



# Southern California Steelhead Spawning Ecology in Two Dammed Rivers

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Matilija Dam in the Ventura River Watershed.

## 1. INTRODUCTION

Because steelhead (*Oncorhynchus mykiss*) in southern California experience variable and at times extreme environmental conditions, the species is expected to develop behavioral and ecological traits that are not typical of northern conspecifics. The spawning ecology of the species in southern California is poorly understood and not well described. Fundamental questions have not been adequately tested regarding the interaction between anadromous and resident life-history forms during the spawning season, the timing of arrival and subsequent spawning, the specific location and features of spawning areas, and the number of individuals that may comprise the annual spawning population.

## 2. METHODS

The National Marine Fisheries Service (NMFS) initiated the use of a standard protocol in 2009/2010 to study *O. mykiss* spawning ecology in southern California rivers. Surveys were conducted in Malibu Creek and Ventura River watersheds after the first measurable rainfall on December 19, 2009, through May 28, 2010. The number of spawning *O. mykiss* and nests (i.e., redds) were

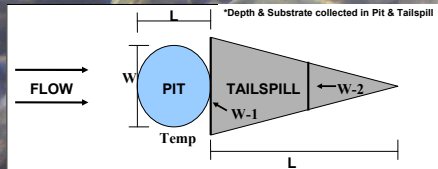


Figure 1. Redd area is calculated from length and width of pit & tailspill.

recorded in designated index stream reaches. All redds were photographed, measured (Figure 1), and georeferenced. We measured the dominant pit and tailspill substrate. Index reaches in the Ventura River (6.6-km, Figure 2) below Matilija Dam and all available spawning habitat in Malibu Creek downstream of Rindge Dam (4.8-km, Figure 5) were surveyed bi-monthly (pending river conditions). Redd age was estimated and monitored to determine redd life.

## 3. 2010 RESULTS

Watershed	Stream Reach	Reach Length (km)	Total Redd Count	Redd Density (redd/km)	Spawn Timing Range (mean date)	Pit / Tailspill Substrate (cm)	Redd Area m <sup>2</sup> Range (mean)
Malibu Creek	Lower Malibu	2.4	2	0.8	2/18 – 5/07 (3/29/10)	2.4 / 1.8	0.7 – 2.4 (1.5)
Malibu Creek	Upper Malibu	2.4	4	1.7	2/14 – 3/29 (3/13/10)	4.2 / 3.0	0.5 – 1.0 (0.7)
Malibu Creek	Combined	4.8	6	1.3	2/18 – 5/07 (3/18/10)	3.6 / 2.6	0.5 – 2.4 (1.0)
Ventura River	Lower Ventura	3.2	3	0.9	2/08 – 3/08 (2/17/10)	2.7 / 2.7	0.5 – 0.6 (0.6)
Ventura River	Upper Ventura	2.4	17	7.1	2/08 – 4/07 (3/07/10)	6.4 / 4.4	0.2 – 2.5 (0.9)
Ventura River	San Antonio Creek	0.8	18	22.5	1/25 – 3/21 (3/01/10)	3.8 / 3.0	0.4 – 0.9 (0.6)
Ventura River	Combined	6.4	38	5.9	1/25 – 4/07 (3/03/10)	5.1 / 3.7	0.2 – 2.5 (0.8)

### 3A. VENTURA RESULTS



Figure 2. Ventura River and San Antonio index survey reaches showing redd distribution & date observed.

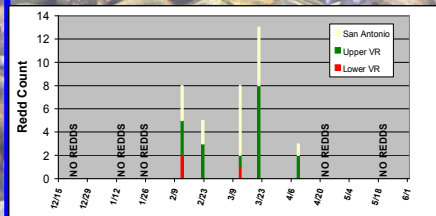


Figure 3. Ventura River and San Antonio Creek spawning activity.

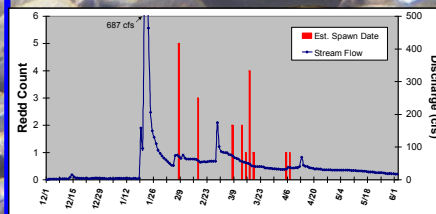


Figure 4. Ventura River spawn timing and discharge (36 – 68 cfs).

### 3B. MALIBU RESULTS

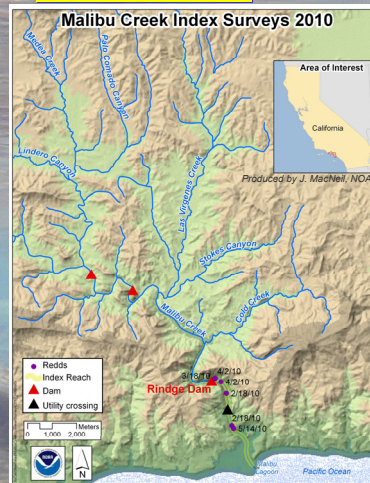


Figure 5. Malibu Creek watershed index survey reaches showing redd distribution & date observed.

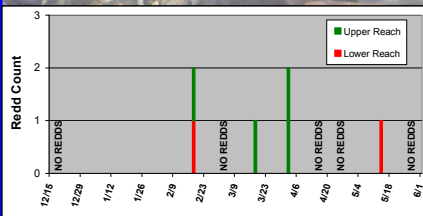


Figure 6. Malibu Creek spawning activity by survey reach.

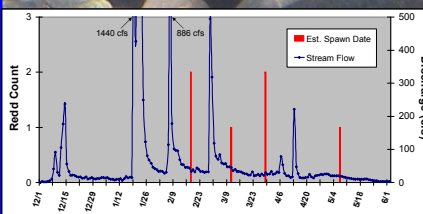


Figure 7. Malibu Creek spawn timing and discharge (18 – 39 cfs).



Rindge Dam on Malibu Creek.

## 4. CONCLUSIONS

- The findings from these early studies indicate that spawning is patchily distributed throughout both study watersheds.
- Timing of redd construction is related to periods of elevated streamflow, predominantly on the descending limb of the hydrograph.
- Redd size and direct observations of spawning *O. mykiss* suggest that anadromous and resident *O. mykiss* spawn concurrently in southern California.

## 5. FUTURE WORK

- Continue surveys in the study watersheds to extend the current understanding of steelhead spawning ecology at the southern geographic extent of the species' range.
- Conduct census population counts of returning spawners to the anadromous-accessible portion of the study watersheds to address variability between wet and dry years.
- Investigate spawning contribution of anadromous and resident forms in southern California DPS.



*O. mykiss* redd and carcass (50-cm) located in the Ventura River watershed.

## 6. ACKNOWLEDGEMENTS

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