

Habitat Restoration Work Group Meeting  
*October 21, 2014*

Meeting Materials:

Meeting Agenda

Corrales Siphon [presentation]





# **Pueblo of Sandia Environment Department**

**Corrales Siphon Presentation to  
Habitat Restoration Workgroup  
Michael Scialdone – Bosque Project  
Manager  
October 21, 2014**

# The Corrales Siphon

## Background

- Built in 1933
- Wood stave pipe (2.5 inch Douglas fir) with metal bands
- 5 ft. diameter inside of a timber box
- Starts on Pueblo of Sandia lands and goes ~975 ft. under the Rio Grande to the Corrales side to begin their irrigation system
- Capacity is about 100 cfs (per BoR)
- When built, the top of it was about 8 ft. below the riverbed
- Reports state that as long as it stays wet, it is safe

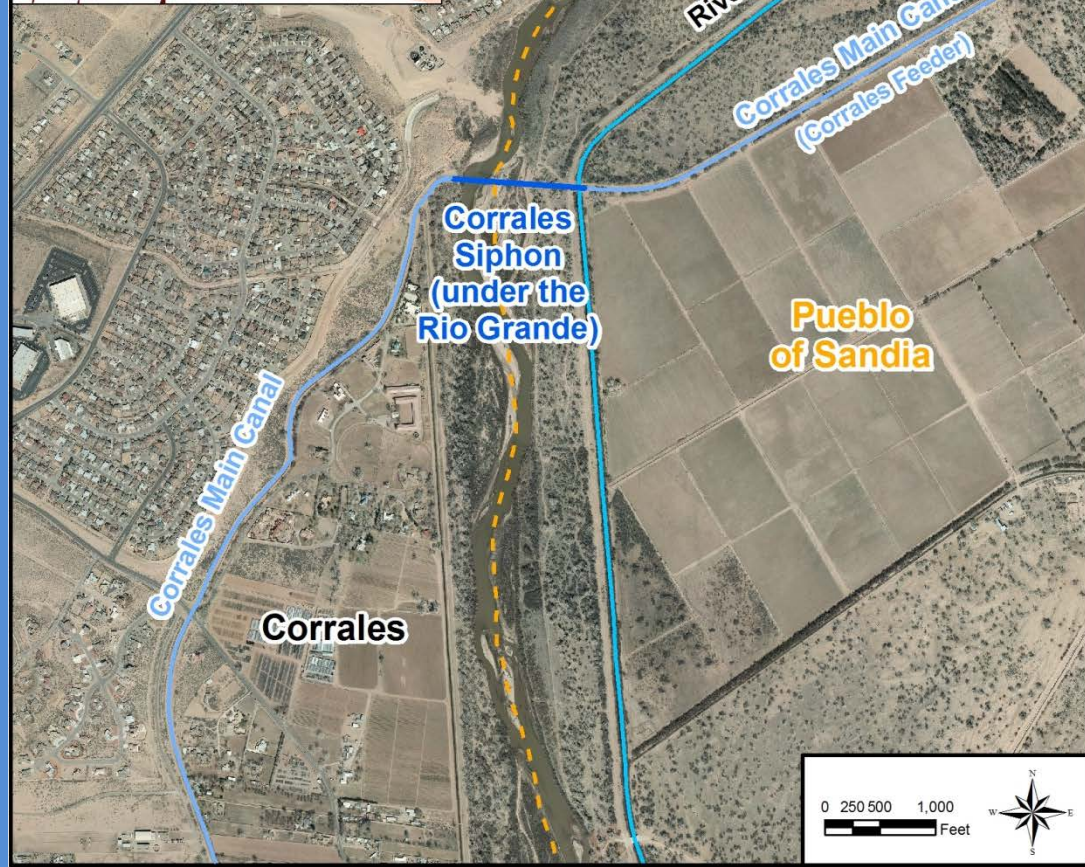
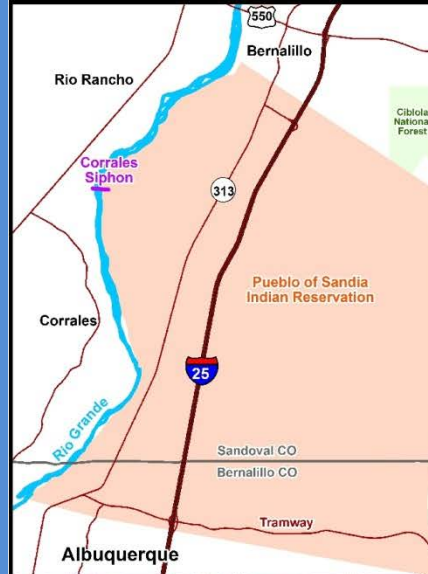


# The Corrales Siphon Regional Overview

Water is taken from the Rio Grande at the Angostura Diversion Dam, about 10 miles north of Corrales. All of this water goes to the east side of the river, with some ending up in the Albuquerque Main Ditch.

