

**June 30, 2002**

**Memo to:** Joe Miyamoto, Manager of Fisheries & Wildlife

**From:** Jose D. Setka, Fisheries Biologist II

**Subject:** Mokelumne River 2001-02 Spawning Survey

The following is a summary report describing the results of the 2001-02 salmonid spawning survey in the lower Mokelumne River (Figure 1). Complete descriptions of methodologies and background material are available in EBMUD spawning reports for 1993-1999. Weekly surveys were begun on October 16, 2001 and ended on March 20, 2002. A total of 16 surveys were conducted over a 24-week period. From the end of December to March 20, surveys were conducted every two weeks.

### **Escapement and Redd Numbers**

Based on counts at Woodbridge Irrigation Dam (WID), the 2001-02 Mokelumne River fall-run chinook salmon estimated escapement was 8,114 fish. Conditions during the monitoring season at WID did not allow for accurate sex ratios to be determined. The hatchery return for 2001-02 was 5,809 salmon. Of these 2,021 (35%) were male, 2,361 (41%) were female and 1,427 (24%) were grilse. The steelhead trout (>38cm) WID escapement estimate was 72 fish (36 female, 23 male, 13 unknown). Based on estimated escapement and hatchery returns, the estimated in-river chinook salmon spawning population was 2,305.

A total of 843 chinook salmon redds and 30 steelhead trout redds were observed during the survey period (Figure 2 and 3). Eighty percent of the chinook redds were constructed in Reach 6, while 20% were constructed in Reach 5. The first chinook redds were observed October 23, 2001, while the first steelhead redd was observed on January 22, 2002. All of the observed steelhead redds were constructed in Reach 6.

### **Enhancement Gravel Usage**

Since 1990 a total of 12 sites along the river have been enhanced through the addition of spawning gravel. Three hundred thirty-four (39.6% of total) chinook salmon redds were constructed in enhancement gravel areas (Figures 4 and 5) in 2001. Additionally, five (16.7% of total) steelhead redds were constructed in enhancement areas. Chinook salmon redd superimposition within enhancement areas numbered 46 or 13.7% of the total redds constructed in the sites. Redds were constructed in the 2001 enhancement site (Van Assen) less than 60 days post-project.

## **Superimposition**

During the 2001-02 spawning season a total of 92 (10.9% of total) chinook salmon redds were superimposed. During the peak of the run weekly superimposition levels were approximately 18% (Figure 6).

## **Environmental Data**

Water temperature below Camanche Dam during the period of October 1, 2001 to March 31, 2002 ranged from 9.3°C to 15.6°C (Figure 7). During the same time period the water temperature at Mackville Road ranged from 8.9°C to 15.7°C. The daily average Camanche release was 225cfs during the entire survey period.

## **Emergence Timeline**

Based on egg model data chinook salmon fry emergence was predicted to begin the week of December 27, 2001 and continue through April 12, 2002 (Figure 8). Peak chinook fry emergence was predicted to occur the week of February 6, 2002.

## **Discussion**

The 2001 estimated escapement number, redd count and hatchery return were very similar to 2000. Due to the monitoring problems encountered this year at WID, no accurate sex ratio is available to determine the in-river spawning composition. One difference between 2001 and recent years was the large amount of aquatic macrophytes growing on spawning areas, especially in the dayuse area. Figure 9 illustrates the potential impact the growth had on site specific available spawning habitat. Significant reductions in redd numbers between 2001 and 2000 were observed in the upper two spawning areas. Within the 1990 enhancement area (see Catwalk Figure 5) the number of redds dropped from 160 (16.3 % of total redds) in 2000 to 81 (9.6% of total redds) in 2001. The 1999 enhancement site dropped from 30 (3% of total redds) to 8 (<1% of total redds) (Figure 4). At both of the above mentioned sites it appeared that the aquatic vegetation had a direct effect on habitat suitability. The effects of the vegetation included velocity dissipation, matting over substrate and sedimentation associated with drops in velocity. While there was an observable increased trend in aquatic macrophyte throughout the approximately 10-mile spawning reach, the main apparent impact to spawning habitat and site selection was observed in the upper spawning sites.

The observed influence of the vegetation growth is another demonstration of the numerous variables associated with salmon spawning in natural systems. Past reports have illustrated the impacts of run composition, both male versus female percentage and grilse percentage, on spawning site selection. Relative comparisons between years have dubious significance.

In 2001 we had another opportunity to conduct extended spawning surveys for steelhead trout. A total of 30 steelhead redds were observed and all occurred in Reach 6. In two consecutive spawning seasons all but 1 steelhead redd were found in Reach 6.

