

**Final Report  
November 2014  
Restoring and Protecting Wetlands in Cebolla Canyon Closed Basin  
Assistance Agreement No. CD-966857-01-0C (FY2008)**

(This project is Part C of a larger 2008 grant award to NMED Wetlands Program entitled “NMED 2008 Wetlands Awards Project.”)



Volunteers restoring wetlands at Cebolla Canyon Closed Basin, Cibola County, New Mexico

**New Mexico Environment Department  
Surface Water Quality Bureau  
Wetlands Program**

Restoring and Protecting Wetlands in Cebolla Canyon Closed Basin  
June 2014

## **Project Goals and Objectives**

The New Mexico Environment Department Surface Water Quality Bureau Wetlands Program (SWQB Wetlands Program), in cooperation with the Rio Puerco Alliance, the Albuquerque Wildlife Federation (AWF), and other partners have worked with the Rio Puerco Field Office of the Bureau of Land Management (BLM) to complete a wetlands restoration demonstration project with the intent of returning Cebolla Creek located in Cebolla Canyon Closed Basin, Cibola County (Figure 1), to its pre-agricultural condition. Historic irrigation diversions and impoundments have dried out the wetlands that are sustained by naturally-occurring springs along Cebolla Creek, and have caused gully formation, head-cutting, and incision in the Cebolla Creek main channel. The goals of this project are to demonstrate innovative techniques that restore water to the wetlands and return the Cebolla Creek to natural springs, stream channel and floodplain conditions through implementation of these restoration techniques and using sustainable management practices. This project builds on previous restoration efforts on Cebolla Creek by the BLM Rio Puerco Field Office and the AWF that have already improved wetland and stream conditions and have created over 40 acres of saturated wetlands along Cebolla Creek.

This project was designed to demonstrate innovative restoration techniques that return land altered for agricultural use to its natural condition and to demonstrate innovative monitoring techniques to measure the results of these practices over time. This effort provides a model for other projects using similar techniques to return many acres of land hydrologically modified for agricultural use to their original wetland condition, which will have enormous benefits to other watersheds in New Mexico. This project improves habitat for diverse plant and animal species, which was limited; and increases the amount of recharge into local aquifers. A water quality station and assessment unit was established to measure water quality improvements in Cebolla Canyon over time. In addition, photo-point and cross-section monuments were also established to record the condition of the wetland over time. This project and others like it would be sustainable, so long as management practices protect the land returned to its natural condition.

## **Project Outcomes**

- Additional funding was secured at the outset of this project including State Legislature-funded River Ecosystem Restoration Initiative funds (used as match during the Wetlands project period), and from the 2009 American Recovery and Reinvestment Act (Federal funds).
- RPA was awarded \$25,000 (used as match) from the New Mexico Community Foundation from their New Mexico River Conservation and Restoration Fund to hire the Southwest Conservation Corps (SCC) for eight weeks during the summer of 2012 to help complete restoration handwork in the Cebolla wilderness.
- Using ARRA funds and project funds, 1.8 miles of road were removed from the valley bottom. The road stretch was previously capturing water that now goes to wetlands in Reach 0. Over 4 miles of road were improved by Rangeland Hands (contractor) to prevent gully and sediment entering the Cebolla floodplain.

- More than 80 acres of historic wetland, stream and floodplain were affected by restoration project activities. The project area underwent severe drought during the project term and still over of 4 acres of new jurisdictional wetlands, 30 acres where wetland hydrology has been established, and 1.5 miles of rewetted stream reach and 0.7 miles of increased sinuosity in Reach 0, 0.5 miles of rewetted stream in Reach 2, and 1 mile of rewetted stream in Reach 5 have been verified in November 2013 by monitoring. In the long term, the site will experience more acres of new wetland restored by project activities.



Figure 2. Buried enclosure fence in reach by a major storm in September 2013 (photo in late fall 2013). This channel is now only 4 feet from the former wide wetland surface of the valley (called “Lake Cebolla”) and is expected to fill and vegetate with no additional treatment creating an additional 10-20 acres of wetland. The fences were also repaired in 2014.

- Headcuts in three tributaries of Reach 0 were fixed with plug and pond structures. In Reaches 3, 5, and 6, Zuni bowl structures were used to prevent further movement of headcuts and restore channel function.
- A Wetlands Action Plan was developed providing guidance for measures for future protection and restoration of wetlands in Cebolla Canyon watershed within the North Plains closed basin. The Wetlands Action Plan emphasizes the importance of partnerships. It also addresses the entire watershed with an emphasis on the scarce but important wetland resources. The Wetlands Action Plan for the Cebolla Canyon Closed Basin is available on the NMED SWQB Wetlands Program website at <http://www.nmenv.state.nm.us/swqb/Wetlands/>.
- Seven weekend workshops were conducted using restoration field methods to conduct handwork by volunteers. Participants included Albuquerque Wildlife Federation volunteers, NMED, BLM staff and project contractors leading the

restoration work. The National Wild Turkey Federation held two restoration day events. Restoration hand work was also completed during the two Cebolla Wetlands Outdoor Classrooms.

- Two Summer Academies were conducted for high school students and teachers in the Grants area with special emphasis on local and tribal schools. There is interest in continuing this event beyond the life of this grant.
- After the project ended the BLM has agreed to rest the project area from grazing by cattle for at least two years. The BLM is in negotiations with new permittees. The BLM is constructing a new exclosure to prevent trespass cattle and elk from grazing sensitive restored riparian and wetland areas.

### **Project Location and Previous History**

The Cebolla Canyon is primarily within and protected by a congressionally designated Wilderness Area (Cebolla Wilderness) within the congressionally designated El Malpais National Conservation Area (EMNCA) near Grants, New Mexico (Figure 1). All of the project area is Bureau of Land Management Public Lands. Within the project area, Cebolla Spring (Figure 1) and Cebollita Spring provide a continuous water source that previously fed Cebolla Creek and provided water for a variety of wildlife species including mule deer, elk, mountain lion, bobcat, two species of wild turkey (*Meleagris gallopavo intermedia*, *Meleagris gallopavo Merriami*) and reptiles such as the side-blotched lizard (*Uta stansburiana*). However, water from the springs was previously used for agricultural irrigation and channeled to fill a nearby cattle pond and impoundments. As a consequence all the water was channeled away from Cebolla Creek which was dewatered and eroding. The next nearest perennial water source for wildlife is the Rio San Jose, approximately 40 miles away. Several ephemeral playas hold seasonal water but the nearest playa is about seven miles away.





Figure 3. Cebolla Spring pre-project (2008).

The valley was homesteaded in the early 1900s. Today only ruins of the stone houses and hydrological modifications established by early settlers remain. The historic wetland of Cebolla Creek was drained and earthen dams were constructed to retain water for agricultural use. These changes to the area's hydrology coupled with current and historic cattle grazing have reduced the historic wetlands to a fraction of its original size.

