

Scott River Riparian Restoration Project



Siskiyou Resource Conservation District

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Scott River Watershed

December 22nd 2014

State Water Resources Control Board

Project Type: Nonpoint Source Implementation

Agreement # 09-669-551

Total Project Cost: \$468,210

\$317,777 Clean Water Act §319(h) and \$150,433 (Match)

I. Grant Summary Form

Scott River Riparian Restoration – 09-669-551
California Nonpoint Source Program, Clean Water Act 319 (h)
Etna, California

Background



The Scott River is a major tributary to the Klamath River. The Scott River watershed covers an area of 819 square miles of Siskiyou County – land ownership is 55% private and 45% public. Land use in the upland areas is predominantly commercial timber harvest and recreational wilderness, where as land use on the valley floor is predominantly farming and ranching. In 2006, the Scott River was designated by the California North Coast Regional Water Quality Control Board as impaired under Section 303 (d) of the Clean Water Act for non-point source pollution, specifically temperature and sediment. The basin is currently under waiver status for both listings (Order No. R-2012-0084) as efforts are being made to meet Total Daily Maximum Load (TMDL) requirements through community-based restoration and enhancement efforts.

Project Description

The goal of this project was to reduce in-stream sediment and temperature loads in the Scott River by stabilizing actively eroding banks and enhancing the riparian corridor. A Geomorphic Assessment on two major reaches of the Scott River was completed to identify restoration sites. Two eroding banks along the Scott River (river mile 36 and 52) were stabilized with bioengineered log jams and stone sills to decrease the bank angle and reduce the potential for further significant lateral migration of the channel. A total of 11 acres spanning six individual sites (river mile 36, 38, 40, 48 East and West Bank, 52) were planted with mixed willow species and black cottonwood poles to capture and store suspended sediment, promote shade and filter potential pollutants from adjacent lands. Tasks also included the development of a *Scott River Watershed Restoration Strategy & Schedule* to guide future revegetation efforts.



Project Performance



This project addressed two considerable sources of sediment (an estimated 638 tons per year) and aimed to fill in areas lacking full riparian vegetation. The Siskiyou RCD implemented two bank stabilizations spanning 1,200 feet (exceeding the target of 800 feet), which have both proved effective under high flows. Development of each of the project sites was lengthy and required a one-year grant extension, however, the project came in just under budget. Drought conditions over the past several years and heavy browse by foragers impacted vegetation efforts, which required replanting at one of the sites (river mile 48 East bank). All other sites planted in 2013 have exhibited a survival rate of 60% or better and photo-monitoring of sites planted in 2014 will be ongoing. The Siskiyou RCD planted a total of 11 acres, which was under our goal of 15-20 acres, however, the *Scott River Watershed Restoration Strategy & Schedule* identifies priority sites for future revegetation projects and sources of funding to continue addressing riparian enhancement.

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III. Executive Summary

With funds provided through an agreement with the State Water Resources Control Board, the Siskiyou Resource Conservation District (Siskiyou RCD) implemented bioengineered streambank stabilization projects and riparian replanting projects on the mainstem Scott River for the primary goal of addressing temperature and sediment loads within the system. Two bioengineered streambank stabilization projects were installed, at River Mile 36 (Hanna Brothers Ranch) and River Mile 52 (Merlo Property), and approximately 11 acres of riparian planting were implemented throughout various locations of the mainstem riparian corridor. In addition to these projects, the Siskiyou RCD developed the *Scott River Watershed Restoration Strategy & Schedule* to guide further riparian enhancement efforts.

