

**Prepared Pursuant to the Clean Water Action Plan and
Unified Assessment of New Mexico Watersheds**

**Jemez Watershed
Restoration Action Strategy
(WRAS)**

Revised August 2005



Jemez Watershed Restoration Action Strategy

**Prepared by the Jemez Watershed Group
under a 319 Grant administered by The Meridian Institute
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Contents

INTRODUCTION	2
I. FORMATION OF THE JEMEZ WATERSHED GROUP	4
II. PUBLIC OUTREACH AND EDUCATION	6
III. WATERSHED ASSESMENT/INVENTORY	8
<i>LOCATION:.....</i>	8
<i>HYDROGEOLOGY:</i>	8
<i>SURFACE WATER:</i>	8
<i>POINT SOURCES OF DISCHARGE:</i>	8
<i>TOPOGRAPHY:</i>	8
<i>SOILS:</i>	8
<i>VEGETATION & PRECIPITATION:</i>	8
<i>LAND STATUS:.....</i>	9
IV. WATER QUALITY PROBLEMS	13
<i>SITES AND ISSUES IDENTIFIED BY THE JWG.....</i>	13
<i>WATER QUALITY EXCEEDANCES.....</i>	19
V. WATER QUALITY GOALS	19
<i>TMDL REACHES</i>	19
<i>PROPOSED POLLUTANT LOAD REDUCTION TO ACHIEVE WATER QUALITY GOALS</i>	20
VI. RECOMMENDED ACTIONS TO ADDRESS SITES OF CONCERN.....	23
VII. MONITORING AND EVALUATION.....	28
VIII. FUNDING.....	28
Appendix A – Contact List.....	30
Bibliography.....	37
Other Resources.....	37

INTRODUCTION

The Jemez River is a tributary to the Rio Grande, located in north central New Mexico (Figure 1). Its watershed is defined as Hydrologic Unit Area (HUA) #13020202. The Jemez Watershed was identified in New Mexico's Unified Watershed Assessment (UWA) as a Category I watershed: a watershed in most urgent need of restoration. The contributing watershed to the Jemez River is approximately 1,034 square miles and the total length of the Jemez River is approximately 65 miles to its confluence with the Rio Grande. The watershed is dominated by both forest and rangeland on mostly USDA Forest Service, Tribal, and private land. The Jemez watershed is almost entirely in Sandoval County. It includes the villages of San Ysidro, Jemez Springs, unincorporated areas surrounding them, as well as the Pueblos of Zia, Jemez, and some Santa Ana tribal lands.

The federal Clean Water Act requires each state to identify surface waters within its boundaries that are not meeting, or expected to meet, established water quality standards. Through section 303(d) of the Act, the federal government requires states to prioritize their listed waters for the development of Total Maximum Daily Loads (TMDLs). A TMDL is a budget for the influx of pollutant into a watercourse. The New Mexico Environment Department (NMED) Surface Water Quality Bureau (Bureau) is actively developing TMDLs and load allocations for many priority rivers, creeks and streams across the state. The state of New Mexico has 20 years to develop TMDLs, starting in 1997. Where waters show exceedences in TMDLs, the Bureau relies on a voluntary approach to correct the pollution. The Clean Water Act does not regulate nonpoint sources, but relies on states and other entities (such as collaborative watershed groups) to develop best management practices (BMPs) to help reduce pollution loading.

The Bureau completed TMDLs for many of the reaches of the Jemez watershed in December 2002, including Clear Creek (turbidity and total organic carbon), Jemez River (Chronic aluminum, turbidity and stream bottom deposits), Sulphur (for pH and conductivity), Redondo & San Antonio Creeks (temperature and turbidity), East Fork of the Jemez River (turbidity), Rio Cebolla (stream bottom deposits), Rio de las Vacas (temperature and total organic carbon), Rito Peñas Negras (stream bottom deposits, total organic carbon, and temperature) and the Rio Guadalupe (Chronic aluminum, turbidity and stream bottom deposits). Potential sources of stream impairment are thought to be soil erosion resulting from a variety of natural and other activities such as grazing, recreation, stream bank modification/erosion, removal of riparian vegetation, silviculture, road construction and maintenance, channel widening, and other unknown causes.

The Clean Water Action Plan asks each state to prepare a Watershed Restoration Action Strategy (WRAS) for the priority watersheds identified in the UWA. The WRAS should list specific water quality problems; identify sources of contamination causing those problems; and provide a schedule of action items to be undertaken to abate those sources along with estimated funding requirements to perform these actions. A WRAS is a non-regulatory, voluntary approach to addressing nonpoint source impacts to water quality. Nonpoint source pollution does not originate from one source, such as through a pipe or from a tank, but rather originates from multiple sources over a relatively large area. Nonpoint sources can be divided into source activities related to either land or water use including failing septic tanks, improper animal-keeping practices, forestry practices, and urban and rural runoff. A WRAS is considered to be a work in progress, to be updated every couple of years to reflect changing conditions. A WRAS is based not on legal obligations but on a desire to restore watershed health and water quality

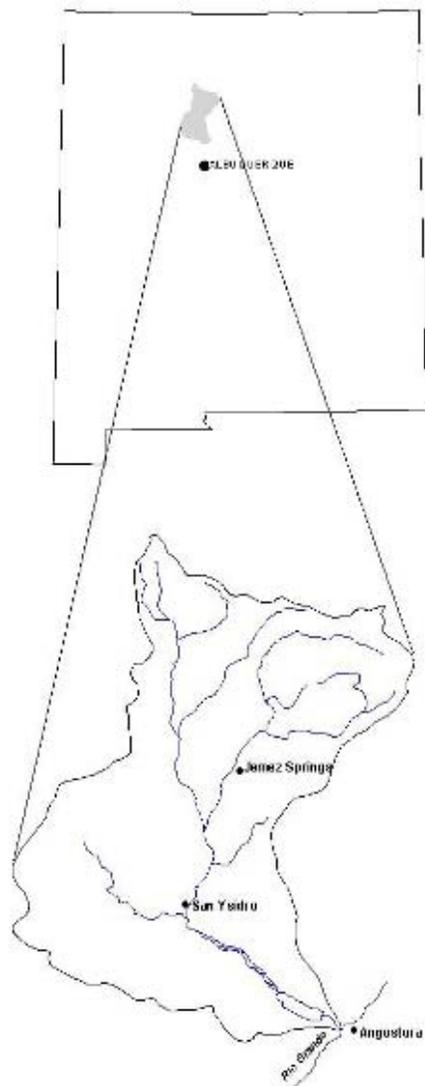


Figure 1. Site Location - Jemez Watershed

through the strength of community cooperation, and open communication among local residents, agencies, and other stakeholders. It is a general blueprint for a comprehensive, watershed-wide restoration program, one project at a time.

The initial draft of the Jemez WRAS was developed over a period of months, starting in the spring and into the early fall 2004. The WRAS was completed and submitted to the Bureau in October 2004. The content and structure of the WRAS was drawn from local community knowledge provided at public meetings of the Jemez Watershed Group, and from the input of the WRAS Subcommittee which met on several occasions. The WRAS was updated in August 2005, integrating accomplishments over the past year and additional details on field projects to improve water quality. Published resources on watershed conditions are listed at the back of this document.

I. FORMATION OF THE JEMEZ WATERSHED GROUP

Based on the results of the TMDL Report on the Jemez River completed in December 2002, the Bureau issued a request for proposals for the formation of a collaborative community watershed group to help address nonpoint sources of pollution and other watershed concerns that might be identified in a collaborative process. The Bureau selected the Meridian Institute to provide facilitation, outreach and coordination services to evaluate the interest in forming a collaborative watershed group and provide facilitation services should a group be formed. Starting in September 2003, Meridian spent several months contacting residents and other interested stakeholders in the Jemez watershed to learn more about the activities, interests and concerns of stakeholders within the watershed, identify key stakeholders, and begin to educate stakeholders about a possible watershed process. The first public meeting took place in February 2004, thus forming what is now referred to as the Rio Jemez Watershed Group (JWG).

The JWG developed an organizational structure, including a process for guiding its discussion and making decisions at its meetings. The group meets on a quasi-monthly basis. Each meeting is facilitated and documented by a neutral convener. The group has also formed several subcommittees to address a selection of educational programs and to develop the initial draft of the WRAS. JWG members feel that they are, in part, formalizing their organizational structure and future direction in this WRAS.

