HUERFANO COUNTY WATER CONSERVANCY DISTRICT

Spring Creek Fire Remediation Project

CWCB Grant Contract CTGG1 PDAA 202100002486

FINAL REPORT

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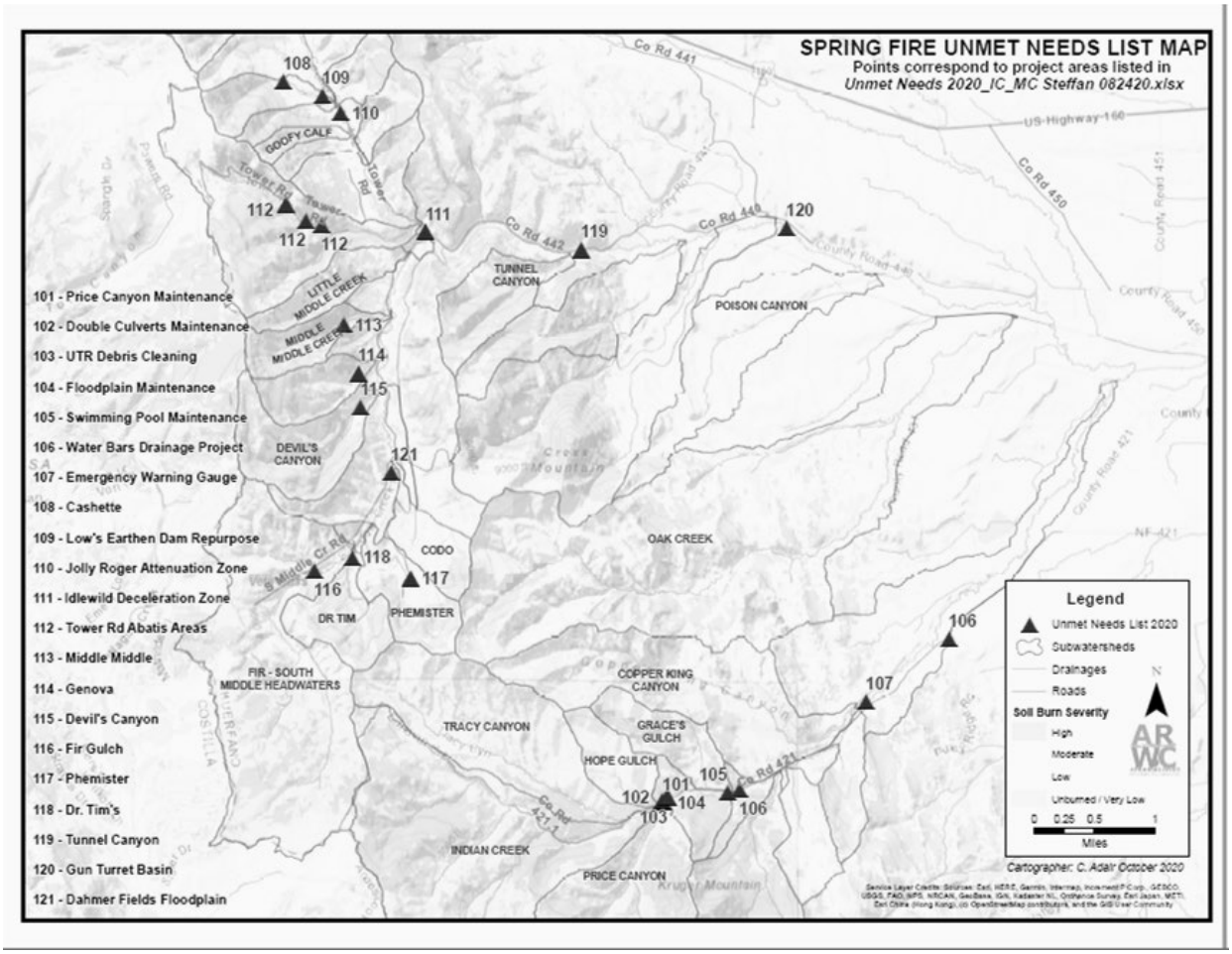
INTRODUCTION

This project was part of a multi-year collaborative recovery program in Huerfano County within and below the 2018 Spring Creek Fire burn scar in the greater Middle Creek watershed above the Town of La Veta. It includes Middle Creek's principal tributaries, Indian Creek and South Abeyta Creeks. The project was orchestrated by Huerfano County Water Conservancy District (HCWCD), with assistance from Huerfano County and several other key stakeholders.

The County, using Natural Resources Conservation Service (NRCS) Emergency Watershed Protection (EWP) funding, focused on private parcels throughout the greater Middle Creek watershed with emphasis on South Abeyta and Indian Creeks. HCWCD, using Colorado Water Conservation Board (CWCB) WRP and other funding, concentrated on public and private lands not slated for EWP funding. The HCWCD consultant, Arkansas River Watershed Collaborative (ARWC), worked in the drainages of the mainstems as well as the various side tributaries of Middle and Indian Creeks.

This project builds on the topographic survey, hydraulic modeling and geomorphic assessment conducted in the 2019 Phase 3 of this ongoing program. That assessment can be found at this link: https://enginuity.egnyte.com/fl/OF24DqQrua



A process of stakeholder engagement produced preferred solutions to address threats from flooding, including life, safety and property. The solutions were evaluated as part of that core group involvement. Stakeholders were also able to discuss fluvial opportunities, non-structural approaches and post-fire techniques. The group prioritized solutions, and the highest priority solutions and projects were implemented within budgetary constraints.

The project area was extremely unstable, with installed structures and remedies soon being claimed by repeated flooding and debris flows. Therefore, in the midst of this overall remediation project, a targeted strategic analysis was commissioned by CWCB through HCWCD to determine which specific tasks would be most useful and effective going forward to make the best use of the remaining grant funding. In 2022, HCWCD contracted with Enginuity Engineering Solutions LLC to produce a strategic assessment based on the most current observations of the burn scar. That assessment was completed in June 2022.

Monitoring and evaluation of project implementation was conducted for longer than the

planned three-year time span, providing data on post-fire techniques and treatments.

The project objectives were:

- Protect life, safety and property.
- Reduce sediment loading and debris flows in Middle and Indian Creeks.
- Engage stakeholders in a discussion on fluvial considerations, opportunities and threats.
- Explore new treatment ideas through the lens of water rights, agriculture and the environment.
- Provide valuable information and data to the water community on post-fire treatments.
- Collaboratively prioritize recovery projects.
- Implement projects based on modeling, engineering analysis, water rights analysis, landowner participation, and stakeholder input.

These project objectives were met by accomplishing the targeted tasks described in the following pages.

TASK 1

Stakeholder Engagement, Evaluation and Project Prioritization

ARWC was contracted to serve as manager for planning and on-the-ground implementation for the project. The stakeholder group for this project included representatives from agriculture, environmental/recreational, water rights administration, and municipal. They participated in meetings to discuss opportunities, threats, locations, and considerations for implementation of solutions. Results from the Spring Creek Fire Phase 3 modeling and engineering analysis were used by stakeholders to identify the types of project implementation methods suitable for post-fire recovery work in the watershed. The team worked from a spreadsheet of “unmet needs” (see map above), which were necessary flood mitigation projects that had not been implemented in previous phases of the Spring Creek Fire remediation work due to a lack of available funding.

Evaluation and Prioritization

ARWC convened the stakeholder committee meetings in February and March of 2021 to examine the viability of potential projects and set priorities. This core team included representatives from HCWCD, ARWC, Huerfano County Office of Emergency Management, La Veta Fire Protection District, Upon the Rock Camp. Additional stakeholders were invited to participate and eventually included Natural Resources Conservation Service, Town of La Veta, Colorado Parks and Wildlife, and Colorado State Land Board.

Cost estimates, mapping and project summaries were considered. Data was also used to prioritize treatments derived from those methods. Stakeholders evaluated performance of treatments, then prioritized projects, techniques and methods to be used.

The deliverable for this task was met with a prioritized list of projects based on stakeholder engagement. The opportunities, threats, considerations, and proposed implementation were decided for each site.

The upper reaches of the burn scar are comprised of steep canyons with little access to alluvial fans. Having identified topographic challenges, as well as the water rights and administrative concerns, the stakeholders were challenged to balance the many diverse

needs and interests in unstable post-fire conditions.

In August 2021, after three significant storm events, another stakeholder meeting and tour were held in the Middle Creek project area. The team considered possible attenuation zones, as well as wildcat ponds that might economically be converted into off-channel basins. Also considered were areas of head cutting into side gulches where log cribbing might prove effective.

