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Improving Stream Temperature in the Headwaters of San Antonio Creek on the Valles Caldera

By Daniel Guevara, NMED SWQB - Environmental Scientist

San Antonio Creek originates from its headwaters in the Valles Caldera National Preserve of the Jemez Mountains in north-central New Mexico. This section of the creek has been included on the New Mexico state list of impaired waters since 2002 due to high stream temperatures and turbidity. Since the transfer of the land from private ownership to a National Preserve in 2000, there have been multiple stream restoration projects to address erosion from roads and headcuts, and to protect and improve riparian and wetland areas. Since 2008, monitoring of these stream restoration projects in upper San Antonio Creek has documented improvements to water quality, including a decrease in daily maximum temperature of 1.95 degrees Celsius. These efforts show potential for San Antonio creek to improve further and meet standards, despite a general warming trend and more frequent droughts.

Problem

High stream temperatures and turbidity have kept San Antonio Creek on the list of impaired waters since 2002. These and additional water quality problems, such as low dissolved oxygen and high aluminum, have prevented San Antonio Creek from supporting the designated use of high quality cold-water aquatic life. To address these issues the SWQB established Total Maximum Daily Loads (TMDLs) for San Antonio Creek in 2002.

The impairments resulted from past management, including eroding roads and intensive grazing activities. There are many old logging

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roads throughout the watershed, as well as multiple primitive road crossings used to access a natural gas pipeline that crosses the Valles Caldera National Preserve (VCNP) to the Los Alamos National Laboratory. As this road travels adjacent to and through the creek, it negatively affected water quality in San Antonio Creek and the structure and function of the wetlands and riparian areas. Additionally, multiple road intersections located at the confluence of the Rito de los Indios widened the stream, adding sediment and decreasing stream bank stability. Several culverts were undersized and improperly located, and steep pitches in the road gradient lacked proper drainage and were rapidly eroding. Another impact from the roads and grazing is damage to the slope wetlands that are common in the headwaters of San Antonio Creek. Berms and ditches have concentrated runoff into gullies which have eroded and drained wetlands.

Restoration Highlights

Multiple restoration projects in the upper San Antonio Creek watershed have reduced temperature, turbidity, and suspended sediment. The nonprofit group Los Amigos de Valles Caldera implemented the first projects, which aimed to reduce sediment and turbidity by improving low-water road crossings, replacing bad culverts, and treating eroding hillslopes and cut banks. They also removed and replaced degraded in-stream structures. The WildEarth Guardians constructed large fenced exclosures and planted native riparian vegetation to increase cover and decrease stream temperature on San Antonio Creek both above and below the VCNP boundary and in the Rito de los Indios watershed. Additional work was conducted by Keystone Restoration Ecology in the Rito de los Indios watershed to reduce erosion and restore wetlands following the Las Conchas Fire. Another project on the mainstem of San Antonio Creek prevented a meander cut-off which would have generated a damaging headcut that would have increased incision of the creek.

Another project called “The Six Tribes Project” used innovative plug-and-pond techniques to restore slope wetland habitat to help trap sediment and cool water temperatures. This project also treated road drainage issues by installing rolling dips and addressed headcut erosion with multiple rock structures. Several projects included fencing and planting native riparian vegetation to increase canopy cover and shade to decrease stream temperature. Many of the projects described above were greatly assisted by the Albuquerque Wildlife Federation, which for years has held volunteer restoration workshops in the VCNP. Some of the projects were supported with federal Clean Water Act section 319 funds, and some were funded under the New Mexico River Stewardship Program.



Improving the road crossing at the Rito de los Indios tributary confluence to reduce erosion.

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The projects have restored flow to the natural channel and returned incised channels to grade so that the high stream flows can disperse across the floodplain. Spillways on several stock ponds were modified to spread flow broadly across wetland surfaces. These projects used innovative restoration techniques pioneered in New Mexico, which was a goal in the Jemez Watershed Restoration Action Strategy (2005) and in the environmental assessment for wetland restoration in San Antonio Creek watershed. The benefits of these restoration efforts include water temperature and turbidity reductions, stream flow attenuations, sediment retention, groundwater recharge, base flow augmentation and improved fish, and wildlife habitat.



