



COLORADO RIVER DISTRICT
PROTECTING WESTERN COLORADO WATER SINCE 1937



Lower Gunnison Project (2015 NRCS RCPP) Final Summary Report Sponsoring Local Organization: Colorado River District



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Attachment A: Final Soil Health Survey Report

Acknowledgements

The Lower Gunnison Project owes its success to a long list of dedicated partners, organizations, and individuals. As such, there are too many devoted participants to separately thank and acknowledge. However, in addition to the federal family of Department of Interior agencies (US Bureau of Reclamation, US Geological Survey, US Bureau of Land Management and the US Fish and Wildlife Service) the main non-federal partnering organizations can and should be explicitly acknowledged, these include: the Colorado Water Conservation Board, No Chico Brush (Agricultural Producer Group), Colorado State University (CSU) Agricultural Extension Service and the CSU Water Center, the Nature Conservancy, Trout Unlimited and a host of Gunnison basin water conservancy, conservation districts, and ditch company members. Most of these local stakeholders and water users are unpaid volunteers, working extremely hard to modernize their agricultural infrastructure, as stewards of our precious natural resources.

Beginning in 2014, this group worked tirelessly to overcome a host of overlapping challenges to ensure that the Lower Gunnison Project met and even exceeded its original goals and objectives.

Additionally, this project could not have been completed without the dedicated assistance of the NRCS team in Colorado and across the country. In particular, the Lower Gunnison Project project team would like to specifically thank and acknowledge the efforts of Clint Evans, Randy Randall, John Andrews, and Barb Gohlke among the many other capable NRCS staff that worked behind the scenes to provide significant assistance.

Executive Summary and Project Description

The RCPP-funded project entitled *Modernizing Agricultural Water Management in the Lower Gunnison River Basin: A Cooperative Approach to Increased Water Use Efficiency and Water-Quality Improvement* (hereinafter referred to as the *Lower Gunnison Project or LGP*) had the objective of protecting and enhancing four natural resource concerns: improvements to water availability, water-quality, degraded habitat, and soil health.

These objectives were accomplished through the development and implementation of an integrated program to improve off- and on-farm irrigation efficiency by modernizing and optimizing irrigation water conveyance and application systems in four focus areas within the Lower Gunnison Basin.

In 2015, the Colorado River District received notice that up to \$8 million of funding was available from the NRCS under RCPP for this project and an Alternative Funding Arrangement (AFA) was set up with directed funds allocated by the NRCS program area into Watershed Authority (PL-566) and Environmental Quality Incentives Program (EQIP) and divided into Technical Assistance (TA) and Financial Assistance (FA) budget ‘buckets’ for each program area.

Now completed, the LGP supported a total of seven off-farm projects and 15 on-farm construction projects. These were distributed within the following four sub watersheds or “focus” areas within the Lower Gunnison River Basin (see Figure 1):

1. North Fork Water Conservancy District (NFWCD)
2. Uncompahgre Project
3. Crawford Water Conservancy District (CWCD)
4. Bostwick Park Water Conservancy District (BPWCD)

A total of \$16,811,896.70 of combined federal NRCS and partnership funds were expended to bring this project to completion.

Overall, the LGP RCPP-funded efforts assisted water users and agricultural producers meet state and federal regulatory requirements. All required NEPA and cultural resource compliance activities were completed and approved for all off- and on-farm projects via individual processes and pursuant to the [2018 Final Watershed Plan and Environmental Assessment for the Lower Gunnison Project](#).

This final project summary report provides the relevant details of this four-year project.

