Hatcher	2544841	5400430	1888708	
Change in f	-38917.2	-62378.2	53717.82	
Hatchery B	14247261	14247261	14247261	
Hatchery to	16831019	19710070	16082252	
Hatchery to	16792102	19647691	16135970	

Delta Survival Change - Sac River Basin			
River and r	median	97.5 %ile	2.5 %ile
Sacramento	-1.6E-06	4.63E-06	-4.3E-06
Sacramento	-0.00031	0.002105	-0.00165
Sacramento	-5.9E-05	0.000216	-0.00185
Sacramento IOS lifecycle model to ocean			
Clear Creek	-7.4E-05	0.000494	-0.00039
American F	-0.00072	0.004847	-0.00379
Feather Riv	0.000777	0.004067	-0.0052
Other Sac T	-0.00011	0.00033	-0.0003
Other Sac T	-0.00095	0.006329	-0.00495
Delta Survi	-0.00145	0.018394	-0.01813
Delta Survi	0.998549	1.018394	0.981865
Natural fish	7213294	7345972	7212756
Freshwater	0.998054	1.085459	0.922498
Natural fish	7199259	7829735	6654246

	median	97.5 %ile	2.5 %ile
Natural Chi	7213294	7345972	7212756
Natural Chi	7199259	7829735	6654246
Hatchery ju	16831019	19710070	16082252
Hatchery ju	16792102	19647691	16135970
Total juven	24044313	27056042	23295008
Total juven	23991361	27477427	22790216
Bay to oce	0.018884	0.018884	0.018884
Ocean Adu	454051.7	510925	439901.8
Ocean Adu	453051.7	518882.4	430369.4
Adjustment for winter-run from IOS model			
Winter-run	3292.975	9345.134	445.5395
Winter-run	0.10579	0.500726	-0.44954
Winter-run	3641.339	14024.48	245.2499
Ocean Adu	457344.7	520270.2	440347.4
Ocean Adu	456693.1	532906.9	430614.6

Change in r	-651.58	12636.76	-9732.76
Percent ab	-0.00142	0.024289	-0.0221
Change in C	-11005.2	213434.9	-164386

* The median winter-run Chinook ocean abundance for 2001-2018 was used as the baseline

** median adult weight of 16.89 pounds

ts - Delta Passage Model Lifecycle effects - IOS					Proportion of CV Abundance
97.5 %ile	2.5 %ile	median	97.5 %ile	2.5 %ile	
		0.10579	0.500726	-0.44954	0.014114
0.015145	-0.01398				0.000306
0.021709	-0.01697				0.096985
0.008336	-0.07148				0.025939
0.021709	-0.01697				0.02277
0.021709	-0.01697				0.223272
					0.009901
0.016971	-0.02171				0.239664
0.015145	-0.01398				0.021773
0.021709	-0.01697				0.291531
					0.026361
					0.028417

)

Total Hatchery Release	
Proportion released in-river	
Survival to Delta	
Hatchery fish to delta	10
DPM results (fall-run)	m
COS DPM survival	
PA DPM survival	
COS hatchery fish to bay	:
PA Hatchery fish to bay	:
Change in hatchery fish to bay	
Hatchery Bay release	10
Hatchery total in Bay COS	10
Hatchery total in Bay PA	10

Delta Survival Change - Sac River Basin			
River and run	median	97.5 %ile	2.5 %ile
Sacramento River spring-run	-0.000002	0.000005	-0.000004
Sacramento River fall-run	-0.000314	0.002105	-0.001646
Sacramento River late fall-run	-0.000059	0.000216	-0.001854
Sacramento River winter-run	IOS lifecycle model to ocean		
Clear Creek	-0.000074	0.000494	-0.000386
American River	-0.000724	0.004847	-0.003789
Feather River Fall/spring	0.000777	0.004067	-0.005203
Other Sac Tribs -spring	-0.000110	0.000330	-0.000304
Other Sac Tribs - fall	-0.000945	0.006329	-0.004948
Delta Survival change	-0.001451	0.018394	-0.018135
Delta Survival compared to COS	0.998549	1.0183936	0.9818654
Natural fish in Bay baseline (COS)	7,213,294	7,345,972	7,212,756
Freshwater change (upstream X Delta)	0.99805	1.08546	0.92250
Natural fish in Bay in PA	7,199,259	7,829,735	6,654,246

