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

Rio Chama Watershed Restoration Action Strategy

(WRAS)

2005

Prepared by the Rio Chama Watershed Groups under a 319 Grant administered by The Meridian Institute 2005

For more information contact:
Jennifer Pratt Miles
Meridian Institute
P.O. Box 1829
Dillon, CO 80435
970-513-8340 ext. 213
jprattmiles@merid.org

Contents

INTRODUCTION

Watershed Location and Description

The Rio Chama watershed (U.S. Geological Survey Hydrologic Unit Code 13020102) is a subbasin of the Rio Grande Basin. Its principle drainage, the Rio Chama, is approximately 120 miles in length. There are three reservoirs on the Chama River. These are: Heron Lake, El Vado Reservoir and Abiquiu Reservoir. The watershed's surface water is used principally for domestic uses and irrigation. Additionally, the Rio Chama , along with its reservoirs and some of its tributaries, are used extensively for a wide variety of recreational activities. Most of this watershed, with the exception of a small portion that extends into southern Colorado, is located in north-central New Mexico within the political boundaries of Rio Arriba County (Figure 1), and includes the villages of Chama, Tierra Amarilla, Cebolla, Canjilon, Abiquiu, Coyote, El Rito, Vallecitos as well as portions of the Jicarilla Apache Nation, San Juan Pueblo and Santa Clara Pueblo. Approximately one third of surface area of the watershed is privately owned. (Ownership by the Jicarilla Apache Nation is included here as privately owned). The remaining two thirds are held by the Forest Service, Bureau of Land Management, Department of Defense, National Park Service, New Mexico Game and Fish Department, or the New Mexico State Land Office. This watershed was identified in New Mexico's Unified Watershed Assessment (UWA) as a Category I watershed: *a watershed in most urgent need of restoration.*

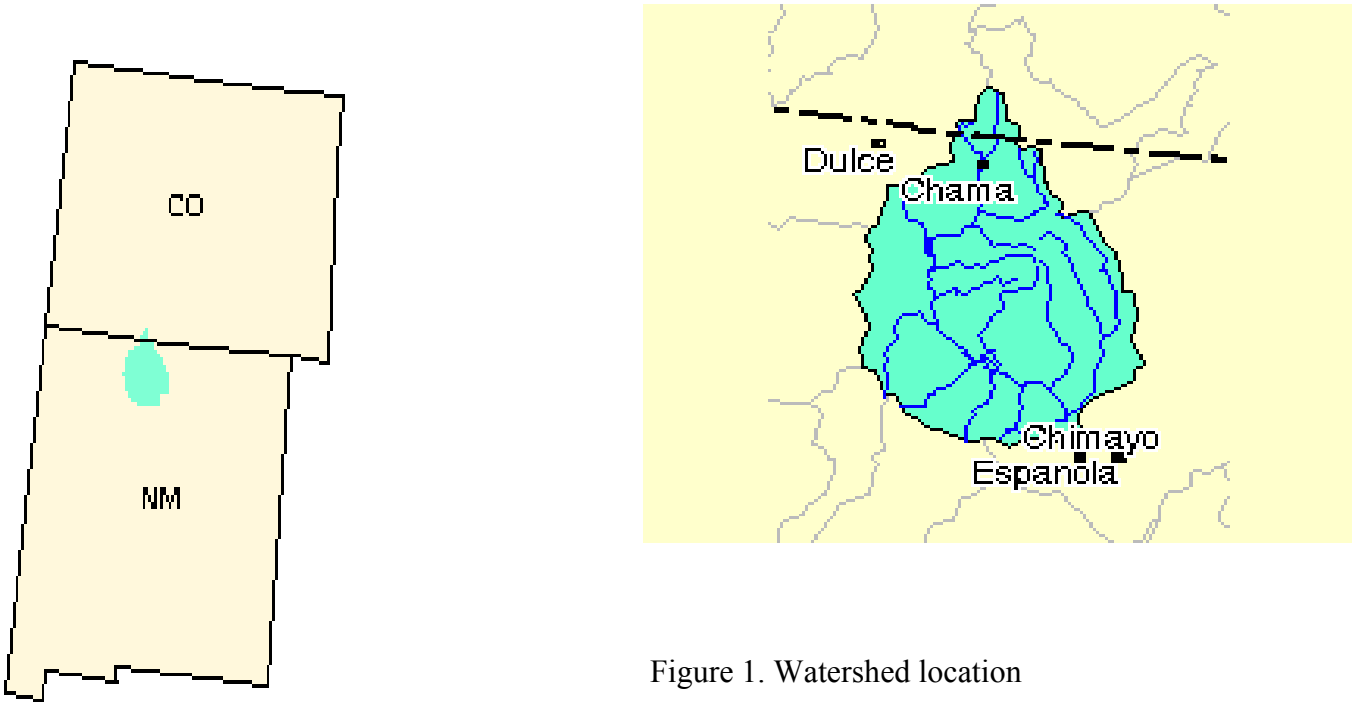


Figure 1. Watershed location

The federal Clean Water Act requires that all states identify surface waters within their respective boundaries that do not meet, or are expected to not meet, established federal water quality standards. Additionally, through section 303(d) of the Act, the federal government requires the states to prioritize their listed waters for the development of Total Maximum Daily Loads (TMDLs). (A TMDL is a budget for the amount of a pollutant that can enter a

watercourse without causing it to exceed surface water quality standards). The state of New Mexico has 20 years to develop TMDLs, starting in 1997. 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 New Mexico Environment Department (NMED) Surface Water Quality Bureau (Bureau) is presently developing TMDLs and load allocations for rivers, creeks and streams within the state as per its prioritized list. Where waters show exceedences in TMDLs, the Bureau relies on a voluntary approach to correct the pollution.

The Bureau has sampled water at various sites throughout the Chama watershed, developed TMDLs for the watershed, and identified 18 stream segments that do not currently meet state standards for different reasons, including: turbidity from soil erosion; stream bottom deposits; water temperature that affects fish and other life in the river; dissolved oxygen; levels of aluminum, ammonia, and phosphorous; specific conductance; and fecal coliform. TMDLs were completed for reaches of the upper part of the Chama watershed in September 2003, and for stream segments in the lower portion of the watershed in June 2004. Due to an oversight error by the Surface Water Quality Bureau, TMDLs were developed for only 12 of the stream segments identified as impaired; the remaining 6 stream segments with exceedances remain on the 303(d) list pending completion of their respective TMDLs and will continue to be a priority for clean up efforts along with the identified TMDL segments. The Surface Water Quality Bureau will revisit the Rio Chama Watershed in 2007 for another surface water quality survey.

In addition, local residents have articulated concerns about: channelization and erosion, the impact of the drought on stream temperatures, peak runoff occurring earlier in the season and limiting the ability to irrigate, unauthorized impoundment of water, impacts of upland development on the river, unauthorized travel (particularly on public land) by ATVs, the existence of old logging roads contributing to erosion, poorly regulated and improperly installed private septic tanks and community sewerage treatment facilities, the presence of many varieties of noxious plants, encroachment by woody species such as sage and pinon juniper, dense tree growth and its potential impact on water yield, and the risk to communities and potential affects on water quality of catastrophic wildfire due to the build-up of hazardous fuels in the watershed.

The Clean Water Action Plan asks each state to prepare a Watershed Restoration Action Strategy (WRAS) for the priority watersheds identified in the UWA. 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, but not limited to, failing septic tanks, construction, road maintenance, recreation, animal-keeping practices, forestry practices, and urban and rural runoff. U.S. Environmental Protection Agency (EPA) guidance suggests that a WRAS should:

- list specific water quality problems,
- identify sources of contamination causing those problems,
- provide a schedule of action items to be undertaken to abate those sources and
- estimate funding requirements to perform these actions

A WRAS is based not on legal obligations but on a desire to restore watershed health and water quality 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. As such, a WRAS is considered to be a work in progress, to be updated every couple of years to reflect changing conditions and new information.

The initial draft of the Rio Chama WRAS was developed over a period of months, starting in the winter 2005. The content and structure of the WRAS was drawn from existing WRAS documents from other New Mexico watersheds, local community knowledge provided at public meetings of the Rio Chama sub-watershed groups and sources suggested at these meetings, and the TMDL documents developed by the New Mexico Environment Department's Surface Water Quality Bureau.

I. FORMATION OF THE RIO CHAMA WATERSHED GROUPS

Based on the sampling done in the Chama River in 1998 and 1999 by the New Mexico Environment Department (NMED) Surface Water Quality Bureau (SWQB), and on the TMDLs that were being developed at the time, the Bureau deemed it necessary to issue a request for proposals (FRP) for the formation of a collaborative community watershed group that would (with state and federal assistance) address nonpoint sources of pollution and other watershed concerns that would be identified by this watershed group through a collaborative process. Based on their response to the RFP, Meridian Institute was selected 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 many residents and other interested stakeholders in the Chama watershed to learn more about the activities, interests and concerns of both resident and non-resident stakeholders within the watershed. Concurrent with this, Meridian Institute began providing information about the Clean Water Act, surface water quality impairments identified in the watershed, and the 319 Program.

The first public meeting of this formative group took place in February 2004. Due to the large size of the watershed, the group agreed to form subgroups based on sub-watersheds. The sub-watershed groups that resulted from that decision are:

- Upper Chama Sub-Watershed Group,
- Rios Nutrias, Cebolla and Canjilon Sub-Watershed Group,
- El Rito Creek and Rios Vallecitos, Tusas and Ojo Caliente Sub- Watershed Group
- Gallina, Coyote, Abiquiu Sub-Watershed Group

The subgroups meet on a quasi-monthly basis. Each meeting is facilitated and documented by a neutral convener provided by Meridian Institute. It has been agreed to and affirmed at several meetings that there exists compelling need for diverse stakeholder representation; these were identified early on and continue to be invited to participate in the process. Stakeholders currently involved in the groups within the Rio Chama watershed include members of the general public,

private landowners, representatives of acequias, grazing associations, water users, tribal government, local government, state and federal agencies, and community and environmental organizations. (A list of all individuals contacted thus far in this process is presented in Attachment A. Many of these individuals have attended one or more meetings.)

Participants 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. These efforts include, but are not limited to: Rio Arriba Regional Water Plan (the Water Plan), NMED SWQB Total Maximum Daily Load (TMDL) Reports, existing 319 grants in the watershed, and the New Mexico State Forestry Forest and Watershed Health Plan.

This WRAS is for the entire Rio Chama Watershed, but it is based on the input that has been generated for the most part at meetings of the individual sub-watershed groups. All four groups have contributed to the development of the WRAS. It is noted here that while the participants find it more efficient to work during the present phase as four separate sub-groups, there is also some support for maintaining one overarching entity that brings all four sub-groups together under one identity. Some participants have proposed that such an entity could benefit the sub-groups by providing a forum for information exchange, planning, and seeking funding.

Participants of the Rio Chama watershed groups drafted and agreed upon the following mission and goals to guide the groups' efforts, including the development of this WRAS.

MISSION STATEMENT:
The Rio Chama Watershed Groups are grassroots efforts that build upon a historical tradition of sustainable practices vis-a-vis land and water and provide forums for public and private sector partnership to address issues of watershed management for the benefit of local communities, including: water quality, ecosystem restoration, and traditional uses of the land.

GOALS:

- Improve water quality
- Maintain and preserve traditional and cultural uses of the land
- Improve overall ecosystem health
- Reduce soil erosion
- Conduct outreach to stakeholders and provide a forum for people to participate
- Preserve key species (avoid listing as an endangered species) such as the Rio Grande Cutthroat Trout, Silvery Minnow, SW Willow Flycatcher
- Reduce fire hazard to rural communities
- Leverage our skills and funds to make a difference on the landscape
- Recognize the cultural ecology of the area and the sustainable practices vis a vis water that have been employed in the past
- Document the social and economic history of the landscape and of local people to effectively utilize resources available
- Have a safer, healthier, more productive watershed as the end result
- Conduct coordinated resource planning to improve quality of life and improve our natural resources

In the context of the goals and objectives listed above, the members of the Rio Chama watershed groups identified a set of water quality and related natural resource concerns as described in Section IV WATER QUALITY AND RELATED NATURAL RESOURCE PROBLEMS. They proposed solutions to address the root causes and sources of the contamination observed at these sites as outlined in Section V PROPOSED STRATEGIES TO ADDRESS SITES OF CONCERN.

