May 30, 2001

Memo to: Joe Miyamoto, Manager of Fisheries & Wildlife

From: Jose D. Setka, Fisheries Biologist II

Subject: Mokelumne River 2000-01 Spawning Survey

The following is a summary report describing the results of the 2000-2001 salmonid spawning survey in the lower Mokelumne River (Figure 1). Complete descriptions of methodologies and background material are available in reports for prior years. Weekly surveys were begun on October 2, 2000 and ended on March 15, 2001. A total of 18 surveys were conducted over a 24-week period. From the end of December to March 15, surveys were conducted every two weeks.

Escapement and Redd Numbers

The 2000-01 Mokelumne River fall-run Chinook salmon estimated escapement was 7,418 fish. Of the 7,418 salmon, 5,194 were adults (2,798 females, 2,221 males, 175 unknown), 1,074 were grilse (246 female, 714 male, 114 unknown) and 1,150 were unclassified (103 female unknown length, 132 males unknown length, 915 unknown length and sex). The hatchery return for 2000-01 was 5,524 salmon. Of these 2,082 (38%) were male, 2,555 (46%) were female and 877 (16%) were grilse. The steelhead trout (>38cm) escapement estimate was 46 fish (30 female, 9 male, 7 unknown).

Based on estimated escapement and hatchery returns, the estimated in-river chinook salmon spawning population was 1,894 salmon (216 adult male, 341 adult female, 197 grilse and 1,140 unknown). Applying the known adult percentage (83%) developed from WID counts to the unknown fish total results in an additional 944 adult salmon. The total in-river adult spawning population estimate was 1,501 salmon.

A total of 987 chinook salmon redds and 40 steelhead trout redds were observed during the survey period (Figure 2 and 3). Eighty-six percent of the chinook redds were constructed in Reach 6, while 14% were constructed in Reach 5. The first chinook redds were observed October 2, 2000, while the first steelhead redd was observed on December 7, 2000. Thirty-nine of the 40 steelhead redds were constructed in Reach 6.

Enhancement Gravel Usage

Four hundred seventy-nine (48.5% of total) chinook salmon redds were constructed in enhancement gravel areas (Figures 4 and 5). Additionally, twenty-three (57% of total) steelhead redds were constructed in enhancement areas. Chinook salmon redd superimposition within enhancement areas numbered 82 or 17% of the total redds constructed in the sites. Redds were constructed in the 2000 enhancement site less than 60 days post-project. Additionally, 29 redds were constructed in the 1999 enhancement area compared to 1 redd in 1999.

Superimposition
During the 2000-01 spawning season a total of 137 (14% of total) chinook salmon redds were superimposed. During the peak of the run weekly superimposition levels were approximately 11% (Figure 6).

Environmental Data
Water temperature below Camanche Dam during the period of October 1, 2000 to March 31, 2001 ranged from 9.7°C to 15.4°C (Figure 7). During the same time period the water temperature at Mackville Road ranged from 9.3°C to 15.5°C. The daily average Camanche release was 325cfs during the entire survey period.

Emergence Timeline
Based on egg model data chinook salmon fry emergence was predicted to begin the week of November 29, 2000 and continue through April 19, 2001 (Figure 8). Peak chinook fry emergence was predicted to occur the week of January 19, 2001.

Discussion
The main difference between this year's run and those in the past is the percentage of the total chinook salmon run that entered the hatchery. In 1996, the Mokelumne River estimated salmon escapement was 7,775 fish. Of the 7,775 fish, 3,883 (50% of escapement) returned to the hatchery. This year, the estimated escapement was 7,418 fish and the hatchery return was 5,524 (74% of total) salmon. The difference in hatchery returns between 1996 and 2000 resulted in significantly differing in-river populations (3,887 in 1996 and 1,894 in 2000). However, redd counts for both years were similar (929 in 1996 and 987 in 2000). The similar counts may be a result of a number of factors including run composition. A large component (32%) of the 1996 return was made up of grilse, which are mostly male and do not construct redds. The 2000 estimated in-river population grilse component was approximately 17%. Although there was a difference of approximately 2,000 fish in the in-river populations between 1996 and 2000, it was the run composition that served as the better indicator of redd construction.

This year, due to the lack of flood flows, we had an opportunity to extend the survey through the steelhead spawning season. The results indicate that steelhead spawning habitat may be limited to Reach 6 (Camanche Dam to Mackville Road). Thirty-eight of the 40 steelhead redds were found in Reach 6.

