



## Section 319

# NONPOINT SOURCE PROGRAM SUCCESS STORY

## New Mexico

### Controlling Sediment Improves a Native Cutthroat Trout Stream

#### Waterbody Improved

Historical overgrazing by cattle and elk herds damaged riparian areas and streambanks along Comanche Creek. Water quality surveys in 2000 and 2002 prompted the New Mexico Environment Department (NMED) to add the creek to the state's Clean Water Act (CWA) section 303(d) list of impaired waters for sedimentation and temperature. Reducing the number of cattle and implementing grazing management practices have improved water quality and habitat for the native cutthroat trout. In 2008 NMED removed sedimentation as a cause of the impairment of Comanche Creek on the state's list of impaired waters. Although the creek is still impaired because of temperature, data show improvements.

#### Problem

Comanche Creek is a scenic trout stream in the Valle Vidal unit of the Carson National Forest in northern New Mexico (Figure 1). The 10.3-mile-long creek drains a 43-square-mile watershed and empties into Rio Costilla (Costilla Creek), which flows into the Upper Rio Grande watershed in southern Colorado. The major land uses in the Comanche Creek watershed are forest (66 percent) and rangeland (33 percent). Today, the Forest Service manages the entire watershed.

Until 1982 the Comanche Creek watershed was under private ownership and subject to intense grazing from cattle and elk herds. Substrate analyses conducted in the creek by NMED in the 1990s recorded a high frequency of very small sediment particles. A water quality survey conducted in 2000 showed that the creek was failing to support its high-quality aquatic life use because of excessive sediment. New Mexico's general narrative water quality standard for stream bottom deposits requires that surface waters be free of contaminants from other than natural sources that will damage or impair aquatic life or significantly alter the physical and chemical properties of the bottom. At the time of the initial listing, the state used a target maximum of 20 percent fines (particles less than 2 millimeters in size) to assess stream bottom deposits. On the basis of the sediment data, NMED added a 4.3-mile segment of Comanche Creek to the CWA section 303(d) list of impaired waters for sediment in 2000. In 2006 the sediment-listed portion of the creek was expanded to cover a 10.3-mile-long segment (NM-2021.A \_ 827).



Figure 1. A restored section of Comanche Creek in the Valle Vidal unit of the Carson National Forest, 2012.

Water temperature data collected in 2002 indicated that the creek exceeded the state's numeric water quality criterion: Temperature must remain below a maximum of 23°C (73°F). On the basis of these data, in 2004 NMED added temperature to the list of impairments on Comanche Creek. Rangeland grazing from cattle and elk was listed as the probable source of the impairments. NMED developed a total maximum daily load (TMDL) for temperature for the Upper Rio Grande (which includes Comanche Creek) in 2004; no sediment TMDL was developed.

#### Project Highlights

In 1982 a private landowner, Pennzoil, donated 100,000 acres of its Vermejo Park Ranch property to the Forest Service. The Forest Service immediately suspended domestic livestock grazing for two years and established a new stocking rate to allow



Figure 2. A cut bank on Comanche Creek, before treatment.



Figure 3. The same cut bank on Comanche Creek, after installation of post vanes.

vegetation to begin to recover. Since then, the Forest Service has closed approximately 300 miles of unpaved access road in the Valle Vidal area.

In 1991 NMED and Carson National Forest cooperated on a CWA section 319 grant project that stabilized erosion along Comanche Creek. In 2001 and 2004, NMED awarded CWA section 319 grants to the Quivira Coalition, a local nonprofit organization, to implement restoration work in Comanche Creek. The projects included installing more than 50 small exclosures to restrict elk and cattle grazing, 130 post vanes (a series of posts pounded into the streambed to deflect water flow away from the streambank), several Zuni

bowl rock structures (rock-lined step pools) to arrest headcut migration, and 75 upland structures to control erosion (Figures 2 and 3). Project partners also improved drainage and culverts on eight miles of road, planted willows and sedges, and conducted planning, design, coordination and monitoring. The Quivira Coalition conducts annual workshops that engage volunteers in maintaining the exclosures and other structures.

In 2008, similar restoration work in Comanche Creek continued under the River Ecosystem Restoration Initiative (RERI), a state-funded program patterned after the CWA section 319 program. The RERI project realigned the channel away from the bank to stop erosion on a very high cut bank along a meander bend. In addition, the Quivira Coalition initiated a new project in 2012 to improve and protect wetlands on slopes within the headwaters of Comanche Creek. The Comanche Creek watershed restoration projects have been conducted in the context of two watershed plans developed by the Quivira Coalition—the *Comanche Creek Watershed Preliminary Assessment Report* (2001) and the *Comanche Creek Watershed Restoration Action Strategy* (2005).

## Results

Restoration projects have improved water quality and habitat for the native cutthroat trout, which has been reintroduced to Comanche Creek. The creek was surveyed in 2000 and again in 2006. Pebble counts showed that percent fines decreased from 44 percent to 3 percent over that period, indicating significant sediment load reductions. Benthic macroinvertebrate surveys were also conducted, but the assessment methodology changed during the course of restoration work, making before-and-after comparison of bio-scores difficult. The bio-scores, however, did change from an “impaired” category before restoration to a “non-impaired, full support” category after restoration. Furthermore, comparisons of cross sections before and after restoration show a statistically significant decrease in bankfull width and width-to-depth ratio, indicating a decline in sedimentation. On the basis of these data, NMED removed sedimentation as a cause of impairment for the 10.3-mile segment of Comanche Creek on the 2008 CWA section 303(d) list. Statistical tests have indicated that summer maximum temperatures in Comanche Creek have decreased as well. The creek exceeds the state’s current water quality numeric criteria for temperature, however, and will remain listed as impaired for temperature.

## Partners and Funding

Key partners in the restoration effort were NMED, the Forest Service’s Carson National Forest and the Quivira Coalition. Other partners included the Albuquerque Wildlife Federation (contributed volunteers for restoration work), New Mexico Game and Fish (carried out Rio Grande Cutthroat Trout reintroduction), Trout Unlimited (contributed volunteers), the Santa Clara Fire Crew and the Gallup Youth Conservation Corps.

Several CWA section 319 projects have taken place in the watershed. In 1991 NMED and the Carson National Forest cooperated on a \$1,273,012 CWA section 319 grant to implement erosion control. The Quivira Coalition led two projects between 2001 and 2008 using \$361,075 in CWA section 319 funds (and another \$317,262 in matching funds and in-kind labor). State nonpoint source program members had oversight responsibility and coordination roles in each of these projects.

The Quivira Coalition also received state-supported RERI funds in 2008 (\$157,900) and 2011 (\$199,171) to conduct additional restoration projects.



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