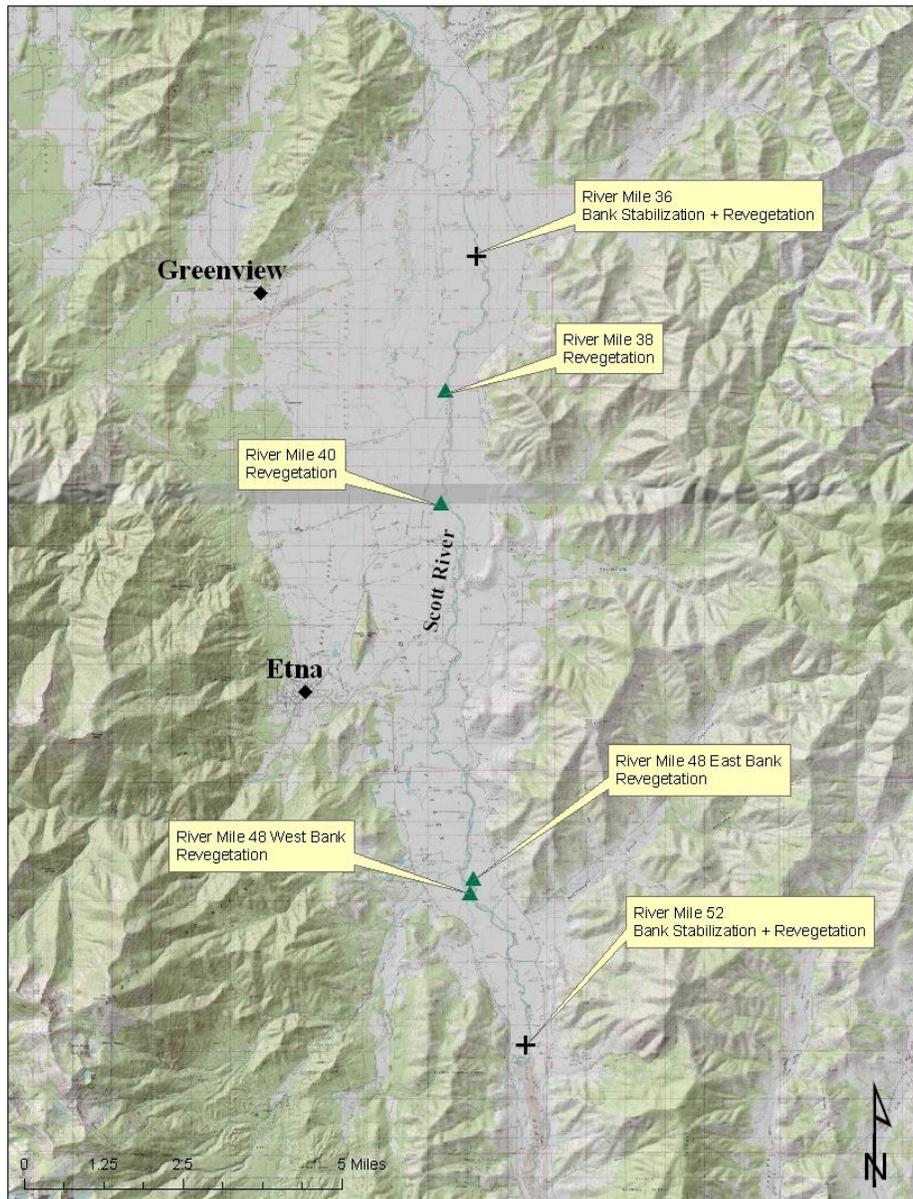


Image 1: Map of Final Restoration Sites (Siskiyou RCD)

IV. Problem Statement & Relevant Issues

The Scott River Watershed is listed as impaired for sediment and temperature under Section 303 (d) of the Federal Clean Water Act. In December 2005, the North Coast Regional Water Quality Control Board (NCRWQCB) adopted the Action Plan for the Scott River Sediment and Temperature Total Maximum Daily Load (TMDL). The Action Plan identifies increased solar radiation from reductions of shade as the primary factor leading to elevated stream temperatures and stream bank erosion as the primary source of instream sediment.

The alteration of the Scott River's mainstem in the 1930's has created reaches where the stream channel, stream bank and flood plain are significantly altered from historic conditions. Stream reaches with altered channel structures (e.g. channel incision and levees) create stream banks and floodplains that are, in some locations, significantly above the water table. An understanding of the relationship between the stream channel, stream banks and water table will help direct the planting techniques and maintenance necessary to recruit successful riparian corridors.

The Upper Reach is aggraded mine tailings with a relatively shallow water table and a history of significant channel changes during high flows. The Lower Reach is incised with levees and some vertical banks, contains a deeper but stable water table and a history of successful riparian planting. This reach also has areas with a risk of bank erosion that could threaten existing vegetation unless treated with bioengineering stabilization techniques. Tight channels in this reach provide the opportunity for over-story to cast afternoon shade across one of the more heated reaches of the Scott River. A thriving example are the plantings established in the early 1990's by Alvin Lewis which have reached mature growth and are effectively offering shade to the stream channel at river mile 38.

In an effort to ensure a coordinated approach to addressing TMDL implementation, various cooperators, consisting of the Siskiyou RCD, NCRWQCB, Timbervest California LLC, U.S. Forest Service (USFS), Michigan California Timber Products, Northern California Resource Center, Quartz Valley Indian Reservation and the Natural Resource Conservation Service (NRCS), met on Sept 24th, 2008 to discuss TMDL implementation priorities for the Scott River. The group discussed a strategy to pull together all assessment information in the watershed for the purpose of prioritizing restoration locations and to develop project ideas. One outcome of the meeting was this project proposal (*The Scott River Riparian Restoration Project*) by the Siskiyou RCD, while another outcome was a proposal by the USFS titled *Scott River Road Sediment Source Reduction: Kelsey Creek*.

V. Project Goals

The goal of the *Scott River Riparian Restoration Project* was to reduce in-stream sediment and temperature loads in the Scott River by stabilizing actively eroding banks and enhancing existing riparian vegetation through bioengineered treatments and riparian planting. The treatment of actively eroding streambanks serves to stabilize substrates, reduce the potential of significant channel changes, capture and store suspended sediment, promote shade and filter potential pollutants from adjacent lands, while riparian planting will help revegetate select areas of the Scott River corridor. With the implementation and monitoring of these treatments, the Siskiyou RCD hopes to fulfill TMDL requirements by reducing the Scott River's exposure to solar radiation and sediment load contribution. Additionally, the Siskiyou RCD developed the *Scott*

River Watershed Restoration Strategy & Schedule, which will serve to guide future riparian planting efforts in the watershed.

