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Historic and Present Distribution of Chinook Salmon and Steelhead in the Calaveras River

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Historic and Present Distribution of Chinook Salmon and Steelhead in the Calaveras River

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ABSTRACT

Interest is great in projects that would restore Central Valley steelhead (*Oncorhynchus mykiss*) and Central Valley Chinook salmon (*Oncorhynchus tshawytscha*) to California drainages where they have historically existed and where there is good quality habitat upstream of instream barriers. The Calaveras River has garnered renewed attention for its potential to support these anadromous fish. I evaluated migration opportunity in the Calaveras River, and whether these salmonids could have been present in the river historically, by comparing historical anecdotal and documented observations of Chinook salmon and steelhead to recorded flows in the river and Mormon Slough, the primary migration corridors. Collected data show that these fish used the river before New Hogan Dam was constructed in 1964. Three different Central Valley Chinook salmon runs, including fall-, late-fall- and spring-run salmon, and steelhead may have used the river before the construction of New Hogan Dam. Fall and possibly winter run and steelhead used the river after dam construction. The timing and amount of flows in the Calaveras River, both before and after the construction of New Hogan Dam, provided ample opportunity for salmonids to migrate up the river in the fall, winter, and spring seasons when they were observed. Flows less than 2.8 m^3/s (100 ft^3/s) can attract fish into the lower river channel and this was likely the case in the past, as well. Even in dry years of the past, flows in the river exceeded 5.6 m^3/s (200 ft^3/s), enough for fish to migrate and spawn. Today, instream barriers and river regulation, which reduced the number of high flow events, has led to fewer opportunities for salmon to enter the river and move upstream to spawning areas even though upstream spawning conditions are still adequate. Improving migration conditions would allow salmonids to utilize upstream spawning areas once again.

KEYWORDS

Calaveras River, Chinook salmon, steelhead

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INTRODUCTION

Interest is great in projects that would restore Central Valley Chinook salmon (*Oncorhynchus tshawytscha*) and Central Valley steelhead (*Oncorhynchus mykiss*) to California's Central Valley drainages where they have historically existed and where there is good quality habitat upstream of instream barriers. The Calaveras River has garnered renewed attention for its potential to support anadromous fish such as Central Valley Chinook salmon and Central Valley steelhead (herein after referred to as Chinook salmon and steelhead). The San Joaquin River at one time in the past had the state's largest run of spring-run Chinook salmon (Yoshiyama et al. 2001), and the basin also had late-fall run and fall-run Chinook salmon and steelhead (Yoshiyama et al. 2001, McEwan 2001). The Stanislaus, Mokelumne, and Cosumnes Rivers, all San Joaquin River tributaries adjacent to the Calaveras River, had Chinook salmon and steelhead populations (DFG 1993, Yoshiyama et al. 1998). Some investigators believe that salmonids in the Calaveras River are limited by low streamflow, particularly in the lower river below Bellota, and by instream dams and other barriers, which together block adult and juvenile migrating fish (CALFED Bay-Delta Program 2000; Stillwater Sciences 2004). Historical documentation prior to 1970 of the presence of Chinook salmon and steelhead in the river is limited. Regular surveys of adult escapement or spawning had not been conducted in the Calaveras River until recent United States Fish and Wildlife Service (USFWS) surveys. Presently, anadromous fish have access to 58 km of the river between New Hogan Dam and the San Joaquin River when flows permit. This study compares observations of salmon and steelhead in the Calaveras River with San Joaquin River Basin salmonid life history, salmonids found historically in adjacent drainages, and seasonal availability of flows and channel migration conditions in order to evaluate the historic and present distribution of Chinook salmon and steelhead in the Calaveras River.

The watershed of the Calaveras River is about 1,040 km^2 (400 m^2) with headwater elevations of about 1,500 m (5,000 ft) (Figure 1). The Calaveras River's primary water source is seasonal rainfall due to its elevation below typical snow level. Approximately 93% of all runoff, and most flooding, occurs between November and April (USFWS 1998). Rain is generally moderate but can be prolonged over several days, causing floods that are characterized by high, but short, peak flows. Twenty-nine km upstream of the river mouth the river is split by Bellota Weir at Bellota into two channels, the old Calaveras River channel and Mormon Slough (Figure 2).

Figure 1. Location of Calaveras River and watershed.

Mormon Slough, converted to a flood control channel in the 1960s, now typically has more flow than the old Calaveras River channel, making it the primary channel in the lower river used by migrating anadromous fish to access spawning areas upstream of Bellota Wier. Historical descriptions of Mormon Slough indicated higher flow in winter and spring and periods of low to no flow in late summer and fall. Mormon Slough still experiences dry periods in summer and early fall as it did under the pre-1964 unregulated hydrologic regime. Currently, flows are controlled by Bellota Weir into Mormon Slough. The channel is filled with irrigation water until around mid-October when irrigation season ends. Following the end of the irrigation season, fall flows in Mormon Slough frequently drop to levels less than 0.57 to 0.85 m^3/s (20-30 ft^3/s), which may prevent spawning migration during fall (Stillwater Sciences 2004). Many channel segments go dry through the winter except

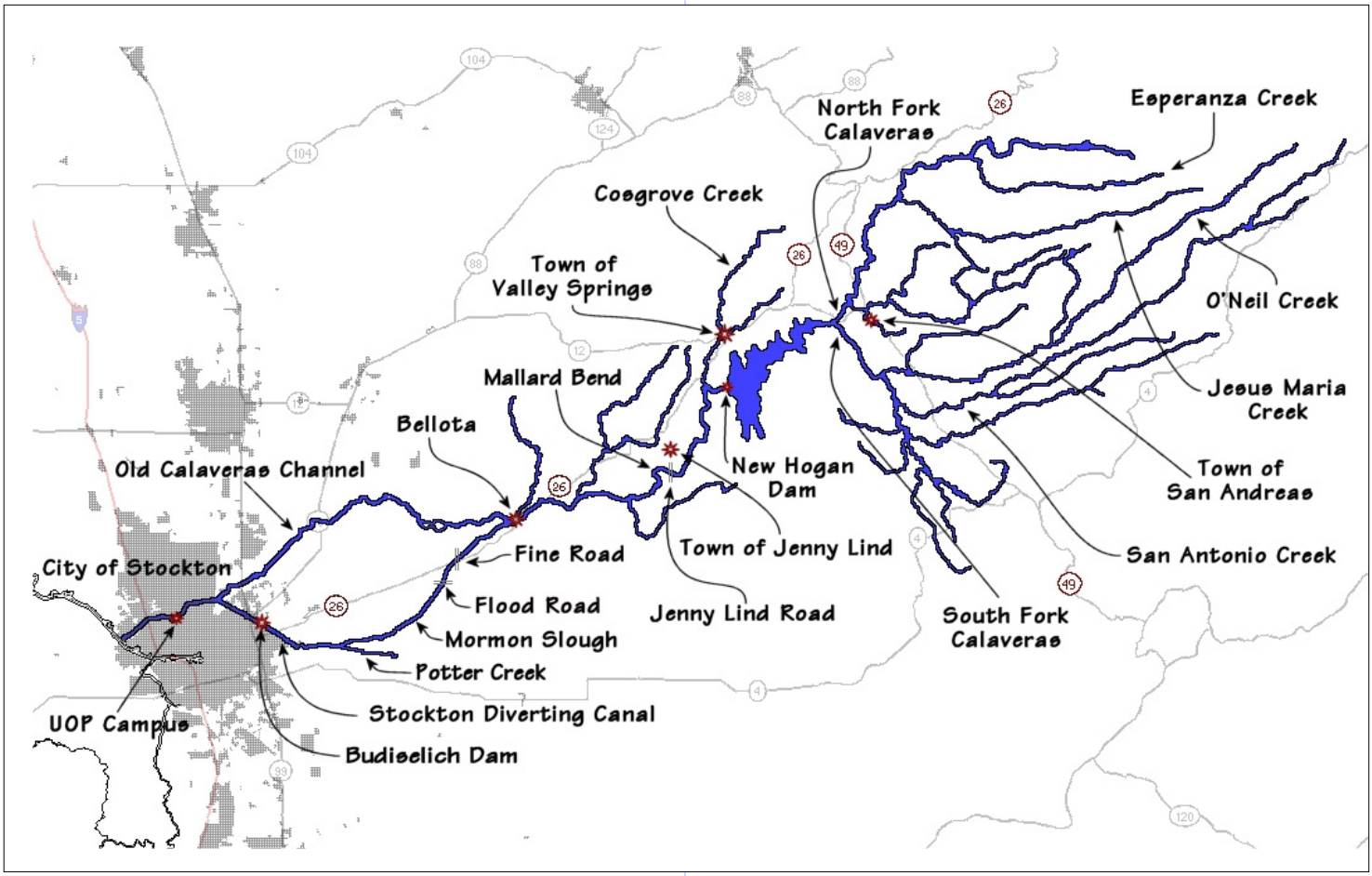

Figure 2. Map of the Calaveras River and major tributaries showing the location of significant barriers and features.

during storms when runoff and high flows enter the channel or overtop Bellota Weir. Once flows recede, the channel goes dry except for disconnected pools where salmon become stranded. In recent years, steelhead have been documented using winter and spring flows from rain, runoff, and occasional reservoir flood releases, to migrate up the river, though barriers such as Bellota Weir can stop steelhead once flows recede after a storm. Significant obstacles also impede steelhead smolt outmigration in the fall and winter, including low to no flows, barriers in Mormon Slough and the old Calaveras channel where smolts become stranded, and possible entrainment at the unscreened municipal diversion at Bellota Weir.

The city of Stockton first impounded the river for flood control by building Hogan dam in 1930 near Valley Springs, about 11.2 km (7 mi) upstream of Jenny Lind (Figure 2). Later, the United States Army Corps of Engineers (USACE) completed New Hogan Dam in 1964, submerging Hogan Dam behind it. New Hogan Reservoir's large capacity (401 x 106 m^3 or 325,000 acre-ft yr^{-1}) relative to the average annual inflow (194 x 106 m^3 or 157,000 acre-ft yr^{-1}) means spills occur only in wet years. New Hogan Reservoir substantially altered the timing, magnitude and duration of flows in the river. In 1978, Stockton East Water District began operating a 1.84-m^3/s (65 ft^3/s) water diversion at Bellota Weir for a water treatment plant. The river's former intermittent seasonal flow was replaced with a steady year-round flow delivering water from New Hogan Dam to the plant's diversion at Bellota. Water now flows year-round between New Hogan Dam and Bellota Weir. In general, instream flow releases during the irrigation season (April - October) range from 4.25 to 7.08 m^3/s (150-250 ft^3/s)

(DFG 1993). Summer and early fall streamflow patterns were different before and after construction of New Hogan Dam (Figure 3). Under pre-dam conditions the months of highest flows were typically January through April, and the months of lowest flows were September to mid-November. After regulation by New Hogan Reservoir in 1964, summertime flows increased as water was released for irrigation, and winter and early springtime flows were of much less magnitude due to control of water released from the reservoir.