Cc: J. Myers
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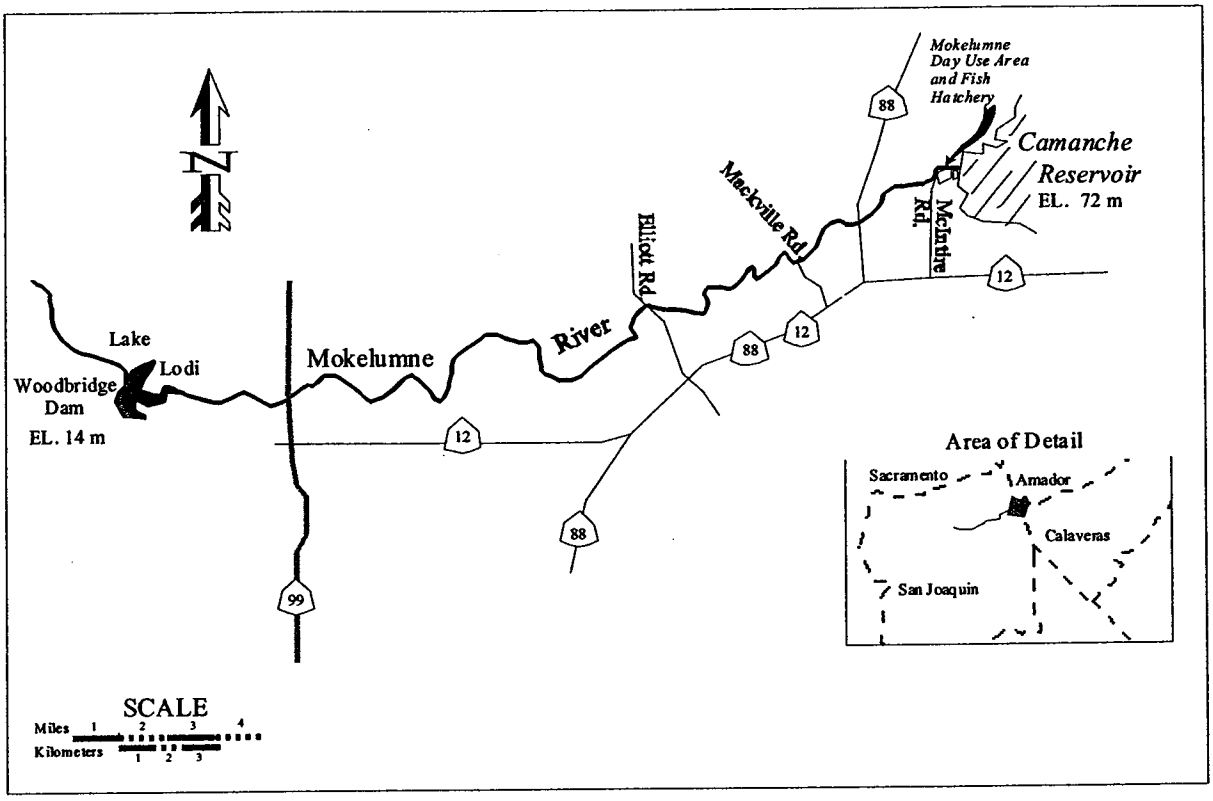

Figure 1. Lower Mokelumne River Camanche Dam to Woodbridge Dam, California.