Objective: Treat up to 800 feet of actively eroding streambank through the use of bioengineering techniques (instream structures composed of a designed combination of rock and live cuttings).

Outcome: Reduce the amount of direct sediment delivery to the Scott River from eroding banks. Capture and store suspended sediment. Create riparian vegetation on the restored banks to shade the Scott River.

Objective: Restore the riparian corridor of the Scott River through riparian replanting along 15-20 acres.

Outcome: Increasing the area of riparian vegetation along the Scott River banks and terraces that offers sediment stabilization and storage while preventing solar radiation from heating the waters.

VI. Project Description

Project Type: Nonpoint Source Implementation

Project Cost and Matching Contributions:

- **State Water Board CWA 319(h):** Amount Awarded – \$317,777
Amount Expended as of January 1st 2014 – \$307,622.95
- **US Fish and Wildlife Service, *Scott River Bioengineering and Riparian Planting:***
Project Cost – \$62,150
Funds were used to implement a bioengineered streambank restoration project along the mainstem Scott River, at River Mile 48 (Spencer Property), for the purpose of reducing sediment contribution and to enhance fisheries habitat in a section of the river that is critical to salmonid spawning and rearing. The project was designed by Joey Howard and implemented by North River Construction in the summer of 2013. It consists of eight large woody debris barbs (LWD) that are designed to direct flow off of the eroding bank and promote sediment deposition. *Scott River Riparian Restoration Project* funds were used at this location to plant vertical bundles in between four of the LWD barbs and to revegetate an 5.51-acre section of the riparian corridor.
- **National Oceanic and Atmospheric Administration, *Scott River Streambank & Riparian Soil Bioengineering Field Day:*** Project Cost – \$20,000
In 2010 the Siskiyou RCD, in cooperation with NOAA and the NRCS, hosted the Scott River Streambank & Riparian Soil Bioengineering Field Day which was designed to educate local conservation groups on how to properly implement various streambank restoration and riparian planting treatments. Specialist from the NRCS oversaw the implementation of rootwads, stone sills, brush sills, dragon’s teeth, various forms of toe protection, as well as vertical bundles, brush mattresses, and other planting methods, over a 250-foot section of eroding streambank at River Mile 49 (Tobias Property) on the Scott River.
- **National Resource Conservation Service, *River Mile 52 Maintenance:*** Project Cost – \$22,257

Funds provided by the NRCS have been set aside for monitoring and maintenance, of both the bank stabilization project and riparian plantings, at the River Mile 52 (Merlo Property) streambank restoration site.

- **US Fish and Wildlife Service, *Scott River Fencing***: – \$46,026
This project installed approximately 5,700 feet of riparian exclusion fencing along the mainstem Scott River at River Mile 30 (Starwalker Farms), and approximately 4,100 feet of riparian exclusion fencing along the mainstem Scott River at River Mile 48 (Spencer Property, east bank).
- **Total Matching Funds** – \$150,433
- **Total Project Cost** – \$468,210

Project Methodology/Construction/Description/Pollutant Load:

The *Scott River Riparian Restoration* project was intended to address the Scott River TMDL, specifically temperature and sediment. This has been accomplished with the implementation of riparian planting and stream bank stabilizations along the Scott River mainstem. Two sites were chosen for bioengineered streambank stabilizations to reduce sediment loads at River Mile 36 (Hanna Brothers Ranch) and River Mile 52 (Merlo Property). Treatments for these sites were designed by Joey Howard of Cascade Stream Solutions, LLC, and implemented by competent and experienced contractors (Mark Johnson Construction and North Rivers Construction). All necessary permits were obtained prior to implementation. Streambank stabilizations were accompanied by riparian planting at the sites to promote vegetation within the riparian corridor, which will provide further stability to the banks, filter runoff and add shade to the river. Funding from this project also provided for the revegetation of four additional sites (shown in Image 1): River Mile 38, 40, 48 East Bank and 48 West Bank. Targeted cover in the treatment area was 60% with a portion of this resulting in direct canopy over the stream channel to reduce solar radiation and, subsequently, instream temperatures. A total of 11 riparian acres were revegetated as part of this grant agreement.

No water quality monitoring was included in this agreement.

Bank Stabilization Sites, Conditions and Photos

Scott River Bioengineered Streambank Site, River Mile 36 (Hanna Brothers Ranch): Portions of the Scott River between River Mile 29.3 and 41.4 were channelized by the US Army Corp of Engineers in the late 1930's, which has caused a gradual lowering of the riverbed and an ensuing reduction in access to the floodplain. Prior to treatment in 2013, the top of the bank was 12 to 15 feet above the low flow surface elevation and had retreated approximately 30 to 35 feet over the past 17 years. Furthermore, the eroding bank threatened agricultural land, offered little opportunity for the recruitment of natural vegetation, and it is estimated that this location contributed 169 tons of sediment to the Scott River annually.



