Watershed Restoration Grant Program FINAL PROGRESS REPORT

Restoration of Priority Meadows in the Walker Watershed Project

Date: January 31, 2022	Agreement No.: P1796011-02
Project Title: Restoration of Priority Meadows in the Walker Watershed Project	Grant Term: February 1, 2018 – March 15, 2022
Grantee: American Rivers	Final Construction Dates: Seasonally - September 2018 – October 2020

FISCAL REPORT

Fund Source	Amount Awarded	Total Amount Reimbursed
CDFW PROP 1 Grant Funds	\$235,757	\$227,916*
California Department of Parks and Recreation – Off Highway Vehicle (OHV)	\$12,000	\$12,000
Humboldt-Toiyabe National Forest	\$57,000	\$63,691
American Rivers (Unrecovered Indirect Costs)	\$11,583	\$13,373.10
Agreement Totals	\$316,340	\$316,980*

*Totals reflect 3rd Quarter 2021 and will be updated based on final invoice in March 2022.

PROJECT MAP AND PHOTOGRAPHS OF PROJECT



Figure 1. Project location map



Figure 2. As-built map for Lower Sardine Meadow



Figure 3. As-built map for Cloudburst Meadow



Figure 4. As-built map for Upper Sardine Meadow.



Figure 5. Paired Pre- (2018) and post- (2021) restoration photos at Lower Sardine. Top: gully channel fill. Bottom: grade control structure.





Figure 6. Paired pre- (2018) and post- (2021) restoration photos at Cloudburst Meadow. Top: re-constructed grade control structure. Bottom: large headcut fill.





Figure 7. Paired pre- (2018) and post- (2021) restoration photos at Upper Sardine Meadow. Top: grade control structure. Bottom: large headcut fill.



Figure 8. Photos of Yosemite toad utilizing the restored area for breeding (left) and egg masses (right) in the restored area in Upper Sardine Meadow in May 2021. Egg masses are dark spots at the base of the flag.

PROGRAM/TECHNICAL REPORT

Brief Summary of Work Performed February 1, 2018 to January 31, 2022

Task 1 – Project Management and Administration

- Prepared and submitted 13 quarterly invoices, 14 progress reports and two project amendments that included budget and scope changes.
- Developed and executed subcontracts with: Forest Creek Restoration (formerly Todd Sloat Biological Consulting) to develop final restoration designs and implement restoration activities; Humboldt-Toiyabe National Forest (HTNF) to provide construction oversight and monitoring and Yosemite toad population and habitat monitoring.
- Worked with partners to ensure data were collected and stored appropriately and produced in formats acceptable for submittal to statewide databases and CDFW. Submitted Yosemite toad monitoring data to the California Natural Diversity Database (CNDDB). Submitted final project information/data to EcoAtlas Project Tracker, the UC Davis Clearinghouse, and CDFW. The Final Monitoring Report will be posted to the American Rivers website by February 28, 2022.

Task 2 - Environmental Compliance and Permitting

- Acquired all permits and environmental compliance including CEQA Notice of Exemption, NEPA Notice of Determination, Section 401 and 404 permits, and Caltrans Encroachment Permit.
- Completed monitoring and reporting for environmental and permit compliance.

Task 3 – Stakeholder Engagement and Outreach

- Engaged stakeholders of the Walker Workgroup and Sierra Meadows Partnership (SMP) from 2018-21. Attended the SMP annual meeting in 2018 and participated in ongoing bi-monthly calls. Presented project to the Walker Workgroup in November 2018 and led a site visit in July 2019.
- Leveraged the success of this project to engage partners and the stakeholders of the Walker Workgroup toward additional meadow restoration in the Walker Watershed, vetting and securing funding for project planning at two additional meadow restoration projects at Pickel and Grouse Meadows.
- Engaged partners and stakeholders to improve the ability of Yosemite toads to cross Highway 88 at Upper Sardine Meadow. Caltrans funded and installed two types of amphibian-friendly road crossing features for Yosemite toad in summer 2020 and is monitoring to determine efficacy.