Cc: J. Myers  
J. Smith  
R. Hartwell

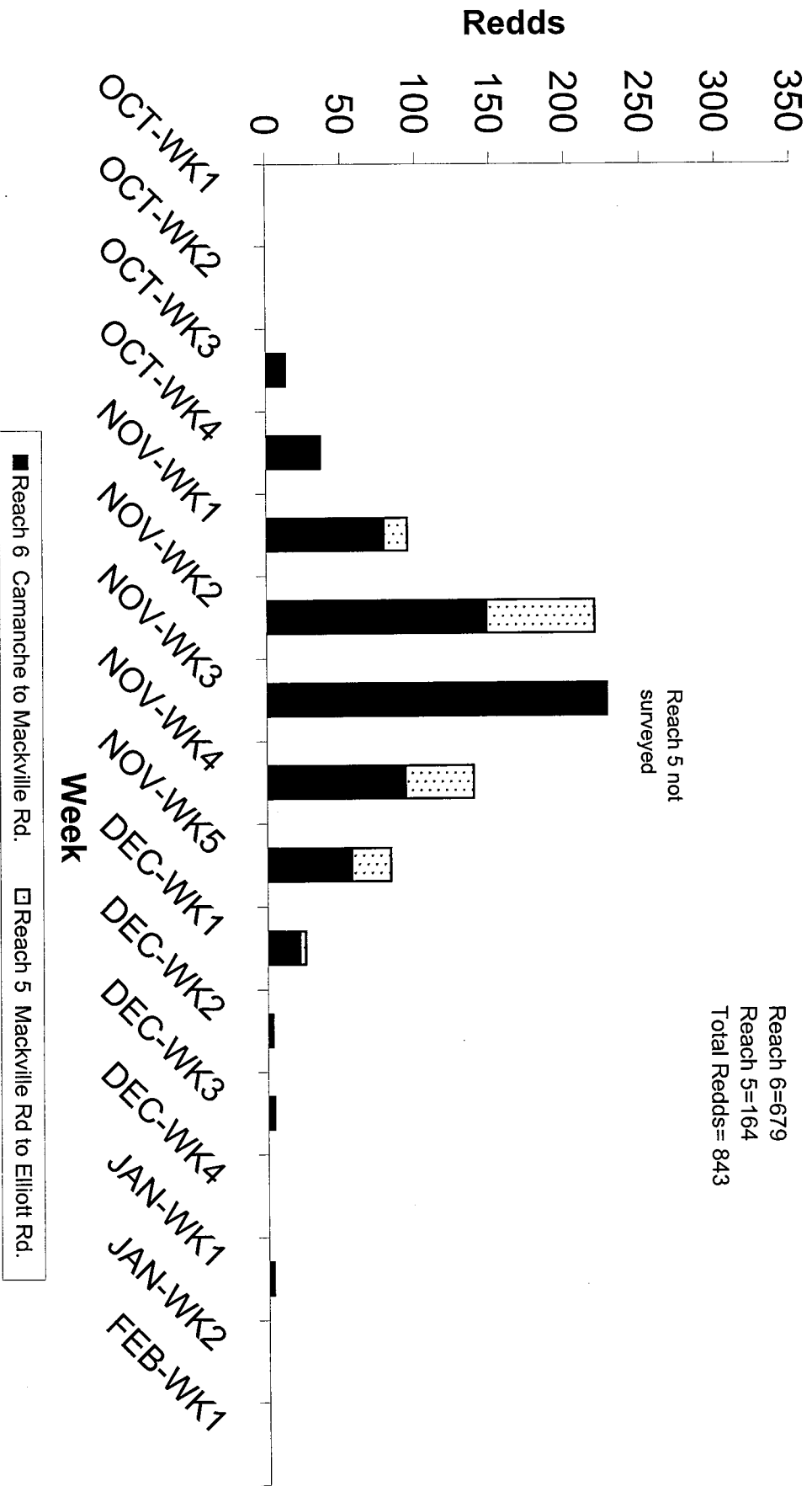


Figure 2. Fall-run chinook salmon redds observed during the 2001-02 survey in the lower Mokelumne River, CA.

