BUREAU OF RECLAMATION

Selenium Management Program
Gunnison River Basin
2020 Annual Progress Report

Selenium Management Program
Upper Colorado Basin, Western Colorado Area Office

Mission Statements

The mission of the Department of the Interior is to protect and manage the Nation's natural resources and cultural heritage; provide scientific and other information about those resources; and honor its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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Cover Photo: Lower Gunnison Basin Selenium Management Program monitoring well site, adjacent to wetlands study area on the east side of the Uncompahgre Valley, Montrose County, Colorado, June 2016. (Reclamation/John Sottilare).

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Introduction and Background

In response to a series of studies, agreements and decisions, the following report was developed by Bureau of Reclamation (Reclamation) in conjunction with the Selenium Management Program (SMP) Workgroup. It details the progress of the SMP since its inception with an emphasis on 2020 activities and accomplishments.

In 2009. the Gunnison Basin Programmatic Biological Opinion (PBO) issued by the U.S. Fish and Wildlife Service (FWS) directed Reclamation to "develop and implement a Selenium Management Program (SMP), in cooperation with the State of Colorado and Gunnison River basin water users to reduce adverse effects of selenium on endangered fish species in the Gunnison and Colorado rivers…". A Selenium Program Formulation Document (PFD) was developed by the SMP Workgroup and finalized in December 2011. The SMP was also identified as a "Conservation Measure" in the 2012 Record of Decision (ROD) related to the Aspinall Unit Re-Operations Environmental Impact Study (EIS); together with the PFD, these documents and agreements have guided SMP activities.

The SMP Workgroup typically meets on a quarterly basis and/or on an as-needed basis. Science & Research and Outreach subcommittees have been established to support the SMP program. SMP Workgroup ground rules were developed and adopted in July 2013. Program activities and status updates are reported in the following annual reports to the FWS and interested parties consistent with the PFD; these reports and studies help the SMP Workgroup monitor conditions and comply with SMP goals and objectives:

- This Selenium Management Program Gunnison River Basin Annual Progress Report (this report) details the activities and progress of the SMP from the previous year relative to the SMP Action Plan (discussed below).
- The USGS prepares Annual Selenium Trend Analysis reports. Prior to 2017, the Trend Analysis reports were attached to the annual summary report. Due to the timing constraints related to publishing requirements, the USGS now creates and publishes a separate, citable Selenium Trend Analysis report. The most recently published Annual Selenium Trend Analysis report is the 2017 report (https://pubs.er.usgs.gov/publication/ofr20201078)).
- The USGS publishes annual reports that incorporate the annual water quality monitoring data. Each report summarizes and evaluates data from the preceding five years.

SMP Action Plan

The SMP Action Plan is a living document (Appendix B). It evolves and changes as more is learned about selenium fate and transport, and as implementation activities to reduce selenium loading and concentrations in the Gunnison River are identified, initiated and/or completed. The narrative below highlights the SMP progress and activities and corresponds to the most recent revisions to the SMP Action Plan. The SMP Action Plan is referenced throughout the document by task item number (e.g. A.1.30).

Part A - Reduce Existing Selenium Load

The following are actions that control and/or will control selenium loading from existing sources, such as current irrigated agricultural (off- and on-farm) non-point sources and current non-agricultural point and non-point sources related to municipal, residential and industrial water use practices.

Irrigated Agriculture – Off-Farm – In 2019, Reclamation issued another FOA for Salinity Control Projects above Imperial Dam, pursuant to Title II of the 1974 Salinity Control Act (ref.). Six new projects within the Lower Gunnison Basin were selected for funding, totaling about $24.2 million (A.1.34 – A.1.39). In total, these new Lower Gunnison Basin projects are predicted to control about 14,488 tons of salt per year.

Two salinity control projects selected in prior year FOAs were completed in 2020 (A.1.24 and A.1.28), three are under construction (A.1.29, A.1.30, and A.1.32). Eight salinity control projects are in the planning/National Environmental Policy Act (NEPA) stage (A.1.31, and A.1.33 – A. 1.39). While all of these projects focus on reducing salinity in the Lower Gunnison Basin, there is significant associated selenium load reduction via these salinity control efforts.

Through Phase 9 of Uncompahgre Valley Water User Association's (UVWUA) East Side Laterals (ESL) Piping Project, approximately 61.3% of the ESL Project has been completed, or is under construction, as shown in Appendix B (A.1.2 - A.1.5, A.1.7-A1.9, A.1.17, and A.1.29). It is anticipated that the remainder of Phase 9 will be completed in 2021.

Activities to Target, Define, Plan, and Implement Off-farm Projects – Planning and implementation efforts related to off-farm projects continued in FY2020. These efforts included the use of NRCS RCPP (associated with PL-566) funding for off-farm improvements (A.2.3.2) related to the Lower Gunnison Project (LGP). Total directed funding in the amount of $6M was received and expenditures are scheduled to continue through July 2021 from the Natural Resources Conservation Service (NRCS) and the Colorado River District, that are managing these funded off-farm projects.

Since 2018, NRCS Regional Conservation Partnership Program (RCPP) funding has been used to target four focus areas in the Lower Gunnison Basin for off-farm projects that control both salt and selenium. These areas include Bostwick Park, Crawford, North Fork Water Conservancy Districts (WCDs) and UVWUA. Additional Salinity Control Program and Colorado River Storage Project Memorandum of Agreement (CRSP MOA) funds are being used to leverage the NRCS RCPP funds and to expand these projects while meeting RCPP cost-share matching requirements, as part of the LGP.

The SMP continues to support efforts of the UVWUA to develop strategies that maximize funding and cost-share opportunities for completion of the remaining ESL project. Consistent with the other focus areas, the UVWUA has taken a pro-active approach to securing additional grants to maximize water quality benefits and to extend available funding. This includes the CRSP MOA, and this leveraging concept is the basis for the LGP.

A total of $15M from the CRSP MOA funding has been committed for piping and/or lining additional ESLs (A.1.14), as well as related water efficiency projects. These funds were originally approved and reserved in 2012-13. These funds served as cost share for the LGP.