Toward the north end of the Pueblo of Sandia, it connects with the Corrales Main Canal, often called the Corrales Feeder on the Pueblo side. This is the beginning of the irrigation system for all the farms on the west side of the Rio Grande from Corrales down to Montañito.

Just before the Riverside Drain, water drops into the Corrales Siphon, which takes it under the Rio Grande and back up into the ditch on the Corrales side.



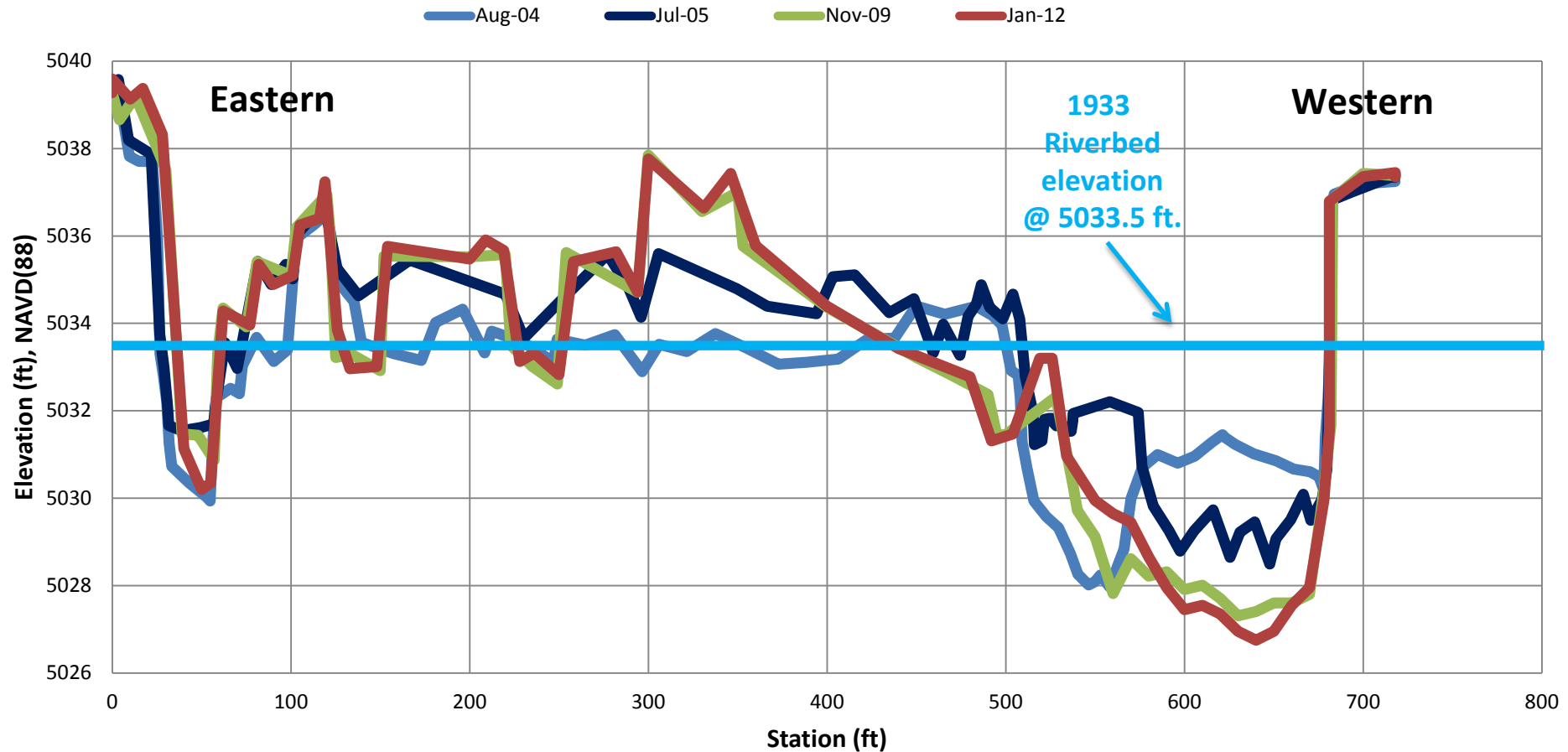
# The Corrales Siphon

## Down-cutting and Incision of the Rio Grande

- Cochiti Dam was completed in 1973
  - The dam and the pool behind it cause the Rio Grande to drop its sediment load
  - Clear “sediment starved” water comes out below the dam that can easily cut into and transport sediments
- Since Cochiti came online, the Rio Grande has down-cut, especially in the reach from Cochiti Dam to Alameda Blvd. (Massong, Tashjian, Makar)
  - The river channel is narrowing and incising with the most down-cutting occurring in the reach from the Rio Jemez to the Harvey Jones Channel (1.5 miles below the Corrales Siphon)
  - The riverbed is coarsening
  - Sediment transport capacity of the river is much greater than sediment supply (per BoR)

