

2004 Feather River Salmon Spawning Escapement Survey Summary

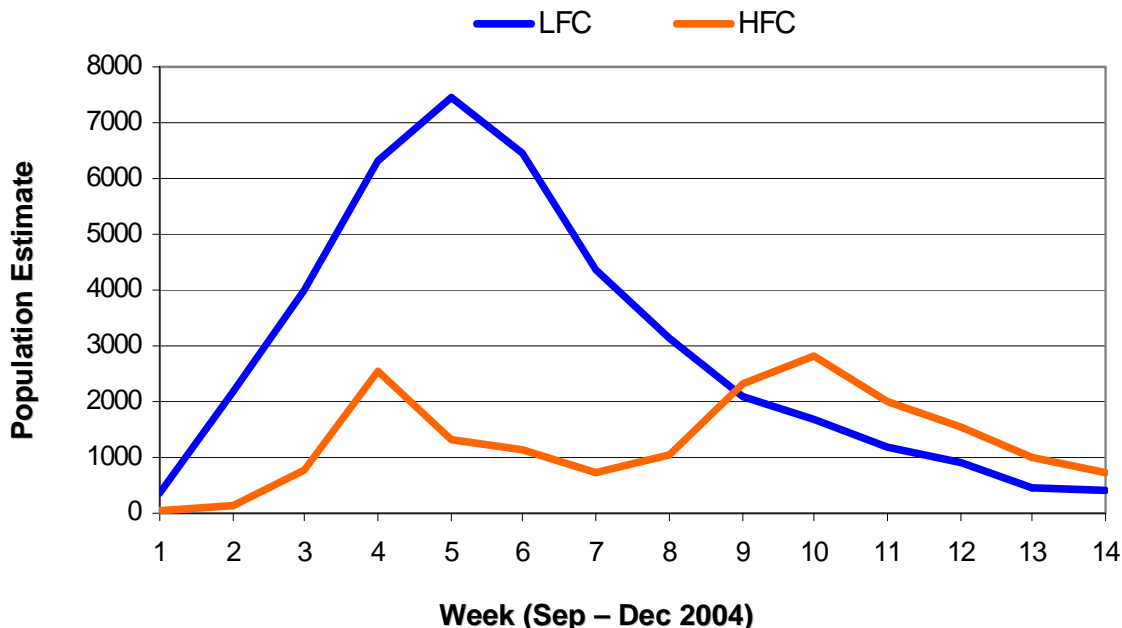
Alicia Seesholtz^{1,2}, Brad Cavallo¹, Jason Kindopp³ and Ryon Kurth³
*California Department of Water Resources
 Division of Environmental Services*

The Chinook salmon spawning escapement survey began September 2 and continued through December 17, 2004.

Population Estimate:

The Low Flow Channel (LFC) includes the area in the Feather River from the Fish Barrier Dam downstream to the Thermalito Outlet. Salmon carcass mark recapture resulted in a population estimate for the LFC of 37,058 salmon composed of 33,315 adults and 3,743 grilse. The High Flow Channel (HFC) survey extended from the Thermalito Outlet downstream to the Gridley Bridge. The population estimate for the HFC was 17,113 salmon with about 15,265 adults and 1,848 grilse. Heavier spawning activity in the LFC is consistent with previous years (long term average since spawning season 2000 is 62% in the LFC). In addition, spawning peaked about four weeks earlier in the LFC than the HFC (Figure 1). However, it does appear there was a bimodal spawning peak in the HFC (Figure 1). Over 50% of the coded wire tags (CWTs) recovered during the earlier peak at Week 4 (end of September) were spring-run Chinook. The largest peak at Week 10 consisted of 100% fall-run CWT recoveries. Total in-river spawning for the Feather River (LFC + HFC) was 54,171 which consisted of an estimated 48,580 adults and 5,591 grilse. These estimates include fall-run and spring-run Chinook salmon since their spawning does not appear to be spatially or temporally segregated on the Feather River.

Figure 1. Weekly population estimates in the LFC and HFC of the lower Feather River during the 2004 Chinook salmon escapement survey.