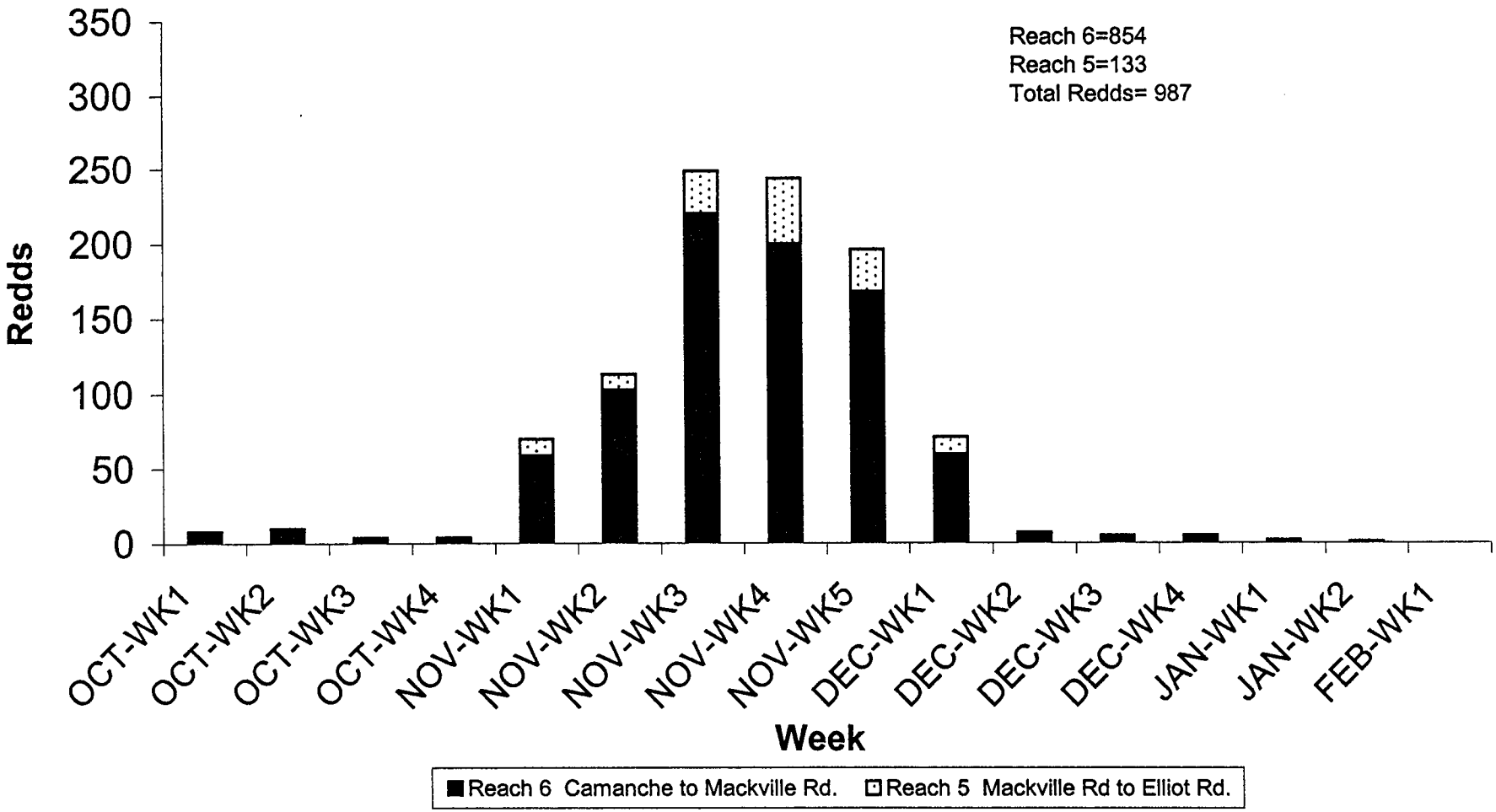

Figure 2. Fall-run chinook salmon redds observed during the 2000-01 survey in the lower Mokelumne River, CA.

