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SPAWNING SURVEY SUMMARY UPDATE

1. INTRODUCTION

The California Department of Fish and Game (CDFG) has conducted fall-run Chinook salmon spawning surveys on the Tuolumne River since 1971 as part of the fish study program for the Don Pedro Project FERC license. TID/MID 1992 reviewed the 1971-1988 period and TID/MID 1997 summarized the 1989-1996 period. This report updates Ford and Kirihara 2009 and summarizes the 1971-2009 period. There is only limited preliminary information provided by CDFG at this time (much less than for the 2008 run a year ago), so this report is abbreviated for that reason.

2. SUMMARY UPDATE

2.1 Survey Reach

The reach CDFG surveyed in 2009 was extended downstream into Section 5 (Figure 1) that starts near Fox Grove (RM 26.4). Our records indicate that reach has not been reported as surveyed for spawning activity by CDFG since about 1989. The survey was extended downstream presumably to examine for spawning activity above and below the Tuolumne River counting weir (RM 24.5), but there is little comparable data available due to the lack of surveys in prior years.

2.2 Carcass survey data and population estimates

Tuolumne River carcass numbers, mark/recapture survey results, and population estimates since 1971 are in Table 1. Those 2009 carcass data do not include Section 5 where CDFG reported an additional 15 total carcasses, including 13 tagged and 7 recovered in that mark/recapture effort. The 2009 run estimate of 300 is based on 280 counted at the Tuolumne weir through Jan 15 and 20 more salmon estimated below the weir. The initial CDFG estimate based on carcasses surveys is only 124 and that number may not include salmon in Section 5. The Tuolumne salmon run estimates for 1971-2009 have ranged from less than 100 salmon in 1990 and 1991 to 40,300 fish in 1985. Estimates for the San Joaquin basin rivers since 1940 are in Table 2.

2.3 Live and redd counts

Table 1 has the maximum weekly counts of live salmon and redds from the CDFG surveys. The earliest date of peak weekly live count for the 1971-2009 period was Oct 31, 1996 and the latest peak was Nov 27, 1972 with a median date of Nov 12 (Table 3). The 2009 run had a peak live count of 69 salmon during the week of Nov 23. During the following week of Nov 30, their peak redd count of 62 occurred. CDFG reported for Section 5 a peak live count of 15 on Nov 2 and a peak redd count of 22 on Nov 25. FISHBIO conducted an intensive redd survey from La Grange Dam (RM 52.2) down to Santa Fe Road (RM 21.5), downstream of the lower mapped end of the CDFG Section 5 at RM 24.1, from Nov 30 - Dec 2. That survey obtained a count of 99 redds in Sections 1-4 and another 16 redds in Section 5 (and below), with 3 redds upstream of the weir and 13 downstream.

3. REFERENCES

Ford, T., and S. Kiriara. 2009. Spawning Survey Summary Update. Prepared by Turlock Irrigation District/Modesto Irrigation District, California and Stillwater Sciences, Berkeley, California for Federal Energy Regulatory Commission, Washington, D.C.

TID/MID (Turlock Irrigation District and Modesto Irrigation District). 1992. Tuolumne River Salmon Spawning Surveys 1971-1988. 1991 Federal Energy Regulatory Commission Article 39 Report, Appendix 3.

TID/MID (Turlock Irrigation District and Modesto Irrigation District). 1997. Tuolumne River Salmon Spawning Summary, Supplement to 1992 FERC Report Appendix 3. 1996 Federal Energy Regulatory Commission Report 1996-1.