Treating eroding banks to reduce sedimentation in the middle reach of San Antonio Creek.

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Results

The Surface Water Quality Bureau of the New Mexico Environment Department has been monitoring water quality on upper San Antonio Creek since 2000. An analysis of the upper restoration reach has shown promising results—there was a decrease in the daily maximum stream temperature from the upstream to downstream sites from before and after the restoration projects (Figure 1).

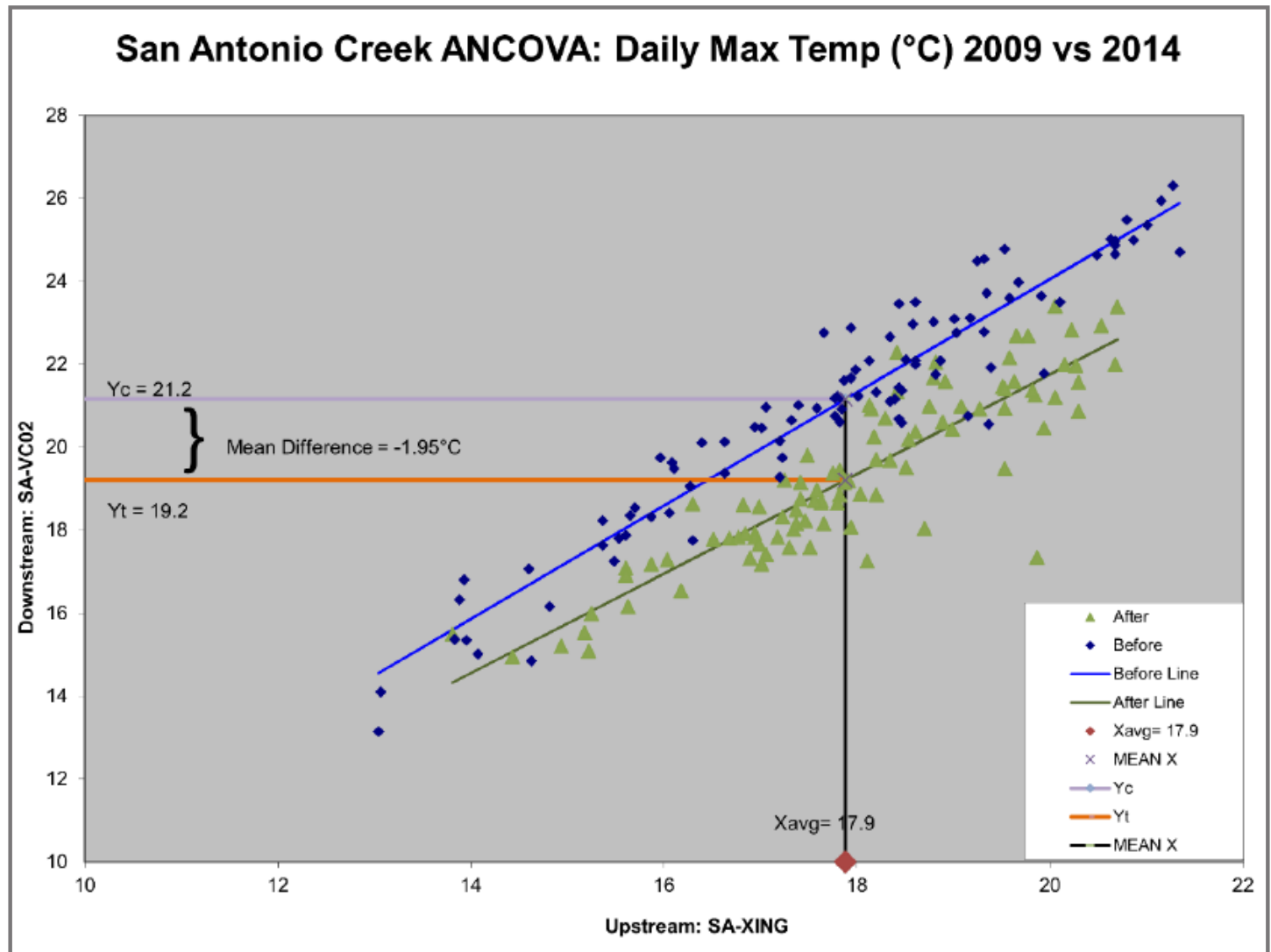


Figure 1. Chart summarizing the results of the ANCOVA for San Antonio Creek on the Valles Caldera National Preserve, showing a decrease in stream temperature following restoration projects.

