Summary of 2001 Feather River Salmon Spawning Escapement Surveys

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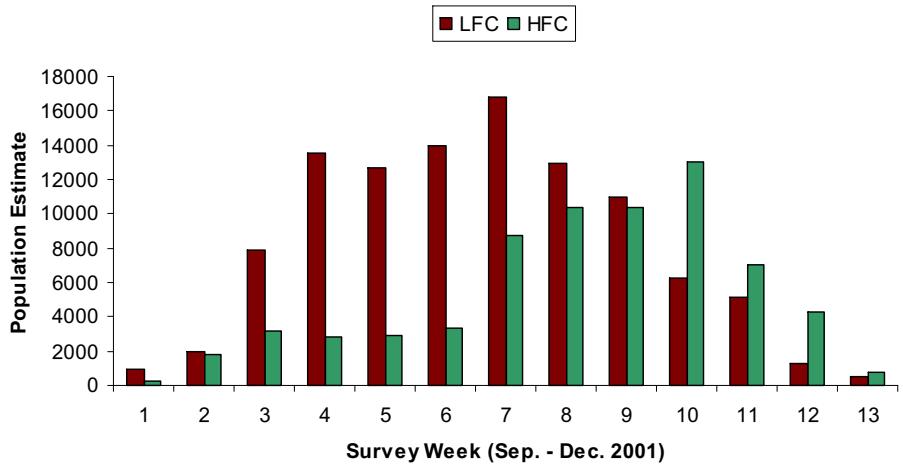
The Chinook salmon spawning escapement survey began September 10 and continued through December 31, 2001. The survey is conducted on the upper 16 river miles of the Feather River from the Fish Barrier Dam (FBD) downstream to Gridley Bridge (GB). Separate population estimates are calculated for two distinct reaches: the Low Flow Channel (LFC) from the FBD downstream to the Thermalito Afterbay Outlet (TAO), and the High Flow Channel (HFC) from the TAO downstream to the GB.

Population Estimate:

Salmon carcass mark-recapture resulted in a population estimate for the Low Flow Channel (LFC) of 101,057 salmon, 97,631 adults and 3,426 grilse (fish ≤ 65 cm fork length). The population estimate for the High Flow Channel (HFC) of the Feather River was 68,031 salmon, 65,725 adults and 2,306 grilse. The total in-river spawning for the Feather River (LFC + HFC) was 169,088, 163,356 adults and 5,732 grilse. These estimates include both fall run and spring run Chinook salmon since their spawning is currently not fully segregated on the Feather River. An additional 28,948 Chinook salmon (24,870 fall run and 4,078 spring run) entered the Feather River Hatchery (FRH). The 2001 Feather River salmon population estimate is the highest on record (Figure 1).

Figure 1. Weekly population estimates in the LFC and HFC of the lower Feather River during the 2001 Chinook salmon escapement survey. (Abundance estimated from number of fish observed).



Age Composition:

Recovered Coded Wire Tags (CWT) were used to assess age composition of the spawning population (Table 1). Age 3 and 4 salmon dominated the spawning population at 86.1% and 12.6% respectively. Age 2 fish were uncommon (1.3%) while age 5 fish were undocumented.

Comment [g1]: I'm wondering whether the word year should be in there, like "Three and four year old salmon…"

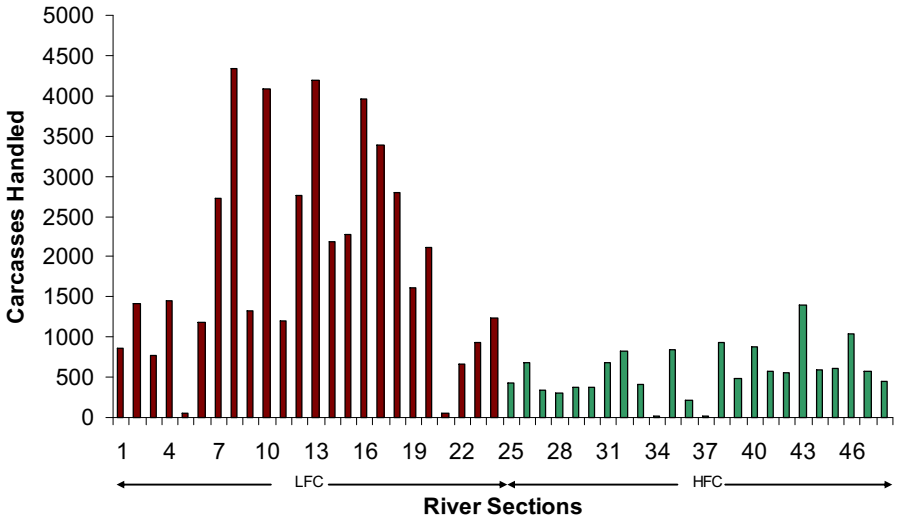
Table 1. Age composition of Feather River Hatchery origin Chinook salmon recovered during the 2001 escapement survey.

