

**Lower American River  
River Mile 1.8L Bank Protection Project**

**Monitoring Report – 2008 (Year 3)**

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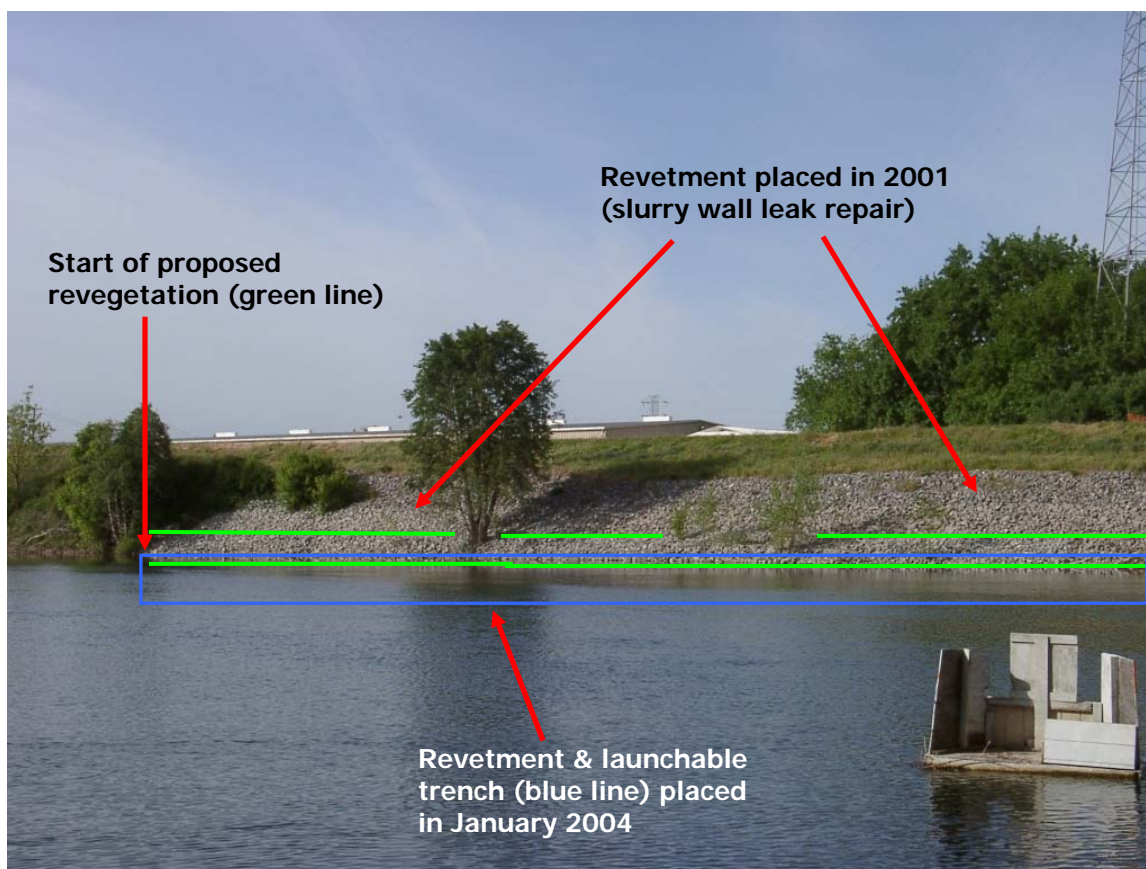
## Introduction

In December 2003 as part of a coordinated effort to obtain FEMA certification for the American River levee system, the Sacramento Area Flood Control Agency (SAFCA) undertook construction of the RM 1.8L Bank Protection Project. The purpose of the project was to protect the levee against toe erosion and subsequent levee failure due to high river velocities and sheer stress. Construction consisted of extending revetment from the 10 ft contour elevation to the river bottom and constructing a "launchable toe". A commitment was made to replant the site with native plants following heavy construction to reduce or eliminate construction-related effects and enhance environmental quality. The following narrative describes SAFCA's proposed re-vegetation plan for the site.