Although there was a mean decrease of 1.95 degrees Celsius, both stations still occasionally exceeded the upper limit of 20 degrees C set by the standards. Restoration work is ongoing, and effectiveness monitoring will provide the basis for further analysis to determine if San Antonio Creek can fully attain the standards. However, the decrease in stream temperature during a period of general warming and more frequent prolonged drought is confirmation that the restoration projects are having a positive effect.

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Partners and Funding

Primary partners on the upper San Antonio Creek watershed restoration projects include Bob Parmenter (VCNP), Nina Wells (Los Amigos de Valles Caldera), Steve Vrooman (Keystone Ecology), Van Clothier (Stream Dynamics), and Michael Scialdone (Albuquerque Wildlife Federation). Five of the six projects used section 319 funding for a total of \$855,169, with \$172,000 in state match from a New Mexico River Stewardship Project and \$690,403 in other match.

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Photo left;

San Antonio creek above VC02 Road crossing, rock armor to protect the road, and stream temperature monitoring location.

Photo right;

Rito de los Indios tributary downstream of improved road crossing, showing evidence of improved floodplain access to disperse post-fire flooding.

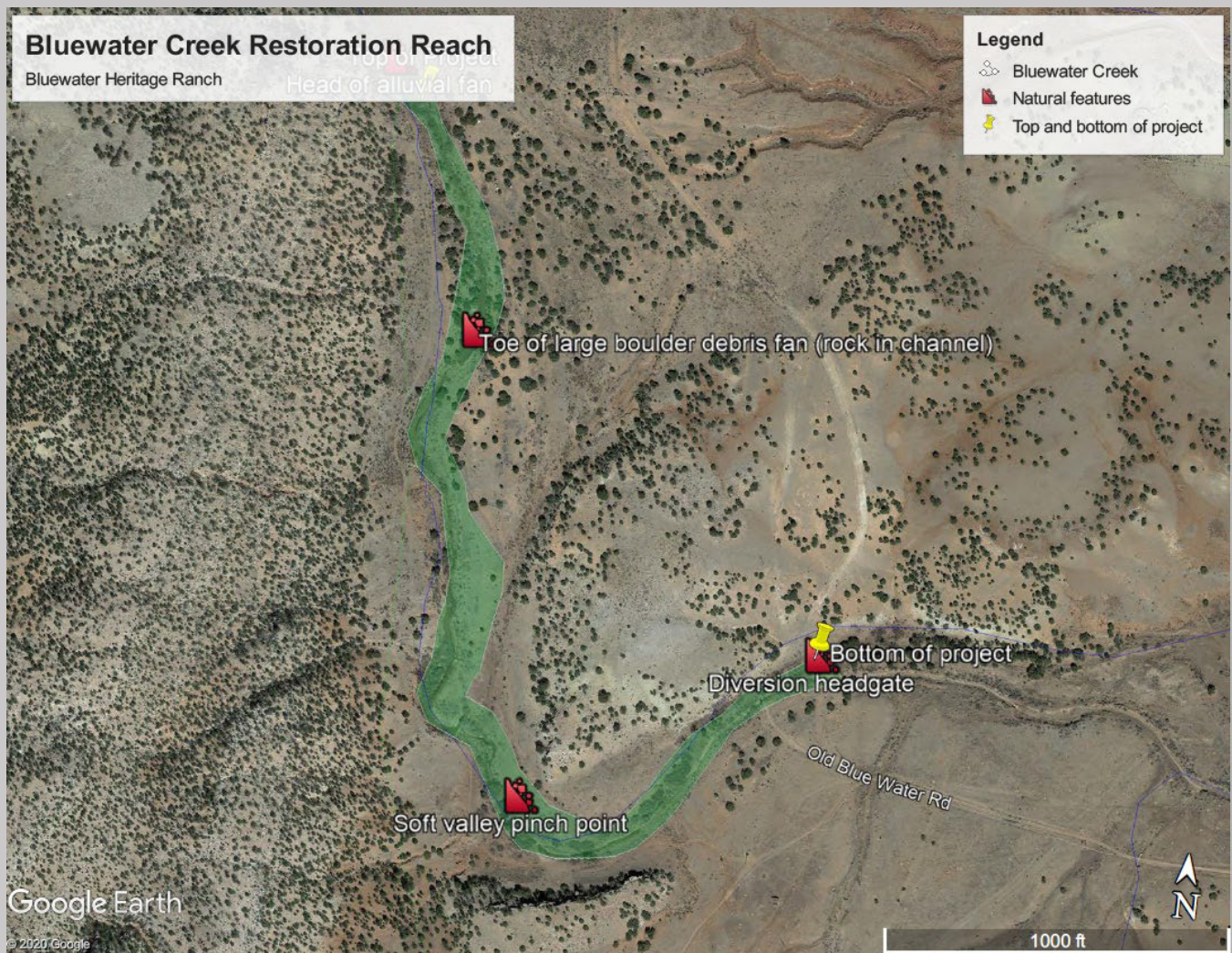


Eight New 319 Projects Underway!

The Watershed Protection Section and cooperators have started eight new projects since June 2021, funded under Section 319 of the Clean Water Act. These projects were identified and developed through a Solicitation for Applications (SFA) released in late 2020 for on-the-ground projects that implement watershed-based plans (WBPs) and Wetlands Action Plans (WAPs). In addition to conventional implementation of management measures identified within WBPs and WAPs, the projects include outreach, education, and watershed coordination. Each of the projects includes a local match commitment of at least two thirds the federally funded amounts listed below.