# River Cross Section near Corrales Siphon (2004-2012)

- River bed has lowered near western bank almost 4 feet just in the last 9 years
- Image taken from BoR presentation to Corrales Village Council on Nov 12, 2013





# The Corrales Siphon

## Ownership and Responsibilities

- **Middle Rio Grande Conservancy District**
  - Owner of the Siphon
  - Responsible for Operation, Maintenance, & Improvements
- **Bureau of Reclamation**
  - Authority: Flood Control Acts of 1948 & 1950
    - Middle Rio Grande Project
  - Responsible for River Rectification and Maintenance. This would include the river and pool behind Cochiti Dam. The pool is causing the Rio Grande to lose its sediment load
- **U.S. Army Corps of Engineers**
  - Permitting and engineering expertise
  - Owner and operator of Cochiti Dam, which is causing the incising problem
- **Pueblo of Sandia**
  - Landowner through which Corrales Feeder (ditch) flows to the beginning of the Corrales Siphon

# The Corrales Siphon

## The Threat of Exposure

- A gravel bar coming out of Arroyo de la Baranca, just upstream of the Siphon directed the Rio Grande to the west side
  - The Siphon is two feet deeper on the east side and rises to the west
  - The down-cut river is now directly over the most shallow part of the Siphon and the river is now pouring over it
- The Siphon now begins to act as a weir, pushing water toward the bank that is already up near its exit on the Corrales side

Photos: Frank Chaves



# The Corrales Siphon

## The Ecological Degradation of the Rio Grande

- The down-cutting and incising of the Rio Grande also has tremendous ecological implications
- Little to no overbank flooding and dropping water table
  - Loss of floodplain habitat
  - Overbank flooding needed to regenerate bosque habitat, particularly cottonwoods
  - Existing bosque is drying out; effectively an upland
- Endangered species issues
  - Silvery minnow in particular needs overbank flooding for spawning, rearing, and feeding
  - Southwestern willow flycatcher does best in flood-adapted habitats

# The Corrales Siphon

## Towards a Comprehensive Solution

Even the simplest approach of just addressing the Corrales Siphon involves:

- Pueblo of Sandia – landownership on the east side
- Village of Corrales – obvious economic/irrigation interests tied to the Corrales Siphon
- Middle Rio Grande Conservancy District (MRGCD) – irrigation infrastructure and delivery
- US Army Corps of Engineers (USACE) – engineering expertise, permitting
- US Bureau of Reclamation (BoR), who is responsible for river rectification and maintenance
- Fish & Wildlife Service (FWS) – oversee the Endangered Species Act and can restrict projects when they may have an adverse effect on a listed species (the Rio Grande silvery minnow and Southwestern willow flycatcher and now the Yellow-billed cuckoo)

# The Corrales Siphon

## Towards a Comprehensive Solution

- **Other entities that should or may have involvement include:**
- **Interstate Stream Commission (ISC) who is responsible for meeting Compact obligations for delivery of water to Texas**
- **Bureau of Indian Affairs (BIA), who has responsibility for insuring agencies of the Federal Government meet their trust obligations to Indian Nations**
- **Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program), set up to bring various stake-holders together to work on endangered species in the Middle Rio Grande**
- **Town of Bernalillo**
- **County of Sandoval**
- **Individual farmers and ranchers**
- **NM Gas Co: there is a gas line that (likely) goes under the Sandia side of the Siphon and crosses the river just upstream of the Corrales Siphon.**

# The Corrales Siphon

## Towards a Comprehensive Solution

- There is an obvious need to address the Siphon itself and its immediate threat, but this needs to be in the context of a more comprehensive solution would address:
  - The incising, narrowing, and continued down-cutting of the river;
  - Protection of the Corrales Siphon;
  - Improvement of the bosque ecosystem;
  - The habitat needs of endangered species.
- The Pueblo of Sandia has adjacent (MERES) and nearby restoration sites and as well as suitable areas that could be used for mitigation requirements.