JWG Members agreed on the need for diverse stakeholder representation, and identified individuals and stakeholder groups to be involved. Stakeholders currently involved in the JWG include members of the general public, representatives of acequia associations, water users, private landowners, local government, environmental groups, state and federal agencies, and some of the Pueblos. Representatives of the Jemez Pueblo are tracking the development of the JWG and have been present as observers at meetings. A list of individuals contacted thus far in the process is presented in Attachment A. A number of these individuals have attended one or more JWG meetings.

Members of the JWG also agreed on the need to be educated about other current and past planning and analysis efforts regarding water quantity, quality and watershed health and to integrate these efforts into the WRAS as appropriate. The most comprehensive of these efforts was the collaborative development of the Rio Puerco y Rio Jemez Sub-Regional Water Plan 2000-2050 (the Water Plan).

Members of the steering committee presented an overview of the plan as well as the planning process to the JWG over the period of several meetings. The wealth of information provided by the Water Plan greatly assisted the JWG in developing the WRAS. Of particular value was the identification of visions, values, missions, and goals within the plan. These represented input from more than 175 people over the course of the planning process.

The JWG agreed to base the goals and objectives of the WRAS on the visions, values, missions, and goals identified in the Water Plan. The goals and objectives the JWG feel most closely characterize the current concerns and interests of the JWG are as follows:

MISSION STATEMENT:

The JWG promotes a sustainable balance between the availability and use of water, healthy watersheds, and retention of a rural lifestyle to benefit local communities and residents.

Based on the mission developed in the sub regional water planning process.

The following goals and objectives are listed in no order of priority. The goals and objectives have been assigned numbers and letters for discussion purposes only.

Goal 1: Restore and manage the watersheds on public and private land to enhance water retention and quality and to preserve natural systems dependent on water.

Objective 1A: Restore fire-adapted ecosystems.

Objective 1B: Decrease soil erosion and increase water retention and infiltration.

Objective 1C: Reduce, prevent, and repair incising of arroyos.

Objective 1D: Repair, increase and enhance habitat along streams, arroyos, and in wetland and riparian areas.

Objective 1E: Increase the bio-diversity and productivity on public and private lands.

Objective 1F: Support locating and eradicating non-native, invasive plants on public and private lands.

Objective 1G: Promote sustainable sources and adequate distribution of rangeland water.

Objective 1H: Support the beneficial role of agriculture and ranching within the ecosystem.

Objective 1I: Maintain the scenic and ecological condition which has attracted people to the Jemez watershed for over 1000 years.

Goal 2: Promote education for all who live, work or visit the area regarding the connection between land use, water, and the environment as well as the importance of water protection and conservation.

Objective 2A: Create water conscious communities and assist future generations in learning about water.

Objective 2B: Promote the importance of a healthy and functioning watershed in sustaining the work, livelihood, and quality of life in the area.

Objective 2C: Capitalize on the wealth of traditional knowledge and available technology to educate people on water-wise practices.

Goal 3: Provide for monitoring the implementation of the WRAS

Objective 3A: Develop consistent and practical monitoring methods that can be used by a variety of landowners and managers.

For additional information on the Water Plan, the reports and analysis prepared during the planning process, as well as the entire Water Plan are available online at www.WaterAssembly.org, or at cost from Mid-Region Council of Governments at 247-1750 or from Cuba Soil and Water Conservation District, P.O. Box 250, Cuba, NM 87013.

In the context of the goals and objectives listed above, the JWG identified a set of sites impacted by nonpoint sources of pollution as described in Section IV WATER QUALITY PROBLEMS. They proposed solutions to address the root causes and sources of the contamination observed at these sites as outlined in Section V RECOMMENDED ACTIONS TO ADDRESS SITES OF CONCERN.

II. PUBLIC OUTREACH AND EDUCATION

The residents of the Jemez watershed have historically worked together to address a variety of water quality and quantity issues. Key participants in these efforts have included representatives of various acequias, Pueblos, municipalities, and other stakeholders having interest and concern about water resources in the Jemez watershed. Three recent efforts of note are:

1. The stakeholder discussions and proceedings regarding the non-Pueblo, non-federal proprietary water rights in the Jemez River stream system - adjudication establishing the rights to water available to be diverted or impounded and to beneficially use the public surface and underground waters.
2. The ongoing stakeholder involvement with the Rio Puerco y Rio Jemez Subregional Water Planning process.
3. The USFS's Respect the Rio (RtR) program is a combination of environmental education, watershed restoration, and public involvement that empowers local communities and forest users to participate in watershed restoration. The program identifies specific activities ready for implementation that would benefit riparian zones, land use, and water quality. This project concentrates on overall watershed health by incorporating treatment of dense forest stands, meadow maintenance, livestock grazing, roads, and recreation management.

The education campaign is an incredibly important component in the long-term success of Respect the Rio. From students to campground users to dispersed recreators, Respect the Rio has directly reached over 5,000 people during the past 2 years. Thousands more have been reached through a multi-media campaign that includes informational table tents and placemats in local restaurants, interpretive signs located at key areas within the Guadalupe Watershed, a website, newspaper articles, advertisements, and interpretive panels and native fish aquarium at the Walatowa Visitors Center.

Most recently, the JWG was formed in response to the need to involve the public in addressing the surface water quality concerns identified in the TMDL Report on the Jemez River. The JWG is a volunteer group which is open to and inclusive of any member of the public with interest in water and/or watershed health. JWG meetings take place on a quasi-monthly basis and are structured around concerns and interests of attending members. All meeting documentation (agenda, summaries, attendance lists, meeting materials, contact lists, and other miscellaneous documentation) is kept on file by the JWG convener. All individuals contacted in the convening process and attending meetings receive all meeting documentation, and other notification about educational events and funding opportunities via e-mail or by regular mail. When possible, the local paper posts notification of the meetings. Identification of and contact with additional stakeholders is and will be a continuous task for the group.

The JWG has agreed on the need to be educated about other current and past related activities regarding water quantity, quality and watershed health, and to integrate these activities and the information they yield in the efforts of the JWG. Integrating the substantial body of work and public input to the Rio Puerco y Rio Jemez Subregional Water Planning process is a primary interest to a number of the stakeholders now involved in the JWG. In addition to integrating educational presentations into many of its monthly meeting agendas, the group has designed and participated in two field trips in the Jemez watershed to view sites along TMDL surface water reaches exhibiting ongoing pollution from nonpoint sources and/or corrective measures in place to abate the pollution process.

JWG Members also expressed an interest in and commitment to educating the public about watershed concerns. Through its membership, the group supports the utilization of the Rolling River Water Trailers - a cooperative project sponsored by the New Mexico Soil & Water Conservation Districts, New Mexico Department of Agriculture, US Bureau of Reclamation, and USDA/Natural Resources Conservation Service – as a mobile educational tools to demonstrate water flow and erosion, and provide information about water use, control, and release.

One of the subcommittees formed by the JWG is also providing input the design of the upcoming Water Fair that is sponsored by the Cuba Soil and Water Conservation District, and is planning an educational booth about the JWG for the Fair. The Fair will take place in the spring 2005. The District hopes to have support from potential partners of New Mexico Environment Department (NMED) Surface Water Quality Bureau and USDA Forest Service. A potential location for the Fair is San Ysidro. Future plans might include a sequence of Fairs that would have different focuses for each event.

The JWG hopes to coordinate with and/or involve different educational programs and institutions in future activities. Organizations may include, but not be limited to:

- Local schools and school districts
- Cuba Soil and Water Conservation District Forestry Camp
- USDA FS Respect the Rio program
- The New Mexico Community College system
- New Mexico Universities and Colleges.

Future outreach activities may be establishing a website.

III. WATERSHED ASSESMENT/INVENTORY

A watershed is an area of land contributing surface water runoff to a system of creeks and rivers discharging toward a single outlet. The Jemez watershed contributes runoff to the Jemez River and its tributaries to the point of its discharge to the Rio Grande in Bernalillo.