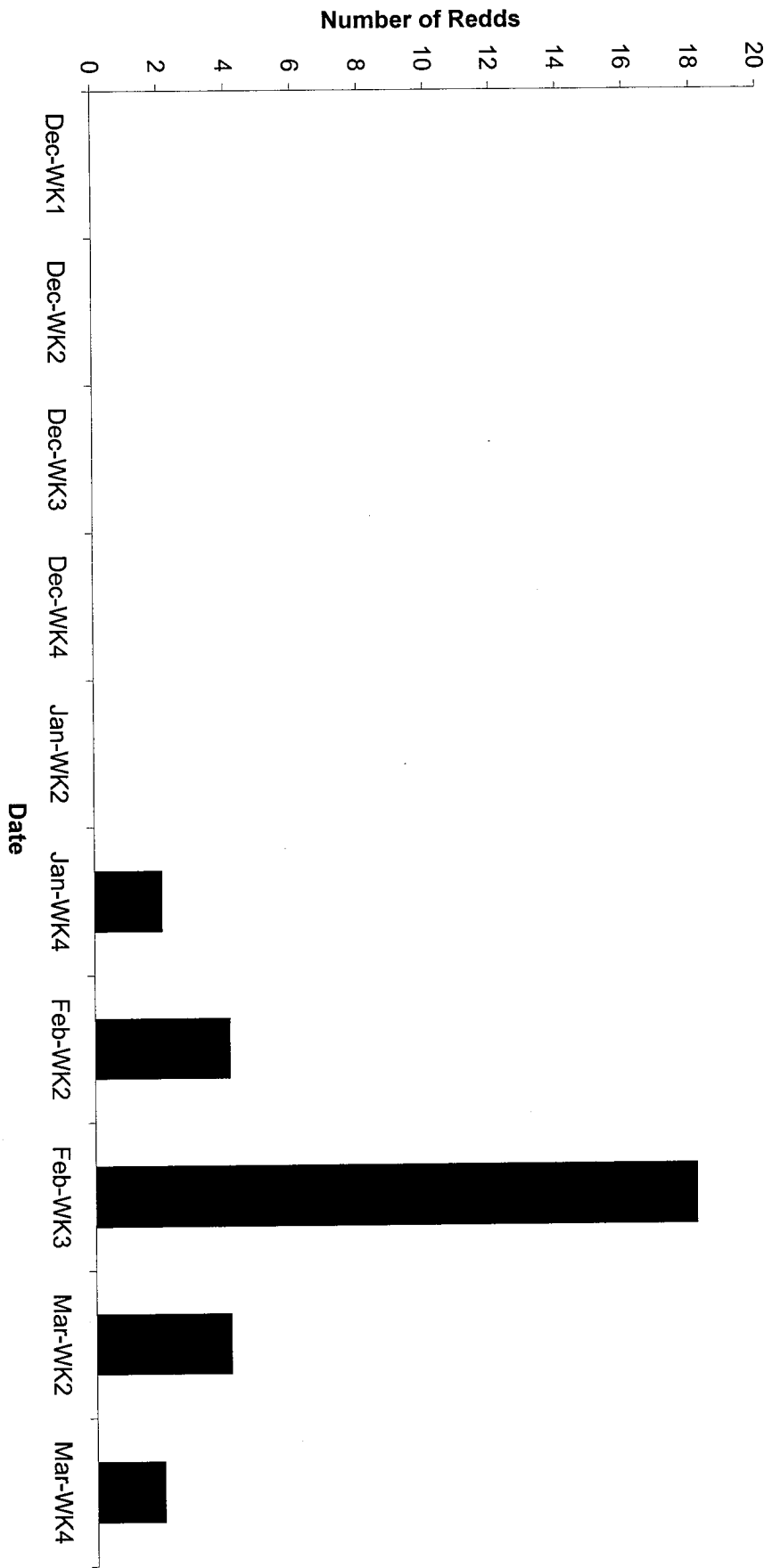


Figure 3. Steelhead trout redds observed per week in the lower Mokelumne River, CA during 2001-02 survey. All redds occurred in Reach 6.