Bluewater Creek Riparian Improvement Project

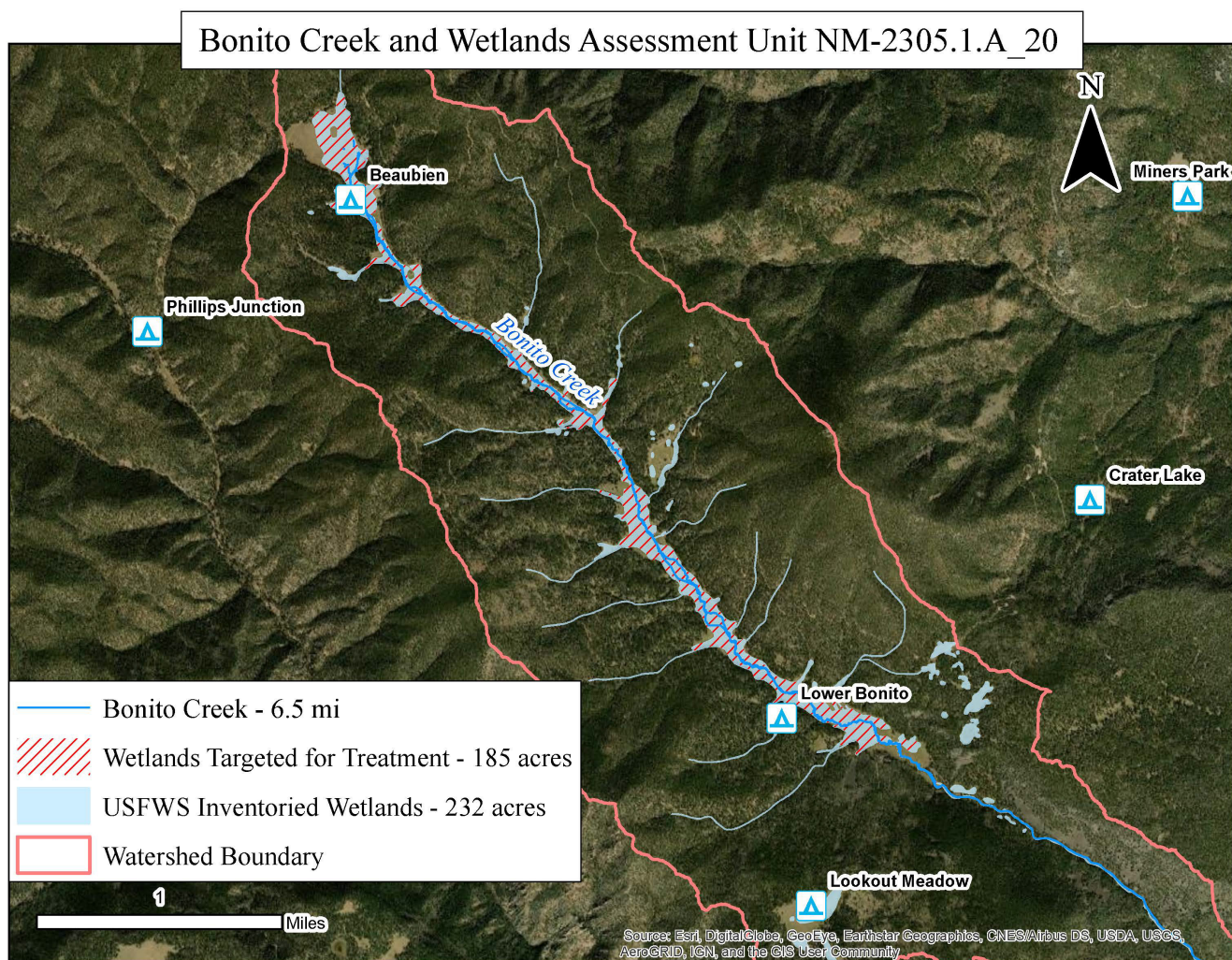
This project will increase riparian canopy cover, reduce incision, and increase sinuosity in a 0.75-mile reach of Bluewater Creek, in furtherance of the Rio Puerco Watershed-Based Plan. These actions will decrease temperature and reduce nitrogen loading in Bluewater Creek. Through this sub-grant agreement, NMED awarded the Nielson Family Limited Partnership \$189,300 to complete this project.



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Bonito Meadow Stream and Wetland Restoration Project, Phase 1

The purpose of this project is to improve watershed and wetland conditions in 185 acres of wetland along Bonito Creek on the Philmont Scout Ranch. The project implements portions of both the Cimarron River Watershed-Based Plan and the Cimarron Watershed Wetlands Action Plan, by stabilizing gullies and protecting sensitive areas from livestock and elk. These actions will decrease temperature and reduce loading of sediment, nutrients, and *E. coli* in Bonito and Rayado Creeks. Through this sub-grant agreement, NMED awarded the Boy Scouts of America - Philmont Scout Ranch \$227,824.20 to complete this three-year project.



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Managing Watershed Runoff into the Mesilla Valley

New Mexico State University's Water Resources Research Institute is implementing this project to reduce *E. coli* loading to the Rio Grande in the Mesilla Valley. The project implements portions of the Paso del Norte Watershed-Based Plan, including construction of a variety of erosion control structures that promote infiltration of storm runoff, establishment of native plants through imprinting, seeding, and mulching, and outreach and education. These activities will be focused in two urban neighborhoods, an area of rangeland on the west mesa of Las Cruces, and the vicinity of Tortugas Dam. NMED's sub-grant agreement with NMSU allocates \$443,067 in grant funds to this project.