¹ 3251 S Street, Sacramento CA 95816

² Please direct comments or questions to Alicia Seesholtz at aseeshol@water.ca.gov or (916) 227-7539

³ 460 Glen Drive, Oroville CA 95966

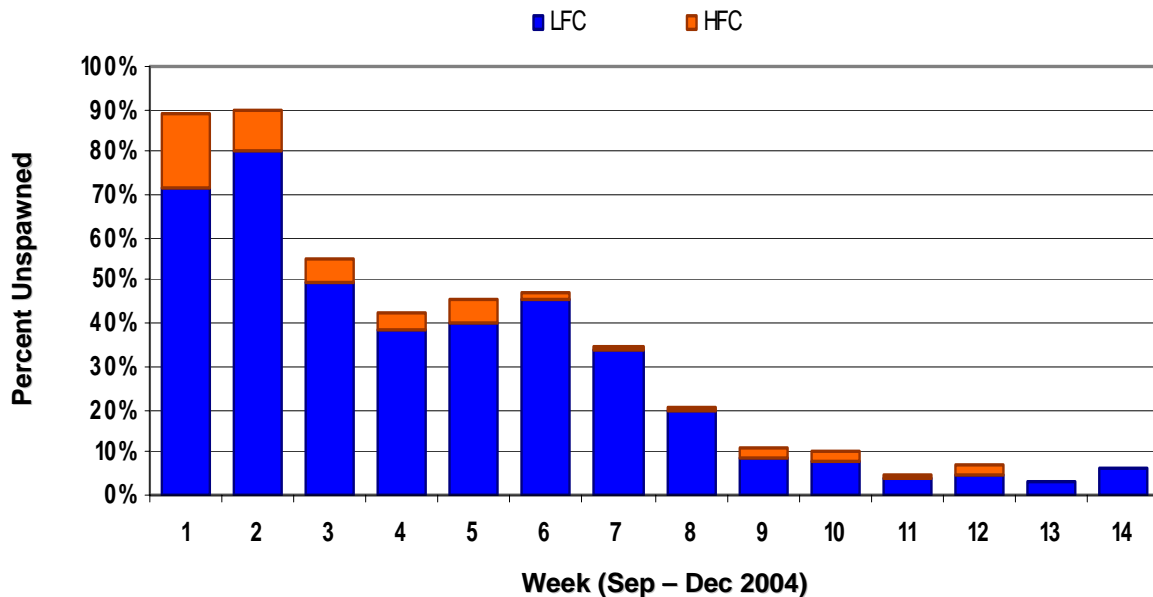
Pre-spawning Mortality:

On average, 29.4% of the 2,452 female salmon examined in-river had died before the majority of their eggs were deposited (Table 1). Pre-spawning mortality was generally higher early in the survey (September-October; Figure 2) and in the LFC (Table 1 & Figure 2). Since we began monitoring pre-spawn mortality in 2000, we have observed similarly high levels. The cause of pre-spawning mortality is unclear, but likely results from stresses associated with upstream migration, water temperatures, angling pressure, and intense competition for limited spawning habitat.

Table 1. Spawning status of female Chinook salmon examined during the 2004 escapement survey in the lower Feather River.

River Section	Spawned	Unspawned	Total	% Unspawned
LFC (Sect. 1-23)	1288	654	1942	33.7%
HFC (Sect. 24-46)	444	66	510	12.9%
Overall	1732	720	2452	29.4%

Figure 2. Weekly percentage of unspawned females in the lower Feather River during the 2004 Chinook salmon escapement survey.



CWT Sampling:

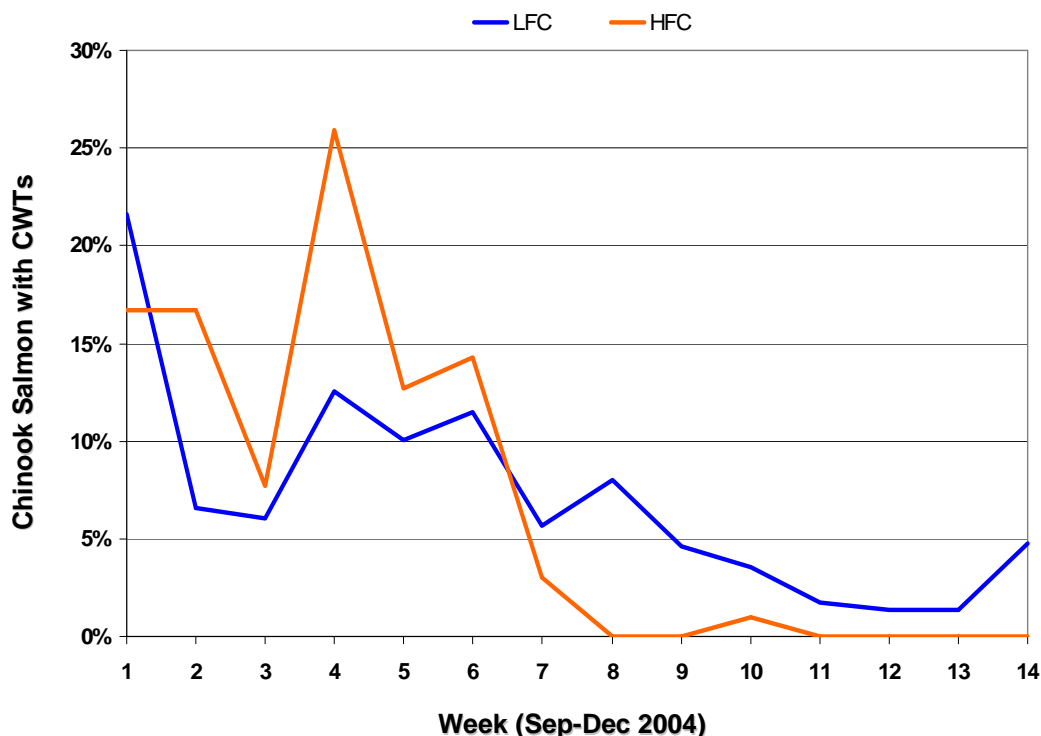
Of the 4,040 salmon checked for presence of an adipose fin clip (an external mark which indicates a CWT is present), a definitive assessment (clipped or not) was made on 3,995 fish. The other 45 fish were removed from analysis because adipose classification was confounded by uncertainty of adipose regeneration or decomposition. 253 heads with CWTs were collected,