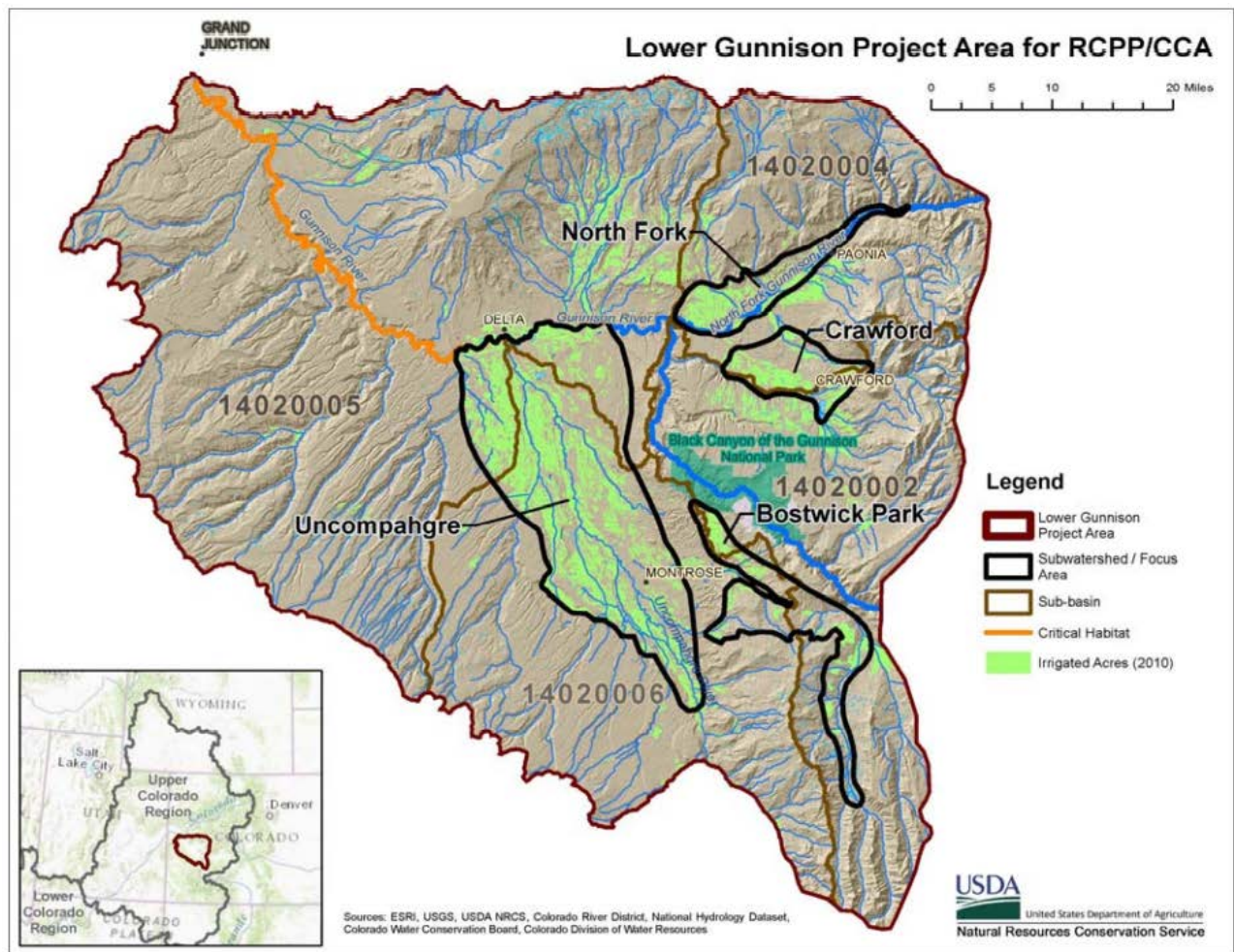


Figure 1 – Lower Gunnison Project Map, showing Hydrologic Unit Codes (HUCs)

1 Watershed Plan and Program (PL-566) / Off-Farm Improvement Projects

In all, seven off-farm projects were designed and constructed, consistent with NRCS standards and practices. These projects were certified and documented as complete by NRCS State Engineer, John Andrews after careful review, inspections, and standard close-out processes.

All completion reports and additional project details are available upon request, however, relevant off-farm project-specific information is available on <https://gunnisonriverbasin.org/projects/lower-gunnison-project/>.

With additional outside funding, two of the seven off-farm projects are anticipated to be expanded and to continue moving forward in 2021 and 2022; these include the Grand View-Aspen Integration and canal improvement project, cost-share funded by USBR Salinity Program, and the Lower Aspen Canal project funded by multiple partners and overseen by the Crawford Water Conservancy District. Construction is anticipated to begin in late 2021 and continue through 2022, effectively expanding and leveraging the original 2015 AFA and consistent with the 2018 watershed plan.

Furthermore, the 2018 Environmental Assessment is currently being expanded and supplemented to include additional related projects for future permitting. Funding has not yet been secured for this list of projects. The publication of the Supplemental EA is due in 2022.

Table 1: Off-farm summary table

#	Project	Total Non-Amortized Construction Costs ¹			Estimated Average Annual Benefit ²					
		FA Costs	TA Costs	Total Costs	Avoided Salinity Reduction	O&M Savings - Piping	Cost Avoidance	Producer benefits	Reduced Travel Costs - SCADA	Total
1	Fire Mountain Canal & Reservoir Company Rogers Mesa Segment 47 Pipeline and SCADA	\$1,271,961.53	\$ 37,504.64	\$1,309,466.17	\$ 338,566.00	\$ 31,549.00	\$ 116,996.00	\$ 15,124.00	\$ 24,195.00	\$ 526,430.00
2	Uncompahgre Project Phase 9 Lateral Piping (GB & GBA Laterals) and SCADA	\$1,441,870.72	\$ 294,770.00	\$1,736,640.72	\$ 323,111.00	\$ 1,391.00	\$ 176,390.00	\$ 89,681.00	\$ 14,517.00	\$ 605,090.00
3	Crawford C4 Ranch Regulating Reservoir and SCADA	\$ 350,703.47	\$ 48,651.15	\$ 399,354.62	\$ 23,545.00	\$ 4,173.00	\$ 28,041.00	\$ 11,692.00	\$ 14,517.00	\$ 81,968.00
4	Needle Rock Ditch Company Head Gate Replacement & Piping Project and SCADA	\$ 335,381.63	\$ 26,175.81	\$ 361,557.44						
5	Crawford Water Conservancy District SCADA	\$ 101,191.73	\$ 41,432.40	\$ 142,624.13						
6	Grandview-Aspen Piping Integration Project	\$ 528,183.64	\$ 66,202.08	\$ 594,385.72						
7	Bostwick Park West Lateral Phase I Piping and SCADA	\$ 572,187.53	\$ 2,370.00	\$ 574,557.53	\$ 34,533.00	\$ 601.00	\$ 15,767.00	\$ 8,837.00	\$ 14,517.00	\$ 74,255.00
TOTAL		\$4,601,480.25	\$ 517,106.08	\$5,118,586.33	\$ 719,755.00	\$ 37,714.00	\$ 337,194.00	\$ 125,334.00	\$ 67,746.00	\$ 1,287,743.00

It should be noted that the estimated average annual cost benefits above were calculated as part of the 2018 Environmental Assessment. These estimated benefit values were not independently verified nor recalculated upon project completion. All costs shown are limited to NRCS RCPP and do not include the cost-share portion of these project components.