According to historical accounts, the Calaveras River's valley reach downstream of Bellota was a large floodplain with many braided streams during times of high water (Tinkham 1880). This reach has changed from an uncontrolled floodplain of sloughs and oak groves of the 1860s to today's system of controlled channels, dams, and levees. Linn (1963) noted in a DFG study that zero flows or flows less than one cubic foot per second were "common in the late summer and fall months downstream of old Hogan Dam. During most years, several days or even months of no flow can be expected in this reach starting in July and continuing through November." However, deep pools in the six-mile reach from New Hogan Dam to the town of Jenny Lind provide suitable summer holding areas for salmon and resident trout in all but the driest years (CALFED Bay-Delta Program 2000). Linn also reported that tributary streams upstream of New Hogan Dam likely had water temperatures and habitat suitable for cold and warm water fish during summer months. Calaveras County trout fishing records indicate that major tributaries had permanent flows from cold springs at the 360-600-m elevation (1,200-2,000 ft), supplying sufficient cold water to support self-sustaining populations of German brown trout and rainbow trout (Linn 1963). During high stream flows in spring, trout redistributed themselves both upstream and downstream in these tributary streams making trout fishing possible during late spring (Linn 1963). Lindley et al. (2006) modeled historical distribution of summer rearing habitat for anadromous *O. mykiss* for the entire Central Valley, including San Antonio, San Domingo, O'Neil, and McKinney Creeks, tributaries upstream of New Hogan Dam (Figure 2). They also propose an historical independent population of steelhead for these creeks and for the mainstem Calaveras River. Linn (1963) also notes that O'Neil Creek had permanent flow during normal and wet years near Sheep Ranch; the North Fork Calaveras River and San Antonio Creek had perennial flows at the Railroad Flat-Sheep Ranch Road crossing in 1961; and Jesus Maria and O'Neil Creeks had perennial flows in the vicinity of the Railroad Flat-Sheep Ranch Road. Upstream of Hogan reservoir, all streams in the Calaveras River drainage were dry in late summer where they cross Highway 49 (Linn 1963).

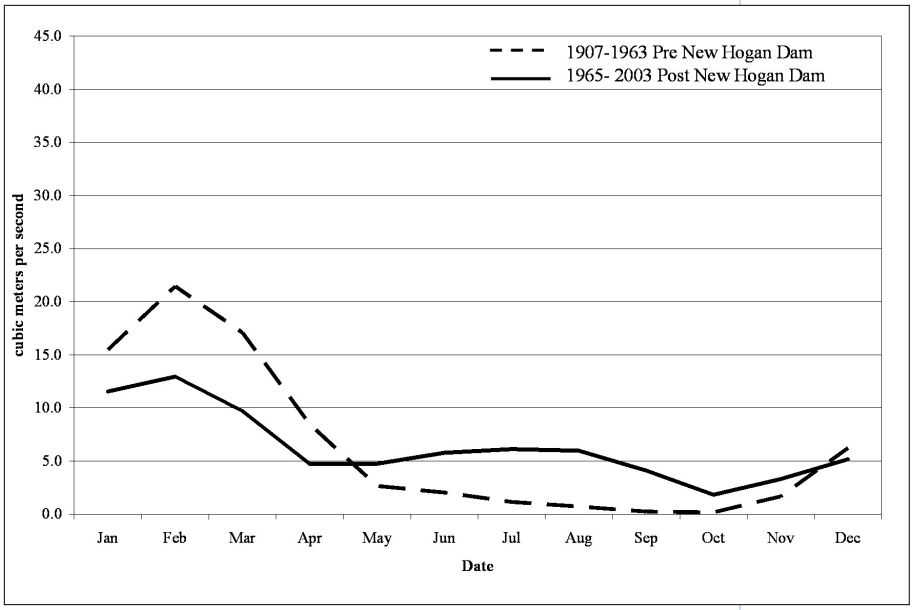

Figure 3. Pre- and post-New Hogan Dam mean of monthly streamflow based on daily average streamflow data. USGS Jenny Lind, 1907-1963, data from USGS. New Hogan Dam, 1965-2003, data from USACE.

Little is known about Central Valley Chinook salmon and steelhead life history in the Calaveras River. In evaluating the possible life history of these fish in the Calaveras River, it is helpful to compare what is known about their life history in the San Joaquin River Basin and their historical distribution in the neighboring Cosumnes, Mokelumne, and Stanislaus Rivers. Life history timing for late-fall run in the San Joaquin River Basin is not well documented, and neither is the life history nor migration period of spring run on the San Joaquin River. Baker and Morhardt (2001) described a general-

Table 1. Generalized life history timing of Central Valley Chinook salmon runs.

River/Life Stage	Adult Migration	Spawning	Juvenile Emergence
San Joaquin River Basin			
Late-fall run[2]	Mid-October – mid-April	January – mid-April	January - June
Spring run[3,4,5,6,7]	March – mid July Adult holding – May – July	Mid August – October	Undocumented
Fall run in Tuolumne River[8]	October – early January	Late October – January	December – April
Generalized life history[1] - San Joaquin River & major tributaries	October – December; occasionally September and frequently in January	Peak November	Late December - April
Sacramento River Basin			
Late-fall run[8]	October - April	Early January - April	April - June
Fall Run[8]	June – December	Late September – December	December – March
Spring run[8]	March – September	Late August – October	November - March
Winter run[8]	December – July	Late April – early August	July – October

1. Baker and Morhardt 2001
2. Department of Fish and Game (DFG) 1993
3. Stillwater Sciences 2004.
4. Hallock and Van Woert 1959.
5. Clark 1942.
6. CFGC 1921.
7. Hatton and Clark 1942.
8. Yoshiyama et al. 1998.

ized life history for Chinook salmon in the San Joaquin River and major tributaries, and Yoshiyama et al. (1998) constructed life history timings for specific runs, as well. Table 1 presents a summary of what is generally known about life history timing for Central Valley Chinook salmon runs in the Sacramento and San Joaquin River Basins. These runs are not confirmed genetically, and the run names are primarily based on peak migration period. Steelhead, the anadromous life history form of rainbow trout (*Oncorhynchus mykiss*), are broadly characterized into winter and summer runs (Stillwater Sciences 2004), again based on peak migration period. Only winter steelhead are believed to have occurred in the San Joaquin River Basin. A generalized life-stage periodicity for Central Valley steelhead describes spawning migration in fall or winter, and spawning a few months later in winter or late spring (Meehan and Bjornn 1991, Behnke 1992, McEwan 2001). No other information on the run timing or life history of steelhead that occurred in the San Joaquin River Basin is available.

Fall-run Chinook salmon historically occurred in the Cosumnes (Stillwater Sciences 2004), Mokelumne (Yoshiyama et al. 2001), and Stanislaus Rivers (Yoshiyama et al. 2001). Presently, fall run still occurs in all three rivers (USFWS 1998). Late-fall run occurred historically in the Calaveras, Mokelumne and Stanislaus Rivers (Yoshiyama et al. 2001) and may still occur in the Stanislaus River (DFG 1993). Late-fall run on the Calaveras River may now be extirpated, and Yoshiyama et al. (2001) considered the run sporadic and not self-sustaining on the Calaveras River. Spring run historically occurred in the Mokelumne and Stanislaus Rivers (Yoshiyama et al. 2001). Spring run may be extirpated from the San Joaquin River Basin. Steelhead historically occurred in the Mokelumne River (USFWS 1998), and may have occurred in the Cosumnes (Stillwater Sciences 2004) and Stanislaus Rivers (Yoshiyama et al. 2001). Presently, Mokelumne River native steelhead are extinct (USFWS 1998), and steelhead are maintained in the river by hatchery plants.

METHODS

Information about salmon and steelhead presence in the Calaveras River was obtained from three sources: 1) anecdotal, 2) museum and newspaper archives, and 3) state and federal agency documentation including reports, files, and surveys. In many cases, anecdotal observations were corroborated by documented obser-

vations. Anecdotal stories were gathered from interviews of residents of the watershed in San Joaquin and Calaveras counties, located through notices published one time in local San Joaquin and Calaveras County newspapers and a one-time bill insert mailed to Calaveras County Water District (CCWD) customers. Interview questions focused on obtaining as many details as respondents could recall regarding year, season or month, location, and conditions when they saw salmon or steelhead in the river. Bank of Stockton archives of *The Record* (formerly *The Stockton Record*) and *Stockton Evening Mail* newspapers from 1900 to the 1940s were reviewed for early stories documenting salmon or steelhead. Primarily spring and fall issues of the newspapers were reviewed to increase the likelihood of locating pertinent stories. Appendix A's Table 2 contains transcripts of interviews with individuals providing anecdotal observations and a bibliography of documented observations.

Data from all these sources were broken out by year, location of observations, water-year type, season, and whether observations occurred before or after New Hogan Dam was built. Pre- and post-dam periods correspond to the construction of New Hogan Dam in 1964. Location data consists of either specific locations (for example, the Jenny Lind bridge) or general reach or segment (for example, upstream of Jenny Lind, or downstream of Bellota Weir). Observations were reported as either specific months or seasons. General seasonal references for this study were interpreted as fall (September 1 to November 30), winter (December 1 to February 28), spring (March 1 to May 31), and summer (June 1 to August 31). These month ranges correspond best to distinctions made by interview respondents regarding seasonal events or conditions, and similar observations reported by other sources for which a month was known. For example, respondents who stated "fall" as a season often identified the month as November, and identified spring as March, April, or May, or when trout-fishing season opened, which was typically early May. In cases where respondents could only specify an entire decade (for example, the 1940s) or range of years within a decade (for example, the late 1940s) when they recalled observing salmon or steelhead, the observation was assigned to the decade in general. Only observations associated with an individual year were tallied, and observations attributed to decades or portions of decades were omitted from tallies. Only observations of adult salmon were included in reported tallies.

Hydrology analysis was performed using flow data from three gauges: Jenny Lind (United States Geological Survey No. 11309500, period of record 1907-1966), New Hogan Dam (USACE NHG, period of record 1964-present), and Mormon Slough at Bellota (USACE No. MRS, period of record 1989-present). The Jenny Lind gauge represents pre-flow regulation hydrology and the New Hogan Dam gauge represents post-flow regulation hydrology. Data from several other no longer used gauges at Bellota Weir and in the Stockton Diverting Canal (Figure 2), a connecting channel leading to Mormon Slough and part of the migratory pathway, were not used because they were either relocated several times, the gauge was considered inaccurate due to influence of the fluctuating pool level behind Bellota weir during irrigation season, or the gauge may have been tidally influenced. Water year type designations (wet, above normal, below normal, dry, and critical) are from the California Department of Water Resources (DWR) Chronological Sacramento and San Joaquin Valley Water Year Hydrologic Classification Indices (http://cdec.water.ca.gov/cgi-progs/iodir/wsihist). The indices are based on runoff from four rivers flowing into the southern Sacramento River Region and four rivers flowing into the northern San Joaquin River Region.

Migration opportunity was evaluated by comparing all documented and anecdotal observations, including observations attributed to decades or portions of decades, to a migration opportunity criteria. The migration opportunity criteria for this study is average daily flows exceeding 0.7 m^3/s (25 ft^3/s) for a minimum of four days at Jenny Lind, New Hogan Dam, and Mormon Slough (after 1997). The migration opportunity criteria represents likely flow volume and duration conditions for salmonid migration in the river and reflects the range of low to higher flows during which salmon have been observed in the river recently. In addition, this flow range represents flows for which the river could potentially be

managed in the future. Four days is the average amount of time it could take a salmon to travel 28.8 km (18 miles) from the river mouth upstream to Bellota, based on studies by Allen and Hassler (1986), Goldstein et al. (1999), Gray and Haynes (1979) and Heifetz (1982). Alternatively, Fishery Foundation of California (FFC) biologist Trevor Kennedy stated it could take only one day or less for healthy adult Chinook salmon to reach Bellota under adequate flows. He bases this conclusion on telemetry data of salmon migrating up the Cosumnes River in which he found that fish traveled distances greater than 56 km (35 miles) in less than 24 hours even when passage was difficult at some locations. Additionally, the percentage of years meeting the criteria in both pre- and post-dam periods were compared seasonally.