# The Corrales Siphon

## Recent Activities (as of Oct 2014)

- MRGCD has put \$100,000 in its budget toward a Feasibility Study. USACE and BoR are aiding with this process.
- MRGCD has hired a contractor to investigate the integrity of the Siphon by running a camera inside of it.
- Pueblo of Sandia has submitted a Section 1135 Request to USACE. Section 1135 is a USACE authority to study and implement environmental improvements when their projects have caused degradation. Approval has not been granted at this time.
- Pueblo of Sandia has submitted written testimony to the Senate Committee on Indian Affairs as part of their Oversight Hearing on Irrigation Projects in Indian Country, highlighting the Corrales Siphon and the need for a comprehensive look at the problem.

Questions?





## The Corrales Siphon

Overview of issues related to its possible exposure

### BACKGROUND ON THE CORRALES SIPHON

The Corrales Siphon was built around 1933 by the Middle Rio Grande Conservancy District. It is a wooded stave-built pipe made from Douglas fir planks that are 2.5 inches thick that are held by metal bands. If it were empty, it is large enough to walk through. When it was originally built, it was several feet below the 1933 Rio Grande riverbed. As long as the Corrales Siphon remains wet and below the river, it is protected and will remain functional. It may be the oldest surviving structure of its type in the United States. For location of the Corrales Siphon, see map on p.6.

The Corrales Siphon is essential to providing water to irrigators/farmers in the town of Corrales. Water from the Rio Grande River is diverted to the east side of the river at Angostura Dam into the Albuquerque Main ditch. In the northern portion of the Pueblo of Sandia Reservation, water is diverted from the Albuquerque Main into the Corrales Main, often called the Corrales Feeder on the east side. The Corrales Siphon takes this water under the Rio Grande and into the Corrales Main on the west side of the river where it is distributed to the irrigation system of Corrales.

### THE INCISION PROBLEM AND THE CORRALES SIPHON

The historic Corrales Siphon is at risk because the Rio Grande has down-cut and incised itself. The incising of the river is most directly attributable to Cochiti Dam, which began holding back waters of the Rio Grande in 1973. Sediment in the Rio Grande from its northern reaches is dropped when it comes into Cochiti Reservoir. Clear “sediment starved” water released below the dam is able to mobilize the sediment it encounters and move it downstream. With the Rio Grande held in place by levees and jetty-jacks, this sediment is coming from the bed of the river itself and therefore the river is cutting downward at a fairly rapid rate. After 40 years, nowhere is this incision more evident than the reach of the Rio Grande between the Hwy 550 Bridge and the Montano Bridge (the Sandia Reach). Near the Corrales Siphon are cut-banks nearly 8 feet in height.

Looking at the Rio Grande where the Corrales Siphon goes under it, one can “see” its location (see photo on p. 4 below). It is not directly exposed yet. A hump or wave in the river shows where it is pouring over the Corrales Siphon. Reports on the Corrales Siphon note that as long as it stays wet, it is safe. However, nothing is stated about how long it can retain its structural integrity with the river pushing directly into it, regardless if this keeps it wet. Going through the trouble to put the top of a 6ft structure 8ft below the riverbed when it was it was built, it seems clear the original designers planned not just for it to stay wet but protected from direct contact with the river’s flow. This protection is gone and time is of the essence for a solution.

A further complication is that as the Corrales Siphon is pushed on by the river, it starts to act like a weir. This means that it will push water toward the banks, potentially compromising them. At the Corrales Siphon, the Rio Grande is at the far right (west) bank, not far from where irrigation water leaves the Corrales Siphon and continues in the Corrales Main. In other words, it would not take much bank-line erosion to reach and cut into the Corrales Main. See graph on p. 7 showing how much the river has dropped on the western bank.

### THE INCISION PROBLEM AND THE ECOLOGY OF THE RIO GRANDE

A significant measure of the health of a river ecosystem, especially in the arid southwest, is the river’s connectivity to its floodplain. Periodic overbank flooding brings in needed water and nutrients to the

floodplain. Many important native riparian species such as cottonwood and willow have seeds that respond directly to overbank flooding. With the severe down-cutting that has occurred in the Sandia Reach, much of the bosque (cottonwood dominated woodlands) along the Rio Grande receives no overbank flooding, resulting in cottonwood stands that are drying out and getting older with little to no recruitment of new trees.

Two endangered species in the Middle Rio Grande are the Southwestern willow fly-catcher (SWFL) and the Rio Grande silvery minnow (RGSM). Habitat needs for the SWFL include thick patches of willow near water. Habitat needs for the RGSM include overbank areas with slow moving water. Both of these habitats are severely compromised where a river is incised as the Rio Grande is in the Sandia Reach.