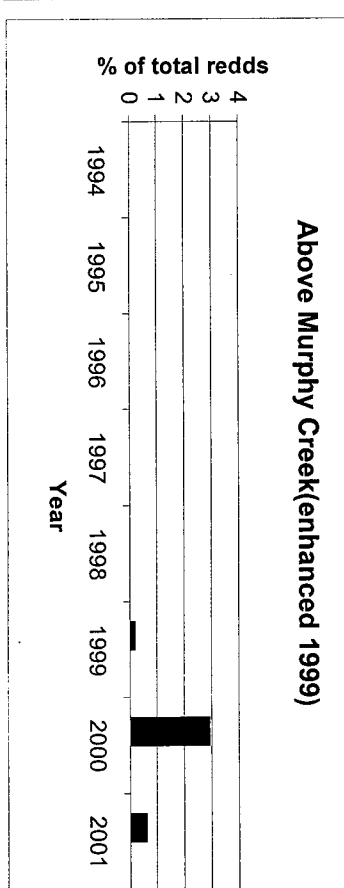
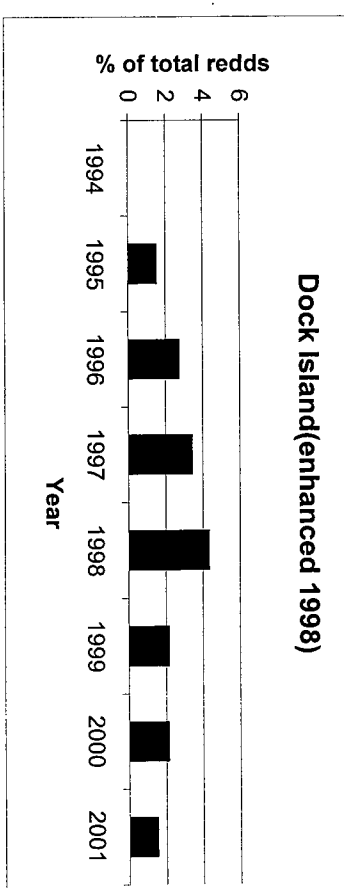
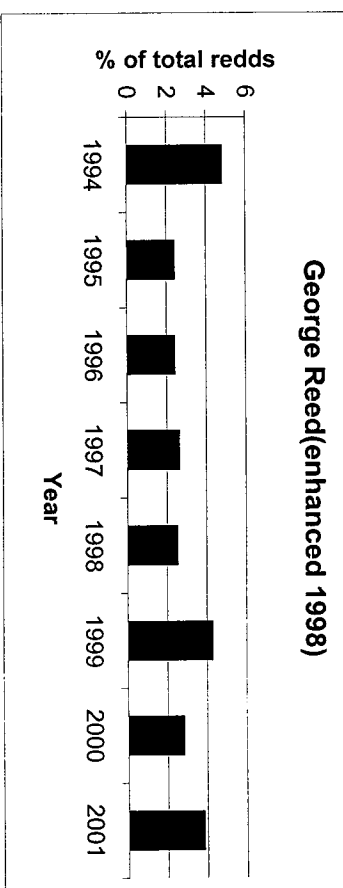
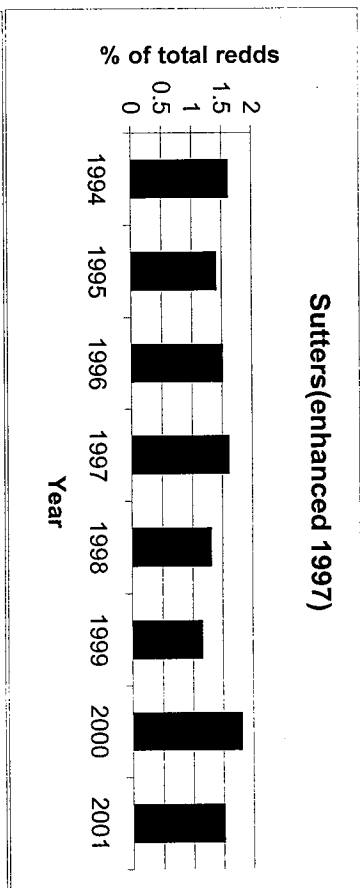