In June 2020, the parties to the CRSP MOA entered into an extended second MOA. This second MOA represents a combination and extension of the original MOA and MOA 2. The MOA 2 preserves revenues to be collected pursuant to the original MOA, and adds additional revenues to be collected beginning in October 2020. This MOA 2 funding is available through September 2037. The types of activities that could be funded under the MOA include elective operation, maintenance, and replacement (elective OM&R) and

"costs of environmental compliance for CRSP initial units, including biological opinions or programmatic biological opinions and associated improvements that are necessary to satisfy compliance for continuation of operation of facilities…" The CRSP MOA does not provide funding for normal OM&R or new construction/facilities. These funds can and will continue to be utilized as appropriate to address selenium loadings in the Lower Gunnison River Basin.

Data has been collected by the U.S. Geological Survey (USGS) on loading impacts of non-agricultural sources, including ponds, individual septic disposal systems, and other point/non-point sources (C.1.9). Preliminary findings indicate some non-ag features such as septic systems and storage ponds are significant variables in selenium models. Findings will be published in FY2021 as part of the GIS Selenium and Salinity Model (C.1.11). See C.1 (Expand Knowledge Base) for additional information on investigations, including the USGS led Selenium Science Plan (C.1.2), which is available upon request, the wetlands study (C.1.7), and the monitoring of the 30-well groundwater network (C.1.6.A). Additional informational documents are published and hosted at https://www.usbr.gov/uc/progact/Selenium/index.html.

The SMP Workgroup continued working with sub-basin level data developed by USGS to determine where to encourage, support and target projects that accomplish selenium reduction goals (A.2.3). Based on current information, projects with the largest potential to reduce selenium loading include the Uncompahgre Project's East side and identified drainages in the North Fork, Crawford and Bostwick Park areas of the Gunnison River watershed.

The SMP also continues to work with the USGS on ranking contributing areas of salt and selenium in the Lower Gunnison Basin using new, updated multiple linear regression models (A.2.3). In 2013, USGS published previous modeling results in a report entitled Ranking Contributing Areas of Salt and Selenium in the Lower Gunnison Basin, Colorado, Using Multiple Linear Regression Models. The report is available online at http://pubs.usgs.gov/sir/2013/5075/. Results from the current modeling effort are scheduled to be published in 2021 (C.1.11). Preliminary findings indicate significance in models for septic and pond layers as well as traditional features such as irrigated lands and geology and soil types. New techniques were applied in this version of the modeling effort to better define areas that should be targeted or discussed as high selenium loading areas. Resolution has been effectively increased from square miles to acres. This increased definition for the models allows the user to more accurately define areas to target for discussion of salinity and selenium control efforts.

Under the Agricultural Improvement Act of 2018 (also known as the 2018 Farm Bill), NRCS may also now enter into EQIP contracts with "water management entities" including States, irrigation districts, and similar entities to implement water conservation and efficiency practices under a watershed-wide project using a streamlined process. These programmatic changes, which were finalized in 2020, will provide new opportunities to utilize NRCS-EQIP funding to support larger, off-farm improvement projects such as canal piping and lining that reduce selenium loading and other water quality and resource management benefits.

Irrigated Agriculture – On-farm – Projects completed from FY2011 through FY2020 under the Environmental Quality Incentives Program (EQIP) and the Salinity Control Program's Basin States Program (BSP) are described in A.3.1.1 to A.3.1.9. The NRCS and BSP continues to promote irrigation efficiency projects (A.3.1).

NRCS reports that on-farm EQIP salinity contracts within the Gunnison River Basin in Delta and Montrose Counties for FY2020 totaled 1,903 acres. Approximately $4.9M was obligated for these projects (A.3.1.10). This does not include the associated costs to provide technical assistance by NRCS nor through the Lower Gunnison Project RCPP EQIP activities curated by the Colorado River District. While these

programs may primarily focus on reducing salinity in the Lower Gunnison Basin, there is significant associated selenium load reduction with these salinity control efforts.

In 2012, Reclamation and the State of Colorado finalized an agreement that provided $2M Basin States Funds to the State Department of Agriculture for on- and off-farm irrigation improvements. This program replaced the previous "Parallel Program". In 2020, no new contracts were written under the Basin States Program for on-farm improvements (A.3.1.10).

Activities to Target, Define, Plan, and Implement On-farm Projects – In addition to the on-going EQIP and BSP improvements, NRCS agency staff continue to help landowners improve water management on their land (A.4.4). These projects have the potential to reduce the mobilization of selenium in the Gunnison Basin through more efficient use of irrigation water.

Pond Seepage (Recreational, Farm, Aesthetic) – The SMP continues to explore options and formulate plans for identifying and mitigating any impacts due to seepage from unlined recreational, farm and aesthetic ponds (A.5.1 to A.5.3)

Municipal & Industrial Sources – Funded by the SCTF, the USGS completed the delineation and inventory of septic sources using GIS. It is anticipated that this data will help to determine if septic systems are a potentially significant source of selenium loading (A.6.3). This information will be published in FY2021 as part of the GIS Selenium and Salinity Model (C.1.11).

Public Lands – The Bureau of Land Management (BLM) Uncompahgre Field Office finalized their Resource Management Plan (RMP) in April 2020. The RMP addresses selenium by including a stipulation to require special design plans for development on soils mapped as saline/selenium soils (A.7.1).

Part B – Outreach and Education

The following are actions that help to educate and inform water users and the public regarding selenium fate, transport and related issues with the intent to prevent, minimize and/or mitigate selenium loading, with a focus on domestic, municipal, residential and industrial water sources.

Public Education and Outreach Activities – The SMP Education and Outreach Subcommittee continues to work on planning and coordination activities that include educating the public, county commissioners, and collaborating with and supporting other outreach efforts occurring in the Lower Gunnison Basin which benefit selenium reduction goals of the SMP. This includes a growing presence on the GunnisonRiverBasin.org website.

The Gunnison Basin and Grand Valley Selenium Task Force (STF) and the Colorado River District continue to help to support the annual Soil Health Conference in Delta (B.2.2). The conference is an opportunity to meet with water users and landowners and provide information on selenium activities in the Lower Gunnison Basin and beneficial relationship to healthy soil practices.