II. PUBLIC OUTREACH AND EDUCATION

The Rio Chama watershed groups were formed in response to the need to involve the public in addressing the surface water quality concerns identified in the two TMDL Reports on the Chama River. The Rio Chama sub-watershed groups are made up of volunteer participants and are open to and inclusive of any member of the public with interest in water and/or watershed health. Meetings are held on a quasi-monthly basis and are structured around concerns and interests of the people in attendance. All meeting documentation (agenda, summaries, attendance lists, meeting materials, contact lists, and other miscellaneous documentation) is kept on file by the Meridian Institute as the groups' 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. Also, local papers and radio stations assist by announcing upcoming meetings, and watershed group participants post flyers about upcoming meetings at local post offices and other public places. Identification of and contact with additional stakeholders continues to be important for these groups.

Participants in the Rio Chama sub-watershed groups have stressed the importance of education and information, and the need to educate themselves about other current and past activities affecting water quality, quantity, and watershed health. In addition, several members have discussed the importance of providing information and education for the public about the functions and values of riparian areas, best management practices, the cultural ecology of the watershed, and current water quality and related natural resource issues of concern in the watershed. In August 2004, the watershed group borrowed the Rolling Rivers Trailer from the East Rio Arriba Soil and Water Conservation District and used it to demonstrate water flow and erosion and provide information about watershed health at the Rio Arriba County Fair. The Rolling Rivers Trailer - 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 - is a mobile educational tool that serves to promote a more thorough understanding of rivers and riparian function and values. Watershed group participants have discussed the possibility of coordinating with other organizations – including local schools, the Soil and Water Conservation Districts, New Mexico State Forestry, the U.S. Army Corps of Engineers (Abiquiu Reservoir), etc. - on future educational activities. Some future outreach activities that have been suggested include:

- Developing a brochure about the watershed group. The Army Corps of Engineers could offer these to visitors at Abiquiu Reservoir. USDA Forest Service Rangers could carry them and distribute to guests as well.
- Hosting speakers at watershed group meetings on topics of interest such as range conditions, forest health, fire, water operations on the river

- Collecting, developing and distributing informational materials about best management practices
- Talking with science teachers and their classes at local schools about the watershed groups' activities
- Posting information about watershed group meetings at school sporting events and other locations throughout the watershed
- Creating a website for meeting notices, agendas, summaries, documents, etc. and asking participating agencies and organizations to provide links to the site
- Creating a video of successfully implemented BMPs that have benefited both water quality and the traditional way of life.

III. WATERSHED ASSESMENT/INVENTORY

The Chama watershed, like other watersheds, is characterized in part as an area of land for which rainfall and snowmelt is either temporarily stored in the area's subsurface or is drained by one single river. The Chama watershed consists of a complex system of tributary streams, springs, arroyos, ponds and lakes, and the Rio Chama itself, which eventually discharges into the Rio Grande just north of Espanola.

Some documents related to past and present land and water management efforts that provide valuable information about the watershed include:

- Agua Caballos FEIS, Felipito EA
- Best Management Practices for Water Quality and Grazing Activities on the Rangeland/Jarosa Allotment Project, USFS. September 2002.
- Carson and Santa Fe National Forest Land Management Plans.
- El Rito Forty-Year Water Plan. July 2004.
- New Mexico State Forestry Forest and Watershed Health Plan 2004. www.nmforestry.com
- New Mexico State Water Plan. December 2003.
- Rio Arriba Regional Water Plan (*currently under development)*
- Rio Chama Floodplain Management Study. February 1993.
- Rio Chama Instream Flow Assessment. December 1992.
- Rio Chama Management Plan
- Rio Vallecitos Watershed Project (99-E) Final Report (NMED)
- Total Maximum Daily Loads (TMDLs) for the Lower Rio Chama Watershed. June 2004.
- Total Maximum Daily Loads (TMDLs) for the Upper Rio Chama Watershed. September 2003.

LOCATION: See Introduction paragraph 1 and Figure 1.

HISTORY:
The Chama River Valley was first settled by cultural descendants of the Four Corners Anasazi ("ancient ones"). These first inhabitants were then followed by nomadic Indians and much later by Spanish colonists (Polling-Kempes1997). In the late 1600s and into the early 1700s, Abiquiu was established as one of the Spanish colony's outposts, and by 1827 had a population of 3,557

(Arellano 1978). This area also became a major trade center between the Ute, Navajo and other Native American Tribes and the Spanish, and thus played a role in the settlement of other parts of the Chama watershed, including El Rito, Cañones, Coyote, and Tierra Amarilla (Arellano 1978).

In 1814, Marcial Montoya and Pablo Antonio Romero submitted the first documented grant petition to the Spanish crown for a land grant on the "Brazos del Rio de Chama" on behalf of themselves and 60 others. This petition and several subsequent applications were denied (Arellano 1978), but in 1832, Manuel Martinez submitted a grant petition on behalf of himself and his family, requesting that access to pastures, roads, and watering places be limited to grantees in an attempt to acquire a private rather than a communal grant. The Committee of the Territorial Deputation rejected the request for limited access and instead made the Tierra Amarilla grant a community grant (Quintana 1991).

In 1860, Congress changed the Tierra Amarilla grant from a communal grant to a private grant, giving it to Manuel Martinez and his descendants. In spite of deeds supported settlers' claims to their rights on common lands, the grant was signed over to Thomas Benton Catron in 1881, one of the richest landowners in the country at that time (Quintana 1991). In 1901, Catron received patent on the entire grant with only small exceptions of the lands allotted to a few settlers. On numerous occasions during the early years of U.S. occupation the people of this area appealed for Congressional investigations into the circumstances that had lead to this alienation of original land grantees.

By 1904, the area between what is now the villages of Chama and Tierra Amarilla had been cleared of ponderosa pine by the Southwestern Lumber and Railway Company. This removal of trees lead to extensive soil erosion, gully scaring and siltation of the watershed downstream. (Quintana 1991). Also the first commercial barbed wire fences were installed in this area around 1912, further depriving settlers of their open range rights. The Alianza Federal de Mercedes first appeared on the scene in Northern New Mexico in 1966; its immediate appeal was in response to the colonialism that had denied the historical residents, mostly impoverished Spanish, access to the resources of their ancestral lands and had destroyed their communal way of life. In 1967, the Alianza attempted a citizen's arrest of a District Attorney at the Tierra Amarilla Courthouse. The episode at the courthouse and its attendant fall-out lead to inquires by the Civil Liberties Union and returned a sense of pride and identity with the land and associated culture (Quintana 1991).

GEOLOGY:

The northern most Cumbres Mountains are composed of Precambrian granite and Tertiary volcanic rock (Chronic 1987). The Brazos Mountains and Tusas Mountains in the northwestern and northeastern section and the Jemez Mountains in the southwest portion of the watershed experienced uplifting during a mountain building period that formed the ancestral Rocky Mountains during the Paleozoic time, some 300,000 million years ago. The Jemez mountains are dominated by Pennsylivain, Permian and Triassic sedimentary rocks along the mountain slopes. Quanternaery rhyolites and tuffs along with teriary volcanics can be found at the higher elevations. Precambrian metamorphic and sedimentary rocks form the Brazos and Tusas Mountains in the eastern portion of the Upper Rio Chama watershed. The Brazos Box is a

dramatic 2000-foot-deep cliff-walled canyon that is three times deeper than the Rio Grande gorge near Taos. Small cinder cones are sources for lava that flowed down the Brazos Box into the Rio Chama basin to the west of Tierra Amarilla approximately 250,000 years ago. In places on these western slopes, glacial gravels overlie Mancos shale which is a particularly weak Cretaceous rock unit. Road construction through these areas has led to landslides over the years (Chronic 1987). The Rio Chama Valley below the Brazos Mountains contains Cretaceous sediments dominated by the Mancos shale. The name Tierra Amarilla refers to the yellowish soil derived from this Mancos shale. West of the Village of Chama off State Highway 64, the Mancos shale bluffs are capped by Mesa Verde group sandstone and shale. The Mancos shale also floors the Chama syncline that extends to the south. The Cumbres Mountains to the north are composed of Precambrian granite and Tertiary volcanic rocks (Chronic 1987). Starting at Navajo Canyon and south through Abiquiu, the Triassic red beds and Jurassic sandstones are readily evident. Some mesas south of Abiquiu are capped with teriary basalts.

RIVER MORPHOLOGY:

The U.S. Bureau of Land Management completed an instream flow study in 1992 for the Wild and Scenic portion of the Rio Chama. The following information is excerpted from that document. Average stream gradients measured on the Wild and Scenic sections of the Rio Chama range from 0.002-0.005 ft/ft. Throughout most of the Wild and Scenic corridor, the Rio Chama is slightly entrenched. The ratio of floodplain to bankfull channel width is generally less than 2 to 1. Sinuosity above the Monastery is generally less than 1.15, but increases below the confluence of the Rio Gallina. Substrate size is generally coarsest near tributaries where larger material is deposited and cliff-river interfaces where rock material falls into the river. Tributaries are also major sources of fine sediment such as silt and clay, which is distributed further in the system than coarse material. Sediment loads strongly influence the morphology of the Rio Chama by creating pools behind large debris dams and steep riffles moving water on the downstream side.

HYDROGEOLOGY:

To be added.

SURFACE WATER:

Perennial streams in the upper region of the Chama watershed include Sixto Creek, Nabor Creek, Rio Chamita, Wolf Creek, Willow Creek, Little Willow Creek, Canones Creek, Rio Brazos, Chavez Creek, and Rito de Tierra Amarilla. Perennial streams in the lower portion of the watershed below El Vado Reservoir include Abiquiu Creek, El Rito Creek, Vallecitos Creek, Rio Tusas, Rio Nutrias, Canjilon Creek, Cebolla Creek, Rio Ojo Caliente, Rio del Oso, Abiquiu Creek, Polvadera Creek, Chihuahuenos Creek, Canones Creek, Rio Puerco de Chama, Rito Encinco, Coyote Creek, Poleo Creek, Rito Redondo, Rito Resumidero, Rio Gallina, Cecilia Canyon, Rio Capulin, and Clear Creek.

In addition, the Rio Chama Watershed contains three reservoirs on the main stem of the Rio Chama: Heron Resevoir, El Vado Reservoir and Abiquiu Resevoir. The San Juan/Chama Diversion which was built in the 1960's, diverts up to 110,000 acre feet of water per year from the San Juan Basin to the Rio Chama Basin at Willow Creek. This water is initially stored in Heron Reservoir, which is owned and operated by the US Bureau of Reclamation (BOR). Water

stored in Heron from the San Juan Basin is primarily designated for use by several contractors downstream on the Rio Grande, including the cities of Albuquerque, Santa Fe, Espanola, the Middle Rio Grande Conservancy District, and others. The Middle Rio Grande Conservancy District owns, and BOR operates, El Vado Reservoir and Dam which is downstream from Heron on the Rio Chama. El Vado is for native Rio Chama water and is stored for the Middle Rio Grande Conservation District for irrigation of cropland in the Middle Rio Grande valley. Abiquiu Reservoir and dam downstream from El Vado is owned and operated by the US Army Corp of Engineers for flood control purposes for the downstream Rio Chama and Rio Grande.

POINT SOURCES OF DISCHARGE:
There are two permitted point sources in the Upper Rio Chama basin: The Village of Chama Wastewater Treatment Plant (NPDES Permit No. NM0027731) and the New Mexico Department of Game and Fish Parkview Fish Hatchery (NPDES Permit No. NM0030139).

TOPOGRAPHY:
Elevations in the Chama River Watershed range from the highest point of 11,403 feetabove sea level at Brazos Peak to the lowest point of 5,620 feet above sea level at the confluence of the Rio Chama with the Rio Grande.