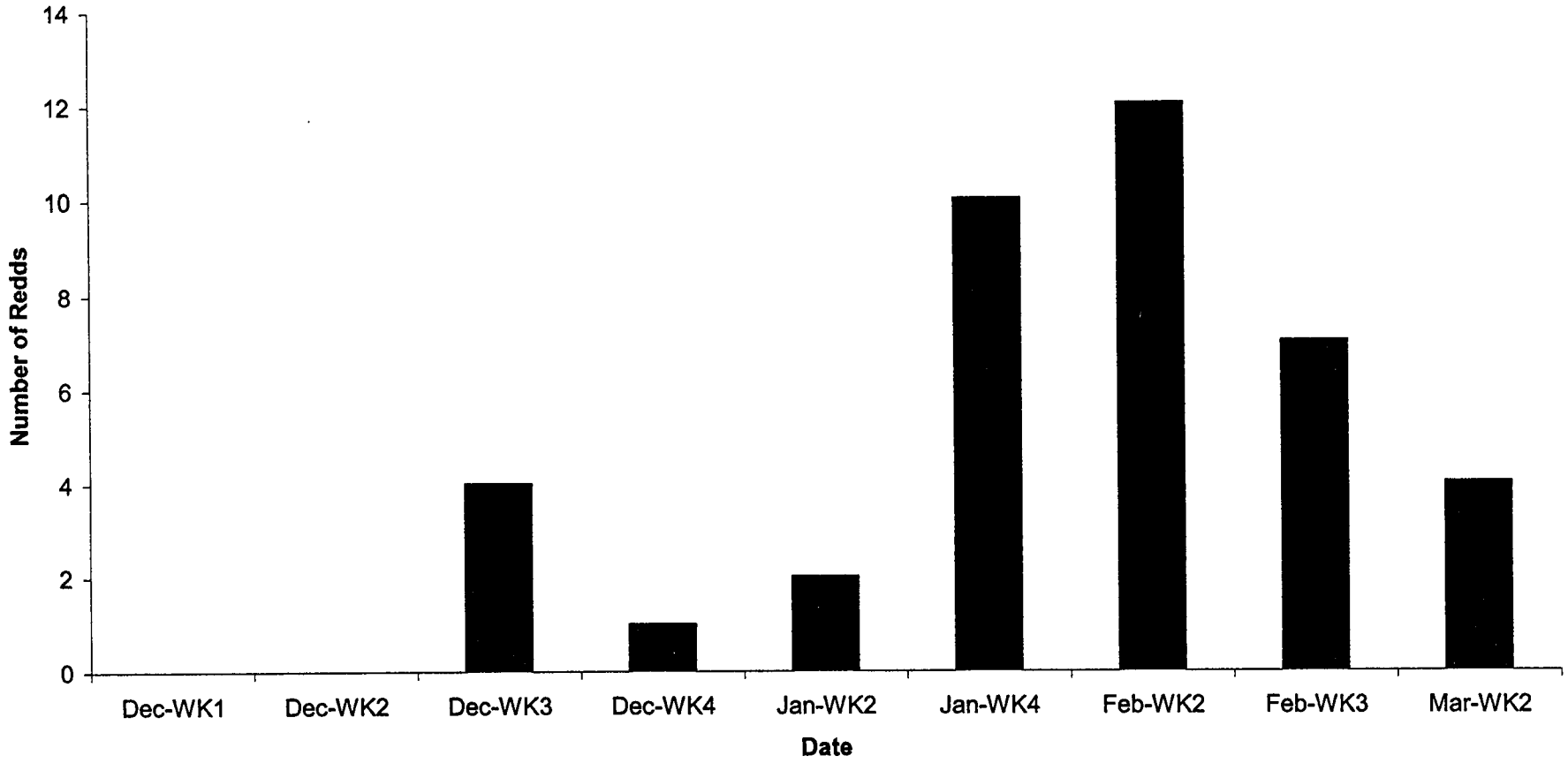

Figure 3. Steelhead trout redds observed per week in the lower Mokelumne River, CA during 2000-01 survey.

