California Department of Fish and Wildlife
Environmental Enhancement Fund (EEF) Grant Program
Final Progress Report
Lower Hoke Meadow Restoration

Date: 2/28/2025

Agreement No.: Q2275067

Project Title: Lower Hoke Meadow Restoration

Grant Term: 8/23/2022 – 3/31/2025

Grantee: Truckee River Watershed Council

FISCAL REPORT

Fund Source	Amount Awarded	Total Amount Invoiced
CDFW EEF Grant Funds	$232,000	$231,929.47
Cost Share	$288,000	$288,000.00
Agreement Totals	$520,000	$519,929.47

PROGRAM/TECHNICAL REPORT

Brief Summary of Work Performed 8/23/2022 to 3/31/2025:

Task 1. Project Management and Administration
Throughout the grant period we completed the following management and administrative activities:

- Secured project permits
- Managed subcontractors
- Oversaw construction and monitoring activities
- Assisted with project monitoring
- Completed quarterly invoicing
- Completed quarterly reporting
- Submitted draft and final project reports

Task 2. Project Construction
We split project construction across two seasons. Work completed in 2023 consisted of:

- Final project layout
- Mobilization and site preparation

- Fill import and generation for partial gully fill
- Vegetation salvage
- Fill placement, shaping, and revegetation
- Riffle construction
- Demobilization
- Construction supervision
- Outreach and coordination:
    - We held one volunteer restoration day
    - We designed and installed funder acknowledgement signs at the project area
    - We featured the project in an e-newsletter article and one print newsletter
    - We coordinated closely with the landowner (US Forest Service)

Construction activities completed in 2024 consisted of:

- Final project layout
- Mobilization and site preparation
- Culvert installation
- Site stabilization and revegetation
- Demobilization
- Construction supervision
- Adaptive management/supplemental revegetation of 2023 work
    - Installed one additional willow mattress (all willows sourced on site, *Salix lemmonii*)
    - Maintained five willow fascines
    - Added two willow fascines
    - Spread native seed (upland mix) on decommissioned road
        - *Elymus elymoides, Elymus lanceolatus, Poa secunda, Lupinus argenteus, Purshia tridentata, Artemisisa tridentata*
    - Spread pine needle mulch on decommissioned road
    - Spread native seed (wetland mix) on channel fill areas
        - *Elymus trachycaulus, Hordeum brachyantherum, Deschampsia cespitosa, Potentilla gracilis*
    - Removed mullein (non-native, not considered invasive) from channel fill
- Outreach and coordination:
    - We hosted a site tour
    - We held one volunteer restoration day
    - We featured the project in an e-newsletter article and one print newsletter
    - We coordinated closely with the landowner (US Forest Service)

EEF funding was primarily used to support construction in 2024, particularly the culvert installation. A primary cause of channel incision in Hoke Valley is County Road 270 that crosses the meadow and bounds the downstream end of the project area. Where the channel intersects the road, it was directed into one single culvert, with an invert elevation approximately two feet below the meadow floodplain. Prior to project implementation, all flood flows travelling down the valley had to either pass through the culvert or breach the road berm, which had no additional flood flow culverts. Without correcting this downstream drainage, the project was at risk of future headcutting and potential erosion of fill that was placed in the meadow to reconnect historic stream channels.

In 2024, we added two additional culverts under County Road 270 and placed approximately 2 feet of

cobble embedment in the existing culvert. The additional culverts will allow flood flows to pass under the road without concentrating into the single culvert. This effective floodplain expansion will help to slow stream velocity throughout the lower meadow. Raising the bed elevation of the existing culvert will help match the grade of channel fill and prevent future incision.

Culverts were installed in late fall, 2024 and the site has been inaccessible due to snow. We will assess the effectiveness of the culverts as soon as the site is accessible in the spring of 2025.