RESULTS

Chinook Salmon

Only data for the years 1930-2002 were available. No documented data were found for the period 1900-1929. No early newspaper stories were found of salmon harvesting or sport fishing for either the Calaveras River or the neighboring Stanislaus, Cosumnes, or Mokelumne Rivers. Winter and summer observations came primarily from documented sources. Data summarized from Appendix A indicate there are more individual year documented and anecdotal observations after 1964 (35 and 16, respectively) than before 1964 (0 and 3, respectively). This is likely because no official records were kept before 1964, fewer long time or elderly residents are alive or could be located, and it was more difficult for respondents to recall a specific year for their earliest pre-1964 recollections.

California Department of Fish and Game (DFG) surveys during the winter and spring in the 1970s and early 1980s and USFWS fall migration surveys since 2001 resulted in more fall (September 1–November 30) and spring (March 1–May 31) season adult observations being documented overall. Counting both documented and anecdotal observations, more salmon observations overall occurred in fall and spring. Nine observations occurred in fall, 13 in spring, seven in winter (December–February 28) and one in summer (June 1–August 31). Overall, salmon were observed in more seasons during wet years than all other water-year types. There were ten observations in wet years, four in above normal, three in below normal, seven in dry, and four in critical years.

Anecdotal, individual year observations for adult salmon were found for fall, winter, and spring seasons prior to 1964. Documented evidence for adult salmon exists for all four seasons after 1964. Before 1964, observations were found for fish in spring in dry and critical years and in fall in below normal years. After 1964, fish observations were found for wet years in spring, fall, winter, and summer. In dry years, fish observations were found for fall and winter seasons. In above normal years fish observations were found for spring and fall seasons, and in below normal years fish observations were found for spring. In critical years fish observations were found for winter season.

After 1964 fewer observations were found for fish upstream of Bellota in fall (two observations) even though more than three times as many fish observations were found downstream of Bellota (seven observations). In contrast, after 1964 more springtime observations were found for fish upstream of Bellota (ten observations) than downstream of Bellota (six observations). Observations of fish after 1964 were found for both upstream and downstream of Bellota in most wetter and drier water-year types. Generally, in wet springs more fish observations were found upstream of Bellota than downstream, and more fish were observed upstream in wet years than in drier years. Across all seasons, fewer observations were found of fish upstream of Bellota in drier years (three upstream versus seven downstream). Details of documented and anecdotal Chinook salmon observations follow. Appendix A, Table A1, lists all collected observations chronologically. Specific observations of adults spawning and of juvenile salmon are listed in Tables 2 and 3, respectively.

Documented Chinook Salmon Observations

Pre-water development documentation of salmon runs is extremely limited although humans have used the Calaveras River and its tributaries for thousands of

Table 2. Reports of spawning Chinook salmon in the Calaveras River.

Spawning Reports			
Year	*Season*	*Location*	*Source*[a]
1930-39	Spring	Calaveras River Park downstream of old Hogan Dam	Fred "Bud" Day
1940-44	Spring	Calaveras River Park downstream of old Hogan Dam	Fred "Bud" Day
1945-49	February, March, April	Mallard Bend downstream Jenny Lind bridge	John Prioli
1960-69	Fall	Mormon Slough between Fine and Flood Roads	Fred Solari
1972	April-May	Calaveras River upstream of Bellota; no location reported	Anecdotal DFG (1975c)
1975	April-July	Downstream of New Hogan Dam	DFG (1975d)
1997	Fall	Between Fine and Flood Roads	Fred Solari
2001	December	Mormon Slough downstream of Bellota Weir	DWR 2003, Stillwater Sciences 2004
2002	December	Mormon Slough downstream of Bellota Weir	DWR 2003, Stillwater Sciences 2004

a. All sources referenced in Appendix A, Table A1.

Table 3. Reports of juvenile Chinook salmon in the Calaveras River.

Juvenile Reports				
Year	*Season*	*Description*	*Location*	*Source*[a]
1949	Spring	juveniles	University of the Pacific	John Prioli
1950	March	juveniles	University of the Pacific	John Prioli
1973	April	yearling	Downstream of Bellota	DFG 1975c
1974	April	yearling	Downstream of New Hogan Dam	DFG 1974a
1977	February	yearling	Upstream of Jenny Lind	USFWS 1989
1987	June	yearling	Upstream of Bellota	USFWS 1989, 1993
1995	Spring	smolt	UOP	Tom Taylor
1996	Feb-June	juveniles	Between Bellota and New Hogan Dam	DFG 1996

a. All sources referenced in Appendix A, Table A1.

years, and there are archeological sites in the area with evidence of Native Americans. The Miwok tribe commonly used the area for hunting and fishing. The historian Sanchez (1932) noted entries in Moraga's diary referring to river tribes fighting against Sierra tribes for possession of the salmon in the river. Fenenga (1969) excavated middens on the north bank of Mormon Slough, 4.8 km east of the city of Stockton, and recovered spearing artifacts likely used for salmon. According to Tinkham (1880), Stockton Slough (a former branch of the Calaveras River's valley floodplain that connected with the San Joaquin River) contained "an abundance of every description of fish. There are salmon, trout, sturgeon, and an infinite variety of the smaller kinds to the heart's content."

Gobalet et al. (2004) reviewed the record of fish remains from California archeological sites and found *Oncorhynchus* (Chinook salmon or steelhead trout) remains recorded for Calaveras and San Joaquin Counties.

The USFWS (1993) reported unconfirmed reports of large runs of adult anadromous salmonids entering the Calaveras River in the early 1900s and the existence of a small population of fall-run Chinook salmon prior to construction of New Hogan Dam. In the 1940s, Stockton illustrator Ralph Yardly drew early Stockton scenes from photographs including two scenes depicting early winter flooding in 1906 and 1907 in Mormon Slough (Figure 4 provides one example). In the scene men are shown standing on a bridge over the flooded channel with gaff hooks, poised to spear fish coming up river. The gaffs held by the anglers, and the time of year, suggest the presence of salmon. A DFG report by Linn (1963) noted that "occasionally steelhead and king salmon enter the drainage but only in insignificant numbers and at irregular intervals," which Yoshiyama et al. (2000) consider almost certainly fall–run Chinook. Clark (1929) reported that the river was "dry

most of the summer and fall" and so had no salmon. Clark may have been only considering a fall-run of salmon. E. Gerstung, retired DFG fishery biologist, considered the stream habitat of the north and south forks upstream of New Hogan Dam marginal for salmon with no over-summering habitat for spring-run fish. USACE 1981 cites an unpublished 1960 USFWS report that cannot be found but that documented the presence of Chinook salmon in the river. Linn (1963) stated that insignificant numbers of steelhead and king salmon enter the Calaveras River at irregular intervals.

Post-New Hogan Dam observations of salmon are more common. In 1975, DFG biologists observed fish migrating as early as January and spawning in April to July or holding in pools downstream of New Hogan Dam in June. Low autumn flows in some years apparently caused juveniles to hold over and migrate out as yearlings (USFWS 1993). DFG documented Chinook salmon yearlings in 1974, 1977, and 1987 in February through June. DFG (1993) documented a run of salmon in winter that spawned in late winter and spring, but it is unknown whether the run existed before the river was dammed. This winter run was documented by DFG six times from 1972 to 1984 and numbered 100 to 1,000 fish annually. Yoshiyama et al. (2000) do not consider this winter run an indigenous natural run because the Calaveras River originally did not have year-round conditions suitable to support the native winter run. These authors assert that the stock established itself as a result of coldwater releases from New Hogan reservoir and later was extirpated by the multi-year severe drought of the late 1980s.

In recent years, fall-run salmon entered the river in 1995, 1997, 1998, 2000, 2001 and 2002, 2003, and 2004 when suitable fall stream flows occurred and under a variety of water year types, including wet, above normal, below normal, and dry. These runs, numbering from fewer than a dozen to several hundred, were documented by DFG, FFC, DWR, or in *The Record*, a Stockton newspaper. During February through June 1996 DFG biologist Maury Fjelstad conducted juvenile Chinook surveys and found age 0 + Chinook salmon juveniles rearing in the river between Bellota and New Hogan Dam, indicating that

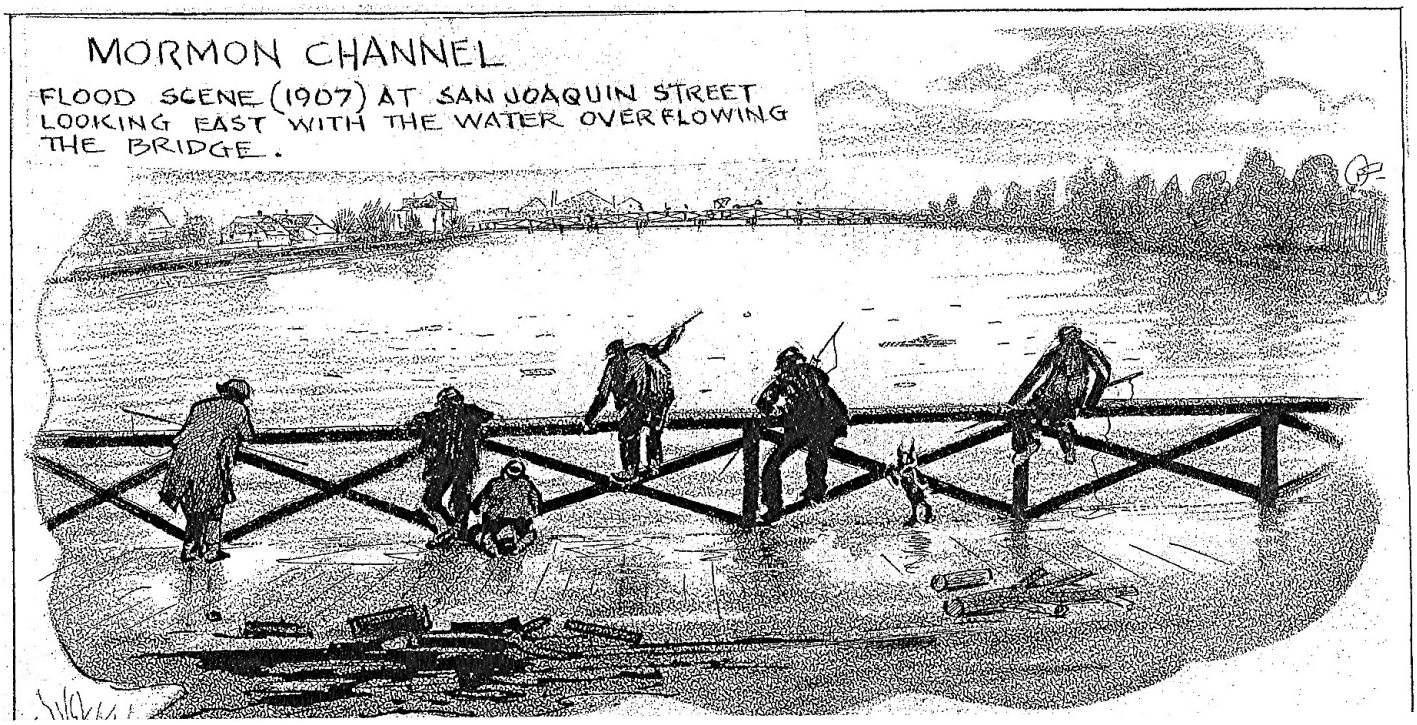

Figure 4. Flooded Mormon Channel, Stockton, 1907. Haggin Museum Library Archive, Stockton, California.

the 1995 run had spawned successfully (DFG 1996). Up to 28 salmon were documented by FFC biologists in Mormon Slough in fall and winter 2003 and 2004, including several in December 2004 (in a dry water year) found stranded in the old Calaveras channel (FFC unpublished data).