Today the irrigation systems are no longer functional and the impoundments breached. At the beginning of the project, Cebolla Creek was displaced from its natural drainage, the valley bottom headcut in some areas as deep as 50 feet, and the wetlands were not recovering. Plant community composition in the valley had deteriorated to a monoculture of blue grama grass (*Bouteloua gracilis*) with rabbit brush (*Chrysothamnus nauseosus*) increasing in the valley bottom. This coupled with increasing encroachment of piñon (*Pinus edulis*) and juniper (*Juniperus scopulorum*) from the uplands converted the vegetative composition of the valley to a warm season upland plant community. In 1994, as a demonstration, a seven-acre exclosure was constructed by BLM to reduce livestock use of the Cebolla Spring. In one growing season, the spring turned from a mud bog to standing water. The water promoted vegetative growth, which increased ground cover and shade, reducing loss of water to evaporation. As a result, a permanent saturated zone developed, providing the conditions for a nascent wetland. Since the fall of 2000 the Albuquerque Wildlife Federation (AWF) has been organizing volunteer groups to help with restoration efforts in Cebolla Canyon. The groups have worked to construct restoration best management practice structures to spread water over the valley and the

saturated zone spread to over 40 acres. These initial efforts were built off the “low hanging fruit” for wetland recovery. A long-term landscape-based approach to improving the ecological health of Cebolla Canyon and its associated wetlands was needed.

This project was developed to conduct an initial site reconnaissance in GIS to locate areas where improvements would continue to recover stream conditions and expand wetlands. Field reconnaissance developed an integrated project design to place a variety of innovative structures and techniques to capture storm water and sediment to fill and heal headcuts and entrenched channels, to cut off flow paths that still carried water to adjacent irrigation ditches, to reduce or convey sediment from gullies and nearby dirt roads, and to guide water across the floodplain which would support increased wetland vegetation growth and diversity. Animal inventories pre-project were conducted to determine what species were in the project area and which were extirpated, and to provide habitat information so that habitat needs could be addressed as part of the project design. The project proponents met with the BLM to develop a grazing management plan that would be accepted and adhered to by the permittees and grazing deferment was planned for the project post-implementation.

The restoration structures constructed during this project using this projects’ funds, the matching River Ecosystem Restoration Initiative State funds and the road improvements using ARRA funds are all contributing to re-wetting the valley bottom, widening the stream banks, and building up the channel bottom to return this portion of the wilderness area to its natural condition of a perennial stream and a functioning and diverse wetland. The result has been two-fold: the creek gradient is flattened and water infiltration has increased, promoting an increase in emergent wetland plant species, which add to bank and floodplain stability. The saturated zone associated with the Cebolla Spring has expanded downstream along the first terrace adjacent to the creek. The area has been experiencing severe drought during the implementation of this project. In addition, a severe storm in September 2013 caused riparian fences to be broken allowing trespass cattle to enter the recovering wetlands. Despite these unfortunate incidents, overall the area is recovering and is expected to produce the desired ecological results in the long term. Beyond this effort, the BLM and the AWF will monitor, restore using the design elements of this project, and continue to improve the wetlands in the Cebolla Canyon closed basin. More work needs to be done, including grazing and recreation management of this sublime landscape, and the re-introduction of native species and monitoring of habitat.



Figure 4. Current view (September 2014) of the Cebolla Canyon Wetlands after implementation of project restoration structures, grazing cattle removed from the area, and the 2014 monsoon season.

### **Original Timeframe**

The grant award that included this project was approved January 29, 2009, and was to be completed by December of 2012. The grant award was amended for a no cost extension to December 2013. The final year was used to complete additional monitoring data collection and included volunteer restoration weekends as match. The timeline for the grant award was again extended to June 2014. Our contractor used the additional time to revise the Cebolla Closed Basin Wetlands Action Plan to include input from key experts. The stated goals and objectives of the project remained the same, as well as the key project Tasks.

### **Partners Involved**

Successful partnerships were forged with our principal partners including:

Bureau of Land Management  
 Albuquerque Wildlife Federation  
 Rio Puerco Alliance  
 Rio Puerco Management Committee (over 35 state, federal, tribal and NGO partners represented (established in 1996 through Public Law 104-333),  
 Acoma Pueblo Student Conservation Corps  
 Cottonwood Gulch  
 El Malpais National Conservation Area  
 National Wild Turkey Federation

New Mexico Wilderness Alliance  
EPA Region 6 Wetlands and Water Quality Protection Division  
Permittees

These groups expressed continued interest in work in the Canyon beyond the work funded by this project.

The New Mexico Department of Game and Fish helped with wildlife monitoring and providing wildlife habitat information.

Additional partners who contributed to this project either on the ground or through the development of the Wetlands Action Plan for Cebolla Canyon:

Connor Stava (Master's Degree Student, U. of Alcalde, Spain) developed the preliminary draft Wetlands Action Plan.

April Lee (Western NM U. student) assisted with groundwater monitoring and soils profiles.

Nik Gualco, Rio Puerco Alliance VISTA, worked with Ken Jones, El Malpais National Conservation Area Supervisory Park Ranger to establish an exhibit at the Northwest Multiagency Visitor Center in Grants, NM.

Travis Perry, Furman University, conducted small mammal monitoring for the project.  
[http://allaboutwatersheds.org/groups/CWP/monitoring-materials/CEBOLLA Wildlife Report 2 9 10.pdf/view](http://allaboutwatersheds.org/groups/CWP/monitoring-materials/CEBOLLA_Wildlife_Report_2_9_10.pdf/view)

A number of retired BLM professional staff provided historic and current information and guidance – Steve Fisher, Gene Tatum.

**Steering Committee members and Practitioners** – Matt Schultz, *NMED Project Officer*, Barbara Johnson, *RPA Director*, Ed Singleton, *BLM Director*, Tom Gow, *BLM NEPA Coordinator*, Bill Zeedyk, *Practitioner*, Richard Prather, *EPA Region 6*, Steve Vrooman, *Practitioner*, Ellen Soles, *Practitioner*, Maryann McGraw, *NMED WPC*, Shelly Barnes, *NMED Project Officer*, Matt Attencio, *BLM Range*, Josh Freeman, *BLM Wildlife*, Dave Mattern, *BLM Hydrologist*, Nick Guelco, *RPA Outreach Coordinator*, Emily Wolf, *RPA Vista*, Michael Scialdone, *AWF*, Dale Hall, *NMDGF*, Ken Jones, *El Malpais National Conservation Area*.

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## **Funding**

The original Federal amount was **\$265,239.00** which was spent and **\$153,668.00** match. In the summer of 2013, a request to EPA was approved to move funds from the San Vicente Project (08A) to this project (08C) because the construction of the San Vicente Project came in below the anticipated amount, and there was an error in the reconciliation of the Cebolla project which resulted in over allocation of funds in the contractual category. The final federal amount for this project was \$283,439.00 which was spent.