Task 4 – Restoration Implementation

- Developed draft final design plans for all sites and submitted for CDFW engineering review. Following the review, American Rivers finalized designs that incorporated CDFW engineering feedback for Lower Sardine and Cloudburst Meadows in 2018 and had Forest Creek Restoration hire an engineer to redesign the grade control structure at Upper Sardine Meadow in 2019.
- Developed the Project Implementation Workplan and updated as needed.
- Completed restoration activities at all sites in 2018-19, followed by adaptive management.
 - Lower Sardine Meadow: Construction in 2018 included treating an eroded gully channel and swale, constructing a grade control structure, de-compacting a closed OHV route, re-routing a trail, installing erosion control features, and revegetation. In 2019, American Rivers and partners engaged Caltrans to fund and install two new culverts under Highway 108 to better disperse hillslope flows entering the meadow.
 - Cloudburst Meadow: Construction in 2018 and 2019 included arresting headcuts, treating gullied channel features, constructing a grade control structure, installing erosion control

features, and revegetation.

- Upper Sardine Meadow: Construction in 2019 included arresting headcuts, treating gullied channel features, constructing a grade control structure, installing erosion control features, and revegetation.
- Adaptive management occurred in 2019-2021. It included augmenting grade control structures, filling additional channels, and installing additional erosion control features.
- Prepared and submitted three Annual Summary of Restoration Activities reports for CDFW that included as-built designs for each site.

Task 5 – Monitoring and Adaptive Management

- Developed and finalized a Monitoring Plan including feedback from CDFW and partners.
- Conducted monitoring from 2018-21 in accordance with the Final Monitoring Plan. Monitoring included groundwater level, photo points, California Rapid Assessment Method (CRAM), headcuts, gully dimensions, and vegetation cover. The HTNF and US Forest Service Region 5 amphibian experts conducted Yosemite toad population and habitat monitoring.
- Analyzed data and compiled results into Annual Monitoring Reports for the 2018 and 2019 seasons. Developed and submitted the Final Monitoring Report in January 2022.
- Worked with the HTNF to develop the Long-Term Management and Grazing Management Plan. The sites were not grazed in 2019 and 2020. In 2021, Upper Sardine was not grazed and the HTNF installed temporary electric fencing in Lower Sardine Meadow to exclude sheep from work areas and Yosemite toad breeding sites in accordance with the US Fish and Wildlife Biological Opinion for the project.

<u>Task</u>	Description	Deliverables	Expected Completion Dates	Completed (Yes/ No) *	Date submitted to CDFW
1	Project Management and Administration	Quarterly Progress Reports	Due within 30 days following each calendar quarter (March, June, September, December) following grant execution	Yes	Quarterly July 30, 2018- January 31, 2021
		Draft Final Project Report	December 31, 2021	Yes	December 31, 2021
		Final Project Report	January 31, 2022	Yes	January 31, 2022
		Quarterly Invoices	Due within 30 days following each calendar quarter (March, June, September, December) after grant execution	Yes	Quarterly July 30, 2018- November 1, 2021
		Executed Subcontracts	Due within 30 days of Subcontract execution	Yes	April 24, 2019
		Proof of submission of special status	Due with Final Project Report: January 31, 2022	Yes	January 31, 2022

Deliverables

		species data to CNDDB and CNPS			
		Final Project Shapefile	Due with Final Project Report: January 31, 2022	Yes	January 31, 2022
		Proof of submission of final Project Information to EcoAtlas Project Tracker	Due with Final Project Report: January 31, 2022	Yes	January 31, 2022
		Proof of successful submission of relevant data to GeoTracker GAMA.	Due with Final Project Report: January 31, 2022	No – N/A for project†	
		Proof of successful submission of relevant data to the U.C. Davis Sierra Meadows Data Clearinghouse	Due with Final Project Report: January 31, 2022	Yes	January 31, 2022
		Final Monitoring Report posted on the Grantee's website	Due with Final Project Report: January 31, 2022	Yes	Will submit by February 28, 2022
		All Final Project Data	Due with Final Project Report: January 31, 2022	Yes	January 31, 2022
		Final Project Invoice	March 15, 2022	No	Will submit by March 15, 2022
2	Environmental Compliance and Permitting	Permits	Due 15 days before conducting on-the-ground work	Yes	Prior to August 1, 2021
3	Stakeholder Engagement and Outreach	Meeting Summaries	Due with subsequent Quarterly Progress Reports	Yes	November 2018, July 2019, November 2021, January 2022
4	Restoration Implementatio n	Draft Final Design Plans	May 1, 2018	Yes	April 19, 2018
		Final Design Plans – Lower Sardine and Cloudburst Meadows	July 1, 2018	Yes	July 13, 2018
		Draft Final Design Plans – Upper Sardine Meadow	August 1, 2019	Yes	August 16, 2019
		Final Design Plans –	September 1, 2019	Yes	September 23,

