# Spatial Distribution of Spring-run and Fall-run Chinook Salmon Spawning in the lower Yuba River

Neither CDFG surveys conducted from 2000 – 2007, or later surveys conducted by the RMT (beginning in 2008) have detected a bimodal distribution of spawning activities (i.e., a distinct spring-run spawning period followed by a distinct fall-run Chinook salmon spawning period). Rather, these surveys have detected a slow build-up of redd construction generally starting in early September and continuing into the main fall-run spawning period of October and November.

Observations of acoustically-tagged fish during 2009, 2010 and 2011, combined with early redd detections and initial carcasses appearing in the annual carcass surveys, suggest that the spring-run Chinook salmon spawning period in the lower Yuba River may be of shorter duration than previously reported, extending from September 1 through mid-October. Other than the presumption, supported by acoustically-tagged fish observations, that the earliest (i.e., September to mid-October) spawning fish are spring-run Chinook salmon, there is no definitive manner in which to distinguish between spring-run and fall-run Chinook salmon redds.

The RMT conducted extensive Chinook salmon redd surveys during 2009, 2010 and 2011. During 2009 and 2010, Chinook salmon redd surveys were conducted approximately weekly on a near-census basis throughout most of the lower Yuba River. Approximately 20.9 mi of the 24mi of the total length of the lower Yuba River was surveyed during the redd surveys. About 0.7 mi of the lower Yuba River located immediately below the first set of riffles downstream of Deer Creek to the top of Narrows Pool was not surveyed due to rugged and dangerous conditions in the steep canyon known as the Narrows. No surveys were conducted in the 0.4 mi section of river located directly upstream of Daguerre Point Dam due to safety concerns of working in close proximity to the dam. Additionally, an approximate 2 mi section of the lower Yuba River from Simpson Lane Bridge to the confluence with the lower Feather River was not regularly surveyed because redds have not been observed in this area during past surveys. However, this section of the river was surveyed once during peak Chinook salmon spawning to ascertain that this section was not being utilized for spawning. Also, it is important to note that during the 2011 Chinook salmon spawning season, a random sampling method at monthly sampling intervals was implemented, by contrast to near-census weekly sampling during 2009 and 2010.

Consequently, the most reliable and comprehensive data available on Chinook salmon spawning spatial distribution are those obtained during the approximately weekly, near-census redd surveys conducted during 2009 and 2010. These data were used to characterize the spatial distribution of Chinook salmon spawning. GPS coordinates of each newly constructed redd were categorized by River Mile (RM) bins extending from the confluence with the lower Feather River upstream to Englebright Dam. In order to characterize the spatial distribution of spawning separately for each run, it was assumed that redds constructed on or prior to October 15 each year were spring-run

Chinook salmon redds (**Table 1**), and those constructed on or subsequent to October 16 each year were fall-run Chinook salmon redds (**Table 2**).

**Table 1. Spring-run Chinook salmon redds (i.e., built on or prior to Oct 15) by River Mile (RM) in the lower Yuba River. RM 0 is at the mouth of the river, and RM 24.3 is at the base of Englebright Dam.**