¹ Costs reflect the federal investment portion only and do not include cost share.

² Benefits numbers were taken from [2018 Final Watershed Plan and Environmental Assessment for the Lower Gunnison Project](#), National Economic Development (NED) Section, Table 5.6-11

Table 2: Off-farm project benefits summary table

#	Project	Benefits				
		Water Quality	Water Availability	Soil Health	Habitat Improvements	Greenhouse gas emission reduction
1	Fire Mountain Canal & Reservoir Company Rogers Mesa Segment 47 Pipeline and SCADA	Salt reduction: ~ 2,365 tons/year	x	x	X	x
2	Uncompahgre Project Phase 9 Lateral Piping (GB & GBA Laterals) and SCADA	Salt reduction for Phase 9: ~ 6,030 tons/year Selenium reduction range: 241-482 lbs/year	x	x	X	x
3	Crawford C4 Ranch Regulating Reservoir and SCADA		x		X	x
4	Needle Rock Ditch Company Head Gate Replacement & Piping Project and SCADA	x	x		X	x
5	Crawford Water Conservancy District SCADA		x		x	x
6	Grandview-Aspen Piping Integration Project	x	x		X x	
7	Bostwick Park West Lateral Phase I Piping and SCADA	x	x		x	x
	TOTAL	Salt reduction: ~ 8,395 tons/year Selenium reduction range: 241-482 lbs/year				

1.1 Fire Mountain Canal & Reservoir Company Improvement Project and SCADA (Rogers Mesa Segment 47 Pipeline)

This project was within the North Fork Water Conservancy District focus area and was jointly funded by NRCS RCPP, Reclamation's Salinity Control Program, and Colorado Water Conservation Board. The RCPP funded portion involved piping of approximately 2 miles of the total improvement project that piped a total of 4.2 miles of the Fire Mountain Canal (see Figure 2).

Additionally, four solar powered remote monitoring and SCADA (Supervisory Control and Data Acquisition) infrastructure was funded by RCPP and implemented at the following sites:

1. Patterson lateral
2. Rubicon gate at Leroux creek
3. Leroux creek intake
4. Main intake and Jessie ditch turn out



Figure 2 – Fire Mountain Canal Improvement Project: New siphon entrance and screen structure (left) with HDPE piping related to segment 47 pipeline (right)

1.2 Uncompahgre Project Phase 9 Lateral Piping (GB & GBA Laterals) and SCADA

The Phase 9 lateral piping project was jointly funded by RCPP, Reclamation Salinity Control Program, and State of Colorado Non-point source program. The RCPP portion of the project piped 3.4 miles of the GB and GBA lateral canals (see Figure 3). This project also included the development of the west side system optimization and modernization plan.

Additionally, remote monitoring and SCADA infrastructure was implemented at the following four sites (see Figure 4):

1. Selig canal diversion – headgate and canal
2. Loutzenhizer canal diversion – headgate and canal
3. East canal diversion – headgate and canal
4. Office HUB – computer and software



Figure 3 - Stockpile of PVC pipe used (left) used to enclose GB-GBA laterals (right) as part of Phase 9 East side lateral project of the Uncompahgre Project, north of Montrose, Colorado



Figure 4 – SCADA controls installed at the Loutzenhizer Diversion, Uncompahgre River, south of Montrose, Colorado

1.3 Crawford 4C Ranch Regulating Reservoir and SCADA

The 4C regulating reservoir (or fluctuation pond) was constructed within the Crawford Water Conservancy District, east of Crawford, Colorado. The project included the construction of a 19 acre-foot capacity reservoir, inflow and outflow control structures and SCADA. Much of the design and initial site work was funded by the Colorado Water Conservation Board as cost share, through a cooperative agreement with the Colorado River District to provide this technical assistance. Please see Figure 5.

The remote monitoring and SCADA infrastructure was implemented in the following sites, as shown in Figure 7:

1. Crawford clipper diversion – Parshall flume
2. Baxter manifold
3. 4C pond inflow and outflow

Solar panels were used to power the systems at the Crawford Clipper diversion and 4C pond. The project also added SCADA integrated network communication infrastructure on Young's Peak, near Crawford (Figure 8).



Figure 5 – The 4C regulating reservoir during construction, part of the Crawford Clipper Ditch Company, near Crawford, Colorado



Figure 6 – The completed 4C regulation reservoir after construction, near Crawford, Colorado.



Figure 7 – Solar powered implemented SCADA system component at 4C regulating reservoir outflow, Crawford



Figure 8 - Young's Peak Communication Station, Crawford, Colorado

1.4 Needle Rock Ditch Company Head Gate Replacement & Piping Project and SCADA (i.e., NRD Project)

This project was located within the Crawford Water Conservancy District focus area. It included replacement of 875 feet of open earthen ditch with 42-inch pipe, construction of diversion headworks with screening structure and fish passage along with SCADA implementation. The incorporated fish passage and screening improvements eliminated an existing obstacle to migration and thereby expanded aquatic habitat. This portion was made possible through a funding partnership with the National Resources Defense Council (NRDC), Colorado Trout Unlimited (CTU), and the State of Colorado. This cooperative effort significantly expanded the fish and wildlife benefits and helped meet habitat improvement objectives of the LGP. Please see Figure 9.

