

Lower American River River Mile 1.8L Bank Protection Project

4th Annual Report 2009



Prepared by:



**Sacramento
Area Flood
Control
Agency**

**Sacramento Area Flood Control Agency
1007 7th Street, 7th Floor
Sacramento, CA 95814
(916) 874-6451
Contact: Lizette Crosbie**

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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.

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. The project area is approximately 750 feet long and up to 30 feet wide, covering less than an acre of levee surface, berm and channel bottom.

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 majority of original mature riparian vegetation along this reach was removed during this 2001 levee reconstruction work.

In late 2003/early 2004, SAFCA added additional protection to the site by installing approximately 10,000 tons of riprap along 750 feet of the levee toe below the ordinary high water mark (Figure 1). Vegetation within the area was limited to the sparse riparian vegetation that was not removed during the 2001 construction or that re-established following the Corps' repair work.

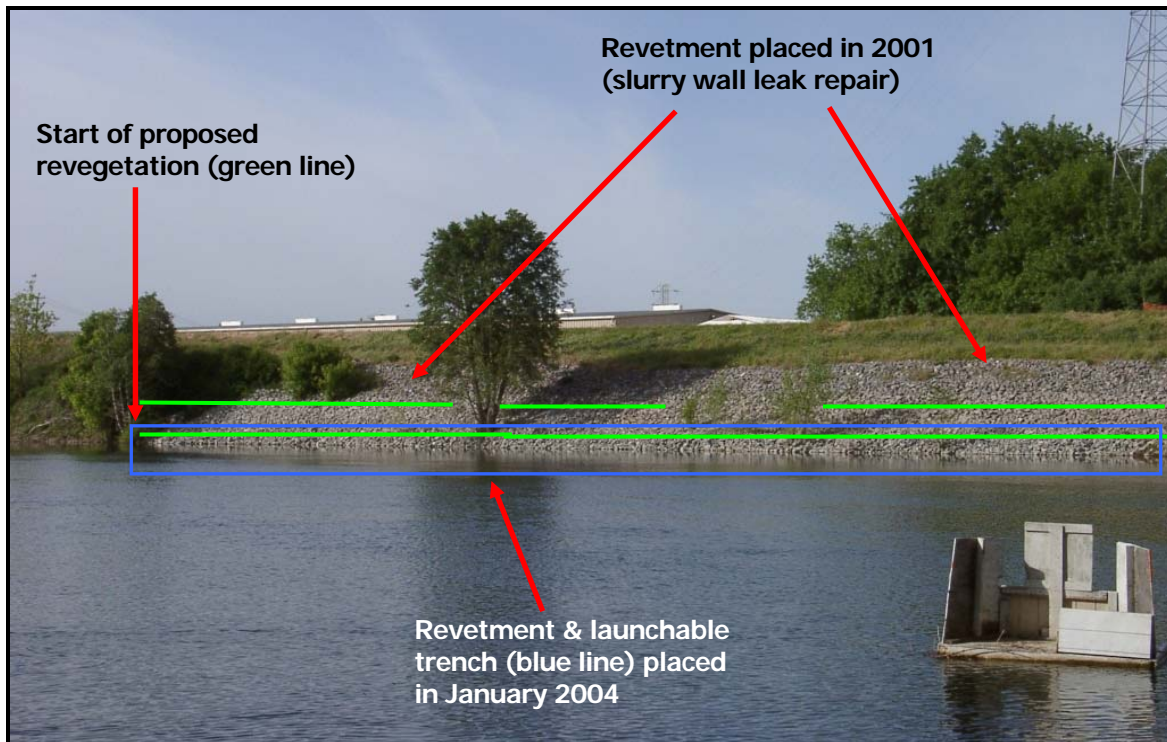


Figure 1 – Existing conditions at upstream end of site

Habitat Mitigation Requirements

Concurrences were received from the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NOAA Fisheries) that this project is not likely to adversely affect the federally threatened Valley Elderberry Longhorn Beetle and will avoid adverse effects to listed species, respectively. Per consultation with the USFWS (1-1-04-I-0360) and NOAA Fisheries (SWR-04-SA-9028:JCB), SAFCA committed to revegetating the site with native riparian species.

