Franks, Sierra
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Possibility of natural producing spring-run Chinook salmon in the Stanislaus and Tuolumne Rivers

Currently Central Valley spring-run Chinook salmon are listed as threatened under the Endangered Species Act (ESA). This species was first listed in 1999. Historically in the San Joaquin River system spring-run Chinook are thought to have been one of the most viable runs, but were not listed under the original ESA listing as it was presumed by 1950, that the entire run of spring-run Chinook salmon was extirpated from the San Joaquin River (Fry 1961). The former spring run of the San Joaquin River has been described as "one of the largest Chinook salmon runs anywhere on the Pacific Coast" and numbering "possibly in the range of 200,000-500,000 spawners annually" (CDFG 1990).

Analyzing the historic data and information provided specifically on the Tuolumne and Stanislaus rivers, there is high probability based on records coupled with current data that natural (fish that naturally spawned in river systems and whose parents did as well) occurring spring-run Chinook are still present in small numbers. Here it is discussed where spring-run originally used these river systems.

On the Tuolumne River, Clavey Falls (10-15 ft. high) at the confluence of the Clavey River, may have obstructed the salmon at certain flows, but spring-run salmon in some numbers undoubtedly ascended the mainstem a considerable distance. The spring-run salmon were most likely stopped by the formidable Preston Falls at the boundary of Yosemite National Park (~50 mi upstream of present New Don Pedro Dam), which is the upstream limit of native fish distribution (CDFG 1955 unpublished data).

Spring run Chinook also originally occurred in the Stanislaus River. Spring-run probably went up the system considerable distances because there are few natural obstacles (Yoshiyama et al. 1998). Much of the spawning occurred on the extensive gravel beds in the 23-mi. stretch from

Riverbank upstream to Knights Ferry, which is essentially on the Valley floor at approximately 213 feet in elevation. Upstream of Knights Ferry, where the river flows through a canyon, spawning was (historic observations of spring-run) and is (fall-run) concentrated at Two-mile Bar (~1 mi above Knights Ferry) but also occurs in scattered pockets of gravel (Yoshiyama et al. 1998). Historically, the spring run was the primary salmon run in the Stanislaus River, but after the construction of dams which regulated the stream flows (i.e., Goodwin Dam and, later, Melones and Tulloch dams); the fall run became predominant (CDFG 1972 unpublished report).

Recent information suggests that perhaps a self-sustaining (capable of reproducing without hatchery influence) population of spring-run Chinook is occurring in some of the San Joaquin River tributaries, most notably the Stanislaus and the Tuolumne Rivers. Snorkel surveys (Kennedy T. and T. Cannon 2005) conducted between October 2002 to October 2004 on the Stanislaus River identified adults in June 2003 and June 2004 between Goodwin and Lovers Leap. Additionally on the Stanislaus, snorkel surveys also observed Chinook fry in December 2003 at Goodwin Dam, Two Mile Bar, and Knights Ferry, which they interpreted as an indication of spawning occurring in September, which is earlier than when fall-run Chinook salmon would be spawning in the river.

FISHBIO a fisheries consultant has operated a resistance board weir coupled with a Vaki RiverWatcher video monitoring system on the Stanislaus since 2003 and on the Tuolumne since 2009. Information obtained from this monitoring indicates that adult Chinook salmon are passing upstream of these weirs at a time period that would historically indicate a spring-run timing. Looking specifically at the months from February to June almost annually since observation began, some adult Chinook are migrating upstream (Table 1). It should be noted that the weir has not always operated past December due to study design or non-conducive river conditions. For example in 2007, 11 phenotypic spring-run Chinook were observed passing the weir between May and June on the Stanislaus. Future monitoring will determine if these fish are a typical occurrence or an anomaly (Anderson et al. 2007). Further personal observations by fisheries biologist from other agencies (CDFG & USFWS) that are familiar with these systems have accounts of seeing adult Chinook holding in these river systems in summer months (CDFG & USFWS, Personal comm.). If this is the case then genetic testing would be needed to confirm that these fish are in fact naturally producing spring-run Chinook and not hatchery strays*, i.e.*