A variety of current and historical efforts provide valuable information about the watershed. For example, the Santa Fe National Forest's Fisheries program has completed Stream Inventory Reports within the Jemez Watershed on San Antonio Creek, East Fork Jemez River, Rio Cebolla, and the Rio de las Vacas. The main objectives of these surveys were to: 1) collect historical information that outlines effects on stream and watershed condition; 2) collect baseline data to determine the quality of fish habitat and floodplain condition and sources of habitat loss; 3) identify areas for possible migration barrier construction; 4) identify restoration needs; and 5) determine fish species presence and distribution. Copies of these reports can be obtained from Sean Ferrell, Forest Fish Biologist, at (505) 829-3535.

LOCATION: See Introduction paragraph 1 and Figure 1.

HYDROGEOLOGY: The bedrock geology in the west is characterized by Precambrian metamorphic and Permian sedimentary rocks. The bedrock geology in the central and eastern regions of the watershed is comprised of volcanic rocks, largely Bandelier tuffs associated with the Valles Caldera. Surficial deposits overlying bedrock includes wind blow deposits, river alluvium, and developed surface soils. Differences in the geology through which these creeks and rivers flow influences the surface water chemistry. Ground water occurs in bedrock and in surficial deposits overlying the bedrock.

SURFACE WATER: Streams in the western region of the Jemez watershed include Clear Creek, the Rio de las Vacas, Rio Cebolla, Rio Guadalupe and the Rito Penas Negras. Streams in the central and eastern regions of the watershed include Jemez River, Calaveras Creek, San Antonio Creek, Sulphur Creek, Redondo Creek, and the East Fork of the Jemez River.

POINT SOURCES OF DISCHARGE: There are three permitted point source discharges in the basin: the Village of Jemez Springs (NPDES Permit No. NM0028011), the Jemez Valley Schools campus (NPDES Permit No. NM0028479), and the New Mexico Department of Game and Fish Seven Springs Fish Hatchery (NPDES Permit No. NM0030112).

TOPOGRAPHY: Elevations in the Jemez River Watershed range from over 11,000 ft. at the headwaters of the watersheds to 5,000 ft. at the respective confluences with the Rio Grande.

SOILS: Soils in the Jemez River Watershed to some extent reflect the composition of the underlying geology. The soils were mapped by the Natural Resources Conservation Service, as part of the Sandoval County Soil Survey. Soils within the Santa Fe National Forest were mapped and recorded in the *Terrestrial Ecosystem Survey of the Santa Fe National Forest*.

VEGETATION & PRECIPITATION: The Jemez River is surrounded by the Jemez Mountains. The Jemez Mountains are considered to be part of the Southern Rocky Mountains Ecoregion which is characterized by Open Woodland – Coniferous Forest – Alpine Meadow Province, an Ecoregion term and delineation used by Neely et al. (2001). Depending on the elevation, the

average rainfall in the basin varies annually between about 10 to 20 inches, with substantial annual variation.

LAND STATUS: Land status in the Jemez River Basin includes ranching, irrigated and dry-land agriculture, silviculture, recreation, mining and some urban development. Land ownership or management in the Basin is show on Figure 2. Table 1 summarizes the land status by acres and percentage of land area.

The Spanish Queen Mine, located between Jemez Springs and the Pueblo of Jemez, was developed for the extraction of copper ore. The mine has since been abandoned. Several open-pit pumice mines are located in the basin. The Las Conchas Mine is closed and is under remediation. The El Cajete Mine is active and is located at the head of Mistletoe Canyon.

TABLE 1 – Summary of Jemez River Watershed Land Status		
Ownership	Acres	Percentage of Land Area in the Watershed
State Lands	7,027	1.05%
Tribal Lands	214,099	31.94%
Private Lands	44,244	6.60%
Bureau of Land Management	64,494	9.62%
Forest Service	251,108	37.46%
Valles Caldera Nat. Preserve	89,000	12.97%
State Park	268	0.04%
National Park Service	303	0.05%
Dept. of Defense	1,809	0.27%
Totals	670,294	100.00%

Content of Table 1 from the The Río Puerco y Río Jemez Sub-Regional Water Plan

DATA GAPS: *The JWG has not discussed data gaps extensively at this point in the process. Data gaps will be a topic of discussion at future meetings.*

WATERSHED/RIVER RESTORATION PROJECTS:

Members of the JWG and/or their organizations have initiated or been involved with activities in the watershed designed to improve water quality. Examples of some of the past and ongoing activities are presented below.

Jemez Watershed Group in 2004 – 05

From the fall of 2004 through August 2005, members of the JWG:

- Held 10 JWG meetings and several planning calls to learn more about watershed topics of concern to the community and to finalize and begin to implement the WRAS.
- Submitted first draft of the WRAS to US Environmental Protection Agency for comment and to the New Mexico Environment Department (NMED) Surface Water Quality Bureau for the record in October 2004. The WRAS was updated in August 2005, integrating accomplishments over the past year and additional details on field projects to improve water quality.
- Continued with community outreach and education on the watershed and the JWG. Members of the JWG worked with local High School students to create an educational poster about the JWG for the booth. The poster was exhibited at the first annual Rio Jemez and Puerco Water Fair, and copies of the poster are on exhibit at 5 or 6 different public locations in the watershed.
- The JWG provided input on the first annual Rio Jemez and Puerco Water Fair which was held on May 28, 2005. Members of the JWG attended the Fair and shared information on the JWG with interested public.
- Supported two additional members of the JWG in their submission of proposals for the 2006 319 grant cycle to implement additional watershed restoration activities.

USDA Forest Service

- Utilizing the JWG WRAS and the support of the JWG, the USDA Forest Service submitted a proposal for 319 funds to support a community education program and a series of watershed restoration activities. The grant was received.
- 2003 and 2004 – completed multiple riparian fencing projects.
- 2003 – reconnected a large spring system along Forest Road 376 to its wet meadow by adding a french drain system.
- 2003 – established a wet meadow road crossing to allow for vehicle traffic to cross to dispersed campsites on the other side of the meadow.
- 2003 – replaced two small, fish barrier culverts along the Rio Cebolla with large, bottomless arch culverts.
- Spring 2004 – A vehicle “Road to River” closure implemented on land between Forest Road 376 and Rio Guadalupe. Dispersed campsites were fenced off to protect from vehicle traffic in this area. Fence design allows for walk-through campers.
- Spring 2004 – fenced along the Upper Cebolla. This fence will help eliminate the large problem of trespass cattle in the riparian area.

- Summer 2004 – restored almost 2 miles of stream along Rio de las Vacas. Work extended from the confluence with Rio Cebolla to approximately 10,000 feet upstream along Rio de las Vacas.
- Summer 2004 – planted willows on approximately 2 miles of streambank along the upper Rio Cebolla.

Valles Caldera Preserve

The Preserve has established best management practices (BMPs) for road maintenance. Examples of their implementation of BMPs follow.

- Project: Road A – Reconstruction of 3.5 miles of road (completed). Activities:
 - Installation of 5 bottomless arch stream crossings
 - Adding 8-12” of aggregate material including geo textiles.
 - Establish ditches and water lead outs
 - Replace all culverts
- Project: Road B – Realignment of road B to reconnect hydrolic function (planned). Activities:
 - Realign approximately .20 miles of road to restore hydrology and reduce erosion caused by current grade and alignment
 - Re-establish hydrology by installing barrier cloth and permeable aggregate layers along approximately same distance of road.

The Preserve has also initiated BMPs for livestock grazing, as described below.

- Use herders on horseback and Low Moisture Block supplement placement to control cattle impact on riparian areas.
- Monitor the effectiveness of above strategies using GPS collars on livestock and visual observations.
- Use of portable electric fences to protect sensitive riparian features.
- Construction of permanent exclosures on riparian areas.
- Establishing permanent riparian plots on stream courses throughout the preserve.

In addition, the Preserve has initiated a research project to inventory and monitor watershed health, as described below.

- Inventory of aquatic organisms.
- Inventory and monitoring through permanent plots riparian plant communities.
- Conducting field sampling of vegetation in upland and riparian forest lands.
- A landscape scale vegetation survey and assessment of ecological condition.

The Preserve has a project on education about healthy watersheds. In support of this project, the Preserve has initiated the following activities.

- Volunteer workdays with Boy Scouts, and Wild Turkey Federation, and the Valles Caldera Coalition.
- Youth fly-fishing clinics (sponsored or nominal fees).