## Location and History

The project area is located along the waterside of the American River south levee (left bank) downstream of Highway 160, approximately 1.8 miles east (upstream) of the confluence of the American and Sacramento Rivers at River Mile 1.8L. This location is just downstream of Sacramento River Bank Protection Project (SRBPP) Site 1.

River mile 1.8L has experienced erosion over the years and has been treated with varying types of rubble revetment. Much of this rubble has slid into the channel and has now been removed and the levee covered with angular riprap (Figure 1).



**Figure 1 RM 1.8L - Existing conditions at upstream end of site**

In 2001, the levee was rebuilt and revetted by the Corps of Engineers following a hydraulic fracture of the levee during construction of the American River Common Features slurry wall improvement project. The original mature riparian vegetation along this reach was removed during the levee reconstruction work. Vegetation within the area is now limited to the sparse riparian vegetation that was not removed during construction or has re-established itself following the Corps' repair work.

## Revegetation Plan Description

The revegetation area is roughly 750 feet in length and approximately 50 feet in width, covering less than an acre of levee surface, berm and channel bottom. The revegetation is consistent with the requirements of California Code of regulations Title 23 Waters Division 1, Reclamation Board and includes most of the species planted by the Corps at SRBPP Site 1.

The revegetation design consists of two rows of woody vegetation along the bottom one third of the revetment site. The rows were planted 16 feet apart and trees were spaced at 12 ft centers. Scattered shrubs were planted in between the parallel rows (Figure 2) in addition to a band of herbaceous plants at the waterline. Vegetation has been and will continue to be intensively irrigated with an above ground irrigation system, which is installed at the beginning of the growing season (April) and then removed prior to the onset of the flood season (end of October). Intensive weeding and irrigation will be conducted for a three-year establishment period. A summary of the revegetation plan including cross sectional drawings and the proposed planting palette is attached as Exhibit A.