	median	97.5%
Natural Chinook smolts in Bay baseline (COS)	7,213,294	7,34
Natural Chinook smolts in Bay in PA	7,199,259	7,82
Hatchery juvenile Chinook total in Bay COS	16,831,019	19,71
Hatchery juvenile Chinook total in Bay PA	16,792,102	19,64
Total juvenile Chinook in Bay (COS)	24,044,313	27,05
Total juvenile Chinook in Bay (PA)	23,991,361	27,47
Bay to ocean adult survival	0.0189	0
Ocean Adult Chinook Abundance (COS), not including winter-run	454,052	51
Ocean Adult Chinook Abundance (PA), not including winter-run	453,052	51
Adjustment for winter-run from IOS model		
Winter-run Chinook COS (IOS model) *	3,293	
Winter-run Chinook COS to PA (proportional IOS model changes)	0.106	
Winter-run Chinook PA (IOS model changes)	3,641	1
Ocean Adult Chinook Abundance (COS)	457,345	52
Ocean Adult Chinook Abundance (PA)	456,693	53
Change in median number of Adult Chinook in the Ocean COS to PA	-652	12,
Percent abundance change in adult Chinook in the Ocean from COS to PA	-0.14%	2.
Change in Chinook Biomass (pounds) COS to PA**	-11,005	213,
* The median winter-run Chinook ocean abundance for 2001-2018 was used as the k and proportional changes over the IOS modeling period are applied to that value		
** median adult weight of 16.89 pounds		

in COS and proportional changes over the IOS modeling period are applied to that value

River and run	Upstream effects - Egg Mortality Model			Upstream effects - Salmor juvenile production		
	median	97.5 %ile	2.5 %ile	median	97.5 %ile	2.5 %ile
Sacramento River winter-run						
Sacramento River spring-run				-0.0108	151.8044	-99.78
Sacramento River fall-run				-0.0034	0.0734	-0.200
Sacramento River late fall-run				-0.0068	0.0807	-0.078
Clear Creek						
American River	-0.0001	0.0389	-0.0333			
Stanislaus River	0.0037	0.1542	-0.1042			
Feather River Fall/spring						
Other Sac Runs (spring)						
Other Sac Runs (fall)						
San Joaquin Basin	not ev					
Mokelumne	not ev					

Aggregate change in survival (and production) from COS to P.

Upstream	Values scaled to CV-wide		
	median	97.5 %ile	2.5 %ile
	lifecycle result for ocean abundance		
Sacramento River winter-run			
Sacramento River spring-run	0.00000	0.04643	-0.03052
Sacramento River fall-run	-0.00033	0.007119	-0.019436
Sacramento River late fall-run	-0.00018	0.002093	-0.002041
American River	-0.00002	0.008685	-0.007435
Stanislaus River	0.00004	0.001527	-0.001032
Feather River Fall/spring	upstream changes not quantified		
Other Sac Runs (spring)			
Other Sac Runs (fall)			
Upstream survival change	-0.00050	0.06585	-0.06046
Upstream survival compared to COS	0.99950	1.06585	0.93954

Hatchery annual Chinook releases	General goal	Proportion bay	Proportion in-river	Number in-river
Coleman fall	12,000,000	0	1	12,000,000
Coleman late fall	1,000,000	0	1	1,000,000
LSNFH Winter	200,000	0	1	200,000
Feather Fall	6,000,000	0.7	0.3	1,800,000
Feather Spring	2,000,000	0.5	0.5	1,000,000

Feather enhancement	2,000,000	1	0	0
Nimbus	4,000,000	0.33	0.67	2,680,000
Mokelumne	5,000,000	0.7	0.3	1,500,000
Mokelumne enhancement	2,000,000	1	0	0
Merced	300,000	0	1	300,000
Total release	34,500,000			
In-river release	20,480,000			
Proportion released in-river	0.59			

35,059,237		
0.59		
Smolt survival RBDD to the delta based on JPE (2013-2018 AT studies)		
0.5		
0,405,988		
Median	97.5 percentile	2.5 percentile
0.248	0.525	0.176
0.245	0.519	0.182
2,583,758	5,462,809	1,834,991
2,544,841	5,400,430	1,888,708
-38,917	-62,378	53,718
4,247,261	14,247,261	14,247,261
6,831,019	19,710,070	16,082,252
6,792,102	19,647,691	16,135,970

6ile	2.5 %ile
15,972	7,212,756
19,735	6,654,246
20,070	16,082,252
27,691	16,135,970
36,042	23,295,008
47,427	22,790,216
50,0189	0.0189
60,925	439,902
68,882	430,369
9,345	446
0.501	-0.450
4,024	245
0,270	440,347
2,907	430,615
,637	-9,733
43%	-2.21%
,435	-164,386
baseline in COS	

d	Delta effects - Delta Passage Model			Lifecycle effects - IOS			Proportion of CV Abundance
	median	97.5 %ile	2.5 %ile	median	97.5 %ile	2.5 %ile	
e				0.1058	0.50073	-0.4495	0.0141
7	-0.0051	0.015145	-0.014				0.0003
4	-0.0032	0.021709	-0.017				0.0970
7	-0.0023	0.008336	-0.0715				0.0259
	-0.0032	0.021709	-0.017				0.0228
	-0.0032	0.021709	-0.017				0.2233
							0.0099
	0.0032	0.016971	-0.0217				0.2397
	-0.0051	0.015145	-0.014				0.0218
	-0.0032	0.021709	-0.017				0.2915
valuated							0.0264
valuated							0.0284

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