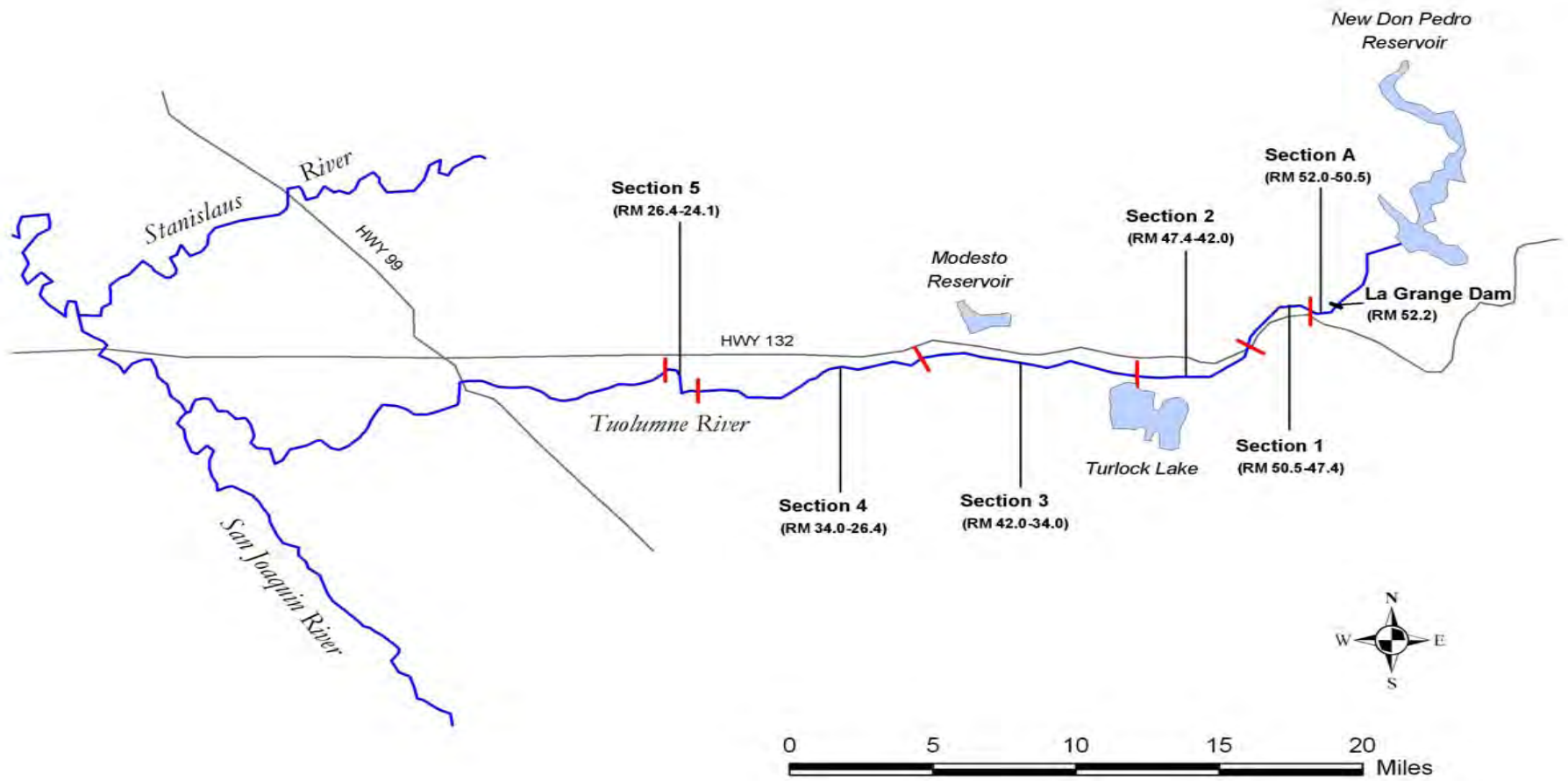


Figure 1. Map of the Tuolumne River salmon spawning survey reaches.

TABLE 1. TUOLUMNE RIVER SPAWNING SALMON SURVEY COUNTS AND ESTIMATES, 1971-2009.