Engagement

Continuing stakeholder participants in this grant project included:

HCWCD (Carol Dunn and Lonnie Brown)
Colorado Water Conservation Board (Andrea Harbin Monahan)
Spanish Peaks Alliance for Wildfire Protection (David Steffan)
Upon the Rock Camp (Mark Brunner)
Natural Resources Conservation Service, Walsenburg (Garrett Quintana)
Natural Resources Conservation Service, Trinidad (Sammie Molinaro)
Natural Resources Conservation Service, Denver (T.J. Burr)
Arkansas River Watershed Collaborative
Colorado State Land Board
Huerfano County (John Galusha and Carl Young)
Town of La Veta (Mayor Doug Brgoch)
Colorado Parks & Wildlife (Matt Kondratieff and Carrie Tucker)
Adjacent and downstream ditch owners

CSRMS

Through the participation of Lonnie Brown, HCWCD board member, and David Steffan, HCWCD monitored the work of and participated in Colorado South Region Mitigation Stakeholders (CSRMS). The group's goal is to ensure information sharing related to the fire remediation project work being accomplished in the region. One important step toward this goal is to provide a "data clearinghouse" for all partner and agency projects. ARWC will host this data and make it accessible to the partners in an ArcGIS online account. It is the goal of CSRMS to determine the best solution for hosting/compiling/ sharing data through its meetings and process.

In 2023, CSRMS made two links available to participants:

- Link to map with "Points of Interest" for people coming into the area.
- Link to the map of the Field Tour sites for those who wish to visit fire remediation sites.

TASK 2

Indian Creek Drainage Recovery

The stakeholder meetings established that the first phase task, considered a top priority, was to get the flows of Indian Creek and Price Creek, tributaries to the Cucharas River, reestablished in the historical stream channels instead of on County Road 421. Significant Spring runoff was causing further head cutting and adding significant sediment to the stream system.

Other tasks ranged from channel clearing and snagging, construction of log erosion barriers (LEBs) on severely burnt slopes, cross vane weirs, waterbars, earthwork, low

water crossings, culvert repair, non-structural innovations, and mulching and seeding with native grasses.

As remediation coordinator, ARWC worked with local contractors, volunteers and a State Wildland Inmate Fire Team of Colorado Correctional Industries (SWIFT) crew to implement project tasks based on the priorities developed by the stakeholder meetings.

Remediation tasks were developed for the Indian Creek drainage, and the project was scoped with cost estimates. HCWCD was able to reduce costs owing to the adjacent landowner (Mark Brunner, Upon the Rock) assisting with the work by using a mini-excavator at no charge to help complete the first task. An Americorps/NCCC crew was also utilized to move the logjam referenced in the following list.

Implementation in April 2021 included:

- Install Hesco cages filled with rock to guide stream flow.
- Install below-ground gabions next to a private drive to stop head cutting.
- Move existing logs to change direction of the stream channel.
- Install Hesco cages at the site of culverts damaged by recurring flood debris flows.
- Burn woody debris, weather permitting.

Indian and Price Creeks were both diverted back to their channels in early April 2021, preventing further damage from the highest runoff period.

The next tasks involved clearing woody debris from approximately 400 linear feet of stream channel and about two acres of flood plain. This was accomplished with the assistance of the Americorps crew, which was contracted through Huerfano County. The cleanup included cutting, piling and burning woody debris. This portion of the project is where cost savings were accomplished due to the contribution of landowner and County labor, plus the use of the mini-excavator at no charge.

The next phase involved channel clearing to enhance stream and floodplain capacity below Sulphur Springs on County Road 421, where road inundation and erosion continued to take place. Clearing the narrow channel was intended to keep flows in the channel and away from residences, agricultural buildings and roads.

The channel was recreated to keep the water flowing to the side rather than on the roadway.

Channel before work

Channel after work

The Sulphur Springs property, particularly the swimming pool, was overwhelmed by rock and sediment runoff and sustained damage. It was decided to utilize the swimming pool as a detention basin.

Sulphur Springs pool (center) filled with sediment and rocks

After the snow in the area melted, several basin and floodplain enhancement projects on North Middle Creek were scoped in detail, followed by project development.

At the same time this work was being coordinated by ARWC, Huerfano County through its EWP projects, worked on stream realignment, clearing and revegetation in the Indian Creek drainage. ARWC collaborated with the County and Enginuity Engineering Solutions, the County's consultant, to ensure these projects worked in concert with the EWP projects.

Spring runoff was high. Huerfano County Emergency Management and ARWC worked with an NCCC team to clear slash from Indian Creek, piling and burning it as work proceeded. In cooperation with the La Veta Fire Protection District, with burn piles closely monitored. The side of the creek away from the road was cleared, offering flowing water a path of least resistance instead of claiming the roadbed.

Although the damage was extensive, the project task was workable, and Indian Creek was moved back into its channel.

In May 2021, the next set of project tasks were let out for bid and awarded. They included:

- Clean the swimming pool and surrounding area of rock and sand.
- Sort the rock by size and type.
- Decommission the driveway to the Sulfur Springs garage.
- Create a layered system of gabion baskets, mining cribwalls and sill logs to fill the driveway cut, along with rock and dirt.
- Install rock vanes down the channel, now referred to as the low flow channel.
- Create a high flow channel, keeping the swimming pool as a detention basin and sheeting the flood water across the old Sulfur Springs building site.
- Create a diversion wall for low and high flows.
- Install a low water crossing by the Sulfur Springs caretaker's house.

All relevant permits, including an Army Corps of Engineers Section 404, were obtained.

Lowes's Pond:

Spring runoff bumped this project to a priority position on the task list. This large pond had structural failure cracks in the dam wall. It is a large pond that post-fire flooding had filled with rock and debris. The risk of the dam breaking carried serious consequences. Tasks were set to:

- Stabilize the dam.
- Create a low flow channel through the dam instead of at the side of the pond, which was causing additional damage.
- Excavate a small sink for debris capture and remove only what needed to be used for the project. None of the rest of the material was moved offsite.

The accumulation of small woody debris was removed by NCCC. A skid steer was used by ARWC personnel to clear the flood plain of larger debris, which had accumulated to a depth of about two feet. The larger trees were used at the edge of the flood plain. The objective was to get the roadway elevation higher than the flood plain.

A tour of the project area was held for the Huerfano County Commissioners to provide perspective for establishing a low water crossing and repair of the road with materials on hand.

Outside funding was obtained by ARWC to install a hardened crossing at Tower Road, with a combination low flow culvert and high-flow low water crossing.

Work on Lowe's Pond and on the Sulphur Springs swimming pool and grounds was conducted in June 2021.

Due to a storm event changing parameters, the scope of channel work had to be revised.

Storm damage in the area of Sulphur Springs, June 2021

The 2021 monsoon season occurred earlier, lasted longer and was more eventful than any season since the Spring Creek Fire burned in 2018. Fortunately, there were no basin wide events, which, given the soil moisture content levels, would have been a disastrous scenario.

In the last two weeks of July 2021, three storm events occurred which impacted the project area:

- July 21 – confined to the Middle Creek drainage;
- July 25 – centered on Indian Creek drainage;
- July 31 – in Indian Creek, Middle Creek and Big Branch.

The flooding from the July 31 event was unprecedented since the 2018 fire, both in surge flow amounts and in geographic coverage.

The project areas saw moderate surges during the first two events and little damage to structures and channels that had been installed. However, the July 31 event resulted in massive amounts of rainfall over a short duration, hitting the North and South slopes of Raspberry Mountain and the east-facing slopes of Tower Mountain.

The damage to the Spring Creek Fire Remediation Project areas from this event was greatest in the area of the confluence of Price and Indian Creeks. ARWC estimated flows of 1,600 cfs, which overwhelmed the channel and caused significant headcutting, with Price Creek taking the meadow. The boulders coming out of Price Canyon overwhelmed the Indian Creek channel below the Upon the Rock gate. The Indian Creek channel moved back onto County Road 421 at the narrowest spot in the canyon.

Sulphur Springs garage (background); pool to the right

The recent task to clear the Sulphur Springs pool of sediment and rock was timely, and the project was largely successful. The pool held up to the surge and was filled to capacity with sediment and rock again, as it was designed to do.

Unfortunately, the sheer volume of water incised the stream channel, and the low water crossing access to the project area that had previously been installed was lost. Although

cutting of the roadbed occurred, the road remained passable with minor cleaning. It was this same section that was completely washed out and covered with boulders during a storm on August 3, 2020.