In future phases, it is anticipated that this SCADA node will be integrated into the regional SCADA network that Crawford Water Conservancy District operates and maintains.



Figure 9 – Needle Rock Ditch Company new pipeline screening structure, stilling basin and fish passage. Flow is from left to right. The SCADA installation with mast and solar panel can be seen to the left of the new headgate entrance, Crawford.

1.5 Crawford Water Conservancy District SCADA (aka Smith Fork SCADA)

This project included sensor installation and remote monitoring at the following locations:

1. Crawford Reservoir control house - with existing AC power
2. Aspen canal monitoring point – solar powered
3. Crawford Reservoir Feeder Canal - with existing AC power

This is illustrated in Figure 10.



Figure 10 – Implemented SCADA equipment at the Crawford Reservoir Feeder Canal, Crawford, Colorado

The project also implemented additional network communication equipment to the Young's Peak tower (shown in Figure 11) to enable communication between the Feeder canal and the CWCD office. It is anticipated that this location will support an expansion of the SCADA network within the Crawford WCD.



Figure 11 – SCADA network telemetry equipment installed on Young's Peak tower to assist with the transmission of regional information collected, Crawford, Colorado

1.6 Grandview-Aspen Piping Integration Project

This project was located within the Crawford WCD focus area and leveraged RCPP funds against US Bureau of Reclamation Salinity Funds to create a large, multi-beneficial project. The project included enclosing 460 feet of the Grand View canal's middle section with dual large diameter pipelines. It also included the

construction of a large entrance structure to control, measure, and screen debris from entering the dual pipelines. This is shown in Figures 12 and 13.



Figure 12 – Grandview Canal inlet and screening structure during construction, Crawford



Figure 13 – Grandview completed canal inlet and screening structure, Crawford, Colorado

1.7 Bostwick Park West Lateral Phase I Piping and SCADA (West Lateral)

The Bostwick Part West Lateral Phase I Piping project replaced approximately 0.5 miles of open, earthen lateral with an enclosed pressurized HDPE pipeline. The project also included remote monitoring and SCADA implementation. See Figure 14.



Figure 14 – Bostwick Park West Lateral Improvement Project showing piping and valve installation

2 On-Farm and Near-Farm Irrigation Improvement Projects

There were four separate application periods for Conservation Activity Planning (CAP) for on- and near farm irrigation improvement funding. These plans were ranked based on owner interest, ability to address priority, resource concerns, and cost effectiveness. This resulted in 3 funding rounds for project implementation.

“Round 0” CAP application period did not result in any on-farm implementation projects. Proposed projects that met ranking criteria in Rounds 1 through 3 were funded and successful applicants chose the Technical Service Provider (TSP) from an approved list to develop the desired CAP, create approved designs and oversee construction, as appropriate, to result in the following irrigation improvement projects.

1. Summary Rounds 0 and 1:
 - a. 21 applications, 21 CAPS completed resulting in 14 construction projects.
 - b. The original associated obligated construction contracts totaled \$1,265,060.22, but this was reduced to \$974,957.01 due to the rescindment of one project based on landowner non-compliance.
 - c. These projects resulted in approximately 338 acres being treated in the Lower Gunnison Basin.
2. Summary Rounds 2 and 3:
 - a. 7 applications, 7 CAPS completed resulting in 1 construction project.
 - b. Construction costs totaled \$138,307.
 - c. The project resulted in approximately 63 acres treated in the Lower Gunnison Basin.

Table 3 summarizes the on-farm activities from all rounds, indicating that a total of \$1.5 million was expended to develop 28 CAPS for a total of 1072 acres. 16 projects were designed and 15 were implemented, treating approximately 401 acres and controlling approximately 800 tons of salt, assuming an average of 2 tons per acre per year (NRCS personal communication).