#### TOWARDS A COMPREHENSIVE SOLUTION

Even the simplest approach of just addressing the Corrales Siphon involves:

- Pueblo of Sandia, whose lands the Corrales Main flows through as it comes off the Albuquerque Main to the beginning (eastern) side of the Corrales Siphon;
- Village of Corrales, with obvious economic/irrigation interests tied to the Corrales Siphon;
- Middle Rio Grande Conservancy District (MRGCD), responsible for irrigation infrastructure and delivery
- US Army Corps of Engineers (USACE), whose engineering expertise may be needed plus they are the permitting agency for projects in waters of the US;
- US Bureau of Reclamation (BoR), who is responsible for river rectification and maintenance
- Fish & Wildlife Service (FWS), who oversee the Endangered Species Act and can restrict projects when they may have an adverse effect on a listed species (the Rio Grande silvery minnow and Southwestern willow flycatcher)

Other entities that should or may have involvement include:

- Interstate Stream Commission (ISC) who is responsible for meeting Compact obligations for delivery of water to Texas
- Bureau of Indian Affairs (BIA), who has responsibility for insuring agencies of the Federal Government meet their trust obligations to Indian Nations
- Middle Rio Grande Endangered Species Collaborative Program (Collaborative Program), set up to bring various stake-holders together to work on endangered species in the Middle Rio Grande
- Town of Bernalillo
- County of Sandoval
- Individual farmers and ranchers
- NM Gas Co: there is an active gas line that goes under the Siphon and then crosses the river just upstream of it.

MRGCD is responsible for irrigation infrastructure. Their initial thought is to cement the Corrales Siphon. While this may be a quick solution to protect the immediate economic interests associated with the Corrales Siphon, it would not address the incising issue that lead to the problem.

Rather than this piecemeal approach, a comprehensive solution would address:

1. The incising and/or continued down-cutting of the river;
2. Protection of the Corrales Siphon;
3. Improvement of the bosque ecosystem;
4. The habitat needs of endangered species.

Each of these has its own solutions, complications, and costs, which underscores the need to work collaboratively and comprehensively. For example, incising of the river can be halted through gradient control structures. Upstream of the Hwy 550 Bridge on the Pueblo of Santa Ana Indian Reservation, four GRFs (gradient restoration facility) were installed to preventing further incising of the river in their reach. They are basically underwater weirs and have been in place long enough to show they can work. However, each GRF costs over \$1 million and there would likely be a need for three or more in the Sandia reach. It is not clear if actually raising the bed of the Rio Grande could be accomplished with these, so the Corrales Siphon may remain at the level of exposure it has when GRF construction began.

Another engineering solution could be an erosion control mat laid over the Corrales Siphon. A company called Submar has concrete mats for such purposes. They are laid over a pipeline to protect it from hydraulic forces. It isn't clear if such a solution could work in the setting the Corrales Siphon is in.

With any major project in the Rio Grande, the Fish & Wildlife Service will be concerned about protection of endangered species from the disturbance of the project itself and from the effects of the project's end result. Addressing habitat needs of the Rio Grande silvery minnow and/or the Southwestern willow flycatcher may be a mitigation requirement of any project. The Pueblo of Sandia has areas suitable for such mitigation. In fact, at the Corrales Siphon and downstream from it is a project called MERES where channels were carved into a sandbar for the benefit of the minnow. The area is in need of maintenance.

Bank lowering to reconnect the river with its floodplain is a method the Pueblo of Sandia has used to restore native bosque habitat. It is also a way to mitigate floods as the surging water is able to spread out and loose some of its power. Doing this upstream from the Corrales Siphon may be a way to prevent a flood from severely damaging it while also creating bosque habitat.

#### CURRENT STATUS (AS OF BEGINNING OF 2014)

The Bureau of Reclamation notified the MRGCD about conditions at the Corrales Siphon River Crossing in an April 2013 letter. The issue was presented to the MRGCD Board on August 26<sup>th</sup>. Since then MRGCD has consulted with BoR and the US Army Corps of Engineers and developed a Scope of Technical Feasibility Study which includes:

- Ensure irrigation water delivery to the Corrales Main Canal
- Investigate short and long term alternatives including a replacement option
- Assess short and long term degradation
- Consider river maintenance actions and life cycle costs
- Select a Preferred Alternative based on:
  - Engineering function
  - Economics
  - Environment & Lands considerations
- Completion would include a 30% design with construction estimates

USACE is pursuing funding for a Feasibility Study and Construction. On November 12, 2013, MRGCD, BoR, and USACE gave a presentation to the Corrales Village Council on the status of the Corrales Siphon and the need for a feasibility study.

On October 11, 2013, USACE and the Pueblo of Sandia went on a field trip to discuss the incising of the river. This trip included a stop at the Corrales Siphon. Following this field trip, the Pueblo of Sandia submitted a letter to the USACE asking them to conduct a feasibility study on solutions for the incising of

the river. Under an authority called Section 1135, USACE is appropriated funds from Congress to address environmental issues created by USACE projects (see Attachment 1, p. 8). In this case, USACE built Cochiti Dam, which is causing the incising problem. A letter from a concerned/affected entity begins the process.