Feather River. Otolith analysis may be the best way to confirm this by matching chemical signatures specific to each river system. Additionally there is no segregation barrier in place for spring-run and fall-run and it is likely that fall-run are superimposing on spring-run redds (Wikert, Personal Comm.). A further analysis looking at these tributaries rotary screw trap (RST) data helps support the suggestion of self-sustaining spring-run by looking at length at date criteria and comparing it to known spring-run Chinook populations on Sacramento River tributaries. RST data provided by Stockton United State Fish and Wildlife Service (USFWS) corroborates with the adult timing, by indicating that there are a small number of fry migrating out of the Stanislaus and Tuolumne at a period that would coincide with spring-run juvenile emigration (Tables 2 & 3).

Additionally during snorkel and kayak surveys in April, May and June of 2013 with CDFW, USFWS and NMFS staff the author observed a large number of adult Chinook in the upper reaches of the Stanislaus River below Goodwin Dam.

References:

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Yoshiyama, R. M., F. W. Fisher, and P. B. Moyle. 1998. Historical abundance and decline of Chinook salmon in the Central Valley region of California. North American Journal of Fisheries Management 18: 487–521.

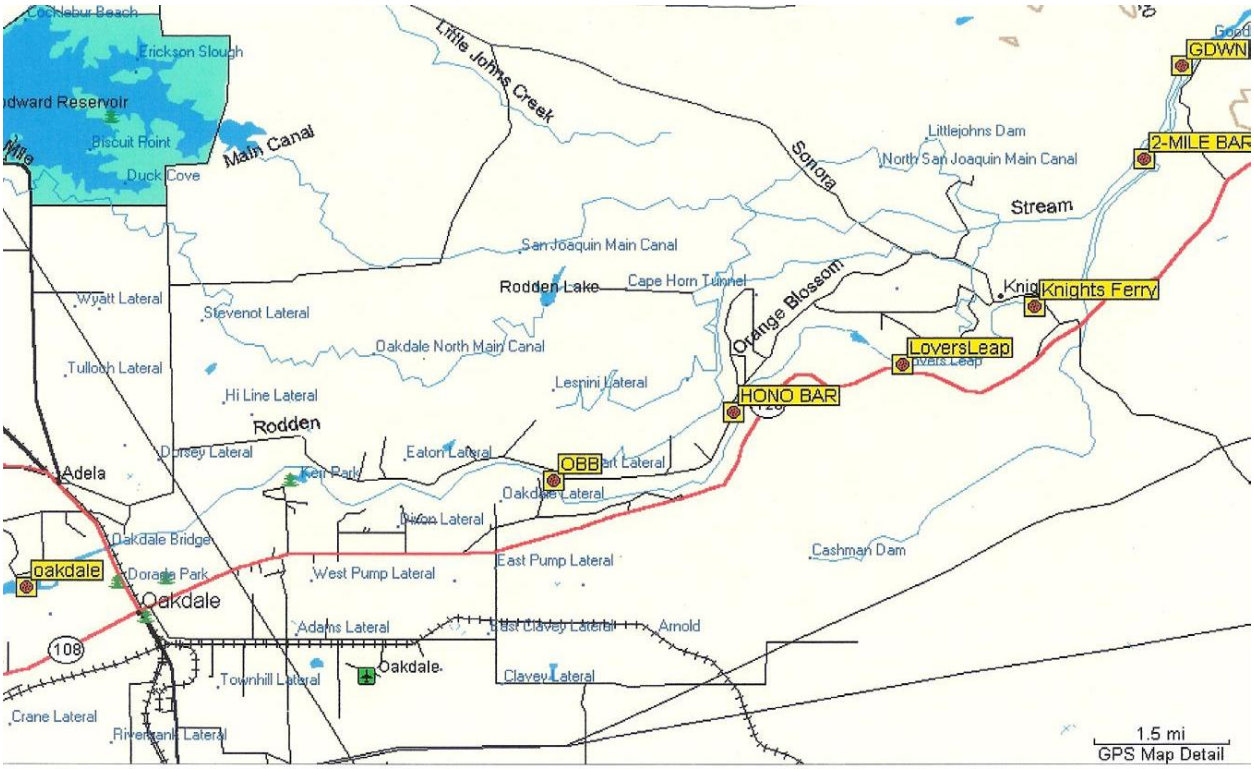

Figure 1. Displaying specific points mentioned in the text on the Stanislaus River, such as Goodwin Dam, 2-Mile Bar and Knights Ferry.