Reporting Requirements

Per consultation (200300723) with the U.S. Army Corps of Engineers (Corps), SAFCA is required to submit annual monitoring reports of the native riparian plantings by December 31st of each year for five years or until vegetation survival is deemed successful by the Corps or USFWS.

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 and berm. 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 consisted of two rows of woody vegetation along the bottom one third of the revetment site. The initial planting for this site began in November 2004 and continued into the first part of 2005. 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 irrigated with an above ground irrigation system. Intensive weeding and irrigation was conducted for the three-year establishment period and irrigation was reduced to once per week in 2009. A summary of the revegetation plan including cross sectional drawings and the planting palette is attached as Exhibit A.

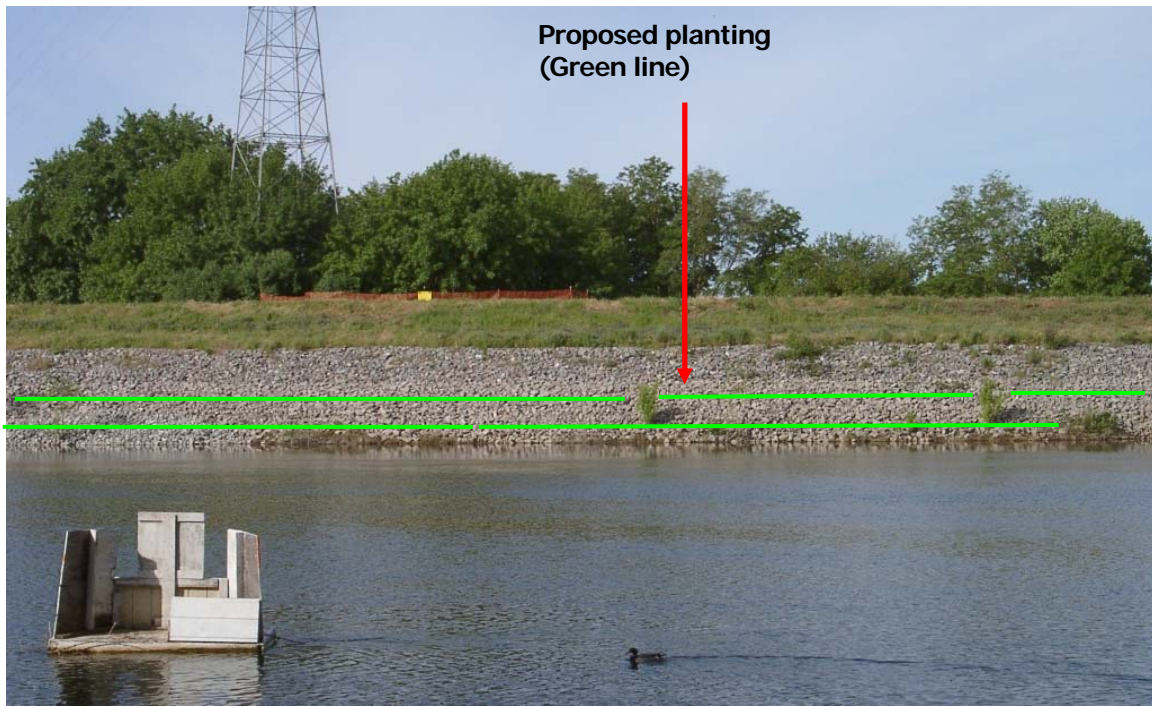


Figure 2 – Pre-project conditions at mid section of RM 1.8L.

Hydraulic Impacts of the Revegetation Plan

Prior to the levee fracture and subsequent reconstruction of the levee in 2001, 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 present at the site prior to 2001. 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 and a hydraulic analysis was not conducted.