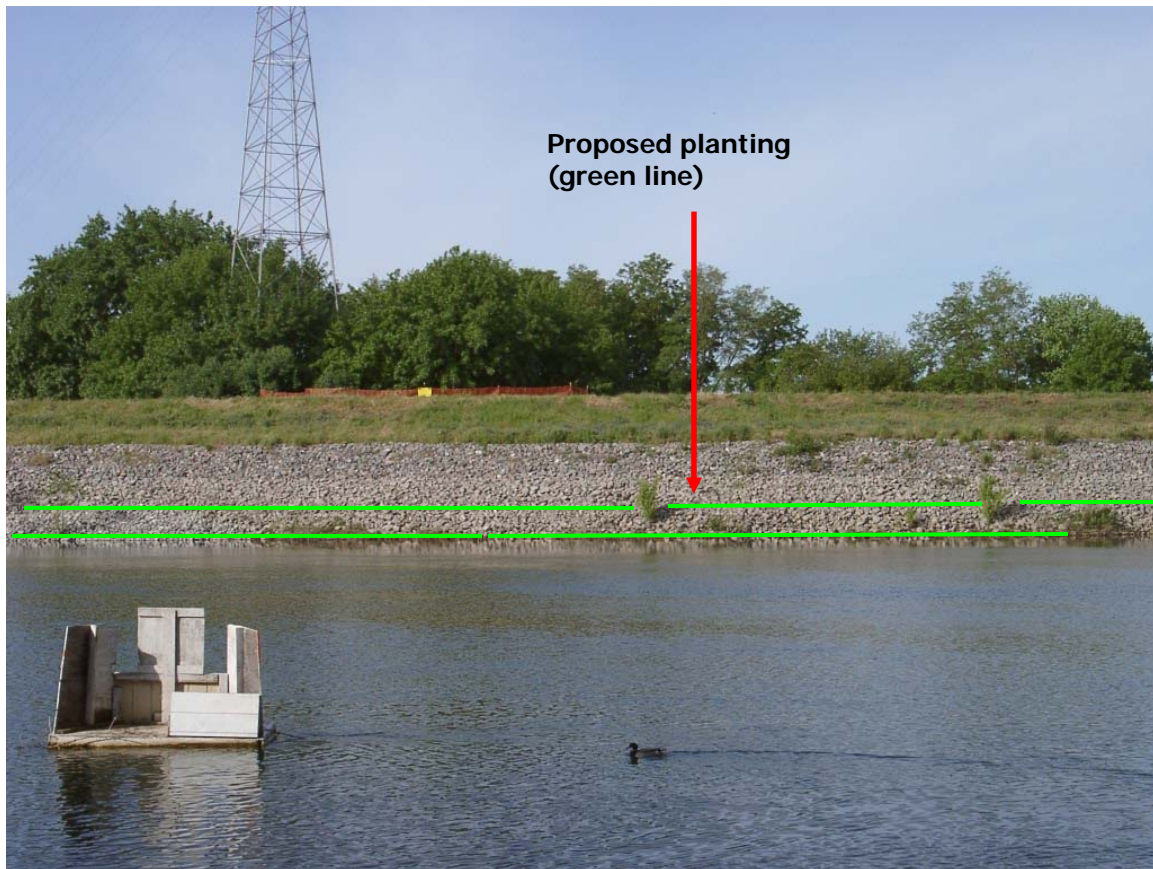
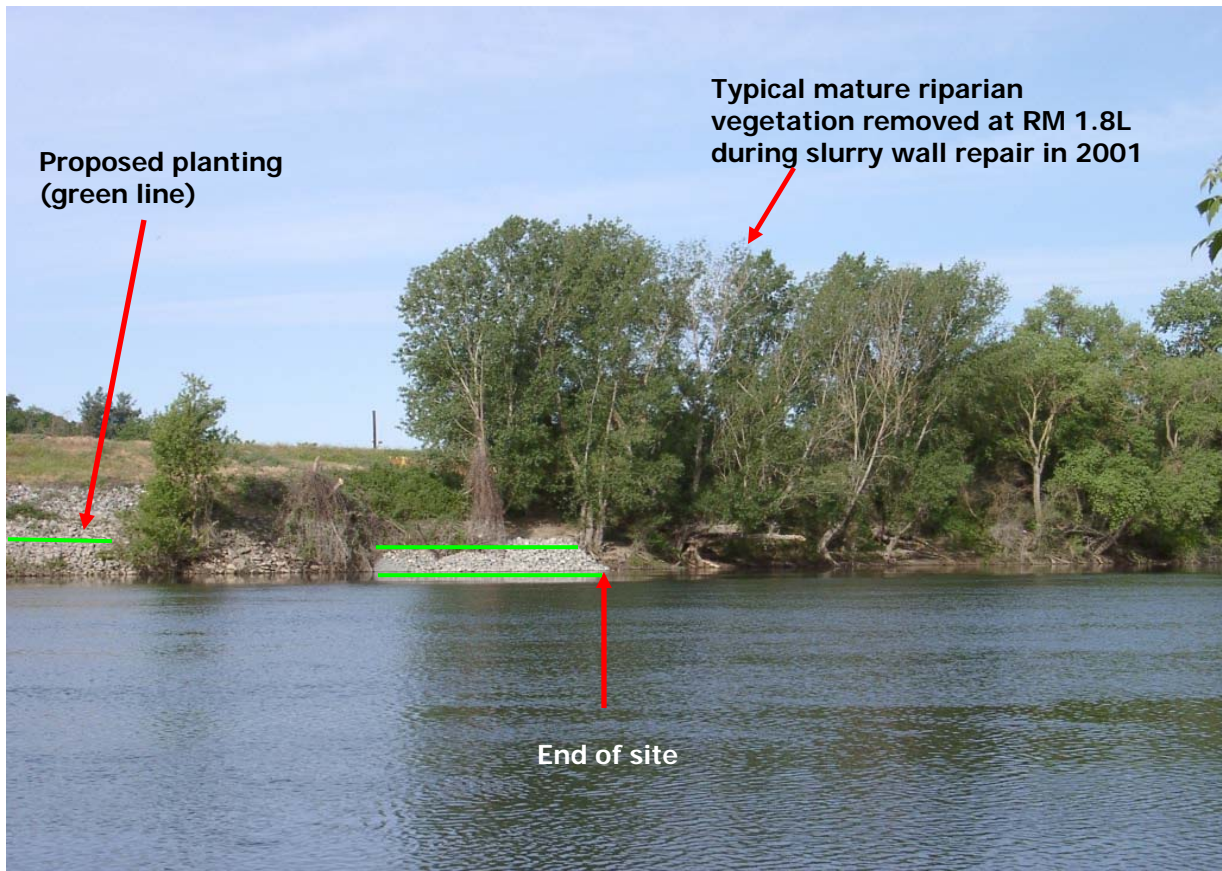