resulting in an average occurrence rate of 6.3% (Table 2). Higher percentages of Chinook salmon with CWTs occurred in the HFC than the LFC during the first half of the survey but this trend reversed during the second half (Figure 3). However, Chinook salmon with CWTs occurred at three times a higher rate in the LFC than in the HFC (Table 2). Overall, CWT fish were more common before week seven (Figure 3).

Table 2. Adipose fin presence/absence summary from Chinook salmon examined in the Feather River during the 2004 escapement survey.

River Section	Clipped	Non-clipped	CWT Rate
LFC (Sect. 1-23)	228	2768	7.6%
HFC (Sect. 23-46)	25	974	2.5%
Overall	253	3742	6.3%

Figure 3. Weekly percentage of all examined Chinook salmon with CWTs in the LFC and HFC of lower Feather River during the 2004 Chinook salmon escapement survey.



The age composition of the spawning populations was assessed using CWTs from Feather River Hatchery origin fish recovered from the in-river escapement surveys in the LFC and HFC, and from the Feather River Hatchery. The last CWTs of Feather River Hatchery Origin were recovered on November 26, 2004 (Week 12). Table 3 shows the in-river spawning population of Chinook was dominated by age-3 (50.5%) salmon. Age-4 (24.3%) and age-2 fish (23.8%) were also fairly common while age-5 fish were rare (Table 3A). In contrast, younger fish were more common in the hatchery (Table 3A & B). The hatchery population was dominated by both age-2 (44.8%) and age-3 Chinook salmon (44.1%). Age-4 fish (10.3%) were fairly common

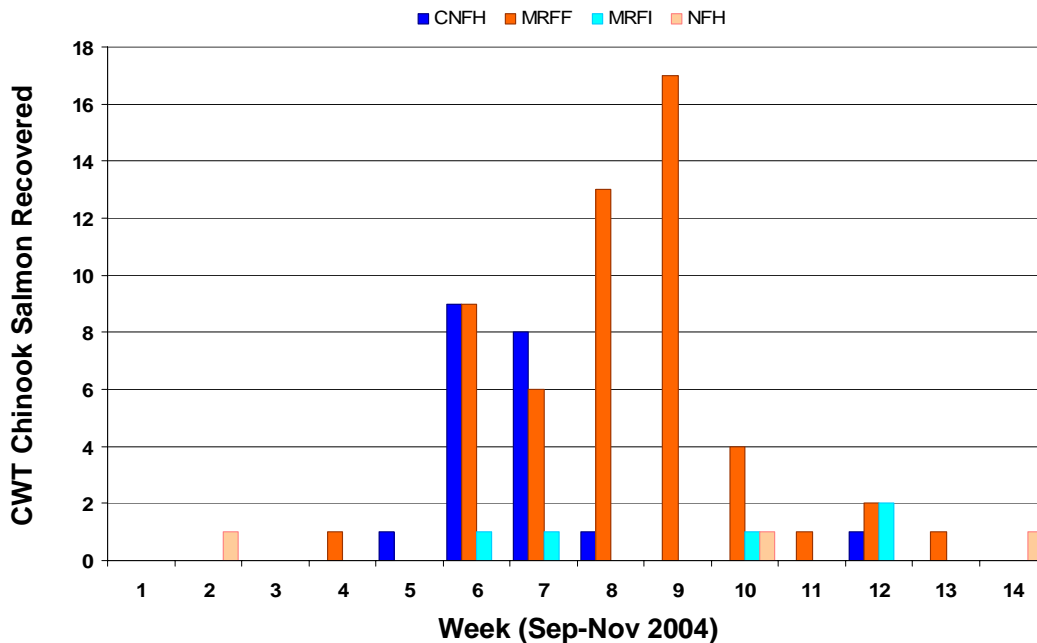
while age-5 fish were uncommon (Table 3B). There were no age-1 fish in either the in-river or hatchery populations.