The channel and floodplain project work below Sulphur Springs were successful for flood attenuation, preventing road inundation and reducing subsequent erosion of the road. These areas reduced surge velocity and volume. A resulting reduction in surge size was observed at points where the Cucharas River passes through the Town of La Veta. Fortunately, the Price Creek flood surge moved through La Veta about twenty minutes before the Indian Creek flood surge arrived. Warnings were issued to residents, but no evacuations were called for.

Also in August 2021, the Juniper Valley Hotshots (a SWIFT team) worked on contour felling of burned trees on the high slopes of the watershed. They assisted on the project area for about two weeks.

ARWC provided onsite project oversight and project management for all project implementation. This included analysis, design, drafting, and documenting solutions

The deliverable for this task was met by developing a prioritized list of projects based on stakeholder engagement. The opportunities, threats, considerations, and proposed implementation were decided for each site.

TASK 3

Middle Creek Drainage Recovery

Middle Creek is by far the most vulnerable area in the burn scar and has seen the most damage from post-fire flooding. This drainage and its associated tributaries significantly contribute sediment to the Cucharas River. The Middle Creek watershed is situated upstream of the Town of La Veta.

After the fire in 2018, Huerfano County used NRCS-EWP funding to focus on private parcels throughout the greater Middle Creek watershed, with emphasis on South Abeyta Creek. HCWCD used CWCB-WRP and other funding, to focus on public and private lands not subject to EWP funding. On-the-ground sediment control structures were used, supervised by ARWC, for the drainages of the mainstems and tributaries of Middle and Indian Creeks.

Considering the stated goals of sediment capture, rebuilding and reconnecting floodplains and reduction of further channel and head cuts, the Middle Creek canyon area proved to be the best candidate for treatment. Additionally, the site combined the mutual interest of the greatest number of stakeholders, including the Town of La Veta, Colorado State Land Board, Huerfano County, Natural Resources Conservation Service, Colorado Parks and Wildlife, and adjacent and downstream landowners and water users.

With the assistance of ARWC, projects in this watershed were prioritized based on need, ability to slow streamflow, potential to reduce sediment loading, and landowner participation. Projects were also developed in conjunction with the County's proposed EWP projects identified for Middle Creek. Solutions included channel clearing, drop structures, grade control, hand crew-laid abati structures, hillslope treatments such as LEBs on severely burnt slopes, connection of floodplain, willow planting, and native grass seeding/mulching. Machine cleaning of these channels was intended to reduce sediment loss and provide better attenuation capacity.

In the summer of 2019, a Department of Corrections heavy equipment crew helped with manual cleaning of the stream channel in this area. The materials were either chipped onsite or hauled to the County pit on County Road 450. The result was that this stretch remained fairly clean and unclogged for the first several flood surges. Subsequent surges brought woody debris from farther up basin. ARWC conducted engineering analysis and design for project components. It also worked with local contractors,

volunteers and the SWIFT crew to implement the projects.

A map showing projects in the Middle Creek basin can be found on the HCWCD website at this link.

After three significant storm events in July and August 2021, the projects on Middle Creek (Lowe's earthen dam project and the Tower Road low water crossing) performed well. Minor damage did occur, but this was expected and planned for as an anticipated maintenance issue.

One of the negative effects of the massive flood surge that moved down the side draws of Tower Mountain and into Middle Creek valley was the filling of the stream channel with rocky debris. Huge amounts of alluvial deposits filled the creek where it once meandered. As a result, the creek channel formed a straight line across meadow and riparian areas, resulting in topsoil loss and more fine sediment entering the system.

Because of the damage done to project tasks installed under this project, installation of additional remediation measures under this grant was halted at the end of 2021.

Although it was commissioned for another watershed, the study found at this link: https://www.hcwcd.net/_files/ugd/c647df_9645c825d6fe4af4bf3400231a06c220.pdf shows the representative damage that storms continued to inflict in the watersheds where the burn scar is located.

The damaging floods and debris flows repeatedly caused significant damage to public and private lands, including a change in the Middle Creek stream channel so the flood emergency warning gage installed in 2018 no longer could measure stream flow.

Pause in Implementation

Therefore, in the midst of this overall project, CWCB commissioned and provided $100,000 funding for the Spring Creek Fire Recovery Strategic Analysis. Because of the challenges continued storms were causing, the decision was made to pause the installation of other structures, address the flood warning gage maintenance, and conduct the strategic analysis.

The objectives of this strategic analysis included:

- Protect life, safety and property.
- Assess hydrologic, hydraulic and geomorphic impacts on the streams.
- Conduct a watershed-wide analysis to increase stream function, health and protection of assets critical to water quality and quantity.
- Develop a plan with preliminary concept design and costs to reduce sediment loading and debris flows in the greater Middle Creek basin.

- Provide valuable information and data to the water community on post-fire treatments.

The strategic analysis of the existing conditions was necessary to determine the most prudent strategic actions and projects to protect and enhance the habitat and water quality, restore the watershed, continue to protect assets, and restore streams.

Enginuity was contracted to develop an alternatives assessment that looked at means and methods to increase watershed health and protect water assets, including water quality and quantity. This assessment also considered stream health and function and identified projects that could increase stream health and protect structures, critical water supplies, and assets important to the area stakeholders and the community at large.

STRATEGIC ASSESSMENT

Features of the strategic assessment included the following methods and procedures:

- Develop a series of projects and alternatives for consideration.
- Compare alternatives by cost, functionality, and how they accomplish the overall goal of HCWCD and CWCB in burn scar remediation.
- Perform hydrologic, hydraulic and stream analysis to support project recommendations.
- Prepare a technical memorandum for HCWCD that documents the alternative development and selections.
- Alternatives planning document.
- Digital files for HWCD and CWCB records (i.e. model files and GIS data).

The executive summary and final report of the Spring Creek Fire Watershed Health Assessment by Enginuity Engineering Resources can be found on the HCWCD website at these links:

- Executive Summary: Risk and Costing of Protections
- Identification of Risk and Costing of Protection FULL REPORT

Middle Creek Gage Priority

The Middle Creek flood warning gage, originally installed in 2019, was slated by HCWCD to remain functional through 2025. More information on the flood warning gages can be found on the HCWCD website: https://www.hcwcd.net/copy-of-flood-warning-gages

Over the years, the Middle Creek gage site needed to be stabilized several times, and the gage itself was finally moved from the tree where it was originally mounted to a more stable frame. However, it continued to be affected by multiple damaging flood events which caused the channel to reestablish itself away from the measuring device.

In Summer 2019, a Department of Corrections heavy equipment crew performed hand cleaning of the stream channel in this area. The materials were either chipped on site or hauled to the County pit off County Road 450. The result was that this stretch remained fairly clean and unclogged for the first several flood surges. Subsequent surges brought woody debris from farther up the basin.

In 2022, Huerfano County cleaned woody debris off the frame on which the stream gage had been remounted and rechanneled the flow of Middle Creek back under the gage. However, there were still significant amounts of cobble rock and small to medium sized boulders along the low flow stream channel directly upstream. Even a moderate surge had the potential to bring this material down and quickly clog the gage frame.

As the Town of La Veta and Huerfano County installed remedies, periodic flood events continued to thwart these efforts and render the gage temporarily useless. Protection of the flood warning gage to ensure reliable functionality was one of the most pressing needs to be considered for continued work in the Middle Creek drainage.

The gage equipment, supports and structures were in good condition with no visible damage from debris impact. While the equipment was operational, cleaning and maintenance were needed to reestablish the channel bottom and direct the flow over the vortexes to restore the gage functionality. The ability to monitor water levels was lost each time flood debris changed the course of the channel.

FINAL PLANS FOR REMEDIATION WORK

Most of the on-the-ground remediation work – what had essentially become a series of band-aid solutions – had been put on hold while Enginuity completed the Strategic Assessment identifying the best approach and projects for the future work. That Strategic Assessment report was issued in June 2022.

No on-the-ground remediation work was performed during the period between Winter 2022 and early 2023.

In November 2022, HCWCD investigated a change of remediation contractors for conclusion of this project because of staffing changes at Arkansas River Watershed Collaborative. The position of ARWC executive director was vacated in October 2022, which created a void in coordination and plans to move forward with final remediation efforts.

Stakeholder Participation

In March 2023, HCWCD reactivated the project with a stakeholder meeting to discuss the focus for future tasks to accomplish the most impactful projects with the remaining grant funds. The Enginuity Strategic Analysis of Risk and Costing was used as a guide. The stakeholder meeting was held in La Veta, with an online Zoom option.

