Project Quality Assurance Plan

for

Comanche and Cordova Creeks Watershed Restoration
Action Strategy, Education, and Restoration Project

FY01-Q

Amended for 04-D

Comanche Creek Watershed Restoration Project—Restoring Habitat
for the Rio Grande Cutthroat Trout, Part 2

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EXECUTIVE SUMMARY

The *Comanche Creek Watershed Restoration Project—Restoring Habitat for the Rio Grande Cutthroat Trout, Part 2*, is a Clean Water Act Section 319 project that seeks to address the nonpoint source temperature TMDL on Comanche Creek, in the upper Rio Grande watershed (HUC 13020101) in New Mexico. The project also seeks to address sediment loading which has resulted in observed impacts to Comanche Creek. These impacts were marginal enough that Comanche Creek was removed from New Mexico's 303(d) List for sedimentation/siltation in 2004.

The project includes a monitoring task in the project workplan (Task 10). This Task was included in the workplan at the request of Comanche Creek Working Group members, who steer and implement the project. The task description in the workplan briefly describes specific monitoring activities which were identified as having the highest priority, and Section 319 funds were requested to support some (but not all) of this monitoring. Some of the monitoring will be implemented using non-federal funds or in-kind effort, and some will be funded with other federal funds.

There are three monitoring activities which will be partially supported with Section 319 funds, or the expenses of which will match Section 319 funds. These are upland range monitoring using the USDA's Jornada Experimental Range Rangeland Monitoring Protocol, Rosgen Level II stream morphology monitoring, and riparian vegetation characteristics surveyed with methods developed by Alma Winward. Each of these three monitoring areas is discussed in greater detail below, and references (including Internet links and access to field forms) are provided.

A key monitoring activity that is not described in detail below is temperature monitoring with thermographs conducted by the Carson National Forest. Carson National Forest fisheries biologists have deployed Hobo thermographs at eight locations on Comanche Creek in late June through early September of 1998, 1999, and 2004, and they intend to deploy them again in future years. The thermographs have been deployed in exactly the same locations each year, and in combination with air temperature data from a nearby weather station should provide a sound basis for determining whether this project has addressed the temperature TMDL. As that activity is not being supported by the Section 319 program, it does not require EPA approval at this time, although the data may eventually be used for listing or delisting decisions. Future documentation of listing decisions and conclusions about whether this project has addressed the temperature TMDL, based on data collected by Carson National Forest, will include a description of the measurement methods used and verify that these data were collected consistent with NMED SWQB protocols and acceptance criteria.

Before Section 319 funds can support monitoring, or before the application of monitoring effort and costs can be applied as non-federal match to Section 319 funds, the Environmental Protection Agency (EPA) must evaluate the monitoring activities, and certify that these activities are scientifically sound and that the information collected will benefit water quality goals. The descriptions provided below are provided to EPA as a basis for making this determination.

PROJECT GOALS and OBJECTIVES

The ultimate goal of this project is to improve the condition of the Comanche Creek watershed to meet current water quality standards and to restore normal hydrologic function to Comanche Creek and its tributaries. Completely achieving this goal will likely take decades. Over the next three years, we will continue on-the-ground restoration at Comanche Creek to maximize habitat for the Rio Grande Cutthroat Trout.

Cordova Creek currently exceeds New Mexico water quality standards for turbidity, stream bottom deposits (SBD), and total phosphorous. These exceedances are documented in the Total Maximum Daily Load for Turbidity, Stream Bottom Deposits, and Total Phosphorous on Cordova Creek, NMED; November 1999.

Comanche Creek is listed on New Mexico's 303(d) List as impaired by temperature. There is also evidence of sediment impacts. TMDL's for temperature have been developed for this area. Both Cordova Creek and Comanche Creek are major tributaries of the Rio Costilla.

The Comanche Creek Watershed Restoration Project—Restoring Habitat for the Rio Grande Cutthroat Trout, Part 2 is a three-year project which has several objectives:

Objective 1: Improve water quality and remove sources of impairment so that water quality standards can be met in Comanche Creek.

Objective 2: Collect and compile baseline data on the current condition of riparian and upland areas within the Comanche Creek subwatersheds.