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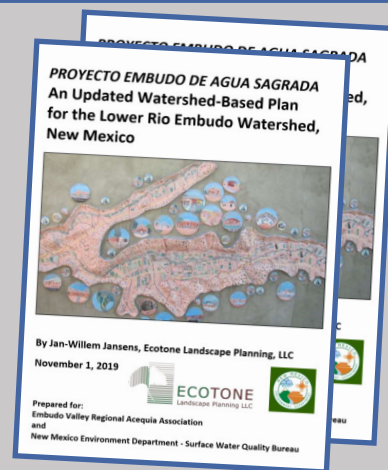


Lower Animas Watershed-Based Plan Implementation Projects Phase 3

The San Juan Soil and Water Conservation District, which coordinates the San Juan Watershed Group, is implementing this project to reduce nutrient loading in the Animas River in furtherance of the Lower Animas Watershed-Based Plan. They plan to stabilize riverbanks with modified J-hook and bendway weir structures, restore a flood plain near Flora Vista, revegetate a two-acre wetland area to function as a filter strip for stormwater flow, establish a grass and pollinator mix filter strip parallel to the Echo ditch, and conduct a series of educational events. Funding for this specific project comes from a small grant awarded by EPA under the authority of Section 319, through the Water Infrastructure Improvements for the Nation Act (WIIN Act). Projects in the San Juan Basin became eligible for these funds because of the 2015 Gold King Mine spill. The federal amount of this grant to San Juan SWCD is \$230,807.

Restoring Springs and Wetlands on State Trust Lands in the Lower Embudo Valley

The purpose of this Project is to reduce turbidity in Embudo Creek, and to develop a Wetlands Action Plan (WAP) for a portion of the Embudo Creek watershed, in furtherance of the Updated Watershed-Based Plan for the Lower Rio Embudo Watershed. Ecotone Landscape Planning, LLC, will accomplish this project by stabilizing streams, gullies, and slopes, and closing off-road vehicle routes. The WAP will be developed using the New Mexico Rapid Assessment Method for Riverine Wetlands, public outreach, and local coordination. This project is supported with \$150,510 in grant funds.



Rio Nutrias Watershed Based Plan Implementation Phase II

This project will reduce turbidity, conduct water quality monitoring and modeling, and provide local watershed coordination in the Rio Nutrias watershed, in furtherance of the Rio Nutrias Watershed-Based Plan. Two undersized and improperly placed culverts on Rio Arriba County roads will be replaced with larger better designed culverts installed to reduce streambank erosion and turbidity, and nearby banks will be stabilized. These actions will decrease loading of total suspended solids in the Rio Nutrias. Aguas Norteñas, LLC is implementing this project with \$219,377 in grants funds.

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Temperature and Erosion Control in Lower Cow Creek – Phase III

