

Rio Puerco Watershed Restoration Project

I. Characterization of the Watershed and the Overall Watershed Planning Effort

A. Description of the Rio Puerco Watershed

The Rio Puerco Watershed, in west central New Mexico, is the largest tributary to the Middle Rio Grande Basin. Originating along the eastern edge of the Continental Divide, the watershed encompasses approximately 7,350 square miles (4.7 million acres/over 1.9M hectares) that contribute flow to the Rio Grande at Bernardo, NM (see map, Appendix A). The Rio Puerco basin includes nine sub-basins, draining portions of seven counties, west of the greater Rio Grande Basin in northwest and west-central New Mexico. The geological setting involves relatively soft sedimentary strata, intruded and capped by younger volcanic rocks. The watershed has been studied in great detail by a variety of noted investigators including geologists, geomorphologists, habitat and range management specialists, social scientists, and others.

B. Problems and Threats to the Rio Puerco Watershed

The Rio Puerco, once the “breadbasket of New Mexico,” has achieved worldwide notoriety as a severely impacted and degraded watershed, the poster child for accelerated erosion. The headwaters lie in the Nacimiento Mountains east of Cuba, NM. Traditional villages dotted its banks and extensive farm fields tapped its waters. Today, the Rio Puerco flows far beneath the historic floodplain, a victim of highly erodible soils, channelization, entrenchment, historically poor land management, and a complex mix of ownership. Formerly productive agrarian communities are now abandoned. The Rio Puerco Watershed is the primary source of undesirable fine sediment to the Rio Grande. The Corps of Engineers has noted that soil erosion within the watershed surpasses that of any other

watershed in the country, yielding 1.36 acre-feet per square mile per year. The Rio Puerco is listed as a Category 1 watershed (in need of restoration) in New Mexico's Unified Watershed Assessment (1998). Several reaches of the Rio Puerco and its tributaries are listed as impaired in "*Water Quality and Water Pollution Control in New Mexico*" (2000), in its Appendix B - the State's 305(b) Report, and in the "*2000-2002 State of New Mexico CWA Section 303-D List for Assessed Stream and River Reaches.*" These documents list non-attained uses for individual perennial to intermittent reaches, including the Rio Puerco and the tributaries developing along the Nacimiento front.

C. Description of Rio Puerco Watershed Plan

The Rio Puerco Management Committee (RPMC) has developed a Watershed Restoration Action Strategy (WRAS, May 30, 2001), approved by the NMED and EPA Region 6, that identified the Upper Main Stem and the Torreon Wash sub-basins as priorities for restoration activities based on impairment and causes of pollution. The greatest opportunities to protect water quality occur in the headwaters regions where perennial to intermittent streams are developed. The intention of this proposal is to implement the WRAS specifically in these sub-basins.

II. Description of Proposed Projects

A. Rio Puerco Watershed Projects Proposed for EPA Watershed Initiative Grant

The RPMC proposes to focus on the 303(d) listed stream segment of the Upper Main Stem and on the Torreon Wash sub-basin taking a holistic approach implementing a cross-section of complementary techniques targeting upland and in-channel restoration. Techniques originated by William Zeedyk, regionally recognized watershed restoration expert, will be

employed. These techniques incorporate and expand on principals established by David Rosgen.

B. Relationship of Proposed Projects to Rio Puerco Watershed Plan and Goals

The overall goal related to the Watershed Plan is to eliminate the water quality impairment of the listed reaches of the Rio Puerco and its tributaries. The impairments of concern include temperature exceedances, stream bottom deposits, plant nutrients, metals, turbidity, dissolved oxygen, and pH. These effects are largely due to a lack of vegetative density and diversity in a region of high erosion potential and impacts resulting from habitat alteration, agriculture, rangeland impacts, resource extraction, reduction of riparian vegetation, stream bank destabilization, and road maintenance activities. The main strategies important in the WRAS and to this project are decreased sedimentation and erosion on the treated sub-basins.

Riparian and stream strategies include increasing desired vegetation, decreasing invasive species, and increasing stream sinuosity. In the upland areas strategies include increase in vegetational cover, and infiltration of precipitation with decreased runoff. The ultimate goal of these efforts will be to teach the next generation techniques that will result in improved water quality, increased quantity, and reduction of overall impairment.

C. Description of Proposed EPA Funded Projects

This RPMC project emphasizes the use of a number of the Zeedyk innovative techniques to restore watershed environments resulting in the goals mentioned above. A main Zeedyk technique is to rehabilitate down cut arroyos by increasing sinuosity and creating floodplains to establish riparian habitats. In first order channels water harvesting techniques use sustainable catchment structures taking advantage of readily available materials that trap sediment and promote the establishment of vegetation. Another water harvesting innovation

comes from the opportunity of spreading water flow to create areas that promote increased vegetation. Included in this effort is the reduction of sagebrush, salt-cedar, and noxious weeds using alternative and innovative approaches that include intensive grazing using goats. As an organizational step, a Project Coordinator will be hired to oversee all aspects of the following enumerated tasks.