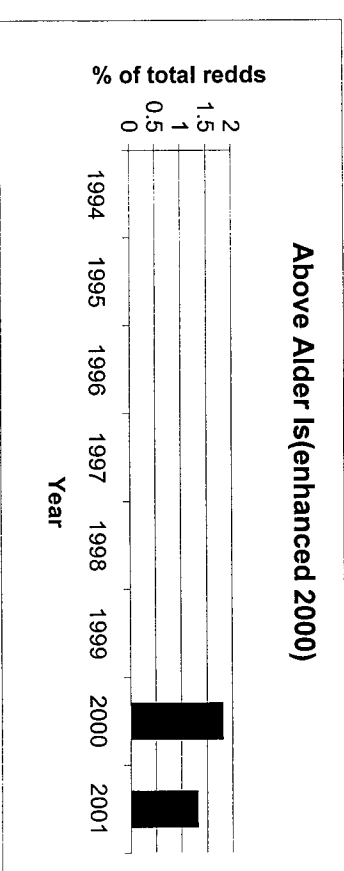
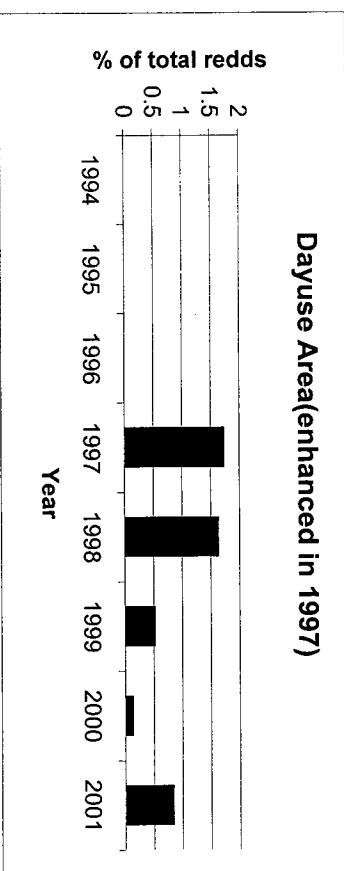
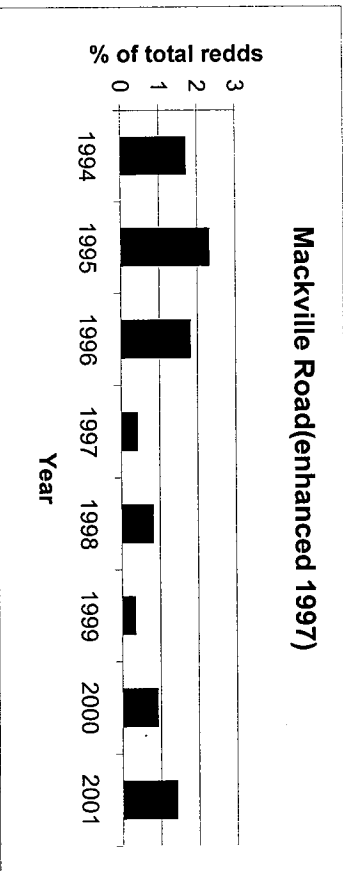
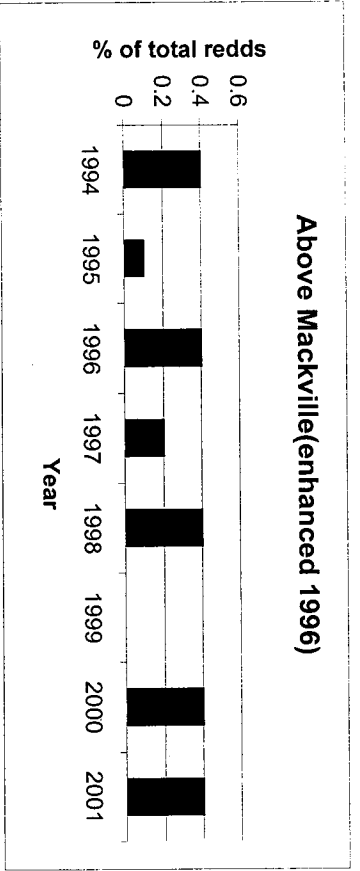


