

**CIBOLA NATIONAL FOREST & NATIONAL GRASSLANDS
MT. TAYLOR RANGER DISTRICT**

SHUSH KIN FEN RIPARIAN RESTORATION PHASE II

Proposed Action



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Summary

In 2021, the Cibola National Forest (the Cibola) began implementing Phase I of the Shush Kin Fen Riparian Restoration project (USFS 2021a). Partners in this work include the New Mexico Department of Game and Fish, U.S. Fish and Wildlife Service, Bat Conservation International, Rocky Mountain Elk Foundation, and the National Forest Foundation. The goal of the work is to restore a heavily degraded riparian ecosystem. The project area is located in the Zuni Mountains of the Mt. Taylor Ranger District in Cibola County, New Mexico. The completed work includes fencing of the fen and nearby springs and installation of new cattleguards to tie into a new pasture fence to better manage livestock grazing. The new pasture fence construction is in progress and estimated to be completed by fall 2026. Phase II of this project is now being planned. Additional actions are being proposed to continue the riparian restoration work at the Shush Kin Fen.

The Cibola has partnered with the New Mexico Environment Department (NMED) to plan Phase II of the project through an active agreement with NMED for *Fen Restoration Projects in the Carson National Forest and Cibola National Forest* (Agreement No. 25-CS-11030200170, Exp. 1/31/2028). The activities proposed in this phase include hummock repair and erosion control in the fen. These activities fall under project categories approved in the Decision Notice for the Northern New Mexico Riparian, Aquatic, and Wetland Restoration project (NNM-RAWR) (USFS 2021b). The purpose and need for this project are consistent with that of the NNM-RAWR decision. Per the requirements of that decision, a checklist of compliance items is being completed prior to authorizing and implementing the work (USFS 2026b). This proposal will be incorporated into the checklist.

Introduction

In 2021, the Mt. Taylor Ranger District of the Cibola authorized the first phase of riparian restoration plans at the Shush Kin Fen. To date, most of Phase I has been implemented. With support from partners, the completed work includes pipe rail fencing around the fen itself and 3 springs immediately downstream of the fen (Figures 1 and 2), the installation of 2 new cattleguards (Figure 3), and reconstruction of the Serna pasture boundary fence. The Cibola is now planning Phase II of restoration work to occur within the fenced area surrounding the fen.

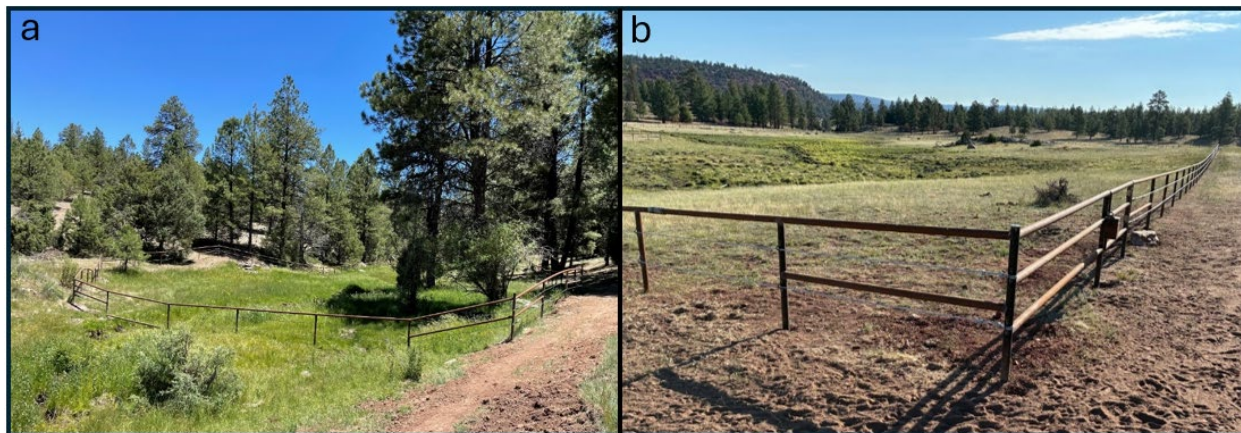


Figure 1. Pipe fence installed around a) springs adjacent to Shush Kin Fen and b) Shush Kin Fen.