Task 1: The New Mexico State Highway and Transportation Department (NMSHTD) will do pre-project aerial photography of the project areas. A Project Coordinator to be hired to compare previous watershed aerial photography and find project target areas along with identifying all sediment contributing dirt roads within the project areas. These aeriels will help to identify straight eroded reaches where Zeedyk techniques to increase stream sinuosity may be employed. The pre- project aerial photography will also be used to create a baseline for evaluating the progress made by the restoration projects proposed.

After the projects are completed in the Upper Main Stem and the Torreon Wash another set of aerial photographs will be produced to evaluate the improvements in these sub-basins and information will be transferred to the Regional Water Plan.

Task 2: Along selected tributaries in the Upper Main Stem and the Torreon Wash water harvesting techniques such as one-rock dams, one rock in height, will be used to slow and modify runoff along with holding eroding soils. The performance target for this task is the construction of an estimated 10,000 structures over the grant period divided between the project sub-basins. Other preventative techniques to be used in the upland areas are sagebrush control, grazing management, and dirt road Best Management Practices (BMPs).

Task 3: Knowledge of improved grazing management will be increased in the project areas by running three workshops during the length of the project in selected local communities on

innovative grazing techniques. In addition, one three day herding clinic will be taught as a demonstration of the techniques covered in the grazing management workshops. An experienced herder will then be hired on contract during the final year of the project to teach all techniques during a 6-month *on-the-ground* demonstration period to reinforce information from the workshop programs.

Task 4: Along the deeply incised channels occurring downstream from the upland restoration areas, techniques will be used to recreate appropriate meander patterns for each local stream type. Induced meanders restore floodplains, and establish desired vegetation to stabilize the channels. This project will treat an estimated 10 degraded reaches between the two sub-basins. Intensive goat grazing will be used to eradicate salt-cedar, Russian Olive and other undesirable species. Volunteers will be used to plant both cottonwood and willow poles to help stabilize the developing floodplains.

Task 5: Recent research in the Rio Puerco, Phippen 2000 M.A. Thesis, indicates that dirt roads are a major source of sediment. Dirt roads identified within the project sub-basins will be modified as needed to reduce sediment loss and erosion by implementing water harvesting and erosion control practices that divert and slow water runoff. Roads will be selected by the amount of erosion evident and proximity to project upland and channel locales.

Task 6: William Zeedyk's field manual, *Rescate y Restauración de Los Rios*, will be revised to reflect recent innovations and the conditions within the Rio Puerco Watershed. The project will publish 10,000 copies of the field manual in both Spanish and English so that it can be given to participants in workshops and volunteers helping to implement these techniques. The publication will then be available for use in other impaired watersheds throughout the western United States.

D. Task 7: Proposed Monitoring and Evaluation Methods

The monitoring plan involves the assignment of an RPMC compliance review team to the project to monitor compliance to the project proposal and goals. The compliance review team will set up a schedule of field reviews to monitor implementation and progress for the project. The Project Coordinator will submit quarterly reports describing actions, finances, and project progress. Monitoring efforts will be subcontracted and include the use of outreach volunteers to the communities.

1. In-stream monitoring: NMED will do water quality baseline measurements, cross-section and longitudinal profiles, and photo points.
2. Riparian monitoring: extent and character of vegetative communities by cross-section and bank edge transects following BLM protocol.
3. BLM with NMHTD Aerial Photography: monitor stream sinuosity, in-stream alterations, riparian changes, and upland vegetative communities at a broad level. Transects will be used to more closely identify any change in vegetational composition and cover.
4. We will utilize performance targets to evaluate outreach, education, and volunteer investment.

E. Rio Puerco Watershed Project Association with Federal, State, and Local Mandates

Federal : Rio Puerco Watershed Act of 1996, (PL104-333 established the RPMC and directed implementation of a Rio Puerco restoration plan)

State: *2000-2002 State of New Mexico CWA Section 303-D List for Assessed Stream and River Reaches*, Section 303(d), New Mexico TMDL Program

Local: In 1993 local concern led to the formation of the Rio Puerco Watershed Committee, Cuba, NM (Pre-cursor to the RPMC, present subgroup)

F. Responsible Persons, Agencies and Organizations

Rio Puerco Management Committee

Steve Fischer, BLM Watershed Team Lead, Chair of the RPMC Executive Committee

Project Coordinator, to be announced

F. Leon Martinez, HUB Resource Conservation and Development, Fiscal Agent

III. Description of Project Management and Stakeholders

A. Management, Staff, Supporters and Stakeholders

The Rio Puerco Management Committee (RPMC) established through Public Law 104-333 has included the active partnership of forty private, local, tribal, state, and federal agencies.

The RPMC as the management group enjoys the full support and participation of all the major stakeholders in the Rio Puerco basin. (For full list see Appendix C)

B. Qualifications and Experience for Rio Puerco Watershed Plan and Projects

The Rio Puerco Management Committee contains members from the participating agencies listed above. The RPMC developed a WRAS for the Rio Puerco Watershed in May 2001.