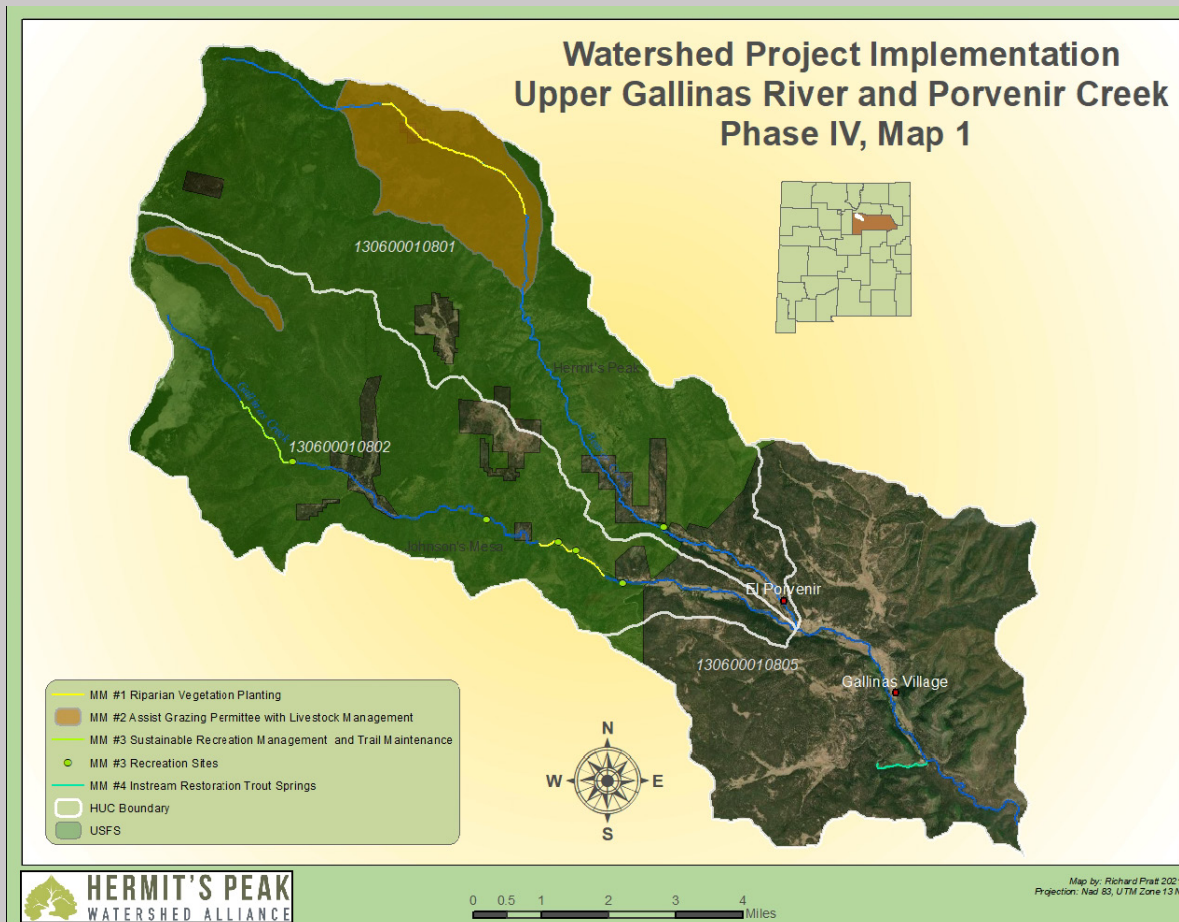
In this project, the Upper Pecos Watershed Association is working to reduce temperature in Cow Creek, in furtherance of the Upper Pecos Watershed Protection and Restoration Plan. They will improve floodplain access and create floodplains, improve in-stream channel geometry, plant riparian vegetation, and conduct community outreach and workshops. The project is located on private land near the community of North San Ysidro, and NMED is supporting this project with \$257,640 in grant funds.



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Watershed Project Implementation for Upper Gallinas River and Porvenir Creek - Phase IV

Hermit's Peak Watershed Alliance is implementing this project with \$292,850 in awarded grant funds. The purpose of the project is to reduce temperature in the Gallinas River and its tributaries Porvenir Creek and Beaver Creek. This will be done through a combination of riparian vegetation planting, livestock management assistance, trail maintenance, beaver habitat augmentation, and outreach and education, as described in the project work plan and in the Updated Watershed Based Plan for the Upper Gallinas River.



For a complete list of current and recent Section 319 and River Stewardship projects, with links to download project work plans (and final reports for completed projects), please visit: www.env.nm.gov/surface-water-quality/watershed-protection-section.

The projects listed above implement portions of WBPs and WAPs. To review these plans, or learn more about each type of plan, visit: www.env.nm.gov/surface-water-quality/wbp.



River Stewardship Program – Request for Proposals *Coming Soon!*

The New Mexico Environment Department (NMED) is preparing to release a Request for Proposals (RFP) for the River Stewardship Program (RSP) in late Spring 2022. The RFP will be announced via the Surface Water Quality Bureau's mailing listserv so keep your eyes peeled for the announcement.

What is the River Stewardship Program?

The goal of the RSP is to enhance the natural functioning of New Mexico's streams and rivers by providing state funding to plan, design, and construct projects that improve surface water quality or river habitat statewide. The RSP is a critical component of the non-point source management program and addresses water quality problems including impacts from wildfires, floods, and drought; engages local stakeholders in restoration of their waters; supports New Mexico small businesses both directly for those contracted to do restoration work and indirectly via increased tourism and recreational opportunities; and ensures the necessary match for approximately \$2.3 million per year in federal Clean Water Act funding for New Mexico.

What should I know about the upcoming RFP?