Table 3: On-farm summary table

#	Focus Area	Round	Acres	System	CAP FA	Construction FA	Construction TA	Total Costs	Construction costs/Acre
1	Crawford	0	55.0	center pivot	\$3,555.00	N/A	N/A	\$3,555.00	N/A
2	Uncompahgre	0	21.0	center pivot	\$4,366.00	N/A	N/A	\$4,366.00	N/A
3	Uncompahgre	0	115.8	center pivot, big guns, gated pipe	\$2,897.00	N/A	N/A	\$2,897.00	N/A
4	North Fork	0	98.0	center pivot, wheel line	\$3,735.00	N/A	N/A	\$3,735.00	N/A
5	North Fork	0	18.8	Sideroll sprinklers	\$2,683.97	N/A	N/A	\$2,683.97	N/A
6	North Fork	0	17.7	center pivot, big guns	\$2,951.28	N/A	N/A	\$2,951.28	N/A
7	North Fork	1	188.0	center pivot, big guns	\$4,164.00	N/A	N/A	\$4,164.00	N/A
8	Uncompahgre	1	14.0	gated	\$1,980.00	\$18,220.16	\$7,419.00	\$27,619.16	\$1,831.37
9	Uncompahgre	1	18.2	pod sprinklers	\$3,538.00	\$41,271.62	\$9,890.00	\$54,699.62	\$2,811.08
10	Uncompahgre	1	7.1	wheel-line	\$2,813.00	\$36,357.47	\$9,402.00	\$48,572.47	\$6,445.00
11	Uncompahgre	1	36.8	center pivot	\$3,645.00	\$133,412.36	\$10,891.00	\$147,948.36	\$3,926.62
12	Uncompahgre	1	15.0	gated	\$2,520.00	\$23,675.78	\$6,361.00	\$32,556.78	\$2,002.45
13	Uncompahgre	1	14.0	near farm delivery	\$1,980.00	\$24,940.80	\$4,844.00	\$31,764.80	\$2,127.49
14	Uncompahgre	1	37.0	gated, near farm delivery	\$1,980.00	\$101,656.51	\$18,368.00	\$122,004.51	\$3,243.91
15	North Fork	1	17.5	gated, micro	\$4,010.00	\$93,179.47	\$17,066.00	\$114,255.47	\$6,299.74
16	North Fork	1	46.5	center pivot, wheel-line, big guns	\$5,972.00	\$174,418.90	\$18,906.00	\$199,296.90	\$4,157.52
17	North Fork	1	71.5	center pivot, wheel-line, hand-line	\$2,813.00	\$242,792.12	\$30,076.00	\$275,681.12	\$3,816.34
18	North Fork	1	8.4	near farm delivery	\$3,349.00	\$16,500.00	\$4,913.00	\$24,762.00	\$2,549.17
19	Crawford	1	19.5	wheel-line	\$2,970.00	\$62,083.61	\$6,460.00	\$71,513.61	\$3,515.06
20	Crawford	1	14.8	center pivot, solid set	\$3,105.00	\$55,381.04	\$7,408.00	\$65,894.04	\$4,242.50
21	Crawford	1	17.9	center pivot, solid set	\$3,195.00	\$54,577.26	\$12,768.00	\$70,540.26	\$3,764.41
22	Uncompahgre	2	63.0	center pivot	\$4,150.00	\$127,360.16	\$10,946.00	\$142,456.16	\$2,195.34
23	Crawford	2	46.1	center pivot, guns	\$6,095.00	N/A	N/A	\$6,095.00	N/A
24	North Fork	2	0.0	Big guns	\$5,820.00	N/A	N/A	\$5,820.00	N/A
25	North Fork	2	24.9	center pivot, guns	\$7,238.00	N/A	N/A	\$7,238.00	N/A
26	North Fork	2	28.0	surge, storage pond	\$3,600.00	N/A	N/A	\$3,600.00	N/A
27	Crawford	2	22.3	center pivot, guns	\$5,000.00	N/A	N/A	\$5,000.00	N/A
28	Crawford	2	35.0	gated	\$7,238.00	N/A	N/A	\$7,238.00	N/A
Grand Totals			1071.7		\$107,363.25	\$1,205,827.26	\$175,718.00	\$1,488,908.51	

3 Summary Budget

All off and on-farm projects were completed within the overall project budget with some reallocation of monies between individual project components. An example of this reallocation occurred with the Grandview-Aspen Piping Integration Project. The location of the screen structure changed, requiring additional access infrastructure, a new Parshall flume, and screen structure enlargement to incorporate additional emergency spillway. Additionally, this project experienced some cost overages due to an increase in pipe costs and increase in gate valve costs.

The NRCS directed funds were augmented with approximately \$10 million of cost share acquired by

the Project Sponsor (Table 7) and together these funds were sufficient to complete all the projects scoped in the 2018 Environmental Assessment for the Watershed Plan. With prior approval and local contract amendments, some funds were reallocated from projects that were underbudget to projects that were overbudget within the overall budget of approximately \$18 million.

The on-farm projects were funded under the EQIP program and, similarly, the overall budget was honored with some reallocations between individual project components.

Unfortunately, due to the nature of the PL-566 and EQIP programs and the contracting requirements under the Alternative Funding Arrangement (AFA), the ratio of TA to FA funds was defined in advance of project initiation. Once defined, there was no legal mechanism to move funds between FA and TA. This led to the inability to expend all the directed NRCS funds. Table 4 shows that approximately \$316,000 was unexpended from the PL-566 funding pool (Table 4) and approximately \$265,000 was unexpended from the EQIP funding pool (Table 5), for a total of approximately \$571,000 of NRCS RCPP directed program funds being 'left on the table' (Table 6). This is explained further in Section 6.

The following budget information summary tables include all expenditures made under both PL566 Watershed Authority and EQIP programs.

Please note: the budget information below only includes those funds being managed by the Project Sponsor and does not include a summary of funds potentially obligated and/or expended by CO NRCS as TA to support the LGP. A total of \$637,030 (\$22,000 for on-farm and \$615,030 for off-farm) was withheld by CO NRCS to develop the environmental assessment and to account for NRCS staff time.