Age	CWT's Recovered	%
5	0	0
4	28	12.56
3	192	86.09
2	3	1.34

Carcass Distribution:

Approximately 59.8% of the spawning population spawned in the LFC. The heavier spawning activity in the LFC is consistent with the previous year (63.0% in 2000), which was the first year DWR began the survey. In the LFC, section 8, located at river mile 66.5, had the highest carcass concentration followed by section 13 (RM 64.0). The highest concentrations of spawning in the HFC were found in sections 43 (RM 54.0) and 46 (RM 53.5) (Figure 2).

Figure 2. Carcasses handled by survey section in the LFC and HFC of the lower Feather River during the 2001 Chinook salmon escapement survey. Note: Section 1 in the LFC and Section 25 in the HFC are the most upstream areas surveyed in each reach.



Pre-spawning Mortality:

3,103 female salmon were examined to determine if they had successfully deposited their eggs. Figure 3 shows the weekly percentage of pre-spawning mortality of examined females for each channel. Though the scale is low, a general trend in the two channels can be seen when compared to the population estimate (Figure 1), as numbers of fish increase, mortality increases. This comparison is significant for both channels (alpha = 0.05, $P < 0.001$) and for the HFC, 66.8% of mortality is explained by population numbers, while in the LFC 88.8% is explained by population.

On average, 54.9% had died before egg deposition occurred. Pre-spawning mortality was generally higher early in the survey (September-October), and decreased over time for both channels (Figure 4).

Monitoring of pre-spawn mortality began in 2000 and yielded an average of 42.0%, markedly lower than this year's average of 54.9 % (Table 2). While it's possible that 2001's larger population (the 2000 population estimate was only 70.0% of 2001) is a factor due to the increase in competition for limited spawning habitat, the causes for pre-spawning mortality remain unclear and other factors are considered important as well (e.g. stress associated with upstream migration, water temperatures, and angling pressure).

Figure 3: Percentage of all unspawned females examined throughout the survey for the two channels in the lower Feather River during the 2001 Chinook salmon escapement survey.

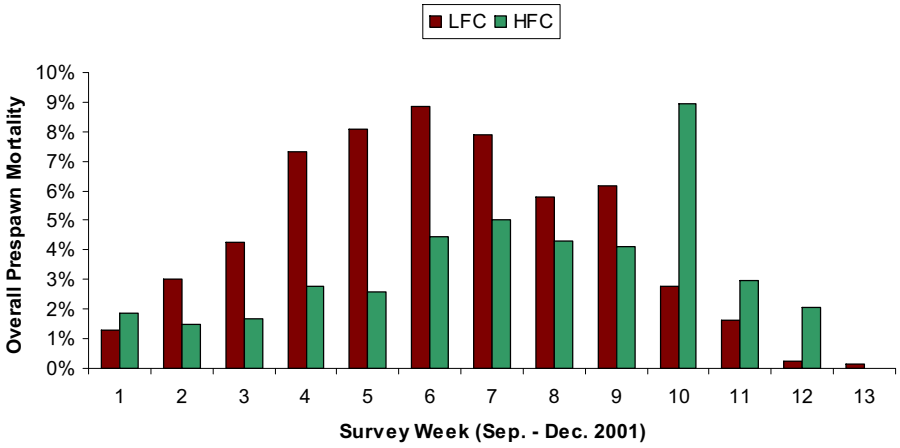


Figure 4: Weekly percentage of unspawned females by channel in the lower Feather River during the 2001 Chinook salmon escapement survey. Each week is considered on an individual basis.

