

Summary of 2004 Feather River Hatchery Spring-run Chinook Fish Ladder Investigations (**Draft**)

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Recent genetic studies on Chinook salmon in the Feather River (University of California at Davis, Bodega Marine Laboratory, 2002) indicate that a small, but potentially significant difference exists between spring-run Chinook and fall-run Chinook salmon. Considering Central Valley spring-run Chinook salmon are listed as threatened under both the California Endangered Species Act and the Federal Endangered Species Act, it is exceedingly important to conserve spring-run Chinook life history. Restoring reproductive isolation between spring and fall Chinook would maintain the current genetic differences between runs as well as provide a means for restoring former, ostensibly greater, genetic disparity. Assuming the earliest arriving salmon more closely reflect spring-run genetic characteristics, continually capturing and spawning these fish separate from later arriving salmon could maintain and likely increase genetic differentiation between Feather River spring-run and fall-run salmon.

To better understand spring-run Chinook life history in the Feather River the CA DWR and CA DFG set out to count and individually mark all salmon that entered the FRH facilities in the spring. Studies performed in 2003 showed that holding a limited number of salmon over-summer in the Feather River Hatchery (FRH) is possible, but at great expense. Furthermore, the hatchery can not provide the appropriate holding conditions for large numbers of spring Chinook. Thus, an alternative program was developed to mark up to 4000 Chinook salmon entering the hatchery between April 1 and July 15, 2004. Once marked, fish were released and allowed to over-summer naturally in deep pools of the lower Feather River. During the hatchery spawning season, the mark enabled the FRH to spawn early arriving spring-run separately from fall-run Chinook. The following brief summarizes the preliminary results of this program.

Between May 17 and June 17, 2004, 3650 spring Chinook salmon were marked. Twelve salmon were sacrificed for brain tissues (as part of the circadian rhythm research project conducted by Michael Banks, OSU) and an additional 35 salmon were lost prior to marking (1.3% overall mortality during initial handling). Two hundred sixty-five fish were recaptured in the FRH and released again before the marking period concluded on June 17. Two additional fish were found dead in the river possibly due to handling or angling related stress. When spawning commenced in the fall, a total, of 1263 fish were recaptured: 834 at the FRH, 328 in the river escapement survey, and 101 by anglers. The FRH successfully spawned 769 (92%) of the fish returning to the hatchery, but 65 were

found dead in holding tanks and were not spawned. One hundred sixty-five (88%) of the 187 female salmon recovered in the river escapement survey were classified as spent (and are thus assumed to have spawned successfully). We did not recover tagged fish beyond the month of October (Table 1). Assuming these fish spawned one to two weeks prior, the majority of tagged spring run salmon spawned in September.

Table 1. Recovery and spawning status of female tagged spring run salmon from the escapement survey.

WEEK	Females	
	Unspent	Spent
5-Sep	3	
12-Sep	1	
19-Sep	6	12
26-Sep	6	35
3-Oct	5	65
10-Oct		34
17-Oct		16
24-Oct		3

Eighty nine percent of the marked salmon at the FRH were spawned before October 1. The majority of fish recaptured in the river were found in the upper reaches of the low flow channel (Figure 1 and Figure 2). Based on the escapement survey recapture data the sex ratio of the marked spring-run was 1.33:1 females to males. Of the 101 marked salmon caught by anglers 77% were harvested.

Preliminary results suggest that this program was successful at individually marking and recapturing spring-run Chinook in the Feather River with very low rates of handling mortality. Providing a mechanism to count the spring-run and visually distinguish them from fall-run at the FRH is vital to restoring and protecting genetic diversity. Future efforts will focus on marking more spring-run and refining the tagging process to increase tag retention and recovery.