The SMP will also continue to explore opportunities to address new sources of selenium loading. In 2021, the SMP plans to continue developing strategies to facilitate and encourage Lower Gunnison Basin water users and the public to undertake projects and implement BMPs to minimize new sources (B.2.4).

Participation in the SMP by federal and state agencies and local water users' organizations has been good. Additional outreach to local and county officials and regulatory agencies will continue in 2021.

Part C - Support Activities – Studies, Research and Monitoring

The following are additional support activities such as research and monitoring that expand our knowledge base on selenium loading, fate, transport and mitigation.

Selenium Studies – The SMP continues to support expanding the knowledge base as illustrated in C.1 through C.2. These investigations are intended to increase our knowledge and ultimately lead to additional or more focused implementation activities. The SCTF has financially supported a majority of these investigations, performed by the USGS, along with agency and other matching cooperator funding.

In 2013, the State of Colorado and USGS funded the development of a Selenium Science Plan intended to describe and identify data gaps in monitoring and research efforts as needed to more fully understand selenium occurrence and the efforts to mitigate projects in the Lower Gunnison Basin (C.1.2). A draft 5-Year plan was completed in late 2013 and finalized in 2014. The final Plan was approved by the SMP Workgroup. The Workgroup and its Science Team are planning to update the Selenium Science Plan, beginning in 2019. Currently, the SMP and USGS are targeting late 2021 or early 2022 to accomplish this update. The Workgroup and Science Team will continue to document and approve updates as needed.

Other major accomplishments include continued monitoring of the 30-Well Groundwater Monitoring Network (C.1.6.A). While it is still known as the 30-Well Network, one of the wells was accidentally destroyed by a landowner. Monthly groundwater levels were taken at each well. The installation of this 30-well network and the data collected allowed for the development of a conceptual model of selenium mobilization and transport in the shallow groundwater system. Monitoring wells were sampled between August 2013 and March 2015 to understand groundwater quality, seasonality, sources of recharge, and groundwater age. Concentrations of dissolved selenium ranged from below the limit of detection to 4,100 micrograms per liter (µg/L), with a median concentration of 14 µg/L. Concentrations showed a high degree of spatial variability and no seasonal difference. Similarly, no seasonal pattern was observed in specific conductance values of groundwater despite the influence of seepage from irrigation water that typically exhibits considerably lower specific conductance values.

Nitrate concentrations in groundwater derived from geologic material has been identified to be a primary control on reduction-oxidation conditions in groundwater (https://www.sciencedirect.com/science/article/abs/pii/S0883292714001516?via%3Dihub). As such, nitrate values in the local geology play a significant role in the degree of selenium oxidation and mobility in groundwater. Nitrate concentrations in groundwater can be reduced by denitrification, but in the study area, data suggest that groundwater denitrification may not be sufficient, or to the extent necessary, to enable selenium reduction. Thus, selenium mobility remains relatively high and groundwater discharge to the surface water system remains a significant source of selenium loading.

Additionally, groundwater age analyses were performed for groundwater samples from eight wells and results ranged from 6 to 20 years old. These isotopic data results indicate groundwater was recharged by irrigation water; no information collected supported an older, deeper source of recharge to the shallow groundwater system. These results, along with others were published in 2019, and are available here: https://pubs.er.usgs.gov/publication/sir20195029 (C.1.6.B).

FY2020 Groundwater Level Measurements: This is a continuation of monitoring the existing 30 well network for an additional 12 months. All 29 wells will be measured once a month. This work tracks trends and helps the SMP to better understand seasonal groundwater fluctuations, leading to a better definition of flow paths that affect fate and transport of selenium loads from the UVWUA area. The water level data was collected by a volunteer for some months as well as USGS. All work is checked and approved by USGS. A

request to the SMP and SCTF has been made to continue water level monitoring into 2021.

In FY2017, Reclamation received a $15,000 Science and Technology (S & T) Grant to investigate available technologies for in situ selenium removal from groundwater, and to identify locations within the study area best suited for a demonstration project. Work included a literature search and site visits. A scoping report was completed in February 2018. The next step would be to potentially select one or two areas to conduct a demonstration project and determine what in situ techniques show the most promise. The S & T Grant funding source allows Reclamation to write a follow-on proposal and apply for another grant, in the event a demonstration project is identified. Through this funding source, Reclamation can solicit up to $100,000 each year for three years to implement a demonstration project. This is a joint effort between Reclamation and the USGS (C.2.3). This effort is currently on hold as the key Reclamation and USGS personnel involved in this effort have moved on to other positions.

The USGS investigated loading impacts of individual septic systems as part of its GIS Selenium and Salinity Model (C.1.11).

The USGS completed the Sunflower Drain groundwater/surface water interaction study (C.1.13). This study provides information about the spatial and temporal distribution of groundwater inflow to Sunflower Drain and quantifies instantaneous groundwater selenium loads during the non-irrigation and irrigation seasons. Locations of diffuse and focused groundwater discharge to Sunflower Drain were identified. This report was published in 2020 (Characterization of Groundwater Quality and Discharge with Emphasis on Selenium to an Irrigated Agricultural Drainage near Delta, Colorado, 2017–19 (https://pubs.er.usgs.gov/publication/sir20205132)).

In support of the Selenium Management Program (SMP), the USGS is developing an Ecosystem-scale Selenium Accumulation Model (ESAM) for the critical habitats of the Gunnison River (C.1.14). Selenium is accumulated in aquatic organisms through their diet rather than directly from aqueous or dissolved selenium in the water column. An ESAM is needed to understand how selenium enters the food web and to accurately relate dissolved (aqueous) selenium to effects in fish. A report on the ESAM is planned for publication in early 2021.

Monitoring Activities: Water Quality – The SMP continues to support a robust surface water quality monitoring program (C.3.1 through C.3.3). These data are published to the USGS' National Water Information System (NWIS) webpage (See hyperlinks in Appendix C).