YEAR	TOTAL CARCASSES	% FEMALE	TAGGED CARCASSES			(1) (WEEKLY)	(1) (WEEKLY)	ESTIMATED RUN
			NUMBER	NUMBER	%	MAXIMUM	MAXIMUM	
			TAGGED	RECOVERED	RECOVERED	LIVE COUNT	REDD COUNT	
1971	2,283	58.0			10.4 e	2,128	1,598	21,885
1972	537	52.0			10.5 e	349	423	5,100
1973	351	59.0	270	35	13.0			1,989
1974	90	55.0	84	7	8.3			1,150
1975	130	60.0	125	8	6.4	154	212	1,600
1976	336	51.0	330	61	18.5	241	312	1,700
1977	45	62.0						450
1978	116	67.0	35	2	9.0 e	81	119	1,300
1979	305	51.0	75	22	29.3	153	204	1,184
1980	248	61.0	74	30	40.5	112	117	559
1981	5,819	44.0	664	334	50.3	1,646	1,650	14,253
1982	2,135	60.0	293	123	42.0	530	1,111	7,126
1983	1,280	25.0	270	25	9.3	263	465	14,836
1984	3,841	34.0	693	201	29.0	1,084	1,143	13,689
1985	11,651	56.0	895	273	30.5	2,986	3,034	40,322
1986	2,463	48.0	456	172	37.7	1,123	1,250	7,288
1987	5,280	31.0	1,069	461	43.1	2,155	850	14,751
1988	3,011	60.0	2,171	1,316	60.6	1,066	1,936	6,349
1989	625	52.0	491	318	64.8	291	461	1,274
1990	37	32.0	30	14	46.7	44	42	96
1991	30	45.0	12	7	58.3	24	51	77
1992	55	42.6	47	26	55.3	49	38	132
1993	187	61.3	169	96	56.8	94	215	431
1994	215	49.7	185	110	59.5	226	264	513
1995	461	54.1	415	175	42.2	270	174	928
1996	1,301	34.9	1,186	369	31.1	636	216	4,362
1997	1,520	58.6	1,056	253	24.0	1,258	716	7,548
1998	2,712	50.6	2,170	679	31.3	1,058	448	8,967
1999	3,980	45.9	2,375	1,398	58.9	1,403	404	7,730
2000	6,884	62.6	2,162	870	40.2	3,269	2,104	17,873
2001	5,400	53.9	1,170	717	61.3	1,865	1,251	9,222
2002	4,702	54.4	1,283	826	64.4	1,366	478	7,125
2003	1,489	59.7	585	328	56.1	463	349	2,961
2004	1,224	59.3	529	344	65.0	718	455	1,700
2005	312	66.5	176	58	33.0	129	124	719
2006	152	45.1	91	21	23.1	114	115	625
2007	87	37.8	37	15	40.5	92	107	211
2008	161	57.1	105	46	43.8	200	165	372
2009(2)	40		23	18	78.3	69	62	300

(1) Redd counts were taken from TID/MID summary tables after 1980; redd counts for 1986 partially based on aerial photographs taken on 26 November 1986.

(2) 2009 population estimate is based on weir count.