To protect their watersheds and riparian areas, the Preserve has implemented strict policies regarding access to the Preserve, as described below.

- No personal vehicles are permitted for recreational use on the Preserve.
- No ATV use.
- No waders or personal nets are permitted.
- Each individual is greeted and provided with orientation prior to recreating on the Preserve.
- Capacity along streams is limited to 1 group of 5 or less to each 1-1 ½ miles of stream.

IV. WATER QUALITY PROBLEMS

SITES AND ISSUES IDENTIFIED BY THE JWG:

The following list of water quality problems are not listed in any order of preference.

- 1. Noxious Weed Control** – Noxious weeds, such as saltcedar, Russian olive and thistle, have altered riparian conditions in the Jemez Watershed by outcompeting native species and depleting the water table. Possible methods of control and abatement would include mechanical and chemical treatment to reduce existing populations with the goal of eradication. Treatment might consist of one or all of the following: hand grubbing, mechanical, and chemical treatment. Another potential resource for methods to address the infestation is the draft Environmental Impact Statement (EIS) for the Santa Fe National Forest.
- 2. Rancho de Chaparral Girl Scout Camp** – Stream bank reclamation along Rio de les Vacas to help reduce sedimentation. This action would complement and strengthen the impact of similar actions taken by USDA Forest Service downgradient from the Scout camp.
- 3. State Road 126 Maintenance** - Storm runoff continually clogs the culverts that often are mashed from traffic. As a result, the water tends to run long distances down the road or side, picking up more silt before finally finding a place to run off and into the Cebolla Creek. This problem will persist in parts of the Seven Springs area even after completion of a pending federal project to pave State Road (SR) 126 between the Cuba area and the currently paved road south of Fenton Lake. Possible Project: (1) Evaluate the suspended solids along SR 126 in the Seven Springs area between the fish hatchery and the beginning of the paved road south of Fenton Lake. (2) Use this information to propose improvements to SR 126. Involved Groups: Federal Government (highway administration and forest service), State of NM and/or Sandoval County (road maintenance), Fenton Lake management, and Seven Springs residents.
- 4. Fenton Lake Dredging** – Forest fires in recent years have caused sedimentation runoff into Fenton Lake. This lake is impacted as a result by becoming more shallow from silt buildup. This reduces the quality of the lake as a recreational asset for fishing and as a fire-fighting water resource. Possible Projects: A project designed to test the effectiveness of possible projects including slope restoration to reduce runoff/sedimentation and dredging Fenton Lake to restore the water depth to desirable levels. Find a cost-effective solution for placement of the dredged silt. Involved Groups: US Fish and Wildlife, New Mexico Department of Game and Fish, and New Mexico Park Dept.
- 5. Threat of Fire** - Others suggested that the WRAS address the threat of fire and the need for preventative measures like forest thinning as well as ecological concerns overall. One individual commented that, regardless of how the group approached developing its WRAS, he was involved in the process to learn.

- 6. Road closures and other land access restrictions.** Examples include changes in access to land owned and managed by agencies and organizations like the USDA Forest Service, New Mexico Game and Fish/Park Service, and Valles Caldera Trust.
- 7. East Fork Jemez River Trail** – approximately 5 miles of Forest Trail 137 from Las Conchas Trailhead to Jemez Falls needs to be improved for better drainage and a decrease in sedimentation. Sections of trail are within the active floodplain and need to be re-aligned out of the floodplain. Popular jumping off points and dispersed trails need to be scarified and stabilized with native vegetation. Signing needs to be provided for better direction and to educate visitors about staying on designated trails. Seven log bridges that span the East Fork Jemez River have failed and are no longer usable. This has caused the public to trample banks and widen the stream. The seven bridges need to be replaced and trampled areas need to be scarified and stabilized with native vegetation. Full implementation will reduce sediment delivery to the East Fork Jemez River and thus decrease turbidity.
- 8. San Antonio Hot Springs Recreation Area** - San Antonio Hot Springs is one of three hot springs in the Jemez Mountains and receives a tremendous amount of use throughout the year. The last ¼-mile of Forest Road 376 leading to the springs and the parking area are located close to San Antonio Creek. The parking area and road are actively eroding with inadequate drainage. Beyond this point, Forest Road 376 continues to parallel the stream despite being closed to motorized vehicles. The remaining road prism is causing extensive delivery of sediments from failing road fill and rilling road cuts. Additionally, there is an unusable vehicular bridge crossing San Antonio Creek near the parking area, forcing vehicles and pedestrians to ford the stream, causing bank erosion and stream widening. It has been proposed to redesign the road and parking area so as to prevent extensive runoff from these hardened surfaces into the stream. The closed portion of Forest Road 376 needs to be properly decommissioned including stabilizing raw slopes with hydromulch and native seed. The bridge would be replaced and the trampled areas would be scarified and stabilized with native vegetation.
- 9. Dispersed Campsite Modification and Rehabilitation** – A least 86 dispersed camping complexes with over 400 user-created fire rings are located in the 5th Code Guadalupe Watershed (Rio Cebolla, Rio de las Vacas and Rio Guadalupe). Many of these are located in the active floodplain and are directly delivering pollutants from campsite activities. The modification alters individual complexes on a site-specific basis but with the common goal of reducing non-point source pollution into the streams. Some modifications include (but are not limited to) closure and/or obliteration of user-created roads, designation of parking areas by using heavy equipment to create barriers with rocks or large waterbars, construction of buck-and-pole fence across fragile meadows, develop and maintain an extensive series of informational and directional sign series, and movement of camping opportunities to the west side of Forest Road 376 and further away from the streams. This work started in 2003 with current grant funding from NMED, which included the development and purchase of signs, modification of several sites and creation of parking areas. The work is far from complete. Current funding will come to an end in 2004.
- 10. Spence Hot Springs Trail** – While Spence Hot Springs Trail is only ¼-mile in length, it receives thousands of users on an annual basis on the banks of San Antonio Creek. Due to its extensive use and user-created spur trails, the area is extremely erosive and improperly drained. The log bridge over San Antonio Creek is no longer safe and has forced users to ford the stream causing bank damage and stream widening. This project would involve improvements such as French drains and small culverts for wet area crossing. In addition, the trail would be re-aligned to minimize erosion and sedimentation to San Antonio Creek. User trails would be scarified and planted with native vegetation. The log bridge would be

replaced with a steel bridge. The raw stream banks would be scarified and planted with native vegetation.

- 11. Palomas Trail, San Pedro Parks Wilderness** – Forest Trail 50, needs to be relocated just before it crosses the Rito de las Perchas. The grades are very steep at that point (30%) with not much level ground before the stream to slow down water coming off the trail. There is a lot of gullying and soil loss down slope and a fair amount of sediment makes it into the stream. There is a better location nearby for this trail with a better approach to the stream crossing, but two or more major switchbacks will be necessary to reduce the grades. The Palomas Trail is one of the two major stock use trails into San Pedro Parks Wilderness (along with the Los Pinos Trail, FT 46) and the design maximum grade should not exceed 15%. Relocating the trail as it approaches the Rito de las Perchas will greatly improve that section for stock users. A Student Conservation Association trail crew worked during the summer of 2004 on this section of trail and it is more stable, but the improvement needs to be followed by a trail relocation for a permanent "fix".
- 12. Wilderness Ranger, San Pedro Parks Wilderness** – In conjunction with upgrading the trail system in San Pedro Parks, a Wilderness Ranger would provide much needed personal communication with wilderness users. The Wilderness Ranger would educate and inform the public as well as outfitter guides on Leave No Trace ethics, the importance of healthy streams (particularly at the headwaters), Rio Grande cutthroat trout, and numerous other topics related to water quality issues in the Jemez Watershed.
- 13. Respect the Rio Law Enforcement** – Based on public feedback during the 2003 and 2004 Respect the Rio contact ranger seasons, a common request was for law enforcement to patrol the off road vehicle use in the wetlands, streams, and hillsides. In addition, the public felt that law enforcement would also encourage lighter use on the land and prevent pollution into streams. As the dispersed campsites become modified and relocated, law enforcement in conjunction with the contact rangers' educational effort will assure compliance which in turn will improve water quality. If funding can be acquired, it would be used to provide a full-time Level II Law Enforcement officer to educate the public of the new management objectives and write warnings and tickets as situations warrant in the Respect the Rio corridor.
- 14. Jemez Falls Viewing Platform Modification** – Recreationists are currently accessing Jemez Falls in the East Fork Jemez River by jumping over and around the fence rail on the falls viewing platform. Access then goes down a steep slope and entails climbing up and down a log placed against a rock. A network of trails going down the slope is contributing to soil loss. Increased recreation use/fishing in a pool beneath the falls may be contributing to disturbance of a sensitive species located in the Jemez Falls area. A modification would block access to discourage hikers and anglers from going down the cliff and would harden a trail to viewing areas above Jemez Falls. This will decrease sediment delivery and erosion. The user-created trail would be scarified and planted with native vegetation. The log would be removed. Signing would be provided for better direction and to educate visitors about staying on designated trails.
- 15. Rio Cebolla Willow Planting and Buck-n-Pole Fence Construction** – Rio Cebolla is listed as an impaired stream on the NMED 303(d) list, mostly due to stream degradation, unstable banks and stream widening. Most of this is attributed to riparian vegetation loss and soil compaction from historic grazing. In addition, the system lacks food for beaver, an important member of the riparian community. The project will restore riparian vegetation for (1) corridor habitat for wildlife; (2) improve aquatic and riparian qualities to increase productivity of fisheries, especially the Rio Grande cutthroat trout; and (3) encourage future beaver movement into the area. Willow will be planted along 20,000' of streambank across