Anecdotal Chinook Salmon Observations

Residents living along Mormon Slough and anglers fishing upstream have observed salmon in the Calaveras River on numerous occasions. Pre-1964 observations include those of Stockton resident Ray Schenone, who in March 1955, a dry water year, found 200 - 300 salmon trapped in the pool downstream of an old railroad trestle in Mormon Slough at Potter Creek (Figure 2). The salmon were unable to pass the boulders and riprap put in the channel to protect the trestle. Schenone said the salmon generally came up "with the floods" and were not noticed because they "moved right through," and the water was turbulent and deep in Mormon Slough.

Mike Machado of Stockton saw salmon at Bellota Weir in the spring of 1960, a critical water year, when he was 12 years old. Another Stockton resident, John Prioli, recalled attempts to snag salmon or steelhead from "deep ponds" near the Jenny Lind Bridge (Figure 2) while fishing for black bass in February through April in the mid- to late-1940s. At the same time, he also recalled seeing salmon spawning at Mallard Bend (Figure 2), a wide bend in the river downstream of the bridge. Prioli trapped juvenile salmon in the river behind the University of the Pacific campus (Figure 2) in the spring of 1949 and 1950, both below normal water years, with his college biology instructor, Verna Johnston. Fred Solari of Stockton recalled his father's stories of catching salmon in the 1930s and 1940s in the fall from Mormon Slough, where the old Solari grocery was located at Highway 26 and Fine Road east of Linden (Figure 2). Solari said that before Mormon Slough was modified in the late 1960s it was "more wild." It had pools as deep as 9 m (30 ft), tree-lined banks, and waterfalls over hardpan drops. These pools were eliminated when the channel was flattened and widened to make a larger flood control channel. Fred Day, a 90-year-old life-long Calaveras County resident, saw salmon whenever there was a "wet spring" during the 1930s and early 1940s. From 1930-1944 he worked at the then just-completed Hogan Dam with his brother and cousin. In his account of his recollections, he says:

"I was working at Hogan Dam about four to five years after it was completed and recall the water flows being extremely heavy during spring-runoff. The winter had been severe and there was considerable snowmelt, which produced a very heavy flow. It was March or April and it had been raining for two to three days. The water was so high behind the dam that all nine water outlets, holes in the dam, were gushing full-time, and water covered the bridge and the cattle fencing all around the river. There was a 90 cm (3 ft) wide catwalk at the bottom of the dam. I, my brother and cousin saw lots of salmon trying to come through the holes in the dam, some falling down the face of the dam, some hitting the valves at the bottom of the dam as they fell. The salmon fell across the catwalk and were longer than the catwalk was wide. The salmon leaped at the water gushing out of the holes. Some of the leaping salmon made it through to the upstream side of the dam. Later that spring or early summer I walked upstream of the dam after all the water had gone down. Large sand flats were left behind. I found salmon skulls with big hooked jaws up there. I saw salmon in the Calaveras downstream of the dam most every spring when the water flows were high. The wet years were when I saw the most salmon. I do not recall seeing a fall run of salmon, which would not have been possible most years because there was not enough water then to support the fish coming up the river."

"I saw salmon many times downstream of the old Jenny Lind bridge, which spanned the Calaveras and led to the town of Milton. Fish 90 cm (3 ft) long were common there. I also caught steelhead from the old bridge. Salmon were seen regularly at Calaveras River Park, about 90-180 m (100-200 yds) downstream of the dam, in a large swimming hole that probably measured 21-24 m (70-80 ft) across. I and my wife would catch steelhead in this pool in spring and early summer. The salmon spawned there. One of my jobs was to maintain the rain gauge near Bellota and I would see salmon at Bellota. As a boy, I fished the local tributary streams for trout; these were Jesus

Maria, O'Neill Creek, Murray Creek and others. I caught trout in nearly every stream in this county. I also fished the Calaveras River upstream of Hogan Reservoir, and found skeletons of salmon with big, hooked jaws upstream of San Andreas (Figure 2) in an area known as The Narrows."

After the 1964 construction of New Hogan Dam, anecdotal observations continued to occur during the spring and fall, then the winter, and more recently only during fall. Brian Cudney of Valley Springs recalled catching a salmon upstream of Bellota in the spring of 1966, a below normal water year. Fred Solari saw salmon upstream and downstream of Bellota Weir in the fall during the 1960s, even spawning in Mormon Slough. He could not recall specific years, so it is not clear whether these observations were made before or after New Hogan Dam was constructed. While fishing at the opening of trout season in the spring in the 1970s, Jeff Andrews of San Andreas recalled seeing runs of very large, scarred, and beat up salmon between New Hogan Dam and Jenny Lind. During that time he saw another angler catch a 91.5 cm (36 in) salmon that was fresh and still had good color. In March 1972, a dry water year, Schenone caught four salmon in Mormon Slough downstream of Bellota Weir. These 1970s observations are supported by DFG documentation from the same period.

Steelhead

Some anecdotal and a few documented sources exist for steelhead in the Calaveras River. In general, steelhead were observed both before and after construction of New Hogan Dam, in late fall, early winter, and spring. Both adult steelhead and out-migrating pars have been documented. In addition, the Calaveras River has long been popular with anglers fishing for steelhead, and more typically nowadays, with those seeking rainbow trout.

Documented Steelhead Observations

On March 5, 1979, DFG biologist Charlie Young observed a 35.5-40.6 cm (14-16 in) rainbow trout or steelhead attempting to negotiate Bellota Weir, and a 1.8-2.7 kg (4-6 lb) steelhead downstream of the weir as well (DFG 1979). In March 2000, the DFG documented steelhead and resident rainbow trout stranded downstream of New Hogan Dam after flood control releases were suddenly decreased. In April 2002, FFC biologists found a 73-cm (28.75 in), half-dead and spawned-out female steelhead upstream of the low-flow crossing downstream of Bellota weir. FFC biologists also found several live and dead adult steelhead in Mormon Slough in late March and early April 2002 along with steelhead redds in riffles downstream of Bellota Weir. Yearling trout, possibly steelhead smolts, were also captured in the same area (Stillwater Sciences 2004). In fall 2002 the FFC and SPC found dead adult steelhead in both Mormon Slough and the old Calaveras channel downstream of Bellota, presumably having over-summered in deep pools formed behind irrigation flashboard dams but then dying when the irrigation season ended, irrigation flows down the channels were stopped, and the channel became dry (Stillwater Sciences 2004). FFC snorkel surveys of the lower river downstream of New Hogan Dam in 2002 indicate that a large population of rainbow trout exists and reproduces naturally in the reach (Stillwater Sciences 2004). While conducting fish passage surveys in Mormon Slough from November 2003 to March 2004, FFC biologists documented live outmigrating *O. mykiss* pars (smolt index 3 to 5) in the pool directly downstream of Bellota Weir and further downstream. Since January 2002 SPC has intermittently monitored outmigrating rainbow trout (*O. mykiss*) with a screw trap at Shelton Road, upstream of Bellota. Biologists have documented smolt size fish (smolt index $\geq$ 5) each year, with 146 smolts in 2002, 103 in 2003, 194 in 2004, and 34 in 2005 (data are numbers of captured fish, not expanded data) (SPC unpublished data).

Anecdotal Steelhead Observations

Local anglers reported catching steelhead from the Calaveras River in spring and early summer in the 1930s, November to January in the 1940s, 1960s and 70s, and in spring in 1998, a wet water year. In the 1930s, Fred Day and his wife caught steelhead in the Calaveras River Park pool (about 90-180 m, or 100-200 yards downstream of former Hogan Dam, now inundated by New Hogan Dam) in spring and early summer, and he also caught steelhead from the Jenny Lind bridge. As a youngster John Prioli recalled seeing salmon and steelhead in the river while walking the

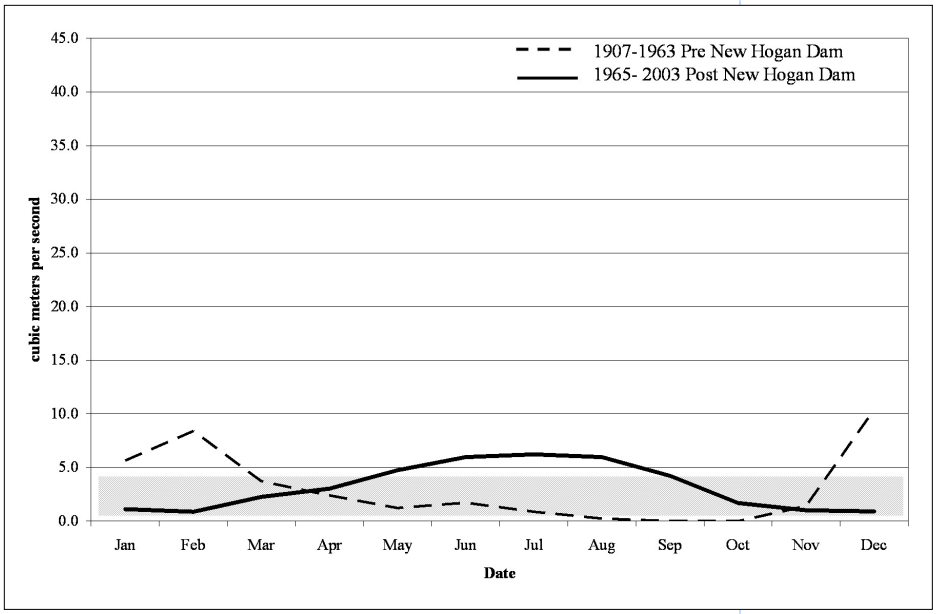

Figure 5. Percentage of years by season in which average daily flows exceeded 0.7, 1.4, 2.8, and 5.6 m^3/s (25, 50, 100, and 200 ft^3/s) for at least 4 days over period of record before and after New Hogan Dam regulated the river. Data: Jenny Lind 1907-1964, USGS. New Hogan Dam 1965-2002, USACE.