Task 3. Pre- and Post-Project Management
We completed pre- and post-project monitoring activities to assess the project outcomes. Monitoring data collected include:

- Groundwater level
- Vegetation
- Bird site use
- Bumble bee site use
- Soil carbon
- Remote sensing
- Photo-monitoring

DELIVERABLES

Task	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) after grant execution	Yes	3/31/2023 6/30/2023 6/30/2024 9/30/2024 12/31/2024 3/31/2025
		Quarterly Invoices	Due within 30 days following each calendar quarter (March, June, September, December) after grant execution	Yes	3/31/2023 6/30/2023 6/30/2024 9/30/2024 12/31/2024 3/31/2025
		Draft Final Report	March 15, 2025	Yes	2/28/2025
		Final Report	March 30, 2025	Yes	3/7/2025

Task	Description	Deliverables	Expected Completion Dates	Completed (Yes/No)*	Date submitted to CDFW
		Final Invoice	March 30, 2025	**Yes**	12/31/2025
2	Project Construction	Complete Project Construction	October 31, 2023	**Yes**	12/31/2024
3	Pre- and Post-project management tasks	Complete Pre- and Post- project management tasks	December 31, 2024	**Yes**	3/31/2025

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

Problems/Delays and Lessons Learned:

We had significant delays associated with the culvert installation portion of the project. Initially, we solicited construction bids for the entire project – "meadow" and "culvert" construction but did not receive any bids for the combined work. We then split the project into two components and were able to successfully bid and award the contract for the meadow restoration portion. We did not receive any bids for the culvert work. We approached a local, qualified firm and were able to negotiate a contract for the work, scheduling the work for late fall, 2023.

The culverts required custom manufacturing, and the manufacturer fell behind schedule, causing the work to be delayed until 2024. The manufacturer fell further behind schedule, and the culverts did not arrive until October 2024, quite late in the construction season. However, weather cooperated, and we were able to install the culverts in fall 2024, finishing construction in November. We had some minor delays during installation, but the final product was installed to specifications, and we were pleased with the outcome.

Project Benefits and Results:

Anticipated project benefits included:

- Expanding habitat connectivity
- Improving wildlife habitat
- Increasing climate resilience
- Increasing carbon storage
- Public recreational benefits

Expanding habitat connectivity. The Lower Hoke Meadow improved meadow and riparian habitat connectivity in the eastern Truckee River Watershed. With our partners, TRWC has focused on improving meadow habitat throughout the Boca and adjoining Davies Creek watersheds for two decades. The Lower Hoke Meadow project increases habitat connectivity between the already completed Davies Merril, Sardine, and Dry Creek meadow restoration projects. Future restoration work is scheduled for Upper Hoke Meadow, Sayles Meadows (aka Davies Merril phase 2), and Little Truckee River tributaries south of Hoke Meadow. Taken together, these efforts greatly increase the available high-quality meadow and riparian habitat for wildlife.

Improving wildlife habitat. Vegetation monitoring data collected after project implementation indicate that Lower Hoke Meadow is transitioning away from upland type vegetation to high quality wet meadow habitat, increasing value for wildlife (Figure 1).

Increasing climate resilience. The Lower Hoke Meadow was designed to improve resilience against both flooding and fires. Data collected to date indicate that natural processes influencing climate resilience have been restored. Prior to project implementation, the stream was confined to a single, incised channel. Minor to moderate flood events did not access the floodplain, resulting in increased incision and erosion further damaging the meadow. We were able to restore natural hydrologic processes through partially filling the incised gully and reconnecting historic meadow channels. Water is now able to access the full valley floodplain and occupy historic, natural channels. Flood flows can spread out, slow down, and infiltrate into the shallow groundwater table. Instream erosion has been eliminated.

Wet meadows can act as fire breaks (Fairfax, unpublished data). Restoring the natural hydrology of Hoke Meadow has led to a rapid conversion to wet meadow habitat, which will greatly improve resilience against fire in the watershed.

