

Final Report
Integrating Stream Restoration Principles and Transportation Maintenance
Cooperative Agreement No. CD-966558-01-0-D
David Menzie, SWQB Project Officer

(This project is Part D of a larger 2007 grant award to NMED Wetlands Program entitled “2007 New Mexico Wetlands Awards Project.”)

Executive Summary

Title: Integrating Stream Restoration Principles and Transportation Maintenance

Define problem addressed by project:

Past land management activities have impacted the riparian corridor of the West Fork of the Gila in the vicinity of the Gila Cliff Dwellings National Monument. These impacts include historical cattle grazing and flood irrigation farming which were discontinued in the early 1960s. This reach has also been impacted by more recent management activities related to the construction and maintenance of NM Highway 15 and the bridge spanning the river. Flooding has damaged the West Fork Gila River Bridge in the project area numerous times over the last few decades and most pre-project discussion with agencies regarding this Project centered on what the Project could do to help stabilize the erosion problems associated with the design and location of the bridge. The bridge over the West Fork Gila River has provided vehicular access to the Gila Cliff Dwellings National Monument since its construction in the mid-1960s. Continued loss of riparian vegetation and wetlands adjacent to the river are caused by flood scour (photo of damage caused by a rain-on-snow flood event in December of 1978).

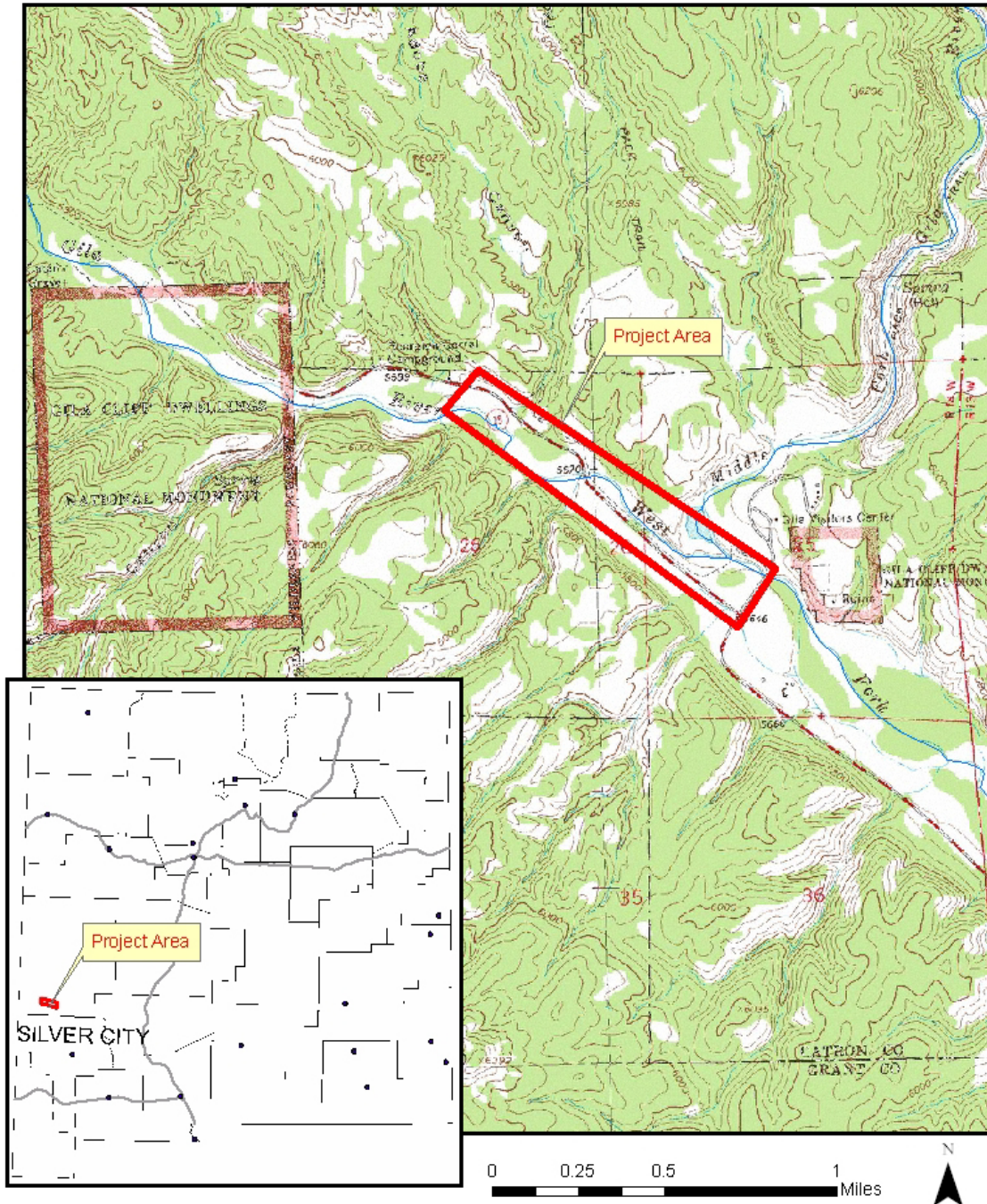


Wetlands goals and objectives:

The original goal of this Project was to demonstrate innovative methods and comprehensive approaches to restore approximately 30 acres of wetland and riparian areas in and adjacent to the West Fork of the Gila River. This project brought together new partnerships in the southeastern part of the State to demonstrate bioengineering techniques that could be used by road and maintenance engineers that actually improve stream, wetlands and riparian areas that are in the vicinity of road projects, bridges and other transportation infrastructure. The objectives of the Project were to demonstrate geomorphic characterization of the stream segment, design of appropriate in-stream structures that improve degrading stream conditions, and plan riparian planting techniques to achieve a net increase of wetlands by 30 acres by effectively stabilizing stream banks adjacent to New Mexico State Highway 15; restoring approximately 30 acres of riparian habitat; and to provide training and outreach for NM Department of Transportation (NMDOT) staff on project principles.

Project Location

Intergrating Stream Restoration Principles and Transportation Maintenance New Mexico



Original timeframe and time of completion:

