

M e m o r a n d u m**To** : To Files**Date:** December 17, 2003**From:** **Colleen Harvey Arrison**
Department of Fish and Game
Northern California-North Coast Region**Subject** : Mill Creek Spring-run Chinook Salmon Surveys for 2003**An estimated 1,426 spring-run Chinook salmon spawned in Mill Creek in 2003.**

This estimate was calculated by expanding salmon redd counts within the spring-run chinook spawning habitat in Mill Creek. In addition to redd counts, carcass counts, redd measurements and fin tissue samples were also collected.

Spawning Surveys

The known spawning habitat of spring-run Chinook salmon in Mill Creek extends a total distance of 41 miles from approximately the Hwy-36 Bridge crossing to the Steel Tower Transmission Lines located three miles downstream from Little Mill Creek's confluence with Mill Creek (Figure 1). We use a combination of ground and aerial surveys to count redds. Ground surveys were used to count redds from upstream of Hwy 36 to Buckhorn Gulch, a distance of 36 miles. Aerial surveys were used from Buckhorn Gulch to the Steel Tower Transmission Lines. Typically, fewer redds are counted from the air than on the ground due to shadows and vegetation. To correct for this problem, we conducted both ground and aerial surveys from Black Rock to Buckhorn Gulch to obtain a corrected ground-to-air redd ratio. This ratio was applied to the air-only counts to obtain a corrected redd count downstream of Buckhorn Gulch. This was the first year ground surveys were made downstream of Pape Place. Due to labor costs and limited access routes, this section will be surveyed aerially in the future.

The ground survey section (Hwy-36 to Buckhorn), was separated into 13 survey reaches. Based on prior years' surveys, it was estimated that the peak of spawning activity is Julian weeks 39-41. Surveys extended from 1 October thru 9 October 2003, Julian weeks 40-41. The aerial redd survey was flown by helicopter on 26 September and extended from Black Rock to the Steel Tower Transmission Lines. (Note: annual variation in the peak spawning weeks may cause these standardized redd surveys to under-estimate the population in years when peak spawning occurs after Julian weeks 39-41).

Fall-run Chinook surveys in Mill Creek are used to determine the extent of temporal and spatial isolation between the two runs. Fall-run Chinook salmon began migrating into Mill Creek 17 October, and spawning peaked the second week of November. Spring-run Chinook had completed spawning activities prior to the peak of fall-run fish spawning. No spawning surveys were made upstream of the upper diversion dam, although fall run spawning was reported as far upstream as Tenmile the first week in November.

During the spawning surveys, a total of 204 live salmon, 70 carcasses and 713 redds were observed (Table 1). In order to expand redd counts to a population estimate, we assumed that each female constructs one redd and there is a 1:1 male to female sex ratio in the population:

$$713 \text{ redds} \times 1 \text{ female/redd} \times 2 = 1,426 \text{ salmon.}^1$$

Adult Salmon Holding Surveys

This year snorkel surveys were not completed for Mill Creek. Due to the State of California's budget crisis all seasonal employees were laid off. Consequently there were insufficient personnel familiar with the survey reaches and trained in swift water snorkel techniques to complete the holding surveys. Also, due to last winters snow pack and high run-off, visibility in Mill Creek may have been too poor accurately count holding salmon.

Spring-run Salmon Population Trends

This year's estimate of 1,426 spring-run Chinook salmon is the second highest count since the early 1970's. The previous high was 1,594 in 2002 (Table 1). The previous 10-year average was 575 salmon. Adult spring-run chinook counts in Mill Creek dates back to late 1940's. An average of 1,900 spring-run chinook spawned in Mill Creek annually from 1947-1964.

Tissue Samples

Forty-three tissue samples from known adult spring-run Chinook salmon will be sent to the Department of Fish and Games, Central Valley Salmon Stock Tissue Collection Project archives.

Redd Measurements

No data on redd size specific to spring run Chinook has been collected for Mill Creek. This season, a total of 107 redds between Hwy 32 and Pape Place were measured to obtain baseline data on redd size. Length includes the tail spill and width was measured at the widest point. The minimum redd size measured was 15 ft², maximum was 322 ft² and average redd size was 104 ft². Practice redds are not included in these measurements. Substrate size was not measured.

¹Expanding the redd counts by a multiplier of two is assuming that each female builds one redd and there is a 1:1 sex ratio in the population. Ratios of redds-to-holding salmon in Deer Creek from 1997-2003 have ranged from 1.1 to 2.5 with a 7-year average of 2.1. For the 2003 Mill Creek estimate a multiplier of 2 will be used.

Acknowledgements

The completion of a comprehensive spawning survey within the Mill Creek watershed is a monumental effort which was further complicated this year by the states budget crisis. This year's survey could not have been completed without the dedicated efforts of other state, federal and private projects. Participants included Randy Benthin, Mike Berry, Bret Rohrer, Mike Ricketts and Matt Johnson from the Departments fisheries program. Mike Spiker from the Departments wildlife program and Teri Moore from the Departments timber harvest program. David Grant, Mora Kraemer and Audrey Silbernagel assisted from the Departments Central Valley Bay Delta Program, Ken Roby assisted from Lassen National Forest, and Howard Brown from NOAA Fisheries. Aric Lester, John Lance and Nancy Snodgrass assisted from Department of Water Resources, Julie Kelley from Sierra Pacific Industries, and Lisa Thompson from UC Davis.

TABLE 1. Spring-run chinook salmon redd counts in Mill Creek in 2003

Section	1997	1998	1999	2000	2001	2002	2003
Above Hwy-36	0	NS ^{1/}	NS	NS	NS	12	0
Hwy-36 to Little Hole-in-the-Ground	1	1	0	0	3	13	6
Little Hole-in-the-Ground to Hole-in-the-Ground	7	2	1	0	19	23	14
Hole-in-the-Ground to Ishi Trailhead	1	1	3	4	13	38	44
Ishi Trailhead to Big Bend	7	1	11	6	14	8	24
Big Bend to Canyon Camp	53	11	6	12	92	103	121
Canyon Camp to Sooner Place	NS	NS	NS	NS	NS	NS	NS
Sooner Place to McCarthy	19	21	22	59	129	172	133
McCarthy to Black Rock	1	25	75	77	153	119	137
Black Rock to Ranch House	5	19	58	34	71	127	39
Ranch House to Avery Place	7	33	}52	53	44 ^{2/}	83	67
Avery Place to Pape Place	NS	39		15	12 ^{2/}	27 ^{2/}	58
Pape Place to Buckhorn Gulch	NS	13	12 ^{2/}	3 ^{2/}	0 ^{2/}	63 ^{2/}	64
Buckhorn Gulch to Blunkall Crossing	NS	25	23 ^{2/}	9 ^{2/}	0 ^{2/}	0	3 ^{2/}
Blunkall Crossing to Little Mill Creek	NS	17	17 ^{2/}	0 ^{2/}	0 ^{2/}	0	3 ^{2/}
Little Mill Creek to Transmission Line	NS	4	0 ^{2/}	0 ^{2/}	0 ^{2/}	9 ^{2/}	0
Total Redds	101	212	280	272	552	797	713
Population Estimate	202	424	560	544	1,104	1,594	1,426

^{1/} NS = not surveyed

^{2/} Estimated redds from a ground: aerial redd survey ratio.

FIGURE 1. Spring-run chinook salmon Surveys reaches in Mill Creek