USACE and BoR are working on a Rio Grande Mobile Bed Numerical Modeling Study. The purpose of this study is to better understand the nature of the sediment in the bed of the Rio Grande and how it is mobilized. This study could be key to any engineering solutions proposed for the Corrales Siphon and the incising of the river.

#### NEXT STEPS

At this time, most of the major parties involved have been informed of the situation facing the Corrales Siphon. Important to moving forward will be a process that keeps all parties updated in a timely fashion. All parties need to be open to new ideas and realistic to the fact that legal issues and dollars available may play a significant role in determining the outcome. Working together will be key to overcoming such obstacles and realizing better solutions.

Of immediate concern will be anything that helps determine how imperiled the Corrales Siphon is. Stopgap measures may be needed regardless of the intent to look at long-term solutions. After this, securing funding for the feasibility study and making sure it is as comprehensive as possible while completed in a timely manner, will require coordination and cooperation of all parties involved. Meetings should be held regularly to keep all parties up to date and looking ahead to finding the resources needed to initiate tasks that are part of any agreed-upon plan.



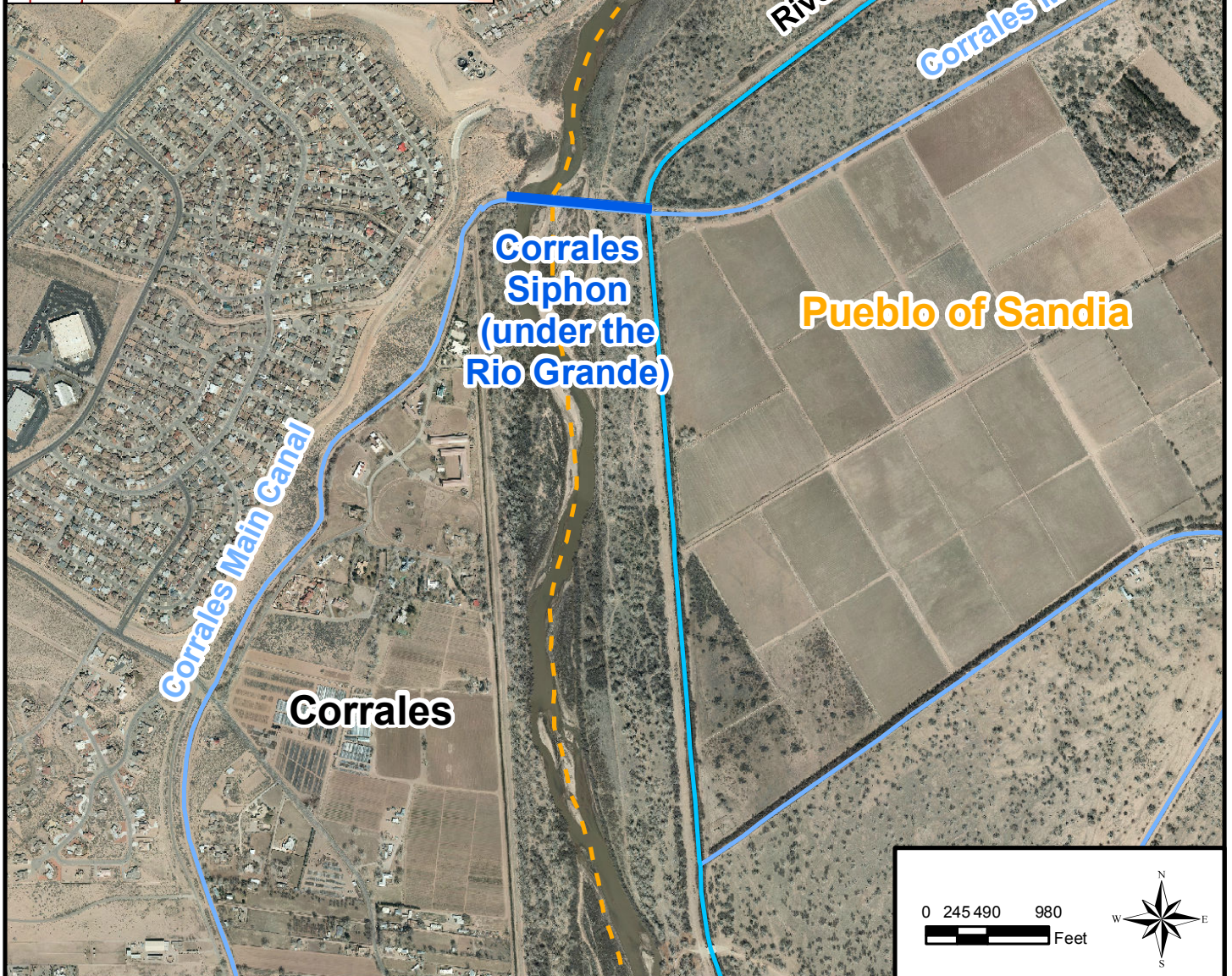
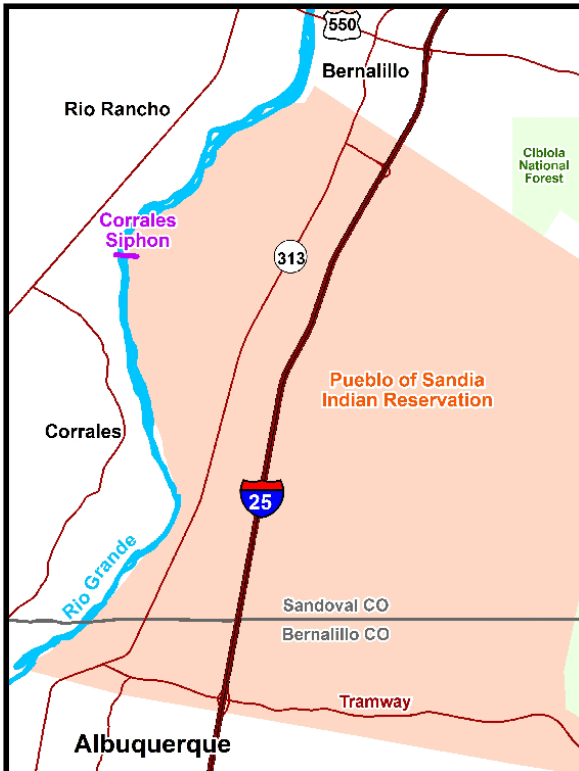
The Rio Grande flowing over the Corrales Siphon.