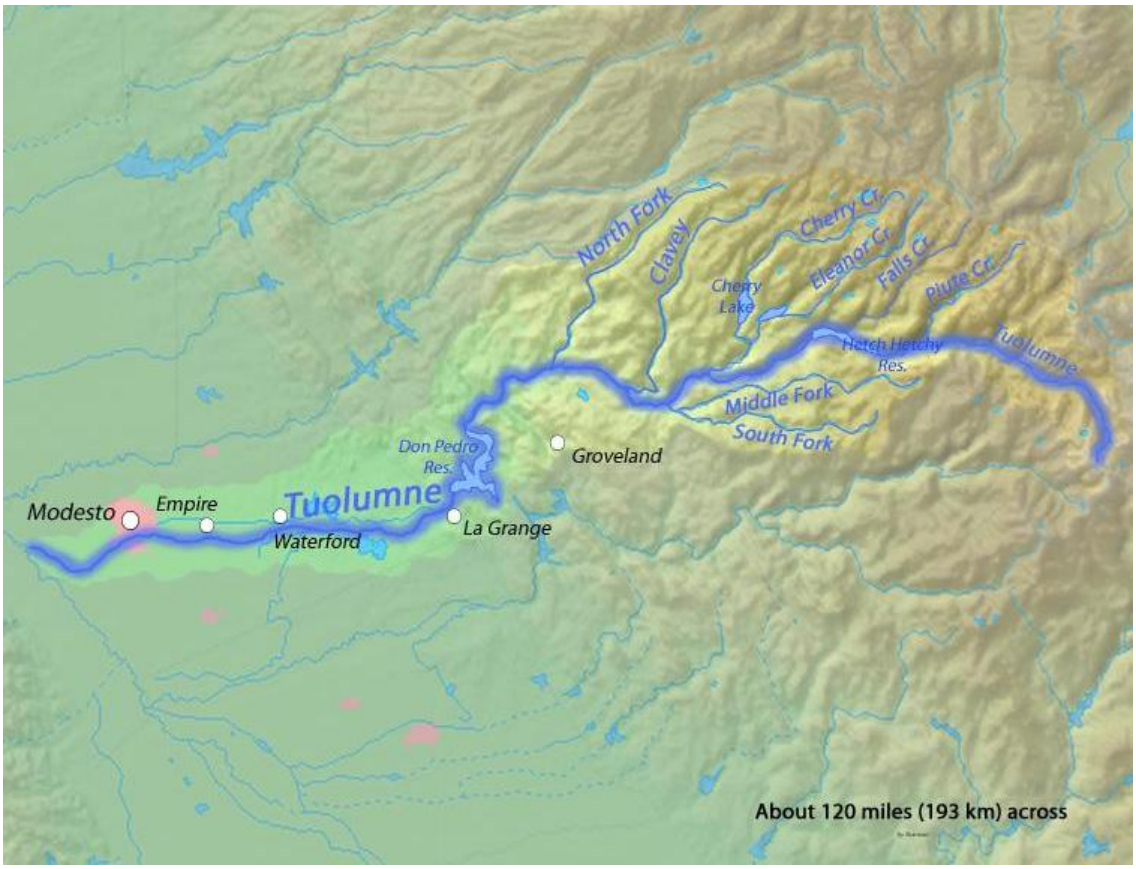

Figure 2. The Tuolumne River

Table 1. **Adult** adipose intact Chinook migrating upstream on the Tuolumne and Stanislaus Rivers (viewed by VAKI RiverWatcher weir: FISHBIO)

* In 2011 the Stanislaus weir was pulled in mid-March due to flood control releases. The Tuolumne weir was not operating

* 2012 adipose clipped information not available at this time (this includes 38 total fish for the Tuolumne)

Table 2. Tuolumne RST cumulative catch 2000-2011 – matching USFWS length at date criteria for spring-run fry at Mossdale