The federal amount was increased by 6% so we increased the required match by 6% which would require a match total of \$163,476.60. The final match amount was **\$284,698.18 in non-federal match** which was still **\$121,221.58** overmatched. See semi-annual reports for details.

## **Project Highlights and Chronology**

- This project was approved and funded by EPA on January 29, 2009.
- Other funding was obtained for restoration activities in the Cebolla Canyon area including a state River Ecosystem Restoration Initiative (RERI) grant and Bureau of Land Management (BLM) federal stimulus funding from the American Recovery and Reinvestment Act (ARRA) of 2009. These monies expanded the scope and area covered by restoration activities within Cebolla Canyon including adding more restoration reaches to be restored, and relocating the road out of the valley bottom.
- A contract with the Rio Puerco Alliance was completed on March 31, 2009 to assist with project coordination, restoration implementation, monitoring, and education and outreach. Zeedyk Ecological Consulting (ZEC) was subcontracted to develop the restoration design and coordinate restoration implementation.
- The NMED Project Officer Matt Schultz, arranged to have all documents related to this project and the results of the corresponding matching projects posted on the NM Energy Minerals and Natural Resources Department (EMNRD) Forest and Watershed Health Information Clearinghouse website “All About Watersheds” ([www.allaboutwatersheds.org](http://www.allaboutwatersheds.org)) during the life of the project.
- The steering committee was established in early 2009. The first meeting was conducted on April 20, 2009 and the Cebolla Canyon project site was toured by the committee members.
- Restoration reconnaissance was initiated May 19-21 and also conducted June 15-17, 2009 with Bill Zeedyk, Matt Schultz (NMED Project Officer), Gene Tatum (AWF volunteer and former BLM manager familiar with the area) and Michael Scialdone (AWF President). Restoration design details were developed between Reach 0 and Reach 7. GPS coordinates were mapped for specific locations of BMPs to be installed.
- A GPS inventory and map of all fences within the project area was completed by Matt Schultz, NMED Project Officer.
- On July 17, 2009 a second steering committee was conducted with stakeholders, contractors, and cooperators representing the NMED, BLM, Rio Puerco Alliance (RPA), Albuquerque Wildlife Federation (AWF), New Mexico Game and Fish (NMDGF), El Malpais National Conservation Area (EMNCA), Rio Puerco Management Committee (RPMC), and Zeedyk Consulting. Topics discussed

- included: restoration reconnaissance update, design considerations, NEPA timelines, wetland action plan references, QAPP, roads, and fence inventory and planning.
- Discussions with the grazing permittee about grazing timing and practices began in 2009.
  - An article describing the NMED 2008 Wetlands Awards Project was published in the NMED Clearing the Waters newsletter spring edition (<ftp://ftp.nmenv.state.nm.us/www/swqb/WPS/CTW/ClearingTheWaters-Spring2009.pdf>).
  - Material from the CTW article was later highlighted in the AWF June 2009 Newsletter ([http://abq.nmwildlife.org/Newsletters/2009JUNENewsletter\[1\].pdf](http://abq.nmwildlife.org/Newsletters/2009JUNENewsletter[1].pdf)).
  - The Quality Assurance Project Plan (QAPP) for monitoring was submitted to EPA and approved on July 22, 2009.
  - Field restoration reconnaissance (Task 2) was completed October 12-14, 2009.
  - The third steering committee was held on November 18<sup>th</sup>, 2009 to discuss restoration design details, monitoring, the fence inventory, grazing, and wildlife habitat.
  - Articles regarding this project have been included in three issues of the Rio Puerco Alliance/RPMC newsletter, *Rio Puerco News*: Winter 2009, Spring/Summer, 2009, and Fall 2009.
  - The Project Officer, Matt Schultz, presented “Wetlands in the Desert” at the El Malpais NCA ranger station with the Los Alamos Middle School 7th grade class in October 2009. About 120 students and 10 adults attended each of two events. The event was written about in the local newspaper, the *Cibola Beacon*, at <http://cibolabeacon.com/articles/2009/10/08/community/doc4ace7c5db3ba8235101302.txt>



Figure 5. Matt Schultz with NMED presenting on “Wetlands in the Desert” to Los Alamitos Middle School 7th graders at an outreach event at the El Malpais NCA ranger station in Fall 2009. Interestingly, “los alamos” means “little cottonwoods” in Spanish, which was woven into the presentation.

- The AWF conducted a 3-day work weekend October 16<sup>th</sup> through 18<sup>th</sup>, 2009 at Cebolla Canyon. An article was in the October 22, 2009 edition of the *Cibola Beacon* about restoration activities in the Cebolla area:  
<http://www.cibolabeacon.com/articles/2009/10/22/community/doc4ae0f7f2b4bc8635945872.txt>
- Geomorphology characterization of Cebolla Canyon using a Trimble sub-meter accurate GPS unit and laser level was completed in Fall 2009.
- A series of photopoints were established in November 2009 to track landscape view changes of the Cebolla valley.
- Water quality samples were collected from Cebolla Spring in December 2009. These samples were sent to the State Laboratory Division for analysis of anions, cations, nutrients, metals (total and dissolved), cyanide, and radionuclides. Other parameters recorded at the site during sampling included temperature, specific conductance, salinity, dissolved oxygen, pH, and turbidity. The results have been entered into STORET.
- Small mammal trapping was conducted by Furman University volunteers in Reaches 0, 1, 2 and by the Stone House. Seven different species, two of which are wetland obligate species, no meadow jumping mice, which should be present, and a couple of water dependent bats were recorded. Small mammal trapping was

necessary to see what was left in this closed basin setting after years of farming reducing any flow to and from a natural wetland.



Figure 6. Townsend big-eared bat (*Plecotus Townsendii*) found in Cebolla Canyon, October 2009.

- The Fourth steering committee was conducted on February 10, 2010
- On February 17, representatives from the steering committee met with the EPA (Richard Prather) and NMED specifically on grazing issues. The main issues are:
  - Developing trust with the permittees
  - Developing a plan
  - Cows are in the project area during the growing season
  - Annual Operating Plan developed by BLM.
- The AWF held a work weekend April 16-18, 2010 at Cebolla Canyon.
- The BLM has completed construction of the road relocation and improvements that were being funded under the ARRA of 2009. The road relocation moved roads out of the valley bottom, which will expand the area available for wetland restoration and reduce hydrological alterations in critical areas. The ARRA federal grant was for \$300,000 leveraged by this project.