Photo: Frank Chaves

#### UPDATED STATUS – OCTOBER OF 2014

The MRGCD dedicated funds to begin a study of the Siphon and what might be done. To start this, it has hired a Pro Pipe and other consultants to send a camera inside of the Siphon. There is some blockage inside of it, likely some kind of log jam / debris pile. The results from this will determine if 1) the blockage can be dealt with; and 2) if the overall condition of the Siphon can handle continued operations. If the Siphon is in good condition, a solution to its exposure will most likely involve protecting it from exposure. If it is in poor condition, a more comprehensive replacement option will have to be considered.

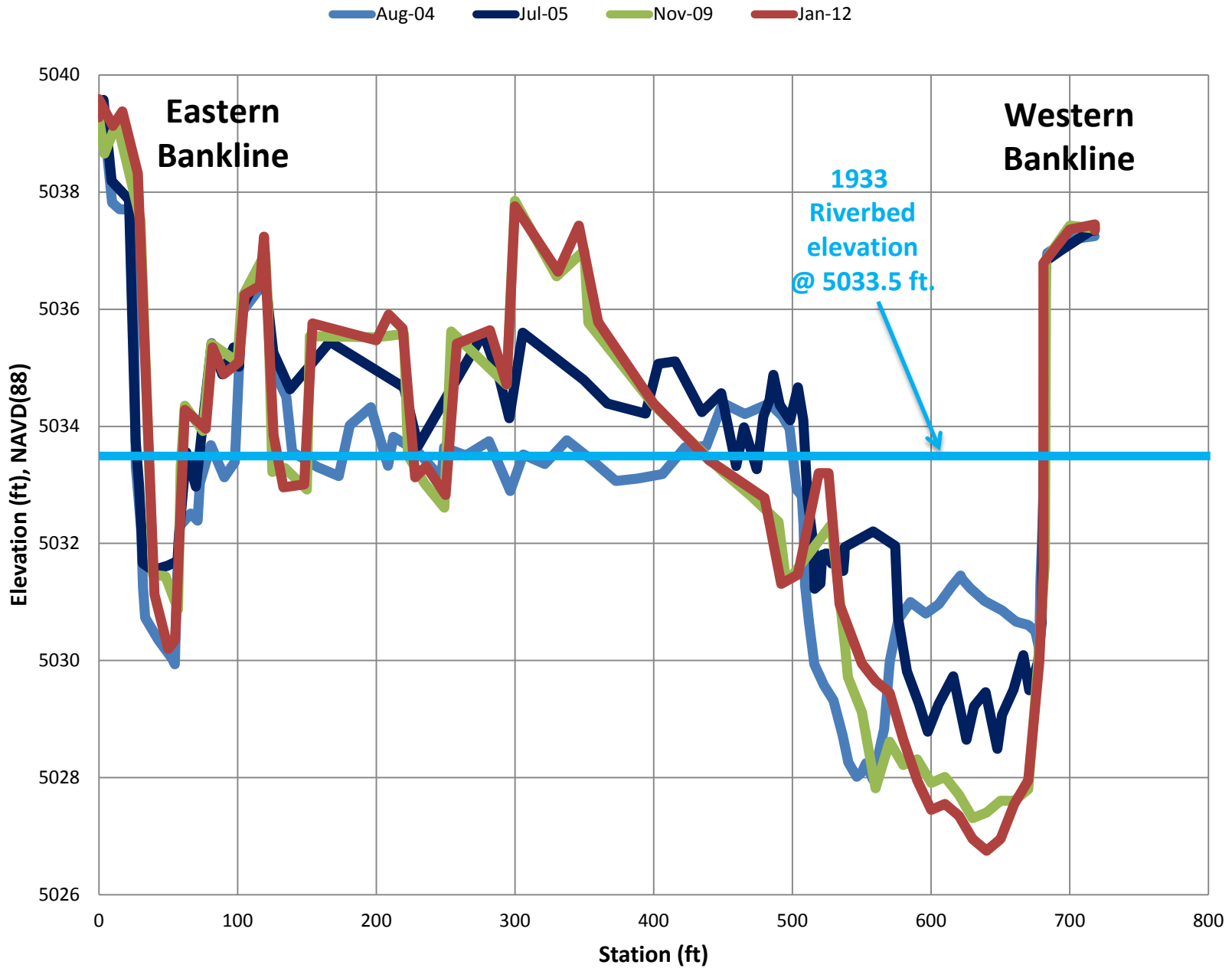
The MRGCD is looking into Section 14 of US Army Corps' Continuing Authorities program. Section 14 deals with streambank erosion. US Army Corps' would fund the first \$100,000 of a feasibility study. After that, it becomes a 50/50 cost share. This was discussed at the MRGCD Board meeting in August. US Army Corps has not initiated this process as of Oct 30, 2014.