The USGS, in cooperation with Reclamation, the Colorado River Water Conservation District (CRWCD), and the BLM, analyzed salinity and selenium data collected at sites in Western Colorado to develop regression models. The study area and sites are on the Colorado River or in one of three small basins in Western Colorado: the White River Basin, the Lower Gunnison River Basin, and the Dolores River Basin. By using data collected from water years 2009 through 2011, regression models which are able to estimate concentrations were developed for salinity and selenium at selected sites. This effort was published in a report titled Regression Models for Estimating Salinity and Selenium Concentrations at Selected Sites in the Upper Colorado River Basin, Colorado, 2009–2012 (of2014-1015.pdf (usgs.gov)).

The regression models are used in conjunction with real time water-quality information from streamflow gages to estimate 'real time' concentrations and loads for selenium (and at some locations, salinity). Several of these sites are located in the Lower Gunnison River Basin (LGRB) and critical fish habitat. These real time sites are listed and indicated by a * in Appendix C. Estimates from the regressions are displayed and housed and the USGS National Real-Time Water Quality (NRTWQ) website: US Geological Survey Real-Time Water Quality Data For the Nation (usgs.gov).

An observation may be made that some of the selenium estimates exceed the actual laboratory values by as much as 25% during certain periods of the year. The USGS explains that the estimates were more accurate a decade ago; however, decreasing trends in selenium have caused the more recent estimates to be high. The SMP Science Team will discuss the utility of updating the selenium equations at future meetings and decide if the effort fits with the programmatic and or scientific goals of the SMP.

Research and Monitoring Activities: Endangered Fish – The Upper Colorado River Endangered Fish Recovery Program (Recovery Program) continues to conduct population monitoring in the Gunnison River (C.4.1). In previous years, the SMP provided funding through the SCTF to the Upper Colorado River Monitoring Program for Mercury and Selenium in Native Fish. The program is a collaboration between BLM, FWS, the states of Utah and Colorado, the Recovery Program, and the USGS. Data collected will provide a better understanding of the extent of selenium accumulation in various native and non-native fish in the Upper Colorado River system.

Multi-life stage monitoring and relative density estimates of Colorado pikeminnow and razorback sucker in the Gunnison and Colorado rivers was conducted in 2020 as described in the PBO. The entire fish assemblage was monitored using electrofishing catch-per-effort (CPE) to track trends in species relative abundance both in the Gunnison River and the 18-Mile Reach of the Colorado River downstream of the Gunnison River confluence. Larval seining was conducted in both rivers to provide an index of reproductive success using CPE (mean number per sample) of endangered fish larvae. For young-of-the-year and small-bodied fish monitoring, seining was conducted during fall (mid-September) using standardized methodology in both the Gunnison (Delta, CO to the confluence) and Colorado (Gunnison confluence to CO/UT state line) rivers. For more details as well as results from the 2020 sampling effort, see 163_FY20AR-Gunnison (https://www.coloradoriverrecovery.org/documents-publications/work-plan-documents/arpts/2020/rsch/163_FY20AR-Gunnison_508.pdf).

The Fish and Wildlife Service and Colorado Parks and Wildlife collects fish tissue plugs to determine selenium concentrations in endangered and native fishes; however, no fish tissue plugs were collected in 2020 (C.4.2).

APPENDIX A – ACRONYMS LIST

The following acronyms and abbreviations are used in this Annual Progress Report and in the Action Table:

Acronym or Abbreviation	Description
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
BPWCD	Bostwick Park Water Conservancy District
BSP	Basin States Program (Salinity Control Program)
BWP	Basinwide Program (Salinity Control Program)
CDPHE	Colorado Department of Public Health and Environment
CRSP MOA	Colorado River Storage Project Memorandum of Agreement
CRWCD	Colorado River Water Conservation District
CSCB	Colorado State Conservation Board
CWCB	Colorado Water Conservation Board
CWCD	Crawford Water Conservancy District
DCD	Delta Conservation District
EQIP	Environmental Quality Incentives Program
ESL	East Side Laterals
FOA	Funding Opportunity Announcement
Forum	Colorado River Basin Salinity Control Forum
FWS	Fish and Wildlife Service
GW	Groundwater
LGP	Lower Gunnison Project
MCD	Mesa Conservation District
NEPA	National Environmental Policy Act
NFWCD	North Fork Water Conservancy District
NRCS	Natural Resources Conservation Service
NWIS	National Water Information System
PBO	Programmatic Biological Opinion
PFD	Program Formulation Document
RCPP	Regional Conservation Partnership Program
Reclamation	Bureau of Reclamation
Recovery Program	Upper Colorado River Endangered Fish Recovery Program
RMP	Resource Management Plan
ROD	Record of Decision
S & T	Science and Technology
SCTF	Species Conservation Trust Fund
SCD	Shavano Conservation District
SMP	Selenium Management Program
STA	Subject to Appropriation
STF	Selenium Task Force
SW	Surface Water
TDB	To Be Determined
USGS	U.S. Geological Survey
UVWUA	Uncompahgre Valley Water Users Association
WNTSC	NRCS West National Technology Support Center, Portland
WQ	Water Quality
WWUC	Lower Gunnison Basin Wise Water Use Council

APPENDIX B – PROGRAM 2020 ACTION PLAN

Current activities for the Selenium Management Program are identified in the following table. Separate sections are included for activities that:

A. Reduce existing selenium load
B. Perform outreach and education to the public, water users, and local agencies
C. Provide support for Program activities and goals

Entities cooperating to complete an activity are identified, typically with the lead entity identified first. Schedules are shown where they have been identified by placing an "X" in the appropriate Federal fiscal year (Oct-Sept) column. Funding sources are only identified when funding has been committed or assurances have been provided by an organization.