Objective 3: Provide educational programs and technical assistance to stakeholders and resource managers in order to make information about the latest range management and riparian restoration practices available to resource users.

Objective 4: Improve habitat for the Rio Grande Cutthroat Trout in Comanche Creek through installation of BMPs.

Objective 5: Survey road conditions in the Comanche Creek Watershed and implement BMPs to reduce the contribution of sediment from roads into Comanche Creek.

Objective 6: Monitor and document the results of these activities.

PROBLEMS AND CAUSES

Sediment in Comanche Creek comes from open and closed Forest Service roads and from eroding stream banks, as well as from grazing practices. Temperature exceedences result from streambank instability and cover problems related to both wildlife use (elk) and livestock grazing issues. The Valle Vidal Grazing Association has gone to a herding operation, which has dramatically improved the area under an allotment management plan in place since 1984. But the herding plan may need to be "tweaked" to maximize riparian recovery. The heavy sediment load into Comanche Creek is the most likely cause of occasional metals exceedences as well.

The closed roads may need additional drainage structures to redirect runoff onto wet meadow areas to maximize the growth of wetland vegetation and to reduce erosion. In addition, Comanche Creek's streambanks need to be stabilized to reduce erosion. Streambank restoration based on a careful analysis will be required to reduce water temperatures in Comanche Creek and to help optimize acceptable habitat for the Cutthroat Trout.

APPROACH TO SOLVING THE PROBLEM

WRAS Development

The *Comanche Creek Working Group* (The Quivira Coalition, New Mexico Trout, U.S. Forest Service, Amigos Bravos, Trout Unlimited, Bill Zeedyk, the Sierra Club, the Valle Vidal Grazing Association, NM Department of Game and Fish, Sangre de Cristo Fly Fishers, the New Mexico Environment Department, Bionomics Southwest, and other interested parties), also identified a suite of monitoring activities that will be used to verify the effectiveness of the project. The group has also developed a Watershed Restoration Action Strategy for Comanche Creek (www.nmenv.state.nm.us/swqb/wps/WRAS/Comanche_Creek_12020101_WIP_Jun_2003.pdf). This strategy includes a riparian restoration program with several elements: amending grazing management, reducing sediment from roads, and working to stabilize streambanks and establish appropriate riparian vegetation.

Education and Outreach

In addition to collecting and interpreting data, a goal of monitoring for The Quivira Coalition is to communicate to a broad audience the vital roles soil, water, and grass play in ecosystem function. Before society can assign value to a landscape, such as recreational use, endangered species protection, livestock production, open space, etc., it needs to examine whether or not that landscape is functioning properly. That means exploring the concept of ecosystem health.

In 1994, The National Academy of Sciences, in a publication entitled Rangeland Health, defined "health" as "the degree to which the integrity of the soil and ecological processes of rangeland ecosystems are maintained." They identified three principal indicators of rangeland health:

- **Soil/site stability (Soil)**: the ability to resist erosion by wind and water
- **Hydrology (Water):** the ability to capture, store, and safely release water from rain or run-off
- **Biotic integrity (Grass):** the ability to support functional communities and resist disturbance.

The intersection of these three indicators can serve as a baseline for not only evaluating the environmental health of an area, but it can serve as a jumping-off point for collaboration and restoration. A grassroots effort to restore the economic and ecological vitality of western landscapes means starting with the grass and the roots.

Education and collaboration can enhance sustainable changes on the ground and bring communities together. Most of Phase II educational activities will have a focus on riparian restoration and grazing management. The Quivira Coalition has produced three guides on 1) riparian restoration, 2) erosion control and 3)planned grazing which we provide to Comanche Creek Workshop participants and disseminate free of charge at other educational events around the southwest. Soon there will be a *Water Harvesting from Low-Maintenance Ranch Roads* guide available.

Inventory and Monitoring

1. We are compiling existing information and doing additional monitoring of the rangeland, streambank, stream channel, temperature, and riparian conditions of

Comanche Creek.