0 245 490 980  
Feet



# Cross Section 350 Feet Downstream of Corrales Siphon



- **River Cross Section 350 Feet Downstream of Siphon Crossing (2004-2012).**
- **River bed has lowered near western bank almost 4 feet in last 9 years.**
- **Image taken from presentation to Corrales Village Council on Nov 12, 2013.**



US Army Corps  
of Engineers®  
Albuquerque District

## Continuing Authorities Program

### Section 1135

(Water Resources Development Act of 1986)

### Project Modifications for the Improvement of the Environment

#### At a Glance:

- \$5 million Federal per-project limit.
- First \$100,000 of Feasibility phase is 100% Federal cost.
- Remainder of the Feasibility phase is cost-shared 50/50
- Design and Implementation phase is cost-shared at 75% Federal and 25% Non-Federal.

**The Authority.** Section 1135 of the Water Resources Development Act of 1986 allows the Corps of Engineers to study, design and construct restoration projects where ecosystem degradation is associated with an existing Corp project. The Continuing Authorities Program consists of a suite of standing authorities provided by Congress to fund projects within certain limits without the need to obtain specific congressional authorization for each project.

**The Process.** A Section 1135 project has two phases: Feasibility, and Design and Implementation.

During the Feasibility phase, a study is conducted to determine if there is Federal interest in the project. Federal interest is determined by comparing costs and benefits for different alternatives and identifying potential environmental affects. If there is a Federal interest in the project (i.e. there is a plan with more benefits than costs that is environmentally acceptable), the study will recommend proceeding to the Design and Implementation phase. The first \$100,000 of the Feasibility phase is provided by the Federal government. Feasibility phase costs that exceed \$100,000 must be cost-shared 50% Federal and 50% non-Federal.

The non-Federal share of the amount in excess of \$100,000 may be provided as work-in-kind.

During the Design and Implementation phase, detailed drawings and descriptions of the project will be developed and the project will be implemented. This phase is cost-shared 75% Federal and 25% non-Federal.

The non-Federal sponsor's required 25% cost-sharing must be provided during the Design and Implementation phase. The 25% may be contributed in cash, work-in-kind (up to 80% of the required 25%), or credit for any project lands, easements, rights-of-way, relocations, and disposal sites that the sponsor must provide as items of local cooperation. The sponsor must agree to operate and maintain the project after completion of construction.

**How to Request a Study.** If you have an environmental restoration project that may fit within the Section 1135 authority, please contact the Albuquerque District at the phone number below. Our Continuing Authorities Program Manager will be happy to assist you and, if warranted, will visit the site to determine whether or not the proposed restoration fits within our authority. Upon receipt of a letter of request from a non-Federal project sponsor the Corps of Engineers can initiate the study.

#### **For more information please contact:**

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