SOILS:
Soils in the Chama Valley are primarily derived from the Mancos Shale, The Dakota Sandstone, and the Mesa Verde geologic formations in the upper portion of the district. Soil textures range from sandy soils at the lower elevations to loamy clay soils in the Cebolla area, to clay soils in the Nutrias area, to loamy soils in the Tierra Amarilla area, to cobble soils in the Chama area. Note: *Several watershed group participants have noted the need to document the erosive nature of soils in the Chama watershed historically, and the factors that contribute to erosion and the development of gullies and arroyos that deliver sediment.*

VEGETATION & PRECIPITATION:
The Rio Chama Watershed has within its boundaries parts of two eco-regions. They are the Southern Rockies (21) and the Arizona and New Mexico Plateaus and Mesas (22). (Ecoregion is a term used to denote regions with generally similar ecosystem characteristics, such as similarity of climate, landform, soil, potential natural vegetation, hydrology, or other ecologically relevant variables.) Ecoregion 22, Arizona and New Mexico Plateaus and Mesas, is represented by tableland with considerable to very high relief to plains with low mountains. In general the area of the Chama watershed from above Abiquiu Reservoir to the confluence with the Rio Grande falls within Ecoregion 22. Generally vegetation in the lower elevations (Ecoregion 22) within the watershed is characterized by mixed grassland and shrubland vegetative types. The dominant shrubs are rabbitbrush along with one-seed juniper. Ecoregion 21, Southern Rockies, is comprised of high mountains and tablelands with high relief. Most of the watershed lies within this ecoregion. In this ecoregion, lower elevations are represented by mixed grassland and shrubland vegetative types. The dominant shrubs here are big leaf sage with some one-seed juniper. Generally as elevation increases, Juniper and Pinyon-Juniper vegetation types increase in dominance, then yield to Ponderosa Pine, and ultimately to mixed conifer at sub-alpine and alpine elevations.

The Rio Chama Watershed experiences a wide array of climatic conditions. Annual precipitation in the watershed averages from 10 inches in the lower elevations to over 30 inches in the higher elevations. Within ecoregion 21, winters are cold with 50% or more of annual precipitation occurring in the winter months. Ecoregion 22 is somewhat milder in temperature with at least 60% of precipitation occurring in the spring and summer growing season. Generally as elevation increases, colder and wetter climatic conditions do also.

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

TABLE 1 – Summary of Chama River Watershed Land Status

Ownership	Acres	Percentage of Land Area in the Watershed
State Lands	27,717	1.4
State Game and Fish	35,919	1.8
Tribal Lands	246,034	12.5
Private Lands	552,652	28.1
Bureau of Land Management	113,854	5.8
Forest Service	973,064	48.9
State Park	15,186	0.8
National Park Service	131	0.00007
Dept. of Defense	2,912	0.1
Totals	**1,967,470**	**100**

Figure 2. Chama Watershed TMDL Reaches/Land Status

DATA GAPS: *Data gaps will be a topic of discussion at future meetings.*

WATERSHED/RIVER RESTORATION PROJECTS:
Many of the participants in our Rio Chama sub-watershed groups have initiated or otherwise been involved in activities in the watershed designed to improve water quality. Some examples these past and ongoing projects are:

- The **Carson National Forest** (El Rito and Canjilon Ranger Districts) has developed a 10 year plan for vegetation management and fuel reduction projects in the forest.

- The **Coyote Ranger District** recently received funding to implement the **Cecilia Canyon Creek Watershed Restoration Project.** This project will assist in managing the area for ungulate use, recreation and forest health while implementing a successful watershed

restoration strategy to re-establish floodplain and stream habitat integrity with a long term goal of increasing the range and population of Rio Grande cutthroat trout.

- **El Rito Ranger District and Permittees** successfully implemented several Best Management Practices on four grazing allotments with 319 grant funding as part of the **Rio Vallecitos Watershed Project**. Some of these BMP's included reconstruction of spring developments, development of several earthen dams, brush-hogging and reseeding of sagebrush/pinon-juniper covered rangeland, and reconstruction of critical allotment fences. The group applied for and received an additional 319 grant for 2005-2008 in efforts to further build upon their success by implementing similar projects in an effort to improve watershed conditions. The El Rito Ranger District also completed a Wild horse and burro management plan for the Jarita Mesa band on the El Rito District.

- **Esperanza Grazing Association** was awarded a 319 grant and has worked with the Bureau of Land Management (BLM) to complete riparian corridor enhancements. The project is on BLM land and NRCS provided technical assistance and some material. The State Land Office is another partner involved in this collaborative effort. This ongoing project incorporated a 4-year maintenance plan which provides for sage removal during the winter months, and if a prescription is in place, use of burning as a tool for accomplishing this.

- **Forest Guild** has received funding through the Conservation Reserve Program (CRP) to do riparian improvements, including fencing, on the High Country Ranch, which is at the headwaters of Jarosa Creek and Long Canyon Creek. Both creeks drain into the Vallecitos River.

- **Ghost Ranch** has developed a constructed wetland project that treats wastewater while providing other environmental benefits. In addition, gray water systems are in place for irrigation and other uses on the property.

- **Jicarilla Apache Nation** has completed a brush management project (7,000 acres in 2003; 5,000 acres in 2004), reseeded the area west of Heron Lake and El Vado Reservoirs, developed livestock watering facilities, and implemented planned grazing systems. Their Environmental Protection Office has also received a grant from the U.S. Environmental Protection Agency (EPA) to develop a GIS system and a water quality assessment program. The initial focus of this assessment would be on El Poso, Horse Lake, Willow Creek Ranch and Boyd Ranch. Results from the water quality testing will be entered into EPA's STORET database.

- **Natural Resources Conservation Service (NRCS)** completed 6,000 acres of brush management in the Upper Chama in 2004.

- **USDA Forest Service in partnership with permittees** in the Coyote Ranger District, including the French Mesa Grazing Association and others, received a 319 grant to install riparian fencing, trick tanks, earthen tanks, and a rest rotation grazing system. In

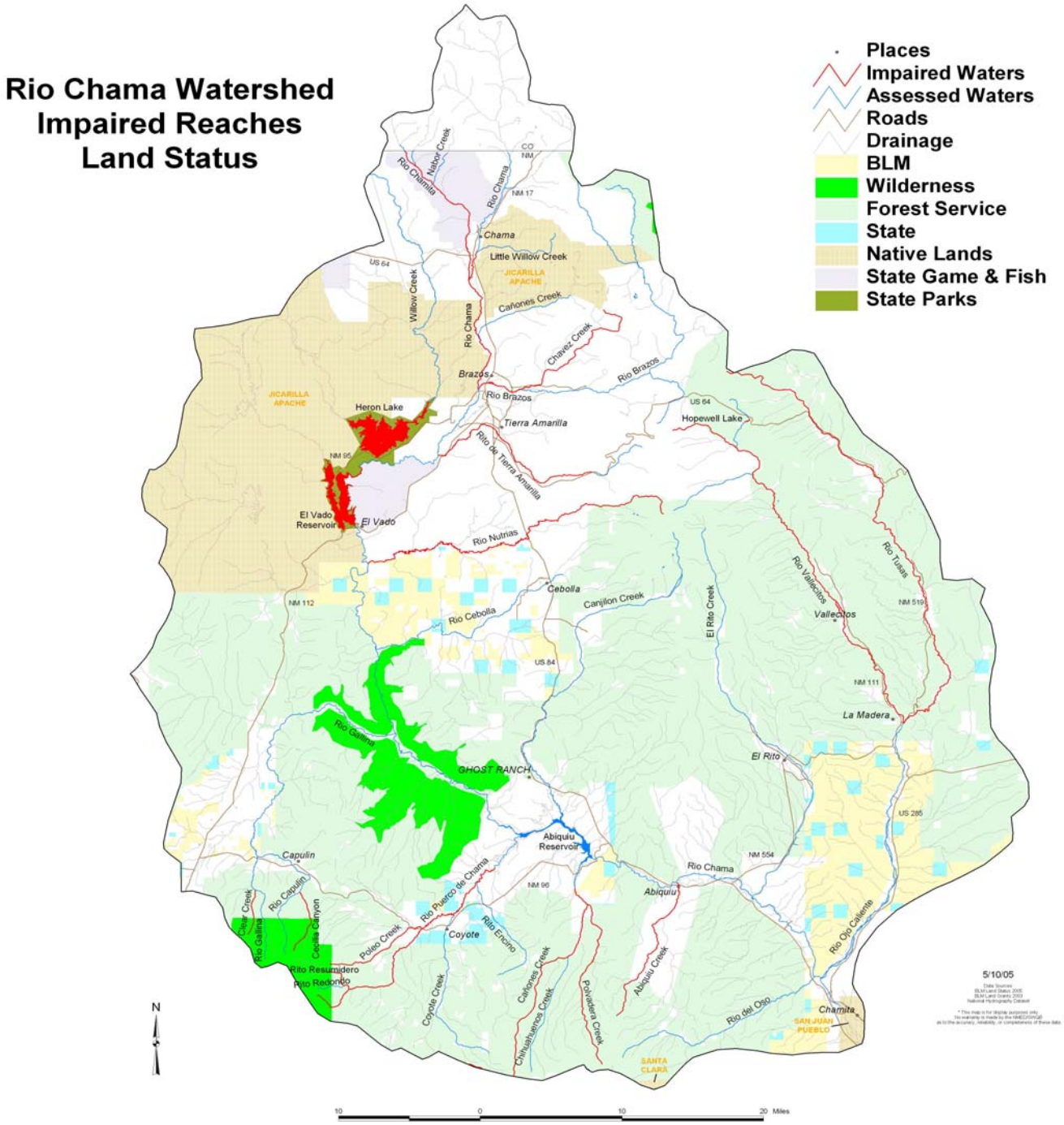
addition, between Cebolla and Ghost Ranch, the U.S. Forest Service is doing fuel reduction and brush management on the Carson National Forest.

IV. WATER QUALITY AND RELATED NATURAL RESOUCE PROBLEMS

ISSUES IDENTIFIED BY THE RIO CHAMA WATERSHED GROUPS:
Participants in the Rio Chama subwatershed groups have identified the following water quality and related natural resource issues, listed in alphabetical order, at meetings and in conversations. Specific sites and proposed strategies to address these concerns are identified in Section VI. Discussions continue to determine the best strategies for addressing these issues.

- **Channelization** of streams and erosion.
- **Climate change and drought** and ecological, social and economic impacts of these phenomenon. Drought conditions are the cause of hardship to some residents of the watershed and may contribute to exceedences in the temperature standard in several streams in the watershed. Additional study is needed to understand the potential impacts of climate change on soil and water quality.
- **Dissolved oxygen.**
- **Dumpsites** throughout the forest and in creeks are an issue of concern to the watershed groups.
- **Erosion impacts due to off-highway vehicle (OHV) use** and the creation of informal trails, as well as **dispersed recreational impacts from campers and day users** along the creek, have reduced riparian vegetation, reduced other protective vegetation and increased runoff and soil erosion. There is a need Forest-wide to increase OHV education, patrol and enforcement along with reclamation of these trails and roads.
- **Fecal coliform**
- **Fire danger** due to build up of fuels on the forest in many parts of the watershed and the impact a catastrophic wildfire would have on water quality.
- **Invasive Species and encroachment by brush –** There are Class A and Class B invasive species - including bull thistle, knapweed, Canada thistle, larkspur, chickory, musk thistle, pepperweed, Russian olive, tamarisk and toadflax - along the roadways in the watershed. These are spreading from there into open pastures, through rivers, canyons and ditches, and on public and private land. The spread of invasive species, noxious plants and brush and the associated reduction in native vegetation can reduce soil stability and contribute to erosion and related pollutants such as turbidity and sedimentation. The Santa Fe and Carson National Forests have recently completed a noxious weed EIS, and the East Rio Arriba Soil and Water Conservation District recently applied for funding to designate a Weed Management Area in the watershed.
- **Livestock management and arroyo management –** On some allotments there is a need to better manage grazing in or near riparian areas and use of arroyos, and to maintain fencing. It has been noted that grazing is a powerful tool to stimulate vegetation growth and rehabilitate the watershed, and that coordination between those grazing on private and public lands throughout the watershed may help to achieve watershed goals.
- **Loss of riparian vegetation and habitat** has destabilized streambanks.