12 miles of stream length. Buck-n-pole fencing will be constructed to protect these areas from off-road vehicle use and livestock grazing. Signing will be provided to encourage the public to respect these planting areas. Work began in 2004 with current grant funding, but further funding is needed to complete the extensive work.

- 16. Vegetative Cover Expansion at Coyote Flats** – This project consists of mechanical treatment of 280 acres of pinyon/juniper in the southwest portion of the Jemez District. The purpose of this project would be to encourage growth of herbaceous vegetation, which provides better soil protection compared to pinyon/juniper, decreasing erosion and sediment delivery into Rio Guadalupe. Phase I which consisted on 80-acres of treatment will be completed in 2004 utilizing Forest Service monies. Phase II of this project will include the remaining 200 acres. Funding will need to be acquired before Phase II can be implemented.
- 17. Upland Water Developments** –By providing alternate water sources away from riparian areas for wildlife and domestic livestock use, riparian and streambank recovery will be promoted, decreasing sediment delivery to streams. This project would consist of construction of up to 16 upland water developments within the Jemez Watershed.
- 18. Rito Peñas Negras Road Obliteration and Spring Protection** – An extensive user-created road system cuts through wet meadows, crosses Rito Peñas Negras (tributary to Rio de las Vacas), follows along the creek on both sides, and traverses steep ground. Part of this road system is also providing access for ATV's to drive through springs. An ongoing project will close approximately 5 miles of road, including obliterating a portion of the road. Another road will be relocated out of the floodplain. Old road closures will be maintained. Two springs will be fenced off. Buck-n-pole fence will be built to prevent access to the wet meadows. Additional funding will be required to continue this project additional funding.
- 19. Highway 4 and 126 Hydromulching** – Active slumps at road cuts along State Highways 4 and 126 are delivering mass quantities of sediment into San Antonio Creek as witnessed during monsoon rain events. It is expected that by applying a layer of hydromulch incorporated with seeding will stabilize the exposed soils, decreasing sediment delivery significantly. Five acres of road cut need to be hydromulched and seeded with native vegetation.
- 20. Butterfly Springs Road Obliteration** – An abandoned FS road parallels Rio Guadalupe, leading to a popular recreation spot, Butterfly Springs. Extensive sediment delivery is coming directly from the erosive road surface. In addition, user-created Jeep trails have developed as spurs from this road. The closure of this road with a gate has eliminated public use of the road, but the road needs to be properly decommissioned to decrease the sediment delivery.
- 21. Stable Mesa Prescribed Burn** – Maintenance of the Stable Mesa Prescribed Burn is needed to reduce the large fuel loading problem. A successful treatment will help promote herbaceous cover which will work to decrease soil erosion on the site. This prescribed burn will help reduce the chances of catastrophic wildfires in the area. Catastrophic wildfires would greatly increase the turbidity problems already experienced in the Rio Guadalupe.
- 22. San Diego/Buchannon Prescribed Burn** – The San Diego/Buchannon Prescribed Burn is needed to reduce the large fuel loading problem. A successful treatment will help promote herbaceous cover which will work to decrease soil erosion on the site. This prescribed burn will help reduce the chances of catastrophic wildfires in the area. Catastrophic wildfires would greatly increase water quality problems in the Jemez Watershed.
- 23. Oat, Pony, and Hay Canyons** – Native grasses and other meadow plants need to be restored back to these canyons to increase percent ground cover, reduce erosion and reduce the risk of catastrophic fire. To accomplish this, encroaching trees 12” diameter at breast height need to be cut over a total of approximately 250 acres. Lower limbs on larger trees may need to be

cut to reduce ladder fuels. In Oat Canyon, a side project of placing logs near the head of Oat Canyon drainage is needed to reduce erosion.

- 24. Blue Bird Fence** – Four miles of new fence construction is needed to direct cattle traffic away from sensitive locations within the Jemez Watershed.
- 25. Jemez River Fish Habitat and Water Quality Improvement** – Fish structures were placed in the Jemez River in the early 1990's. Placement has actually caused water quality degradation as the stream has widened and eroding banks have expanded. Project implementation would include removal of old structures and placement of new structures following Rosgen methodology. Eroding banks would be scarified and planted with native vegetation. This would decrease introduction of sediment and further help distribution of fines being delivered into the system. Before this work takes place, though, a through Stream Inventory Survey needs to be completed by the USFS Fisheries program.
- 26. Sandoval Ridge Rehabilitation** – The Lake Fire in 2002 burned a mosaic of high severity on both Lake Fork Mesa and at the west end of Sandoval Ridge. The fragile volcanic soils left behind did not move off site until the monsoon season during 2003 and again in 2004, when tons of material (including boulders and trees) were swept down onto Highway 126 above Fenton Lake State Park, thence into the lake and into Rio Cebolla. A project has been proposed that would install Log Erosion Barriers over approximately 5 acres on the mesa top and then aerially reseed and mulch most of the ridge top.
- 27. Wildland/Urban Interface (WUI) Projects** – Numerous projects in WUI areas within the Jemez Watershed will go on in the next couple of years. Currently projects are planned for Seven Springs, Los Griegos, Cerro Los Pinos, Redondo campground, and Thompson Ridge.
- 28. Road Location and Design** – Roads in the Valles Caldera National Preserve were constructed through the many large valle systems, separating or disrupting the hydrology of the valles. As roads are assessed for maintenance Best Management practices are being developed and incorporated into the maintenance plans to restore the hydrology within these valles. Particularly impacted are the Valle Grande, the Valle San Antonio, the Valle Toledo, the Valle Santa Rosa and the Valle Jaramillo. Additionally a dense system of roads was established on steep forested areas of the Preserve to extract timber. Many of these roads are adding sediment to streams especially during snowmelt or monsoonal events.
- 29. Forest Health** – Common to all status of forested lands within the watershed is the increased density of small diameter trees (an increase of up to 200 times the historic number). This condition is affecting the health and vigor of the forests, and directly affecting water quality and quantity. The forests and the watershed are left vulnerable to catastrophic fire events (such as the Lake fire) and epidemic insect or disease outbreaks (such as the current ips and western pine beetle infestations) or a combination of these events.
- 30. Seven Springs Fish Hatchery** - The fish hatchery is now a high tech operation using liquid oxygen to put oxygen into the water. Included in the operation is the introduction of special feeds with antibiotics. The effluent created by these operations plus the discharge of fish sewage is challenging the quality of the Cebolla Creek below the hatchery. Possible Project: (1) Evaluate the quality of the surface water above and below the fish hatchery. (2) Use the results of these studies to propose corrective actions to operations at the fish hatchery. Involved Groups: New Mexico Department of Game and Fish, and Seven Springs residents.
- 31. Cuba Ranger District Riparian Fence Maintenance** – Repair and/or reconstruct approximately 6.2 miles of fence in riparian enclosures. This project will help restore and maintain riparian habitat by excluding cattle grazing on riparian forage and eliminating hoof compaction within enclosures.
- 32. Gate Installation on Butterfly Springs Road** – This project would gate the Butterfly Springs Road at the southern end, which parallels Rio Guadalupe, to vehicles. The road is an

unmaintained jeep trail that contributes sediment and other pollutants into the stream course. In the future, it would be preferable to convert this road to the width of a foot path, allowing people, stock, and mountain bikes to traverse the length on a maintained and properly drained surface. The first step, though, is to gate the road and restrict vehicle traffic.