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
PART A - REDUCE EXISTING SELENIUM LOAD																
	IRRIGATED AGRICULTURE – OFF-FARM															
A.1	**Off-farm Projects**															
A.1.1	Uncompahgre Project - Winter Water Program	UVWUA/BOR	1992	Completed in 1995	X											Eliminated winter flows in 407 miles of Uncompahgre Project canals & laterals 1992-1995 (controls 41,330 tons of salt annually)
A.1.2	Uncompahgre Project - East Side Laterals Phase 1	UVWUA/BWP/ NIWQP	1998	Completed in 2000	X											Piped 8.5 miles of laterals from 1998-2000; ESL Project is 4.4% complete. (controls 2,295 tons of salt annually)
A.1.3	Uncompahgre Project - East Side Laterals Phase 2	UVWUA/BWP/ NIWQP	2004	Completed in 2007	X											Piped 20.5 miles of laterals from 2004-2009; ESL Project is 14.9% complete. (controls 6,139 tons of salt annually)
A.1.4	Uncompahgre Project - East Side Laterals Phase 3	UVWUA/BWP/ NIWQP	2007	Completed in 2011	X											Piped 10.5 miles of laterals from 2007-2011; ESL Project is 20.3 % complete. (controls 2,292 tons of salt annually)
A.1.5	Uncompahgre Project - East Side Laterals Phase 4	UVWUA/BWP CDPHE	2008	Completed in 2012	X							$2.8M	BWP/ CDPHE	Yes		Piped 11.4 miles of laterals; Overall ESL Project is 26.1% complete (controls 3,651 tons of salt annually). Completed in 2012
A.1.6	Lower Grandview Canal & Laterals Piping Project	Grandview Canal & Res. Co/ BWP	2009	Completed in 2011	X							$5.4M	BWP	Yes		10 miles of pipe in Alum Gulch drainage; Construction completed in 2012 & habitat replacement completed in 2013. (controls 4,588 tons of salt annually)
A.1.7	Uncompahgre Project - East Side Laterals Phase 5	UVWUA/BWP	2011	Completed in 2014	X							$4.3M	BWP	Yes		Piping of 19.0 miles of laterals completed in 2014; Overall ESL Project is 35.8% complete (controls 5,037 tons of salt annually)
A.1.8	Uncompahgre Project - East Side Laterals Phase 6A (EC Lateral Lining Demonstration Project)	UVWUA/BOR/ CWCB/BSP	2011	Completed in 2013	X							$2M	CWCB/BSP	Yes		Lining of 2.0 mile project completed in 2013. Overall ESL is 36.7% complete (controls 1,374 tons of salt annually)
A.1.9	Uncompahgre Project - East Side Laterals Phase 7	UVWUA/BSP	2011	Completed in 2016	X							$3.2M	BSP	Yes		Piped 12.7 miles of laterals; Overall ESL is 43.2% complete (controls 3,029 tons of salt annually)
A.1.10	Lower Stewart Ditch Piping Project	Stewart Ditch & Res. Co/ BWP	2012	Completed in 2015	X							$6.0M	BWP	Yes		Piped 11.5 miles of lower Stewart Ditch & laterals; (controls 10,920 tons of salt annually); Because project came in under budget, additional piping & salt reduction was included under this agreement.

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
A.1.11	Minnesota Ditch Piping Project – Phase 1	Minnesota Canal & Res. Co/BWP	2011	Completed in 2014	X								$3.9M	BWP	Yes	Piping of 5.2 miles of upper Minnesota Ditch Construction completed in 2013; (controls 3,263 tons of salt annually)
A.1.12	C Ditch/Needle Rock Piping Project	C Ditch Co /BWP	2014	Completed in 2015	X								$1.4M	BWP	Yes	Piped 2.5 miles of the irrigation ditches within the C Ditch/Needle Rock Project; Construction completed in 2014 (controls 1,283 ton salt annually)
A.1.13	Clipper Ditch Project 4 – Spurling & Drake Laterals Piping Project	Clipper Ditch CO/ BWP	2014	Completed in 2015	X								$1.2M	BWP	Yes	Piped 3.5 miles of irrigation canals within the Clipper Ditch Project; (controls 1,038 tons of salt annually)
A.1.14	Uncompahgre Project - Piping Projects (from CRSP MOA)	UVWUA/BOR	2012	Underway, Planning Phase	X	X	X	X	X	X	X	X	$13M	BOR CWCB	Yes	Consideration of which laterals or canals to pipe or line and schedule is underway; Funding committed from both FY12 and FY13 CRSP MOA Funding. Funding thru 2037.
A.1.15	Minnesota Ditch Phase 2 - Extension Piping Project	Minnesota Canal & Res. Co/BWP	2014	Completed in 2015	X								$3.0M	BWP	Yes	Piped 3.8 miles of irrigation ditches which serve 950 acres. This is an extension of A.1.11; (controls an additional 2,328 tons of salt annually)
A.1.16	Slack/Patterson Lateral Piping Project	Roger's Mesa Water Dist. Assoc./BWP	2014	Completed in 2015	X								$3.3 M	BWP	Yes	Piped 9.0 miles of irrigation ditches on Roger's Mesa. (controls 3,345 tons of salt annually)
A.1.17	Uncompahgre Project- Eastside Laterals Phase 8	UVWUA/BWP	2014	Completed in 2018	X								$3.5M	BWP	Yes	Piped 14.0.miles of laterals; Overall ESL is be 50.3% complete, 98.6 of 196 mi. completed (controls 3,307 tons of salt annually).
A.1.18	Cattleman's Ditch Piping Project - Phase 1	Cedar Canon Iron Springs Ditch & Res. Co./BWP	2014	Completed in 2017	X								$2.0M	BWP	Yes	Piped 6.0 miles of irrigation ditches (Hart, McLaughlin, Rockwell & Poulsen Ditches); (controls 1,855 tons of salt annually)
A.1.19	Bostwick Park, Siphon Lateral Piping Project	BPWCD/BSP	2014	Completed in 2015	X								$0.7M	BSP	Yes	Piped 1.76 miles of laterals; (controls 413 tons of salt annually)
A.1.20	Zanni Lateral Piping Project	Clipper Ditch Co/BSP	2014	Completed in 2017	X								$1.0M	BSP	Yes	Piped 1.6 miles of the Zanni Lateral. (controls 551 tons of salt annually)
A.1.21	Forked Tongue-Holman Ditch Piping Project	Forked Tongue-Holman Ditch Co./BSP	2014	Completed in 2015	X								$0.7M	BSP	Yes	Piped 1.32 miles of multiple user and 0.57 miles of on-farm, single user delivery ditches. (controls 412 tons of salt annually, 354 tons off-farm & 58 tons on-farm)
A.1.22	M&D and Ironstone Headgate Automation (SCADA)	BOR/SCTF/ UVWUA	2013	Completed in 2014	X								$82K	WS/SCTFUVWUA	Yes	Demostrated the use of SCADA that will be applied to the eastside. Complete
A.1.23	Cattleman's Ditch Piping Project – Phase 2	Cedar Canon Iron Springs Ditch & Res. Co./BWP	2015	Completed in 2019	X	X							$2.7M	BWP	Yes	Plan is to pipe or abandon 6.0 miles of irrigation canal & ditches; (controls 2,183 tons of salt annually)