The committee consists of hydrologists, engineers, watershed experts, geologists, teachers, ranchers, directors of non-profits, county commissioners, and an outreach coordinator. This expertise has led to the initiation and completion of a number of restoration projects in impaired segments of the watershed. Many of these projects have utilized Zeedyk techniques from the field manual and have shown that the Zeedyk methods are effective in these situations. These projects establish a baseline for the implementation of the proposed tasks and a measure for the projects success.

Table 1: Current Projects

RPMC FY2002 Project Name	Project Funding	Funding Source	Funding Agent	Project Contact
Ongoing Projects				
Rio Puerco Channel Restoration at La Ventana	\$500,000	NMED(319)	NMED/BLM	Michael Coleman
Thompson Spring	\$ 41,480	RPMC	Jemez Pueblo	Anthony Armijo
Gibson Ranch Holistic Demonstration	\$ 30,000	RPMC	Tree New Mexico	Sue Probart
Torreon Youth Program	\$ 20,000	RPMC	Quivira Coalition	Sam Sala
New Projects				
RPMC Coordinator	\$ 19,600	RPMC	Cuba SWCD	Mike Chavez
Cuba Grade Stabilization	\$ 15,000	RPMC	Cuba SWCD	Emmett Cart
Meander Cut-Off	\$ 30,000	RPMC	Cuba SWCD	Steve Fischer
Ojo Encino Range Management	\$ 89,540	RPMC	Quivira Coalition	Watson Castillo
BMP Workshops at Ojo Encino	\$ 16,817	RPMC	Quivira Coalition	Ted Mace
Zeedyk Train the Trainer Workshop	\$ 3,200	RPMC	Quivira Coalition	Barbara Johnson
Whitehorse Lake Chapter Workshops	\$ 5,000	RPMC	Quivira Coalition	Bobby Tsosie
San Pablo Subwatershed	\$179,500	NMED(319)	Cuba SWCD	Mike Chavez

The list of projects above provides evidence of the qualifications and experience garnered by the RPMC and its contributing agencies. The RPMC has been an active participant in the restoration efforts on the Rio Puerco Watershed since the inception of the committee in 1997 and has advanced innovative approaches toward the restoration of this impaired watershed. The projects proposed in this document will help to advance these techniques on a national and international level.

D. Technical Expertise

William Zeedyk, regionally recognized watershed restoration expert

Dave Love, NM Bureau of Geology and Mineral Resources

Anthony Armijo, Dept. of Resource Protection, Pueblo of Jemez

Amos Johnson, Water Resources Engineer, Navajo Nation

Michael Coleman, NMED, Geologist/Environmental Specialist

E. Other Stakeholders

Private landowners and Indian allottees along the Rio Puerco Main Stem and Torreon Wash will be directly involved in the project.

IV. Description of Outreach Activities

A. Strategies for Transferring Knowledge from the Rio Puerco Watershed Project

The publication of the Zeedyk field manual and the training of tribal and community members in these techniques will be a primary focus in disseminating knowledge. A final report will be made available throughout this watershed and to all other interested parties.

Demonstration projects and monitoring will include youth from Jemez and the Navajo Nation along with students from area schools and colleges. Public involvement will continue throughout the life of the project. A research project will be carried out to compare the Zeedyk techniques utilized in this project with other methods of restoration (e.g. check dams, detention features, and gabions) already employed in reaches of the Rio Puerco watershed.

The technical skills of members of the RPMC will be used in aiding student research fostering the interest of college students in careers associated with landscape restoration, conservation, and engineering. A video incorporating the grazing workshops and herding clinic along with demonstrations of upland and incised channel restoration techniques will be produced and available to any group or project dealing with watershed restoration. Results and information on Zeedyk techniques will also be available online at the BLM website.

B. Information and Outreach Components

The Public Participation Subcommittee of the RPMC plays a major role in developing public outreach activities. One of the purposes of the legislation that established the RPMC is to involve private citizens including students in the restoration of this watershed. Restoration work accomplished by this project will only be sustainable if this goal is met. Public involvement will be accomplished through a mix of personal contact, public meetings, workshops, and 20 community work projects over the length of the grant. The Project Coordinator can focus the efforts of local Forest Service, NRCS, and BLM offices, Tribal governments, and State agencies to accomplish even more. Ranchers, environmentalists, agency employees, students, and the general public will be invited to participate. Using demonstration, teaching and hands-on education this project will result in measurable behavioral change and understanding. Voluntary questionnaire and participation numbers will two ways to measure the success of these events.

C. Past Outreach Efforts

Torreón Chapter of the Navajo Nation initiated a restoration teaching and participation project in the Rio Puerco. Bill Zeedyk has run workshops for both the Torreón chapter and participants from Jemez Pueblo. A number of Listening Sessions were undertaken in communities within the greater Rio Puerco Watershed to determine the knowledge and ideas of participants regarding this impaired watershed. Working groups were used to help communities arrive at low cost and sustainable solutions to restoration problems. (See Table 1: Current Projects, Section III)