- Potential contamination of water from **materials used in testing of ammunition and small explosives** should this use be permitted in the watershed.
- **Metals (Chronic aluminum)**
- **Peak stream flows occur earlier in the season** and runoff ends in the first part of June. This is problematic for irrigators and the high velocity runoff contributes to soil erosion.
- Potential impacts from **upland development and septic tank seepage** on the river.
- **Rio Grande cutthroat trout, Silvery Minnow, SW Willow Flycatcher.** The Rio Grande Cutthroat Trout is a native fish that has been eradicated from much of its historic range by the introduction of non-predatory non-native species and by habitat degradation. Regarding habitat, biologists are generally concerned with "the lack of woody riparian habitat, actively eroding streambanks, loss of undercut banks, widened streams, sediment-filled pools, high water temperatures, accumulation of algal growth, and hardened wet meadows" (Ferrell, et al, 2002 in the Rio Puerco de Chama Hydrologic Condition Assessment, 2004) "Stream surveys conducted by fisheries crews on parts of the Santa Fe National Forest in 2001-2002 have determined that there is adequate population and habitat extant on the forest to prevent the sub-species from being placed on the threatened and endangered list." (Rio Puerco de Chama Hydrologic Condition Assessment, 2004)
- **Sediment deposition** coming out of and **flooding due to releases** from Abiquiu Dam.
- **Soils** in the valley bottoms of the Rio Chama are erosive in nature.
- **Stream bottom deposits** accumulate when stream energy is too low to transport fine sediment contributed by channel or watershed erosion. Aquatic habitat is impaired because macroinvertebrates and most cold-water fish species require clean gravels for foraging and reproduction.
- **Temperature**
- **Turbidity**
- **Wastewater entering the stream from treatment plants.** The Chama wastewater treatment plant is faced with removing turbidity, ammonia, aluminum, fecal coliform, and phosphorous out of wastewater before it is released into the river. The plant was built before the technology to address all of these pollutants was available and the plant experiences challenges with compliance. Low alkalinity that is corrosive to plumbing is also occasionally a problem. In addition, a pilot study showed that wells in Chama are contaminated with arsenic, which resulted in the Village switching to the use of surface water for water needs. Local residents would also like more information about the quality.


Rio Chama Watershed
Impaired Reaches
Land Status
Places
Impaired Waters
Assessed Waters
Roads
Drainage
BLM
Wilderness
Forest Service
State
Native Lands
State Game & Fish
State Parks
Rio Chamita
Nutor Creek
Rio Chama
CO
NM
NM 17
Chama
Little Willow Creek
US 64
JICARILLA APACHE
Willow Creek
Cañones Creek
Chavez Creek
Brazos
Rio Brazos
Heron Lake
Tierra Amarilla
Rio de Tierra Amarilla
Hopewell Lake
NM 95
El Vado Reservoir
El Vado
Rio Nutrias
Cebolla
Canjilon Creek
Rio Cebolla
NM 112
El Rito Creek
Rio Vallecitos
Vallecitos
Rio Tusas
NM 519
US 84
NM 111
La Madera
Rio Gallina
GHOST RANCH
El Rito
US 285
Abiquiu Reservoir
Capulin
Rio Capulin
Rio Puerco de Chama
NM 554
Rio Chama
NM 96
Abiquiu
Clear Creek
Cejita Canyon
Coyote
Rio Encino
Rio Ojo Caliente
Poleo Creek
Rito Resumidero
Rito Redondo
Coyote Creek
Cañones Creek
Chihuahuenos Creek
Polvadera Creek
Abiquiu Creek
Rio del Oso
Chamita
SAN JUAN PUEBLO
SANTA CLARA
N
10
0
10
20 Miles
5/10/05

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

TABLE 2 – Chama Watershed - Water Quality Exceedances in TMDL Reaches	
Location	**Exceedance**
Rio Chamita	Fecal Coliform, Metals (Chronic Al), Total Ammonia, Temperature
Rio Chama (Little Willow Creek to Rio Brazos)	Temperature
RioBrazos (Chavez Creek to Rio Chama)	Temperature
Chavez Creek	Temperature
Rito de Tierra Amarilla	Temperature, Turbidity, Stream Bottom Deposits
Abiquiu Creek	Dissolved Oxygen
Canones Creek	Turbidity, Metals (Chronic Al), Fecal Coliform
Poleo Creek	Turbidity
Polverdera Creek	Temperature
Rio Vallecitos	Turbidity, Metals (Chronic Al), Temperature
Rio Nutrias	Turbidity

TABLE 3. Chama Watershed – Water Quality Impairments on 2004-2006 303(d) List	
Location	**Impairments**
Cecelia Canyon	Stream Bottom Deposits
Clear Creek	Stream Bottom Deposits
Rito Resumidero	Stream Bottom Deposits
Rio Puerco de Chama (Poleo Creek to Headwaters)	Stream Bottom Deposits
Rio Puerco de Chama (Abiquiu Reservoir to Poleo Creek)	Fecal Coliform, Temperature
Canijlon Creek	Temperature, Turbidity, Specific Conductance
Rio Tusas	Stream Bottom Deposits

V. WATER QUALITY GOALS

TMDL REACHES: Water quality goals for the Chama River and its tributaries have been established by the state for TMDL parameters. Table 4 below summarizes the listed waters in the Chama Watershed that are impaired by nonpoint sources of contamination and the designated use(s) that are not attainable due to the contamination. Table 5 below represents those waters impaired and identified on the 303(d) list.

TABLE 4. Chama Watershed - Water Quality Goals in TMDL Reaches	
Location	**Designated Use**
Rio Chamita	High Quality Coldwater Fishery, Secondary Contact
Rio Chama (Little Willow Creek to Rio Brazos	High Quality Coldwater Fishery
Rio Brazos (Chavez Creek to Rio Chama)	High Quality Coldwater Fishery
Chavez Creek	High Quality Coldwater Fishery
Rito de Tierra Amarlla (Hwy 64 to Rio Chama)	High Quality Coldwater Fishery
Abiquiu Creek	Coldwater Fishery, Warmwater Fishery
Canones Creek	High Quality Coldwater Fishery, Secondary Contact
Poleo Creek	High Quality Coldwater Fishery
Polverdera Creek	High Quality Coldwater Fishery
Rio Vallecitos	High Quality Coldwater Fishery
Rio Nutrias	High Quality Coldwater Fishery

Table 5. Chama Watershed – Water Quality Goals in 303(d) List Reaches	
Location	**Designated Uses**
Cecilia Canyon	High Quality Coldwater Fishery
Clear Creek	High Quality Coldwater Fishery
Rito Resumidero	High Quality Coldwater Fishery
Rio Puerco de Chama (Poleo Creek to Headwaters)	High Quality Coldwater Fishery
Rio Puerco de Chama (Abiquiu Reservoir to Poleo Creek)	Coldwater Fishery, Secondary Contact
Canjilon Creek	High Quality Coldwater Fishery
Rio Tusas	Coldwater Fishery, Warmwater 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, temperature, stream bottom deposits, metals (chronic Al), fecal coliform and total ammonia. These impairments are addressed in the 2004 Total Maximum Daily Loads Report for the Lower Rio Chama Watershed (below El Vado Reservoir to the confluence with the Rio Grande), 2003 Total Maximum Daily Loads Report for the Upper Rio Chama Watershed (El Vado Reservoir to the Colorado Border) and 1999 Total Maximum Daily Load Report for the Rio Chamita Watershed.

Turbidity

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:

- Rito de Tierra Amarilla 2,406 lbs/day reduction
- Canones Creek 1,974 lbs/day reduction
- Rio Nutrias 9,621 lbs/day reduction
- Poleo Creek 357 lbs/day reduction
- Rio Vallecitos 192 lbs/day reduction

Given the list of stream reaches impaired by turbidity and the load reduction needed further reconnaissance by stakeholders and landowners in the watershed is required to identify and prioritize sources of the impairment. Possible sources could include areas of excessive erosion of soil, eroded streambanks, removal of riparian vegetation or any disturbing activities within the stream channel. These 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.

Stream Bottom Deposits

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:

- Rito de Tierra Amarilla 59% 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 possible sources could include areas of excessive erosion, unstable streambanks, lack of riparian vegetation or any disturbing activities within the stream channel. Again further inventory of these stream reaches to identify problem areas will need to be carried out by the Chama watershed group.

Temperature

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 seven stream segments in the Chama watershed. The following are the exceedances for temperature found in those segments.

Table 6. Chama Watershed – Temperture TMDL Reaches		
Location	**Maximum Temperature Standard**	**Maximum Temperature Observed**
Rio Chamita	20º C (68º F)	22.5º C (73º F)
Rio Chama	20º C (68º F)	27.9º C (82º F)
Chavez Creek	20º C (68º F)	28.7º C (84º F)
Rio Brazos	20º C (68º F)	29.2º C (85º F)
Rito de Tierra Amarilla	20º C (68º F)	29.5º C (85º F)
Polvadera Creek	20º C (68º F)	24.1º C (75º F)
Rio Vallecitos	20º C (68º F)	24.5º C (76º F)

Based on all assumptions and data collected in the field and inputted to the model, Stream Segment Temperature (SSTEMP) version 2.0, reducing the temperature through an increase of canopy (shade) or increasing the depth to width ratio should effectively decrease stream temperature. Further explanation of all assumptions and data inputted to the SSTEMP model please refer to the Lower or Upper Chama TMDL Survey report.

Table 7. Shading and Width to Depth Ratios for Temperature TMDL Reaches.				
Location	Present % Shading	Optimum % Shading	Present Width to Depth Ratio	Optimum Width to Depth Ratio
Rio Chama	11.3	26.0	9.14	7.0
Rio Brazos	15.0	29.8	12.3	8.3
Chavez Creek	10.0	34.0	16.1	8.5
Rito de Tierra Amarilla	5.0	42.5	10.8	10.8
Polvadera Creek	10	27.5	8.0	8.0
Rio Vallecitos	10	30.3	7.8	7.8

The Chama Watershed Group may inventory these stream reaches to identify and determine which BMPs would effectively reduce the temperature.

Chronic Dissolved Aluminum

Aluminum is the most commom element in the earth's crust. Aluminum comprises on average about 8% of the earths crust. In general, increased Aluminum in the water column can commonly be linked to sediment transport and accumulation, where Aluminum is a constituent part of the sediment. During the 1999 Survey for the Lower Chama and the 1998 Survey of the Upper Chama, exceedances of the chronic Aluminum standard were documented in the Rio Chamita, Canones Creek and the Rio Vallecitos.

Rio Chamita	8.8 lbs/day
Canones Creek	7.7 lbs/day
Rio Vallecitos	33.8 lbs/day

Due to the link between sediment transport and increased Aluminum concentrations, potential sources can be very similar to sources mentioned for turbidity or stream bottom deposits. The Chama Watershed Group will inventory these reaches to identify areas contributing to sediment and determine BMP's to be applied.

Fecal Coliform

Based on 1999 sampling in the Lower Rio Chama and 1998 sampling in the Rio Chamita exceedances of the New Mexico Surface Water Quality Standards for Fecal Coliform were documented. The presence of fecal coliform is an indication of the possible presence of other bacteria that may limit benefical uses and present human health concerns. Both streams have two potential non-point sources of fecal coliform in rangeland and on-site waste water systems. The Rio Chamita also has one point source for fecal coliform from the Chama WWTP.

Rio Chamita	7.5 x 10/9 cfu/day (non-point source)
Canones Creek	6.6 x 10/11 cfu/day (non-point source)

While the point source in the Rio Chamita is controlled by permit other non-point sources will have to be further identified. Solutions will be determined at a later date.

Dissolved Oxygen

Primary sources of dissolved oxygen (DO) impairment in Abiquiu Creek are rangeland, land disposal (on-site wastewater systems), hydromodification (channelization), removal of riparian vegetation, streambank destabilization and road runoff. Upstream activities such as, grazing, confined feeding operations, natural springs, residential area runoff and waste water systems and the highway 84 bridge may be contributing to the DO impairment. The above mentioned watershed activities increase nutrient rich and organic enriched substances in the stream. It results in low DO. Reduction or control in watershed activities associated with nutrient rich or organic enriched substances will result in higher DO. Further work in this subwatershed with stakeholders and landowners to determine the best course of action will occur in the future.

.