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
A.1.24	Clipper Center Lateral Piping Project	Clipper Ditch CO/ BWP	2016	Completed in 2020	X	X							$3.2M	BWP	Yes	Plan is to pipe 4.4 miles of irrigation laterals; (controls 2,606 tons of salt annually)
A.1.25	North Delta Canal Piping Project – Phase 1	North Delta Irrigation Co./BWP	2016	Completed in 2019	X	X	X						$5.6M	BWP	Yes	Plan is to pipe or abandon 6.0 miles of irrigation canal & ditches; (controls 4,383 tons of salt annually). An extension is proposed which would increase the amount of salt controlled utilizing the same amount of funding.
A.1.26	Orchard Ranch Ditch Piping Project	Orchard Ranch Ditch Co./BWP	2016	Completed in 2019	X	X							$1.3M	BWP	Yes	Plan is to pipe 2.0 miles of irrigation canal & ditches; (controls 1,004 tons of salt annually)
A.1.27	Minnesota L-75 Lateral Piping Project	Minnesota L-75 Lateral Co./BWP	2016	Completed in 2018	X								$153K	BWP	Yes	Piped 0.6 miles of irrigation lateral; (controls 129 tons of salt annually)
A.1.28	Fire Mountain Canal Piping Project	Fire Mountain Canal & Res. CO./BWP	2016	Completed in 2020	X	X	X						$3.0M	BWP	Yes	Plan is to pipe or abandon 4.2 miles of irrigation canal & ditches; (controls 2,365 tons of salt annually)
A.1.29	Uncompahgre Project- Eastside Laterals Phase 9	UVWUA/BWP	2016	Underway, In construction	X	X	X						$5.4M	BWP	Yes	Plan is to pipe or abandon 21.6 miles of irrigation laterals; Once this phase is completed ESL will be 61.3% complete, 120.2 of 196 mi. completed (Phase 9 will control approx. 6,030 tons of salt annually)
A.1.30	Gould Canal Improvement Salinity Control Projects A & B (two projects)	Fruitland Irrigation Co./BWP	2018	Underway, In construction	X	X	X						$7.9M	BWP	Yes	Plan is to line, pipe, or abandon 12.4 miles of irrigation laterals; (controls 5,697 tons of salt annually)
A.1.31	Shinn Park and Waterdog Laterals Piping Project	BPWCD/BSP	2018	Underway, Pre-construction	X	X	X	X					$4.1M	BSP	Yes	Plan is to pipe or abandon 7.8 miles of irrigation laterals; (controls 3,304 tons of salt annually)
A.1.32	Upper Stewart Ditch Piping Project	Stewart Ditch & Res. Co/ BWP	2018	Underway, Pre-construction	X	X	X	X	X				$2.5M	BWP	Yes	Plan is to pipe 2.6 miles of irrigation laterals; (controls 1,622 tons of salt annually)
A.1.33	Crawford Clipper - Jerdon, West, and Hamilton Laterals Piping Project	Clipper Ditch CO/BSP	2019	Underway, Pre-construction		X	X	X	X	X			$4M	BSP	Yes	Plan is to pipe or abandon 6.5 miles of irrigation laterals and 0.3 mile of natural drainage; (controls 2,614 tons of salt annually)
A.1.34	Uncompahgre Project- Eastside Laterals Phase 10	BWP	2020	Underway, Pre-construction			X	X	X	X	X		$5.1M	BWP	Yes	Plan is to pipe 19.2 miles of irrigation laterals; (controls 3,501 tons of salt annually)
A.1.35	Grandview Canal Middle and Lower Extensions Piping Project	BWP	2020	Underway, Pre-construction			X	X	X	X	X		$6.8M	BWP	Yes	Plan is to pipe 4.1 miles of irrigation laterals; (controls 3,553 tons of salt annually)