e - estimated

Table 2. SAN JOAQUIN BASIN CHINOOK SALMON SPAWNING STOCK ESTIMATES (in 1000's of fish)									
Year	Stan.	Tuol.	Merced (river)	Merced (hatchery)	Merced (total)	Trib. Total	SJR abv. MR	Basin Total	
1939							5.00		
1940	3.00	122.00	1.00		1.00	126.00		126.00	
1941	1.00	27.00	1.00		1.00	29.00	9.00	38.00	
1942		44.00				44.00		44.00	
1943							35.00		
1944		130.00				130.00	5.00	135.00	
1945							56.00		
1946		61.00				61.00	30.00	91.00	
1947	13.00	50.00				63.00	6.00	69.00	
1948	15.00	40.00				55.00	2.00	57.00	
1949	8.00	30.00				38.00	8.00	46.00	
1950							0.50		
1951	4.00	3.00				7.00		7.00	
1952	10.00	10.00				20.00		20.00	
1953	35.00	45.00	0.50		0.50	80.50		80.50	
1954	22.00	40.00	4.00		4.00	66.00		66.00	
1955	7.00	20.00				27.00		27.00	
1956	5.00	6.00	0.00		0.00	11.00		11.00	
1957	4.00	8.00	0.40		0.40	12.40		12.40	
1958	6.00	32.00	0.50		0.50	38.50		38.50	
1959	4.00	46.00	0.40		0.40	50.40		50.40	
1960	8.00	45.00	0.40		0.40	53.40		53.40	
1961	2.00	0.50	0.05		0.05	2.55		2.55	
1962	0.30	0.20	0.06		0.06	0.56		0.56	
1963	0.20	0.10	0.02		0.02	0.32		0.32	
1964	4.00	2.10	0.04		0.04	6.14		6.14	
1965	2.00	3.20	0.09		0.09	5.29		5.29	
1966	3.00	5.10	0.04		0.04	8.14		8.14	
1967	11.89	6.80	0.60		0.60	19.29		19.29	
1968	6.39	8.60	0.60		0.60	15.59		15.59	
1969	12.33	32.20	0.60		0.60	45.13		45.13	
1970	9.30	18.40	4.70	0.10	4.80	32.50		32.50	
1971	13.62	21.89	3.45	0.10	3.55	39.06		39.06	
1972	4.30	5.10	2.53	0.12	2.65	12.05		12.05	
1973	1.23	1.99	0.80	0.20	1.00	4.22		4.22	
1974	0.75	1.15	1.00	0.40	1.40	3.30		3.30	
1975	1.20	1.60	1.70	0.40	2.10	4.90		4.90	
1976	0.60	1.70	1.20	0.30	1.50	3.80		3.80	
1977	0.00	0.45	0.35	0.20	0.55	1.00		1.00	
1978	0.05	1.30	0.53	0.10	0.63	1.98		1.98	
1979	0.10	1.18	1.92	0.30	2.22	3.50		3.50	
1980	0.10	0.56	2.85	0.16	3.01	3.67		3.67	
1981	1.00	14.25	9.49	0.92	10.42	25.67		25.67	
1982		7.13	3.07	0.19	3.26	10.39		10.39	
1983	0.50	14.84	16.45	1.80	18.25	33.58		33.58	
1984	11.44	13.69	27.64	2.11	29.75	54.88		54.88	
1985	13.47	40.32	14.84	1.21	16.05	69.85		69.85	
1986	6.50	7.40	6.79	0.65	7.44	21.34		21.34	
1987	6.29	14.75	3.17	0.96	4.13	25.17		25.17	
1988	10.21	6.35	4.14	0.46	4.59	21.15	2.30	23.45	
1989	1.51	1.28	0.35	0.08	0.43	3.21	0.33	3.54	
1990	0.48	0.10	0.04	0.05	0.08	0.66	0.28	0.94	
1991	0.39	0.08	0.08	0.04	0.12	0.59	0.18	0.77	
1992	0.26	0.13	0.62	0.37	0.99	1.37	0.00	1.37	
1993	0.68	0.47	1.27	0.41	1.68	2.83		2.83	
1994	1.03	0.51	2.65	0.94	3.59	5.13		5.13	
1995	0.62	0.83	2.32	0.60	2.92	4.37		4.37	
1996	0.17	4.36	3.29	1.14	4.43	8.96		8.96	
1997	5.59	7.15	2.71	0.95	3.66	16.39		16.39	
1998	3.09	8.91	3.29	0.80	4.09	16.09		16.09	
1999	4.35	8.23	3.13	1.64	4.77	17.35		17.35	
2000	11.00	17.87	11.00	1.95	12.95	41.82		41.82	
2001	6.00	9.25	9.20	1.66	10.86	26.11		26.11	
2002	6.90	7.17	8.87	1.80	10.67	24.74		24.74	
2003	4.85	2.96	2.53	0.50	3.03	10.84		10.84	
2004	4.41	1.98	3.27	1.05	4.32	10.71		10.71	
2005	4.12	0.72	1.92	0.42	2.34	7.18		7.18	
2006	3.07	0.63	1.47	0.15	1.62	5.31		5.31	
2007	0.41	0.21	0.50	0.08	0.57	1.19		1.19	
2008	0.92	0.37	0.40	0.08	0.47	1.77		1.77	
2009	1.25	0.30	0.36	0.25	0.60	2.15		2.15	
Recent Tuolumne and Stanislaus estimates based on weir counts are in Bold.									
(1940 Stan. and Merced, and 1941 Stan., Tuol., and Merced, are partial counts)									

Table 3. Tuolumne River salmon survey periods and peak live counts.