2. Water quality has been monitored by NMED in both creeks following the guidelines described in the Quality Assurance Project Plan for Water Quality Management Programs 2000 (NMED 2000). We are using their and Forest Service data and TMDL assessments as baseline.

3. We will continue to inventory Forest Service roads and install BMPs to reduce runoff and erosion along Comanche Creek. We will survey all closed roads within the seven identified problematic subwatersheds and try to determine the effectiveness of in-place BMPs and to install additional measures as indicated by the survey.

4. During Phase II of this project (2004-2007), we will continue to monitor all conditions to determine what effects, if any, are being achieved.

Why Monitor?

The primary purpose of monitoring is to detect CHANGE over time. Detecting change in riparian and upland environments is the best way to provide answers to questions that will help landowner/managers make informed decisions about the future of the land under their care. On public land, it is the best way to inform citizens of the current conditions and trends of their land, and to build trust.

Additionally, independently gathered, scientifically credible monitoring data will fill in the "blank spots" in the often contentious debate about the effects of cattle grazing in the West. Too much of this debate is being argued without reliable data, with many sides relying on testimonials or hearsay to make their point.

The monitoring objective is to quantify over time the effects of management treatments in a variety of habitats. This means, principally, quantifying ecosystem function, resistance to degradation, and capacity to recover following degradation. Monitoring measurements are used to generate a suite of basic indicators which are directly related to three fundamental attributes of ecosystem function: hydrology, soil/site stability, and biotic integrity.

Monitoring Protocols

The monitoring program provides complementary information from different components of the system (e.g. upland and riparian), and at different levels of detail. For example, the thermograph data summarize the functioning of the whole system, in that they integrate the effects of all management changes taking place within the watershed. Photo points cover the watershed with relatively high density, but on the lower reach, provide only qualitative information. Geomorphology survey data are more quantitative and detailed, but will only be collected at two representative reaches chosen to characterize the effects of implemented BMP's. Vegetation transects (cross sections) conducted at more locations in the riparian area will provide additional information not provided by geomorphologic surveys. We are using several monitoring techniques and protocols.

1) USDA's Jornada Experimental Range Rangeland Monitoring Protocol.

In 2001, 11 sites within the Comanche Creek watershed were selected for data collection using protocols developed by the scientists at the USDA's Jornada

Experimental Range. Baseline data were collected in 2001 and one follow-up data collection was performed in September 2004, under a previously approved monitoring plan. No changes are proposed for this monitoring; rather, the Phase II project warrants additional years of monitoring. Each monitoring site consists of a center post with three transects in equidistant spokes. Three basic measurements are taken on each transect line: (1) photo point, (2) line point intercept for vegetation cover and composition, and (3) canopy gap intercept for size of canopy gaps. The Jornada method includes as many as six additional protocols, such as belt transects for woody and invasive plants, plant species richness, soil penetrometer for compaction, single-ring infiltrometer, and others. Additional measurements may be developed or added according to the monitoring goals.

