



Dry Creek Meadow and Stream Restoration

(amended)

Recipient: Truckee River Watershed Council

Project Period: 8/01/2019 – 3/31/2021

Award Amount: \$80,696.94 (actual project disbursement: \$51,319.60)

Matching Contributions: \$220,000

Project Number: #8006.19.065094

Summary of Accomplishments

The Dry Creek project completed restoration and supplemental revegetation of 30 acres of mountain meadow habitat, 3,900 feet of perennial stream, and 500 feet of intermittent and ephemeral streams. Implementation work included construction and revegetation at four sites. Pre- and post-project monitoring were completed. Site revegetation is progressing and groundwater levels in the largest meadow site are elevated over pre-project conditions. Detailed monitoring data were submitted with our 2020 Annual Report (December 2020).

Project Activities & Outcomes

Project activities included:

- Implementation
- Post-project monitoring
- Adaptive management
- Project management and reporting

Implementation. Implementation included work at four sites.

Site 8. Site 8 is the largest and most complex restoration site. Past human actions diverted the existing channel of Dry Creek into a straight channel – causing the stream to downcut and disconnect from the historic meadow surface. Restoration included restoring flow to historic remnant channels thereby increasing stream length and floodplain connectivity. Work included diverting the flow of Dry Creek around the work area, salvaging and stockpiling the existing wetland sod, filling the existing channel, replanting the salvaged sod with heavy equipment, and planting willows by hand. Fill for the project came from removing an on-site railroad grade, Site 7, and from material salvaged from a previous restoration project. A minor amount of fill was generated by excavating two ponds within the former stream channel.

Volunteers assisted with revegetation work by planting willows.

Site 5. Work included repair of a headcut that was eroding into highly functioning meadow habitat. Since the project was identified in a 2013 watershed assessment (USDA, 2013), the headcut had moved at least 20 feet upstream into the meadow and had not stabilized. We used heavy equipment

to grade out the headcut to provide a sustainable transition between the meadow above and below the incision point. Fill material was generated from adjacent hillslopes.

Initial revegetation included placement of salvaged sod and topsoil by heavy equipment contractors, and seeding and mulching completed by the Sacramento Regional Conservation Corps (SRCC).

Site 6. Work included re-routing a road segment out of a drainage, installing a culvert and low water crossing, restoring the natural drainage topography, and initial site revegetation. All project work (with the exception of the revegetation) was completed with heavy equipment. Revegetation was completed by the SRCC and included seeding and mulching.

Site 7. Work included removing a redundant road spur to restore meadow habitat and natural drainage patterns. A second redundant road spur was decommissioned. Prior to restoration, the drainage through the meadow had been channelized into a culvert through the redundant road segment and was eroding into the meadow upstream and downstream of the road. Removing the road fill entirely restored the full meadow and stream floodplain and allowed for reconnection of the historic drainage path. The fill was off hauled and used for restoration of Site 8.

Initial revegetation included placement of salvaged sod, topsoil, and slash by heavy equipment. Additional revegetation was completed by the SRCC and included spreading native seeds and mulch.

Signage was developed for the restoration work. We additionally designed a [project specific webpage](#)

Post-project monitoring. We collected post-project monitoring data during the field season of 2020. Data collected included:

- Vegetation monitoring. We repeated detailed vegetation monitoring at permanent transects located within Site 8. Data were summarized in our 2020 Annual Report, previously submitted. Data collected show that restoration is on track, but will likely take another season or two to fully develop. Coverage at all sites was good and progressing according to expectations.
- Hydrologic monitoring. We continued to take periodic measurements from the shallow groundwater wells located at Site 8. Data were summarized and analysis included in our 2020 Annual Report. Groundwater levels rose at most wells, despite the fact that 2020 was a substantially drier year than 2019. Groundwater is at a level that will support wet meadow habitat.
- Aquatic Habitat surveys. Pre-project measurements were repeated at Site 8. Data were summarized in our 2020 Annual Report. Aquatic habitat monitoring demonstrated over a 400% increase in available floodplain area as compared to pre-project conditions.
- Photo-monitoring. We completed post-project photo-monitoring at all four sites. Pre- and post-project photos were included in our 2020 Annual Report.