Attendance included:

Carol Dunn, HCWCD
David Steffan, Spanish Peaks Alliance for Wildfire Protection
Mark Brunner, Upon the Rock Camp
Garrett Quintana, Natural Resources Conservation Service, Walsenburg
Sammie Molinaro, Natural Resources Conservation Service, Trinidad
Jonathan Paklaian, ARWC
Lonnie Brown, HCWCD
Brittney Ciarlo, Huerfano County Department of Emergency Management
Andrea Harbin Monahan (by Zoom), Colorado Water Conservation Board

At that meeting, because the new ARWC executive director Jonathan Paklaian was still not up to speed on the project, the meeting was coordinated by David Steffan.

Steffan presented a list of potential tasks. He recommended the work begin at the Middle Creek flood emergency warning gage and work upstream from there, where there are more usable boulders, rocky material and large tree debris to use to build structures. The group agreed that there would be a good confluence of stakeholders in that area, including Natural Resources Conservation Service, State Land Board, Huerfano County, Town of La Veta, CPW, and ditch owners.

Huerfano County had already had a crew attempt to put the stream channel back under the flood emergency warning gage. The County felt boulders should be used to stabilize the County Road 442 roadbed in the project area – a big source of sediment during post-fire flooding. It was suggested low water crossings be added to get a passable roadway.

Other accomplishments by the stakeholder group:

- The State Land Board was agreeable to having remediation work done in this area.
- NRCS representatives prioritized weed control, reestablishing the floodplain for sediment capture, and seeding the area with native species for erosion control.
- The landowner, David Andreatta, was contacted about his damaged stream diversion, rendered unusable by the flooding, and whether he would contribute funding to the project.

- Colorado Parks & Wildlife was contacted about the specifications required for the waterfall/fish barrier they were interested in installing; Steffan also investigated whether CPW could contribute funding to the project.
- The NRCS State Engineer was invited to attend a site visit and tour of the project area.

While it was agreed that the earliest date for starting work would be October, it was decided it would be more realistic to plan for work in Spring 2024.

After the March 2023 stakeholder meeting, HCWCD moved forward with choosing David Steffan as the new HCWCD Remediation Coordinator. Steffan had been a previous ARWC employee and performed on-the-ground work on the Spring Creek Fire burn scar for ARWC and for Bureau of Land Management (BLM). Steffan's contract as HCWCD Remediation Coordinator took effect in April 2023.

With experience as a mitigation specialist and project manager for Spanish Peaks Alliance for Wildfire Protection (SPAWP), as well as burn scar recovery manager at ARWC, Steffan had already worked extensively on the ARWC-coordinated Spring Creek Fire remediation projects. Earlier in 2022, Steffan managed five BLM ephemeral draw sediment capture and erosion control projects for SPAWP in areas that were upstream of the Middle Creek remediation work. These projects were a direct complement to the Middle Creek work, especially from a water quality perspective.

Identifying Project Site

In April 2023, Steffan made site visits on Indian Creek, Oak Creek, the Dahmer meadows on upper South Middle Creek, as well as the outlet of Middle Creek canyon.

Considering the stated goals of sediment capture, rebuilding and reconnecting floodplains, and reduction of further channel and headcuts, the Middle Creek canyon site proved to be the best candidate for treatment. Additionally, the site combined the mutual interest of the greatest number of stakeholders, to include the Town of La Veta, the State Land Board, Huerfano County, NRCS, Colorado Parks and Wildlife, and adjacent and downstream water users.

In keeping with the Enginuity strategic analysis, it was agreed that one of the main objectives should be protection of the flood warning stream gage. Significant amounts of cobble rock and small- to medium-sized boulders remained along the low flow stream channel directly upstream of the gage. Even a moderate surge had the potential to bring this material down and quickly clog the gage frame.

Another positive aspect of the site was that it was entirely on property managed by the State Land Board. Steffan previously worked with their land stewardship trust manager

and conservation services manager. Involving them and getting input as to what we could do to help achieve any of their recovery objectives proved to be mutually beneficial to all affected by the project.

The restoration of the diversion for the Toll Gate Ditch was another project component. The landowner had invested in a new weir to bring the diversion into compliance just before the fire. The diversion channel could be restored in conjunction with channel work and the construction of an off-channel basin or floodplain rebuild.

Colorado Parks and Wildlife had invested in the establishment of a Hayden Pass cutthroat trout fishery in the South Middle Creek basin. Although there was minor mortality from the August 2022 floods, it was hoped that surviving trout would be able to spawn in following seasons if the sediment didn't deter them. CPW was interested in developing a fish barrier waterfall in the stream to prevent the potential future invasion of non-native species such as brook trout. The objective was to incorporate such a structure into the project. In June 2022, Steffan toured the prospective project area with the CPW habitat and aquatic biologists, who suggested three possible sites for their fish exclusion barrier.

The NRCS objective was to have areas reseeded with appropriate native grass mixes and stabilize the area after construction to achieve erosion control.

A followup stakeholder core group meeting was held in April 2023 in La Veta, CO (with an online Zoom option) to discuss future activities and projects. The meeting was attended by:

Carol Dunn, HCWCD
David Steffan, HCWCD Remediation Coordinator and Spanish Peaks Alliance for Wildfire Protection
Mark Brunner, Upon the Rock Camp
Garrett Quintana, Natural Resources Conservation Service, Walsenburg
Sammie Molinaro, Natural Resources Conservation Service, Trinidad
Lonnie Brown, HCWCD
Andrea Harbin Monahan (by Zoom), Colorado Water Conservation Board

Steffan organized a site tour in July 2023. NRCS State Engineer TJ Burr participated, along with local and district engineers from Alamosa, Pueblo and Trinidad. Also in attendance was Doug Brgoch, the La Veta Mayor, former Water Commissioner and HCWCD's new contract Water Advisor. A goal of the July tour was to get insights on priorities and treatments that the involved stakeholders/agencies would be interested in implementing as a part of the project.

Attending that Middle Creek site tour were:

TJ Burr, NRCS State Engineer

Pamela Lopez, NRCS Pueblo District Engineer
Garrett Quintana, NRCS Soil Conservationist
Doug Brgoch, La Veta Mayor and HCWCD water advisor
David Steffan, HCWCD remediation coordinator

On the tour, Doug Brgoch showed the group where subsurface sheet piling and riprap were installed above the Middle Creek flood warning gage. At the site, it was noted there were substantial amounts of logs and large boulders to utilize for structures.

Subsequent to the July site tour, project objectives that were agreed upon were:

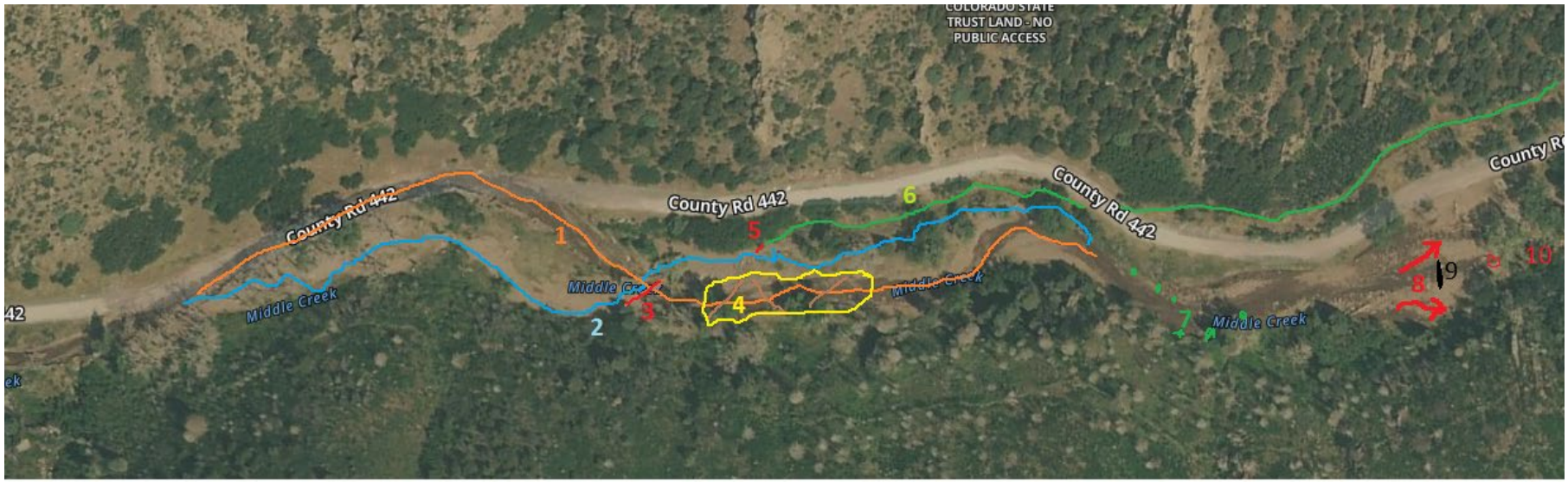
- Sediment capture and rebuilding of floodplains.
- Ensure the continued function of the stream gage.
- Restore the Toll Gate ditch diversion and possibly the original channel.
- Install a fish barrier per CPW specs to protect the newly stocked cutthroat population from invasive species.
- Prevent further erosion and headcutting.
- Improve the site for use by the State Land Board's recreation lease holders.