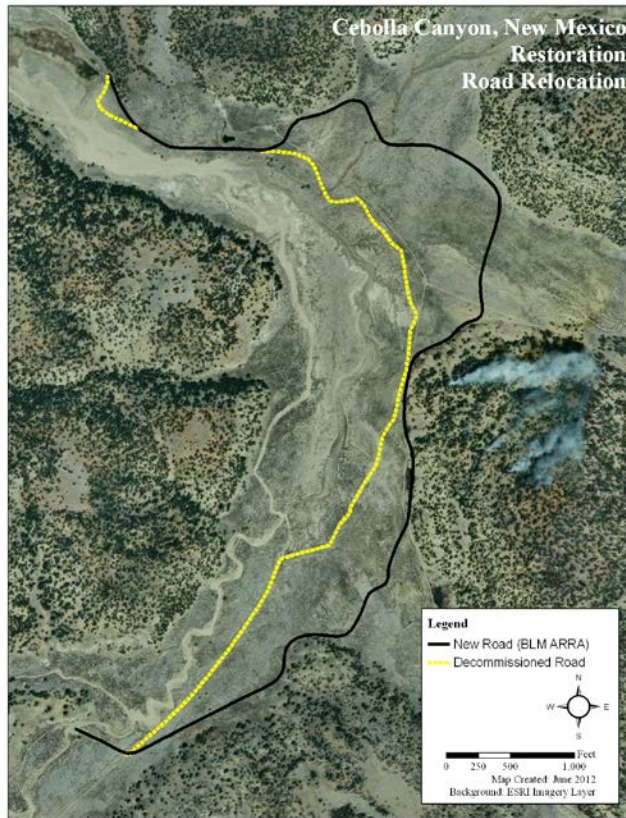


Figure 7. ARRA Road project to take the existing road out of the Cebolla Floodplain.

- Delineation of rock harvesting areas for constructing restoration structures was completed in Fall 2010.
- A wetland restoration workshop was conducted September 17-19, 2010 with approximately 20 participants from the Albuquerque Wildlife Federation (AWF).
- The restoration design that was the final preferred alternative in the EA was completed in February 2011. The original design was redesigned to meet the “minimum tool” requirement for working in designated wilderness.

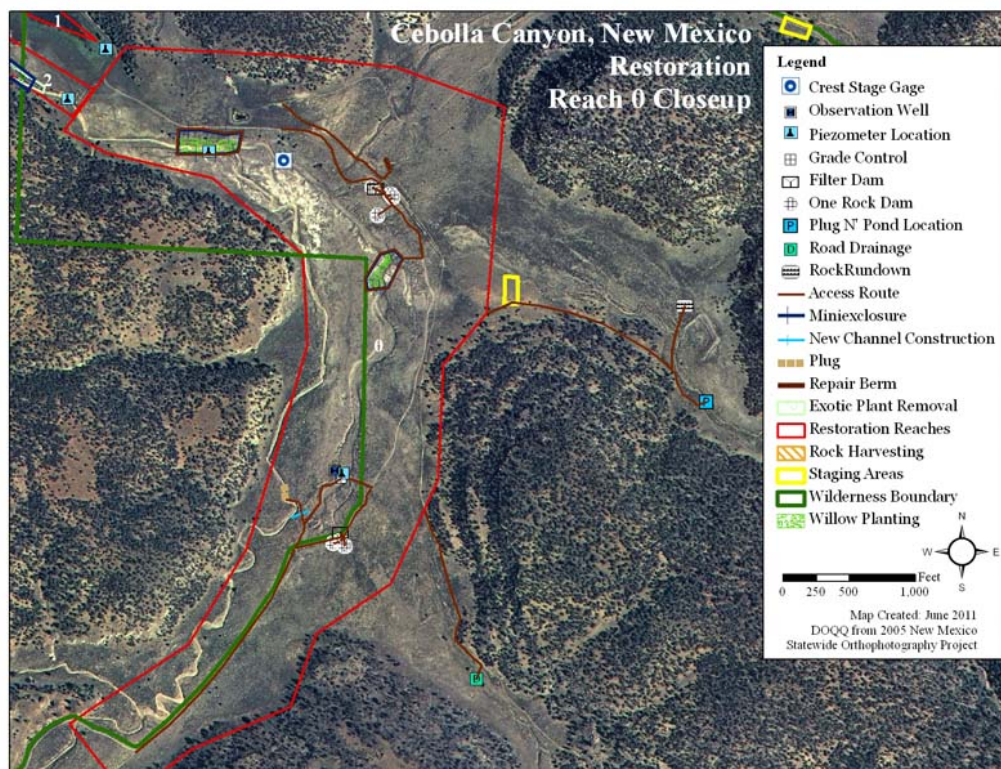


Figure 8. Reach 0 restoration design.