| RM | 2009 | | 2010 | | Combined Years | |
|---|---|---|---|---|---|---|
| | No. Redds | % Redds | No. Redds | % Redds | No. Redds | % Redds |
| **0 - 0.9** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **1 - 1.9** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **2 - 2.9** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **3 - 3.9** | 0 | 0.0 | 3 | 0.2 | 3 | 0.1 |
| **4 - 4.9** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **5 - 5.9** | 0 | 0.0 | 7 | 0.4 | 7 | 0.2 |
| **6 - 6.9** | 1 | 0.1 | 1 | 0.1 | 2 | 0.1 |
| **7 - 7.9** | 0 | 0.0 | 1 | 0.1 | 1 | 0.0 |
| **8 - 8.9** | 0 | 0.0 | 3 | 0.2 | 3 | 0.1 |
| **9 - 9.9** | 9 | 0.7 | 16 | 1.0 | 25 | 0.9 |
| **10 - 10.9** | 47 | 3.7 | 59 | 3.7 | 106 | 3.7 |
| **11 - 11.9** | 4 | 0.3 | 12 | 0.8 | 16 | 0.6 |
| **12 - 12.9** | 16 | 1.3 | 27 | 1.7 | 43 | 1.5 |
| **13 - 13.9** | 34 | 2.7 | 86 | 5.4 | 120 | 4.2 |
| **14 - 14.9** | 67 | 5.3 | 112 | 7.0 | 179 | 6.3 |
| **15 - 15.9** | 111 | 8.8 | 179 | 11.2 | 290 | 10.1 |
| **16 - 16.9** | 97 | 7.7 | 77 | 4.8 | 174 | 6.1 |
| **17 - 17.9** | 87 | 6.9 | 132 | 8.3 | 219 | 7.6 |
| **18 - 18.9** | 119 | 9.4 | 240 | 15.0 | 359 | 12.5 |
| **19 - 19.9** | 134 | 10.6 | 190 | 11.9 | 324 | 11.3 |
| **20 - 20.9** | 460 | 36.4 | 400 | 25.0 | 860 | 30.0 |
| **21 - 21.9** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **22 - 22.9** | 58 | 4.6 | 39 | 2.4 | 97 | 3.4 |
| **23 - 23.9** | 19 | 1.5 | 16 | 1.0 | 35 | 1.2 |
| **24 - 24.3** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **Total** | 1,263 | 100 | 1,600 | 100 | 2,863 | 100 |

**Table 2. Fall-run Chinook salmon redds (built on or subsequent to Oct 16) by River Mile (RM) in the lower Yuba River. RM 0 is at the mouth of the river, and RM 24.3 is at the base of Englebright Dam.**

| RM | 2009 | | 2010 | | Combined Years | |
|---|---|---|---|---|---|---|
| | No. Redds | % Redds | No. Redds | % Redds | No. Redds | % Redds |
| **0 - 0.9** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **1 - 1.9** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **2 - 2.9** | 12 | 0.6 | 2 | 0.1 | 14 | 0.4 |
| **3 - 3.9** | 20 | 1.0 | 8 | 0.5 | 28 | 0.8 |
| **4 - 4.9** | 31 | 1.5 | 28 | 1.9 | 59 | 1.7 |
| **5 - 5.9** | 40 | 2.0 | 56 | 3.7 | 96 | 2.7 |
| **6 - 6.9** | 92 | 4.5 | 48 | 3.2 | 140 | 3.9 |
| **7 - 7.9** | 79 | 3.9 | 75 | 5.0 | 154 | 4.3 |
| **8 - 8.9** | 68 | 3.3 | 39 | 2.6 | 107 | 3.0 |
| **9 - 9.9** | 229 | 11.2 | 91 | 6.1 | 320 | 9.0 |
| **10 - 10.9** | 208 | 10.2 | 127 | 8.5 | 335 | 9.4 |
| **11 - 11.9** | 42 | 2.1 | 23 | 1.5 | 65 | 1.8 |
| **12 - 12.9** | 58 | 2.8 | 48 | 3.2 | 106 | 3.0 |
| **13 - 13.9** | 145 | 7.1 | 124 | 8.3 | 269 | 7.6 |
| **14 - 14.9** | 176 | 8.6 | 118 | 7.9 | 294 | 8.3 |
| **15 - 15.9** | 244 | 11.9 | 128 | 8.5 | 372 | 10.5 |
| **16 - 16.9** | 74 | 3.6 | 61 | 4.1 | 135 | 3.8 |
| **17 - 17.9** | 104 | 5.1 | 104 | 6.9 | 208 | 5.9 |
| **18 - 18.9** | 102 | 5.0 | 117 | 7.8 | 219 | 6.2 |
| **19 - 19.9** | 84 | 4.1 | 89 | 5.9 | 173 | 4.9 |
| **20 - 20.9** | 204 | 10.0 | 192 | 12.8 | 396 | 11.2 |
| **21 - 21.9** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **22 - 22.9** | 26 | 1.3 | 17 | 1.1 | 43 | 1.2 |
| **23 - 23.9** | 8 | 0.4 | 4 | 0.3 | 12 | 0.3 |
| **24 - 24.3** | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| **Total** | 2,046 | 100 | 1,499 | 100 | 3,545 | 100 |