After the stakeholder meetings, it was decided that final work to get the flood warning gage back in working order was the top priority. With the rock graded and stabilized, the flow could be measured consistently and accurately by the gage; the gage itself would also be protected.

In September 2023, HCWCD allocated $5,000 to clean up and facilitate access to the Middle Creek project area, pending finding a contractor in the area who was still available to do the work before winter set in. A sign was also erected by Steffan with a brief description of the project, where funding came from and the partners involved.

The contractor chosen for the work on the warning gage site, Double M Excavating, had previous experience with the post-fire projects on Pass Creek and Idlewild Creek, including restoration of a ditch diversion and channel work. Having worked with TJ Burr previously, the contractor readily understood the recommendations and guidance for the project.

Following is the map of the final planned implementations for the grant project:



1. Current(unstable) flood channel.
2. Former (stable) creek channel.
3. Cutoff dam.
4. Flood plain restoration area with three permeable sills.
5. Diversion to Toll Gate Ditch headgate.
6. Toll Gate Ditch.
7. Revegatation Area.
8. Rocky debris to be graded to restore stream gauge function.
9. Stream Gauge.
10. Woody debris to be removed to provide clear outflow below gauge.

First: Middle Creek Flood Warning Gage

In Fall 2023, the planned maintenance was completed at the existing Middle Creek flood emergency warning gage. Debris was cleared by pushing the rocky boulder and sediment deposits to the north wall, forcing the water course back across the center of the vortex and over it. Limited upstream channel establishment was performed, and trees and woody debris were placed downstream of the gage with a limited amount hauled away. The integrity of the existing gage facility was maintained.

In Summer 2024, final work was completed to stabilize the gage location and reestablish the stream channel. After work on the stream gage site was finished, the intention was to move directly to the diversion project without interruption or the need to remobilize equipment. The time frame of early Summer 2024 resulted in completion of the work after spring runoff and before the summer monsoons.

Completed Middle Creek flood warning gage site; gage mounted on metal frame shown (center right)

Two seeding mixtures developed by USDA Natural Resources Conservation Service were used. Steffan seeded as Larry Morgan walked in the surface with the machinery to

achieve finish grade. The seeding mixes were for “above 7,500-feet” and “below 7,500-feet”. This site sat essentially at the split in elevation. Steffan used an NRCS-approved riparian mix to selectively hand seed the appropriate areas along the creek for this phase as well as for the final phase.

Ten willow shrubs were chosen by Double M contractor Larry Morgan and planted along the riparian area. Steffan also planted 20 gooseberry plants and 30 broadleaf alders on the completed project site.

Steffan installed breakaway border fencing along the leased private land at the lower end of the project area to keep livestock off the seeding and plantings.

Second: Channel Restoration and Diversion Replacement

When he took over coordination of the remediation efforts, one of Steffan’s first steps was to organize two stakeholder meetings to go over options and choose the final remediation projects to install in the Middle Creek drainage. Stakeholders weighed in on their priorities, and project objectives beyond the flood warning gage were determined accordingly. Once these were established, the site tours helped refine the project scope of work and the scale of improvements that could be implemented within the remaining budget.

Former DWR Water Commissioner Doug Brgoch and NRCS State Engineer T.J. Burr visited the area to provide overall recommendations, including the design of the dam structure for the ditch diversion. With this expert input, original plans were revised to achieve strength against floodwaters and a design to prevent flanking, resulting in moving the dam upstream. The benefits achieved were a reduced size for the dam, less construction material required, cost savings, the ability to restore the original stream channel, and use of a natural rock formation to tie into at the top of the dam.

Restoration of the diversion for the Toll Gate Ditch was a component of restoring the stream channel. The headgate was dug out, elevations were established for the dam and raceway, then the grade of the surface was established. Large boulders were stockpiled for use in the dam and the sediment capture structures. The channel was restored above the dam site. The stream was temporarily diverted to bypass both it and the area where the sediment capture structures would be. This unstable wide flood channel needed to be rebuilt, as recommended by Burr, so flood stages over about 280 cfs will overtop the dam and sheet out across the structures, depositing and capturing sediment.

Channel restoration above dam site

The dam was tied into the rock cliff that previously bounced the creek into a wide meander. Lined with geotextile fabric, the dam was built up with boulders and grouted. On its lower side, four- to six-foot rectangular boulders were tightly fitted and grouted. The cutoff dam surface forms a ten-foot wide swale, with the lower side several feet taller. The raceway to the diversion begins at the lower end of the dam and continues about one hundred feet to the diversion. The diversion itself was topped by a row of three-foot boulders to prevent any flood stage from trying to follow the ditch.

Diversion (background) and headgate with boulders to mitigate flood surges

The remediation work on Middle Creek restored its flow to the stable original stream channel. In doing so, it may enable eventual reconstruction of County Road 442. CR442 had been rendered unusable by post-fire flooding damage, which turned the roadway into the stream channel and added large amounts of sandy loam into the stream system.

Restored Middle Creek stream channel

Revegetated streambanks with alders and willow clumps (left and far right)

Steffan advised in September 2024, if more is to be done with remediation, it should include bank stabilization, which seems to be the most pressing issue on and below the burn scar.

Stakeholder Benefits Summary

A positive aspect of stabilizing the flood warning gage site was that it sits entirely on property managed by Colorado State Land Board (CSLB). Steffan worked with the CSLB Land Stewardship Trust Manager and Conservation Services Manager to get their input as stakeholders in the area. It was beneficial to involve them and discover their agency's recovery objectives, so this project could help CSLB work toward them. A Temporary Access Permit was granted by CSLB so HCWCD could ensure the remediation tasks were completed properly, as well as continue to monitor and maintain them.

The landowner agreed to contribute an additional $15,000 to this portion of the project. The restoration of the diversion was done in such a way that stream channel restoration and sediment capture structures were achieved in adjacent areas with significant savings of work and materials.

Fish barrier, Middle Creek

Another stakeholder, Colorado Parks and Wildlife (CPW) was able to dovetail with this project in its effort to establish a Hayden Pass cutthroat trout fishery in the South Middle Creek basin. CPW anticipated the trout that survived the flooding would be able to spawn over a couple of seasons and establish a viable population. A further investment

of some 8,000 fingerlings was made in the summer of 2023. CPW found a natural rocky structure with a cascade that could serve as a fish barrier about a quarter mile upstream of the Middle Creek project. It would serve to exclude invasive non-native species such as brook trout from entering the upper Middle Creek basin.

Per the request of NRCS, areas were reseeded with appropriate native grass mixes after the construction was completed to stabilize the area. Erosion control was achieved by adding a revegetation zone between the stream gage and the ditch diversion. Riparian tree species alders and willows were planted in this area. The contractor's design of the ditch diversion dam was completed under guidance by the NRCS State Engineer after his site visit.

The deliverable for this task was met through cooperative work with and to the benefit of numerous stakeholders, as well as reporting, mapping and photos of project completion.

TASK 4

Huerfano County EWP Projects

Indian, Middle and South Abeyta Creeks

Huerfano County received approximately $7-million in USDA Natural Resources Conservation Service funding for Emergency Watershed Protection (EWP) work subsequent to the 2018 Spring Creek Fire. Implementation work under EWP was conducted in Indian, Middle and South Abeyta Creek drainages. ARWC worked in partnership with the County and Enginuity to ensure that projects installed by ARWC on behalf of HCWCD complemented EWP projects to assist in overall recovery for the area. In addition, ARWC worked in partnership with the County to monitor these projects after completion.

Projects included:

- Indian Creek – County Road 421

  Dam, diversion/excavation earthwork, critical area planting and mulching, erosion control blanketing, waterbar, obstruction/debris removal, streambank protection (580), rock riprap.

- Middle Creek – County Road 422 and Lot 19

  Dam, diversion/excavation earthwork, debris removal, rock riprap, low water crossing.

- South Abeyta Creek – County Roads 442, 440 and State Highway 160

  Dam, diversion (348)/excavation earthwork, critical area planting (342) and mulching, obstruction/debris removal (500), streambank protection (580), trash/debris racks, rock riprap, waterbar, soil stabilization/traps.

