Shoreline Erosion Control Project
Funded by EPA NPS319 and US Fish and Wildlife Service Partners Project
2013-2015

Objective:
Correct erosion problems that have occurred on the East end of the marina through replanting of the area with native plants, and anchoring soil down through willow bundles.

Background:
The East shoreline of the marina has lost several feet of soil over the past 3 years due to several years of heavy rains, wave action, storm water coming from culverts which were aimed toward the shoreline, and loss of plants along the shoreline due to chemical weed control. The area is approximately 85 feet long, from the retaining wall and ending at the walnut tree along the shore (see Figure 1). Without a shoreline erosion control project, we believe that the fencing along Mission Rancheria is threatened. In addition, soils washing away during rains contribute to poorer water quality because of increased sedimentation to the lake, which will feed algae blooms in the summer.

Figure 1: Pre project condition of the shoreline along the East Wall in the marina

Figure 2: Area of Erosion Control Project (85 ft x 25 ft)

Figure 3:
Red – tule replanting 85 ft x 3 ft
Blue – willow bundles 85 ft x 14 ft
Yellow – Native plants 85 ft x 8 ft

Project Input:

EPA staff met twice with staff of the local Natural Resource Conservation Service (NRCS): Korinn Woodard and Kate O'Donnell of Lakeport NRCS and Jack Alderson of Colusa NRCS. On February 24, 2012, Korinn and Jack joined Sarah Ryan and John Gichuki to look at the extent of the erosion problem in the marina (See Figure 2). Their suggestion was to anchor down willow bundles (using willow branches from the berm) along the mid eroded area of the shoreline (see Figure 3), to break the impact of the waves, to hold soils that run down and to provide a location for saplings to be inserted in the spring.

Jack again joined us, along with Kate O'Donnell, on October 11, 2012, to further develop the project idea. With the lake levels low, we have the opportunity to revegetate the lower eroded area of the shoreline (see Figure 3) with tule plugs from offsite. Earlier tule replanting along the shoreline (conducted in 2010), resulted in successful regrowth of tules. We did a site visit to the berm and found that many willows were the right size for the project (over 6 feet tall and an inch in diameter.

With US Fish and Wildlife Partners' funds, the Tribe procured an ecologist to provide additional information on the type of vegetation to plant on the shoreline which included tules and wild rose (no live willows were planted due to cultural reasons), as well as native seed erosion mix.

Project Logistics:

This project is a task within the EPA NonPoint Source Grant 319 and US Fish and Wildlife Partners Project.

Task 4(a): Shoreline stability projects with National Resource Conservation Service (NRCS) based on recommendations from Shoreline Erosion Control Plan using bio-engineering techniques (will combine mechanical, Biological and Ecological concepts to prevent and or/stop shoreline erosion) to mitigate structural damage, degraded water quality and loss of property and habitat and improve habitat for fish and wildlife.

PHASE 1

Stabilizing bottom of eroding bank:

1. Removing tules with tubers at various locations around the lake using county YouTube tule replanting videos for training labor
2. Planting tules with tubers on shoreline 18 inches apart on the center

Stabilizing middle of eroding bank:

3. Measure out areas for replanting (EPA staff) and estimate total of bundles and placement
4. Cut and build willow bundles from berm willows (see Willow Bundling instructions Step 1 below)
5. Install willow bundles on shoreline
6. Planting willow cuttings or other appropriate plant in the spring, within the bundles (See Willow Bundling instructions Step 2 below)