March	245 Chinook fry -6% of TC
April	761 Chinook fry – 26% of TC
May	736 Chinook fry – 25% of TC
June	7 Chinook fry – 2% of TC

Table 3. Stanislaus (Caswell) RST cumulative catch 2000-2011 - matching USFWS length at date criteria for spring-run fry at Mossdale

March	636 Chinook fry - 9% of TC
April	911 Chinook fry - 12% of TC
May	363 Chinook fry – 6% of TC
June	4 Chinook fry - < 1% of TC

Table 4. Official Water Year Hydrologic Classification Indices from CDWR

	Year Type
2000	Above Normal
2001	Dry
2002	Dry
2003	Below Normal
2004	Dry
2005	Wet
2006	Wet
2007	Critical Dry
2008	Critical Dry
2009	Dry
2010	Above Normal
2011	Wet
2012	Dry

Table 5. Rotary Screw Trap Data on the Tuolumne, cumulative from 2000 – 2011. Data courtesy of Kes Ben, USFWS.

Chinook Salmon Length Range (5 mm intervals) by Month, Tuolumne Rotary Screw Trap Data, 2000-2011.

Length Range (mm)	January	February	March	April	May	June	December
25.1 - 30	41	60	9				2
30.1 - 35	1,835	2,336	1,473	74	17		135
35.1 - 40	2,462	2,900	1,541	37	9		39
40.1 - 45	15	67	38	2	1		
45.1 - 50	1	59	59	6	1		
50.1 - 55	4	58	144	14	1		
55.1 - 60	3	50	179	19	3		
60.1 - 65	3	35	226	58	5	2	
65.1 - 70	3	27	230	144	14	1	
70.1 - 75	7	34	199	333	61	6	
75.1 - 80	15	15	130	605	214	12	
80.1 - 85	22	8	72	658	488	25	
85.1 - 90	26	12	43	495	615	47	
90.1 - 95	12	5	20	266	679	77	
95.1 - 100	6	9	12	126	492	94	
100.1 - 105	4	16	8	26	244	47	
105.1 - 110	5	12	3	16	104	19	
110.1 - 115	2	5	2	6	33	5	
115.1 - 120		4	3	2	10	1	
120.1 - 125	2	4	3			1	
125.1 - 130	4	5	2				
130.1 - 135		3	5				
135.1 - 140	1	4	3				
140.1 - 145							
145.1 - 150			2				
150.1 - 155			1				
155.1 - 160							
160.1 - 165							
165.1 - 170		1					
175.1 - 180							
190.1 - 195							

Table 6. Rotary Screw Trap Data on the Stanislaus, cumulative from 2000 – 2011. Data courtesy of Kes Ben, USFWS.

Chinook Salmon Length Range (5 mm intervals) by Month, Stanislaus Rotary Screw Trap Data at Caswell, 2000-2011.

Length Range (mm)	January	February	March	April	May	June	July	December
20.1 - 25			2					
25.1 - 30	53	105	29					
30.1 - 35	496	967	496	4				4
35.1 - 40	413	1,227	555	6	1			3
40.1 - 45	18	395	507	2	2			
45.1 - 50	4	298	734	21	2			
50.1 - 55		181	924	109	3			
55.1 - 60		110	965	381	10			
60.1 - 65		52	928	799	69	1		
65.1 - 70		14	761	1,280	282	5		
70.1 - 75		2	602	1,509	828	22		
75.1 - 80			358	1,480	1,305	105		
80.1 - 85		1	193	1,040	1,510	162		
85.1 - 90			85	635	1,147	256		
90.1 - 95	1		26	276	677	213	2	
95.1 - 100			11	104	274	100		
100.1 - 105			1	41	89	46		
105.1 - 110				18	24	5		
110.1 - 115		1	1	7	3	2		
115.1 - 120			1		1			
120.1 - 125			3			2		
125.1 - 130			3					
130.1 - 135		1						
135.1 - 140			2					
140.1 - 145		1	1	1				
145.1 - 150	1	1	1	1				
150.1 - 155		1	2					
155.1 - 160			1					
160.1 - 165			4					
165.1 - 170								
170.1 - 175								
175.1 - 180								
180.1 - 185								
185.1 - 190			1					