Figure 4. Percentage of total redds built in post-1995 gravel enhancement areas within the lower Mokelumne River from 1994-2001.

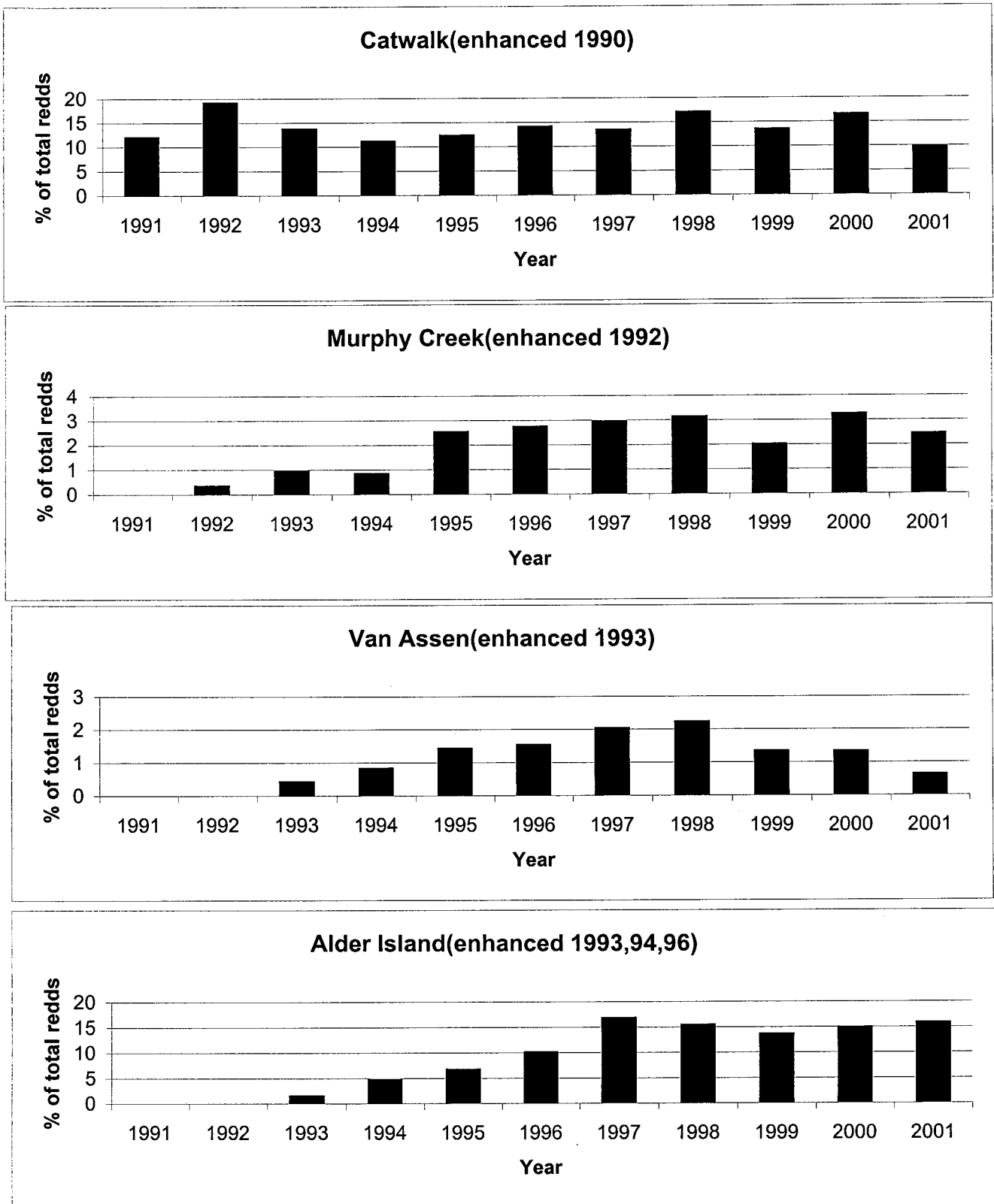


Figure 5. Percentage of total redds built in pre-1995 gravel enhancement areas within the lower Mokelumne River from 1991-2001.