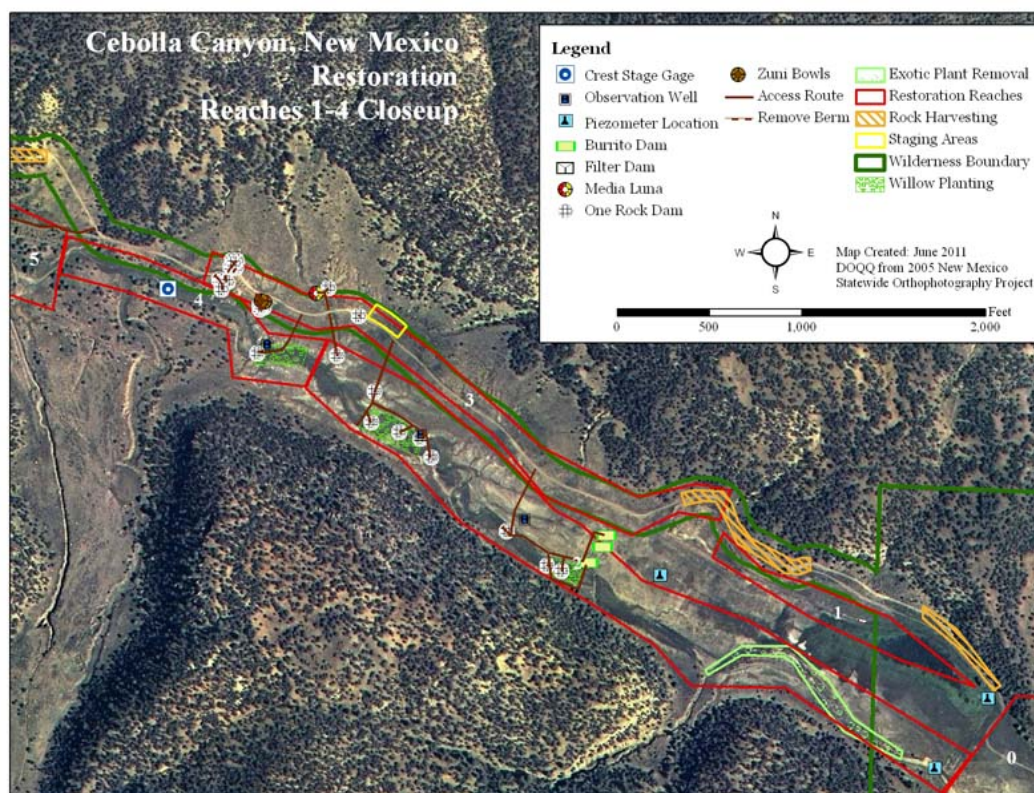


Figure 9. Reaches 1-4 Restoration Design



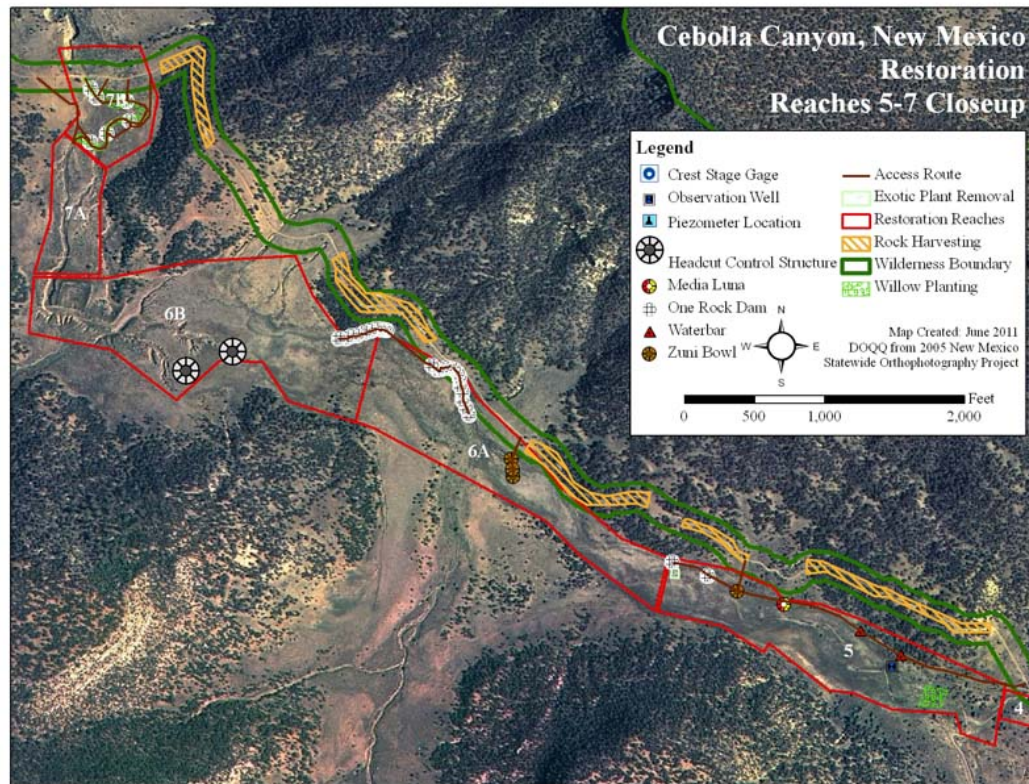


Figure 10. Reach 5-7 restoration design.

- The Record of Decision and Finding of No Significant Impact were signed March 30th, 2011 by the Bureau of Land Management (BLM).
- Installation of piezometers, groundwater monitoring wells and crest gage stages was completed June and July 2011 with the assistance of the Southwest Conservation Corps from Acoma Pueblo and a Western New Mexico University student intern.
- A steering committee meeting was held August 18, 2011 to finalize arrangements before restoration construction with heavy equipment.
- Connor Stava compiled the history of Cebolla Canyon and other data for the Wetlands Action Plan (WAP) for this project, for his Master's Degree thesis from the University of Alcalde in Spain.
- The York Ranch (grazing permittee in Cebolla Canyon) developed a Coordinated Resource Management Plan (CRMP) under a New Mexico Association of Conservation Districts assistance agreement. Under this plan, they would construct fencing and install wells and drinkers in addition to limiting/rotating their grazing period on the BLM grazing allotment in Cebolla Canyon.

- Two enclosure fences were constructed in September and October to: 1) create a “delta” into the “Lake Cebolla” (slope wetland) and sediment plug to restore 2 acres of wetlands upstream in the main and side channels, and 2) protect sediment plug from wind and stream erosion in order to maintain water levels and improve vegetative recovery in Reach 0.
- Restoration activities using heavy equipment allowed as part of the preferred alternative in the EA were completed September-October 2011, which mostly constructed larger structures and staged rock for further handwork to be done by volunteers in the Spring and Summer 2012.



Figure 11. Dam breached and outlet created with heavy equipment to convey flow to center of valley. Larger materials were used on the upstream and downstream edge of the constructed filter dam. Bill Zeedyk (design Contractor) inspects the design and construction results.

- Rock was harvested and staged for later handwork in the areas described above and other areas. All heavy equipment work was completed for this project and demobilized by October 2011.





Figure 12. Piles of rock delivered in the Fall 2011. The rocks were later used by volunteers to hand install restoration structures due to wilderness concerns.

- The Reach 1 Restoration was completed in September-October 2011. Material from a berm of an abandoned irrigation ditch was removed and used to plug the ditch to reconnect the spring wetland to low lying areas of valley right creating a high quality wetland area.
- On February 22, 2012, the Steering Committee met to discuss handwork construction of restoration structures under the “Minimum Tool” restriction to be completed during summer 2012. The Steering Committee conducted a site visit on April 19, 2012 where Bill Zeedyk explained how the innovative restoration structures were working.



Figures 13.a and b. (Figure a) A berm across the valley was capturing flow and conveying it to a historic irrigation ditch. (Figure b) The berm was strategically breached according to the restoration design to return flow to the natural channel in valley center. Numerous acres of wetlands are still developing in this area.



Figure b.

- Restoration activities on Reach 3 using heavy equipment were completed, including numerous rolling dips along the road to reduce head-cutting and gullyng. In addition, rock was delivered to locations where planned grade control structures (i.e. one rock dams), flow spreader (i.e. media luna), and



headcut control structures (i.e. Zuni bowls) to be hand-constructed by volunteers in the Spring and Summer 2012.



Figure 14. Harvesting rocks off dirt road by contractor for restoration structure hand work.

- Restoration activities on Reach 4 using heavy equipment were completed, which mostly was staging rock for further handwork to be done by volunteers in the Spring and Summer 2012. The large grade control structure at the end of the valley section, representing the last chance to aggrade valley bottom before channel grade steepens, was staged with rock and partially completed. The structure was finished by hand with volunteers in Spring and Summer 2012.



Figure 15. One-Rock Dam grade control structures constructed by volunteers promote the spreading of flow from small incised channels to expand wetland obligate species and groundwater infiltration across the valley floor. In the background are piles of rock staged for hand placement in designed structures.