Table 4 – PL566 Budget (Off-farm activities) Summary

PL 566 - Watershed Authority		
TA Budget	TA Cumulative Expenditures	TA Balance
\$ 900,469.00	\$ 603,933.32	\$ 296,535.68
FA Budget	FA Cumulative Expenditures	FA Balance
\$4,624,441.00	\$ 4,605,236.23	\$ 19,204.77
Total Budget	Cumulative Expenditures	Balance
\$5,524,910.00	\$ 5,209,169.55	\$ 315,704.45

Table 5 – EQIP (on-farm) Budget Summary

EQIP		
TA Budget	TA Cumulative Expenditures	TA Balance
\$ 253,660.00	\$ 249,510.18	\$ 4,149.82
FA Budget	FA Cumulative Expenditures	FA Balance
\$1,584,400.00	\$ 1,323,843.25	\$ 260,556.75
Total Budget	Cumulative Expenditures	Balance
\$1,838,060.00	\$ 1,573,353.43	\$ 264,706.57

Table 6 – Overall Budget Summary (NRCS directed funds only)

Overall Budget Summary		
Total TA Project Budget	Total TA Expenditures	TA Balance
\$1,154,129.00	\$ 853,443.50	\$ 300,685.50
Total FA Project Budget	Total FA Expenditures	FA Balance
\$6,208,841.00	\$5,929,079.48	\$ 279,761.52
Total Project Budget	Total Expenditures	Balance
\$7,362,970.00	\$6,782,522.98	\$ 580,447.02

Table 7 – Partner Contribution

	PL 83-566 (Off-Farm)	RCPP EQIP (On-Farm)	Total Partner Contribution
TOTAL:	9,583,422.32	445,921.40	\$10,029,343.72
Remaining Partner Contribution			(\$2,029,343.72)

Negative number indicates that the total original required partner contributions of \$8 million were exceeded by this amount.

4 Efforts to Address Natural Resource Concerns and Results

This section outlines the actions taken to address the four main resource concerns of the Lower Gunnison Project: Water Quality, Water Availability, Soil Health & Degraded Habitat.

4.1 Natural Resource Concern: Water Quality

Off-farm lateral piping projects within the LGP focus areas were targeted to improve water quality conditions based on their ability to control and reduce excessive selenium and salinity loading, along with ancillary benefits including nitrate and sediment load reduction (all are from natural geological and anthropomorphic sources). Water quality benefits were estimated based on best available data, modeling, and trend analyses.

Water quality data continues to be collected downstream of the LGP project components. Downward trends for salt and selenium have been established by the USGS at the Whitewater compliance point (USGS gage location above Grand Junction).

Along with other related actions, the LGP resulted in significant water quality gains. In fact, in June 2021, the Colorado Water Quality Commission delisted 66 miles of the Gunnison River, between Delta and Grand Junction, from the impaired waters list for selenium after more than 20 years after its original impairment listing, in 1998. Although the LGP continues to address water quality concerns through ongoing planning and project implementation, this is a critically important milestone in the Lower Gunnison River basin and a direct outcome of the integrated efficiency projects described in this report. This has additional documented benefits for threatened and endangered species (<https://www.usbr.gov/uc/progact/Selenium/index.html>)

Consistent with documented decreasing trends in concentrations and loads of salinity and dissolved selenium at the Lower Gunnison River watershed compliance point³, above Grand Junction, it is anticipated that tributary water quality monitoring data locations near LGP improvement projects reflect similar decreasing trends as the LGP projects continue to be implemented. Data to quantify changes in selenium and salinity loads are being collected and documented under the close cooperative partnership with the Gunnison Basin Selenium Management Program (SMP)⁴ but were not fully available at the time of this report. Specifically, the water-quality monitoring in affected, local watershed monitoring points, downstream of the LGP irrigation improvement projects, continue between 4-6 times per year. These data are archived as part of the USGS NWIS database⁵.

4.2 Natural Resource Concern: Water Availability

Using similar techniques developed for water quality impact analysis, estimates of potential water availability benefits were developed based upon best available data, modeling, and trend analyses. Robust water diversion and depletion data is being collected and analyzed in proximity of the LGP project components. It is premature to draw quantified conclusions, but anecdotal information related to water supply availability is positive. This was especially noticed during the 2020 and 2021 irrigation years that were characterized by severe drought. The expected water shortages were ameliorated in the project focus areas.

³ USGS Report - [Assessment of Dissolved-Selenium Concentrations and Loads in the Lower Gunnison River Basin, Colorado, as Part of the Selenium Management Program, 2011–17](#)

⁴ [USBR Gunnison Basin Selenium Management Program](#)

⁵ <https://waterdata.usgs.gov/nwis>

4.3 Natural Resource Concern: Soil Health

Soil surveys, samples, and a corresponding soil health report for each RCPP CAP project were completed with technical assistance funding from the Colorado Water Conservation Board via a Soil Health Technician. The technician was hired and managed by the Shavano Conservation District and a private agricultural production company. Associated findings and related soil health education was promoted by the LGP at the annual Western Slope Soil Health Conference (held throughout the LGP project period Februarys 2017-21); see <http://www.westerncoloradosoilhealth.org/> for more info.

Soil health education and outreach occurred through mid-2021 with community field visits and site demonstrations. Covid precautions were implemented, and proper health board protocols were followed.

A final Soil Health Survey Report was supported using NRCS RCPP funding along with significant assistance from local partners (agricultural producers and the CWCB) completed and is included in the Appendix as Attachment A.

4.4 Natural Resource Concern: Degraded Habitat

Consistent with USGS studies and USBR's SMP, it is anticipated that LGP associated reductions in selenium (and to a lesser extent salinity) concentrations and loading provide significant benefits to sensitive, threatened, and endangered river fishes that occupy designated critical habitat in the Lower Gunnison and Colorado Rivers. The USFWS continues to document habitat improvements via annual sufficient progress determinations, enabling water development to continue pursuant to the 2011 Gunnison Basin Programmatic Opinion and thereby providing regulatory certainty to LGP water users.