Year	Survey Period		Peak Live Count		Tuolumne Estimate (x 1,000)	Peak Live / Pop.est. (%)
	Start Date	End Date	Date	Number		
1940	26-Sep	02-Dec	04-Nov	5,447	122.0	4.5%
1941	21-Sep	18-Nov	13-Nov	2,807	27.0	10.4%
1942	13-Sep	30-Nov	01-Nov	3,386	44.0	7.7%
1944	30-Sep	30-Nov	06-Nov	10,039	130.0	7.7%
1946	11-Oct	20-Nov	04-Nov	6,002	61.0	9.8%
1957	05-Nov	03-Jan			8.0	
1958	06-Nov	09-Jan			32.0	
1959	03-Nov	01-Jan			46.0	
1960	12-Nov	13-Jan			45.0	
1961					0.5	
1962	08-Nov	04-Jan			0.2	
1963	10-Feb				0.1	
1964	04-Nov	18-Dec			2.1	
1965	19-Nov	12-Jan			3.2	
1966	08-Nov	18-Jan	09-Nov	271	5.1	5.3%
1967	18-Oct	13-Jan	21-Nov	184	6.8	2.7%
1968	11-Nov	15-Dec	22-Nov	1,490	8.6	17.3%
1969	20-Nov	12-Jan			32.2	
1970	19-Nov	20-Jan	20-Nov	1,517	18.4	8.2%
1971	15-Nov	27-Dec	16-Nov	2,128	21.9	9.7%
1972	13-Nov	23-Jan	27-Nov	349	5.1	6.8%
1973	05-Nov	17-Jan			2.0	
1974					1.2	
1975	06-Nov	31-Dec	06-Nov	154	1.6	9.6%
1976	03-Nov	29-Dec	15-Nov	241	1.7	14.2%
1977	29-Nov	20-Dec			0.5	
1978	26-Oct	19-Dec	24-Nov	81	1.3	6.2%
1979	05-Nov	17-Dec	02-Nov	153	1.2	12.8%
1980	12-Nov	18-Dec	12-Nov	112	0.6	18.7%
1981	04-Nov	16-Dec			14.3	
1982	08-Nov	29-Nov	15-Nov	545	7.1	7.7%
1983	07-Nov	01-Dec	15-Nov	263	14.8	1.8%
1984	01-Nov	30-Nov	01-Nov	1,084	13.7	7.9%
1985	29-Oct	20-Dec	12-Nov	2,986	40.3	7.4%
1986	27-Oct	05-Dec	03-Nov	1,123	7.3	15.4%
1987	28-Oct	16-Dec	17-Nov	2,155	14.8	14.6%
1988	25-Oct	29-Dec	14-Nov	1,066	6.3	16.8%
1989	24-Oct	29-Dec	09-Nov	291	1.3	22.8%
1990	23-Oct	26-Dec	19-Nov	44	0.1	45.8%
1991	22-Oct	02-Jan	25-Nov	24	0.1	31.2%
1992	05-Nov	21-Dec	19-Nov	49	0.1	37.1%
1993	14-Oct	18-Dec	06-Nov	94	0.4	21.8%
1994	03-Nov	05-Jan	21-Nov	226	0.5	44.1%
1995	27-Oct	30-Dec	03-Nov	270	0.9	29.1%
1996	22-Oct	04-Dec	31-Oct	636	4.4	14.6%
1997	14-Oct	23-Dec	12-Nov	1,258	7.5	16.7%
1998	07-Oct	22-Dec	02-Nov	1,058	9.0	11.8%
1999	04-Oct	28-Dec	01-Nov	1,403	7.7	18.2%
2000	02-Oct	05-Jan	06-Nov	3,269	17.9	18.3%
2001	04-Oct	05-Jan	05-Nov	1,865	9.2	20.2%
2002	01-Oct	02-Jan	04-Nov	1,366	7.1	19.2%
2003	30-Sep	30-Dec	18-Nov	463	3.0	15.6%
2004	04-Oct	06-Jan	08-Nov	718	1.9	37.8%
2005	03-Oct	22-Dec	14-Nov	129	0.7	17.9%
2006	05-Oct	28-Dec	13-Nov	114	0.6	18.2%
2007	02-Oct	28-Dec	19-Nov	92	0.2	43.6%
2008	06-Oct	08-Jan	04-Nov	200	0.4	53.8%
2009	5-Oct	13-Jan	23-Nov	69	0.3	23.0%
<u>For period 1971-2009:</u>						
Minimum	30-Sep	29-Nov	31-Oct	---	---	---
Maximum	29-Nov	23-Jan	27-Nov	---	---	---
Median	26-Oct	28-Dec	12-Nov	---	---	---