VI. PROPOSED STRATEGIES TO ADDRESS SITES OF CONCERN

Location of Site of Concern	*Problem/Issue to be Addressed*	*Proposed Strategies to Address the Problem/Issue*	*Timeframe* *
UPPER CHAMA SUBWATERSHED (from TA Creek to the Colorado border)			
Rio Chamita	TMDLs for temperature, chronic aluminum, ammonia and fecal coliform. Village of Chama waste water treatment plant needs to improve treatment system. Above the Village rangeland is degraded with brush and Juniper, streambanks and riparian improvements are needed.	The Village is working towards improvements in their wastewater treatment system. The aluminum issue will be addressed at the waste water treatment plant by changing coagulants in 2004. Above the Village brush control along with streambank stabilization and riparian improvements (fencing and upland water development).	
Rio Chama from the confluence with Little Willow Creek to the confluence with the Rio Brazos	TMDL for temperature. Arsenic detected in village wells above new standard. Riparian vegetation has been reduced. Home development has increased pressure on the riparian areas. The channel and streambanks are unstable in places. Habitat improvements for aquatic life are needed in the channel.	The Village of Chama would like to remove the arsenic from the wells so they could be available in the case of insufficient surface water due to drought or other causes. Development of upland water sources are needed in grazing areas. Riparian improvements are needed including willow and cottonwood plantings, riparian fences in places. Channel restoration in places including streambank stabilization.	
Rio Chama (Abiquiu Reservoir to El Vado Reservoir)		Strategies to improve pasture management.	
Rio Brazos from Chavez Creek to Hwy 84 bridge	TMDL for temperature. Increases in house development have increased runoff from roads and roofs.	Construct river flow quieting measures. Channel restoration that will increase river depths, decrease channel width and improve pools. Cottonwood tree planting and riparian cover to shade the river are two options to consider to address the temperature exceedences. Work with landowners to develop strategies to address the issues. Investigate possible actions to mitigate impacts of gravel operations. Repair and protect eroded banks.	

Location of Site of Concern	*Problem/Issue to be Addressed*	*Proposed Strategies to Address the Problem/Issue*	*Timeframe* *
Chavez Creek	TMDL for temperature	Riparian improvements, including fencing and planting could help address temperature.	
Rito de Tierra Amarilla (TA Creek)	TMDLs for temperature and stream bottom deposits	Brush control, riparian improvements, streambank stabilization, upland water development and fencing are some of the improvements needed.	
RIOS NUTRIAS, CEBOLLA & CANJILON SUBWATERSHED			
Rio Nutrias	TMDL for turbidity. Potential causes include: Natural causes (e.g. erosive soil type), increase in woody species (sage, juniper) and reduced riparian vegetation. Channel has cut done exposing many steep unprotected streambanks.	Brush control, rangeland improvements that include upland water development and fencing to improve grazing management, streambank stabilization, riparian planting, fencing and channel stabilization projects.	
Lower Rio Cebolla	Invasive species and brush management are issues. Sagebrush canopy overgrowth may be contributing to turbidity through sheet erosion.	Installation of mechanical structures or earthen dams may retain water before it reaches Rio Cebolla. Modifications to grazing patterns and development of livestock water facilities could also help address turbidity.	
Lopez Canyon	Currently this four miles stretch is not a perennial stream. Incised channel has widened exposing steep streambanks and reduced riparian vegetation.	This could potentially become perennial, if channel restoration is conducted. Riparian fencing has reestablished riparian vegetation in places. This work could be expanded. Increase herbaceous vegetation cover associated with brush treament and invasive plant strategies. Restoration of riparian vegetation (carex/rush) is also an option for holding moisture and collecting and filtering sediment before reaching perennial stream. Channel and streambanks can be stablizied	

Location of Site of Concern	*Problem/Issue to be Addressed*	*Proposed Strategies to Address the Problem/Issue*	*Timeframe* *
		where needed utilizing rock structures and other natural materials.	
Canjilon Creek	Creek is impaired for temperature, turbidity and specific conductance. Forest is overgrown and dense, brush has increased, and upland water sources have deteriorated. This has put more pressure on the riparian areas and higher elevation pastures, which have also deteriorated over time. All have reduced the grass component and water storage component of the watershed.	Los Vaqueros de Canjilon hold livestock grazing permits on the Canjilon Allotment and they wish to improve the range condition and production by installing range facilitating practices that will allow them more options as to the rotational rest of pastures, provide a better balance of forage availability and increase overall distribution of use on the landscape. Some of the planned range practices that are being discussed are brush management, erosion control structures, water development, pasture fencing, thinning of P-J, hiring a Range Rider, proper salting locations, monitoring and a planned grazing system.	
RIOS TUSAS, VALLECITOS, OJO CALIENTE & EL RITO SUBWATERSHED			
Rio Vallecitos	TMDLs for turbidity, chronic aluminum, temperature. Pollution from outdoor toilets.	Forest Reserve and the High Country Ranch have are considering planting of mixed conifer in this area and would also like to plant willows to shade the river and improve the fisheries in the Jarosa and Long Canyon Creeks, which drain into the Vallecitos. In addition, they would like to develop water sources, including surface springs, for cattle grazed on the 12,000 acre ranch, to complement fencing that they will be putting up to discourage cattle from standing in the river. Bank stabilization could help address temperature. There may be impacts from the wild horse herd as well as other wildlife, including elk, in the area. Additional data regarding horses and monitoring of population and impacts would be helpful. One option may be experimental birth control for	

Location of Site of Concern	*Problem/Issue to be Addressed*	*Proposed Strategies to Address the Problem/Issue*	*Timeframe* *
		horses. Thinning in forest is needed to help improve watershed health and reduce fire danger. The source of chronic aluminum is uncertain at this time, although there is an abandoned mine in Madera that might be a cause. If the a mine site is not the source, the aluminum may be naturally occurring as part of the clay soil, and measures to address turbidity by reducing erosion may also help address this problem. Installation of a vault and an approved drainage system would address the problem of contamination from outdoor toilets.	
El Rito Creek	Erosion and impacts due to off-road vehicle use and the creation of informal trails. Other recreational impacts from campers and day users along the creek have reduced riparian vegetation, reduced other protective vegetation and increased runoff and soil erosion.	One proposed strategy to address this issue is setting aside a certain amount of acres for off-road vehicle use (similar to the model of snowboard parks at ski resorts) in an attempt to preserve other areas. Other suggestions were to build bridges to provide alternatives to driving through the river, and redesigning or possibly relocating campsites away from the river. Education was another component stressed and publications and information for local schools was suggested. Implement BMP's to better manage area for recreational users that would reduce their impacts. Thinning is needed to improve watershed health and reduce fire danger.	
LOWER CHAMA SUBWATERSHED			
Coyote Ranger District	Build up of hazardous fuels on the forest.	Thinning.	
Rios Gallina and Capulin	While the Rio Gallina was recently delisted, local residents observe vertical banks, significant erosion, increased velocity and continuing cutting of the stream. Another problem cited is the disposal of solid waste in the stream. The upper watershed is	The Gallina/Capulin Acequia Association would like to implement bank stabilization and erosion control measures along these reaches. These might include retention dams and choker dams with stones and wire mesh. They would also like to develop additional water sources to better distribute animals over the allotment. A representative from the Forest	

Location of Site of Concern	*Problem/Issue to be Addressed*	*Proposed Strategies to Address the Problem/Issue*	*Timeframe* *
	Forest Service land including the San Pedro Parks Wilderness. This portion of the watershed is overgrown and dense. Meadow areas are being encroached by trees. Water yields have been greatly reduced.	Service offered that they could provide design services to support such a project. Explore options for thinning the upper watershed, including the San Pedro Wilderness to reduce the risk of catastrophic wildfire and potentially increase water yield.	
Clear Creek	303(d) list for sedimentation/siltation	Proposed strategies to address this problem include: Reduce fuel loads (thinning) to prevent catastrophic fire; reduce conifer encroachment in meadow areas; eliminate noxious weeds; reduce road densities; improve road drainage; develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Cecilia Canyon Creek	303(d) list for sedimentation/siltation	The Gallina/Capulin Acequia Association is also interested in stabilization and erosion control measures similar to those mentioned above for the Rio Gallina. Other proposed strategies to address this problem include: Reduce fuel loads (thinning) to prevent catastrophic fire; reduce conifer encroachment in meadow areas; eliminate noxious weeds; reduce road densities; improve road drainage; develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Rio Puerco de Chama	303 (d) list for sedimentation/siltation, fecal coliform, temperature	Proposed strategies to address this problem include: Reduce fuel loads (thinning) to prevent catastrophic fire; reduce conifer encroachment in meadow areas; eliminate noxious weeds; reduce road densities; improve road drainage; develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Poleo Creek	TMDL for turbidity	Proposed strategies to address this problem include: Reduce fuel loads (thinning) to prevent catastrophic fire; reduce	

Location of Site of Concern	*Problem/Issue to be Addressed*	*Proposed Strategies to Address the Problem/Issue*	*Timeframe* *
		conifer encroachment in meadow areas; eliminate noxious weeds; reduce road densities; improve road drainage; develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Coyote Creek (Rio Puerco de Chama to headwaters)	Previously listed for turbidity and stream bottom deposits	Proposed strategies to address this problem include but are not limited to: Improved road maintenance; closure and decommissioning of roads identified in the Coyote Ranger District's Road Management Environmental Assessment; and construction of fences to protect riparian areas and development of new upland water sources.	
Rito Encino (Rio Puerco de Chama to headwaters)	Turbidity, total organic carbon	Streambank stabilization and improving riparian cover by planting trees/shrubs/grasses.	
Rito Resumidero	303 (d) list for sedimentation/siltation	Proposed strategies to address this problem include: Reduce fuel loads (thinning) to prevent catastrophic fire; reduce conifer encroachment in meadow areas; eliminate noxious weeds; reduce road densities; improve road drainage; develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Rito Redondo (Rio Resumidero to headwaters)	Total organic carbon	Develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Canones Creek	TMDL for chronic aluminum, turbidity, fecal coliform	Proposed strategies to address this problem include: Reduce fuel loads (thinning) to prevent catastrophic fire; reduce conifer encroachment in meadow areas; eliminate noxious weeds; reduce road densities; improve road drainage; develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Chihuahuenos Creek (Canones Creek to	Stream bottom deposits	Proposed strategies to address this problem include: Reduce fuel loads (thinning) to prevent catastrophic fire; reduce	

Location of Site of Concern	*Problem/Issue to be Addressed*	*Proposed Strategies to Address the Problem/Issue*	*Timeframe* *
headwaters)		conifer encroachment in meadow areas; eliminate noxious weeds; reduce road densities; improve road drainage; develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Polvadera Creek	TMDL for temperature	Proposed strategies to address this problem include: Reduce fuel loads (thinning) to prevent catastrophic fire; reduce conifer encroachment in meadow areas; eliminate noxious weeds; reduce road densities; improve road drainage; develop wildlife and cattle upland watering sites; improve riparian cover by planting trees/shrubs/grasses; improve/build fencing to improve range utilization and protection of riparian areas.	
Abiquiu Creek	TMDL for dissolved oxygen. Local residents have observed a reduction in meadows, willows, and the water table over the past two generations since actions were taken to straighten the stream. The loss of willows and cottonwoods is also thought to be partly due to an increase in noxious weeds and livestock management practices in the area. Documentation from 1750 when the Grant was first made indicates significantly more forage on the property than there is today. All of these are thought to be potential contributors to the increase in dissolved oxygen in the creek. It was also noted that fire suppression south of the Land Grant has resulted in the need for forest thinning to reduce the risk of catastrophic wildfire.	Putting a meander back in this creek might cool the temperature, increase the water table, and allow willows to return. Actions already underway by the Abiquiu Land Grant to address some of these issues include: implementation of a rest-rotation grazing plan, construction of some fences to protect riparian areas, and removal of tamarisk and salt cedar along Abiquiu Creek. Some regeneration of willows and cottonwoods has already been observed in response to the grazing plan. UNM studies along this creek testing ambient moisture in areas where treatment has occurred as well as in a control area(s) for comparison purposes might provide information that could help the watershed group evaluate the success of removing non-native species in addressing water quality problems. It was suggested that the group explore the potential for implementing best management practices described by Bill Zedike to increase the soil's water retention to continue to address some of the issues described above.	
Vallecito Creek (a tributary to Abiquiu Creek)	A reduction of flows has been observed in this creek, and this is thought to be the	Thinning conifers in this area could potentially allow more snow to fall to the ground and enter the stream, rather than	

Location of Site of Concern	*Problem/Issue to be Addressed*	*Proposed Strategies to Address the Problem/Issue*	*Timeframe* *
	result of several factors, including tree encroachment , loss of meadows, reduction in the number of aspen and increase in evergreens, and livestock grazing.	evaporating from the tree canopy.	
Rio del Frijoles	Erosion is a problem. Bank stabilization is needed. When it floods it runs in excess of 100 cfs.	Choker dams with stones and wire mesh might address this problem. Potential cure may entail channel restoration.	
Rio del Oso			
WATERSHED-WIDE			
Invasive species	There are Class A and Class B invasive species along roadways in the watershed, including bull thistle, knapweed, Canada thistle, chickory, toadflax, tamarisk and Russian olive.	Work with local, state, tribal and federal governments who are beginning to identify stakeholders to address this issue. The Carson and Santa Fe National Forests recently completed an inventory/mapping of invasive species on the Forests as part of an EIS.	
Dumping of trash in arroyos		It was suggested that the Solid Waste Bureau be contacted to find out what can be done to address this issue.	