The Project started in January 2008 and was expected to end January 2012. However, due to delays in the permitting process and because of the Whitewater Baldy Fire, the project timeline was amended and ended on May 31, 2013.

Cooperators involved:

The principle cooperators for this project are:

- New Mexico Department of Transportation (NMDOT), an excellent partner that contributed a significant portion of the match through review and approval of restoration design, labor and services for clearances and permits, and participation in organizing and attending the two and one half day Stream Restoration Principals workshop. Originally the NMDOT was also going to provide 120 hours of labor, 120 hours of heavy equipment, and assistance with gathering plant material from local sources and planting riparian trees at the demonstration restoration site by providing 2 staff for 35 hours each.
- New Mexico Department of Game and Fish (NMDGF) was the main land management agency where the Project site is located.
- The Project also involved some cooperation and coordination with the Gila National Forest (GNF) and the Gila Cliff Dwelling National Monument which have lands involved or immediately adjacent to the Project site.
- EPA Region 6 provided timely assistance in obtaining ESA coordination.
- USACE provided timely assistance in obtaining 404 permits.

Funding

The original Federal amount was \$165,675, however the demonstration implementation portion of the funding was not spent and \$102,134 was returned to EPA due to the Whitewater Baldy Fire and its changes on the watershed that would affect the current project design. \$63,541 in Federal funds was spent on the completed project tasks.

The match for the original amount was expected to be \$55,313 or 25% of the total project expenses. The final amount of Match is \$53,439, or 46% match on the tasks completed.

Describe Project Tasks completed:**Program Element 1 - Administration/Reporting****Task 1.1: Project Administration**

Administrative tasks include general work to set up internal accounts, identifying and selecting qualified contractors, writing contracts and Memoranda of Agreement with cooperating State and Federal agencies, processing invoices, and writing semi-annual reports and the final report.

Program Element 2. Restoration/Watershed Approach

Task 2.1: Field Surveys

Natural Channel Design, Inc. completed the bulk of the field survey work for the project by late March of 2008.

Task 2.2: Design Wetland/Riparian Restoration

Natural Channel Design, Inc. submitted the final design construction sheets for the for bank protection in late February of 2009. These construction sheets were distributed to NMDOT, NMDGF, GNF, and the National Parks representative for the Gila Cliff Dwellings National Monument for their review and comments.