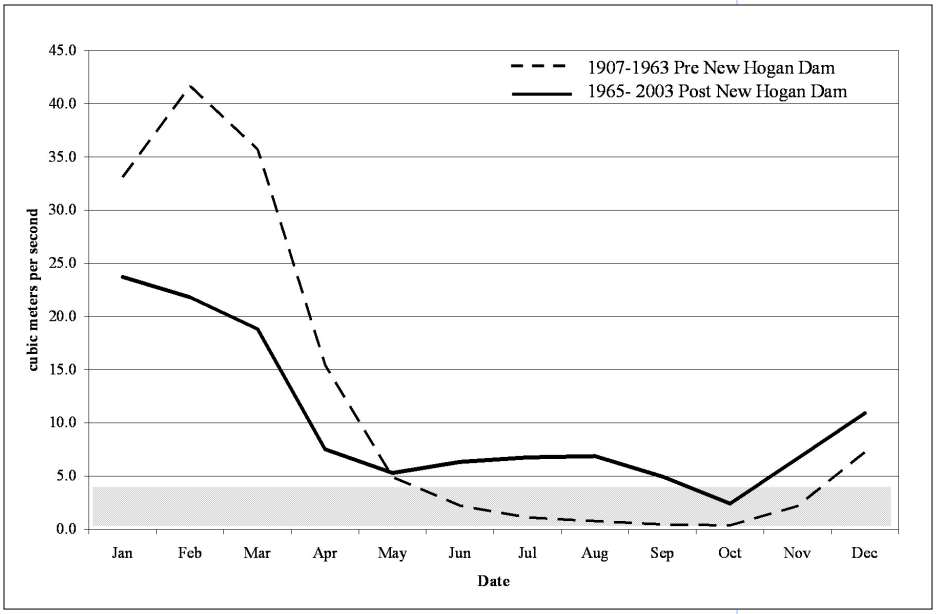

Figure 6. Pre- and post-New Hogan Dam mean of monthly streamflow for wet water years for period 1907-2003. Based on daily average streamflow data. USACE New Hogan Dam (1965-2003) and USGS Jenny Lind (1907-1963). Shaded area shows period when salmonids would be expected to use the Calaveras River.

gold-dredged areas upstream of Bellota in November through January of the early 1940s. Brian Cudney of Valley Springs recalled catching steelhead in the fall or winter from the Jenny Lind bridge in the 1960s and 1970s. In spring 1998 Fred Solari caught two 46 cm (18 in) steelhead between Fine Road at Avisino Dam in Mormon Slough. Ninety-two-year-old (at the time of the 2002 interview) Murphys resident, Lois Ostrowski Schachten, recalled that her husband and young sons fished for steelhead on the Calaveras River in the spring, usually in May (author's note: this was likely around the 1940s). Her sister-in-law, Maisi Schachten, was born and reared in the town of Murphys on the Stanislaus River. Over 50 years ago, her husband fished the Stanislaus with local Indian friends, as did his father in the late 1800s. They caught steelhead by the basketfuls just upstream of Murphys at 651.3-m (2,171 ft) elevation, an elevation similar to major Calaveras River tributaries with permanent flows and reported trout populations.

DISCUSSION: HYDROLOGY AND MIGRATION OPPORTUNITY

Prior to New Hogan Dam, the driest recorded year was 1961, with annual mean streamflow of just 0.45 m^3/s (16 ft^3/s). The driest year after the river was regulated by New Hogan Dam was 1977, with an annual mean streamflow of 2.32 m^3/s (81.8 ft^3/s). The dam also significantly reduced floods on the river. The largest daily mean flow was over 878 m^3/s (31,000 ft^3/s) before the dam was built and less than 227 m^3/s (8,000 ft^3/s) afterwards. Mean of monthly flows for dry and wet water years are similar in both pre- and post-New Hogan Dam periods with rainfall-induced peaks occurring in winter and early spring. However, they differ in that summer and early fall flows are elevated after flow regulation began (Figures 5 and 6). During dry years between 1907 and 1950 there were about two to three

Table 4. Number of monthly peak flows over 2.8 m³/s (100 ft³/s) during potential Chinook salmon migration period (November to April) in dry and wet years. Period of record for Jenny Lind (1907-1963) and New Hogan Dam (1964-2002) gauges.

Gauge (Period of Record)	# of Dry Years in Period of Record	# of Wet Years in Period of Record	Dry Years # of Monthly Peak Flows > 2.8 m^3s^{-1} November-April	Wet Years # of Monthly Peak Flows > 2.8 m^3s^{-1} November-April
Jenny Lind (1907-1963)	7	15	30	76
New Hogan Dam (1964-2002)	7	15	9	61

months each year with monthly mean streamflow less than 0.42 m³/s (15 ft³/s) at Jenny Lind (typically August and September). Once New Hogan Dam was built, there have been no months in which monthly mean streamflow was less than 0.42 m³/s (15 ft³/s) at New Hogan Dam gauge except in 1977, the driest year on record. The number of years classified as wet or dry is the same in the pre- and post-dam regulation period. However, after river regulation the number of peak flows over 2.8 m³/s (100 ft³/s) drops dramatically in dry years from 30 to 9 events, potentially reducing migration opportunities for salmonids in drier years (Table 4).

The overall percentage of average daily fall flows meeting the migration opportunity criteria was higher after New Hogan Dam was built. The percentage of average daily winter and spring flows meeting the migration opportunity criteria was similar between the pre- and post-dam periods (Figure 7). Even so, New Hogan Dam decreased the percentage of years with average daily flows exceeding 2.8 m³/s (100 ft³/s) between December 1 and February 28, peak months for late-fall run migration. However, even the driest water years in the Calaveras River still had flows exceeding 5.6 m³/s (200 ft³/s) in the spring and winter months, enough for fish to migrate and spawn in those seasons.

In most years, average daily flows in the Calaveras River in fall, winter, and spring from 1930 to 2004 met the migration opportunity criteria (flows exceeding 0.7 m³/s (25 ft³/s) for a minimum of four days.) Flows meeting the criteria were available in each year and season when adult Chinook salmon and steelhead observations were made. In addition, according to observations in the late 1990s and early 2000s by FCC biologist Trevor Kennedy, flows less than 2.8 m³/s (100 ft³/s) have been enough to attract salmon into the river downstream of Mormon Slough and into Mormon Slough itself.

Two examples illustrate that flows meeting the migration opportunity criteria were used by Chinook salmon. In the first example, juveniles captured in spring 1949 and spring 1950 in the Old Calaveras channel indicate that spawning occurred in fall 1948 and fall 1949. In fall 1948, a below normal water year, flows did not exceed even 0.57 m³/s (20 ft³/s) until early November

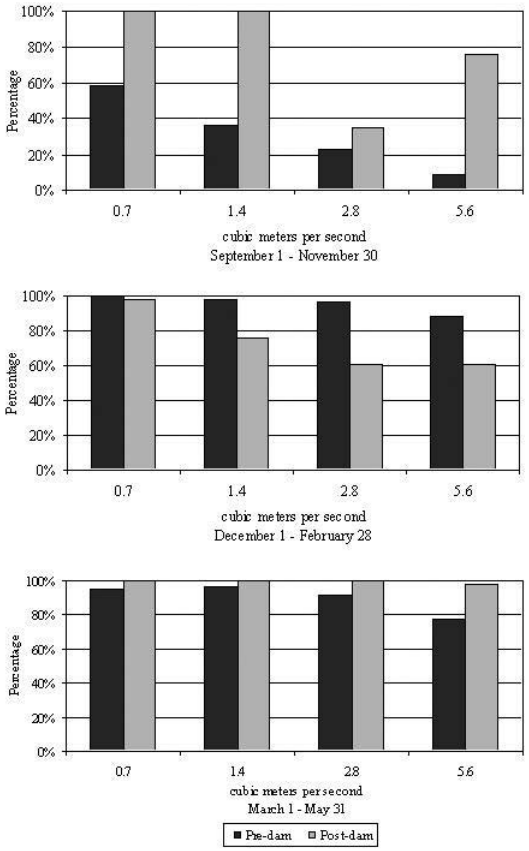

Figure 7. Percentage of years by season in which average daily flows exceeded 0.7, 1.4, 2.8, and 5.6 m³/s (25, 50, 100, and 200 ft³/s) for at least 4 days over period of record before and after New Hogan Dam regulated the river. Data: Jenny Lind 1907-1964, USGS. New Hogan Dam 1965-2002, USACE.

for a few days at a time. Spawning fish may not have had migration opportunities until December when flows exceeded 0.7 m^3/s (25 ft^3/s). In fall 1949, adult salmon were observed upstream of Jenny Lind in a below normal water year in which sustained four-day flows never exceeded 0.7 m^3/s (25 ft^3/s). However, flows between 0.45 – 1.1 m^3/s (16-38 ft^3/s) occurred in early and mid-November 1949, and flows reached 1.7 m^3/s (62 ft^3/s) from November 29 through December 2. Such flow spikes could have been enough to attract fish into the lower river. Winter and spring flows at Jenny Lind met the migration opportunity flow criteria in all years of the 1940s, and fall flows met the criteria in many years.

In the second example, fall flows at New Hogan Dam exceeded 0.7 m^3/s (25 ft^3/s) in 2000 through 2004, a period of drier water years. In Mormon Slough fall flows exceeded that threshold in 2000 through 2003, enough to attract steelhead and fall-run salmon into the channel where they were observed. However, salmon were stranded in Mormon Slough in fall 2000, and in the Stockton Diverting Canal at Budiselich Dam (Figure 2) in late November 2001, 2002, and 2003, once flows had dropped to less than 0.7 m^3/s (25 ft^3/s) after rain had stopped. Had these fish been able to migrate past Bellota they would have found flows to sustain spawning and juvenile rearing upstream. Winter and spring flows at New Hogan Dam exceeded 0.7 m^3/s (25 ft^3/s) in each year from 2000 to 2004.

SUMMARY

Several factors support the historical and present distribution of Chinook salmon and steelhead in the Calaveras River. Calaveras River hydrology was adequate for salmonid migration, and observations of salmon are consistent with Central Valley Chinook salmon life history and historical distribution in the San Joaquin River Basin and in neighboring rivers. Early observations and documentation indicate that fall-, late-fall, and possibly spring-run Chinook salmon and steelhead used the Calaveras River prior to 1964 when New Hogan Dam was completed and prior to other earlier flood control and water development projects. After New Hogan Dam construction, steelhead and fall-run salmon and a run occurring in winter, and spawning in spring and early summer (potentially winter-run salmon), have been documented. While a winter run of fish was documented in the river during the 1970s and 1980s, evidence of that run before the construction of New Hogan Dam is difficult to distinguish from observations of what could have been late-fall-run fish.

Fall observations of salmon in the Calaveras river were likely fall run migrating upstream to spawn. In the post-New Hogan Dam period fall migration presents a special challenge. Fewer overall observations of salmon upstream of Bellota than downstream suggests that in very low water years, fish were less successful in migrating upstream of Bellota even in spring when flows typically were higher. Salmon migrating in fall, even in wet years, appeared less successful in migrating upstream of Bellota than fish migrating in the spring. By the 1990s and 2000s, only fall run have been documented in the river, primarily in Mormon Slough where their upstream migration was stopped by downstream barriers, including Bellota Weir, and lack of flow volume and duration, often leading to stranding. Even though adequate flows may be released from New Hogan Dam, the water is diverted at Bellota, leaving migrating fish dependent on rain run-off or rare storm releases from New Hogan Dam for flows downstream of Bellota Weir. Bellota Weir, located in the valley portion of the Calaveras River, has had a similar impact on salmon and steelhead runs as Woodbridge Dam has had on runs in the Mokelumne River, where, according to Clark (1929) and Fry (1961) not enough water flowed over the dam to provide fish passage during summer and fall.

The neighboring Cosumnes River, a tributary to the Mokelumne River, has similar elevational (1,290 m or 4,300 ft), watershed size (1430 km^2 or 550 m^2), and hydrologic settings as the Calaveras River. According to Yoshiyama et al. (2001) the Cosumnes River has been an intermittent stream and from earliest times offered limited access to salmon, yet it has historically had a fall run of Chinook salmon, and the presence of rainbow trout suggests that steelhead may have also existed in this river (Stillwater Sciences 2004). Like the Calveras River, the Cosumnes River is also almost exclusively fed by rainfall during winter and spring rains and the annual hydrograph is similarly charac-

terized by a high-water period during winter rains followed by a low-flow period during the dry summer months. Floods in the river usually result from intense rainfall, are generally very flashy, and typically last for only a few days (Jones and Stokes 2003). Similar to the Calaveras River, salmon generally cannot ascend the Cosumnes River until late October to November, when adequate flows from rainfall occur (DFG 1993). Adults are stranded in shallow areas in low-flow conditions. In years of low rainfall, salmon do not successfully migrate to suitable spawning areas upstream (USFWS 1998). Even so, Clark (1929) reported the presence of "a considerable run" in the Cosumnes River, which he stated to be equal to that of the Mokelumne River.