- 33. Spence Hot Springs Trail Improvement** – While the Spence Hot Springs Trail is only ¼-mile in length, it receives thousands of users on an annual basis. Due to its extensive use and user created spur trails, the area is extremely erosive and improperly drained. This project would involve realigning the trail to minimize erosion and sedimentation to San Antonio Creek. User trails would be scarified and planted with native vegetation.
- 34. Schoolhouse Mesa Fence** – This project would establish a fenceline to keep cattle on the upland Schoolhouse Mesa to eliminate cattle from drifting down to Rio Cebolla. This will reduce the impact of trespass cattle on the Rio Cebolla riparian area. More vegetation of the stream banks will help prevent stream widening which results in increased stream temperatures.
- 35. Coyote Flats Pinyon/Juniper Treatment Project** – This project will selectively remove P/J woodland species that have encroached upon historic grasslands to promote the growth of herbaceous species. Removal of these species should promote growth of herbaceous vegetative cover to help hold soil in place.
- 36. Stable Mesa Pipeline Extension Project** – This project will extend the current pipeline system by 3 miles. The pipeline will allow areas to be more evenly utilized by livestock. This leads to improved plant recovery, vigor, and cover.
- 37. Barley Corral Project** – This project will construct one corral near the junction of Hwy 126 and FR 144. The corral will allow for a rotational grazing system to be instituted on the Cebolla/San Antonio Allotment. By establishing such a system, areas are more evenly utilized by livestock. This leads to improved plant recovery, vigor, and cover.
- 38. Middle Rio de las Vacas Buck and Pole Fence Maintenance** – This project will consist of reconstructing and maintaining an existing buck and pole fence on the Middle Rio de las Vacas. This fence helps maintain riparian habitat by excluding vehicle travel on riparian vegetation. The fence closes a dispersed campsite, a wet meadow and ford crossing to vehicles.
- 39. Trail Creek Buck and Pole Fence Maintenance** – This project will consist of reconstructing and maintaining an existing buck and pole fence along Trail Creek. This fence helps maintain riparian vegetation by excluding vehicle travel and controlling cattle grazing in riparian areas.
- 40. FR 539 Buck and Pole Fence** – This project will consist of continuing the fence along the dispersed campsites between FR 539 and the Rio de las Vacas. The fence is needed to help maintain riparian habitat and prevent vehicle traffic next to stream banks and from fording the stream.
- 41. Flood and flood plain management.** Floods and flood plain management are a source of concern throughout the Jemez watershed.
- 42. Storm Water Control.** Storm water, a critical factor in flood and flood plain management, is a particular concern to Villages and other areas in the watershed because it can be destructive to property, infrastructure (e.g., roadways) and people. The Jemez watershed receives approximately 7.5 inches of rain a year, most of which occurs in high intensity, short duration thunder storms in the months of July, August, and September. Where land slopes steeply and is not covered with vegetation, most of the precipitation runs off, carrying suspended solids and sediment to points or areas of discharge into surface water.
- 43. Erosion Control in Arroyos.** Arroyos, nearly vertical walled, flat floored stream channels, are present throughout the watershed. Arroyos are erosional features which are formed in

large part by heavy rains and flooding in arid and semi-arid regions. Preexisting drainages may be vulnerable to arroyo formation, as are areas lacking in vegetation which may help to buffer the erosional effects of surface water runoff. Potential effects of arroyo formation include lowering the water table and altering ecological environments and reducing agricultural productivity, decreased flood protection from excess sediment deposition from arroyo formation, and loss of land that may be used for other purposes.

- 44. Rio de Las Vacas Wetlands Restoration Project** – The “Rio de Las Vacas” project is the first phase of work proposed to restore the wetlands along the Rio de Las Vacas. Wetlands and riparian areas will be restored using bioengineering, planting of native plants, repairing fences and building cattle and elk mini-enclosures, and installing trick tanks. The project will be funded by CWA section 104(b)(3).
- 45. Stream Bank Erosion at the Public school complex at Canon.**
- 46. The impact of tourism, including waste.**
- 47. Sufficient water quantity for multiple uses.**
- 48. The impact of urban encroachment, including subdivision.**
- 49. Water Fair** – The Cuba Soil and Water Conservation District, with the assistance of the JWG, plans a Water Fair in spring 2005 to help educate the public about water, the watershed, watershed concerns, and how to help address these concerns.

WATER QUALITY EXCEEDANCES: The Bureau completed TMDLs for many of the reaches of the Jemez River watershed in December 2002. The sampling showed exceedances for several nonpoint source parameters in a number of surface water reached in the Watershed, as listed in Table 2 below.

TABLE 2 – Jemez Watershed - Water Quality Exceedances in TMDL Reaches	
Location	Exceedance
Clear Creek	Turbidity
Jemez River	Metals (Chronic Aluminum), turbidity, sediment
Jemez River East Fork	Turbidity
Redondo Creek	Metals (Chronic Aluminum), temperature & turbidity
Rio Cebolla – From inflow to Fenton Lake to the headwaters (2)	Temperature & sediment
Rio Cebolla - From Rio de las Vacas to Fenton Lake (1)	Sediment
Rio de las Vacas	Temperature
Rio Guadalupe	Metals (chronic Aluminum), sediment, turbidity
Rito Penas Negras	Sediment & Temperature
San Antonio Creek	Temperature & Turbidity
Sulphur Creek	Conductivity and pH

V. WATER QUALITY GOALS

TMDL REACHES: Water quality goals for the Jemez River and its tributaries have been established by the state for TMDL parameters. Table 3 below summarizes the standards or goals for each of the waters in the Jemez Watershed that are impaired by nonpoint sources of contamination. The Zia, Santa Ana, and Jemez Pueblos have also established water quality goals.

TABLE 3 – Jemez Watershed - Water Quality Goals in TMDL Reaches	
Location	Standard
Clear Creek	High Quality Cold Water Fishery
Jemez River	High Quality Cold Water Fishery, Cold Water Fishery, Livestock Watering
Jemez River East Fork	High Quality Cold Water Fishery
Redondo Creek	High Quality Cold Water Fishery
Rio Cebolla	High Quality Cold Water Fishery
Rio de las Vacas	High Quality Cold Water Fishery
Rio Guadalupe	High Quality Cold Water Fishery
Rito Penas Negras	High Quality Cold Water Fishery
San Antonio Creek	High Quality Cold Water Fishery
Sulphur Creek	High Quality Cold Water Fishery

PROPOSED POLLUTANT LOAD REDUCTION TO ACHIEVE WATER QUALITY GOALS:

In Table 2 in Section IV Water Quality Problems, the impairments that have been documented by the state are listed. They are as follows: turbidity, metals, sediment (stream bottom deposits), and temperature. Sulphur Creek, also listed in this table for conductivity and pH impairments is undergoing a User Attainability Analysis (UAA) to remove it from the TMDL listing. The pH, which is lower than the standard, is due to natural causes that also affect the conductivity of the stream. If the UAA is approved, the standard for this stream segment will change to recognize the unique characteristics that naturally occur.

The metal impairment is specifically “chronic aluminum” that has a high incidence of occurrence in this watershed. Staff from NMED Surface Water Quality Bureau has suggested reviewing these exceedances of the New Mexico State Standards as a result of geologic and/or chemical process (M.W. Coleman, 1999).

The remaining impairments, turbidity, sediments (stream bottom deposits), and temperature are addressed in the *2002 Total Maximum Daily Load Report for the Jemez River Watershed*, Sections 10 through 12.

