



Red and Bonita Fen Restoration Proposal
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Environmental Protection Agency
Region 8
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1.0 Overview

Mountain Studies Institute (MSI) proposes a major restoration project below the Red and Bonita mine site in the Bonita Peak Mining District starting in 2017. The proposal comes at the request of the EPA Region 8 Superfund removal program. MSI has successfully restored several other fen sites in the San Juan Mountains and has over 15 years of experience doing fen restoration and monitoring in the area.

A fen is a type of wetland that accumulates peat and is fed by groundwater. Fens form because their soils are permanently saturated, creating oxygen-free soils that slows decomposition rates and allows organic matter to accumulate. Fens form slowly over thousands of years and are refugia for rare, relict plant species left in the San Juan Mountains by the last glacial period.

Fens have been thought to be rare in the continental Western U.S. because of the hot and dry climate. However, it has recently become apparent that fens are numerous in the higher elevations of the Rocky Mountains and that they support endemic and wildly diverse flora and fauna. Fens require perennially saturated soils produced by nearly constant groundwater inflow to accumulate peat. Even small water diversions or depletions can reverse the process of peat accumulation that has been ongoing in many fens for more than 10,000 years and lead to fen destruction. Fens in the San Juan Mountains have been disturbed for various reasons, including mining of minerals in the peats and draining areas for larger construction interests. These impacts have affected plant communities, soils, erosion and water quality. Once the areas are denuded, frost heave, degraded soils, and lack of moisture affect the area's ability to regenerate on their own. Restoration has been shown to greatly increase the success of the revegetation of these areas.

Red and Bonita fen is considered to be a rare type of "iron fen," which in the San Juan's have been found to be disproportionately degraded (Chimner et al. 2010). Iron fens are acidic (Red and Bonita fen pH=3.8), accumulates metals, and hosts rare plants uniquely adapted to these conditions. The iron fens in the Southern Rocky Mountains occur from unique geology that weathers iron pyrite, which naturally creates acidic groundwater. These iron fens have very unique regional plant communities that are typically dominated by *Sphagnum* mosses and *Carex aquatilis* sedges.