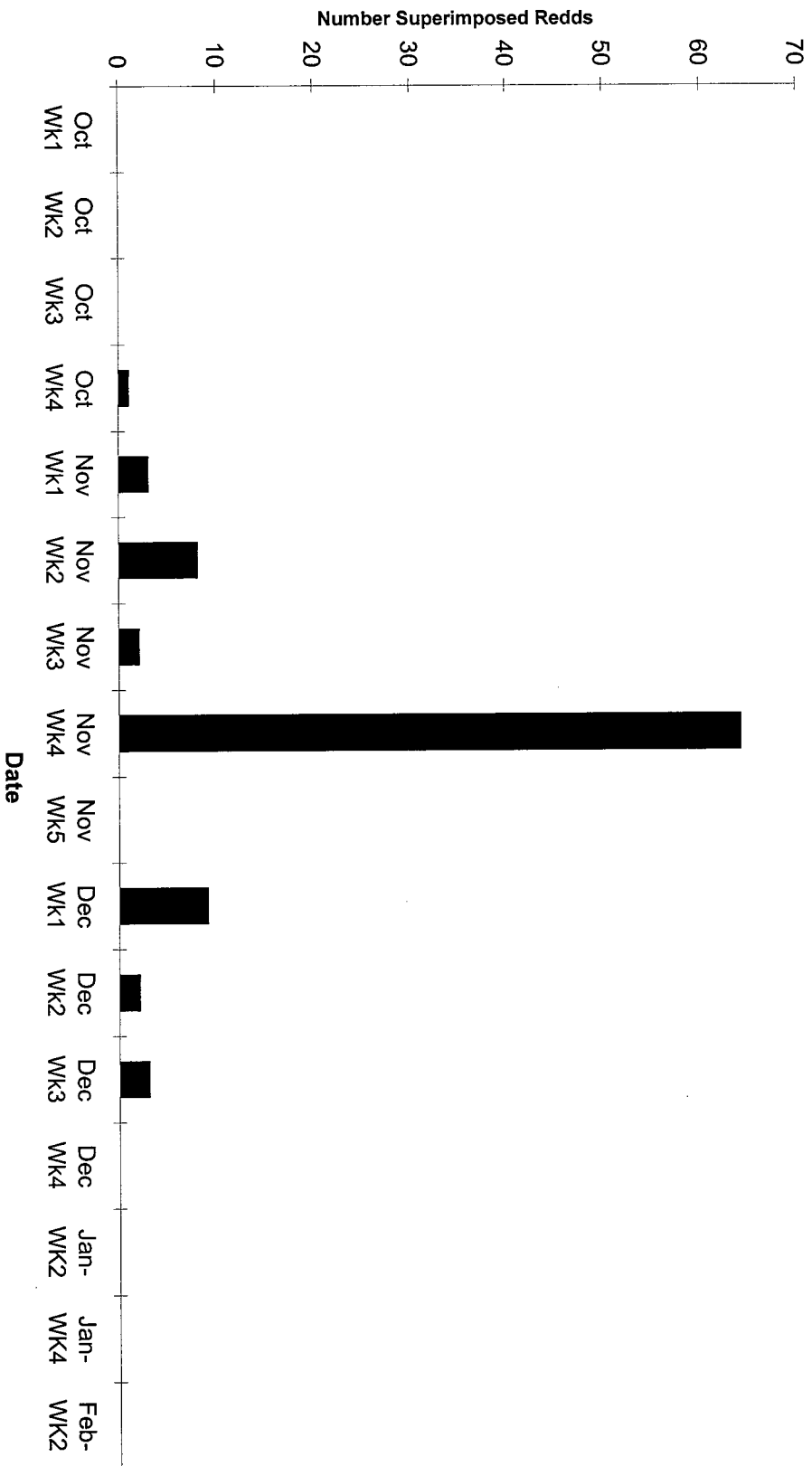


Figure 6. Weekly number and percentage of superimposed chinook salmon redds in the lower Mokelumne River, CA 2001-02.