Strong evidence suggests that late-fall run historically occurred in the Stanislaus, the Mokelumne, and the Calaveras Rivers. A smaller run in the winter (most likely late-fall-run fish) reportedly occurred in the Stanislaus River in earlier times (DFG 1972). S.P. Cramer and Associates (2004) documented migrating adult female Chinook salmon in the Stanislaus River as late as February 14, 2004 during their first year of monitoring. Yoshiyama et al. (2001) suggests late-fall-run salmon seen in recent years could be strays moving in from the Sacramento River system. Existence of a late-fall run would explain the observations of adults in early winter, or December through January, on the Calaveras River. Anecdotal observations from the 1930s and 1940s, like those of John Prioli, commonly reported adult salmon in the river during spring (March 1-May 31) and reported spawning in February, March, or April. This pattern corresponds well with the late-fall run life history timing suggested for the San Joaquin River Basin. Although fall-run fish can also migrate in late fall and early winter, the spring spawning period observations argue for late-fall-run fish. While water flows occurring after 1964 might have attracted a winter run of salmon into the river and provided spawning and rearing conditions upstream of Bellota Weir, late-fall run fish would likely have been able to take advantage of these migration and spawning conditions as well. In addition, pre-dam observations of spawning behavior were in the spring, while post-dam observations for winter run were in late spring and summer.

In reviewing historical documentation by Jordan (1892, 1904) of a run in December in the Sacramento and smaller rivers southward, Yoshiyama et al. (2000) commented that Jordan was likely observing a late-fall run in which adult migration and spawning were concentrated in January to April, or, perhaps a very late running segment of the fall run. The earliest historical references to salmon seem to indicate that late-fall run salmon actually occurred in the Mokelumne River at least until the mid-1800s. Historical journal accounts from the late 1820s trapping period and the 1849 Gold Rush describe purchases of salmon in "fine" condition on January 22, 1828 (Sullivan 1934) and December 22, 1851 (Clark 1973). Yoshiyama et al. (2000, 2001) suggest that although fall run stragglers cannot be discounted, it is somewhat more likely that late-fall-run fish would have been present in a physical condition that could be described as "fine," that the timing seemed extraordinarily early for spring run, and that it was the wrong place for winter run. Clark also reported that only a fall run occurred, "usually quite late." Yoshiyama et al. (2001) suggested this may be an indication of a late-fall run, but it could also be that the fish for the most part were a late running fall run, delayed by the lack of water stored behind Mokelumne River dams. This is a condition similar to that caused by Bellota Weir on the Calaveras River.

Salmon continued to be observed in the Calaveras River in spring until 1966. A remnant spring-run could have persisted in the Calaveras River until the construction of New Hogan Dam as they are thought to have persisted in the Mokelumne River until construction of Camanche Reservoir in 1963 (USFWS 1998). Similarly, the spring run was the primary run, but after construction of flow regulating dams the fall run became predominant (Yoshiyama et al. 2001). Thus, it was likely loss of access to upstream reaches above New Hogan Dam, rather than a reduction in spring migration opportunity flows, that extirpated spring run from the Calaveras River. While fish were observed migrating or spawning in the spring and early summer in the 1930s, 1940s, and 1950s, it is not known if these fish over-summered in the river or spawned in the fall. Where and when would spring-run on the Calaveras have spawned? There were no collected observations of salmon upstream in the late

summer or early fall, August to October, or of adult salmon in pools upstream of Bellota during summer. Spring-time observations of salmon were more likely because more observers reported visiting the river to fish for steelhead or trout in the spring, but did not often frequent the river in summer or fall. It is more likely that salmon would have utilized deep summer pools in the canyon downstream, between New Hogan Dam and Jenny Lind, an area difficult for anglers to access. The months August to October, the period when Hallock and Van Woert (1959) and Clark (1942) documented spring-run spawning in the San Joaquin River basin, are potentially a period when the Calaveras River would have been composed of disconnected pools and dry reaches. In the San Joaquin River Basin the fall run spawning period is a month later than in the Sacramento River Basin. If, likewise, the San Joaquin spring run spawning period may occur a month later, then perhaps spring run could have taken advantage of the early fall rains of November to spawn when the Calaveras River and its major tributaries reconnected and salmon could have dispersed from holding pools to spawning areas, just as trout were reported to do in upstream tributaries.

Winter-time observations of salmon in the Calaveras River could have been of strays from the Sacramento River system. The timing of the so-called winter run in the Calaveras River in the 1970s and 1980s corresponded to timing of winter-run salmon of the Sacramento River Basin. Winter run have used the Stanislaus River in recent years, as well. In June 2000 FFC biologists documented what they believe were small numbers of stray winter-run adult salmon in the Stanislaus River that were in poor condition and had already spawned. Yearling Chinook were also observed in low numbers over-summering in the river upstream of Lovers Leap in the Stanislaus River (FFC 2002). However, winter run were not known historically in the San Joaquin River Basin. Yoshiyama et al. (2000) commented that none of the Central Valley streams south of the Sacramento River had summer flows suitable for winter-run salmon spawning and incubation periods.

The fact that trout were fished from Calaveras River tributary streams at similar elevations as steelhead in the Stanislaus River argues that steelhead were likely historically present in the Calaveras River before it was dammed. In addition, the proposal of Lindley et al. (2006) that the Calaveras River had an historical independent population of steelhead is supported by the collected anecdotal and documented information presented in this study. Steelhead must have taken advantage of winter and spring flows prior to construction of New Hogan Dam to migrate and spawn upstream where they were sought after by anglers.

The timing and amount of flows in the Calaveras River, both before and after New Hogan Dam, provided ample opportunity for anadromous fish to migrate up the river in the fall, winter, and spring seasons when they were observed. Even though the percentage of average daily winter flows that meet the migration opportunity criteria was higher after construction of New Hogan Dam, barriers in the lower river have made it nearly impossible for fish to take advantage of storms and migrate upstream unimpeded as they did in the past. After the construction of New Hogan Dam, and subsequent river regulation, such barriers became serious impediments to fish migration, causing stranding when flows high enough to transport fish over the structures drop. The combination of instream barriers and fewer high flow events has led to fewer opportunities for salmon to enter the river and move upstream through Mormon Slough to spawning areas upstream of Bellota, even though upstream conditions for spawning were, and are today, adequate. At this point in time, winter and spring flows during non-irrigation season, when most flashboard dams in Mormon Slough are removed (other than Bellota Weir), could still provide opportunity for steelhead and late-fall run, and potentially spring run to migrate up the river. However, these salmon runs have not been observed in recent years and may be extirpated by now, leaving only the fall run and steelhead available to use the river under the right conditions. The percentage of years with average daily fall flows meeting the migration opportunity criteria increased substantially after New Hogan Dam, but most of this flow does not reach Mormon Slough when fall-run fish arrive in response to flow pulses caused by fall rain storms.

Restoring salmonids to the Calaveras River will require improving migration conditions, including remediating multiple low-flow barriers and Bellota Weir in Mormon Slough so that salmonids can successfully reach up-

stream spawning and rearing areas during the short periods of higher flows that occur after fall and early winter storms and during rare flood water releases from New Hogan Dam. Additionally, flow pulses from New Hogan Dam into Mormon Slough may also be necessary to improve timing and duration of flows for migration.

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APPENDIX

Table A1. Salmon Observations by Year, Season, Location, Water Year Type and Source.

Footnote Number	Year observed	Season	Location	WY type	Source
1	1930s (1930-39)	Fall	MS - Solari Grocery	W, AN, C, D	Anecdotal (F. Solari)
2	1930-39	Spring	MS -Bellota	W, AN, C, D	Anecdotal (F. Day)
3	1930-39	Spring	C - Jenny Lind Bridge	W, AN, C, D	Anecdotal (F. Day)
4	1930-39	March, April	C - at old Hogan Dam	W, AN, C, D	Anecdotal (F. Day)
5	1930-39	Spring	C - above old Hogan Dam	W, AN, C, D	Anecdotal (F. Day)
6	1930-39	Spring	C - spawning at Calaveras River Park below old Hogan Dam	W, AN, C, D	Anecdotal (F. Day)
7	1940s (1940-49)	Fall	MS - Solari Grocery	W, AN, BN, D	Anecdotal (F. Solari)
8, 10	1940s, early (1940-1944)	Nov - Jan	C - gold dredged area (5 mile reach below canyon)	W, AN, BN	Anecdotal (J. Prioli)
9, 11	1940s, late (1947-1949)	Late fall/early winter	C - Just below Hogan Dam	D, BN	Anecdotal (J. Prioli)
12	1940-44	Spring	MS -Bellota	W, AN, BN	Anecdotal (F. Day)
13	1940-44	Spring	C - Jenny Lind Bridge	W, AN, BN	Anecdotal (F. Day)
14	1945 to 1949	Feb, March, April	C - Jenny Lind bridge	AN, BN, D	Anecdotal (J. Prioli)
15	1940-44	March, April	C - at old Hogan Dam	W, AN, BN	Anecdotal (F. Day)
16	1940-44	Spring	C - above old Hogan Dam	W, AN, BN	Anecdotal (F. Day)
17	1945 to 1949	Feb, March, April	C - spawning at Mallard Bend, a wide bend in river below Jenny Lind Bridge	AN, BN, D	Anecdotal (J. Prioli)
18	1940-44	Spring	C - spawning at Calaveras River Park below old Hogan Dam	W, AN, BN	Anecdotal (F. Day)
19	1949	Fall	C - above Jenny Lind	BN	Anecdotal (J. Prioli)
20	1949	Spring	Old C - juveniles behind UOP campus	BN	Anecdotal (J. Prioli)
21	1950	Spring	Old C - juveniles behind UOP	BN	Anecdotal (J. Prioli)

Footnote Number	Year observed	Season	Location	WY type	Source
			campus		
22	1955	March	MS - RR trestle at Potter Creek	D	Anecdotal (R. Schenone)
23	1960	Spring	MS- Bellota	C	Anecdotal (M. Machado)
24	1960s	Fall	MS - Solari Grocery	W, AN, BN, D, C	Anecdotal (F. Solari)
25	1960s	Fall	C - between Shelton and Bellota	W, AN, BN, D, C	Anecdotal (F. Solari)
26	1960s	Fall	MS -Between Fine and Flood Roads, spawning	W, AN, BN, D, C	Anecdotal (F. Solari)
27	1966	Spring	C - between Valley Springs and Stockton	BN	Anecdotal (B. Cudney)
28	1972	March	SDC, 1 mile east of Jack Tone Rd. Fish rescue.	D	DFG 1974b, 1975c; Anonymous 1972
29	1972	March	MS - Jack Tone Road crossing	D	Anecdotal (R. Schenone)
30, 31	1972	April - May	C - spawning reported, unknown location	D	Anecdotal reported by DFG 1975c
32	1973	Spring	C - above Jenny Lind	AN	Anecdotal (J. Andrews)
33	1973	April	Below Bellota - large juvenile downstream migrants stranded and killed after dams erected.	AN	DFG 1975c
34	1974	Spring	C - above Jenny Lind	W	Anecdotal (J. Andrews)
35	1974	Spring	C - New Hogan Dam Road	W	Anecdotal (B. Andahl)
36	1974	April	C – yearling below NHD	W	DFG 1974a
37	1975	January	SDC - adults stranded downstream hwy 99	W	DFG 1975c, 1978a
38	1975	January	MS - Bellota	W	DFG 1975c
39	1975	Spring	C - above Jenny Lind	W	Anecdotal (J. Andrews)
40	1975	April	C - adults	W	DFG 1975d