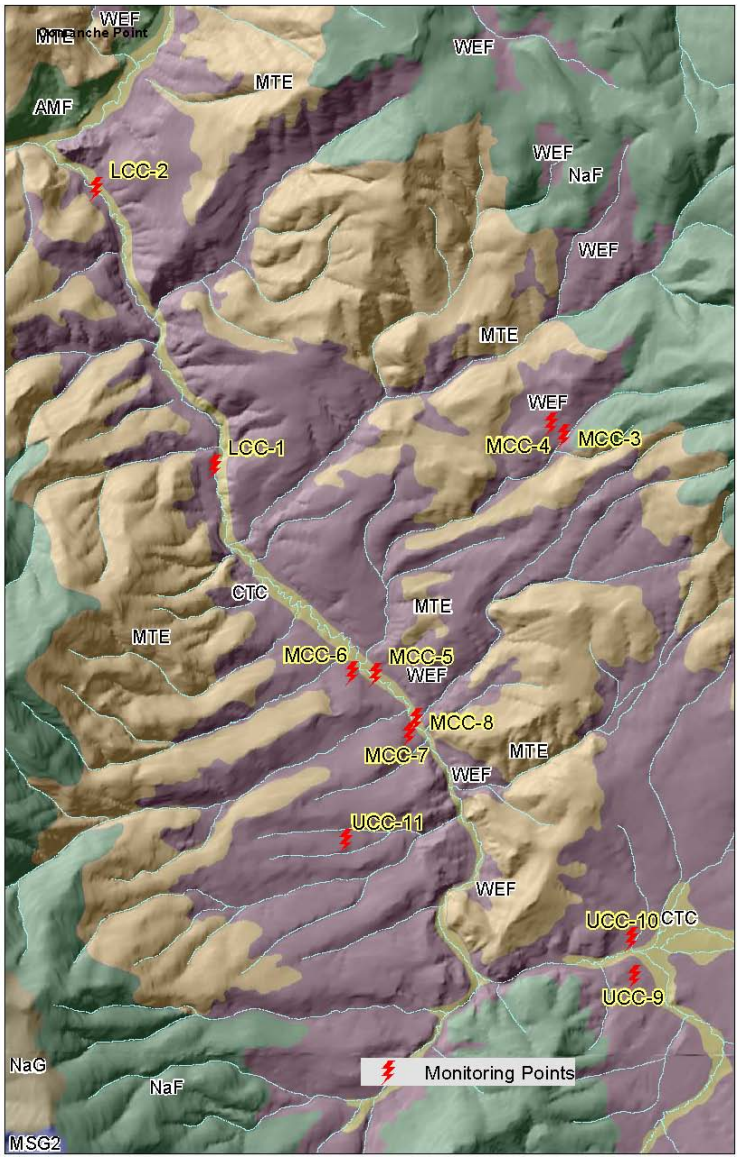
Photo points. A photo is taken of each transect while the tape is still lying on the ground along the transect. The picture is taken from directly above the center post with the long axis of the camera parallel to the ground.

Line-point intercept. This measurement provides quantitative indicators of biotic integrity including species composition, community and canopy structure, and surface structure. Dropping a pin flag so that it falls vertically and touches the near side of the tape, the recorder notes every live leaf or stem touching the pin, or the vertical line drawn by the pin, from the sky down to the soil or ground surface. Litter, rock, lichen, moss, crust, or bare soil are recorded if they occur. Dead trees, grass, forbs or shrubs are recorded. This data provides a means of comparing data collected at different locations and at different times. As a result, trends in time for each of the indicators will be evident.

Canopy Gap intercept. This data are also quantitative and provides a measure for comparing the number of canopy gaps per site, the mean gap size per site, and the relative distribution of gap sizes at each site. Each of these gap features is indicative of system structure and function, particularly with respect to potential for erosion.

Up-land baseline monitoring took place October 2001, and transect photos are being re-taken each year. The transect lines were re-read in September 2004. A report will be available by August 30, 2005. Up-land transect photos will be re-taken in September 2005 and 2006. Transects will be re-read September 2007.

Location map of established upland monitoring sites:



Reference:

Herrick, J. C.; Van Zee, J. W.; Havastad, K. M.; Burkett, L. M.; Whitford, W.G. 2005 ***Monitoring Manual for Grassland, Shrubland and Savanna Ecosystems Volume I: Quick Start.*** USDA-ARS Jornada Experimental Range, Las Cruces, New Mexico. This reference and monitoring forms and calculation sheets are available on the Internet at: http://usda-ars.nmsu.edu/Monit_Assess/monitoring.php.

2) Fluvial geomorphological assessment of stream conditions and departures (Rosgen level 2) for the target reach of lower Comanche Creek (from the confluence of Comanche Creek with Little Costilla Creek to the Rio Costilla). John Pittenger of Blue Earth Ecological Consultants and Art Volmer of Trout Unlimited established permanent cross sections and conducted a Level 2 survey at one location in 2001 which may or may not eventually include mini-exclosures or vanes (the "upper survey"), and Art Volmer repeated those surveys in 2004. In June 2005, this reach will be located precisely (survey markers should already be present) and mapped to ensure that it can be located in 2007,

when Trout Unlimited volunteers will re-survey the reach before the end of Phase II. The purpose of this monitoring is to detect changes in stream morphology that may be occurring due to project activities in the watershed or other changes in management or climatic events.