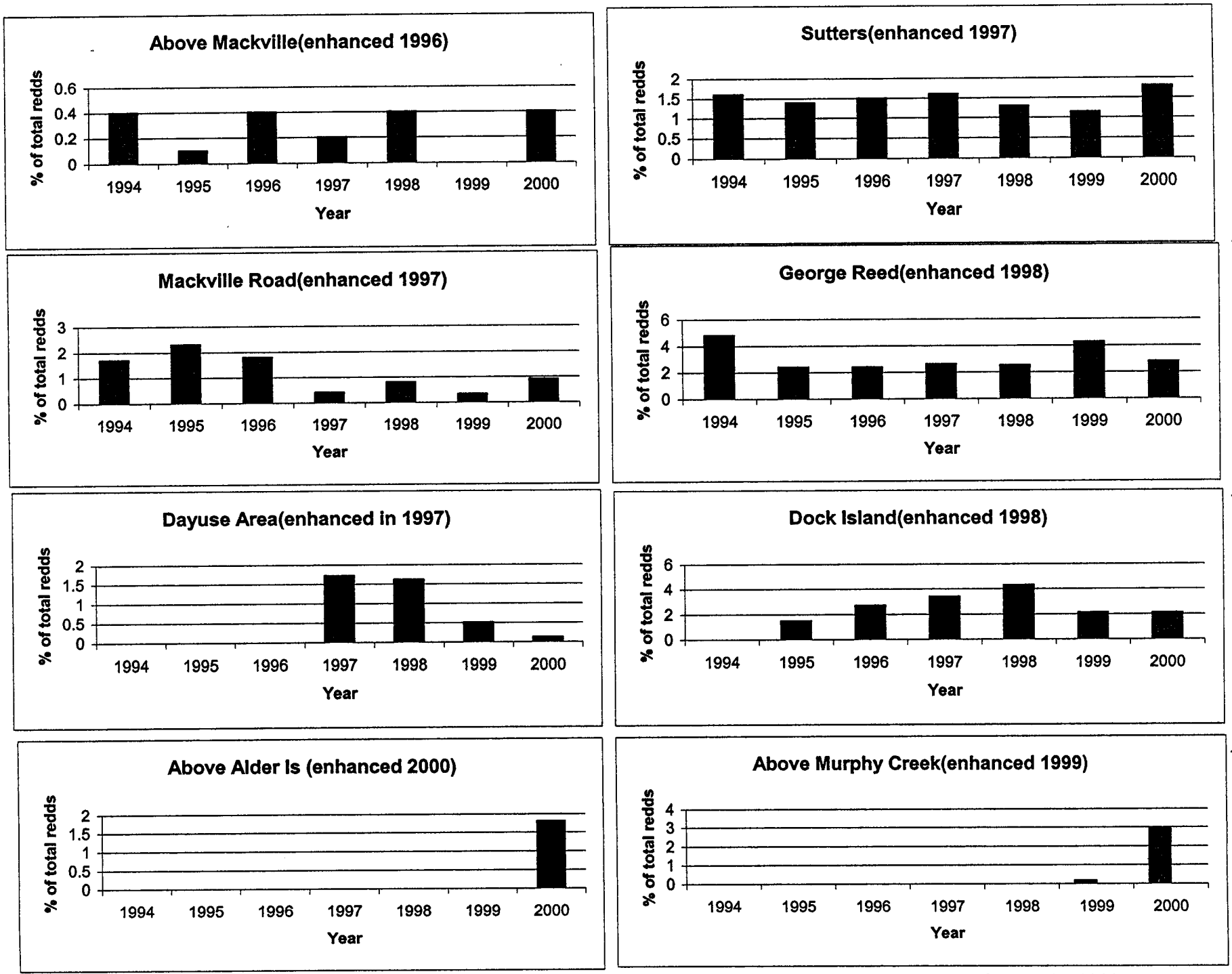

Figure 4. Percentage of total redds built in post-1995 gravel enhancement areas within the lower Mokelumne River from 1994-2000.