The Shush Kin Fen has historically been a water source for the Agua Fria livestock grazing allotment and the wildlife and fish in the area. The fen is a unique riparian resource and an important ecological component of the surrounding area that has been severely degraded and reduced by overgrazing. Other water sources connected to the fen include multiple springs and a tributary to Bluewater Creek, also negatively impacted by overgrazing. Two Species of Conservation Concern (SCC) occur in the project area – the Rio Grande sucker and the Rio Grande chub. The area is near Critical Habitat for the Mexican spotted owl. The area also contains documented archaeological sites.

The recently constructed fencing has successfully excluded livestock from the fen and nearby springs. Riparian vegetation has begun to recover due to the removal of excessive trampling and overgrazing.

More work is needed to repair the severe hummocks that have been caused by heavy grazing. Erosion control structures are also needed to stabilize soil, protect and restore wetland vegetation, and increase water retention.



Figure 2. New cattleguards installed in 2023 to tie into the new Serna pasture fence.

Existing Condition

The Shush Kin Fen is a perennial spring- and runoff-fed wetland that has been severely degraded from years of overgrazing. There is widespread pedestalling and hummocked soils (root crowns exposed by erosion) with eroding plant communities (herbaceous forbs and grasses). The wetland is underlain by peat but due to historic overgrazing, several channels are forming and the peat is eroding, leading to accelerated soil loss and drying of the wetland. The surface water largely flows at the base of vegetation pedestals 14 – 24 inches lower than the soil surface of the hummocks. Survey and mapping of vegetation indicate that the historical width of the fen was likely more extensive in comparison to its current condition.

Approximately 80% of the fen shows damage from overgrazing as evidenced by livestock/game trails, bare soil, head cuts and incision, and exposed muddy soils from extensive hoof action. Research shows that a healthy high elevation fen should not have more than 5% of the total area with this kind of disturbance (Milford 2023). Recent livestock fencing around the fen is expected to improve vegetation cover but additional restoration interventions are expected to accelerate the ecological recovery of the wetland. Furthermore, native ungulates have not been excluded from the fen and therefore, some grazing pressure and surface disturbance is still present in the fen.

In 2023, soil elevation cross-sections were mapped along 3 transects in the fen (Figure 4). These data reveal erosion patterns not typically found in proper functioning montane wetland fens in which sheet flow rather than channel flow is expected ([Characterization and Restoration of Slope Wetlands in New Mexico, 2018](#)). The proposed action aims to restore sheet flow in the wetland and capture sediment to stabilize soils and support riparian vegetation, plant composition, and vigor.



Figure 3. Hummocks and evidence of severe hoof action in Shush Kin Fen, July 2023.