5 Project Issues and Lessons Learned

This section outlines some documented testimonials from water users that benefited from the RCPP LGP. In general, participating private landowners were satisfied and/or pleased with the irrigation water use efficiency projects that were cost shared and completed under the RCPP EQIP directed funding. For example, two separate participants were quoted as follows:

- "The program was fantastic. Any way that we can fund projects to make water more efficient makes agriculture more viable on the western slope and in Colorado."
- "The RCPP program was an easier and a more beneficial program to enter into for ditch companies than general EQIP."

Unfortunately, there were some 'unavoidable headaches' associated with the RCPP LGP. Delays associated with the development and approval of the Watershed Plan EA, equipment availability, and overall program constraints. In some cases, excessive delays led to more than 3 years from project application to completion. This also required a no-cost project extension from NRCS headquarters. Overall, these issues seem to be programmatic and were generally associated with NRCS EQIP and PL566 program rules and regulations. In the end, however, many projects were implemented, and the benefits far outweighed the costs and 'headaches'.

Additional constructive feedback was provided from the program participants regarding these issues:

- "Problems arise when one entity funds a project, and another implements it as there are too many cooks in the kitchen. Many of the issues were ironed out successfully and we are very supportive of a future RCPP program."
- "The downside was the rules kept changing and the policies and deadlines didn't seem to be

determined up front for the program. A lot of these were resolved through time, and I think that if the program was offered again, it wouldn't be as cumbersome." In the future, it would be beneficial for the expectations and timelines to be clearly communicated to the participants at the beginning."

5.1 Lessons Learned

Although the RCPP program was successful in soliciting, funding, and completing many important on- and off-farm projects, there was a lot of challenges and learning along the way. The main challenges and setbacks were generally attributable to new, revised program guidelines and lack of local dedicated support team. The lack of local support impacted communication and decision making which led to unclear guidance and delays.

Below is a comprehensive list of 'lessons learned':

- The permitting process was longer and consumed more funds than anticipated.
- NRCS did not have local / state decision making authority. This led to a lot of time to get answers from national NRCS headquarters, far removed from local NRCS administrators and project managers.
- Additional NRCS program training for project sponsors would be helpful early in the program. Topics should include RCPP processes, regulations, restrictions, and realistic timelines.
- Program schedule was not allowed to extend past one year even if uncontrollable delays were caused by the NRCS or permitting process.
- Federal requirements resulted in complicated 2-step contracting system under early AFA rules.
- NRCS payment process was cumbersome, in some cases causing reimbursement delays of weeks to months. This was especially true with respect to 'Assignment of Payment (AOP)' process that did not increase efficiency. The AOP process was then scrapped, and the project sponsor was required to provide 'banking and credit services'.
- On-farm local participants often lacked capacity and required a lot of technical assistance that exceeded TSP budgeted abilities causing a larger load on the Project Sponsor.
- On-farm local participants were often unfamiliar with the contract terms and could not rely upon local NRCS offices for assistance.
- Associated project delays, in some cases, led to outdated estimates and inaccurate projected project costs.
- The program would benefit from additional funding flexibility within the total overall budget. Program rules prevented re-allocation of TA and FA funds. Rules required the project sponsor to estimate the ratio of TA to FA funds well in advance of project design and implementation. In both program areas, PL-566 and EQIP, this led to under / over estimation and resulted in 'stranded funds.'
 - For example, for off-farm projects (PL-566) the ratio of TA/FA was over estimated, resulting in unused TA funds. This occurred because ditch companies provided direct project management and some of the originally projected TA was not needed. This resulted in unspent funds that could have been used as additional FA to expand project scope and benefits.
 - The opposite was true for on-farm projects (EQIP), where it turned out that agricultural producers needed more technical assistance and support. In this case, the underestimation of TA funds led to a shortage and resulted in unspent FA.
- A very popular RCPP EQIP program modification was that the Project Sponsor was able to increase program benefits by providing 75% of documented participant expenditures, rather than to be constrained by the non-RCPP EQIP cost share associated with programmatic cost schedules.

Attachment A: Final Soil Health Survey Report

Farmer Perceptions and Experiences Regarding Cover Crops in the Uncompahgre Valley

-Agronomic, Economic and Informational Barriers to Adoption-

There were 14 farmers surveyed in the Uncompahgre Valley in the Summer and Early Fall of 2021 to discover barriers to more widespread adoption of cover crops. The average number of acres farmed was 748 with a range of 50-2000. The majority of those surveyed farmed over 100 acres (N=5), followed by 50-200 acres (N=4), 201-500 acres (N=3) and 501-1000 acres (N=2). Most of the farmers practiced some cover cropping with only 2 farmers not practicing cover cropping. The majority of those surveyed employed some reduced tillage in addition to conventional tillage, with 7 implementing conventional with some reduced tillage; 5 implementing conventional tillage alone; 1 no-tillage; and 1 reduced tillage with some conventional tillage. This was mostly a function of crop to be planted and ease of subsequent season irrigations. Most farms (N=13) integrate livestock on their farm in some way, with cattle being the primary species (N=11).