Photo 1: Bank treatment site at River Mile 36, June 2013 (Siskiyou RCD).



Photo 2: Bank treatment site at River Mile 36, June 2013 (Siskiyou RCD).

To address these issues, a bioengineered streambank stabilization project was completed on this 400-foot section of the west bank during the low flow period of 2013. The bank was graded from the average high water level (2,724 ft.) back at a 3:1 (horizontal:vertical) slope, and a .02-acre section of the overbank was planted with willow poles. Log barbs and stone sills, consisting of large rock and juniper rootwads, were placed at the toe to reduce erosion by shifting the thalweg away from the bank and minimizing helical flow. These instream structures also increased woody complexity and habitat for aquatic species.



Photo 3: Completed bank stabilization at River Mile 36, November 2013 (Siskiyou RCD).



Photo 4: Completed bank stabilization at River Mile 36, November 2013 (Siskiyou RCD).



Photo 5: Downstream end of completed bank stabilization at River Mile 36, November 2013 (Siskiyou RCD).

Scott River Bioengineered Streambank Site, River Mile 52 (Merlo Property): This section of the Scott River is located directly downstream of historic mining tailings. The area has a wide meander pattern and a spacious river channel that allows for lateral migration. The active channel width at this site is approximately 800 feet and composed of a gravel and sand streambed with areas of clay exposure. During high flows, the velocities near the bank are very swift and were actively eroding the sand lenses at the toe of the bank, which undermined the above clay layer and led to an estimated 469 tons of sediment contributions per year in a reach that is important to spawning and rearing Chinook salmon, coho salmon and steelhead trout. The continued erosion on the outside of this meander did not only impact adjacent agriculture fields, but it had the potential to flank the downstream riparian corridor and move the river into neighboring properties.



Photo 6: Bank treatment site at River Mile 52, November 2013 (Joey Howard).



Photo 7: Bank treatment site, looking downstream, September 2014 (Siskiyou RCD)

The objectives of this design are to reduce streambank erosion by pushing the thalweg off the bank with the installation of anchored log barbs (six total) and engineered log jams (eight total). The project also addresses a secondary and highly erosive cusp, near the downstream end of the bank, with similar treatments. In addition, a complete revegetation of the 0.6-acre site was completed post construction to enhance the existing riparian corridor and establish trees to supply shade to the river. Thirty cottonwood pole cuttings were planted along the top of the bank, and up to forty vertical willow bundles were buried between each of the instream log barbs. Photo points will be revisited annually when vegetation is fully leafed out (July) and counts will be made to evaluate survival. A 50-70 % survival rate is anticipated. A total of 2,800 feet of riparian exclusion fencing will be installed along the mainstem Scott River at River Mile 52 (Merlo Property) in early January of 2015.



Photo 8: Completed bank stabilization at River Mile 52 looking downstream, December 2014 (Siskiyou RCD).



Photo 9: Stabilization of secondary cusp, November 2014 (Siskiyou RCD).

Riparian Replanting Sites, Conditions and Photos

Riparian Planting, River Mile 38 (Black Property): Channelization occurred in this section of the river in the 1930's and greatly altered the riparian corridor by reducing its overall area. Despite this, there is ample opportunity to establish riparian vegetation. Conifer and willows planted on top of the bank in 2000 have been successful at this site, and additional plants were implemented along the slope of the west bank for the purpose of shading the stream and to establish root systems to provide bank stability.

In the spring of 2013, a 0.3-acre site on the west bank was planted with approximately 80 willow cuttings (golden, red, and arroyo varieties). The plantings were installed in two rows, on the mid level of the slope, for the purpose of bank stabilization and shading of the stream channel.



Photo 10: Pre-planting view of River Mile 38 revegetation site, February 2013 (Siskiyou RCD).



Image 2: River Mile 38, 2012 (Google Earth Imagery)



Image 3: River Mile 38, 2014 (Google Earth Imagery)

Despite a dry riverbed during the drought of 2014, vegetation is visibly greater in the treated area and a 60% survival estimate has been determined.



Photo 11: Downstream view of willow plantings at River Mile 36, July 2013 (Siskiyou RCD).

Riparian Planting, River Mile 40 (Bryan-Morris Ranch): Plantings were installed at this site in an effort to revegetate the gravel bar on the west bank. This bank is ideal for providing canopy cover to the Scott River due to its southern orientation. A 2.1-acre site on the west bank was planted with golden willow poles harvested from the eastside of the river. Approximately 75 pole cuttings were planted down to the existing water table in the spring of 2013. Several different methods were used, including trench plantings and cuttings interspersed with existing vegetation (sandbar willows). Survival has been documented at just over 60% at this gravel bar. The trench plantings on the Northern end of the site are visible in the aerial images below.