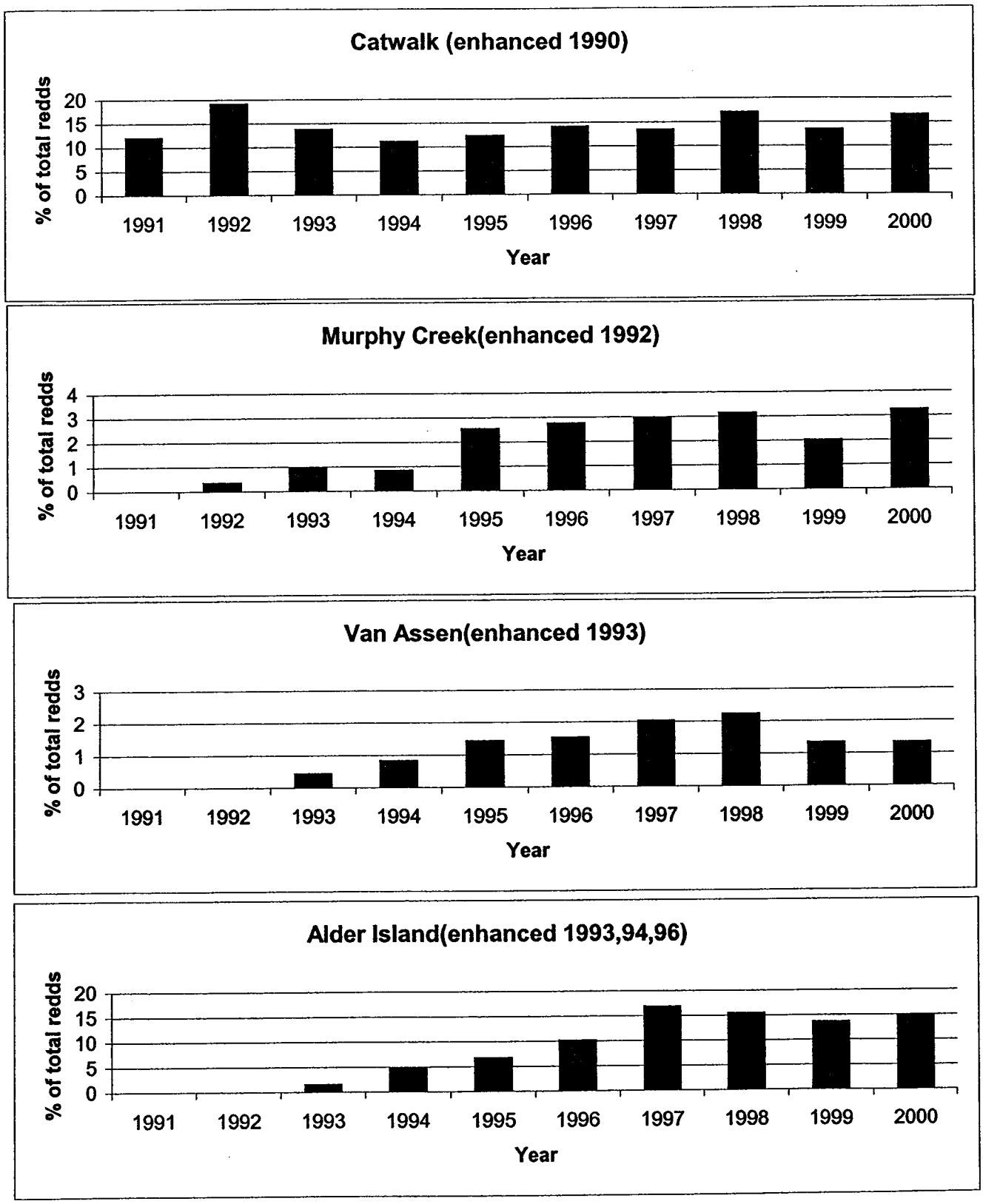

Figure 5. Percentage of total redds built in pre-1995 gravel enhancement areas within the lower Mokelumne River from 1991-2000.