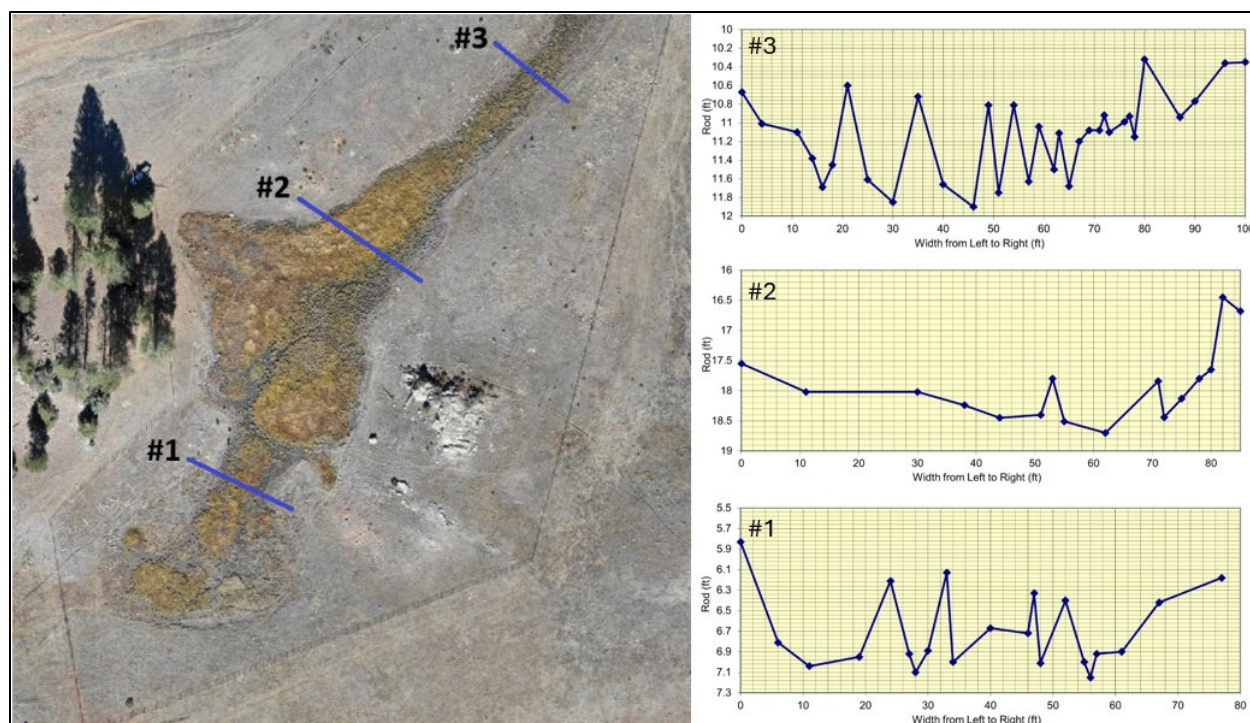


Figure 4. Soil cross-section transects of the Shush Kin Fen, Cibola National Forest, October 2023, upper watershed (#1=77 ft, #2=100 ft, #3=85 ft).

Desired Condition

The desired condition of the Shush Kin Fen is a properly functioning wetland ecosystem that can one day reach an advanced ecological status (USDOI BLM 2003). It may not be possible to restore the fen to its historic condition, but it can be restored to a state that supports soil stability, a robust native riparian/wetland plant community, and sustainable habitat that supports terrestrial and aquatic wildlife. The goal of the restoration design is to capture sediment to arrest and reverse erosion and subsequently increase water retention in the fen. The proposal aims to accomplish this by repairing the hummocks/pedestalling. This plan involves constructing sod swales and erosion control structures to raise and stabilize the soil elevation between hummocks so they can revegetate with native wetland species.

Phase II Proposed Action

The proposed action aims to restore hydrologic function and re-wet the former wetlands where trampling, trailing, and gullies have removed soils and wetland vegetation and reduced the water-holding capacity of the fen. The design is expected to preserve the remaining wetland habitat and support its expansion.

The design includes using local sod plugs harvested selectively from isolated hummocks placed on contour between hummocks that are less isolated to form a swale. The proposed sod swales

would be constructed in lines perpendicular to the slope to capture sediment in the areas of soil loss around hummocks. Minor additional materials may be needed; juniper needles, small branches to hold sod plugs in place and to capture sediment effectively. The sod swales are expected to dissipate energy from surface runoff and spread the seep of water from the fen to accelerate recruitment of native wetland plants.

Rock erosion control structures are also planned inside the fen. The structures include One Rock Dams (ORDs) and media lunas made from 6 – 18 inch rock that are placed on the surface of the land. The majority of rock structures will be built inside the most downstream portion of the fenced area where the channel dries out to reduce erosion, dissipate energy, and encourage sheet flow (Figure 5). The proposal will be further field-fit during implementation. As determined by the Cibola NF additional erosion control structures may be included to bolster the sod swales effectiveness.