Image 4: River Mile 40, 2012 (Google Earth Imagery)



Image 5: River Mile 40, 2014 (Google Earth Imagery)



Photo 12: Pre-implementation view of riparian planting site at River Mile 40, February 2013 (Siskiyou RCD)



Photo 13: Trench plantings on the northern end of the gravel bar, June 2014 (Siskiyou RCD).

Riparian Planting, River Mile 48 East Bank (Spencer Property): This section of the river falls within Reach II of the “Strategy and Schedule”, which is characterized by a wide floodplain and riparian zone with a relatively shallow water table. Revegetation was conducted in 2013 and was

in combination with a bank stabilization project that was funded by the US Fish and Wildlife Service.

A 5.51-acre section of the east bank was planted in April of 2013 with 95 cottonwood poles and 14 willow clumps. While nearly all of the willow clumps survived, the combination of heavy browsing by elk in the area and extreme drought resulted in poor survival of the cottonwood poles (estimated at 10 %). Therefore, this area was replanted with a 35 black cottonwood poles in October of 2014. Additionally, approximately 30 vertical willow bundles were planted in between each of the last four upstream log bars. Photo points will be revisited annually when vegetation is fully leafed out (July) and counts will be made to evaluate survival of this second round of planting.



Image 6: River Mile 48 East Bank, 2012 (Google Earth Imagery)



Image 7: River Mile 48 East Bank also showing boundaries of bank stabilization project, 2014 (Google Earth Imagery).



Photo 14: Pole plantings on the East bank at River Mile 48, April 2013 (Siskiyou RCD).



Photo 15: Pole plantings on the East bank at River Mile 48, April 2013 (Siskiyou RCD).

Riparian Planting, River Mile 48 West Bank (Tobias Property): This site has a wide available riparian zone. Plantings installed in this area in 1997 are some of the most successful in the Scott River in terms of vigor and survival. There are notable surface and sub-surface water sources from perennial flows on the west side of the river, particularly Wolford Slough, that likely contribute to the relatively high water table during the dry season.



Image 8: River Mile 48 West Bank, 2012 (Google Earth Imagery)



Image 9: River Mile 48 West Bank, 2014 (Google Earth Imagery).

Four distinct sites on the west bank were planted in the spring 2013. They were chosen to expand on successful nearby plantings and fill in remaining open areas within the riparian zone. Overall survival on the West Bank has been estimated at 65%.

- i. A 0.8-acre section near the Wolford Slough was planted with cottonwood poles and a variety of willow clusters and bundles (coyote willow, pacific willow, golden willow), all sourced from nearby locations. There were 46 total plantings at this site.
- ii. A 1.13-acre section was planted with mostly cottonwood poles (75 total) and a few willow clumps.
- iii. A 0.15-acre section near the river was planted with a total of 53 mixed pole cuttings (cottonwood, pacific willow, golden willow) and a few willow clumps. Heavy beaver activity in the area has affected survival.
- iv. A 0.21-acre section was planted with 22 black cottonwood poles.



Photo 16: Pole plantings at River Mile 48, April 2013 (Siskiyou RCD).



Photo 17: Pole plantings at the River Mile 48 West Bank site, May 2013 (Siskiyou RCD).



Photo 18: Pole plantings at the River Mile 48 West bank site, May 2013 (Siskiyou RCD).

Data Evaluation/Pollutant Reduction

Based on erosion volumes calculated from Google Earth images dating back to 1993, the streambank stabilization project at River Mile 36 (Hanna Brothers Ranch) has reduced sediment contribution to the Scott River by approximately 169 tons per year.

Based on erosion volumes calculated from Google Earth images dating back to 2005, the streambank stabilization project at River Mile 52 (Merlo Property) has reduced sediment contribution to the Scott River by approximately 469 tons per year.

No temperature data was collected.

VII. Public Outreach

May 1st, 2014 Siskiyou RCD Regular Board meeting
 May 13th, 2014 SRWC Board Meeting
 June 5th, 2014 Siskiyou RCD Regular Board Meeting
 June 17th, 2014 SRWC Board Meeting.
 August 12th, SRWC Board Meeting
 December, 2014 SRWC Quarterly Newsletter

VIII. Conclusions

Project Performance Measures Tables

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| Project Goals- Design Planning, Research, Assessment | Develop a comprehensive “Strategy and Schedule for Riparian Restoration” in the Scott River. | Completed. |
| Desired Project Outcomes: | Develop a plan that identifies the best locations in the watershed to implement riparian restoration activities. Develop plan designs with the assistance of NRCS. | Geomorphic assessment completed to identify bank stabilization sites. Designs completed for two sites with the assistance of NRCS, River Mile 36 and 52. |
| Project Performance Measures: | <u>Output Indicators:</u> Development of “Strategy & Schedule”. Final Design plans as approved by the SWRCB, RWQCB and NRCS. <u>Outcome Indicators:</u> Implementation of “Strategy & Schedule”, re-establishment of riparian vegetation. | “Strategy & Schedule” completed and implementation is ongoing. Final designs for both bank stabilization sites approved and permits secured. |
| Measurement Tools and Methods: | Documentation of implementation of “Strategy & Schedule” through photo monitoring | Pre-implementation photo documentation completed. Post-implementation photo documentation ongoing. |
| Targets | Implementation of “Strategy & Schedule” for at least 20 acres within two years. | Ongoing - 11 acres completed. |
| Project Goals- Outreach, Education, Capacity Building. | Hold a public meeting and develop an educational brochure to keep the public informed. | Completed. |