The following spreadsheet shows the EWP projects that were completed by Huerfano County and considered as match for this CWCB grant. Included are the creeks where work was conducted, recovery measures, project/task names, location, units of treatment, unit cost, total cost, and percentage of watershed affected.

HUERFANO COUNTY EWP Projects Used as MATCH

Creek	Project	Description	Location	Dollar Amt		Total Project	Total Creek	% W/shed
Indian	**Project Name:**	5218 CR 421 5218 CR 421						
	Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)			
	Dam, Diversion / Excavation earth-work	425	CY					
	Critical Area Planting and Mulching	20	AC					
	Erosion Control Blanket	2100	SY					
	Total Installation Cost					**$85,055.00**		
	Project Name:	5218 CR 421						
	Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)			
	Water bar	1	EA					
	Obstruction/Debris Removal	50	CY					
	Streambank Protection (580)	333.333	LN					
	Rock Rip-rap	35	CY					
	Total Installation Cost					**$101,490.00**	**$186,545.00**	20%
Middle	**Project Name:**	2122 CR 442						
	Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)			
	Dam, Diversion Excavation earth-work	400	LF					
	Debris Removal	50	CY					
	Rock Rip-rap	150	CY					
	Total Installation Cost					**$94,890.00**		
	Project Name:	Lot 19 La Veta Ranch						
	Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)			
	Debris Removal	50	CY					
	Rock Rip-rap	40	CY					
	Low Water Crossing							
	Total Installation Cost					**$34,015.00**	**$128,905.00**	14%
South Abeyta	**Project Name:**	5720 CR 442						
	Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)			
	Critical Area Planting (342) and Mulching/Wattles	50	AC	$4,000.00	$200,000.00			
	Rock Rip-rap	420	CY	$130.00	$54,600.00			
	Earthwork, General Cut/Fill (per CY)/Water Bars/Spillway	100	CY	$11.00	$1,100.00			
	Total Installation Cost					**$255,700.00**		
	Project Name:	CR 442						
	Proposed Recovery Measure	Quantity	Units		Amount ($)			

(including mitigation)			Unit Cost ($)		
Dam, Diversion (348) / Excavation earth-work	200	CY	$11.00	$2,200.00	
Critical Area Planting (342) and Mulching/Wattles	10	AC	$4,000.00	$40,000.00	
Streambank Protection (580)	500	LF	$300.00	$150,000.00	
Total Installation Cost					**$192,200.00**

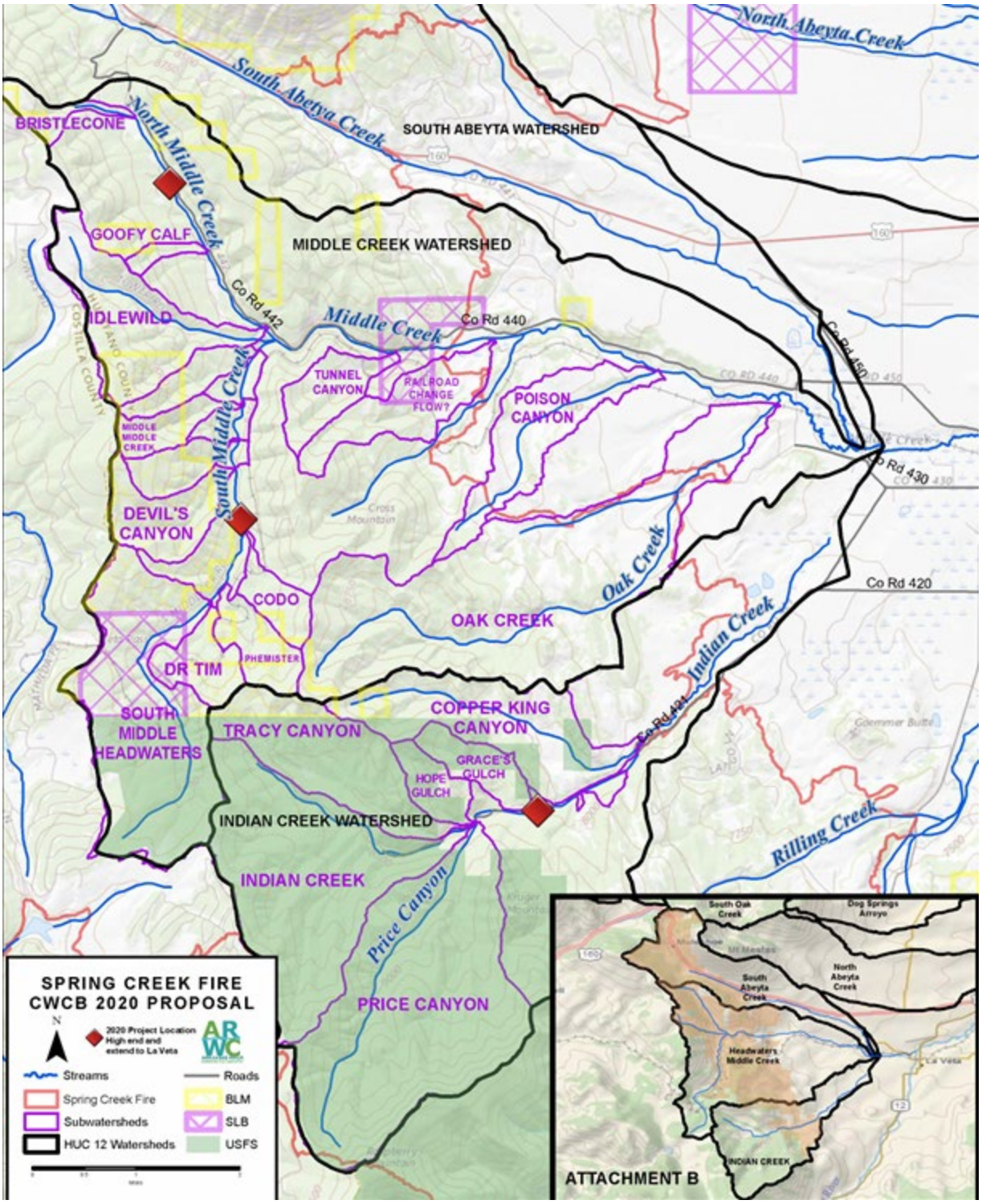
Project Name:	5336 Hwy 160				
Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)	
Dam, Diversion (348) / Excavation earth-work	75	CY			
Critical Area Planting (342) and Mulching/	20	AC			
Obstruction/Debris Removal (500)	1	CY			
Streambank Protection (580)	1700	LF			
Trash/Debris Rack-W	1	EA			
Trash/Debris Rack-N	1	EA			
Rock Rip-rap	700	CY			
Water bar	1	EA			
Total Installation Cost					**$146,715.80**

Project Name:	198 CR 440						
Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)			
Trap/RIB bags 4'	400	LF	$33.00	$13,200.00			
Obstruction Removal	50	CY	$20.00	$1,000.00			
Total Installation Cost					**$14,200.00**	**$608,815.80**	66%
					Total Watershed	**$924,265.80**	100%

Map

https://arcg.is/1CKDn91

The following map shows the area where the EWP projects were completed, including Indian Creek, Middle Creek and South Abeyta Creek.



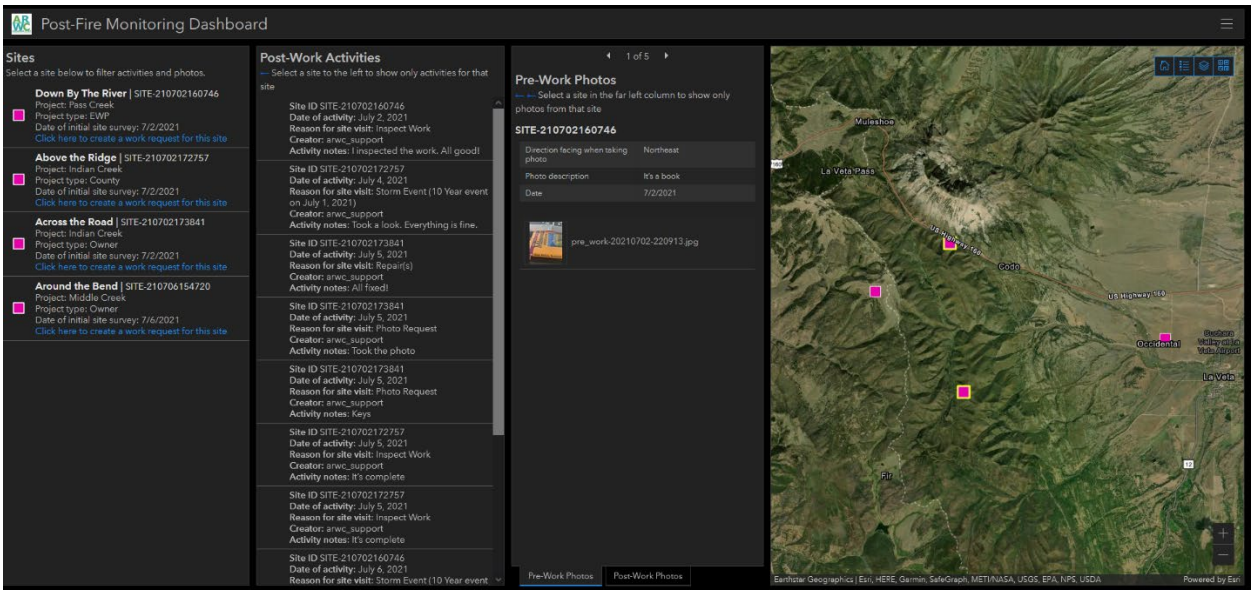
The deliverable for this Task 4 was met through reporting and mapping of project completion.