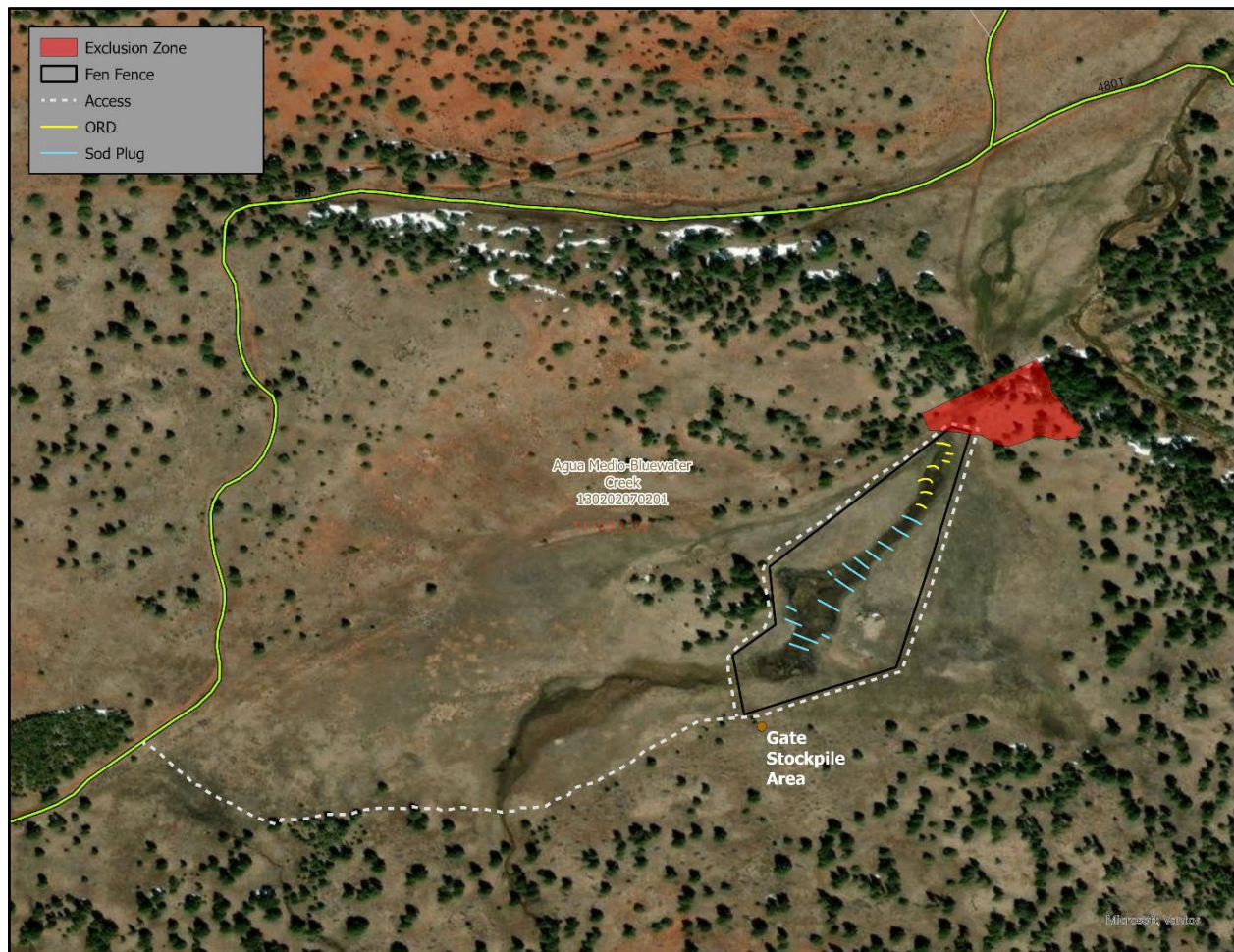


Figure 5. Phase II project activities. ORD = One Rock Dam.