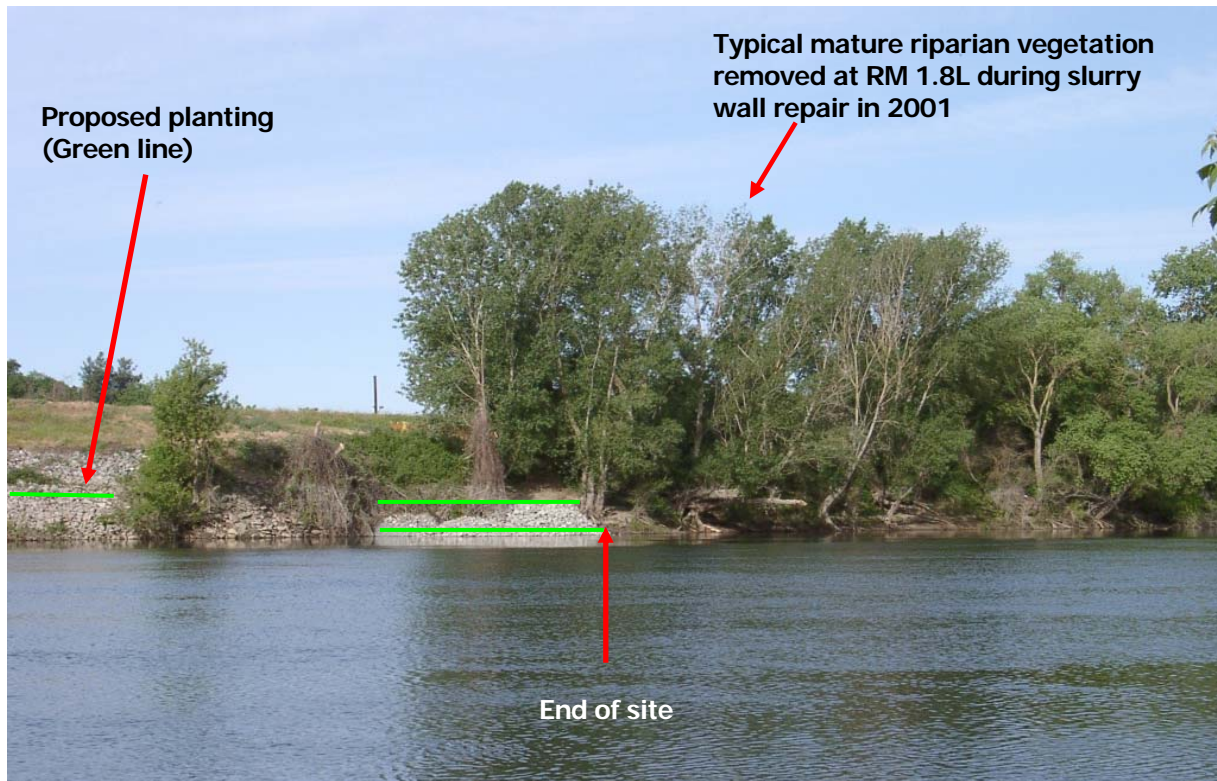


Figure 3 – Mature riparian SRA – existing conditions at downstream end of RM 1.8L.

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 pre-establishment for a total monitoring period of 5 years. Annual monitoring will occur through the pre-establishment 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

The annual monitoring will include a complete count of the trees and shrubs to track the sites performance toward meeting the success criterion. In 2007-2009, height measurements were recorded for a random sampling of 20%¹ of the trees and shrubs and the data was used as a surrogate to measure plant vigor. However, the random sampling method for measuring tree height precludes annual comparisons of growth and is not a good method for determining the average health/growth of plants at this site. Beginning in 2010 a random sampling of height will no longer be conducted. Instead each plant that is counted will receive a vigor rating based on a qualitative assessment of health (poor=1, fair=2, or good=3). The health assessment will be based on the general appearance of the entire tree or shrub and will take into account the amount of yellowing leaves present and any obvious signs of disease on the leaves, stems or trunk; these assessments will be tempered by the observed condition of the same species elsewhere along the river at the time of the survey. Additionally, at least two photopoints will be established that will help track the changes at the site overtime and provide evidence of the site condition. If the success criterion is not met, a replanting effort will occur the following winter/spring season and supplemented irrigation will occur.

