



NONPOINT SOURCE SUCCESS STORY

New Mexico

Riparian Restoration Efforts Reduce Temperature and Sedimentation, Improving Polvadera Creek

Waterbody Improved

Off-road vehicle usage, rangeland grazing and a loss of riparian habitat contributed to increased temperature and sedimentation which degraded water quality in New Mexico's Polvadera Creek. As a result, Polvadera Creek was added to the Clean Water Act (CWA) section 303(d) list of impaired waters for temperature in 2000 and sedimentation in 2006. Following a CWA section 319 project with the Santa Fe National Forest (SFNF), which included riparian restoration practices such as native vegetation plantings and riparian livestock exclusion devices, water quality in Polvadera Creek improved. Due to these improvements, the segment was removed from the 2014 list of impaired waters for sedimentation and temperature.

Problem

Polvadera Creek (segment NM-2116.A_011) is in northern New Mexico near the town of Abiquiu (Figure 1). The creek flows north from its headwaters in the Jemez Mountains to its confluence with Cañones Creek, which flows into Abiquiu Reservoir on the Rio Chama in the Rio Grande Basin. The watershed is primarily in the SFNF; the main land use is rangeland grazing.

Water quality surveys as far back as 1996 and 1999 revealed that 14 miles of Polvadera Creek (from its headwaters to the confluence with Cañones Creek) were impaired by excess sediment and high temperatures. These impairments prevented Polvadera Creek from meeting its designated use of *high quality coldwater aquatic life* and resulted in the listing of the creek for stream bottom deposits in 1998 and temperature impairment in 2000. Stream bottom deposits were delisted as an impairment in 2004 based on the assessment protocol at that time; however, in 2006 the stream was re-assessed using the current protocols, and it was listed as being impaired by sedimentation once again. To meet standards for sedimentation, the creek has to comply with the narrative standard, which requires it to be free of fine sediment that would clog the natural substrate. To meet standards for temperature, the maximum stream temperature must be less than 23°C (73°F), and it cannot exceed 20°C for longer than four hours on three consecutive days (4T3). In 2004 the New Mexico Environment Department developed a total maximum daily load (TMDL) to address the temperature impairment on Polvadera Creek.

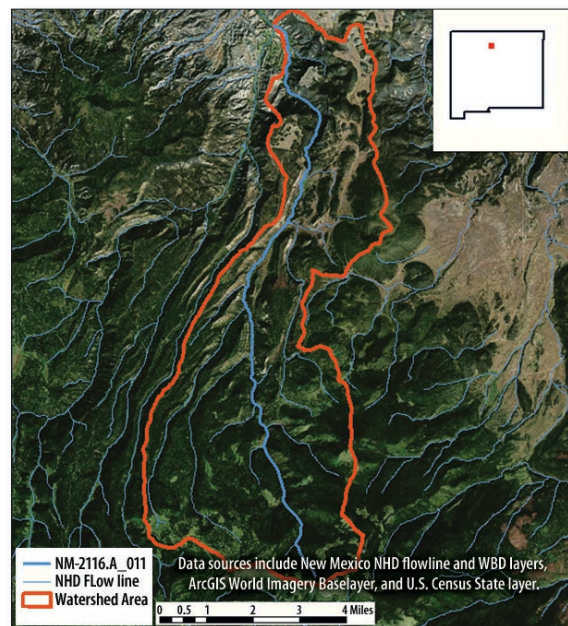


Figure 1. The Polvadera Creek watershed is in northern New Mexico.

Project Highlights

In 2009 the SFNF began a CWA section 319 restoration project to remove the temperature and sedimentation impairments in Polvadera Creek. The project had six major components:

1. **Riparian vegetation treatment.** Beginning in 2007, SFNF staff removed encroaching juniper bushes and planted willows. The treatment is credited with minimizing the impact of the 2010 South Fork Fire on the riparian corridor.



Figure 2. SFNF staff installed this steel pipe fence to prevent ATVs from accessing and damaging the riparian corridor in a recreation area.



Figure 3. This completed livestock "trick tank," an alternative water source installed in an upland area, reduces grazing pressure on the riparian corridor.

2. **Closing the stream corridor to all-terrain vehicles (ATV).** SFNF staff constructed the primary barrier of rocks and steel pipe fencing in 2009, and it successfully reduced erosion and sedimentation from ATV use (Figure 2). Maintenance is ongoing because vandalism has occurred.
3. **Beaver re-introduction.** The project area historically supported a robust beaver population, which had helped to create and maintain a significant wetland complex. The wetlands trapped sediment and increased baseflow, offering a buffer against high summer stream temperatures. Beaver re-introduction was planned but not carried out because of opposition by area farmers and ranchers; however, beavers reappeared in the project area on their own. With continued improvement of riparian habitat, the beaver population is likely to increase.
4. **Riparian fencing.** The riparian fence was constructed in 2001 and continues to be maintained. In 2009 an additional 0.5 miles of fence was added to the riparian fence to further protect the creek. Post-fire flooding has required significant maintenance work on the fence.
5. **Grazing allotment management.** A National Environmental Policy Act (NEPA) analysis was completed for the Polvadera Grazing Allotment in 2009, which resulted in the authorization of grazing under an Adaptive Management approach. This approach included actions such as the deferral of grazing in Rio Grande Cutthroat Trout areas until after July 15th and the installation of upland alternative water sources for livestock called "trick tanks." Completed in 2011 and 2012, these alternative water sources reduce grazing pressure in the riparian areas (Figure 3).
6. **Community education.** In 2009 the SFNF teamed up with Santa Fe Youthworks, a

nonprofit community organization that helps disconnected youth and families in northern New Mexico become engaged in community service. Youthworks and SFNF staff conducted two workshops on constructing fencing and fish habitat structures, as well as a workshop on careers in the Forest Service.

Results

Monitoring in 2012 revealed water quality improvements in Polvadera Creek. There were 30.5 percent sand and fines, which was above the 20 percent threshold for Mountain Site Class. However, the log Relative Bed Stability (LRBS) was -0.63, which is lower in absolute value than the threshold of -1.1 for Mountain Site Class. This indicated that although there was greater sand and fines, sufficient sediment transport capacity existed to protect aquatic life. In addition, the maximum thermograph temperature was 20°C, which met the standard. Therefore, in 2014 sedimentation and temperature were removed as causes of impairment for Polvadera Creek. The vegetation treatment was credited with preventing greater damage to the riparian corridor from the 2010 South Fork Fire. Deferring grazing helped protect the native Rio Grande Cutthroat Trout fishery.

Partners and Funding

The improvement in water quality in Polvadera Creek was the result of a collaboration between multiple partners. The SFNF, the primary cooperator, was responsible for implementing the project using \$41,000 of CWA section 319 funding. Santa Fe Youthworks provided education and outreach. Lastly, Polvadera Grazing Allotment permittees supported the restoration by modifying their grazing activities due to the aforementioned NEPA analysis.



U.S. Environmental Protection Agency
Office of Water
Washington, DC

EPA 841-F-15-001QQ
October 2015

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