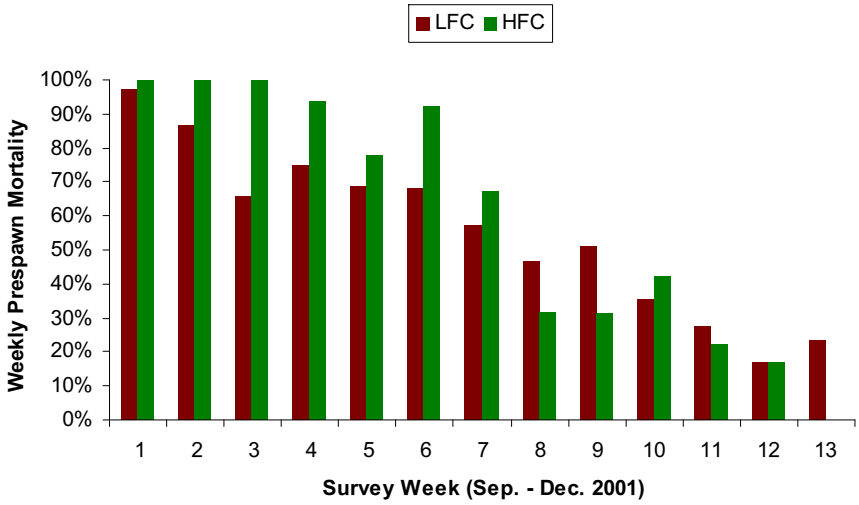


Table 2. Spawning status of female Chinook salmon examined during the 2001 escapement survey in the lower Feather River.

River Section	Spawned	Unspawned	Total	% Unspawned
LFC Sections 1-24	1091	1475	2566	57.48
HFC Sections 25-50	310	227	537	42.27
Overall	1401	1702	3103	54.90

Coded Wire Tag (CWT) Sampling:

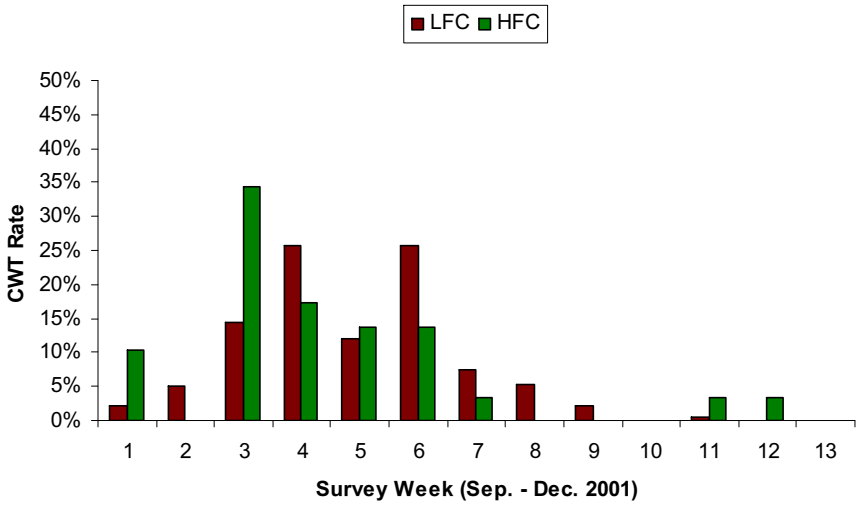
5,246 salmon were checked for the presence of an adipose fin clip (the external mark which indicates a CWT is present). 271 heads with CWT's were collected, resulting in an average 5.2% occurrence rate (Table 3). CWT's were more common earlier (Figure 5) in the survey, with over 85% of fish being discovered by the midpoint of the survey (week 6). CWT'ed salmon also appeared to occur at a higher rate in the LFC (5.7%) than in the HFC (3.0%). This is likely an artifact of proximity to the hatchery as 89.2% of CWT's were found in the LFC, with over half of those (54.5%) being found in the last mile of the 8 mile channel.