Footnote Number	Year observed	Season	Location	WY type	Source
			stranded in Cosgrove Creek		
41	1975	April	C - below NHD	W	DFG 1975b, 1978a
42	1975	June	C - holding in pool below NHD	W	DFG 1975a, 1978a
43, 44	1975	April - July	C- spawning below NHD to 2 miles downstream	W	DFG 1975d
45	1976	Feb	C - entering river	C	DFG 1976, 1978b
46	1976	Spring	C – above Jenny Lind	C	Anecdotal (J. Andrews; J. Sorenson)
47	1976	April	C - rescue of salmon just east of UOP campus	C	Anecdotal (J. Sorenson)
48	1976	April	Old C – below lowest dams, fish rescue	C	DFG 1978b
49	1977	Feb	C – yearling above Jenny Lind	C	USFWS 1989
50	1977	March or April	MS – at lower most dams	C	DFG 1979b
51	1978	early January	C - lower reaches of the river below Bellota	W	DFG 1978c
52	1978	early February	C - lower reaches of the river below Bellota	W	DFG 1978c
53	1978	March	MS - Bellota	W	DFG 1979a, 1980
54	1978	April	MS - Bellota	W	Anedotal (J. Raine)
55	1979	March - April	MS - Bellota	AN	DFG 1979a
56	1982	Spring	MS - Bellota	W	DFG 1986
57	1982	Spring	C - below NHD	W	DFG 1982, 1986
58	1984	April	C - below NHD; unspawned winter run	AN	DFG 1984
59	1987	June	C - yearling caught above Bellota	C	USFWS 1989, 1993
60	1995	November	MS – Bellota. Fish rescue.	W	Anecdotal (M. Bane); Nickles 1995 Nov 4 & 7

Footnote Number	Year observed	Season	Location	WY type	Source
61	1995	Fall	C- canyon near Jenny Lind	W	Anecdotal (L. LeBeouf quoted in Nickles 1996 March 4); Koscho 1995 Nov 7
62	1995	Spring	Old C - smolt behind UOP	W	Anecdotal (T. Taylor)
63	1996	Feb - June	C- juveniles between NHD and Bellota	W	DFG 1996
64, 66	1997	Fall	MS -Between Fine and Flood Roads; observed salmon trying to spawn	W	Anecdotal (F. Solari)
65	1997	Fall	MS - Bellota	W	Anecdotal (F. Solari)
67	1998	late October or early November	MS - Bellota	W	Nickles 1998 Nov 3; Anecdotal (M. Machado)
68	1998	October	SDC	W	Nickles 1998 Oct 17
69	1998	October	MS - Piazza Dam	W	Nickles 1998 Oct 17
70	2000	Fall	C - between Shelton and old gravel plant	AN	Anecdotal (F. Solari)
71	2001	November	SDC	D	DWR 2003, Stillwater Sciences 2004
72	2001	December	Mormon Slough - stranded	D	DWR 2003, Stillwater Sciences 2004
73, 74	2001	December	MS - spawning observed below Bellota	D	DWR 2003, Stillwater Sciences 2004
75	2002	November	SDC	D	DWR 2003, Stillwater Sciences 2004
76, 77	2002	December	MS – below Bellota	D	DWR 2003, Stillwater Sciences 2004
78	2003	November	SDC	BN	Fishery Foundation of California (FFC) unpublished data
79, 80	2003	December	Near tidewater, West Ave., and MS	BN	FFC unpublished data
81, 82	2004	January	MS and Bellota	D	FFC unpublished data
83	2004	February	MS	D	FFC unpublished data

Footnote Number	Year observed	Season	Location	WY type	Source
84	2004	November	Downstream of confluence with SDC	D	FFC unpublished data
85, 86, 87	2004	December	Downstream of confluence with SDC, Old C, and SDC	D	FFC unpublished data

MS = Mormon Slough; C = Calaveras River; Old C = old Calaveras channel;
SDC = Stockton Diverting Canal; NHD = Hew Hogan Dam

Table A2. Anecdotal Sources – Interview Transcripts

Date	Name	Residence	Remarks
Feb 2002 & May 2, 2002	Fred Solari	Stockton	In the 1930s and 1940s Fred's dad caught salmon across the street from the old Solari grocery in the old Mormon Slough. Locals would shoot or spear them in the slough. Fred says this was in the fall. In the 1960s, Fred said as kids they caught salmon by the store as well. Also, during the 1960s he caught salmon and steelhead in the Calaveras River above Bellota. They would float from Shelton Road. to Bellota/Escalon Rd. Once he caught a trout larger than a 50-quart cooler. He once caught a 40 lb. salmon in Mormon Slough in the 1960's. Fred recalls Mormon Slough prior to modification in the late 1960s. In 1967 they used to float from Shelton Rd to the gravel pits. There was a 'cliff' and the 'big hole" on his dad's property between Highway 26 and Flood Rd. The channel was deeper with cliffs opening into a cave and a deep hole. No one knew how far the cave went into the bank. But, when the river dried up, this cave disappeared. It took months for the 'hole' to dry up; it was 20-30 feet deep. This was all between Fine and Flood Rds. They would catch perch from the hole. They swam in the pools in Mormon Slough and would try to catch salmon by hand. Doesn't recall what season of year this was. Could have been fall or spring if it was warm enough. (He personally had only done this once with his friends). They'd catch salmon up to Escalon Bellota Rd. It was rainier in the 1950s and 1960s, lots of fish. After the 70's drought-no fish. He used to catch his limit of trout, small mouth bass up to 21". There used to be otter in the river by Bellota, but hasn't seen one since 1988. In Fall 1983 or 1984, he caught a salmon that didn't look like a chinook; it had a big hooked jaw and the eyes were different, skin was red. His cousin caught a Chinook at the same time. The fish looked different from each other. Couldn't catch any kind of fish (carp, pike minnow, perch, catfish, for example) from 1988-1993 during the drought. Because there was no water in the river. After that drought ended, started catching trout again. For example, in 1997, the Stockton Record reported a big run of salmon. There were hundreds of salmon and steelhead at Fine Rd. Bridge. He saw a salmon over 5 feet long. Found a dead male 37" long. Could see the salmon trying to spawn between Fine and Flood Rd. The newspaper reported only 13-17 caught at Bellota. The paper missed the story- there were many more than that. Fred has only seen salmon in the fall, never seen the spring-run that has been reported. Then in spring 1998, he caught two 18"steelhead between Fine Rd. at Avisino Dam. Beneath Fine Rd. Bridge, he saw 1,000s of 3" juvenile fish (shade of blue with red spots on side, like a rapala bait). Approximately 2 years ago, he caught a jack salmon between Shelton Rd. and old gravel plant. Identified by Stockton DFG office on Wilson Way. Wasn't until last year (2001) that he started catching 4-5" trout again. In October 2001 he caught and released 35 trout from 8" –18"long between Shelton Rd. and Bellota. He caught one at 24". He identified 3 kinds of trout. One that is lime green and beautiful, one solid silver with black spots (he thinks these are steelhead), one bluish with red and black spots.
2/22/02 & 5/3/02	Ray Shenone	Stockton,	In the 1950's Calaveras County was able to keep more water and less water went down to tide water in the diverting canal. At this time, there were no dams, no Bellota Weir. The fish came up with the floods, but most people didn't know they were there. You

			couldn't see them because they moved right through. However, one time in March 1955, while visiting a relative's farm, he and his cousins and brothers found 2-3 hundred salmon stacked up below the railroad bridge at Potter Creek on Mormon Slough. At that time large boulders and riprap had been placed in the channel to protect the bridge. This blocked the salmon, which were in a deep pool. They shot and speared some of the salmon. This was the 1st time Ray had seen so many salmon and he was so impressed he has been interested in salmon ever since. Ray recalls, once, the creeks along hwy 99 and French Camp road flooded and salmon were found in the fields. The salmon had gone up the creeks and into the ditches. Ray pointed out Robert Lavajji's old place along Mormon Slough. Robert caught trout, salmon, and steelhead from his property just downstream of Jack Tone Rd. In March 1972, Ray caught salmon at the jack tone Rd. Bridge. In 1975 his son and cousin were fishing for black bass in the gravel pits above Bellota. They hooked very strong fish that weren't bass. They thought the fish were steelhead though they weren't able to land one. When SEWD was formed, the diverting canal and Mormon Slough were modified, and the dams were put in so farmers could use surface water for irrigation instead of ground water. Prior to modifications in the late 1960's Mormon Slough was wild with deep pools, tree lined banks, water falls over hard pan drops. Now examples of what it used to look like (minus trees) are at Duncan Rd Bridge looking upstream, and Fine Rd. Bridge. The hard pan channel near Jack Tone Rd. used to be an area of deep pools but they were eliminated. Ray thinks keeping the dams in for recharge and putting tunnels through the bottom boards for adults would provide good passage for adult salmon. The deeper water will provide cover for the fish, like before.
2/20/02 & 5/3/02	John Prioli	Stockton	As a teenager, hunted and fished around Jenny Lind from 1945. Fished for bass. Tried to snag salmon and steelhead when he saw them below the bridge in Feb., March, and April. Would see salmon spawning downstream in the wide bend in the river (Mallard Bend). In 1949-50 John took a bio class at Delta College; they would rescue salmon fingerlings right behind UOP. The juvenile salmon par were stranded in the pools left behind by receding water; they netted them and put them back in main channel. Instructor identified the fish for them. Once, for a biology class project in the fall of 1949 he tried to sample for lamprey eels above Jenny Lind but didn't find any. However, he recalls seeing adult salmon at that time. In the late 1940s he heard about people panning for gold just below New Hogan Dam and they saw salmon and steelhead there. During that period of time, he can't recall a spring when he didn't see juveniles. In 1949 and 1950 there were parr both years. In our first interview John said that in Feb., March, and April he would fish for bass every week and see adults (either salmon or steelhead). In our second interview, John said he fished for black bass in the spring and they would try to snag what they thought were salmon or steelhead in the deep ponds. They couldn't really see the fish, so not sure which they were. As a youngster, he walked the gold dredged areas up stream to hunt ducks in November – January; John reports having seen salmon and steelhead in the main channel.
2/20/02 & 5/3/02	Frank Pitto	San Andreas	Resident of County since 1928. Around 1935-36 he fished on the Calaveras just below old Hogan Dam. In summer time the river dried up. Only pools remained and they contained catfish. He fished behind the dam, which was very muddy, with little water