PHASE 2

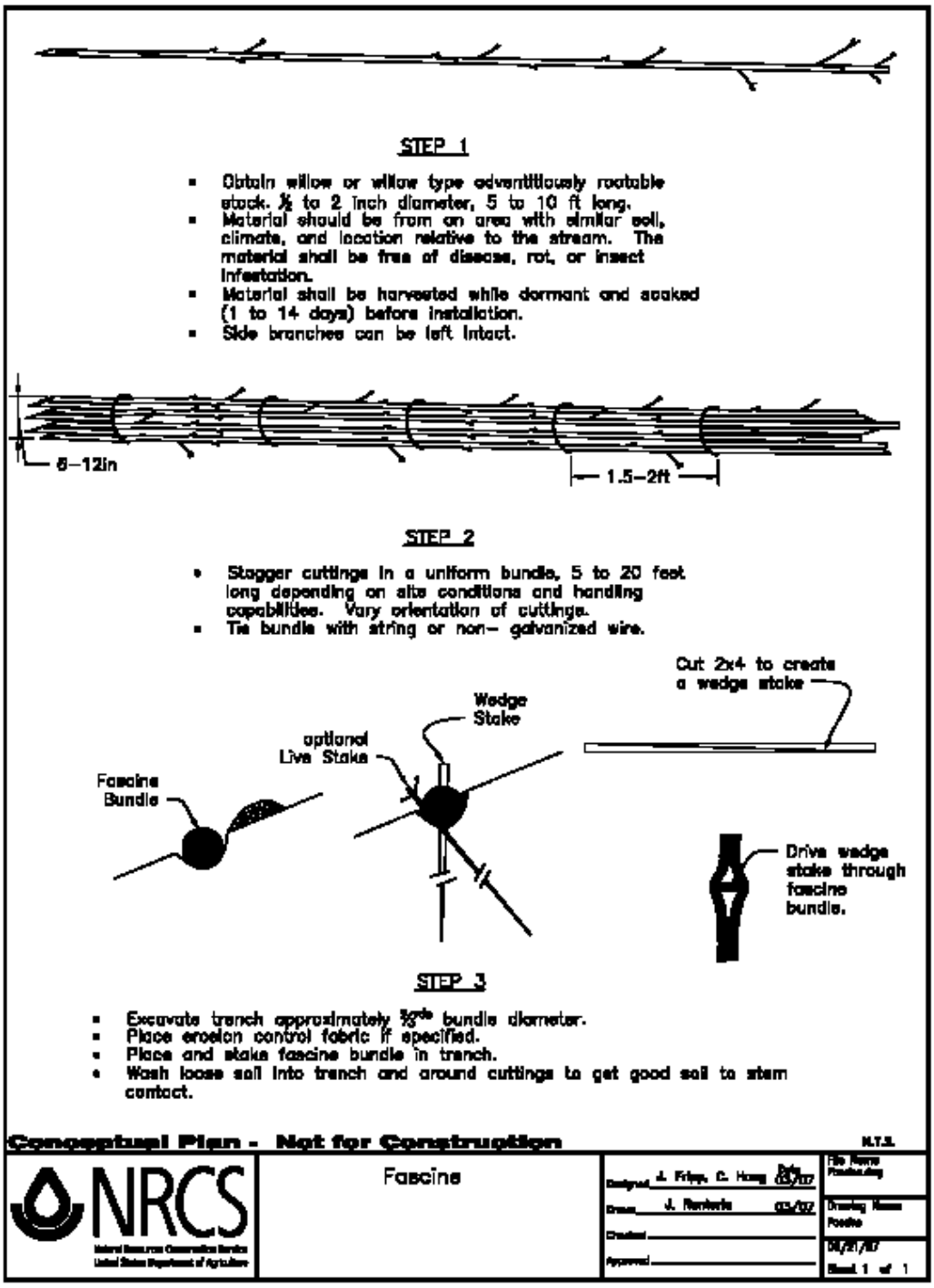
Stabilizing top of eroding bank:

1. Get cuttings from native plants – wild rose, sedge and seeds from creeping rye
2. Auger small holes to install cuttings along top of shoreline
3. Hook up hose from Tribal office, through culvert under street and drip hose along top of shoreline to water plants as needed. It is estimated it will take 2 years of watering during the summer to establish these plants

Expectations

The expectation is that each of the levels of the eroding bank will be stabilized within a few years by the series of plants and bundles that will be anchored as described above. Erosion by wave action should be reduced immediately by the bundles providing dense layer of material to act as a protective layer along the shoreline. The looks of the eroding shoreline will also be improved, with deliberate placing of plants and bundles. If desired, we can also place a semi permanent or permanent sign describing the project.

Willow bundling instructions (Steps 1 and 2)



PLANTING DETAILS

TULES (LOWER LEVEL)

Tule planting range 3-4 feet above water line to lake level. Tules should be planted 18 inches on the center. Tule replanting video must be watched first:

http://www.konoctitrails.com/clarks-island/tule-revegetation

Harvesting native tule plugs at a source area

Prepping tule plugs

Installing tule plugs at project site

WILLOW BUNDLES (MID LEVEL)

Harvesting willow for bundles. Willow is cut and stored for months to dry, ensuring no live sprouting, a requirement due to cultural considerations

Making willow bundles

Prepping project area, removing invasive aquatics near shoreline

Installing Willow bundles and local native dogwood stakes

NATIVE PLANTS (TOP LEVEL)

Wild rose planted in top level

Sedges installed

Installing irrigation

Native Erosion control Mix for project area

Installing straw over project area after all plantings

Project Area replanted and seeded with native erosion control mix and covered with straw