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| Desired Project Outcomes: | Public meetings will be held to inform the public of the development of the plan. Educational brochure will be developed. | Public meetings held. Brochure completed. |
| Project Performance Measures: | <u>Output Indicators:</u> Hold public meeting, develop educational brochure. <u>Outcome Indicators:</u> Documentation of meeting(s), brochure. | Public meetings held. Brochure completed. |
| Measurement Tools and Methods: | Documentation of meeting(s): Agenda, minutes, sign-in sheet. | Completed and submitted. |
| Targets | Two public meetings. | Five public meetings completed. |

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| Project Goals - Pollutant Load Reduction | Improve the health of the current riparian corridor. The riparian ecosystem offers many benefits including: shading the Scott River, bank and soil stabilization, entrapment and storage of suspended sediment and pollutant filtration. | Completed. |
| Desired Project Outcomes: | Restore the riparian corridor of the Scott River through riparian replanting on 15-20 acres | Ongoing, 11 acres replanted to date. |
| Project Performance Measures: | <u>Output Indicators:</u> Documentation of riparian replanting efforts. <u>Outcome Indicators:</u> Presence of riparian vegetation in previously barren streambanks. Long-term potential stream shading. | Pre and Post Implementation photo documentation completed. Presence of riparian vegetation in previously barren streambanks confirmed. |
| Measurement Tools and Methods: | California Department of Fish and Game Monitoring Protocols for fisheries restoration projects. Pre-and post- photo monitoring will be completed. Test plots will be set up at each implementation site and measured annually for plant survival and vigor. | Plant survival estimates completed for plantings done in 2013 (RM 38, RM 40, RM 48). Plant survival estimates will be completed over the following year for plantings done in 2014 (RM 48, RM 52). Pre- and post- photo documentation completed at all sites. |
| Targets | 50% survival of pole cuttings and 75% survival of rooted stock at end of | A 60% survival rate has been determined for all plantings |

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| | contract. | done in 2013 (River Mile 38, 40, 48 West Bank) with the exception of River Mile 48 East Bank (Spencer Property) which has been replanted. Survival estimates for plantings done in 2014 (River Mile 48 East Bank and 52) will be completed in July of 2015. |
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| Project Goals - Pollutant Load Reduction | Stabilize actively eroding streambanks with rock and vegetation to reduce erosion, trap and store suspended sediments and provide streamside shade. | Completed. |
| Desired Project Outcomes: | Treat up to 800 feet of actively eroding streambank through the use of bioengineering techniques (instream structures composed of a designed combination of rock and live cuttings). Reduce sediment contribution to the stream channel. | Two bank sites were treated for a total of 1,200 feet of bank stabilization. |
| Project Performance Measures: | <u>Output Indicators:</u> Approved final site designs, completed project implementation checklists and pre and post project photographs. <u>Outcome Indicators:</u> Actively eroding streambanks will be stabilized. A one mile reach of river will be enhanced with riparian vegetation, providing future potential to shade the stream. | Final approved project designs completed. Pre and Post implementation checklists and photo documentation completed. Approximately 11 acres of river banks have been enhanced with riparian vegetation. |
| Measurement Tools and Methods: | California Department of Fish and Wildlife Monitoring Protocols for fisheries restoration projects (California Salmonid Stream Habitat Manual Flosi et al 1998.) The appropriate CDFW checklists will be used to track pre-project condition, project implementation, and project effectiveness. | Pre and Post implementation checklists completed. |
| Targets | 600-800 feet of actively eroding bank will be stabilized and reduce sediment contribution to the Scott River. | Target Exceeded. |

Project Insight and Review

Streambank Bioengineering: With all stream-bank restoration sites having been implemented within the past two years, there are few issues that have arisen in regards to making improvements or alterations to bioengineering implementation. As time passes and more monitoring is completed, the Siskiyou RCD and associated partners will consider applying techniques that enhance our ability to meet specific project goals.

One improvement that is being applied based off of current monitoring is the deflection of the thalweg at the most upstream end of a respective bank. Over the past two years, the Siskiyou RCD has implemented three bioengineering projects. Of these three projects, two were installed using proportional spacing for instream structures that deflect the thalweg off of the bank. Through the monitoring of these sites it is clear that in order to properly deflect flows using the desired treatments, more deflection structures have to be implemented within the first 100 to 200 feet in order to compensate for higher water velocities at the upstream end of the meander. If this method of deflection is not applied, then there is the possibility that flows will not be completely deflected away from the bank and that a splitting of the thalweg may occur, leading to a less desired result.

