Section 319
NONPOINT SOURCE PROGRAM SUCCESS STORY
New Mexico

Watershed Program Reduces Sedimentation

Waterbody Improved

A reach of the Rio Cebolla in the Jemez Mountains of north-central New Mexico was documented as impaired because of excessive sediment. Assessment data prompted the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB) to add a 9.1-mile segment of the Rio Cebolla to the 1998 Clean Water Act (CWA) section 303(d) list of impaired waters for sediment. The U.S. Forest Service (USFS) implemented *Respect the Rio* (RtR), a program using public outreach, culvert replacement, road and trail drainage improvements, and fencing to manage movement of livestock and recreational vehicles to reduce sedimentation. Sediment levels decreased, and NMED removed the 9.1-mile Rio Cebolla segment from the state's 2008 CWA section 303(d) list of impaired waters.

Problem

Rio Cebolla originates in the Santa Fe National Forest in the Jemez Mountains approximately 12 miles east of Cuba, New Mexico. It is a tributary to the Guadalupe and Jemez rivers, and most of the watershed is on USFS land. Surveys in the Jemez River Basin documented several exceedances of New Mexico water quality standards for stream bottom deposits on a 9.1-mile segment from the confluence of Rio Cebolla with Rio de las Vacas to Fenton Lake. Because the segment did not support the designated use of high-quality, cold water fishery, NMED added it to New Mexico's 1998 CWA section 303(d) list of impaired waters for sediment.

In 2003 NMED completed a total maximum daily load (TMDL) for sediment for the Rio Cebolla. The TMDL identifies runoff from rangeland and roads (Figure 1) as potential sediment sources. The TMDL established target levels that are based on relationships between embeddedness (the degree to which fine sediments fill the spaces between rocks on a stream bed), fines (sediment particles that are 2 millimeters or smaller), and biological score. Those relationships show that at the desired biological score, the target embeddedness (for fully supporting a designated use) would be 45 percent, and the target fines would be 20 percent.

In 2006 NMED revised the sedimentation/siltation assessment protocol for wadeable streams in New Mexico's Mountain Ecoregion. The protocol evaluates percent fines and uses a Macroinvertebrate Stream Condition Index (M-SCI) in comparison to a reference stream. The combined score of the biological and physical parameters indicates if the stream reach is non-supporting or full supporting. For example, a reach is considered non-supporting if percent fines are more than 28 percent over the reference stream and the M-SCI score is less than 56.70.

Figure 1. This August 2003 photo shows erosion damage from off-road vehicle use near Rio Cebolla.

Project Highlights

USFS staff from the Santa Fe National Forest initiated the RtR program in 2001, following a 1999 CWA section 319-funded project that was specific to the Rio Cebolla. The RtR program was implemented in three phases: 2001 to 2004 (phase I), 2005 to 2008 (phase II), and 2008 through the present (phase III). The program addresses the three primary land use activities of concern—recreation, grazing and roads.

Figure 2. New Mexico Trout volunteers build fences to prevent cars from travelling off-road.

Figure 3. The same location as shown in Figures 1 and 2 after fencing and restoration were complete.

Dispersed recreation contributes significantly to degraded water quality, so the program includes a major education and outreach component aimed at the recreational users of the national forest area. An aggressive outreach campaign effectively increased awareness and educated people on ways to protect the stream. Program partners further reduced recreational impacts by installing fences to prevent vehicles from crossing the stream (Figure 2). The partners then worked to restore the closed areas (Figure 3).

Another component of the RtR program was to improve riparian conditions through better grazing management. For instance, in the past, grazing permittees would drive the livestock on foot through the watershed and riparian areas to the winter pastures. Now, grazing permittees more frequently transport their livestock to other pastures using vehicles. Grazing in riparian pastures is limited to two weeks per year. Additionally, old fences were replaced as needed, and upland stock tanks were constructed to relieve concentrated grazing in the riparian areas.

Project partners also helped reduce impacts from roads. They replaced two culverts, which helped to improve floodplain function, reduce bank erosion and improve fish passage. Partners also improved road drainage on selected road segments by installing French drains using permeable material to facilitate seepage. In one case, partners installed three French drains to reconnect an adjacent wet meadow with springs that the road had previously intercepted. Those actions have considerably improved the stream conditions, because road impacts were a significant factor on the Rio Cebolla.

The RtR program will continue and has been funded to expand into other watersheds, and the USFS will continue to maintain and monitor the improvements achieved on the Rio Cebolla.

Results

NMED conducted water quality surveys on Rio Cebolla in 2005, which show that both percent fines and mean percent embeddedness decreased (Table 1). When NMED applied its revised sedimentation/siltation assessment protocol to the 2005 survey data, the results indicated that this reach of the Rio Cebolla was in full support with respect to sedimentation. Therefore, NMED removed the 9.1-mile segment from the 2008 CWA section 303(d) list of impaired waters for sediment.

Table 1. Water quality survey results for Rio Cebolla above Rio de las Vacas

Survey year	Percent fines	Mean embeddedness
1998	28%	53%
2005	23%	25%

Partners and Funding

The Santa Fe National Forest received several CWA section 319 grants to conduct the program. Numerous partners helped restore Rio Cebolla, including New Mexico Trout, Habitat Stamp Program, New Mexico Game and Fish, Trout Unlimited, Backcountry Horsemen, individual permittees and landowners, Jemez Valley and Cuba schools, Boy and Girl Scouts of America, Student Conservation Association and Forest Trust Youth Conservation Corps. The program was patterned after a similar USFS program in the Pacific Northwest.

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