Table 3. Adipose fin presence/absence summary from Chinook salmon examined in the Feather River during the 2001 escapement survey.

	CWT	Non-CWT	Total	CWT Rate
LFC Sections 1-24	242	4038	4280	5.7 %
HFC Sections 25-50	29	934	963	3.0%
Overall	271	4972	5243	5.2%

Comment [g2]: Does the % CWT Rate refer to total fish or total clipped fish?

Figure 5. Weekly percentage of examined Chinook salmon with CWT's in the LFC and HFC of lower Feather River during the 2001 Chinook salmon escapement survey. Channels are independent of each other and each week represents 100%.



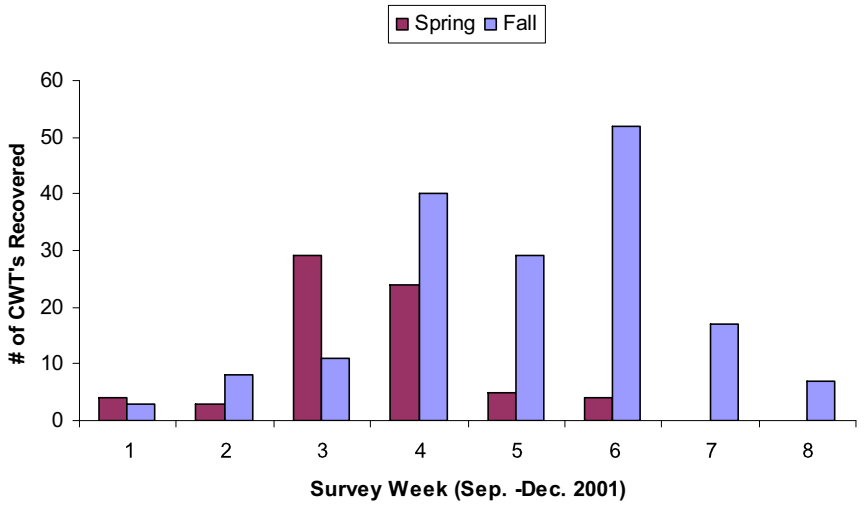
Spring and Fall Chinook CWT Composition:

Of the 271 CWT's collected during the 2001 Feather River Carcass survey, 236 were able to be identified to run. After recovery, it was revealed that the salmon tagged as spring and fall run Chinook demonstrated considerable overlap in their geographical distribution (Table 4) with the majority of each run spawning in the LFC (86.8% for spring run and 91.0% for fall). However, the temporal distribution of the two runs showed less fidelity (Figure 6), with spring run spawning having peaked and ended earlier in the season than the fall run. Individual spring run were last identified in week 6 (in very low numbers), the week in which fall run numbers peaked. This analysis does not reflect information gathered on stray fish from other hatcheries, which will be discussed later in this report.

Table 4. Weekly CWT in-river Chinook salmon recoveries by run of Feather River Hatchery origin fish from the Feather River during the 2001 spawning season showing spatial distribution.

LOCATION	Fall	Spring	Grand Total
HFC	15	10	25
LFC	152	59	211
Grand Total	167	69	236

Figure 6. Weekly CWT in-river Chinook salmon recoveries by run of Feather River Hatchery origin fish from the Feather River during the 2001 spawning season showing temporal distribution.



Strays:

The majority (96.6%) of the tagged Chinook that returned to the lower Feather River and Feather River Hatchery in 2001 were of Feather River Hatchery origin. One hundred and twelve tagged fish were determined to be strays from the Nimbus Fish Hatchery, Merced River Fish Facility, and Mokelumne River Fish Instillation (Table 4). They were collected between the last week of September and the third week of November. All of these fish were fall run fish ranging from age-2 to age-4.

Table 4. Weekly strays recovered by hatchery-origin during the 2001 Chinook salmon spawning season. Note: River = in-river recoveries and FRH = Feather River Hatchery.

	River	FRH	Total
Nimbus	0	2	2
Merced	7	80	87
Mokelumne	0	23	23
Total	7	105	112