			flowing into the reservoir. His whole family would picnic July 4th above the dam and swim in the murky water. They usually fished in late summer/fall when the river would only be 'pools'. They just liked to fish the holes for catfish. In the Fall he fished near Comanche on the Mokelumne, and remembers salmon there in mid October, making it to Comanche. But there were no salmon on the Calaveras. After the New Hogan Dam was built, that's when salmon fishing was made possible in the Calaveras. He worked on the construction of New Hogan Dam. Frank said they didn't go down along Mormon Slough ever, so he had no knowledge of the fish down there.
2/28/02 & 5/7/02	Jay Sorenson	Stockton	Jay coordinated a salmon rescue just east of the UOP campus and the railroad tracks in April 1976. During the same operation he also helped move salmon over Bellota Weir and the Van Allen Road weir. He counted 546 salmon. It was raining that day. Beaver Chemical had released effluent into the sewer and it went into the Calaveras River where he had 5 or 6 salmon cornered for netting. The effluent came out of an outlet right there and immediately killed the salmon they were tyring to net. Later, after the rescue, residents upstream reported seeing salmon spawning on the gravel beds near Jenny Lind. In 1995 he helped put in the Denile ladder at Bellota. Jay has been a fishing guide in the Delta his whole life. Has never fished on the Calaveras.
2/20/02	Doug Codog	Stockton	Doug brought to our attention an archeological report of a midden site on Mormon Slough containing salmon spear artifacts. Archeology paper written by Fenenga, Franklin F. 1969 CA-SJO-17: Morman Slough Site. Unpublished manuscript on file at the Western Archeological Center, National Park Service, Tuscon, Arizona. It was done for the Army Corps of Engineers by Long Beach College (now CSU, Long Beach). The whereabouts of this paper was determined by Janis Offerman, CA Department of Water Resources.
3/11/02 & 5/3/02	Maisi Schachten	Murphys	Maisi will be 85 years old in July. Her deceased husband, Lenwood, was born and reared in Murphys, California. He fished the Stanislaus with local Indian friends. His dad fished the river, too, in the late 1800s. The family fished upstream of Murphys. They never caught a salmon, but caught steelhead. She recalls her husband's stories of coming up from the river with baskets full of steelhead trout. This was over 50 years ago, fishing with his brother and father. Maisi has fished, too. She fished for salmon three different years in Alaska; so she knows what salmon look like. She said her 52-year-old son, Tom Schachten, has fished all the local streams, and probably the Calaveras, too. He'll be back in June. We should contact him for stories. He used to own Glory Hole sports in Angels Camp before New Melones was built. He had to close the shop because the river "dried up" when they were filling New Melones reservoir. He now lives and fishes in Idaho. Maisi taught her kids how to fish across the street from their home in Murphys creek; they caught trout, but no steelhead in that creek. She referred me to her sister-in-law, Lois Ostrowski, for more stories. Maisi said she would mail me some pictures. (as of 5/3/02, she said she hadn't located any pictures yet.)

03/11/02 & 5/3/02	Lois Schachten Ostrowski	Murphys	Lois is 92 years old and she was born and raised in Murphys. Her father was raised in Valley Springs area on Haupt Creek. His mother ran a roadhouse; no family members reside in that area now. She didn't fish, but her husband, father, sons did. In her father's day, they made their own hooks. She does recall family members having fished the Calaveras River. The names Jenny Lind and Valley Spring were familiar to her as places where they might have fished, but she couldn't recall exactly where. She recalled that they caught steelhead in the Calaveras, but never saw or heard of people catching salmon. She thinks (conferred on this with her adult nephew who was in the room with her during our conversation) that this was usually in the spring, the month of May, when they'd get steelhead. I asked her how they knew it was steelhead. Lois said the fishermen knew the differences between steelhead, trout (brown and other trout), and whether it was a planted or wild fish from experience and taste. She said that they would regularly get "salmon bellies" in a salt barrel from down in the valley towns (couldn't remember name of town). These were wine barrels full of fresh salted salmon filets. They bought dried cod fish this way, too. They'd make creamed salmon to pour over rice or noodles. Lois' point was that if they had been able to catch salmon in the river where they lived, they wouldn't have bothered to obtain salmon from town. She has no pictures.
01/28/02 &5/3/02	Marilyn Bane	Valley Springs	Marilyn's husband, George Bane (now deceased), was one of the original salesman for the Rancho Calaveras subdivision. The Bane's home is on Dunn Road, just above the river. They had owned the property for many years while living in the Bay Area. Built a home and moved to the property when they retired. Mrs. Bane continues to live there now. In the early 1960's her husband used to come up from the Bay Area with friends to fish above Jenny Lind. They fished for trout but she doesn't recall what season of year. They would walk a path above the river. One time they watched fishermen catching fish from a deep hole upstream from their property that were as "long as a man's leg." She is uncertain if these fish were salmon or steelhead, but they were not trout as they were much too big. Her grandson, daughter and son-in-law still catch 17"-18" trout from the river on her property. She does not have pictures. Mrs. Bane also related a story about a group of people at the Bellota Weir helping salmon and/or steelhead over the weir. She is certain this took place in November 1995, as she was celebrating her 50th wedding anniversary at the time.
02/05/02 & 5/3/02	Brian Cudney	Valley Springs	Mr. Cudney remembers catching a salmon in the Calaveras River when he was six years of age somewhere. He caught it between Valley Springs and Stockton in approximately 1966. He thinks it was spring because he recalls school was almost out. He had the fish over his shoulder, tail dragging on the ground. He estimates the weight at 20#. At that time there was more water in the Calaveras, enough to float a boat from the dam down to the Jenny Lind bridge. He said his dad used to leave him fishing at the Jenny Lind bridge on Milton Road, then go upriver to just below the dam and put the boat in. Then his dad would float down the river fishing and hunting wood ducks until he reached the bridge to pick Brian up. This would have been in the fall/winter. The grass was green, there were turkeys and frogs. They weren't wearing shorts or t-shirts. Brian remembers catching steelhead (they were big and had red throats) ranging from four to seven pounds at the Jenny Lind bridge in the 60's and 70's. Brian also remembers the salmon run Mrs. Bane

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2/22/02 & 5/3/02	Ray Shenone	Stockton,	In the 1950's Calaveras County was able to keep more water and less water went down to tide water in the diverting canal. At this time, there were no dams, no Bellota Weir. The fish came up with the floods, but most people didn't know they were there. You

Date	Name	Residence	Remarks
Feb 2002 & May 2, 2002	Fred Solari	Stockton	In the 1930s and 1940s Fred's dad caught salmon across the street from the old Solari grocery in the old Mormon Slough. Locals would shoot or spear them in the slough. Fred says this was in the fall. In the 1960s, Fred said as kids they caught salmon by the store as well. Also, during the 1960s he caught salmon and steelhead in the Calaveras River above Bellota. They would float from Shelton Road. to Bellota/Escalon Rd. Once he caught a trout larger than a 50-quart cooler. He once caught a 40 lb. salmon in Mormon Slough in the 1960's. Fred recalls Mormon Slough prior to modification in the late 1960s. In 1967 they used to float from Shelton Rd to the gravel pits. There was a 'cliff' and the 'big hole" on his dad's property between Highway 26 and Flood Rd. The channel was deeper with cliffs opening into a cave and a deep hole. No one knew how far the cave went into the bank. But, when the river dried up, this cave disappeared. It took months for the 'hole' to dry up; it was 20-30 feet deep. This was all between Fine and Flood Rds. They would catch perch from the hole. They swam in the pools in Mormon Slough and would try to catch salmon by hand. Doesn't recall what season of year this was. Could have been fall or spring if it was warm enough. (He personally had only done this once with his friends). They'd catch salmon up to Escalon Bellota Rd. It was rainier in the 1950s and 1960s, lots of fish. After the 70's drought-no fish. He used to catch his limit of trout, small mouth bass up to 21". There used to be otter in the river by Bellota, but hasn't seen one since 1988. In Fall 1983 or 1984, he caught a salmon that didn't look like a chinook; it had a big hooked jaw and the eyes were different, skin was red. His cousin caught a Chinook at the same time. The fish looked different from each other. Couldn't catch any kind of fish (carp, pike minnow, perch, catfish, for example) from 1988-1993 during the drought. Because there was no water in the river. After that drought ended, started catching trout again. For example, in 1997, the Stockton Record reported a big run of salmon. There were hundreds of salmon and steelhead at Fine Rd. Bridge. He saw a salmon over 5 feet long. Found a dead male 37" long. Could see the salmon trying to spawn between Fine and Flood Rd. The newspaper reported only 13-17 caught at Bellota. The paper missed the story- there were many more than that. Fred has only seen salmon in the fall, never seen the spring-run that has been reported. Then in spring 1998, he caught two 18"steelhead between Fine Rd. at Avisino Dam. Beneath Fine Rd. Bridge, he saw 1,000s of 3" juvenile fish (shade of blue with red spots on side, like a rapala bait). Approximately 2 years ago, he caught a jack salmon between Shelton Rd. and old gravel plant. Identified by Stockton DFG office on Wilson Way. Wasn't until last year (2001) that he started catching 4-5" trout again. In October 2001 he caught and released 35 trout from 8" –18"long between Shelton Rd. and Bellota. He caught one at 24". He identified 3 kinds of trout. One that is lime green and beautiful, one solid silver with black spots (he thinks these are steelhead), one bluish with red and black spots.
2/22/02 & 5/3/02	Ray Shenone	Stockton,	In the 1950's Calaveras County was able to keep more water and less water went down to tide water in the diverting canal. At this time, there were no dams, no Bellota Weir. The fish came up with the floods, but most people didn't know they were there. You

			said fish 3' long were common there. Mr. Day also caught steelhead from the old bridge. Salmon were seen regularly at Calaveras River Park, approximately 100-200 yards downstream of the dam, in a large swimming hole that probably measured 70-80 feet across. He and his wife would catch steelhead in this pool in spring and early summer. He says the salmon spawned there at the swimming hole. One of Mr. Day's jobs was to maintain the rain guage near Bellota near the road to Farmington. He changed the paper in it each Saturday and he'd see salmon at Bellota when they were there. As a boy, he fished the local tributary streams for trout; these were Jesus Maria, O'Neill Creek, Murray Creek and others. He said he figures he caught trout in nearly every stream in this county when he was a boy. He caught nice big trout and indicated with his hands they were around 14'' long or longer. Mr. Day also fished the Calaveras above Hogan Reservoir, and recalls finding skeletons of salmon ("big, hooked jaws") above San Andreas in an area known as "The Narrows." I (G. Marsh) asked Mr. Day if he recalled people talking about the fish they caught when he was a boy. He said he didn't recall people fishing for steelhead or salmon; but people regulary fished catfish in the spring and mostly in the Calaveras. For some reason in the spring, the catfish would come up the river and they would be in the eddies and margins along the banks after a rain. One time his sister, brother-in-law, wife and he filled a wash tub full of catfish using cane poles and a short bit of line. A local resident living below the dam, a Swede named Anderson, caught catfish and he heard Mr. Anderson talk about that. Mr. Day was born and raised in Mountain Ranch near a body of water he referred to as Emery Reservoir. The reservoir was named for a senator who apparently provided funds for the construction. The reservoir supplied water to hydraulic miners near Fricot City where the senator may have had a mining interest. His father and Uncle were hydraulic gold miners at the turn of the century at Cave City on McKinney Creek/Emery Reservoir (which he said may be O'Neill Creek, and referred to the headwaters of the creek being in Camp Connell). His dad and uncle planted steelhead trout in Emery Reservoir and fished for them regularly there. In 1911, the dam that held Emery Reservoir broke and he recalls that his father told him that dam failure raised the water level in Bellota by 6 feet. Mr. Day says that those planted trout went downstream with the water flows from the broken dam in 1911. The dam broke again in 1919.
July 29 2002	Mike Machado	Stockton	Recalls seeing salmon at Bellota when he was 12 years old in the spring in 1960, and at Bellota in 1998. No season provided in 1998, but based on other reports assumed to be in the fall.
January 6, 2003	Tom Taylor	Stockton	Tom watched a young salmon behind UOP at a pedestrian bridge. He recalls this was approximately spring of 1995. He watched the salmon smolt moving through a pool, being chased by bass. The smolt leapt out of the water onto the sand bank. Tom went down and shoved it back into the water. He said the smolt was around 90-100 mm. He said bass were all over in the tidal reach of the river.

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