Prioritization, timeframe and cost estimates for proposed projects still to be determined by the group.

VII. MONITORING AND EVALUATION

While monitoring and evaluation have been raised at meetings, the group has not yet discussed the subject in detail or specifically what monitoring and evaluation should be involved in the plan. It has been suggested that individuals, groups and agencies owning land in the watershed currently monitor or could initiate monitoring that could supplement that done by SWQB.

Note: New Mexico Environment Department Surface Water Quality Bureau monitored the perennial reaches of the Chama River and its tributaries in 1998 and 1999 to develop the Total Maximum Daily Load (TMDL) standards. The Bureau will, on an 8 year cycle, perform another intensive water quality survey in the Rio Chama watershed. At present the SWQB is scheduled to resample the Rio Chama Watershed in 2007.

.

VIII. FUNDING

Watershed group participants stressed that their interest in the watershed is long term and the importance of developing sustainable sources of funding to support implementation of this plan. Potential sources of funding that have been suggested to date include:

- 319 nonpoint source grants from EPA
- Natural Resources Conservation Service (NRCS) Environmental Quality Incentive Program (EQIP)
- Fish and Wildlife Foundation – Pulling Together Initiative
- Rocky Mountain Elk Foundation
- Turkey Federation – funding to do projects that benefit wildlife and ranchers
- New Mexico Game and Fish – Habitat Stamp Program (Sikes Act)
- U.S. Army Corps of Engineers
- EPA watershed initiative grants
- Rural Community Assistance Program
- Collaborative Forest Restoration Program (CFRP) grants
- Conservation Reserve Program (CRP)
- Private foundations
- New Mexico State Forestry Division Forest Lands Enhancement Program (FLEP)
- Office of the State Engineer/State Water Board

IX POTENTIAL FISCAL AGENTS AND PARTNERS

- **Acequias and Acequia Associations**
- **Bureau of Land Management (BLM)**
- **Environmental Organizations**
- **Grazing Associations** (Los Vaqueros de Canjilon, French Mesa Grazing Association, etc.)
- **Jicarilla Apache Nation** and Pueblos in the watershed.
- **Land Grants** (Abiquiu Land Grant, etc.)

- **Las Comunidades** is a local non-profit organization that was formed specifically to focus on creating jobs and economic benefits from forest activities on the Vallecitos Federal Sustained Yield Unit (VFSYU). During Summer 2005 there will be three projects that will hire youth to work with the natural resources of the area. With funding from the Carson National Forest and Rio Arriba County, up to 22 youth will be paid to participate in these summer projects.
- **Municipalities**
- **Natural Resources Conservation Service (NRCS)** provides technical assistance on soil and water conservation planning to private landowners. NRCS through the Farm Services Agency provides cost share on a variety of conservation practices and land and wetland reserve programs.
- **New Mexico Department of Game and Fish**
- **New Mexico State Forestry Division** provides technical assistance and service forestry to private landowners. The Division regulates Best Management Practices on private timber sales and provides advice on numerous natural resource concerns by writing Stewardship Management Plans. The Division also has access to federal flow through dollars which can be cost shared and used to accomplish resource work on private lands. These funds are known as the Forest Lands Enhancement Program or FLEP. The Forestry Division also provides wildfire protection to private and state lands within the watershed.
- **New Mexico State Land Office**
- **Northern Rio Grande Resource Conservation and Development Council (RC&D),** one of the first RC&Ds authorized in 1962, operates under the Natural Resources Conservation Service (USDA) and is led by local volunteers that help people care for and protect natural resources in a way that improves local economies, the environment, and living standards. The Northern Rio Grande RC&D has a 501 (c) (3) non-profit tax exempt IRS status and has served as fiscal agent and assisted in the development of proposals and administration of grants for groups in the past.
- **Recreation Interests and Organizations**
- **Rio Arriba County**
- **Upper Chama and East Rio Arriba Soil and Water Conservation Districts (SWCD**) are working to assist producers with control of invasive species and noxious weeds. The East Rio Arriba SWCD was recently awarded a grant to form a Weed Management Area (WMA).
- **USDA Forest Service – Carson and Santa Fe National Forests**

Bibliography

Arellan, Anselmo. 1978. *La Tierra Amarilla: the People of the Chama Valley*. Chama: Chama Valley Public Schools.

Atencio, Ernext. 2001. *Of Land and Culture: Environmental Justice and Public Lands Ranching in Northern New Mexico.* A Report by The Quivira Coalition and the Northern New Mexico Group of the Sierra Club. El Paso: Printworld.

Chronic, Halka. 1987. *Roadside Geology of New Mexico* in New Mexico Environment Department. 2003. *Total Maximum Daily Loads (TMDLs) for the Upper Rio Chama Watershed.*

Dean, Alison. 2004. "Rio Puerco de Chama Hydrologic Condition Assessment." U.S. Department of Agriculture, Forest Service.

Dean, Alison. 2004. "Rio Gallina Hydrologic Condition Assessment." U.S. Department of Agriculture, Forest Service.

Dean, Alison. 2004. "Canjilon Creek-Rio Chama Hydrologic Condition Assessment." U.S. Department of Agriculture, Forest Service.

Raish, Carol and Alice M. McSweeney. 2003. *Economic, Social, and Cultural Aspects of Livestock Ranching on the Espanola and Canjilon Ranger Districts of the Carson National Forests: a pilot study.* Gen. Tech. Rep. RMRS-GTR-113. Fort Collins: U.S. Department of Agriculture, Forest Services, Rocky Mountain Research Station.

Polling-Kempes, Lesley. *Valley Of Shining Stone- The Story Of Abiquiu*. Tucson: University of Arizona Press, 1997.

Quintana, F.L. 1991. *Pobladores: Hispanic Americans of the Ute Frontier* in SWQB, NMED. 2003. *Total Maximum Daily Loads (TMDLs) for the Upper Rio Chama Watershed*.

Rio Puerco de Chama Watershed Group. 2004. "Watershed Restoration Action Strategy".

Surface Water Quality Bureau (SWQB), New Mexico Environment Department (NMED). 2004 *Total Maximum Daily Loads (TMDLs) for the Lower Rio Chama Watershed.* Santa Fe.

SWQB, NMED. 2003. *Total Maximum Daily Loads (TMDLs) for the Upper Rio Chama Watershed.* Santa Fe.

Trujillo, Delbert. *Best Management Practices for Water Quality and Grazing Activities on the Rangeland/Jarosa Allotment Project United States Forest Service*.

U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, and Office of the Field Solicitor U.S. Department of Interior. 1992. *Rio Chama Instream Flow Assessment.*

BLM/SC/PT-93/001+7200. Denver.

U.S. Department of Agriculture, Soil Conservation Service. 1993. *Rio Chama Floodplain Management Study*. Albuquerque.

U.S. Department of Agriculture, Natural Resource Conservation Service. 2004. *Rio Arriba Soils Survey.* Albuquerque.

USDA Forest Service, USDI Bureau of Land Management, U.S. Army Corps of Engineers. 1990. *Rio Chama Management Plan.* Santa Fe.

Appendix A – Contact List

Fermin Abeyta
P.O. Box 124
Tierra Amarilla, NM 87575
phone number: 505-588-7425

Jose Abeyta
P.O. Box 102
Los Ojos, NM 87551
phone number: 505-588-7478

Craig Allen
U.S. Geological Survey
Jemez Mountains Field Station
HCR Box 1, Suite 15
Los Alamos, NM 87544
phone number: 505-672-3861 x 541
fax number: 505-672-9607
e-mail: craig_allen@usgs.gov

Liz Amos
P.O. Box 296
Cebolla, NM 87518
phone number: 505-684-0100

Steve Anderson
New Mexico Department of Game and Fish
3891 Midway Place NE
Albuquerque, NM 87109
phone number: 505-841-8881
e-mail: scanderson@state.nm.us

Belarmino Archuleta
P.O. Box 154
Los Ojos, NM 87551
phone number: 505-588-7786

David Archuleta
Cebolla Cattle Association
P.O. Box 217
Cebolla, NM 87518
phone number: 505-684-2420

Ernesto Archuleta
P.O. Box 163
Cebolla, NM 87518
phone number: 505-684-2249

Fred Archuleta
Cano Allotment
1107 Bellas Lane
Espanola, NM 87532
phone number: 505-665-5513

Lydia U. Archuleta
P.O. Box 217
Cebolla, NM 87518
phone number: 505-684-2420

Pedro Antonio Archuleta
P.O. Box 413
Tierra Amarillo, NM 87575

Julie Arvidson
New Mexico Environment Department
P.O. Box 26110 - N2104
1190 St. Francis Drive
Santa Fe, NM 87502
phone number: 505-827-0586
e-mail: julie_arvidson@nmenv.state.nm.us

Emery Baca
P.O. Box 504
Canjilon, NM
phone number: 505-684-2206
e-mail: emerybaca@hotmail.com

Paul Baca
P.O. Box 477
Canjilon, NM 87518
phone number: 505-684-2489
fax number: 505-684-2221

John Bailey
Bureau of Land Management
226 Cruz Alta Road
Taos, NM 87571
phone number: 505-751-4703
e-mail: jbailey@blm.gov

Donald Banks
P.O. Box 1251
Abiquiu, NM 87510
phone number: 505-685-0777
e-mail: dbanks0777@aol.com

Alberto Baras
Rio Arriba County
1122 Industrial Park Road
Espanola, NM 87532
phone number: 505-747-5336
fax number: 505-753-7774

Fernando Bayardo
phone number: 505-685-4215
e-mail: bayardomf@newmexico.com

Richard Belanger
P.O. Box 1110
Abiquiu, NM 87510
phone number: 505-685-0724

Lorenzo Bello
e-mail: bello@kitcarson.net

Don Berryman
P.O. Box 213
Cebolla, NM 87518
phone number: 505-684-2258
e-mail: berrymanranch@yahoo.com

David Biggs
P.O. Box 662
La Madera, NM 87539
phone number: 505-583-2474
e-mail: plexicon@earthlink.net

Neil Bockman
El Rito Regional Water Association
P.O. Box 422
El Rito, NM 87530
phone number: 505-581-4615
e-mail: neilbockman@aol.com

Agapito Candelaria
P.O. Box 85
Los Ojos, NM 87551
phone number: 505-588-7059
fax number: 505-588-7810
e-mail: JACandelaria@rio-arriba.org

Herman Candelaria
HC 75 Box 81
Chama, NM 87520
phone number: 505-756-2324

Joe Carrillo
New Mexico State Forestry
HC 75 Box 100
Chama, NM 87520
phone number: 505-588-7831
e-mail: jcarrillo@state.nm.us