- **Funding** – During the 2021 Second Special Legislative Session, the New Mexico Legislature appropriated \$10,000,000 in House Bill 2 to NMED for the RSP. This funding originated from the federal American Rescue Plan Act (also known as State and Local Fiscal Recovery Funds) appropriation to New Mexico. In addition, the New Mexico Legislature appropriated \$1,500,000 in capital outlay funds for the RSP. There is no match required for RSP projects.
- **Term** – Projects should be completed by June 30, 2025. An anticipated start date will be Spring 2023.
- **Who** – Eligible entities for contracts or agreements include non-profits, businesses, tribes, pueblos, soil and water conservation districts, municipalities, counties, local agencies and state agencies.
- **Where** – Projects occur in waters of the state, including rivers, streams, wetlands (playa wetlands) and riparian areas. Projects include planning, permitting, design, construction and monitoring.

For any questions about the RSP or the upcoming RFP, please feel free to contact Kate Lacey at (505) 946-8863 or kathryn.lacey@state.nm.us. The RSP page can be found on the NMED SWQB website at the link below; <https://www.env.nm.gov/surface-water-quality/river-stewardship-program/>.

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New Mexico Environment Department
1190 St. Francis Dr., Suite N4050
P.O. Box 5469
Santa Fe, NM 87502
(505) 827-2855
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EVENTS & ANNOUNCEMENTS

March

March 30th - Virtual. NMED SWQB Northern Wetlands Roundtables will continue virtually using WEBEX. As we get closer to the meeting dates we will send out the agendas and “JOIN the MEETING” notices to all of you. Please pass on the invitation to others interested in the Roundtables as well. We look forward to getting together again with all of you at our Virtual NM Wetlands Roundtables! The New Mexico Wetland Roundtables are conducted as part of a Wetlands Program Development Grant from EPA Region 6 to foster partnerships and collaboration for the restoration and protection of wetlands and riparian resources in New Mexico on a semi-annual schedule and if you have not attended in the past, we would like you to see what the New Mexico Wetlands Roundtables are all about. There is no cost to attend. For more information please contact Maryann McGraw; maryann.mcgraw@state.nm.us or 505-490-3135.

April

April 1st - 3rd. Ft. Union Ranch near Watrous, NM - Join Albuquerque Wildlife Federation's (AWF) first camping restoration project of the season, where we will continue our work restoring Higgins Canyon on Fort Union Ranch in partnership with the Hermit's Peak Watershed Alliance. Our restoration activities are part of a larger, landscape-scale conservation effort that includes the nearby Rio Mora National Wildlife Refuge. During this project, volunteers will hand-build rock restoration structures designed by Bill Zeedyk to help heal a gully created by the old wagon highway to Mora. Volunteers do not need to be present for the entire weekend to participate. You are welcome to join us just for the work day Saturday, or camp for just one of the two nights. TO SIGN UP: Email Kristina at abqwildlifefederation@gmail.com Directions and further details will be sent to you once you sign up or visit the AWF's website abq.nmwildlife.org/projects.html.

April 19th - Virtual. NMED SWQB Southern Wetlands Roundtables will continue virtually using WEBEX. As we get closer to the meeting dates we will send out the agendas and “JOIN the MEETING” notices to all of you. Please pass on the invitation to others interested in the Roundtables as well. We look forward to getting together again with all of you at our Virtual NM Wetlands Roundtables! For more information please contact Emile Sawyer at emile.sawyer@state.nm.us.

April 22nd - 24th. Red Canyon Reserve. Albuquerque Wildlife Federation's next scheduled restoration project. Check for more details on their website abq.nmwildlife.org/projects.html.

May

May 27th - 29th. Farmington, NM. Riverfest is a family-friendly, **admission free**, annual event organized by the River Reach Foundation, a 501(c)3 non-profit organization. The River Reach Foundation's mission is to protect, promote, and enhance our riverine corridors, and the Riverfest event's mission is to bring people and the river together. Our vision is a healthy natural habitat for all life along the riverine corridor. There will be fun activities and exciting events between Saturday and Sunday. There will also be arts & crafts vendors, food vendors, beer & wine gardens, and non-food vendors located along the river trails between Berg and Animas Parks. For more information and to view the schedule visit <https://riverfestnewmexico.com/>.

Announcement

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