Note: This method of deflection was implemented at the River Mile 52 project site (Merlo Property) and has functioned very well.

A secondary benefit to this method is increased fish habitat through the implementation of additional large woody debris, as strong fish presence has been recorded in and around the majority of the woody structures.

Riparian Planting: The Siskiyou RCD has been monitoring various riparian planting treatments for over fifteen years, and during this time much has been learned from the successes and failures of different planting locations throughout the watershed. However, a new form of planting protection is being implemented in the southern portions of the watershed due to the large numbers of elk that now inhabit that area. In the past elk herds did little damage to riparian plantings due to a limited population, but over the past five years the population has greatly increased, resulting in a larger impact on riparian vegetation.

In the spring of 2013, the Siskiyou planted approximated 245 pole cuttings and 65 clumps at the River Mile 48 east bank and west bank planting locations (Tobias and Spencer properties). In just a few months, elk had destroyed nearly all of the pole plantings at the east bank location and inflicted heavy damage to the pole plantings at the west bank location. Standard caging methods to protect from beaver activity were implemented at the sites. However, with a large increase in the elk population, which was undocumented at the time, this method offered little protection from browsing and velvet rubbing.

In an effort to address this issue, the east bank location was replanted in the fall of 2014 with thirty-five cottonwood poles. Improved protective cages that stand six feet high, with a diameter of four to five feet, were installed to discourage velvet rubbing. All cages are held in place with wooden stakes driven three feet into the ground, and each pole stands no higher than six feet tall. It is too early to determine whether this new planting treatment will equate to increased survival, but the Siskiyou RCD will be monitoring the site for overall effectiveness with the goal of adapting this treatment if successful.

Next Steps

Future Project Implementation: Continue the implementation of bank stabilization projects and riparian replanting efforts at high priority locations as identified in the “Strategy and Schedule for Riparian Restoration.” Currently, the Siskiyou RCD is working in coordination with various agencies and organization to identify additional streambank restoration and riparian planting locations for the purpose of addressing Scott River TMDL related issues while also restoring and enhancing fish habitat within the Scott River and associated tributaries.

Continued Monitoring: The NRCS has provided \$22,257 in matching contributions for on-going maintenance and monitoring of the River Mile 52 (Merlo Property) bank stabilization project. Maintenance and irrigation of riparian plantings will continue annually as needed. Furthermore, the Siskiyou RCD will continue to monitor the other projects associated with this agreement as part of a holistic monitoring effort of past projects.

Funding Sources

- State Water Resources Control Board
 - **319 H TMDL Implementation:** Annually, the California NPS Program allocates approximately \$4.5 million of CWA Section 319(h) (CWA §319(h)) funding from the U.S. Environmental Protection Agency to support implementation and planning projects that address water quality problems in surface and ground water resulting from NPS pollution. The goal of these projects is to ultimately lead to restoring the impacted beneficial uses in these water bodies. Projects are required to be located in a watershed that has an adopted/nearly adopted TMDL for the constituent of concern and has been identified in the NPS Program Preferences. Projects focused on working toward achieving the goals of the TMDL to restore beneficial uses will be the most competitive in the selection process.
http://www.swrcb.ca.gov/water_issues/programs/nps/solicitation_notice.shtml
- United States Fish and Wildlife Service-Partners for Fish and Wildlife
 - Contact Yreka Office 530-842-5763
- The California Riparian Habitat Conservation Program; Wildlife Conservation Board

The program has a basic mission to develop coordinated conservation efforts aimed at protecting and restoring the state's riparian ecosystems. <http://www.wcb.ca.gov/Riparian/>
- Natural Resource Conservation Service

NRCS offers voluntary programs to eligible landowners and agricultural producers to provide financial and technical assistance to help manage natural resources in a sustainable manner. Through these programs the agency approves contracts to provide financial assistance to help plan and implement conservation practices that address natural resource concerns or opportunities to help save energy, improve soil, water, plant,

air, animal and related resources on agricultural lands and non-industrial private forest land. <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial>

NRCS Programs

- The **Agricultural Management Assistance** (AMA) provides financial and technical assistance to agricultural producers to voluntarily address issues such as water management, water quality, and erosion control by incorporating conservation into their farming operations.
- The **Agricultural Water Enhancement Program** (AWEP) is a voluntary conservation initiative that provides financial and technical assistance to agricultural producers to implement agricultural water enhancement activities on agricultural land to conserve surface and ground water and improve water quality.
- **Conservation Innovation Grants** (CIG) is a voluntary program intended to stimulate the development and adoption of innovative conservation approaches and technologies while leveraging Federal investment in environmental enhancement and protection, in conjunction with agricultural production.
- The **Environmental Quality Incentives Program** (EQIP) is a voluntary program that provides financial and technical assistance to agricultural producers through contracts up to a maximum term of ten years in length.
- The **Wildlife Habitat Incentive Program** (WHIP) is a voluntary program for conservation-minded landowners who want to develop and improve wildlife habitat on agricultural land, nonindustrial private forestland, and Indian land.