After the hummock repair and erosion control structures are complete, the Cibola will raise the height of the existing fence to ~10 ft to temporarily exclude native ungulates for a prescribed period of time to allow the instream restoration actions in Phase II to take effect without disturbance by

large native grazers (Example in Figure 6). The extended fence would remain in place for ~2 years or until soil stabilization and riparian vegetation re-establishment is sufficient to withstand or be resilient to some level of native grazing. Environmental compliance for this part of the project is complete (USFS 2021a).



Figure 6. Example of native ungulate exclusion fence design.

Implementation

Appendix B of the NNM-RAWR Environmental Assessment includes project design criteria (PDCs) and best management practices (BMPs) applicable to the various covered restoration activities which prevent or mitigate potential negative impacts from construction of these features (USFS 2021b). A list of the BMPs and PDCs relevant to this project category and their respective applicability to this project can be found in Appendix A of this document. The only design feature applicable to this project is the following: *Structure types include, but are not limited to, rock check dams, filter weirs, media lunas, straw bale filter dams, sheet piling dams, log and boulder cross vanes, Zuni bowls, log step downs, rock plugs, rolling dips, water bars, out-sloping, drainage pipes, lead-off ditches, boardwalks, corduroy, one-rock dams, plug and pond structures, sod plugs, log mats, and rock/log rundown.* The proposed action is compliant with this measure because it includes sod plugs, rock check dams, and media lunas.

Implementation would be conducted primarily using pick-up trucks, ATVs, and trailers with rubber tires to transport materials on-site. No heavy machinery would be used inside the fenced area around the fen. Hand tools and wheelbarrows would be used to transplant the sod plugs and to construct the rock erosion control structures. Additional ground disturbance would be minimized by limiting the number of vehicles accessing the site to only those transporting rock materials. Soil compaction during construction would be minimized by using materials to reduce impacts from rock transport to swale locations (e.g., plywood, rock net). Access to the fen would be through Forest Service Road (FSR) 480T, which can be accessed from the South off of FSR 50. The access route would diverge from FSR 480T and travel cross-country (i.e., off MVUM roads) for

approximately 1,500 ft where it would reach and wrap around the fen fence (Figure 5). Supplies and materials would be stockpiled at the gated entry on the southwest corner of the fen fence.

No activities would be conducted within the archaeological exclusion zone (Figure 5). This is for protection of a documented archaeological site.

Monitoring

Pre- and post-implementation monitoring would occur to determine whether the wetland is approaching the desired conditions and/or adaptive management is needed. The Cibola and NMED-Surface Water Quality Bureau will collaborate to complete a Quality Assurance Project Plan. To determine effectiveness of the sod plug swales and erosion control structures, the following monitoring activities are proposed for the next 1, 3, or 5 years, depending on the necessary time to demonstrate substantial quantifiable change with high confidence.

1. At least one pre- and one post-implementation overhead drone flight would be conducted to collect digital orthographic imagery and map changes in estimated spatial extent of the wetted fen area.
2. Approximately 6 – 8 geo-referenced and monumented photo points of pre-implementation and 3 – 5 years post-implementation would be monitored to visually estimate change in vegetative cover and extent of visible hummocks.
3. Three soil elevation cross-section transects would be measured pre-implementation and for 3 – 5 years post-implementation to assess hummock infilling (i.e., connectivity and restoration of hummocks) and sheet flow conditions.
4. Three vegetation plots within the fen would be monitored pre-implementation and for 3 – 5 years post-implementation to evaluate changes in the vegetative community. Data on plant species richness, presence and relative abundance of wetland indicator species, and presence and extent of non-native invasive species would be measured. Monitoring plots would be established from a sample of plots that were surveyed in the associated Aquatics Resources and Wetland Delineation Report (USFS 2026a).

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