Increasing carbon storage. Research has shown that restored wet meadows uptake carbon at very high rates, whereas degraded meadows emit carbon (Reed et al., 2020). However, it can take several years for soil properties to change sufficiently to measure a difference. We collected pre- and post- project samples, and surprisingly soil carbon increased after project implementation (Figure 2). Restored hydrology and conversion to meadow vegetation are strong indicators of increased carbon uptake (Sullivan, pers. comm.), so we expect to see even more improvement in carbon storage in the future at Hoke Meadow.

Public benefits. Hoke Meadow is located near a dispersed camping area and numerous roads and trails, however forest health projects closed the area to recreational use in 2024. The area should provide additional scenic enjoyment including enhanced bird watching opportunities once the area is re-opened to the public.

Estimated Co-benefits achieved to date:

The project provided a few co-benefits, including water quality improvement, water supply protection, and informing additional meadow restoration.

Water quality. Water quality should improve as a result of reduced instream erosion. By reconnecting the historic stream planform and promoting floodplain connectivity, water velocities are much reduced in the project area, decreasing erosive force on stream banks. Additionally, the added culverts and modifications to the existing culvert eliminated the knickpoint at the lower end of the project reach, which was also causing channel instability.

Water supply protection. Stampede Reservoir (immediately downstream of Hoke Meadow) is a major source of drinking water for the Reno/Sparks area, as well as critical water supply for the Pyramid Lake Lahontan cutthroat trout and cui-ui fisheries. The area is also identified as a high-risk fire area (USDA, 2020; Vibrant Planet and 34North, 2022). The restored meadow should be better adapted to mitigate effects of post-fire flooding and debris flows (Merrill, 2012).

Informing additional restoration. Lower Hoke Meadow restoration has directly influenced the restoration of Upper Hoke Meadow. We have incorporated what we learned from the restoration of the Lower Meadow into the design for the Upper Meadow, ultimately resulting in a more robust design for the next phase of the restoration.

Summarize Benefits to Disadvantaged Communities (if applicable):

We hired a construction company to complete the meadow restoration based out of Sierra Valley (Sierra and Plumas Counites, both Disadvantaged Communities), providing economic benefit to individuals within disadvantaged communities.

Additionally, Hoke Meadow is located within Sierra County (a DAC). The area around Hoke Meadow is heavily used for recreation including camping, OHV riding, bicycling, hunting, fishing, and bird watching. The improved meadow habitat will provide increased enjoyment of the area.

Objectives

Project Objective (as stated in Grant Agreement)	Objective met or exceeded? (Yes/No)*
Goal: Complete "stage 0" restoration of Lower Hoke Meadow	Yes
Objective: Re-establish natural hydrologic processes	Yes
Objective (long-term): improve habitat for willow flycatcher and other bird species	In progress*
Objective: Improve ability of meadow to support native pollinators	Yes
Objective: improve climate resilience	Yes

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

Issues and Lessons Learned

The project was identified through the Boca Watershed Assessment, funded by the National Fish and Wildlife Foundation. The assessment identified numerous restoration opportunities throughout the Boca watershed, and helped TRWC and the USFS prioritize which efforts to advance. Besides Lower Hoke Meadow, we restored three other meadow sites in 2021 and 2022 and are actively planning restoration of Upper Hoke Meadow.

*We completed annual monitoring for bird use of the project area, both pre- and post-project. We did not anticipate a major shift in bird use in 2024, and in fact, we assumed that there may be a temporary decrease in bird diversity and/or abundance in the year following restoration due to construction related disturbance. To reconnect the historic stream channels, we filled most of the existing channel that supported willow and wetland habitat. The filled areas are not fully revegetated, and planted willow stakes and mattresses will take several more years to mature to the size required for bird nesting habitat.