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
A.1.36	Needle Rock Ditch and Lone Rock Ditch Piping Project	BWP	2020	Underway, Pre-construction			X	X	X	X	X		$4.2M	BWP	Yes	Plan is to pipe 6.7 miles of irrigation laterals; (controls 2,952 tons of salt annually)
A.1.37	Turner/Lone Cabin Ditch Combination Piping Project	BWP	2020	Underway, Pre-construction			X	X	X	X	X		$6.6M	BWP	Yes	Plan is to pipe or abandon 25 miles of irrigation laterals; (controls 3,398 tons of salt annually)
A.1.38	Short Ditch Extension Piping Project	BSP	2020	Underway, Pre-construction			X	X	X	X	X		$549K	BSP	Yes	Plan is to pipe 1.8 miles of irrigation laterals; (controls 419 tons of salt annually)
A.1.39	Pilot Rock Ditch Piping Project	BSP	2020	Underway, Pre-construction			X	X	X	X	X		$940K	BSP	Yes	Plan is to pipe 1.5 miles of irrigation laterals; (controls 665 tons of salt annually)
A.2	**Activities to Target, Define, Plan, and Implement Future Off-farm Projects**															
A.2.1	Participate in Salinity Control Program - Lower Gunnison Comprehensive Plan effort	CRWCD/ BOR/ CWCB/ NRCS/ BSP/SMP	2012	Completed	X								$150K	BSP	Yes	Study examined how to best promote & implement future salinity control projects in LG Basin for both On & Off-Farm. Potential selenium reduction benefits. Final report Feb. 2014
A.2.2.A	2012 Salinity Funding Opportunity Announcement	BWP/BSP	2012	Completed	X								$14.3M (LGB)	BWP/ BSP	Yes	For projects upstream of Hoover Dam; awarded 7 new projects within the Lower Gunnison Basin in 2013-14. See A.1.15 through A.1.22
A.2.2.B	2015 Salinity Funding Opportunity Announcement	BWP/BSP	2015	Completed	X								~$20-25M (LGB)	BWP/BSP	Yes	Awarded 7 new projects within the Lower Gunnison Basin in 2015-16. See A.1.23 through A.1.29.
A.2.2.C	2017 Salinity Funding Opportunity Announcement	BWP/BSP	2017	Completed	X								~$20M (LGB)	BWP/BSP	Yes	Awarded 5 new projects within the Lower Gunnison Basin in 2018. See A.1.30 through A.1.33.
A.2.2.D	2019 Salinity Funding Opportunity Announcement	BWP/BSP	2019	Completed		X							~$20M (LGB)	BWP/BSP	Yes (STA)	Awarded 7 new projects within the Lower Gunnison Basin in 2019. See A.1.34 through A.1.40. Agreements on these new projects are anticipated to be signed in 2020 (Subject to Appropriation (STA))
A.2.3	Identify & prioritize target areas & potential projects	BOR/USGS/SMP		On-going	X	X	X	X	X	X	X	X		BOR	Yes	

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
A.2.3.1	Formulate proposals for future FOAs and grants	UVWUA/BOR/ SMP		On-going	X	X	X	X	X	X	X	X	$100K /year	BOR/CWCB/CDA	Yes	Reclamation and sponsors are working together using CWCB and CDA funds to target saline and selenium areas
A.2.3.2	RCPP Grant Submittal. System Optimization and modernization.	BPWCD/CWCD/NFWCD/UVWUA/NRCS /CRWCD		Underway	X	X	X	X					$20M	NRCS	Yes	Of the $20M requested for the Lower Gunnison Project, approximately $6 million was provided as directed funding for four off-farm project areas. Additional work has been identified, and still needs to be funded.
A.2.3.3	Technical Assistance Grants to Water Users, 2012 FOA	SMP/CWCB/ DCD	2012	Completed	X								$62K	CWCB	Yes	State of Colorado committed up $100K to assist water users in the Lower Gunnison Basin with development of proposals for the FY12 Salinity FOA.
A.2.3.4	Technical Assistance Grants to Water Users, 2015 FOA	SMP/CWCB/ DCD	2014	Completed	X								$150K	CWCB	Yes	Potential Selenium reduction
A.2.3.5	CWCB leading effort planning to identify regional optimization opportunities outside the Uncompahgre Project.	CWCB/Others		Completed	X								$100K	SCTF	Yes	More than $100K provided by CWCB FY14-16 via CRD, to complete master planning studies including the west side of Uncompahgre Project, BPWCD, CWCD and NFWCD.
A.2.3.6	Technical Assistance Grants to Water Users, 2017 FOA	SMP/CWCB/ DCD/SCD/MCD	2017	Completed	X								$132K	CWCB	Yes	Potential Selenium reduction
A.2.3.7	Technical Assistance Grants to Water Users, 2019 FOA	SMP/CWCB/ DCD/SCD/MCD	2019	On-going		X	X						$75K	CWCB	Yes	Grants were awarded to help irrigation companies with associated engineering costs and preparation of an application to Reclamation's FOA process. This activity is related to A.2.3.1.
A.2.4.1	Step 1 of East Side - Uncompahgre Project optimization planning. Rapid Assessment Study.	CWCB/Cal Poly/UVWUA		Completed in 2010	X											Rapid Assessment completed in 2010
A.2.4.2	East Side - Uncompahgre Project optimization planning	Cal Poly/CRWCD/ UVWUA/BOR/ CWCB/CDPHE	2014	Completed in 2014	X								$280K	CRWCD/ CWCB	Yes	Study identified how best to pipe & line east side delivery system & provide more manageable facilities for UVWUA. Currently, final report completed & is publically available. Link to be provided.

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
A.2.4.3	West Side - Uncompahgre Project optimization planning, including SCADA	Cal Poly/CRWCD/ UVWUA/BOR/ CWCB/CDPHE	2014	Completed	X								$35K	NRCS RCPP/ CWCB /CRWCD	partial	Study identified how best to pipe & line west side delivery system & provide more manageable facilities for UVWUA
	IRRIGATED AGRICULTURE – ON-FARM															
A.3	**On-farm Projects**															
A.3.1	On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Ongoing	X	X	X	X	X	X	X	X		NRCS/BSP	Yes	NRCS EQIP and BSP Salinity Programs
A.3.1.1	FY 2011 On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed	X									NRCS/BSP	Yes	FY2011 NRCS-1,803 acres treated in FY10 with cumulative effort totaling 57,588 acres since 1988; figures include all accomplishments of Parallel & Basin States Programs; overall plan is 43% complete. Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP.
A.3.1.2	FY 2012 On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed	X								$4.3M	NRCS/BSP	Yes	FY2012 -Total acres contracted for Gunnison River Basin (Delta and Montrose Counties): 2,163 ac (NRCS EQIP Salinity), 6,635 ac (BSP) -Total dollars obligated for Gunnison River Basin (Delta and Montrose Counties): $3,843,296 (NRCS EQIP Salinity), $496,634 (BSP). Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP.
A.3.1.3	FY 2013 On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed	X								$3.9M	NRCS/BSP	Yes	FY2013 -Total acres contracted (EQIP Salinity) for Gunnison River Basin (Delta and Montrose Counties): 1,888 ac (NRCS EQIP Salinity, 323 ac (BSP) -Total dollars obligated for Gunnison River Basin (Delta and Montrose Counties): $3,293,604 (NRCS EQIP Salinity), $646,205 (BSP). Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP.
A.3.1.4	FY 2014 On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed	X								$5.0M	NRCS/BSP	Yes	FY2014 -Total acres contracted (EQIP Salinity) for Gunnison River Basin (Delta and Montrose Counties): 2,145 ac (NRCS EQIP Salinity, 40 ac (BSP) -Total dollars obligated for Lower Gunnison River Basin (Delta and Montrose Counties): $4,851,485 (NRCS EQIP Salinity), $157,681 (BSP). Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP.