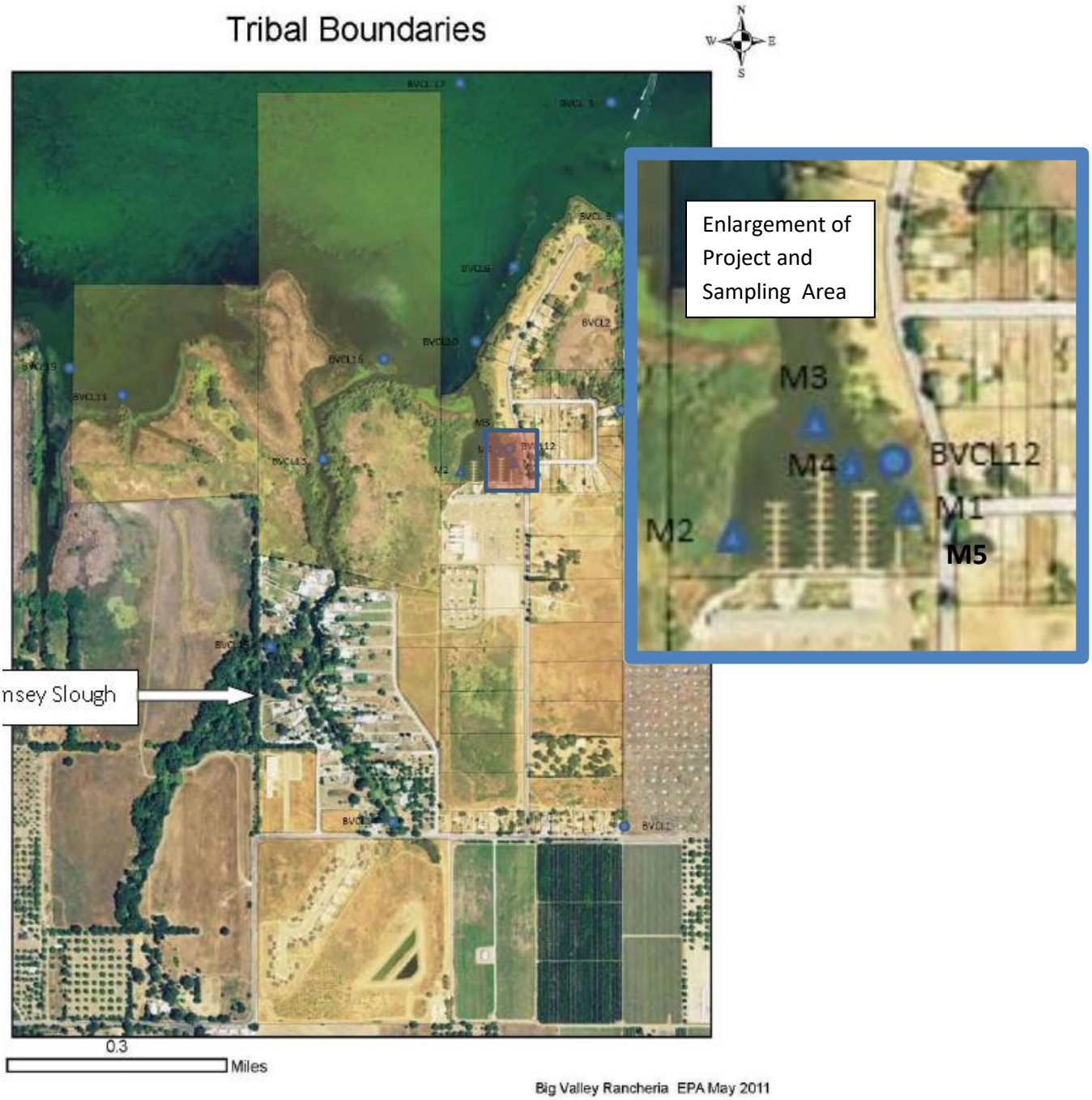
Post project

Restored Marina shoreline BMP, installed willow bundles, native plants and erosion seed mix

As of 2015, the project site has continued growth of installed native plants. Irrigation was removed 1 year after planting. Because of the continued drought, some plants were lost such as the wild rose. The tules appear to be prolific. Erosion off the site appears to be minimal.

Subsequent water quality sampling was carried out in the marina in February 10, 2015 to determine the buffering capacity of the erosion control project. The major parameters determined were: total/fecal coliform, oil and grease, total organic carbon, total Kjedahl nitrogen and total phosphorus. Preliminary data shows that the project is buffering the lake from pollutants except on total and fecal coliform. See table of results and map of sites below.

	Parameters	Inlet		Outlet (adjacent to restored marina shoreline)			
		M5		*M1*	*M2*	*BVCL12*	Average
1	Oil and Grease (mg/L)	ND		ND	ND	ND	ND
2	Total Kjedahl nitrogen (mg/L)	2.1		ND	1.2	ND	1.2
3	Total phosphorous (TP (mg/L)	0.67		0.16	0.18	0.17	0.17
4	Total Coliform (MPN/100 ml)	>1600		>1600	>1600	>1600	
5	Fecal coliform (MPN/100 ml)	22		13	70	23	35.33



Location of sampling sites within Big Valley boundaries