		Upper Sardine Meadow			2019
		Annual Summary of Restoration Implementation	December 31, 2018, 2019, and 2020	Yes	December 27, 2018; Jan 17, 2019; December 29, 2020
		Workplan Revisions, as needed	June 1, 2018, 2019, 2020	Yes	June 1, 2018; June 5, 2019; June 4, 2020
5	Monitoring and Adaptive Management	Draft Monitoring Plan	April 15, 2018	Yes	May 16, 2018
		Final Monitoring Plan	June 15, 2018	Yes	December 28, 2018
		Annual Monitoring Reports	April 15, 2019, 2020	Yes	April 15, 2019; April 17, 2020
		Final Monitoring Report	Due with Final Project Report: January 31, 2022	Yes	January 31, 2022
		Long-term Management Plan and Grazing Management Plan	Due with Final Project Report: January 31, 2022	Yes	January 31, 2022

*If no, summarize in Problems/Delays and Lessons Learned section below

⁺American Rivers discussed this requirement with the Lahontan Regional Water Quality Control Board and they determined it was not appropriate for the type of data collected. This was approved by the former grant manager Hildie Spautz.

Problems/Delays and Lessons Learned:

A few problems/delays and key changes occurred over the course of the project.

Final designs for Upper Sardine Meadow were delayed to address engineering improvements as required by the CDFW engineer review in August 2018. The project team worked with Waterways Consulting to conduct additional assessments and develop engineering designs, which the CDFW engineer approved in time to implement restoration activities at Upper Sardine Meadow in 2019. A lesson learned from this situation is to engage an engineer and/or CDFW early in project development to determine whether engineering is needed for specific project components.

Installation of the grade control structure at Cloudburst Meadow was delayed in 2018 due to constraints with transporting rock to the site. Access to the site is via a steeply graded dirt road. To address this, we developed a new borrow area to source the rock onsite. The HTNF archaeologist approved the new borrow area and installation was completed in fall 2019.

Presentation of the completed project at the SMP Annual Gathering in 2021 was not feasible because the event was cancelled due to the COVID-19 pandemic.

In December 2020, we worked with the Grant Manager to extend the grant term (via amendment) by one

season to allow for additional site observation and adaptive management activities.

An early-season snowstorm closed Highway 108 in October 2021, delaying installation of the funder acknowledgement sign. The sign is printed and ready for installation in spring 2022 when Highway 108 re-opens.

A general lesson learned is to conduct restoration and monitoring activities earlier in the field season for high elevation sites like Upper/Lower Sardine and Cloudburst meadows (~8000-9000 ft) that are accessed via roads that close seasonally due to snow.

Project Benefits and Results:

The Restoration of Priority Meadows in the Walker Watershed Project was highly successful and provided benefits to Yosemite toad and the Walker River watershed. Specifically, the project achieved Objectives 2, 5, 6, 7, and 8 (see Objectives Table below).

Objective 2: Protect intact wet meadow habitat and increase habitat for Yosemite toad on two meadow sites. The project directly restored 18.7 acres and projected 38 acres of meadow across three sites in the Upper West Walker watershed: Upper Sardine, Lower Sardine, and Cloudburst Meadows. The project treated a total of approximately 2,270 linear feet (0.43 miles) of erosional channel/swale features. Restoration arrested erosion that threatened the existing intact wet meadow at these sites. The project protected and enhanced breeding habitat for federally threatened Yosemite toad at Upper and Lower Sardine Meadows, and increased breeding habitat at Upper Sardine Meadow.

- Lower Sardine Meadow: Construction activities at Lower Sardine Meadow restored 10.1 acres of wet meadow. The project treated approximately 875 linear feet of eroding tributary swale and 580 linear feet of historic OHV road that threatened intact Yosemite toad breeding habitat. It also constructed approximately 660 feet of new trail to route foot traffic away from Yosemite toad breeding habitat. In partnership with Caltrans the project also installed two new culverts under Highway 108 to disperse flows and restore more natural sheetflow.
- Upper Sardine Meadow: Construction activities at Upper Sardine Meadow restored 2.6 acres of wet meadow. The project treated approximately 700 linear feet of erosional channel and swale features. This arrested erosion of channels and swales utilized by juvenile toads.
- Cloudburst Meadow: Construction activities at Cloudburst Meadow restored 5.5 acres of wet meadow. The project treated a total of 695 linear feet of erosional channel and swale features.