Figure 2 RM 1.8L – existing conditions at mid section of site



**Figure 3 Mature riparian SRA – existing conditions at downstream end of site**

## Hydraulic Impacts of the Revegetation Plan

A detailed hydraulic analysis of the revegetation plan has not been conducted. Prior to the levee fracture and subsequent reconstruction of the levee, the site was heavily vegetated with trees and shrubs similar to the existing conditions at the downstream end of the site (Figure 3). SAFCA's revegetation plan replaced a portion of the vegetation that was previously present at the site. It was therefore assumed there would be no increase in water surface elevations, or change in velocity distribution, or magnitude as a result of implementing the revegetation plan.

## Performance Standards & Monitoring

SAFCA will maintain the vegetation for a three-year pre establishment period. This period will include regular intensive irrigation, noxious weed abatement and protection of plants from browse damage. The site will be adaptively managed for an additional two years following preestablishment for a total monitoring period of 5 years. Annual monitoring will occur through the preestablishment period (years 1-3) and the post establishment period (years 4-5) to measure success criteria as follows:

Years 1–2 = 80 % survival

Years 3–4 = 70 % survival

Year 5 = 60 % survival

Survival and individual tree/shrub counts will be conducted, in addition to a 25% sampling of tree height measurements across the site, to be used as a surrogate to measure plant vigor. No tree height targets have been established. Annual monitoring reports outlining successes and failures will be submitted to CDFG, the State Reclamation Board and the USFWS for their review and records. Success criteria not met will be followed up with a replanting effort the following winter/spring season.

## Results & Discussion

The initial planting for this site began in November 2004 and continued into the first part of 2005. The results of the 2008 (Year 3) survey indicate that the survival rate is 86% (Table 1); meeting Year 3 survival goals. The increase from the 2007 survival rate of 49% is largely attributable to both natural regeneration and new plantings installed in the fall of 2007. The average height of approximately 20% of the living trees is 13.4 feet (n=25) with a range of two (2) to 40 feet. The following species were not planted but have volunteered at the site: Arroyo Willow, Walnut (*Juglans*), Valley Oak, Interior Live Oak, Fremont Cottonwood and Sycamore.

**Table 1 - Number of surviving plants by species**

Species	Growth Form	No. Planted	2007 Living Plant Count	2008 Living Plant Count
Arroyo Willow	Tree		15	19
Box Elder	Tree	40	40	60
Fremont Cottonwood	Tree		7	26
Goodding's Willow	Tree	15	0	1
Interior Live Oak	Tree		1	1
Sycamore	Tree		3	2
Valley Oak	Tree		1	1
Walnut - <i>Juglans</i>	Tree		1	1
White Alder	Tree	36	7	8
Blue Elderberry	Shrub		2	3
Sandbar Willow	Shrub	31	0	24
Wild Rose	Shrub	60	13	11
<b>TOTAL</b>		<b>182</b>	<b>90</b>	<b>157</b>
<b>Total Percent Survival</b>			<b>49%</b>	<b>86%</b>

This site has been challenging since the initial planting period in the winter 2004/2005. There is riprap up to four (4) feet deep that presents challenges with trying to revegetate the site. For example, roots of the selected species above need to penetrate soil for protection, nutrients and water. While the plants have struggled to survive, those planted at a lower elevation are healthier and larger than those planted at higher elevations. This could be attributed to soil and nutrient inundation from high water levels occurring more frequently at lower elevations. Plants at these lower elevations may also be more readily accessing water from the river.

## Proposed Remedial Measures

Irrigation shall continue throughout 2009 or until the plants are self-sustaining. Due to the challenges associated with this site, irrigation may need to be extended for additional years. Invasive species and trash removal will continue throughout the post-establishment period (years 3-5). Any vegetation mortality below the established success criteria will be compensated for through revegetation efforts.

# Exhibit A