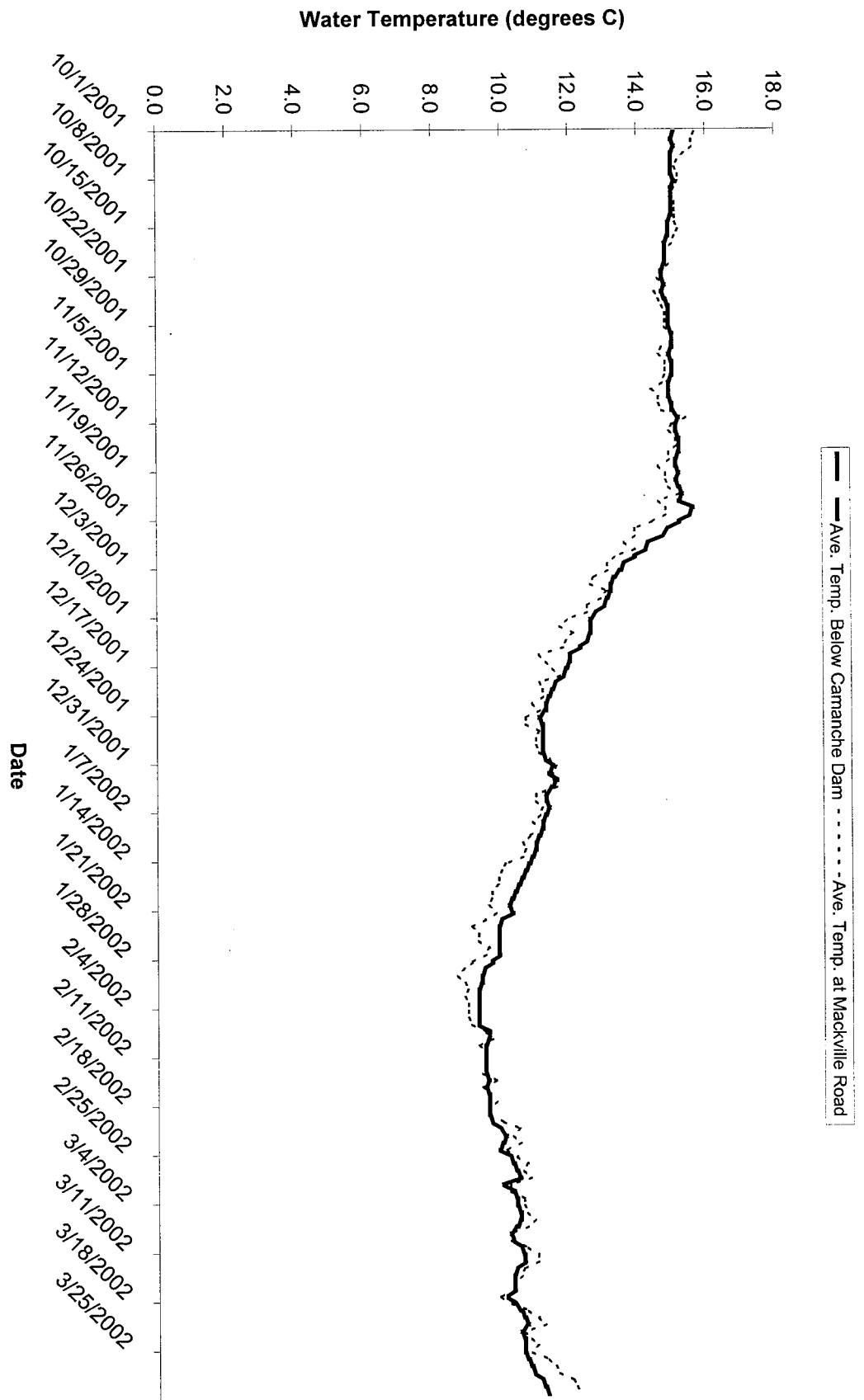


Figure 7. Water temperatures and weekly redd counts during 2001-02 chinook salmon spawning run Mokelumne River, CA.

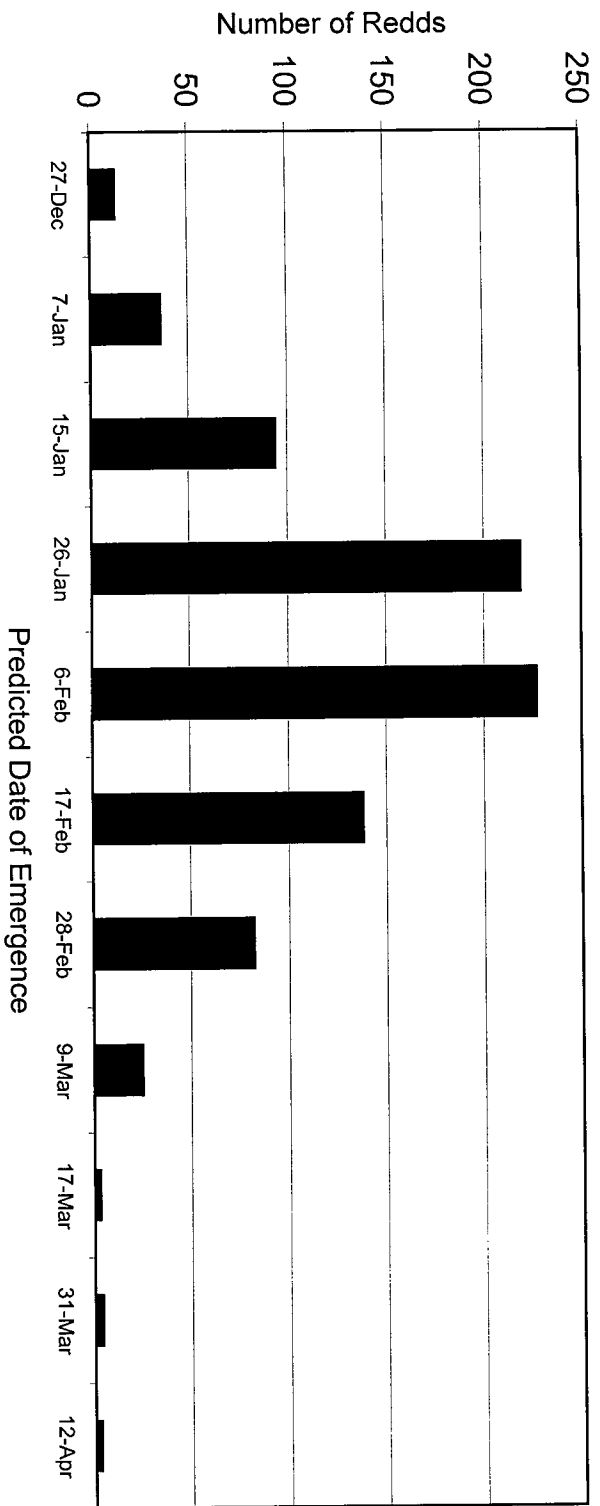


Figure 8. Predicted date of fry emergence from chinook salmon redds for the lower Mokelumne River, CA 2001-02.