Objective 5: Increase understanding of restoration for/with Yosemite toads, and Objective 7: Quantify short-term benefits of restoration for Yosemite toads. The project conducted monitoring to quantify habitat benefits and advance the scientific understanding of the Yosemite toad populations at Upper and Lower Sardine Meadows. This project coincided with the beginning of a 10-year study that will provide invaluable information to US Fish and Wildlife Service (USFWS) about the toad populations at these sites. The HTNF conducted Yosemite toad population monitoring using Capture-Mark-Recapture (CMR) surveys during the breeding season in 2016-2021. Population and habitat monitoring data show that Yosemite toad are utilizing the restored area for breeding in Upper Sardine Meadow. The area had contained toads in previous surveys, but 2021 (post-restoration) was the first-time egg masses were found in this area of the meadow, indicating breeding and demonstrating the success of the project at enhancing and increasing breeding habitat (See Figure 8). In Lower Sardine, restoration did not directly restore areas utilized for breeding, but re-routed an OHV route and trail away from occupied breeding habitat to protect it from vehicles and foot traffic.

Objective 6: Catalyze additional meadow restoration in the watershed, and Objective 8: Produce

recommendations to streamline mountain meadow restoration project planning at sites with Yosemite toads. The project resulted in effective collaborations that improved the project and will catalyze future high elevation meadow restoration. Specifically, the project team successfully engaged Caltrans as a project partner at Lower Sardine Meadow to install two new culverts under Highway 108 in summer-fall 2019 to better disperse flows entering the meadow. The HTNF also engaged Caltrans to install two amphibian-friendly road crossing structures in Upper Sardine meadow to facilitate Yosemite toads crossing Highway 108 and accessing upland habitat. Ongoing monitoring at this site by Caltrans, the HTNF, and researchers will contribute to scientific understanding of Yosemite toad use of such crossings to inform future projects on Sonora Pass and other highway locations with toads. The Biological Opinion developed with USFWS can act as a template to streamline future efforts in the presence of Yosemite toad. In addition, American Rivers used the success of the project and Walker Workgroup stakeholder engagement to launch two additional projects in the Walker Watershed at Pickel and Grouse Meadows, vetting and securing funding for project planning from the National Fish and Wildlife Foundation. The HTNF is also interested in pursuing restoration at an additional site at Brownie Meadow, occupied by Yosemite toad. These projects will build on existing partnerships and apply lessons learned, such as engaging engineers early in the design process.

Estimated Co-benefits achieved to date:

The Restoration of Priority Meadows in the Walker Watershed Project also resulted in co-benefits. Specifically, the project achieved objectives 1, 3, 4 and 9 (see Objectives Table below).

Objective 1: Provide natural water storage, flood attenuation, cooling and filtering of water, improved aquatic and riparian habitat, and increased resilience under climate change, and Objective 4: Decrease sediment entering the Walker River watershed. A primary activity of the project was to treat erosional features that were contributing sediment to downstream waterways in the West Walker River watershed. The project reduced incision by one to four feet on 2,200 feet of channel across three meadows. It installed three grade control structures in three meadows to arrest large headcuts and protect habitat. It also filled and eliminated headcut migration for 21 headcuts across the three sites. Repairing incision will keep ground and surface waters in the meadow for a longer duration, improving natural storage in the upper watershed, reducing peak flood runoff, and cooling and filtering water. Groundwater monitoring at Lower Sardine indicated that groundwater was maintained within 1 feet of the meadow surface for at least 25 days annually post-restoration and installation of the culverts under Highway 108 raised the groundwater locally by ~0.5 feet. CRAM demonstrated that restoration improved the overall meadow condition and hydrologic condition at each site (see Final Monitoring Report for details). These characteristics will improve the meadows resilience to peak flows and drought conditions predicted under climate change.