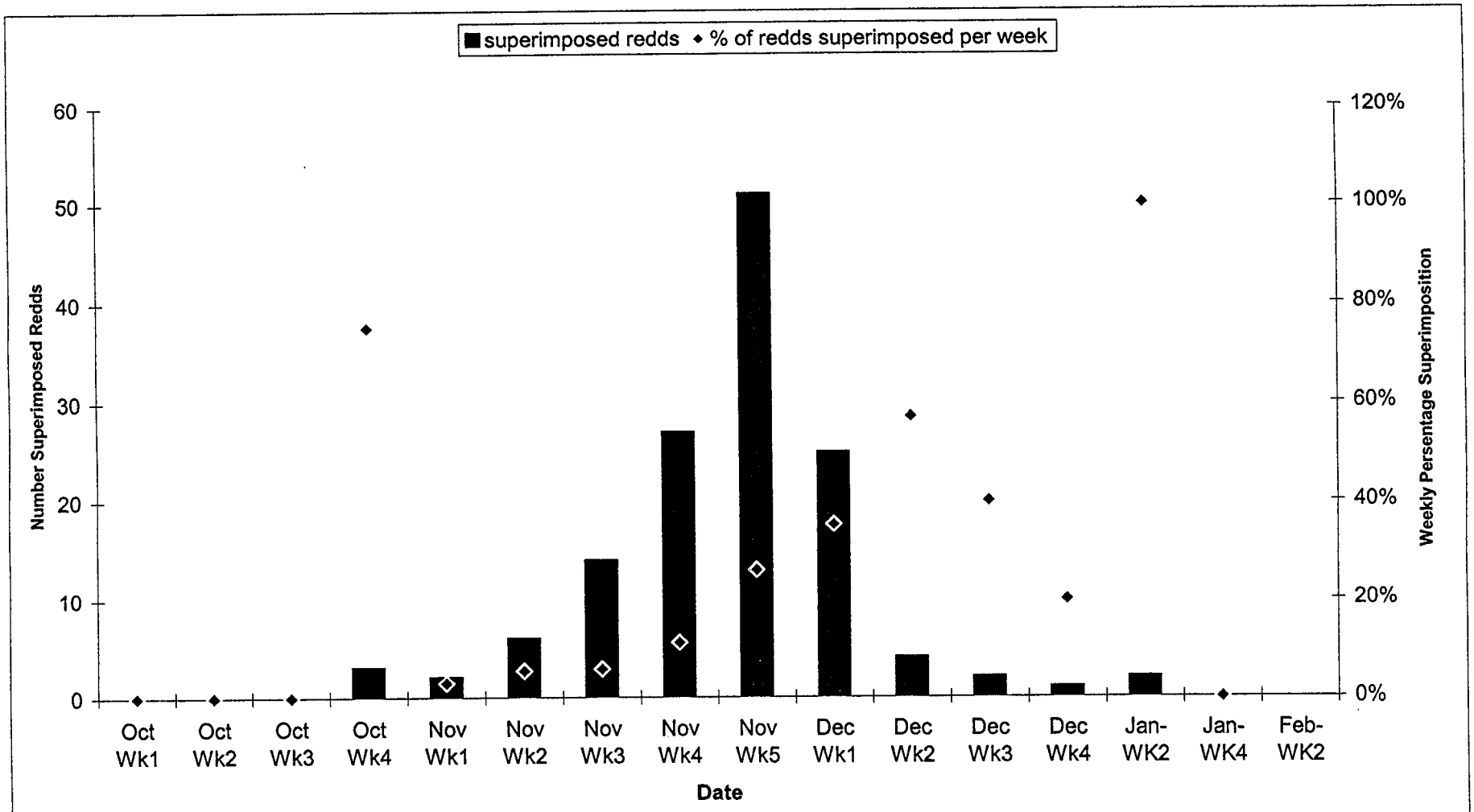

Figure 6. Weekly number and percentage of superimposed chinook salmon redds in the lower Mokelumne River, CA 2000-01.