Schedule

Riparian restoration schedule for Scott River- July 2014

| Task | Location | Status | Timeframe |
|---|---|---------------|------------------|
| Reach I. (Callahan to end of tailings) | | | |
| Completion of geomorphic analysis | No recommendations until further geomorphic analysis is completed. | | |
| Seek funding for geomorphic analysis | | | |
| Reach II. (End of tailings to SVID) | | | |
| Bioengineered streambank | RM 48 across from French Creek | Completed | Fall 2013 |
| Bioengineered streambank | RM 52 downstream of tailings | Completed | Fall 2014 |
| Maintenance of previous planting (caging, etc.) | RM 48 Wolford Slough area | In progress | Annually |

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| | | | |
|---|---|----------------|--------------------------------------|
| Planting implementation | East Bank Scott Across from French Creek & south (~RM 48) | Completed | Fall 2012, Fall 2014 |
| Planting implementation | West bank Scott at RM 48, vicinity of Wolford Slough | Completed | Fall 2012, Spring 2013 |
| Maintenance | All plantings | Annual | Annually |
| Planting implementation -10 acres | As locations are identified. | Seek funding | Annually |
| Reach III. SVID to 1.5 Miles downstream of Etna Creek | | | |
| Bioengineered Streambank | Scott River at RM 41 | In-development | Fall 2015 |
| Maintenance | All plantings, including previously planted RM 42 | Annually | Annually |
| Planting implementation -10 acres | As locations are identified. | Seek funding | Annually |
| Reach IV. Etna Creek to Oro Fino Creek | | | |
| Planting Implementation | Scott at RM 40 | Completed | Spring 2013 |
| Bioengineered streambank | Scott at RM 36 | Completed | Fall 2013 |
| Planting implementation | Scott at RM 38 | Completed | Spring 2013 |
| Planting implementation | Scott at RM 36 | Completed | Spring 2013 |
| Reach V. Oro Fino Creek to end of Valley | | | |
| Hand thinning of arroyo willow and selected planting of cottonwood and alder. | Varied through reach, as landowners are identified. | In development | As identified & funding is available |
| Identify potential planting locations | | | Annually |
| Planting implementation -10 acres | As locations are identified. | Seek funding | Annually |
| Tributaries | | | |
| Geomorphic survey and analysis of Patterson, Kidder, Etna Creek in alluvial sections. | | | When funding available |
| French Creek | As locations are identified. | Seek funding | As identified & funding is available |
| Etna | As locations are identified. | Seek funding | As identified & funding is available |
| Shackleford | As locations are identified. | Seek funding | As identified & funding is available |
| Kidder | As locations are identified. | Seek funding | As identified & funding is available |

| | | | |
|-----------|------------------------------|--------------|--------------------------------------|
| East Fork | As locations are identified. | Seek funding | As identified & funding is available |
| Moffett | As locations are identified. | Seek funding | As identified & funding is available |

IX. Appendices

List of References: N/A

List of Deliverables:

- B1.1 Maps in Electronic format, Scott River Upper Reach
- B1.2 Maps in Electronic Format, Scott River Lower Reach.
- B 1.3 ArcGIS Layers, on CD
- B 1.4 List of Final Restoration Sites
- B 2.3 Final Stream bank Restoration Designs.
- B 3.1 List of Advisory Group Members with Affiliation
- B 3.2 Advisory Group Meeting Minutes and Agenda
- B 3.3 Final Strategy and Schedule for Riparian Restoration.
- B 3.4 Map of Planting/Replanting Sites.
- B 3.5 Plant Maintenance Schedule
- B 3.6 Pre-post Photo Documentation of Riparian Replanting
- B 3.7 Pre-post-Implementation checklists of Riparian Replanting
- B 3.8 Plant Survival Forms
- B 4.1 Map of Restoration Sites
- B 4.2 Pre-post Photo Documentation of Bank Stabilization
- B 4.3 Pre-post-Implementation checklists of Bank Stabilization
- B 5.1 Meeting Minutes and Agendas
- B 5.2 Copies of Mailings
- B 5.3 Educational Brochure

List of Sub-contractors:

- Cascade Stream Solutions LLC – bioengineered streambank designs
- Mark Johnson Construction – implementation of bank stabilization river mile 36
- North Rivers Construction – implementation of bank stabilization river mile 52
- Bryan-Morris Ranch – implementation of riparian planting
- GS Black Inc. – implementation of riparian planting
- California Conservation Corps – implementation of riparian planting

Tables & Graphs of Summarized Numerical Data: N/A

Photos: All photo documentation is included as an attachment to this report.

Copies of Peer Reviewed Documents: N/A

Examples of education & outreach literature (if applicable): Educational Brochure is included as an attachment.