TASK 5

Project Monitoring and Photo Mapping

A system to collect and distribute data was developed and utilized to inform stakeholders, funders, and other organizations about the treatments used in this grant project.

By August 2021, the photo monitoring data collection applications and dashboard had been created and were being tested in the field.

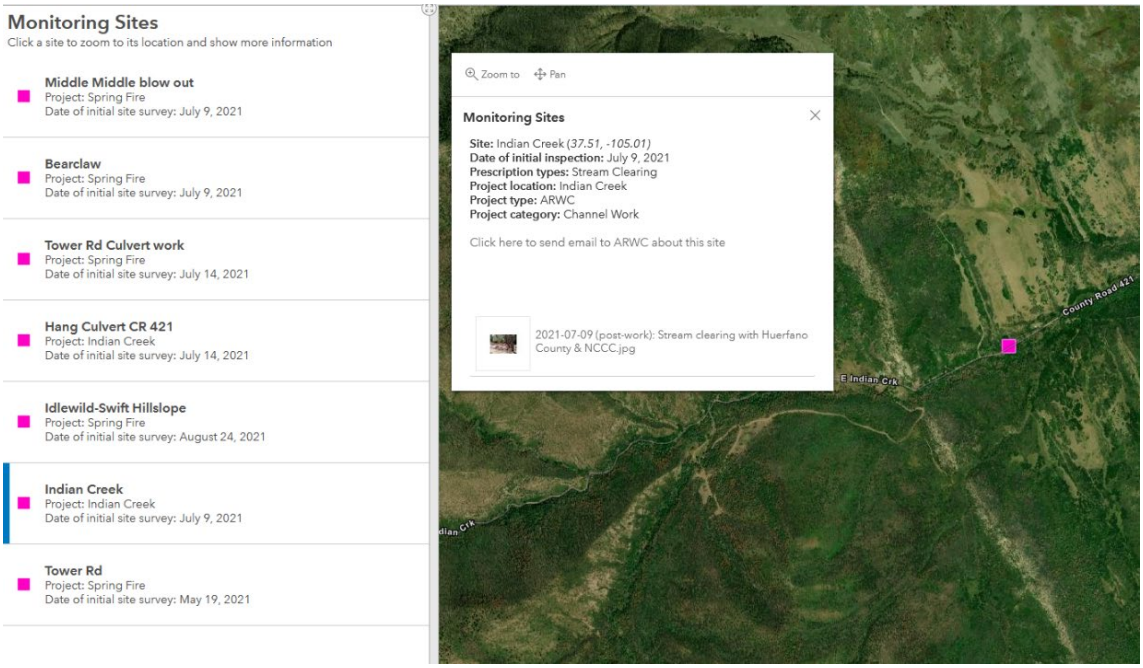


Screen shot of Post Fire Monitoring Dashboard, August 2021

ARWC reported in October 2021 that work was proceeding to build out this mapping and monitoring task. Information was available at the following web address:

https://arkcollaborative.maps.arcgis.com/apps/dashboards/449b5b291f514d419d76fbe52d4edb38

Project sites are listed on the left of the dashboard. If one of the sites is clicked, the map will zoom to that area, open a popup and flash the pink square for the point that goes with the site.



As noted below, drone flights provided aerial images of projects before and after implementation, demonstrating how they were performing over time.

Photo mapping was conducted in excess of the task's goal of three years. ARWC developed an online dashboard and mapping site that tracked recovery projects by CWCB, CDPHE and Huerfano County/EWP. Project monitoring and photo mapping are recognized as being essential to inform future post-fire recovery treatments.

During dashboard development, ARWC encouraged its use and feedback. As a note, the sites shown for "blowouts" on Bearclaw and the Middle reach of Middle Creek were not project sites; they were simply used for workflow and app tests.

Because many before and after photos were taken prior to the dashboard's creation, they and the descriptions were added manually, requiring several months.

Drone Flights

In July 2021, an intense localized storm event over Idlewild Creek and South Middle Creek drainages moved a large amount of sediment, rocks and trees from the hillslopes and into the drainages. The main channel and all tributary channels changed shape dramatically, significantly widening and deepening in the process.

Coincidentally, the day before this storm event, River Science completed pre-flood drone flights to collect aerial imagery for analysis. The same drone flight activity was conducted post-flood. This remote sensing allowed River Science to map and quantify erosion and deposition of sediment in Idlewild Creek.

PHOTO MAPPING

In Summer 2022, ARWC was joined on the Task for photo mapping and monitoring by River Science of Canon City. See the description below in the section on IDLEWILD CREEK for more information. Between Winter 2022 and early 2023, ARWC worked with River Science to do additional drone flights, monitoring and mapping of the project area.

2023 was the last year remaining of the three years – 2021, 2022, 2023 – for which ARWC was contracted to conduct photo monitoring. The final work involved "after" photos in Idlewild canyon provided to ARWC by David Steffan.

Photo mapping can be viewed on the ArcGIS stakeholder information dashboard.

SEDIMENT STUDY AND H&H REPORT

Sediment Study

In its report, "Idlewild Creek Post-Fire Sediment Issues and Treatment Evaluation," River Science concluded that the intense July 2021 rainstorm (a 25-year or 50-year recurrence interval) had eroded a volume of 584,539 cubic feet and deposited 454,116 cubic feet. Within the mapped area, thirteen acres experienced elevation changes. Additionally, the mapped areas did not include the upper sections of two large drainages, which experienced significant widening and erosion. The reported estimate was that those two drainages likely added thousands of cubic feet of additional eroded material.

River Science evaluated the ARWC-led construction of treatments designed to reduce the sediment transport by reducing the channel grade, spreading out and slowing down the flow, and preventing future bank or channel erosion. Of the treatments, 128 were built using locally sourced rock and logs. River Science used survey data and hydraulic modeling to predict that these structures are likely to help reduce the overall flood depth and sediment transport (measured with shear stress).

This sediment study report can be found on the HCWCD website at the following link: https://www.hcwcd.net/_files/ugd/c647df_9645c825d6fe4af4bf3400231a06c220.pdf

Hydrologic and Hydraulic (H&H) Report

Hydrologic assessments performed by Lotic Hydrological were estimated using available data of the July 2021 flood event. Total rainfall depth for the storm was noted at approximately 1.8 inches about one hour after the storm began. Again, Lotic estimated the storm total corresponded to a one-hour rainstorm with a 25- or 50-year recurrence interval. Hydraulic modeling was performed using the datasets discussed in the report referenced above, Idlewild Creek Post-Flood Sediment Issues, as well as surveyed flood debris lines. Using HEC-RAS with recent elevations and these debris lines, River Science used conservative approaches to estimate the flood event discharge under various scenarios. Application of several different approaches for estimating stream flows at the Idlewild watershed outlet indicated that flows during the July 2021 event likely peaked between 550 and 1,000 cfs. River Science reported that bulking was difficult to pinpoint. However, using a relative bulking factor to the outlet's discharge (described in the report), certain sections of the Idlewild Creek could have had a relative factor as high as 2.9, with the southern side drainages between 8- to 12-times. These figures suggest that the side drainages experienced landslides.

The hydrologic and hydraulic report can be found on the HCWCD website at this link: https://www.hcwcd.net/_files/ugd/c647df_65b4219f7b5d4892afff203176b9fa5e.pdf

Unanticipated Findings

In the post-July 2021 flood survey of the drainages, ARWC found evidence in one of the eroded tributaries of past burn layers in the soil profile. Colorado Geologic Survey went to the area and took samples from four different layers in that spot to estimate age based on Carbon-14 dating. This provided background of the fire history of the area.