Adaptive Management. We evaluated each of the four sites in the spring of 2020 to assess the need for adaptive management. While all sites are performing well, additional revegetation and supplemental hand work were identified for each of the sites. Photographs of the work were included in our 2020 Annual Report.

Site 8. Revegetation is progressing extremely well at Site 8, however we determined the site would benefit from some additional revegetation and treatment of three minor headcuts/knickpoints in the restored channels.

In September, 2020 contractors planted additional willows at strategic locations within the site and they spread additional seed in early November 2020.

Three minor headcuts (<6" each) developed in the re-engaged stream channels. There did not seem to be any risk of severe erosion, nonetheless we elected to treat them pro-actively. At each site, contractors placed rocks, sod, and willows to create riffle structures to dissipate future erosive energy.

Site 5. During spring runoff, we observed that there was some adjustment in the newly re-engaged stream channel. We also identified sites where additional willow planting, seeding and mulching would be beneficial.

To address the work in the stream channel, in May 2020, TRWC staff completed a work day where we placed rocks to roughen up the channel and prevent future erosion.

Supplemental willow work was completed by contractors in September 2020, and supplemental seeding and mulching took place in early November, 2020.

Site 6. At Site 6, some vehicle trespass into the newly restored channel occurred in the early summer. The Forest Service placed signage to discourage further use. We will revisit the effectiveness of the signs, and potentially supplement them for 2021. We completed additional seeding at this location in early November.

Site 7. Site 7 is performing well. We completed supplemental seeding in November.

There were no discrepancies between the activities conducted during the grant and the activities included in the grant agreement.

Outcomes

Expected project outcomes include both short-term and long-term outcomes.

Short-term outcomes (outcomes and progress against them are described for each site).

Site 8 short-term outcomes:

- Restore flow to 3,900 feet of historic perennial stream channel
- Re-engage historic valley floor floodplain
- Re-water 8 acres of converted wetland
- Restore natural hydrology to 20 acres of degraded wetland

Progress against outcomes:

- Flow was restored the natural stream channel. The restored stream channel measures 3,900 feet as per the project design.
- Re-engage valley floor floodplain. Aquatic habitat surveys showed that we increased valley floor floodplain by 442%. Observations during spring runoff, even in a very dry water year, confirmed that the floodplain was re-engaged.
- Re-water/restore wetlands. Vegetation conversion will take a few growing seasons. We began collecting post-project vegetation to document this shift. However, groundwater elevations rose to a level that will support wetlands.
- Restore natural hydrology to 20 acres of degraded wetland. Wetland hydrology was restored.

Site 5 short-term outcomes:

- Arrest erosion in 300 feet of intermittent stream
- Restore 315 feet of natural channel
- Restore hydrology to 0.25 acres of degraded wetlands
- Protect an acre of meadow upstream of the headcut

Progress against outcomes:

- Arrest erosion. The primary headcut at Site 5 has been stabilized. We will continue to monitor the site for additional evidence of erosion and make adjustments like those described for our “Adaptive Management” activity.
- Restore natural channel. The natural drainage pattern has been restored.
- Restore hydrology. Wetland vegetation growing at Site 5 indicates that hydrology has been restored.
- Protect meadow. Grading and stabilizing the headcut appears to have limited any upstream erosion into the intact meadow habitat. We will monitor the site into the future.

Site 6 short-term outcomes:

- Restoring 100 feet of ephemeral channel
- Reducing erosion from poorly sited road

Progress against outcomes:

- Restoring channel. We removed the road fill and reconnected the ephemeral drainage
- Reducing erosion. The site is stable, even despite some vehicle trespass. We will continue to work cooperatively with the U.S. Forest Service to limit vehicle trespass.