Tess Casados
P.O. Box 184
Tierra Amarilla, NM 87575
phone number: 505-588-7668

Vernon Casados
P.O. Box 98
Los Ojos, NM 87551
phone number: 505-588-7461

Frank Chacon
Coronado Mid/High School
P.O. Box 230
Hwy. 96
Gallina, NM 87017
phone number: 505-638-5549
fax number: 505-638-5345
e-mail: chacon_fr@jmsk12.com

Gerald Chacon
New Mexico State University
120 S. Federal Place, Room 109
Santa Fe, NM 87501
phone number: 505-983-4615
e-mail: northern@nmsu.edu

Prudencio Chacon
El Rito Regional Water Association
P.O. Box 698
El Rito, NM 87530
phone number: 505-581-4584

Sebedeo Chacon
Jarita Mesa Allotment
Star Route 6-A
Ojo Caliente, NM 87549
phone number: 505-583-2179

Gene Christiansen
Pinon Ridge Subdivision
Tierra Amarilla, NM 87575
phone number: 505-588-7171

Rachel Conn
Amigos Bravos
P.O. Box 238
Taos, NM 87571
phone number: 505-758-3874
fax number: 505-758-7345
e-mail: rconn@amigosbravos.org

Lucas Cordova
P.O. Box 87
Hernandez, NM 87537

Robert Cox
P.O. Box 1124
Abiquiu, NM 87510
phone number: 505-685-0993

Craig Daugherty
New Mexico State Forestry
HC 75, Box 100
Chama, NM 87520
phone number: 505-588-7831
fax number: 505-588-7333
e-mail: cdaugherty@state.nm.us

Archie de Vigil
Village of Chama
P.O. Box 794
299 4th Street
Chama, NM 87520
phone number: 505-756-2184
fax number: 505-756-2412
e-mail: ajvigil@gov.chama.us

Sam DesGeorges
Bureau of Land Management
226 Cruz Alta Road
Taos, NM 87571
phone number: 505-751-4713

John Dixon
USDA Forest Service
HC 78 Box 1
Coyote, NM 87012
phone number: 505-638-5526
fax number: 505-638-5351
e-mail: jdixon@fs.fed.us

Scott Draney
New Mexico Game and Fish
P.O. Box 2765
Ranchos de Taos, NM 87740
phone number: 505-751-4738
fax number: 505-758-1620
e-mail: sdraney@state.nm.us

Damian Eturriaga
P.O. Box 57
Los Ojos, NM 87551
phone number: 505-588-7742
e-mail: et@cvn.com

Sean Ferrell
Santa Fe National Forest
P.O. Box 150 Woodsy Lane
Jemez Pueblo, NM 87025
phone number: 505-829-3535
fax number: 505-829-3223
e-mail: saferrell@fs.fed.us

Colin Finan
Rio Grande Sun
phone number: 505-753-2126
e-mail: colin_finan@hotmail.com

William Fleming
University of New Mexico
phone number: 505-277-6455
e-mail: fleming@la.unm.edu

Felix Gallegos
502 Pine Avenue
Chama, NM 87520
phone number: 505-756-2486

Richard Gallegos
State of New Mexico
3539 30th Street
Farmington, NM 87401
phone number: 505-326-5716
e-mail: rgallego@slo.state.nm.us

Steve Gallegos
El Sueno Cattle Company
P.O. Box 1003
Abiquiu, NM 87510
phone number: 505-685-4478
fax number: 505-685-4015

Augustine Garcia
A.A. Garcia Ditch
P.O. Box 482
Canjilon, NM 87515
phone number: 505-929-0938

Dennis Garcia
New Mexico State Land Office
P.O. Box 1148
Santa Fe, NM 87504
phone number: 505-827-5866
fax number: 505-827-5766
e-mail: dgarcia@slo.state.nm.us

Juan Garcia
El Rito Regional Water Association
P.O. Box 26
El Rito, NM 87530
phone number: 505-747-7110

Patricio Garcia
Rio Arriba County
1122 Industrial Park Road
Espanola, NM 87532
phone number: 505-753-4508
fax number: 505-753-4732

Pete Garcia
P.O. Box 53
Coyote, NM
phone number: 505-638-5546

Ronnie Garcia
El Rito Lobato East Allotment
P.O. Box 696
El Rito, NM 87530
phone number: 505-581-4638

Seldon Garcia
P.O. Box 63
Abiquiu, NM 87510
phone number: 505-685-4511
fax number: 505-685-4300

Tom Gaylor
P.O. Box 835
Tierra Amarilla, NM 87575
phone number: 505-588-7201
e-mail: tgaylor@eschs.k12.nm.us

Anthony Glelch
San Juan Pueblo
P.O. Box 1495
San Juan Pueblo, NM 87566
phone number: 505-852-3222
fax number: 505-747-3887
e-mail: sjoutreach@yahoo.com

Moises Gonzales
Rio Arriba County
P.O. Box 1256
1121 Industrial Park Road
Espanola, NM 87532
phone number: 505-753-7774
fax number: 505-753-3235
e-mail: moises@cybermesa.com

David Griego
Natural Resources Conservation Service
e-mail: David.Griego@nm.usda.gov

Thomas L. Griego
Alamosa Allotment
P.O. Box 742
La Madera, NM 87539
phone number: 505-753-9818

Lynette Guevara
New Mexico Environment Department
e-mail:
lynette_guevara@nmenv.state.nm.us

Steve Guldan
Alcalde Sustainable Science Center
e-mail: sguldan@nmsu.edu

Greg Gustina
Bureau of Land Management
226 Cruz Alta Road
Taos, NM 87571
phone number: 505-751-4707
fax number: 505-758-1620
e-mail: Greg_Gustina@nm.blm.gov

Julie Hall
U.S. Army Corps of Engineers
e-mail: julie.a.hall@usace.army.mil

James Harmon
Bureau of Land Management
226 Cruz Alta Road
Taos, NM 87571
phone number: 505-751-4750
e-mail: james_harmon@nm.blm.gov

Duhl Harris
1889 Candela
Santa Fe, NM 87505

Mary Ann & Bruce Harshman
Chama Courier
P.O. Box 210
phone number: 505-756-1823
e-mail: courier@chama.com

Maureen Havey
P.O. Box 241
Cebolla, NM
phone number: 505-684-2070
fax number: 505-684-2477
e-mail: elm@la-tierra.com

Abram Herrera
P.O. Box 8
Coyote, NM 87012

Bill & Dianne Horn
HC 75 Box 1007
Rutheron, NM 87551
phone number: 505-588-9212

Mark Horner
U.S. Army Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109
phone number: 505-342-3187
e-mail:
mark.w.horner@spa02.usace.army.mil

Sherry Howell
e-mail: Sherryhow@AOL.COM

Ernesto Hurtado
Tres Piedras District
P.O. Box 38
Tres Piedras, NM 87558
phone number: 505-758-8678
fax number: 505-751-3230
e-mail: ehurtado@fs.fed.us

Rudy Jaramillo
Jarosita Allotment
HC 67, Box 50
Vallecitos, NM 87581
phone number: 505-582-4279

Roger Jensen
Bureau of Indian Affairs
phone number: 505-759-3961
e-mail: rgrjn@yahoo.com

Isabel & Sam Jewell
P.O. Box 936
Abiquiu, NM 87510
phone number: 505-685-4028
fax number: 505-6854029
e-mail: joya@cybermesa.com

Jessica Johnston
P.O. Box 753
Abiquiu, NM 87510

Rodney Kindred
P.O. Box 123
Los Ojos, NM 87551
phone number: 505-588-0147

Ron Kneebone
U.S. Army Corps of Engineers
4101 Jefferson Plaza NE
Albuquerque, NM 87109
phone number: 505-342-3355
fax number: 505-342-3197
e-mail: ronald.r.kneebone@usace.army.mil

Ruben Leal
USDA Forest Service
HC 78, Box 4
Coyote, NM 87012
phone number: 505-638-5526
fax number: 505-638-5351
e-mail: rleal@fs.fed.us

Jesse LeFevre
Jicarilla Apache
phone number: 505-759-3530

Ben Leyba
P.O. Box 463
Canjilon, NM
phone number: 505-684-2237
e-mail: bleyba@noraelectric.org

Andy Lopez
El Rito Regional Water Association
P.O. Box 246
El Rito, NM 87530
phone number: 505-581-4728

Esteban Lopez
Interstate Stream Commission
407 Galisteo Street
Bataan Memorial Building, Room 101
Santa Fe, NM 87504
phone number: 505-827-6160
fax number: 505-827-6188

Gabriel Lopez
Lopez Use Allotment
P.O. Box 161
Abiquiu, NM 87510
phone number: 505-685-4443

Joseph Lujan
USDA Forest Service
P.O. Drawer 429
Canjilon, NM 87515
phone number: 505-684-2486
fax number: 505-684-2486
e-mail: jlujan@fs.fed.us

Solomon Luna
P.O. Box 85
Tierra Amarilla, NM 87575
phone number: 505-588-7811

Jessica Madrid
P.O. Box 542
Canjilon, NM 87515
phone number: 684-2429

Rudy Maestas
El Rito Regional Water Association
P.O. Box 682
El Rito, NM 87530

Alberta Maez
USDA Forest Service
P.O. Box 56
El Rito, NM 87530
phone number: 505-581-4554
fax number: 505-524-4556
e-mail: amaez@fs.fed.us

Cipriano Maez
USDA Forest Service
P.O. Box 469
Canjilon, NM 87515
phone number: 505-684-2489
fax number: 505-684-2486
e-mail: cmaez@la-tierra.com

Antonio Manzanares
P.O. Box 307
Tierra Amarilla, NM 87575
phone number: 505-588-7792
e-mail: shephard@rioarriba.com

David Manzanares
Natural Resources Conservation Service
224 Los Alamos Avenue, Suite 1
Espanola, NM 87532
phone number: 505-753-6412
fax number: 505-753-5563
e-mail: David.Manzanares@nm.usda.gov

Molly Manzanares
P.O. Box 307
Tierra Amarilla, NM 87575
phone number: 505-588-7896

John Marron
1111 Roadrunner Lane NW
Albuquerque, NM 87107
phone number: 505-345-4006

Mike & Tim Martin
San Gabriel Allotment
P.O. Box 8
El Rito, NM 87530
phone number: 505-581-4421
e-mail: boxm25@hotmail.com

David Martinez
P.O. Box 234
Cebolla, NM 87518
phone number: 505-684-2418

Donald Martinez
El Rito Regional Water Association
P.O. Box 747
El Rito, NM 87530
phone number: 505-581-4576

Donald Martinez
El Rito Lobato West Allotment
P.O. Box 814
El Rito, NM 87530
phone number: 505-581-4120
fax number: 505-581-4130
e-mail: donmart@nnmcc.edu

Felipe Martinez
Rio Arriba County
1122 Industrial Park Road
Espanola, NM 87532
phone number: 505-753-2992
fax number: 505-753-9397

Harry O. Martinez
P.O. Box 192
Tierra Amarilla, NM 87575
phone number: 505-588-7243

Jonathan Martinez
Office of the State Engineer
phone number: 505-827-6194
e-mail: jmartinez@ose.state.nm.us

Rose Martinez
P.O. Box 28
Los Ojos, NM 87551
phone number: 505-588-7316

Marc May
P.O. Box 307
Abiquiu, NM 87510
phone number: 505-685-0999
e-mail: redmountain@cybermesa.com

MaryAnn McGraw
New Mexico Environment Department
P.O. Box 26110
1190 St. Francis Drive
Santa Fe, NM 87502
phone number: 505-827-0581
e-mail:
Maryann_Mcgraw@nmenv.state.nm.us

Edward McMillen
P.O. Box 241
Cebolla, NM 87518
phone number: 505-684-2477
fax number: 505-684-2477
e-mail: elm@la-tierra.com

Keith Melton
New Mexico Tech
phone number: 505-272-7015
e-mail: kmelton@iera.nmt.edu

Drew Mendez
El Rito Regional Water Association
P.O. Box 116
El Rito, NM 87530
phone number: 505-581-4111

Linus Meyer
Bureau of Land Management
226 Cruz Alta Road
Taos, NM 87571
phone number: 505-751-4726
e-mail: lmeyer@nm.blm.gov

John Miera
Espanola District
P.O. Box 3307, Fairview Station
1710 N. Riverside Drive
Espanola, NM 87533
phone number: 505-753-7331