Target loads for turbidity (expressed as TSS) were calculated based on flow, current water quality standards and a unit-less conversion factor (8.34) that was used to convert mg/L units to lb/day. As referenced in these documents, the load reduction necessary to meet target loads for turbidity are shown as follows:

- Redondo Creek 68.8 lb/day reduction
- San Antonio Creek 3,151.7 lb/day reduction
- East Fork of the Jemez River 9,034.2 lb/day reduction
- Clear Creek 404.4 lb/day reduction
- Rio Guadalupe 36,885 lb/day reduction
- Jemez River 35,765 lb/day reduction

The document also includes possible source contributions, however, the JWG will take inventory at these stream sections to locate bare streambanks and areas of high erosion. Those areas would

have BMPs, (such as enhanced streambank vegetation), implemented that will increase the filtering capabilities of the riparian or wetland areas, thereby reducing the amount of turbidity.

The SWQB Sediment Workgroup evaluated a number of methods described in the literature that would provide information allowing a direct assessment of the impacts to the stream bottom substrate. These procedures included conducting pebble counts (a measurement of percent fines), stream bottom cobble embeddedness, geomorphology (using Rosgen techniques, 1996), and various biological measures. (NMED 2002) The sediment calculation was based on the following formula $WLA + LA + MOS = TMDL$, where the TMDL is the target capacity (20% fines) the waste load allocation (WLA) defined as 0, and the Measure of Safety (MOS) defined as 25% of the target capacity, (5% fines) which arrived at the figure of 15% fines as the load allocation (LA). The results listed below show the following exceedances to the target load on these stream segments:

- Rio Cebolla 1 13% fines
- Rio Cebolla 2 26% fines
- Rito Penas Negras 12% fines
- Rio Guadalupe 8% fines, and
- Jemez River 6% fines.

By reducing the sediment fines by the above list, the segments would meet water quality standards. The BMPs or remedies, similar to the turbidity TMDL, include enhancing the riparian zone and/or increasing wetlands to filter excess sediment entering into the stream. Watershed impacts including roads and overgrazing also influence the stream.

The temperature TMDL was determined using thermographs that measured and recorded water temperature every hour for 2.5 months in the summer of 1998 at thirteen locations. The target values for temperature are based on numeric criteria. (NMED2002) A model, Stream Segment Temperature (SSTEMP) version 2.0 was used to predict stream temperature. The SSTEMP provides an estimate of heat energy per unit volume expressed in Joules (the absolute meter kilogram-second unit of work or energy equal to approximately 0.7375 foot pounds) per meter squared per second ($J/M^2/S$). The numeric standard of 20°C (68°F) for the designated use of High Quality Cold Water Fishery (HQCWF) was exceeded in five stream segments in the Jemez watershed. The following list summarizes these exceedances for temperature.

- Redondo Creek 48.28 joules/meter²/second
- San Antonio Creek (lower) 39.46 joules/meter²/second
- San Antonio Creek (middle) 63.74 joules/meter²/second
- San Antonio Creek (upper) 45.35 joules/meter²/second
- Rio Cebolla (2) 82.93 joules/meter²/second
- Rio de las Vacas (lower) 43.17 joules/meter²/second
- Rio de las Vacas (upper) 54.37 joules/meter²/second
- Rito Penas Negras (lower) 84.79 joules/meter²/second
- Rito Penas Negras (upper) 48.06 joules/meter²/second

The numbers on the second column is the excess solar radiation input to the stream segment. Reducing the temperature through an increase of canopy (shade) or increasing the depth to width ratio should effectively decrease stream temperature. Again, the JWG will take inventory of the sites listed and determine which BMPs would effectively reduce the temperature in these streams.

The JWG may, at some point, choose to establish their own set of water quality and other goals in the watershed.

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VI. RECOMMENDED ACTIONS TO ADDRESS SITES OF CONCERN

Recommended Actions			
<i>Location of Site of Concern</i>	<i>Problem/Issue to be Addressed</i>	<i>Solutions to the Problem/Issue</i>	<i>Timeframe</i> *
San Antonio Creek and Indian Creek (off a road)	Junction of three open roads with pipeline maintenance and moved aggregate above junction.	Reconstruct intersection and deal with cut/decrease slope of cut. At stretch remove pipeline access up to open road (PNM approval).	ST
Along Rio Cebolla above confluence of Rio de las Vacas	System of disconnected streams by FR 376 that should be going into Rio Cebolla.	Redirecting culverts and putting in french drains.	MT
Within the Valles Caldera National Preserve – Roads constructed through the Valles, Grande, Jaramillo, Santa Rosa, San Antonio and Toledo	Roads are currently separating the hydrology of the valles altering (drying) the wetland communities and creating cuts and depositing sediment (into the Eastfork of the Jemez River and San Antonio Creeks) during high water events.	Development and implementation of Best Management Practices to re-establish the hydrologic function of the valles including the installation of french drains, permeable layers, replacing, and redirecting culverts, construction of bridges and other practices as appropriate.	LT with multiple ST projects.
Barley Canyon Ridge into Fenton Lake SR 126	Erosion from fire. Impacts water quality and floods the road. Because of the steep slope and the soil is a high energy system, the soil can't recover. The state highway dept. are going to regrade and pave the road which may increase the erosion to the lake.	Get involved in the road construction project and environmental reports. ICET funding. What about rock dams or similar projects to reduce some of the energy of water moving down drainages.	ST
Fish Hatchery	Possibly releasing effluent into the Rio Cebolla	Information request	ST
Private land Lakes Fire	Erosion from fire.	Gain interest in cooperators/land owners	ST
San Ysidro Public Lands	Salt Cedar	Mechanical removal/spraying	ST
Below girl scout camp	Russian nap weed will spread	Mechanical removal/spraying	ST
Behind the school (near the community center in Jemez Springs)	Dead-end to a bank. Erosion	Rock placement to control erosion. Site visit.	ST
Valles Caldera – Preserve Wide	Bunch grasses contributing to litter accumulation increasing fire danger.	Prescribed fire of grasses	LT
Valles Caldera-Preserve Wide	Invasive weeds (Canada, Musk and Bull Thistle.	Herbicide application, monitoring and control	LT

Valles Caldera – Preserve Wide	Dense road system exists on steep forested land contributing to the sediment loading in San Antonio and Redondo Creeks and the Eastfork of the Jemez River.	Develop and implement Best management practices for reducing and eliminating sediment deposit including road obliteration and revegetation and/or maintenance.	
Watershed wide	Education		LT
Watershed wide	Water Fair, Invasive plants, how to pay for fair	proposal for project coordinator	ST (10/2004)
Watershed-wide	Noxious weeds contributing to sediment	Draft EIS Carson/Santa Fe Forests address this.	
Watershed Wide	Increasing density of small diameter trees affecting water quality, quantity, and increasing risk of wildfire and/or insect outbreaks	Develop and implement Best Management Practices to restore healthy and resilient forest structures including mechanical thinning and prescribed fire.	LT (multiple ST projects)
Valles Caldera National Preserve (Jaramillo, Redondo?) or Jemez - wide	Need for restoration of Rio Grande Cutthroat Trout habitat and population	Restoration of habitat and population Need Suggestion(s) for solution(s) Possible partners: VCC, TU, NMG&F, NM Trout, Quivira Coalition, Amigos Bravos, Great Old Broads for Wilderness, National Wild Turkey Federation, Rocky Mountain Youth Corps, VCT, NM Wildlife Federation	
Confluence of Rito de Los Indios and San Antonio (old borrow pit that now sloughs directly into the creek) at the second PNM pipeline crossing.	Slope stabilization to address old borrow pit that now sloughs directly into the creek	Slope stabilization Need Suggestion(s) for solution(s) Possible partners: PNM, VCT, VCC, RMYC	
Along riparian corridor (Jaramillo, tributary to East Fork?)	Cattle/elk grazing impact on riparian corridor	Experiments/demonstration projects with electric fencing to manage cattle/elk along riparian corridor Possible partners: VCC, VCT, TU, NMG&F, NM Trout, Quivira Coalition, Amigos Bravos, Great Old Broads for Wilderness, National Wild Turkey Federation, Rocky Mountain Youth Corps	
Watershed wide	The continued need for public education on appropriate recreation activities that	Continued use of USFS Education Coordinator, continued use of Respect the Rio Contact Rangers, and continued multi-	