COMPLEMENTARY WORK: NONPOINT SOURCE WATER QUALITY

Through federal Nonpoint Source Water Quality funding provided by EPA/Western Area Power Authority and administered by Colorado Department of Public Health and Environment, ARWC undertook a separate but connected project to address the runoff-damaged burn scar and Idlewild Creek. The federal funding portion of this nonpoint source activity was considered match for CWCB grant *CTGG1 PDAA 2021*2486*.

Because Idlewild is tributary to Middle Creek, the activities contributed to Middle Creek recovery, Task 3 of CWCB *CTGG1 PDAA 2021*2486.* They included hillslope treatments by Colorado Corrections State Wildland Inmate Fire Team **(**SWIFT) crews; the use of SWIFT-felled trees for channel structure treatments and bank reinforcements; culvert and sedimentation retention work at the Tower Road crossing of North Middle Creek.

To restore the channel shape and function, ARWC contracted heavy equipment and used nearly 600 trees to create 132 features and structures, including:

- bank protection;
- floodplain connectivity treatments;
- ramps;
- grade control structures;
- V-structures;
- crib walls.

Treatments were completed along a one-mile-long reach of Idlewild Creek. SWIFT crews completed over 24 acres of hillslope treatments and best management practices to reduce slope erosion in this area. In addition, along one mile of the stream channel, crews completed 3.2 acres of seeding.

The stakeholder dashboard includes “before” and “after” photos of the Idlewild project. ARWC personnel continued to conduct inspections, including photos, in the summer of 2022, particularly after flood events.

River Science conducted additional drone flights over the Idlewild project area after another flooding event in Summer 2022 in order to evaluate the function of the treatments that were installed.

Maps and information about this Idlewild nonpoint source project can be found at the following link:
https://arkcollaborative.maps.arcgis.com/apps/dashboards/449b5b291f514d419d76fbe52d4edb38

The map can be zoomed in and out for more detail.

COMPLEMENTARY WORK: IDLEWILD CREEK

The stakeholder dashboard includes “before” photos of the Idlewild project. Most of the “after” photos have also been added. ARWC personnel are conducting further inspections, including photos, particularly after flooding events. ARWC estimates the rest of the planned photo mapping work under Task 5 will be completed this summer.

A Colorado Geological Survey (CGS) team visited the Idlewild drainage and collected soil samples from four distinct charcoal layers in the soil profile that was exposed (eroded) after a storm even in July of 2021. These samples were sent for carbon-14 dating so we could understand the fire history of this area. They received the test results back and a report of the findings is attached at the end.

CGS found the charcoal layers at depths of 5, 20, 33, and 42 inches in-depth of the soil profile. They believe there might have been some soil contamination of the two samples

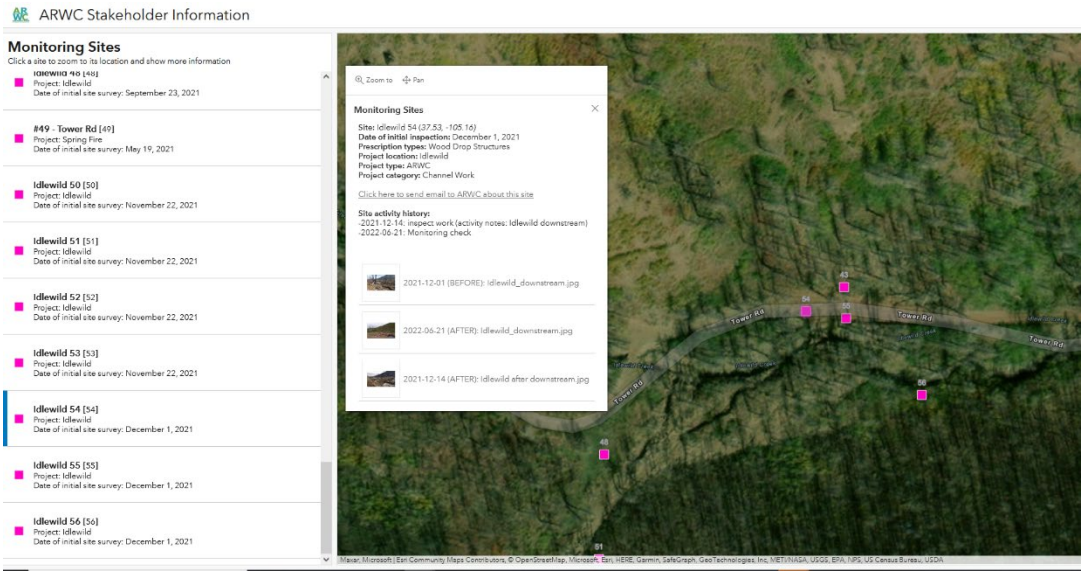
at the 33- and 42-inch depth, because the C-14 age and calibrated age were close to each other; they are planning to return to the site and do a more indepth study.

Nevertheless, some interesting results were found. For example, sample #201 (5.5 inches in depth) and sample #202 (20 inches in depth) show a difference of 213-290 years between the two charcoal layers and just over a foot of soil depth between the two samples, which might speak to the highly erodible soils in the area.

USGS conducted a lake sediment study nine miles south of these charcoal layers in Idlewild on the Bear and Blue Lakes sediment layers. It was anticipated they would be compared to the CGS samples.

Regarding the monitoring in the Idlewild drainage, ARWC personnel went there on June 21, 2022 to check on the main structures to see how they look after snowmelt and light rain. There are updated photos for sites #54, #55 and #56 which can be viewed on the ARWC Stakeholder Information Dashboard. ARWC and River Science continued to monitor the weather and project site for more extensive flooding events. After events, River Science visited the project area to fly drones and capture data on how much material was captured by the structures shown at photo points #54, #55 and #56.

To find the sites on the dashboard, zoom in to the map area with the pink squares and find #54, #55 and #56. When you click on one, a dialog box opens showing the before-work photos, after-work photos and the photo dated June 21, 2022.



Findings of the ARWC site visit and Colorado Geological Survey sampling and study follows.

In mid-November 2022, ARWC personnel made trips to the Idlewild watershed area to inspect the post-fire work following 2022 summer storm events, particularly one in August. Pictures were taken on August 27 and uploaded to the ARWC map at this

link: ARWC Stakeholder Information Dashboard. They include photo points updated with “after photos” 19, 21-24, 27-28, 40-43, 48, and 50-56. Clicking on the corresponding number in the left panel obtains a popup with site information and the photos. As of the end of August 2022, the project structures reportedly were intact and holding back sediment and debris.

ARWC also coordinated with Luke Javernick of River Science as he conducted an additional drone flight to gather data as part of the monitoring for this project.

ARWC conducted follow-up conversations with Colorado Geological Survey (CGS) regarding CGS soil samples taken in the project area. Some of this follow-up was conducted in cooperation with David Steffan, who worked extensively on installation of flood control structures in the project area.

In April 2024, David Steffan assisted ARWC with the final set of monitoring photos for the project area. They are available at this link, which is a shared map: Stakeholder Information Dashboard (external). The map shows numbered monitoring sites with GPS coordinates, date of initial inspection, prescription types, project location, project type, and project category. Also included are photos of the sites.

EXAMPLE:

Site: Idlewild 20 - Confluence w/ Middle Creek (*37.53, -105.14)*
Date of initial inspection: August 27, 2021
Prescription types: Channel Armoring
Project location: Idlewild
Project type: ARWC
Project category: Channel Work

Activities that were accomplished under this Mapping and Monitoring task:

- Established photo point locations for projects.
- Developed a system for collecting data after storm events.
- Conducted drone imagery for post-project completion.
- Collected data after storm events.
- Managed data, created maps and updated online platform.
- Developed reports for stakeholders.

The deliverable for this task was met through successful collection and distribution of data, maps and photos of completed projects through an online platform for over three years.

Task 6

Administration

From the onset of the grant project through October 2024, HCWCD conducted grant management through a contract with Dunn Write (Carol Dunn and staff). Grant management included record keeping, financial management, and other aspects of project administration as follows:

- Progress reports and grant reimbursement requests and documentation.
- Maintaining the HCWCD website with details and progress of this grant project.
- Arranging separate tours of the project area for Joshua Godwin, CWCB and Anna Mauss and Lauren Duncan, CWCB.
- Reporting on project activities as part of HCWCD annual reports to the District Court.
- Research for input on fire/flooding implications on electrical grid resilience in Huerfano County.
- Record keeping for stakeholder/core group activities.
- Contracts with subcontractors.
- Involved and assisted with landowner (Colorado State Land Board) permission for work in the Middle Creek watershed, including easement and liability certificate.
- Investigated potential additional sources of funding for future project tasks.
- Coordination of final Task 5 activities with ARWC.