Site 7 short-term outcomes:

- Restoring 85 feet of intermittent drainage
- Improving hydrology and meadow condition across 2 acres
- Reducing downstream erosion

Progress against outcomes:

- Restoring drainage. We restored at least 85 feet of drainage. We were able to reconnect the stream channel upstream and downstream of the removed road segment for greater function.
- Improving hydrology/meadow condition. The meadow appears to be functioning well with wetland vegetation growing in the filled gully area.
- Reducing erosion. Site 7 is very stable, however we will continue to monitor the site for erosion into the future.

Long-term outcomes.

The following long-term outcomes were identified for this project:

- Increased willow density for improved bird habitat
- Increase habitat quality and quantity for native fish at Site 8
- Water quality enhancement
- Increased carbon uptake from restored meadow hydrology
- Improved aesthetics

All of these benefits will be obtained beyond the grant period however we were able to track progress through vegetation monitoring, photo-monitoring, groundwater monitoring, stability assessments, and aquatic habitat surveys. These monitoring results were included in our 2020 Annual Report.

Outcomes at all project sites met our expectations, although due to the very dry winter after implementation, vegetation growth was less than we had hoped. We re-seeded in 2020 and will do one more round of seeding in early 2021.

One interesting result of the restoration at Site 8 was that a family of Greater Sandhill Cranes spent the late summer and fall at the meadow. They most likely bred at the nearby Kyburz Meadow, but then moved to Dry Creek Site 8 to finish rearing their colt before migration. While the species has been observed in the Dry Creek watershed, it has previously been transient. Prior to restoration it was likely too dry of a meadow to provide good foraging habitat.

The momentum provided through the Dry Creek watershed restoration project helped to launch the Boca Watershed Assessment (supported by NFWF grant 55393) to identify additional restoration opportunities in the area (Dry Creek is a sub-watershed of the Boca Watershed).

Lessons Learned

The four sites included in this project were identified through the Dry Creek Watershed Assessment (USDA, 2013). We have found that completing a watershed assessment is an important step in restoration planning. The watershed assessment identifies root causes of degradation and shapes a framework for addressing that degradation, ultimately leading to more successful implementation projects.

Dissemination

We were able to host a volunteer work day in October, 2019. We additionally had a docent on-site for much of the construction season in 2019 to provide information about the project. We featured the project in our summer and winter 2019 print newsletters and in several editions of our weekly e-newsletter.

We intended to complete additional outreach in 2020 through site tours and an additional volunteer work day, but COVID altered our plans. However, there will be other opportunities to share the outcomes of this project. Meadow and stream restoration is one of TRWC's core priorities. We collected robust monitoring data on the project, some of which we will be able to continue without dedicated funding. Therefore, results from this project will be disseminated through future presentations, site tours, volunteer work days, etc.

POSTING OF FINAL REPORT: *This report and attached project documents may be shared by the Foundation and any Funding Source for the Project via their respective websites. In the event that the Recipient intends to claim that its final report or project documents contains material that does not have to be posted on such websites because it is protected from disclosure by statutory or regulatory provisions, the Recipient shall clearly mark all such potentially protected materials as "PROTECTED" and provide an explanation and complete citation to the statutory or regulatory source for such protection.*

Project Photos



Image 1: Photograph at Site 5 of headcut repair. Prior to project implementation, the headcut was migrating upstream into high quality meadow habitat. The project arrested this erosion.



Image 2: Photo at Site 7 of restored flow path in the meadow. Flow had been blocked to this portion of the meadow through railroad grade construction. We removed the grade and reconnected the stream to rewater the meadow.



Image 3: Photograph at Site 8 showing an example of one of the restored meadow streams. Prior to project implementation, the stream was confined to a deeply incised channel and had limited floodplain access.



Image 4: Photograph at Site 8 of a family of Greater Sandhill Cranes moved to the meadow in late summer to finish rearing their colt. They stayed at the project area for several months.

Please contact CDFW-OSPR Small Spills Restoration Coordinator for additional project information or materials.