	promote watershed health.	media education campaign. This problem also needs to be addressed by providing increased law enforcement in the heavily recreated areas.	
East Fork Jemez River Trail	Approximately 5 miles of the East Fork Trail needs to improved.	Dispersed trails will be scarified and stabilized with native vegetation. Signing will be provided for better direction and to educate visitors. Seven bridges spanning the East Fork Jemez River will be replaced.	ST
San Antonio Hot Springs Recreation Area	The parking area and road are actively eroding with inadequate drainage. The closed section of the road is causing extensive delivery of sediments.	The road will be redesigned to allow for public access to the recreation area, and the closed portion will be redesigned to allow for access to an investment.	ST
Dispersed Campsite Modification	Large user-created camping complexes located in the active floodplain.	The modification alters individual complexes on a site-specific basis with the common goal of reducing non-point source pollution into the streams.	On-going
Spence Hot Springs Trail	Extensive use and user-created spur trails have made the area extremely erosive and improperly drained.	This project would involve improvements such as French drains and small culverts for wet area crossing. The trail would be re-aligned to minimize erosion.	ST, LT
Jemez Falls Viewing Platform	Recreationists are currently accessing Jemez Falls by jumping over and around the fence rails on the viewing platform. This has created a network of trails going down the slope which are contributing sediment to the stream	The modification will block access to discourage hikers and anglers from going down the cliff.	ST
Jemez River Restoration	Stream has widened and eroding banks have expanded.	ST – Stream Inventory Survey needs to be conducted.	ST, LT
Oat, Pony, Hay Restoration	Encroaching trees	Remove encroaching trees to restore native grasses and other meadow plants.	ST

Sandoval Ridge Rehab	Enormous amounts of sediment eroding off Sandoval Ridge from Lakes Fire.	Install Log Erosion Barriers, aerial seed and mulch.	ST
San Diego/Buchannon Prescribed Burn	Extreme fuels loading of woody species which is preventing the establishment of herbaceous cover.	Implement the San Diego/Buchannon Prescribed Burn.	ST
Watershed Wide	Noxious weed control – saltcedar, Russian olive, and thistle.	Mechanical and chemical treatment of noxious weeds.	ST, LT
Cattle traffic (Blue Bird Fence)	Cattle trafficking sensitive areas in the watershed.	Installation of 4 miles of fence.	ST
Rito Penas Negras	Extensive user-created road system cuts through wet meadows, crosses the stream, follows along the creek on both sides, and traverses steep ground.	Closure of approximately 5 miles of road. Two springs would be fenced off.	On-going
Butterfly Springs Road	An abandoned forest road parallels Rio Guadalupe is contributing a large amount of sediment into the stream.	This road would be obliterated and converted into a foot traffic trail.	ST
Coyote Flats	Poor herbaceous vegetation cover due to pinyon/juniper dominance of site has led to erosion and sediment delivery into Rio Guadalupe.	Mechanical treatment of 280 acres of pinyon/juniper.	ST
Watershed Wide	The need to provided alternate water sources away from riparian areas for wildlife and domestic livestock use in order to promote riparian and streambank recovery, thus decreasing sediment delivery to streams.	Construction of 16 upland water developments	ST
Highway 4 and 126 road cuts	Active slumps at road cuts along these highways are delivering mas quantities of sediment into San Antonio Creek.	A layer of hydromulch consisting of seeds, fertilizer and a tackifier.	ST
Cuba Ranger District	Cattle grazing on riparian forage and hoof compaction.	Repair and/or reconstruct approximately 6.2 miles of fence in riparian exclosures.	
Butterfly Springs Road	Unmaintained jeep trail that contributes sediment and other pollutants into the	Gate the Butterfly Springs Road at the southern end, which parallels Rio Guadalupe to vehicles.	

	stream course		
Spence Hot Springs Trail	Due to extensive use and user created spur trails, the area is extremely erosive and improperly drained.	Realign the trail to minimize erosion and sedimentation to San Antonio Creek. User trails would be scarified and planted with native vegetation.	
Schoolhouse Mesa	Trespass cattle on the Rio Cebolla riparian area.	Establish a fenceline to keep cattle on the upland Schoolhouse mesa.	
Coyote Flats	Erosion	Selectively remove P/J woodlands species that have encroached upon historic grasslands to promote the growth of herbaceous species. Removal of these species should promote growth of herbaceous vegetative cover to help hold soil in place.	
Stable Mesa		Extend the current pipeline system by 3 miles. The pipeline will allow areas to be more evenly utilized by livestock. This leads to improved plant recovery, vigor, and cover.	
Cebolla/San Antonio Allotment. Junction of Hwy 126 and FR 144		Construct one corral that will allow for a rotational grazing system to be instituted allowing areas to be more evenly utilized by livestock. This leads to improved plan recovery, vigor and cover.	
Middle Rio de las Vacas	Vehicle travel on riparian vegetation.	Reconstructing and maintaining an existing buck and pole fence. The fence closes a dispersed campsite, a wet meadow and ford crossing to vehicles.	
Trail Creek	Vehicle travel and cattle grazing in riparian areas.	Reconstructing and maintaining an existing buck and pole fence.	
FR 539		Continuing the fence along the dispersed campsites between FR 539 and Rio de las Vacas.	
Jemez Watershed		Flood plain management	
Jemez Watershed		Storm Water Control	
Jemez Watershed		Erosion Control in Arroyos	
Rio de las Vacas		Wetlands and riparian areas will be restored using bioengineering , planting of native plants, repairing fences and building cattle and elk mini-enclosures, and installing trick tanks.	

Cost estimates for actions will be developed.

VII. MONITORING AND EVALUATION

The JWG recognizes the need for monitoring and evaluation in the watershed. In general, we will draw from and build on historic and ongoing monitoring and evaluation programs. Additional monitoring should be appropriate to the abilities and resources of those being asked to perform the monitoring and based on specific needs. Needs might include but not be limited to water quality or quantity, measurable project objectives, or other environmental or community factors determined by circumstance.

Some questions and concerns raised by Members of the JWG that may involve monitoring and evaluation at some point in the future are as follows:

- How do we do a better job identifying sources of contamination and quantifying how much contamination comes from each source? E.g., how much stream bank erosion is from human impacts such as parking and camping and how much is from other uses like cattle grazing? How much of the nutrients and bacteria in surface water are from human sources and how much is from grazing animals or other sources?
- Population growth in the Rio Grande Valley is increasing the pressure on the Jemez Valley for water, recreation, and other resources. The population growth has both negative and positive impacts. Is there a way to better manage the growth and the impact on Jemez Watershed resources?
- What is the impact of forest thinning on water quality and quantity? Can we increase recharge (through surface water runoff, improved infiltration and extended release) into to our surface and groundwater resources with effective forest thinning and management?

In the near term, based on the particular focus of the 319 Grant currently funding the activities of the JWG, monitoring and evaluation needs may focus on:

- Characterizing water quality conditions to confirm, identify or refute potential water quality concerns; and
- Establishing baseline water quality conditions in order to measure whether and how actions taken in the field have impact.

New Mexico Environment Department Surface Water Quality Bureau monitored the perennial reaches of the Jemez River and its tributaries to develop the Total Maximum Daily Load (TMDL) standards in 1998. The Bureau will resample at each location in the next 5 – 7 years, at a time that conforms to the statewide TMDL monitoring schedule

VIII. FUNDING

Potential federal sources for watershed restoration funding include:

- 319 nonpoint source grants from EPA
- EPA watershed initiative grants
- CFRP grants
- U.S. Natural Resources Conservation Service assistance

Potential state and local sources for watershed restoration funding include:

- New Mexico State Legislature
- Cuba Soil and Water Conservation District
- PNM pipeline corridor maintenance funds and other potential utility funds

In addition to government grants and assistance, there are numerous private foundations, both locally and nationally, that fund watershed-based restoration initiatives such as this WRAS, and we will also research and seek grants from those sources as needed.

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Total Maximum Daily Load (TMDL) Report for the Jemez River Watershed, Resource Technology, Inc., December 2002

Other Resources

USDA Natural Resources Conservation Service

USDA Forest Service WRAS for the Santa Fe National Forest

Water Quality information from the Zia, Jemez and Santa Ana Pueblos

USDA Forest Service education program

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