Table 3. Age composition of Feather River Hatchery origin Chinook salmon recovered during 2004 from the A) in-river escapement survey including both the LFC and HFC, and B) the Feather River Hatchery.

A) IN-RIVER			B) HATCHERY		
Age	CWTs Recovered	%	Age	CWTs Recovered	%
5	3	1.5	5	20	0.8
4	49	24.3	4	247	10.3
3	102	50.5	3	1053	44.0
2	48	23.8	2	1074	44.8

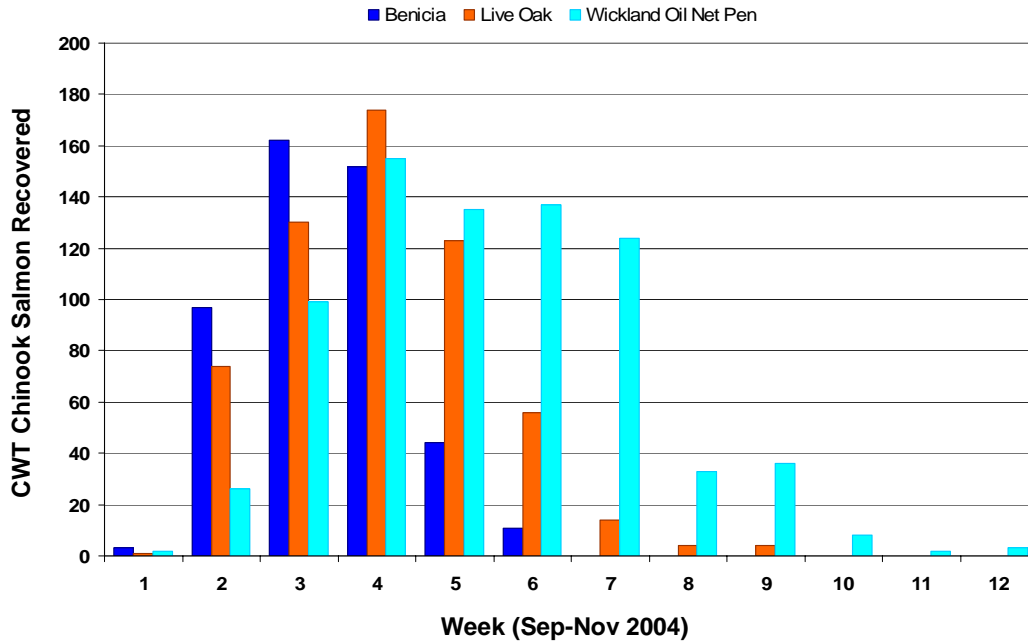
The majority (97%) of the tagged Chinook that returned to the lower Feather River and Feather River Hatchery in 2004 were of Feather River Hatchery Origin. The remaining tagged fish consisted of strays from Merced River Fish Facility, Coleman National Fish Hatchery, Mokelumne River Fish Instillation, and Nimbus Fish Hatchery (Figure 4).

Figure 4. Weekly stray recoveries from the Feather River during the 2004 Chinook salmon spawning season. Note: CNFH = Coleman National Fish Hatchery, MRFF = Merced River Fish Facility, MRFI = Mokelumne River Fish Instillation, and NFH = Nimbus Fish Hatchery.



Of the FRH origin fish recovered in-river and at the hatchery during the spawning season, Chinook salmon released as juveniles at Wickland Oil Net Pens, Live Oak and Benicia contributed more than 10% apiece. Salmon released at Benicia were only found during the first half of the season and those from Live Oak until Week 9 (Figure 5). However, those released at the Wickland Oil Net Pens were recovered through the end of November (Figure 5).

Figure 5. Weekly CWT Chinook salmon recoveries in relation to juvenile release location. Each location contributed at least 10% of the CWT fish recovered from the Feather River, both in-river and the hatchery, during the 2004 spawning season.



Spring and Fall Chinook CWT Composition:

Salmon tagged as spring-run and fall-run at the Feather River Hatchery demonstrated considerable overlap in their temporal distribution. Occurrence of spring-run Chinook CWTs peaked only one week before the peak of fall-run Chinook CWTs (Figure 6). Spring-run CWTs were not detected after Week 7 (Figure 6). The same temporal trend was exhibited by both the in-river and the hatchery recoveries.

Figure 6. Weekly CWT Chinook salmon recoveries by run of Feather River Hatchery origin fish from the Feather River, both in-river and hatchery, during the 2004 spawning season.