¹ In 2007 approximately 25% of the trees and shrubs were sampled.

Results & Discussion

The results of the 2009 (Year 4) survey indicate that the survival rate is 84% (Table 1); exceeding survival goals of 70% for years 3-4. The increase from the 2007 survival rate of 51% is largely attributable to both natural regeneration and new plantings installed in the fall of 2007². The following species were not planted but have volunteered at the site: Arroyo Willow, Walnut (*Juglans spp.*), Valley Oak, Interior Live Oak, Fremont Cottonwood and Sycamore.

Table 1 - Number of surviving plants by species

Species	# Planted	2007	2008	2009
Arroyo Willow		15	19	19
Box Elder ²	40	40	60	66
Fremont Cottonwood		7	22	25
Goodding's Willow	15	0	1	1
Interior Live Oak		1	1	0
Sycamore		3	2	3
Valley Oak		1	1	1
Walnut		1	1	2
White Alder	36	7	8	6
Blue Elderberry		4	3	3
Sandbar Willow ²	31	0	24	16
Wild Rose ²	60	13	11	11
Total	182	92	153	153
Total % Survival		51%	84%	84%

The average tree height is 11.5 feet and the average shrub height is 5.3 feet (Table 2). The variation in the average height from year to year is likely attributable to sampling error associated with the small random sample size. Other factors that also may be effecting the average height is the recruitment of volunteers, in seedling or small sapling stages, and beaver pruning activities on the unprotected trees at this site. All of the trees and shrubs at the site were observed to be in a healthy and vigorous growing state during the annual survey and appeared to be on their way to establishment.

Table 2 - Average height a random sample 20% of trees and shrubs

Species	2007 ¹	2008	2009
Arroyo Willow	16.0 (n=5)	16.0 (n=5)	10.5 (n=2)
Box Elder	8.8 (n=5)	11.2 (n=11)	9.0 (n=10)
Fremont Cottonwood	21.6 (n=5)	32.0 (n=2)	11.3 (n=4)
Interior Live Oak	--	4.0 (n=1)	--
Sycamore	--	12.0 (n=2)	20.0 (n=1)
Valley Oak	13.0 (n=1)	12.0 (n=2)	17.0 (n=1)
White Alder	17.0 (n=4)	8.5 (n=2)	16.0 (n=3)
Tree Averages	15.7 (n=20)	13.4 (n=25)	11.5 (n=21)
Blue Elderberry	7 (n=1)	11.0 (n=1)	--
Sandbar Willow	--	5.0 (n=5)	7.3 (n=4)
Wild Rose	8.3 (n=4)	5.0 (n=3)	2.7 (n=3)
Shrub Averages	8.0 (n=5)	5.0 (n=8)	5.3 (n=7)
Total Tree & Shrub Averages	14.1 (n=25)	11.4 (n=33)	9.9 (n=28)

² During fall 2007, an additional 50 sandbar willow cuttings, 25 box elders and 25 wild roses were planted

This site has been challenging since the initial planting period in the winter 2004/2005. This may be attributable to the lack of soil as well as the riprap that is up to four (4) feet deep. While the plants along the higher elevation are struggling to survive, the trees planted at a lower elevation are healthier and larger than those planted at the higher elevation. This could be attributed to soil and nutrient inundation from high water levels occurring more frequently at lower elevations and that plants at these lower elevations may also be more readily accessing water from the river.

Proposed Remedial Measures

RM 1.8L will continue to be managed, maintained and monitored by SAFCA through 2010 and maintenance activities will include reduced irrigation, invasive plant removal, trash pick-up, and fence and cage maintenance. SAFCA is on track to meet the 5th year success criterion of 60% survival and will seek concurrence from the Corps, USFWS and NOAA Fisheries when that obligation has been met at the end of 2010.

Exhibit A