Additional Level 2 surveys will be conducted at two reaches including mini-exclosures which were recently installed or vanes which will be installed, for the specific purpose of describing the effects of these structures on stream morphology (the "lower surveys"). The locations of the vanes will be established, and baseline Level II surveys will be conducted in June 2005. The sites will be located precisely using survey markers. Follow-up surveys will be conducted in summer 2007, and perhaps again after the project term.

Rosgen Level 2 classification is described as a morphological description of stream types A1-A6 to G1-G6. Inputs into this characterization are: 1) Entrenchment Ratio 2) Width to Depth Ratio 3) Sinuosity , 4) Channel Slope and 5) Channel Materials. Level 2 analyses require extensive field surveys of bankfull features and stream pattern, profile and dimension.

Specialized field books (*The Reference Reach Field Book*) published by Wildland Hydrology will be used for data collection and organization in the field. The data in these books are organized similarly as they are in the first reference below.

Rreferences:

1) Harrelson, Cheryl C; Rawlins, C.L.; Potyondy, John P. 1994. ***Stream channel reference sites: an illustrated guide to field technique.*** Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, 61pgs. This reference is available on the Internet at: http://stream.fs.fed.us/publications/PDFs/RM245E.PDF

2) Rosgen, Dave. 1994. ***Applied River Morphology***. Wildland Hydrology, Pagosa Springs, CO.

3) Riparian Vegetation Monitoring will be conducted at the same locations as the lower geomorphology surveys described above. Three methods will be used. The vegetation cross-section method evaluates the health of vegetation, and measures the width of the riparian or wetland zone, across the valley floor. The greenline method provides a measurement of vegetation immediately adjacent to the stream. Woody species regeneration sampling will be conducted to measure the density and age-class structure of willows or narrowleaf cottonwoods that may be present in the sampling area. These data may be used to indicate how much change has occurred in a particular complex (percent of acreage supporting altered community types), or how closely the composition of types in that area represents a previously described desired condition.

Reference:

Winward, Alma H. ***Monitoring the Vegetation Resources in Riparian Areas.*** 2000. US Department of Agriculture, Forest Service, Rocky Mountain Research Station, Gen. Tech. Report RMRS-GTR-47. This reference (which includes data collection forms) is available on the Internet at: http://www.fs.fed.us/rm/pubs/rmrs_gtr047.pdf

Other protocols will be used by the Forest Service and Fish and Game, but those monitoring efforts are outside the scope of this PQAP because they will neither be funded with Section 319 funds, not will their expense be reported as non-federal match. Continuous monitoring of daily fluctuations in maximum and minimum water temperature in the three target reaches using methodology comparable with existing data previously collected will be done by the Carson National Forest (using thermographs).

DATA CUSTODY AND CONSISTENCY

The Quivira Coalition will administer all aspects of the monitoring work. We will hire monitoring personnel on a contractual basis as needed to do the fieldwork; oversee and ensure delivery of reports; and handle the finances. We will develop a database of monitoring and assessment information that will be available on the Comanche Creek Working Group Website: www.comanchecreek.org.

Data for all three monitoring areas for which support from the Section 319 program is requested will be collected on standardized field forms in widespread use around the country (or at least regionally, in the case of the Jornada Experimental Station protocol) by staff who have been trained in the methods. The staff who collect the data in the field will review and enter their data into Excel spreadsheets for further analysis and distribution. These data will be made available to project participants at www.comanchecreek.org. They will also be housed at the Quivira Coalition offices, they will be provided to the New Mexico Environment Department as project deliverables, and they will be provided to the Carson National Forest.

Additional consistency will be achieved with the continued involvement of individuals who collected baseline data. The upland monitoring (conducted under a previously approved monitoring plan) has been conducted by Tamara and Kirk Gadzia of the Quivira Coalition. Dr. Kris Havstad, who helped develop the Jornada protocols, may help in the analysis and interpretation of the uplands monitoring data. Art Volmer was present for the initial and repeat upper geomorphology surveys, and intends to conduct the 2007 survey. Geomnorphology survey techniques are also somewhat consistent because Dave Rosgen of Wildland Hydrology trained most people conducting this work in New Mexico. The riparian vegetation monitoring will be conducted by the same contractor for the Quivira Coalition.