Task 2.3: State and Federal Clearances

NMDOT submitted the Preconstruction Notification (PCN), Biological Assessment (BA) and Cultural Survey for the CWA Section 404 Dredge and Fill Permit and Section 401 State of NM Certification of the permit in early May 2011. USFWS began an informal ESA consultation for the Project on August 10, 2011 and the formal consultation on January 1, 2012. The formal consultation concluded with the issuance of a Biological Opinion on April 12, 2012. EPA acted as the lead agency for the ESA consultation with the USFWS. The NMDOT also obtained the necessary letter of concurrence from the Historic Preservation Division of the Office of Cultural Affairs (historic and archeological clearances). SWQB obtained a letter confirming completion of tribal consultation.

Task 2.4: Implementation and Re-vegetation

Unforeseen circumstances made the Project untenable and this task was cancelled. The June 2012 Whitewater Baldy Fire which burned intensely in the upper watershed of the West Fork of the Gila River changed the expected flood discharge characteristics and thus made the original design specifications for the in-stream structures inadequate for the expected larger-than-normal flood events. Scouring floods from the burned watershed are likely to occur at some point over the next few years and would have negatively impacted the riparian planting component of the Project. In addition, the Central Federal Lands Highway Division has decided to replace the upstream highway bridge which is located within the Project area. The construction for replacing the bridge is scheduled for startup as early as 2015. Replacement of the bridge would also damage proposed riparian planting and alter flow characteristics affecting the in-stream structures as designed for the Project. Major revisions to the original Work Plan for the **Integrating Stream Restoration Principles and Transportation Maintenance** (the Project) were then determined by USEPA Region 6 Wetland Program staff and SWQB Wetlands Program staff on August 7, 2012. It was decided that the in-stream and vegetative enhancement tasks as presented in the original Work Plan were no longer practical to undertake. In order to achieve some of the original goals of this task it was determined that a training principally for NMDOT personnel that would demonstrate new techniques for road work in the river environment would provide some outcomes that were expected from the Project.

Program Element 3. QAPP/Monitoring and Assessment

Task 3.1: Monitoring and QAPP Development

The PQAPP for this project was approved on January 29, 2009 with annual recertification and is still current. The original data collection through field surveys for the baseline condition and for developing design specifications were the only monitoring conducted.

Since the implementation and re-vegetation task was cancelled there was no post-implementation monitoring.

Program Element 4. Education/Outreach

Original Task 4.1: Stream Restoration Principles Outreach

Project Officer gave a presentation to the NMED/NMDOT Task Force updating progress on the project. This presentation would be modified to emphasize stream restoration principles and how those principles apply to highway maintenance. The modified presentation would be given to various NMDOT Districts around the state as part of completing this task.

Revised Task 4.1: Stream Restoration Principles Outreach

This revised task involved outreach to a general N.M. DOT audience through the presentation of a two and a half-day workshop geared specifically to project development engineers, maintenance staff, drainage engineers, and district managers. The scope for this workshop addressed the need for information regarding environmental stewardship practices in highway construction and maintenance in order to increase environmental sensitivities and help NMDOT avoid unnecessary impacts to wetlands and riparian environments. The workshop was designed to help NMDOT apply more quickly and easily that which has already been learned or developed by others. To this end, the workshop described sample practices and then linked the practices to pertinent examples, design drawings, or more detailed technical guidance or procedures. Twenty-Eight attendees included 18 NMDOT staff from Drainage Design, Bridge Design and Environmental Bureau; City and County of Santa Fe (stormwater and planning); tribal Agencies (Acoma Pueblo and Navajo Nation); and the US Army Corps of Engineers, Albuquerque Branch.

Training notebooks with educational materials, photographs, text and references were prepared for each participant. Custom PowerPoint presentations with photographs, charts, graphs, or other relevant slides were presented in classroom sessions. Workshop materials illustrated many common problems that highway engineers have to contend with when maintaining a highway within the flood prone area of a watercourse. The workshop included a section on how fire affects the hydrology of the watershed, changes in flooding characteristics, stream bank/channel stability, and highway infrastructure.

The workshop conducted field trips to view and discuss in-stream structures and bioengineering practices that demonstrate stream restoration principles. Specific field sites provided examples of projects which address stream restoration principles including hydrologic and fluvial geomorphological analysis, design, environmental permitting, construction and implementation of best management practices, and post construction monitoring and maintenance. The contractor's final report and a hard copy of the training binder are attached.



Steve Vrooman teaching the classroom portion of the Workshop. Approximately 30 attendees filled the classroom.

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Photo of workshop attendees looking at culvert issues and how to fix them. Attendees included NMDOT, Santa Fe County road maintenance, USACE, and others.