Figure 16. Volunteers move tons of rock by hand in the wilderness area. Placement of rock is guided by the design consultants.



- Restoration activities on Reach 6 using heavy equipment were completed. The equipment work was largely for headcut amelioration, using Zuni Bowls. A Zuni Bowl is a headcut control structure composed of rock-lined step falls and plunge pools that stabilizes actively eroding headcuts and prevents headcut migration. Rock for numerous grade control structures in Reach 6 and Reach 7 was staged using heavy equipment for completion by hand using volunteers.



Figures 17a b c and d (Figure a.) Reach 6A before headcut work. (Figure b) During work on Reach 6A. (Figure c ) The finished product. (Figure d) Schematic of Zuni Bowl structure.

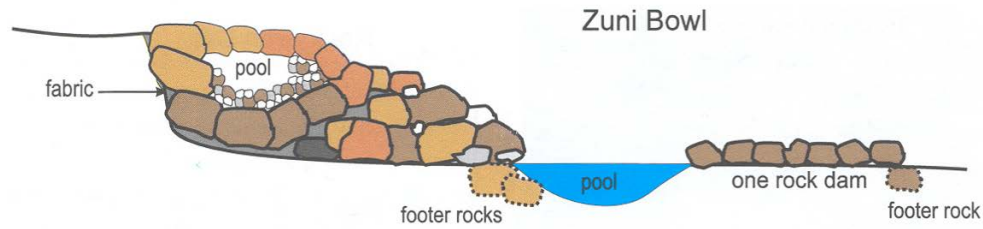


Figure b.



Figure c. This photo shows the use of a combination of innovative structures to arrest a large headcut and slow and distribute flow across the floodplain. In the background, a Media Luna structure spreads the flow and reduces flow velocities above the headcut. A number of Rock Rundowns armor small cuts around the main incised channel. A Zuni Bowl structure is used to heal low headcuts up to two feet high. Zuni Bowls harden the base of the cut to stop scour and undercutting; protect the face of the headcut from drying, sloughing and frost heave; and conserve moisture for enhanced plant growth. The rocks capture sediments, debris, seeds, and plant propagules, and act as rock mulch that protects young plants. They are frequently used in conjunction with one-rock dams.





(Figure d) Schematic From: Zeedyk and Van Clothier, 2009, "Let the Water do the Work".



Figures 18a and b (Figure a) An abandoned road was capturing drainage and creating a gully.  
 (Figure b) Newly constructed structure cuts off flow to the ruts and returns flow to valley center.



Figure b.

- The Acoma Southwest Conservation Corps (SCC) constructed restoration structures by hand May 30 - June 1, 2012 as part of crew leader training.
- AWF held two volunteer restoration work weekends April 20-21 and May 19-20, 2012.
- The National Wild Turkey Federation held a volunteer work weekend June 2-3, 2012 to construct rock structures and plant herbaceous material in Reach 2.
- Reach 0 exclosures were planted with herbaceous and woody wetland plants by volunteers in June 2012. The exclosures promote vegetation growth, sediment capture, lower gradient, and further aggradation. Another potential exclosure area was identified near the berm breach which would serve as a wetland plant propagule “nursery” and to provide appropriate local wetland soil microbes to accelerate wetland plant colonization in expanding wetland areas downstream.



Figures 19a and b. (Figure a) Sediment plug forming “Lake Cebolla” before exclosure fence construction in 2011. (Figure b) Same area within an exclosure one year later in 2012.



Figure b.

- RPA obtained a \$25,000 matching grant from the New Mexico Community Foundation to pay for three weeks of handwork by the Acoma Pueblo SCC, starting August 20, 2012.





Figure 20. Acoma Pueblo SCC constructing flow dissipation structures.

- A Summer Wetlands Academy (Task 12) was held for High School students from July 1-2, 2012 at the Cebolla site and Cottonwood Gulch. The RPA, BLM and Cottonwood Gulch Foundation hosted the event. Activities included wetland ecology, service learning on landscape restoration methods, the examination of a bosque in a healthy cottonwood stand along Bluewater Creek, and finally an opportunity to put it all together and come up with solutions to the issues of land management in the Rio San José basin.



Figure 21. Summer Academy 2012. Steve Vrooman (monitoring contractor for the project shown on left) participates as an instructor in the activities. In addition the Acoma SCC lead a field trip to the structures that they constructed.

- The River Ecosystem Restoration Initiative (RERI) -funded portion of this project was completed in June 2012. Work covered by these matching funds included

work in Reaches 0, 2 and 5 and parts of all other reaches. The final match amount contributed by this project was \$159,111.

- NMED, RPA and Bat Conservation International took a field trip to Cebolla on October 31, 2012 and discussed restoration at Little Cebolla Springs (see photo below) that would improve habitat for bats, and which will be included in the Wetlands Action Plan.



Figure 22. Little Cebolla Spring currently drains into a stockpond which is being considered for enhancing bat habitat.





Figure 23. Bill Zeedyk recounting the history of wetland restoration improvements in the project area to members of the Rio Puerco Management Committee during a site visit in October 2012. Steve Carson of Rangeland Hands, who did much of the equipment work, is in the foreground.

- The eighth steering committee meeting was held March 26, 2013 to plan for the remainder of the restoration work by volunteers.
- AWF conducted a volunteer work weekend April 19-21 to harvest bulrush from the stock tank at little Cebolla Spring and complete wetland planting and structure construction.



Figure 24. Albuquerque Wildlife Federation Volunteers at Cebolla Canyon April 2013.

- Because SWQB Contracts cannot extend beyond four years, the current contract with the Rio Puerco Alliance ended April 22, 2013. The remaining amount was placed in a new contract with the Rio Puerco Alliance which was approved on July 3, 2013.
- The National Wild Turkey Federation held a volunteer work weekend June 29-30 2013 to complete work in Reach 7. This portion of the project is in the incised channel downvalley of the main wetland supported by Cebolla Springs. In this area the goal was to return the gully that is the Cebolla Creek to a meandering channel able to capture sediment on point bars, slow flow and increase infiltration and saturation of the floodplain to support wetland/ riparian development. Work in this reach will continue in the future and is documented as a future action in the Wetlands Action Plan.



Figure 25. National Wild Turkey Federation volunteers building structures to induce meandering in Reach 7 (the critically incised portion of Cebolla Canyon downstream of the Cebolla Springs wetland) - Summer 2013.





Figure 26. Example of one-rock dam rock work completed in Reach 7 by National Wild Turkey Federation.

- The second Summer Academy/Cebolla Outdoors Classroom was held in Cebolla Canyon and Thoreau, New Mexico on July 21-22, 2013. The event involved a two-day workshop, including an overnight at the Cottonwood Gulch (CG) basecamp. The participants ranged from 7th to 10th grade and had a wonderful time learning about land and water management in the high riparian habitat of Cebolla Canyon, building 12 one-rock dams under the guidance of Southwest Urban Hydrology owner Aaron Kauffman.