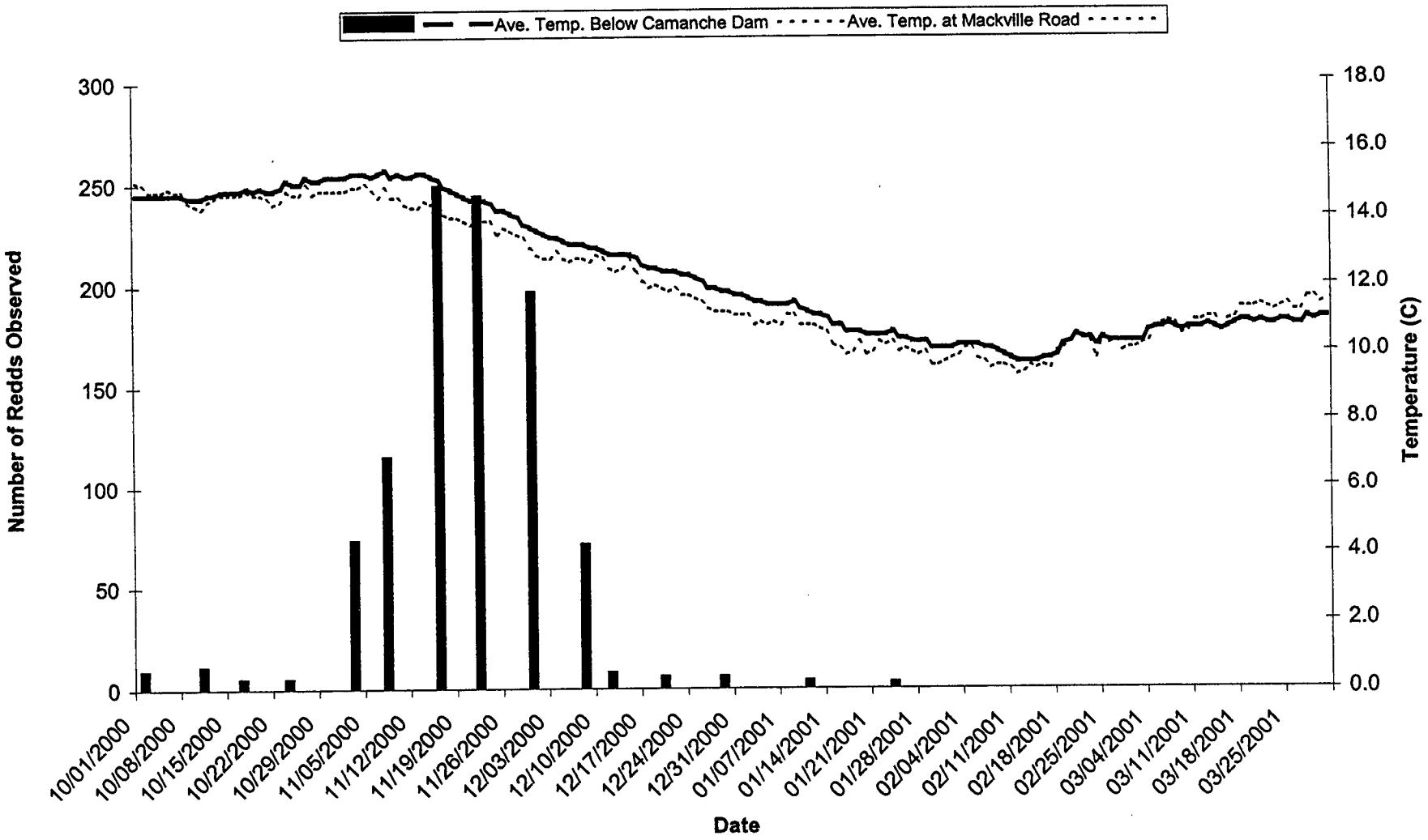

Figure 7. Water temperatures and weekly redd counts during 2000-01 chinook salmon spawning run Mokelumne River, CA.

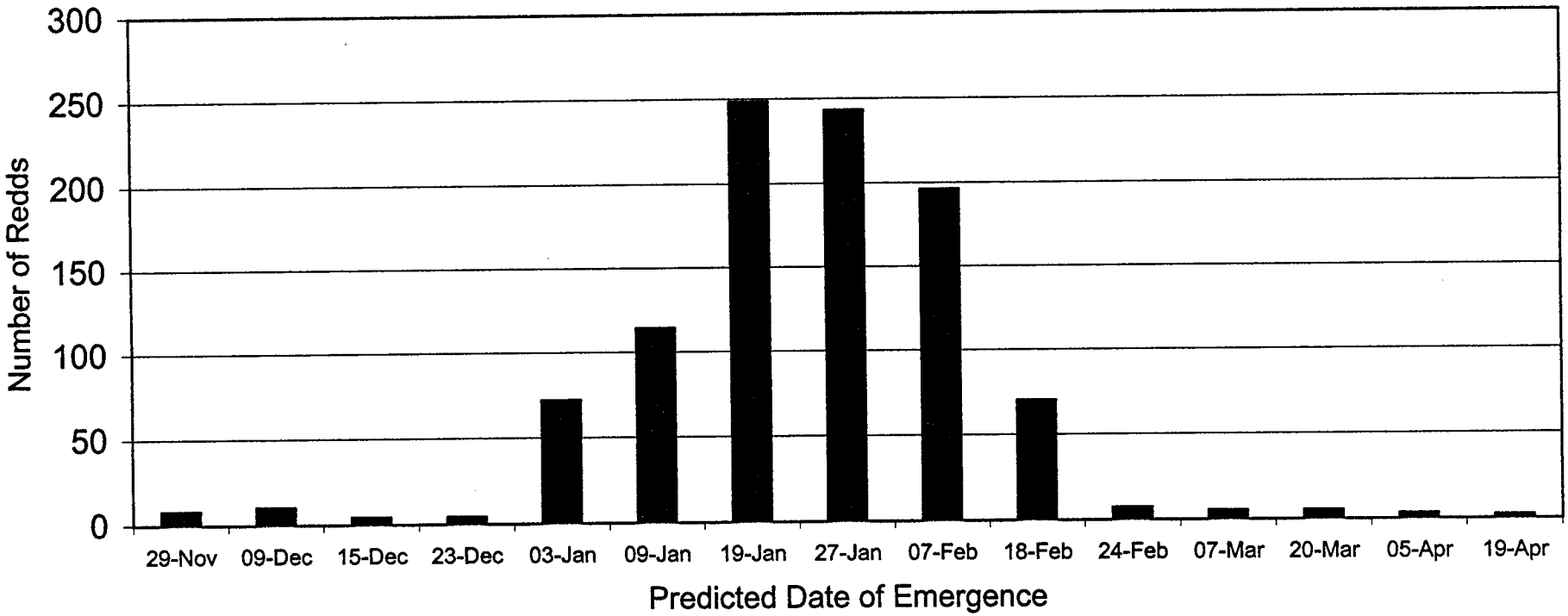

Figure 8. Predicted date of emergence from chinook salmon redds for the lower Mokelumne River, CA 2000-01.