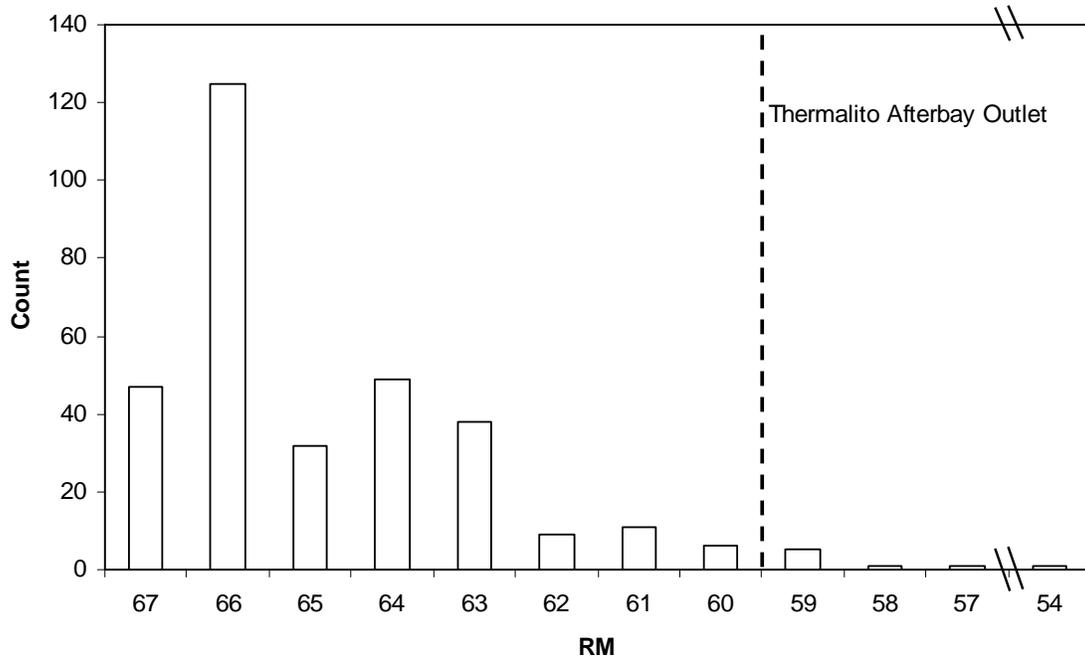


Figure 1. Number of salmon recaptured by River Mile (RM) in the escapement survey

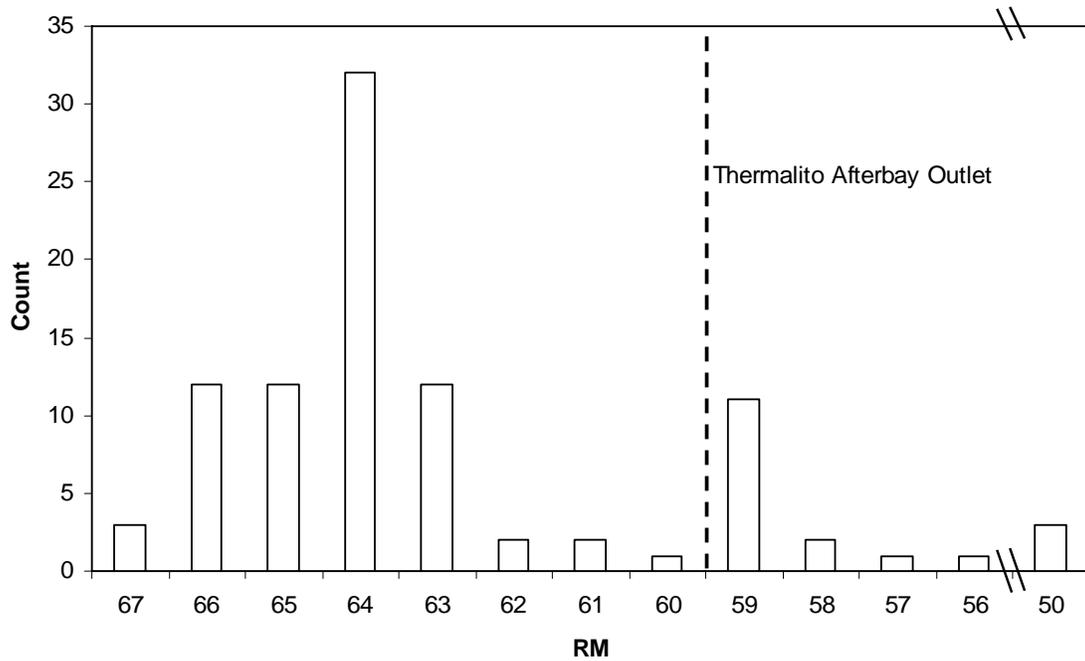


Figure 2. Number of salmon recaptured by anglers per River Mile (RM).