Figure 27. Second Annual Summer Academy/Cebolla Outdoors Classroom in Cebolla Canyon and Thoreau, NM. The event involved a two-day workshop, including an overnight at the Cottonwood Gulch (CG) basecamp. The participants ranged from 7th to 10th grade and had a wonderful time learning about land and water management in the high riparian habitat of Cebolla Canyon, building 12 one-rock dams under the guidance of Southwest Urban Hydrology owner Aaron Kauffman.

- Matt Schultz attended River Morphology and Applications workshop sponsored by Wildland Hydrology in Bend, Oregon, July 7 through July 13, 2013. Matt Schultz also attended a Sedge Identification workshop July 24-26 2013 in Jemez Springs, New Mexico.
- In August 2013, Maryann McGraw (WPC) is the new Project Officer taking over for Matt Schultz, and Shelly Barnes (Wetlands Program Project Officer) is helping with project monitoring.
- A final Steering Committee meeting was conducted at the BLM Offices on September 9, 2013. Topics were the completion of the project, resolution of the grazing issues and fencing.
- In September 2013, a massive flood after years of drought in the region brought moisture and sediment to the project area down Cebolla Canyon. Unfortunately, that storm also damaged some of the exclosure fences and cattle had access to the excluded areas just before fall final monitoring of the project.
- In November 2013, Maryann McGraw, Wetlands Program Coordinator and Project Officer for this project, and Shelly Barnes SWQB Wetlands Program downloaded temperature sensors and pressure transducers from piezometer transects and also winterized equipment in the Cebolla Canyon Closed basin. Two of the piezometers and the enclosed dataloggers were completely missing due to the September flood event. Others were either buried or filled with sediment. In addition, an important barologger that is used to calibrate the data was missing from its data recording location and was not found.
- Approximately 50 trespass cattle were in the project area wetlands as the existing wetland exclosures were damaged due to a storm and flooding in September 2013. It was determined that the exclosures needed to be repaired as soon as possible because the cattle were degrading the wetland and overgrazing the newly establishing wetland vegetation.
- Chris Canavan attended a Springs Assessment Training in Flagstaff, Arizona on September 4-5, 2013 under this project. This training has direct applicability to the Cebolla Wetlands Project as the slope wetland component of the Cebolla Wetlands is supported by springs.



Figure 28. Cattle overgrazing the Cebolla wetland in the November 2013, just prior to final vegetation monitoring for the final monitoring report for this project.

- On November 2013, Maryann McGraw and Dan Guevara, NMED Watershed monitoring staff collected final overview photopoint data. During that time, trespass cattle were grazing the project areas.
- Maryann McGraw completed a request for quotes to repair the damaged water gap fencing on the project to prevent further grazing by trespass cattle. The Rio Puerco Alliance teamed up with BLM staff and a purchase order (for the fencing supplies only) was awarded to RPA in early December 2013.
- Keystone Restoration Ecology submitted a final monitoring report in December 2014.
- A draft of the Wetlands Action Plan was submitted to the WPC in January 2014. The WPC made extensive comments for revisions including the need for stakeholder and expert peer review before acceptance.
- The fence repairs were installed in March 2014 by BLM.





Figure 29. Exclosure fence repaired in March 2014 by BLM with project funds for materials.

- In April 2014, 30 volunteers from the Albuquerque Wildlife Federation completed the remaining proposed structures in Reach 3. An article about the Volunteer weekend was written in the AWF PineCone Newsletter.





Figure 30. A collage of photos taken of volunteers constructing media lunas on Reach 3 during the April 2014 restoration effort by Albuquerque Wildlife Federation. The photos are from the May 2014 PineCone newsletter article.

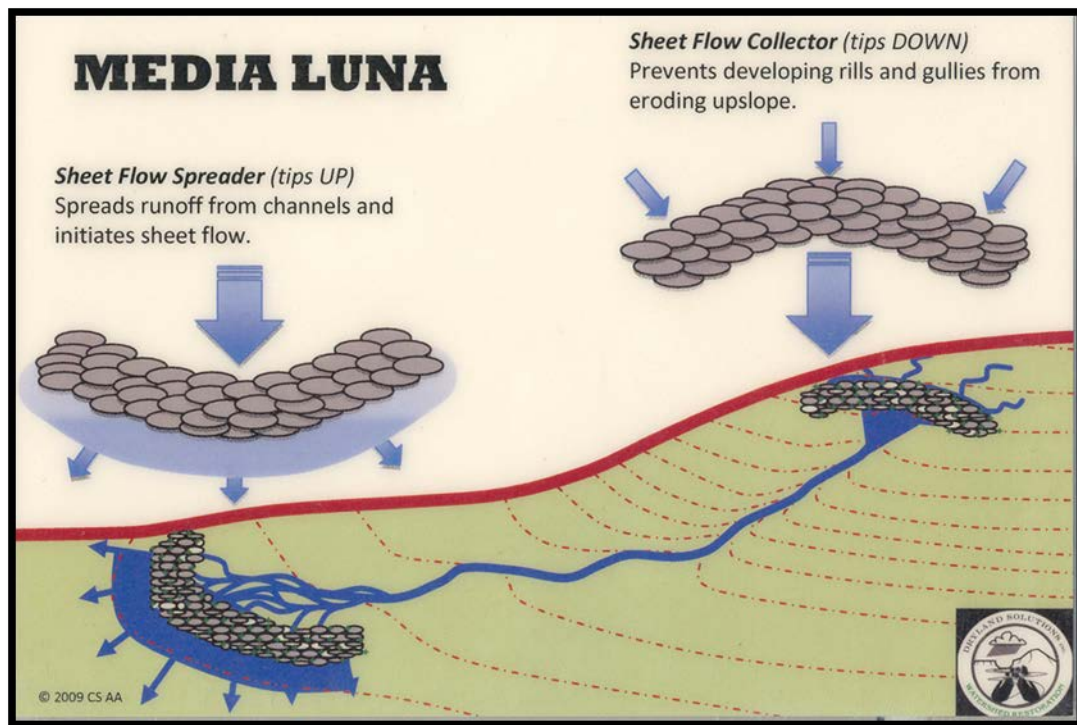


Figure 31. Media Luna Design. Schematic by Dryland Solutions Inc.

- Maryann McGraw attended the Society of Wetlands Scientists Rocky Mountain Region Annual Meeting in Golden, Colorado on April 9, 2014





Figure 32. Wetland recovering after fencing was repaired, cattle removed and after the rainy season of Summer 2014. The fenceline repaired under this project is just visible in the far end of the valley. The photo was taken in September of 2014.