Greg Miller
Carson National Forest
208 Cruz Alta Road
Taos, NM 87571
phone number: 505-758-6251
fax number: 505-758-6213
e-mail: gmiller@fs.fed.us

Johnny Montoya
P.O. Box 561
Canjilon, NM 87518
phone number: 505-684-0081

Joseph Montoya
P.O. Box 4058
Fairview, NM 87533
phone number: 505-684-0102

Robert J. Montoya
phone number: 505-588-9580
fax number: 505-588-0146
e-mail: rjmontoya@zianet.com

Moises Morales
Rio Arriba County
P.O. Box 54
Tierra Amarilla, NM 87575
phone number: 505-684-2270
fax number: 505-756-4208

David Morgan
La Calandria Associates
P.O. Box 6187
Santa Fe, NM 87505
phone number: 505-920-4206
e-mail: dave@lacalandria.net

Travis Mosley
Canjilon Ranger District
P.O. Box 469
Canjilon, NM 87515
phone number: 505-684-2486
e-mail: tmoseley@fs.fed.us

Robert Mundy
Brazos Trees
HC 75, Box 88
Chama, NM 87520
phone number: 505-756-2177
e-mail: robert@mundy.com

Tim Murrell
State of New Mexico
P.O. Box 25102
Santa Fe, NM 87504-5102
phone number: 505-827-4029
fax number: 505-827-6188
e-mail: tmurrell@ose.state.nm.us

Armando Nieto
Quivira Coalition
1005 Osage Avenue
Santa Fe, NM 87505
phone number: 303-332-2964
e-mail: anieto3@yahoo.com

Marci Notsinneh
Jicarilla Apache Nation
e-mail: m_r_notsinneh@yahoo.com

Eloy Olivas
Bureau of Reclamation
P.O. Box 426
Chama, NM 87520
phone number: 505-756-2175
fax number: 505-756-2453
e-mail: eolivas@uc.usbr.gov

Ana Ortiz
New Mexico Environment Department
1889 Candela
Santa Fe, NM 87505

Jemelle S. Padilla
Rutheron Water Association
HC 75 Box 1228
Rutheron, NM 87551
phone number: 505-588-7808
fax number: 505-588-7809
e-mail: jemelle@ravin.net

Allan Pasteris
New Mexico Environment Department
P.O. Box 26110 - N2100
1190 St. Francis Drive
Santa Fe, NM 87502
phone number: 505-827-2575
fax number: 505-827-0160
e-mail: allan_pasteris@nmenv.state.nm.us

Ignacio Peralta
USDA Forest Service
708 Cruz Alta
Box 5453
Taos, NM 87571
phone number: 305-758-6344
fax number: 305-758-6213
e-mail: iperalta@fs.fed.us

Levi Pesata
Jicarilla Apache Nation
P.O. Box 507
Dulce, NM 87528

Walter Pina
P.O. Box 26
Los Ojos, NM 87551
phone number: 505-588-7417

Joe & Juanita Pino
P.O. Box 35
Los Ojos, NM 87551
phone number: 505-588-7880

Steve Polaco
P.O. Box 205
Tierra Amarilla, NM 87575
phone number: 505-588-7758

Delfin Quintana
Acequie Madre Ditch
P.O. Box 156
Cebolla, NM 87518
phone number: 505-684-2435

Ezequiel Rael
USDA Forest Service
P.O. Box 56
El Rito, NM 87530
phone number: 505-581-4554
fax number: 505-581-4556
e-mail: edrael@fs.fed.us

Carol Raish
USDA Forest Service
333 Broadway SE
Albuquque, NM 87102-3497
phone number: 505-724-3666
fax number: 505-724-3688
e-mail: craish@fs.fed.us

Orlando Romero
Forest Guild
P.O. Box 519
Santa Fe, NM 87504
phone number: 505-983-8992, x13
fax number: 505-986-0798
e-mail: orlando@forestguild.org

Rosemary Romero
Rosemary Romero Consulting
1350 San Juan Drive
Santa Fe, NM 87505
phone number: 505-982-9805
fax number: 505-982-5061
e-mail: Rosemary1350@cs.com

Ursula A. Rosauer
New Mexico State University
P.O. Box 159
Alcalde, NM 87511
phone number: 505-929-3234
fax number: 505-852-758-0997
e-mail: rosauer@nmsu.edu

Bill Ross
HC 75 Box 1024
Heron, NM 87551
phone number: 505-588-7327
e-mail: BROSS@ZIANET.COM

Eddin Salazar
Youngsville Cattlemen
P.O. Box 59
Youngsville, NM 87064
phone number: 505-638-5541
fax number: 505-638-0264
e-mail: eds@lanl.gov

Eluid Salazar
P.O. Box 37
Canones, NM 87516

Lester M. Salazar
P.O. Box 810
Tierra Amarilla, NM
phone number: 505-588-0129
e-mail: lester@ravin.net

Victor Salazar
P.O. Box 324
Tierra Amarilla, NM 87575
phone number: 505-588-7684

Clorinda Sanchez
P.O. Box 96
Los Ojos, NM 87551
phone number: 505-5887858

F.B. Sanchez
e-mail: fbsanchez@fs.fed.us

Medardo Sanchez
Acequias del Norte
P.O. Box 96
Los Ojos, NM 87551
phone number: 505-588-7858

Dixon Sandoval
Jicarilla Apache Nation
P.O. Box 507
Dulce, NM 87528
phone number: 505-759-4296
fax number: 505-759-9122
e-mail: dksandoval@yahoo.com

Hobson Sandoval
Jicarilla Apache Nation
P.O. Box 507
Dulce, NM 87528
phone number: 505-759-4296
fax number: 505-759-9122
e-mail: Hsandoval_99@yahoo.com

Levi Sandoval
Natural Resources Conservation Service
P.O. Box 25
1512 Highway NM 17
Chama, NM 87520
phone number: 505-756-2581
e-mail: levi.sandoval@nm.usda.gov

Martha Schumann
Forest Guild
P.O. Box 519
Santa Fe, NM 87504
phone number: 505-983-8992, x23
fax number: 505-986-0798
e-mail: martha@forestguild.org

Donald Serrano
USDA Forest Service
P.O. Box 3307, Fairview Station
1710 N. Riverside Drive
Espanola, NM 87533
phone number: 505-753-7331
fax number: 505-753-9411
e-mail: dlserrano@fs.fed.us

Brian Shields
Amigos Bravos
Box 238
Taos, NM 87571
phone number: 505-758-3874
fax number: 505-758-7345
e-mail: bshields@amigosbravos.org

John Sorrell
Pueblo of Isleta
P.O. Box 1270
Isleta, NM 87022
phone number: 505-869-9623
e-mail: poi36002@isletapueblo.com

Yescu Sullivan
P.O. Box 13
Embudo, NM 87531

Mark Sundin
Bureau of Land Management
226 Cruz Alta Road
Taos, NM 87571
phone number: 505-751-4720

Diane Tarasek
Chama Valley Chamber of Commerce
phone number: 800-477-0149
e-mail: info@chamavalley.com

LeRoy Tecube
Jicarilla Apache Nation
P.O. Box 507
Dulce, NM 87528
phone number: 505-759-3242
e-mail: ltecube@yahoo.com

Luis Torres
Sustainable Communities/ZERI-NM
P.O. Box 901
Santa Cruz, NM 87567
phone number: 505-753-8407
fax number: 505-986-6019
e-mail: luis87567@cybermesa.com

Delbert Trujillo
New Mexico Environment Department
P.O. Box 1110
1190 St. Francis Drive
Santa Fe, NM 87501
phone number: 505-827-2867
fax number: 505-827-0160
e-mail: delbert_trujillo@nmenv.state.nm.us

Diana Trujillo
USDA Forest Service
P.O. Box 56
El Rito, NM 87530
phone number: 505-581-4554
fax number: 505-581-4556
e-mail: dmtrujillo@fs.fed.us

Isabel Trujillo
HC 77, Box 11
Abiquiu, NM 87510

Lucas Trujillo
El Rito Regional Water Association
P.O. Box 57
El Rito, NM 87530
phone number: 505-581-4553

Manuel Trujillo
HC 75, Box 23
Ensenada, NM 87575
phone number: 505-588-7879

Stanley Trujillo
P.O. Box 127
Youngsville, NM 87064
phone number: 505-638-5342
e-mail: stantrujillo@lanl.gov

Virgil Trujillo
Ghost Ranch
HC 77, Box 11
Abiquiu, NM 87510
phone number: 505-685-4333, x114
e-mail: virgilt@ghostranch.org

Herna Ulibarri
P.O. Box 429
Tierra Amarilla, NM 87575
phone number: 505-588-7957

Ronnie Ulibarri
New Mexico State University
P.O. Box 275
Alcalde, NM 87511
phone number: 505-685-4523
e-mail: ronaldulibarri@hotmail.com

John Ussery
PO Box 130
El Rito, NM 87530
phone number: 505-581-4550
fax number: 505-581-4728
e-mail: john@lcdn.org

Adriano Valdez
P.O. Box 531
Canjilon, NM 87515

Arturo Valdez
Comanche Allotment
P.O. Box 794
Tres Piedras, NM 87577
phone number: 505-758-2528

Lorenzo Valdez
Rio Arriba County
1122 Industrial Park Road
Espanola, NM 87532
phone number: 505-753-2992
e-mail: lorenzo@cybermesa.com

Manuel Valdez
P.O. Box 87
Los Ojos, NM 87551
phone number: 505-588-7676

Ronald F. Valdez
P.O. Box 124
Lumberton, NM 87547
phone number: 505-759-1165

Tony Valdez
New Mexico State University
HCR 77, Box 9
Abiquiu, NM 87510
phone number: 505-685-4523
fax number: 505-685-4624
e-mail: tonvalde@nmsu.edu

Vito Valdez
P.O. Box 52
Youngsville, NM 87064

Michael Valez
El Rito Regional Water Association
General Delivery
El Rito, NM 87530
phone number: 505-581-4562

Carol Van Dorn
USDA Forest Service
1474 Rodeo Road
Santa Fe, NM 87505
phone number: 505-438-7854
fax number: 505-438-7834
e-mail: cvandorn@fs.fed.us

Maria Varela
University of New Mexico
P.O. Box 7505
Albuquerque, NM 87194
phone number: 505-345-4092
e-mail: mevz@juno.com

Robert Velarde
Jicarilla Apache Nation
P.O. Box 507
Dula, NM 87528
phone number: 505-754-4296
e-mail: velard1r@yahoo.com

Francisco E. Vigil
Northern New Mexico Stockman's Association
P.O. Box 470
Ranchos de Taos, NM 87557
phone number: 505-758-7760
e-mail: vigil_francisco@hotmail.com

Fred Vigil
Rio de Chama Acequia Association
P.O. Box 687
Medanales, NM 87548
phone number: 505-753-4519

Jake Vigil
El Rito Regional Water Association
P.O. Box 234
El Rito, NM 87530
phone number: 505-581-4712

Jeff Vigil
Gallina/Capulin Acequia Association
e-mail: jeff.vigil@nmshtd.state.nm.us

Valerie Weiss
HC 75 Box 183
Chama, NM 87520
phone number: 505-588-7884

Tim Wellman
New Mexico Rural Water Association
phone number: 800-819-9893
e-mail: tim@nmrwa.org

S.M. 'Buck' Wells
Office of the New Mexico State Engineer
P.O. Box 25102
Santa Fe, NM 87504
phone number: 505-827-6129
e-mail: bwells@ose.state.nm.us

Courtney White
Quivira Coalition
1413 Second Street
Suite 1
Santa Fe, NM 87505
phone number: 505-820-2544
fax number: 505-955-8922
e-mail: executive@quiviracoalition.org

Georgia Whittaker
P.O. Box 176
Cebolla, NM 87518

Kevin Woolridge
e-mail: thevillagebean@yahoo.com

Mark Yuska
U.S. Army Corps of Engineers
e-mail:
mark.e.yuska@spa02.usace.army.mil

Staff:
Jennifer Pratt Miles
Meridian Institute
PO Box 1829
Dillon, CO 80435
phone number: 970-513-8340, x213
fax number: 970-513-8348
e-mail: jprattmiles@merid.org