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“What’s wrong with this structure?” Workshop field trip site to a poorly designed culvert near Los Alamos in the mountains in a previously burned area serving a fairly large watershed.

Task 4.2 Attend a Wetlands Training

This task was completed when SWQB Wetlands Program staff attended Rosgen Level II River Morphology and Applications class in Oregon.

Project products produced: A design for in-stream structures to prevent bank erosion (not constructed), a workshop for integrating stream restoration principles and transportation maintenance.

Outcomes: New partnerships with NMDOT, and others that attended the highly successful workshop. More agency interest in implementing projects that incorporate stream restoration and protection principals. More interest in developing better road, culvert and bridge design incorporating stream protection and restoration during emergency response to flood and fire.

Project Chronology:

Major project highlights – completion of the design in 2009 and conducting the workshop in 2013.

Measures of Success – the workshop would likely be considered the principle measure of

success. The contractor provided a questionnaire to attendees and the results of the questionnaire were very positive including the interest in having more training and future demonstrations. Comments from the questionnaire are included in the Final Report for the DOT Workshop which is attached.

Obstacles – There were many obstacles during the course of the Project including the death of the principle designer and contractor for the Project in 2010 which created a loss of momentum and an expired contract, the Miller wildfire in 2011, several aquatic endangered species within the Project reach which resulted in delays and resistance to the Project from fish biologists with the New Mexico Department of Game and Fish, lack of sufficient funding to revise the project design when the Project went back out to bid, and the most significant obstacle which was the Whitewater Baldy Fire in the upper watershed which resulted in cancelling the construction of the in-stream structures due to significantly increasing potential flood damage to the in-stream structures and vegetation enhancement parts of the project.

Lessons learned:

What made the project successful – the involvement and interest of the NMDOT provided a strong partnership, and the workshop targeting NMDOT staff was very well received. The NMDOT is interested in learning more about implementing the techniques.

What made the project not so successful – the obstacles discussed previously. In a different location, under different circumstances, the demonstration implementation of this project would have been highly successful.

What would you do differently in terms of effectiveness – It was too late and not cost effective to pick a new site after the design was developed, and the fires were not anticipated. In the future, for a demonstration, working in stream reaches with endangered species should be avoided because the permitting takes too long for a demonstration that has a short deadline for implementation. In addition, the workshop emphasized restoration after catastrophic fire which received great interest by the participants. Extreme flooding events when watersheds are burned not only affects roads and infrastructure but also stream conditions. Extremely large fires are becoming more prevalent in the watersheds of New Mexico and more designs specifications and demonstrations should be undertaken so that responses to large watershed-scale fires can be more effective.

Technical transfer:

What information can you pass along to other cooperators, agencies, or local landowners in other watersheds about this project – the Project was somewhat unique but certainly potential project areas (especially demonstration projects) with endangered aquatic species should be undertaken only when absolutely necessary and evaluated in light of the strict regulatory requirements. Climate change will likely make some historical stream flow characteristics of less value in design and construction of in-stream restoration structures and projects based on bankfull relationships. Climate change will also likely increase the frequency, size, and intensity of wildfires which will make

prediction of flood behavior more difficult for planning, implementing, and maintaining restoration projects in the future.

What other projects currently in progress or on the drawing board might benefit from this information – with regard to endangered species issues, wildfire effects on stream flow, and climate change, any project would be well served to evaluate these issues in terms of construction of in-stream structures.

EPA Feedback Loop:

What would you suggest NMED do differently to improve the process with respect to this project? There was nothing NMED could change about the most critical issues facing this project – loss of the principal designer (Tom Moody) in a plane crash who was a moving force for integrating stream principals with transportation design, presence of endangered species that were also under additional stress due to drought conditions, and the Whitewater Baldy Fire which significantly changed the hydrological characteristics of the watershed.

What about other Federal and State partners, if any? Choose your restoration sites with attention to the needs of endangered species and wildfire potential.

Attachments

1. Notebook for the Integrating Stream Restoration Principals and Transportation Maintenance Workshop (the copy of “**Let the Water Do the Work**” by Bill Zeedyk and Van Clothier, is not included in the deliverable although all attendees were supplied with a copy of the book.)
2. Sign-in sheet for workshop attendees
3. Agenda for workshop
4. Final Contractor Report for the workshop.
5. Final Design Memo and Engineering Design sheets for the project.