- Shelly Barnes attempted to analyze data collected from the piezometer transects in the winter 2013 before the project ended. It was determined that SWQB does not have the computer software to complete the data analysis and the data will be turned over to BLM for future monitoring and analyses.
- The need for more fencing to protect the Wetland Restoration area from trespass cattle was identified earlier in the project. In July 2014 after the conclusion of this project, the BLM issued a Request for Comments for the construction of a large exclosure fence in the project area which is currently under construction.
- The revised Wetlands Action Plan was submitted in June 2014 and the WPC made final revisions. The Wetlands Action Plan for the Cebolla Canyon Closed Basin is available on the NMED SWQB Wetlands Program website at <http://www.nmenv.state.nm.us/swqb/Wetlands/>.



## **List of Major Deliverables (on file at NMED)**

Steering Committee Meeting Minutes

Monitoring Reports

Project Design elements

Environmental Assessment and Record of Decision

Semi-Annual Reports to EPA including photographs of project progress

Newsletter links

Completed Restoration

Successful innovative restoration techniques

Documentation of volunteer match

Final Report

## **Lessons Learned**

A key component to successful restoration was the redirection of flow from the agricultural ditches and ponds, and spreading of flow within the slope wetland portion of the project area which included removal of the road within the project floodplain.

Extensive channel/floodplain measurements and analysis by experts in “reading the land” are instrumental to developing effective restoration structure design and placement. Having the designers on site to guide and teach volunteers also contributed to successful structure construction and effective restoration techniques.

## **What Made the Project Successful**

The project was undertaken to continue work originally started by former BLM staff working with the Albuquerque Wildlife Federation. The project was at a juncture where innovative restoration techniques, heavy equipment and materials, and additional partnerships and expertise were necessary to make further significant progress. The restoration of the Cebolla Wetlands was enhanced and brought to a new level of accomplishment through the activities of this project and the matching projects.

The project brought educational activities and events to local stakeholders in a remote, rural and sparsely populated part of New Mexico.

The project restored an important wetland resource in a closed basin with limited and distant perennial sources of water for wildlife.

The project leveraged additional matching funding through the Rio Puerco Alliance who applied for the RERI state funded grant and the NMCF grant that helped restore more acres of potential wetland, channel and floodplain.

The project also brought attention to the need for improving the road for access, for eliminating sediment and runoff from related gullies, and for removing the road from the Cebolla Canyon floodplain, and the BLM used ARRA funds to complete part of that key restoration task. The adjacent road was also improved with funding from this project.

A Wetlands Action Plan was developed to guide continued progress in restoring wetlands in the Cebolla Canyon Closed Basin and also documenting current restoration and monitoring results.

The project demonstrates successful and innovative restoration tools that the NMED Wetlands Program, agencies, tribes and the public can use for future restoration efforts on spring-fed wetlands and in floodplains where flow has previously been diverted to ditches and cattle ponds for agricultural uses.

### **What Made the Project Not So Successful**

The project was delayed because it took more time than anticipated to complete the Environmental Assessment for the project area.

Some of the monitoring equipment (data loggers and piezometers) was lost in a large flood event. Careful thought will be put into monitoring equipment placement, monitoring plan design, and implementation of monitoring equipment, photopoint and cross-section markers, and data loggers on future projects.

Trespass cattle made some of the restoration of wetland vegetation more difficult, even though the hydrology was restored. As soon as the cattle were permanently removed from the project area, project results were more extensive and much quicker to achieve.

### **Technical Transfer**

Most of the project documents, materials and design techniques can be accessed from the All About Watersheds website supported by the Forest and Watershed Health at <http://allaboutwatersheds.org/groups/CWP> .

This Final Report and the Wetlands Action Plan can be accessed at <http://www.nmenv.state.nm.us/swqb/Wetlands/> .

Many newsletter reports about project progress advertised the project and transferred project results to the public.

This project will also be included in the NPS Annual report to EPA and the NMED Clearing the Waters newsletter.

### **EPA Feedback Loop**

*What would you suggest that EPA do differently to improve the process in regard to this project?*

EPA was very supportive in all aspects of this project during the project period, especially allowing grant period extensions to complete high quality and meaningful work, and helping to engage the BLM in managing cattle grazing that was affecting project success.

These types of projects that help develop simple hands-on restoration techniques and that engage the public in restoring wetlands are a critical component of program development. They engage agencies, tribes and the public to be part and partner with the Wetlands Program. They expand the capacity of the Wetlands Program to be meaningful and to show progress in restoring and protecting wetlands as cherished and important New Mexico natural resources. These types of projects should continue to be wholeheartedly supported by EPA Region 6 Wetlands Program Development.

Additional results and recommendations are included with the December 2013, Final Monitoring Report.

## **Future Activity Recommendations**

The Wetlands Action Plan (WAP) was developed in order to document future activities and recommendations. The future recommendations are summarized as follows:

A geomorphological characterization was conducted by Keystone Restoration Ecology and summarized in the WAP. As the wetlands expand, more hydrological data should be collected at the wetland site and for the entire valley to provide a better picture of current hydrology and how to maximize self-sustaining and optimum conditions.

Cebolla Canyon provides important wildlife habitat but many species were extirpated due to past conditions and the isolation of the wetland site. More studies should be conducted to entice and reintroduce native species, especially species like the northern leopard frog which is declining regionwide. All species that would contribute to the ecological diversity and co-dependence of species should be considered.

Other wetlands within the vicinity of this isolated wetland should be considered for restoration and protection to provide wildlife corridors and pathways for native species dispersal. In addition, where impoundments exist, enhancement of the impoundments to support wildlife and wetlands should be implemented.

Because plant communities at the site were monitored while being constantly grazed by cattle during the project period, more vegetation data should be collected now that cattle grazing has been removed to show plant succession and diversity. Noxious and invasive non-native vegetation should be controlled and removed from the watershed.

Any roads within the Cebolla Canyon Closed Basin that are negatively altering hydrology should be modified, moved or removed.

Signage in roadside kiosks and at the Ranger Station should be displayed to inform recreationists and hunters of the value of the restored wetlands and they may contribute to protecting them from damage and impairment.

The BLM Management Plan for the area should ensure the protection and continued restoration of the unique and priceless Cebolla Canyon Closed Basin Watershed and



wetlands. The BLM, the Rio Puerco Management Committee, the Rio Puerco Alliance and NMED Wetlands Program should continue to engage adjacent communities, pueblos and landowners to protect adjacent buffering lands to protect Cebolla Canyon Closed Basin Wilderness and Conservation area.

Monitoring, restoration and adaptive management must continue to ensure improved wetland and watershed conditions.

The NMED Wetlands Program and EPA as partners should continue to engage in important restoration demonstration projects such as Cebolla Canyon Closed Basin.



Figure 33. Barbara Johnson, RPA, conducting project area review, Fall 2014.