Consistency is also facilitated with the use of earlier data to locate sites and assist with such field measurements as plant identification (upland and riparian vegetation monitoring) and interpreting the bankfull elevation (geomorphology surveys).

Most of the volunteers and paid staff are trained in the above Jornada and riparian monitoring methods. They are currently providing assistance on other projects that require the use of these monitoring protocols. Monitoring reports will be written by the individuals performing the data collection and reviewed by Forest Service and NMED personnel.

MONITORING/INVENTORY TIME-LINE:

Rosgen Level 2, lower reach of Comanche Creek, June 2005
Riparian Vegetation Transects, lower reach of Comanche Creek, June 2005
Roads Inventory upper watershed, June 2005

Re-take 11 up-land monitoring photo points, September 2005 and September 2006

Photo documentation of mini-elk exclosures, September 2005 and September 2006

Re-read up-land quantitative transects, September 2007

Riparian Vegetation Transects, middle reach of Comanche Creek (2006 or 2007 depending on when BMP's are installed.

ON-THE-GROUND RESTORATION OF COMANCHE CREEK

This part of the project is an extension of work already begun by the Forest Service and New Mexico Trout, along with the State Department of Game and Fish, for restoration of habitat for the Rio Grande Cutthroat Trout.

A typical mini-exclosure takes 8 green-tree posts cut into 2 ten-foot sections, 1 roll of net wire, 2-3 pounds of staples and some smooth wire. The Forest Service has realized some promising results from installation of mini-exclosures to protect and expand existing clones of woody vegetation. This method is less expensive and more effective than new plantings, especially in the face of elk browsing.

1. In 1993 six mini-exclosures were installed on the lower reach of Comanche Creek and have shown tremendous riparian vegetation re-growth. Between 2001 and 2004 as part of Phase I (319 EPA grant), we installed 36 more mini-exclosures along 5.5 miles of Comanche Creek. We plan to finish installing ~10 more mini-exclosures during the 2005 season along the lower Reach.

2. In 2004, 11.7 miles of road were rehabilitated to reduce sediment sources in the upper watershed. After the 2005 roads assessment, we will continue the installation of dozed structures (BMPs) along Forest Service roads in the seven subwatersheds.

3. A 404/401 permit has been obtained by the Forest Service to implement BMP's along the lower reach of Comanche Creek. During the 2005 season and possibly 2006, we will be installing vanes along certain points of Comanche creek to prevent stream banks from eroding. After the middle reach assessment and 404/401 permitting, we will install various BMP's on the middle reach of Comanche Creek.

4. Continued repair of elk exclosures, which the Forest Service and New Mexico Trout are already working on.

5. After the middle reach assessment and 404/401 permitting, we will install mini-exclosures along the middle reach of Comanche Creek. Planting of willows may be required.

Personnel

NMED Personnel:

Abraham Franklin, Project Officer, Surface Water Quality Bureau

David Hogge, Watershed Protection Section Program Manager

US EPA Personnel:

Tim Herfel, EPA Region 6, Dallas

NMED and EPA provide project oversight and assessment.

The Quivira Coalition:

Courtney White, Executive Director

Tamara Gadzia, Programs & Finance Manager

Gen Head, Mapping Coordinator

Contractual Monitoring Staff:

Kirk Gadzia, Resource Management Services, subcontractor for Uplands Monitoring

Steve Vrooman, Riparian Vegetation Transects & Geomorphological Assessment

Other Volunteers and paid "monitors" as needed

Most of the volunteers and paid staff are trained in the above Jornada and riparian monitoring methods. They are currently providing assistance on other projects that require the use of these monitoring protocols. The up-land data collect are reviewed by Kirk and Tamara Gadzia before being entered into a database and report. Dr. Kris Havstad, who helped develop the Jornada protocols, may help in the analysis and interpretation of the uplands monitoring data. Riparian monitoring reports will be written by the contractor performing the data collection and reviewed by Forest Service and NMED personnel.