The number of bird species detected at Hoke Valley was essentially unchanged when 2023 (pre-) and 2024 (post-) project data are compared – 45 vs. 46. This is encouraging for the future trajectory of the Hoke Meadow restoration, given that 2023 was a very wet year (bias towards more diversity), and the site was still fairly disturbed in 2024 (bias towards less diversity).

Ultimately, the project should yield improved habitat for willow flycatchers. Willow flycatcher preferred nesting habitat includes willow (or other riparian shrub) thickets over standing water. The voids left in

the channel between fill now provide perennial water, improving on-site nesting habitat for this species. Hoke Meadow is located within the dispersal distance of known willow flycatcher territories, so colonization is feasible. Restoration of Upper Hoke Meadow will expand available habitat, further improving chances that the site may attract willow flycatchers.

Relevant Pictures, Maps, Data for this Report:

Results from pre- and post-project vegetation monitoring. Conversion to wet meadow habitat occurred rapidly, within the first year after project implementation.

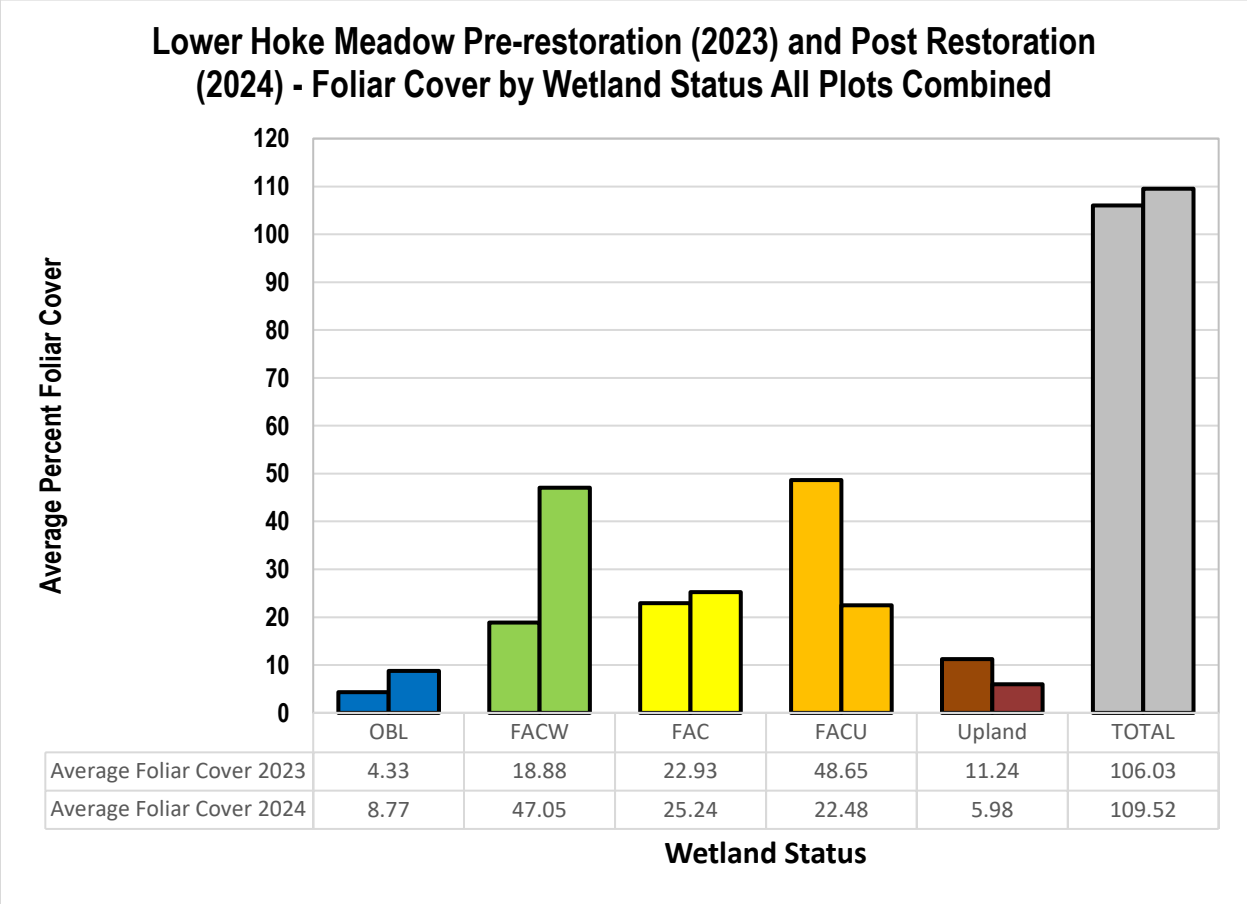