Objective 3: Increase and improve habitat for additional meadow and aquatic species including Sierra Nevada yellow-legged frog, Cutthroat trout, yellow warbler, and Mountain whitefish. Project activities reduced downstream sedimentation, which will benefit native aquatic species downstream, such as Mountain whitefish, as well as historic Lahontan cutthroat trout habitat. The project helped re-establish and prolong saturated conditions at each meadow, conditions needed for focal bird species like yellow warbler. Although not currently occupied, the project enhanced wet meadow conditions and streambank conditions at Upper and Lower Sardine that could benefit Sierra Nevada Yellow-legged frog.

Objective 9: Increase extent of riparian shrub cover by 1.5 acres. The project included planting approximately 70 willow stakes in Lower Sardine meadow along 200 feet of Sardine Creek at the former road crossing to help reestablish cover and discourage motorized vehicle use. This included approximately 0.2-acres. The project also shows a minor trend toward improved plant vigor over baseline based on the Normalized Difference Vegetation Index (NDVI) at Lower Sardine and Cloudburst meadows (see Final Monitoring Report for details).

Summarize Benefits to Disadvantaged Communities (if applicable):

Not Applicable

Objectives

Project Objective number	Project Objective (as stated in Grant Agreement)	Objective met or exceeded? (Yes/No)*
1	Provide natural water storage, flood attenuation, cooling and filtering of water, improved aquatic and riparian habitat, and increased resilience under climate change	Yes
2	Protect intact wet meadow habitat and increase habitat for Yosemite toad on two meadow sites	Yes
3	Increase and improve habitat for additional meadow and aquatic species including Sierra Nevada yellow-legged frog, Cutthroat trout, yellow warbler, and Mountain whitefish;	Yes
4	Decrease sediment entering the Walker River watershed;	Yes
5	Increase understanding of restoration for/with Yosemite toads;	Yes
6	Catalyze additional meadow restoration in the watershed	Yes
7	Quantify short-term benefits of restoration for Yosemite toads	Yes
8	Produce recommendations to streamline mountain meadow restoration project planning at sites with Yosemite toads;	Yes
9	Increase extent of riparian shrub cover by 1.5 acres	Partial

*If No, please explain in Issues and Lessons Learned section below

Lessons Learned

A key lesson learned was to establish pre-project data earlier in project development (e.g. during planning). This lesson applied to groundwater monitoring and the toad habitat surface water monitoring. The groundwater wells were not installed until early in 2018 due to the timing of funding. We anticipated this would provide one year of early season data before the gully fill restoration activities in fall 2018. However, the wells took some time to equilibrate over the 2018 spring/summer season and the early season data was not reliable for comparison. We lost the opportunity for early season pre-project data specific to the gully fill. But as the culverts were not installed until fall 2019, we were able to use the 2018 and early 2019 data as partial pre-project data for comparison with groundwater conditions after the culverts were installed.

The project included the HTNF piloting a new technique of monitoring surface water to quantify potential toad breeding habitat at Lower Sardine. They collected data in 2017 with the USFS amphibian specialist but did not digitize the polygons (polygons were hand drawn). This monitoring did not occur in 2018 due to lack of coordination and capacity constraints during the limited breeding season. In 2019, the HTNF began collecting spatial data with a tablet, allowing for comparison of the spatial distribution of surface water between seasons. Again the 2019 data can provide partial data based on the culvert installation after the early 2019 monitoring. But it does not allow for analysis of whether restoration created new surface water in the gully fill restoration

area.

In addition, we did not install groundwater wells in Upper Sardine. Project partners anticipated Lower Sardine would show the most change in groundwater elevation and surface water as it restored an entire eroded channel feature (versus intermittent headcuts). So, we selected this site for more time and cost intensive groundwater and surface water monitoring. However, field observations and the toad population monitoring indicated that Upper Sardine may have exhibited as much or more change in these parameters resulting in new toad breeding in the restored area. Although cost prohibitive at the time, it would have been beneficial to conduct this monitoring for Upper Sardine as well.

Objective 9 to increase the area of riparian shrubs by 1.5 acres was only partially met due to changes in the project design at lower Sardine Meadow. The project originally planned to address streambanks and channel incision in Lower Sardine, but this element was ultimately removed due to concerns about the effect on existing toad breeding sites. Instead, the project planted approximately 70 willows (0.2 acres) along Sardine Creek to address the former road crossing. We anticipate additional shrub cover to establish at each site due to restored conditions that promote prolonged saturation; however, it would be unlikely to quantify significant change during the project, as willows grow very slowly at the high elevations of the project sites.