Of those surveyed that did plant cover crops, the average number of years of cover crop experience was 4.8. The number of acres in cover crops can vary greatly in a given year, depending on crops grown, weather and other factors. The average number of acres planted into cover crops in a given year was 69, or roughly 10% of a farm was planted to cover crops. Winter cereals were the most common planted cover crop (N=13), these included wheat, spelt, rye, and triticale. A multispecies mix was the next most common (N=4). Many of those that planted a multispecies mix often did not have great success or had issues with some species acting as weeds in subsequent years. Sorghum sudan grass (N=2) and millet (N=1) were also planted. Many producers have experimented with drilling and broadcasting. However, broadcasting (N=8) and then marking was the most common method used to plant, followed by drilling (N=7). Grazing was a common practice, with all but two integrating grazing. The majority (N=8) surveyed used tillage to terminate the crop in the spring, with 4 using an herbicide. Landlord support did not seem to influence cover cropping.

Very real agronomic challenges present themselves as producer's experiment with cover crops (Table 1). Respondents were asked to rank their experience and perception of a given impediment from 1-3, where 1 is a low, 2 is medium and 3 is high. Among the most apparent challenges elicited from responses were selecting the appropriate cover crop; the risk to subsequent cash crop, including yield reduction; issues with termination; and weediness.

The agronomic benefits experienced were mostly lower than what they perceived to benefit from the practice (Table 2). This could be related to the lack of time necessary to accrue benefits. This highlights the importance of tempering claims related to cover crops and soil health as a panacea for agronomic problems.

Their experience of the economic, structural and social impediments to adoption seemed to be less important than what they had perceived (Table 3). Time and risk seemed to be the most important factors in this section.

When seeking information related to cover cropping, those surveyed preferred talking with others/neighbors (N=14; experimenting on their own N=12); crop consultants (N=11); seminars (N=9); retailers (N=7); local workshops (N=6); and NRCS/Extension agents (N=4). However, thirteen of the respondents indicated that they would be interested in active participation in on-farm research with CSU.

Table 1: Perceived & Experienced Agronomic Challenges	PERCEPTION	EXPERIENCE	Difference
Interferes with fall harvest	1.36	1.45	.10
Interferes with spring planting	1.14	1.27	.13
Cover crop incorporation into soil	1.23	1.27	.04
Increased management and associated time required	1.89	1.73	-.17
Establishing cover crops	1.43	1.55	.12
Selecting the right cover crop for my operation	1.57	1.82	.25
Cost of planting and managing crops	1.79	1.82	.03
Cover crop seed availability	1.14	1.18	.04
No measurable economic return	1.61	1.36	-.24
Uses too much soil moisture	1.14	1.18	.04
Not enough water	1.50	1.18	-.32
Becomes a weed in subsequent years	1.21	1.50	.29
Increased insect potential	1.07	1.18	.11
Increases risk in cash crop production	1.07	1.36	.29
Decreases nitrogen availability	1.42	1.50	.08
Yield reduction in the following cash crop	1.00	1.32	.32
Lack of immediate agronomic benefits	1.29	1.45	.17
Availability of planting equipment	1.50	1.27	-.23
Issues with termination	1.14	1.41	.27

Table 2: Perceived & Experienced Agronomic Benefits	PERCEPTION	EXPERIENCE	Difference
Reduce soil erosion	1.93	1.91	-.02
Benefit to cash crop	1.82	1.55	-.28
Reduce nutrient loss	1.54	1.64	.10
Reduce fertilizer applications	1.57	1.36	-.21
Build soil organic matter	2.25	2.22	-.03
Decrease soil compaction	2.13	2.06	-.07
Control weeds	2.21	2.14	-.08
Provides a N source	1.71	1.55	-.17
Provides nutrient scavenging	1.82	1.55	-.28
Increases yields in the following cash crop	1.93	1.45	-.47
Increases economic return	1.79	1.55	-.24
Reduce costs for the following crop	1.71	1.64	-.08
Attracts pollinators	1.64	1.73	.08
Winter kills easy	1.85	2.00	.15
Winter hardiness or survival	1.92	2.30	.38
Reduces disease	1.71	1.70	-.01
Controls insects	1.36	1.50	.14
Increased soil water holding	1.93	1.95	.03
Provides forage for livestock	2.86	2.82	-.04

Table 3: Perceived & Experienced Economic/Structural/Social Barriers	PERCEPTION	EXPERIENCE	Difference
Negative perceptions limit adoption (i.e., aesthetics)	1.29	1.00	-.29
Contract or custom farming options limit adoption	1.54	1.39	-.15
Landlords limit adoption	1.46	1.30	-.16
There is no market	1.31	1.30	-.01
Commodity prices do not impact my use of cover crops	1.14	1.18	.04
Crop insurance premiums influence my decision to plant cover crops	1.07	1.00	-.07
Cost of inputs (seed, fertilizer, etc.) limit my use of cover crops	1.79	1.77	-.01
I do not have the time for cover crops	1.86	2.00	.14
I do not have the equipment necessary to incorporate cover crops	1.21	1.27	.06
There is too much risk	1.14	1.09	-.05
Rented ground keeps me from incorporating cover crops	1.46	1.39	-.07
The near-term cost of cover crops is too great for the uncertain long-term payback	1.36	1.36	.01
The risks to this year's crop success is too great	1.00	1.13	.13
Availability of financial incentives	1.21	1.09	-.12