Figure 1. Lower Hoke Meadow, pre-restoration (2023) and post-restoration (2024). Composition by wetland status, all plots combined. The cover by wetland plants (OBL = occur in wetlands >99% of time and FACW = occur in wetlands 67 – 98% of time) increased one year after project implementation, and cover by upland plants (FACU = occur in wetlands < 34% of time and Upland = occur in wetland 1% of time) decreased.

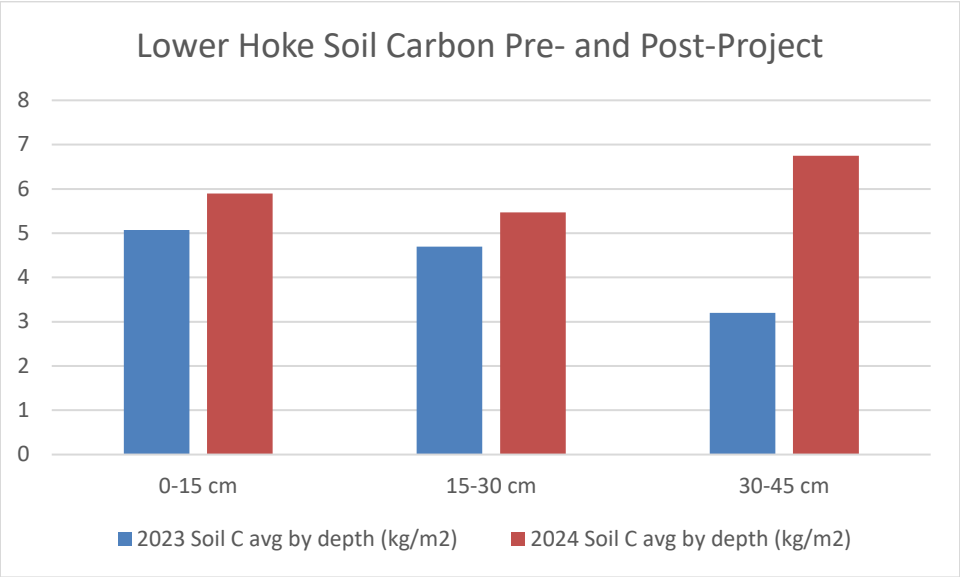

Figure 2. Lower Hoke Meadow Soil Carbon, by depth. Carbon stock increased slightly one year after project implementation.

Pre project conditions, July 21, 2023. The lighter gray-green vegetation is all sagebrush, and the darker green are grasses. 2023 was an extremely wet year, so vegetation was relatively lush when this picture was taken.

Post project July 2, 2024. Sagebrush has been outcompeted by wet meadow sedges and grasses. 2024 was a much drier year than 2023, so the dramatic shift in vegetation composition was unexpected given the short amount of time since restoration, and the dry year.

April 19, 2024 – water accessing meadow floodplain during spring runoff. Sagebrush in this area died out and was replaced by meadow species.

October 17, 2024 – assembling the culverts prior to placement.

November 19, 2024 – compacting fill placed around newly installed culverts.

November 25, 2024 – installed culverts, embankment seeded and mulched.

November 22, 2024 – cobble embedment placed in existing culvert to raise the base elevation.