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
A.3.1.5	FY 2015 On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed	X								$3.9M	NRCS/BSP	Yes	FY2015 -Total acres contracted (EQIP Salinity) for Gunnison River Basin (Delta and Montrose Counties): 2,095 ac (NRCS EQIP Salinity, 0 ac (BSP) -Total dollars obligated for Lower Gunnison River Basin (Delta and Montrose Counties): $3.88M (NRCS EQIP Salinity), $0 (BSP). Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP.
A.3.1.6	FY 2016 On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed	X								$3.85M	NRCS/BSP	Yes	FY2016 -Total acres treated (EQIP Salinity) for Gunnison River Basin (Delta and Montrose Counties): 1,010 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total acres IWM applied to treat salinity (selenium) in FY2016: 3,219 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total dollars obligated for Lower Gunnison River Basin (Delta and Montrose Counties): $3.85M (NRCS EQIP Salinity), $0 (BSP). Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP. -Total acres contracted to treat salinity (selenium) in FY2016: 7,414 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total acres IWM planned to treat salinity (selenium) in FY2017: 1,716 ac (NRCS EQIP Salinity), 0 ac (BSP).
A.3.1.7	FY 2017 On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed	X								$4.75M	NRCS/BSP	Yes	FY2017 -Total acres treated (EQIP Salinity) for Gunnison River Basin (Delta and Montrose Counties): 1,755 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total acres IWM applied to treat salinity (selenium) in FY2017: 3,842 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total dollars obligated for Lower Gunnison River Basin (Delta and Montrose Counties): $4.751M (NRCS EQIP Salinity), $0 (BSP). Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP. -Total acres contracted to treat salinity (selenium) in FY2017: 2,357 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total acres IWM planned to treat salinity (selenium) in FY2018: 3,645 ac (NRCS EQIP Salinity), 0 ac (BSP).
A.3.1.8	FY 2018 On-Farm EQUIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed	X								$6.136M	NRCS/BSP	Yes	FY2018 -Total acres treated (EQIP Salinity) for Gunnison River Basin (Delta and Montrose Counties): 2,808 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total acres IWM applied to treat salinity (selenium) in FY2018: 3,795 (NRCS EQIP Salinity), 0 ac (BSP). -Total dollars obligated for Lower Gunnison River Basin (Delta and Montrose Counties): $6.136M (NRCS EQIP Salinity), $0 (BSP). Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP. -Total acres contracted to treat salinity (selenium) in FY2018: 3,176 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total acres IWM planned to treat salinity (selenium) in FY2018: 2,963 ac (NRCS EQIP Salinity), 0 ac (BSP).

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
A.3.1.9	FY 2019 On-Farm EQIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed		X							$7.144 M	NRCS/BSP	Yes	FY2019 -Total acres treated (EQIP Salinity) for Gunnison River Basin (Delta and Montrose Counties): 6,733 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total acres IWM applied to treat salinity (selenium) in FY2019: 1,555 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total dollars obligated for Lower Gunnison River Basin (Delta and Montrose Counties): $7.144M (NRCS EQIP Salinity), $0 (BSP). Dollars listed do not include Technical Assistance provided by NRCS funded through EQIP. -Total acres contracted to treat salinity (selenium) in FY2019: 4,816 ac (NRCS EQIP Salinity), 0 ac (BSP). -Total acres IWM planned to treat salinity (selenium) in FY2019: 1,391 ac (NRCS EQIP Salinity), 0 ac (BSP).
A.3.1.10	FY 2020 On-Farm EQUIP and Basin States Program Improvements	Landowners/ NRCS/BSP		Completed			X						$4.9M	NRCS/BSP	Yes	In 2020, salinity contracts were awarded to treat 1,903 acres, totaling about $4.9M.
A.4	**Activities to Target, Define, Plan, and Implement Future On-farm Projects**															
A.4.1	Participate in Salinity Control Program - Lower Gunnison Comprehensive Plan effort	CRWCD/ BOR/ CWCB/ NRCS/ BSP/SMP	2012	Completed in 2014	X								see funding for A.2.1	BSP	Yes	Study is examining how to best promote & implement future salinity control projects in LG Basin for both On & Off-Farm. Potential selenium reduction benefits. Final report Feb. 2014. Plan is to treat 50-60% of remaining acreage
A.4.2	Implement EQIP-funded irrigation efficiency improvements	Landowners/ NRCS	1988	Ongoing	X	X	X	X	X	X	X	X		NRCS	Partial (STA)	
A.4.3	Implement BSP-funded irrigation efficiency improvements	Landowners/ BSP/ CWCB		Ongoing	X	X	X	X	X	X	X	X		BSP	Partial	
A.4.4	Improve Irrigation Water Management	Landowners/ conservation districts		Ongoing	X	X	X	X	X	X	X	X		BSP	Partial	Delta District & Shavano District staff help landowners improve water management
A.4.5	On-farm Irrigation BMP Demonstration Projects	Landowner/ STF/Cons Districts/CWCB		Complete	X	X	X						~$100K	CWCB/CRWCD/Landowners/ NRCS		Intended to demonstrate and evaluate practices and improvements that may not be included in the existing programs.
A.4.6	Meaker Big Gun Demo	Landowner/ STF/Cons Districts/CWCB		Complete	X								$210K	SCTF/CRWCD/Landowners/ NRCS	Yes	Demonstrate the feasibility of using Big Gun Sprinkler systems on Adobe soils in irregular shaped parcels.

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
	NON-AGRICULTURAL SOURCES															
A.5	**Pond Seepage (Recreational, Farm, Aesthetic)**															
A.5.1	Formulate program to address existing pond seepage	SMP		Not begun											No	Studies (see C.1.) are proposed to examine loading impacts of ponds and develop selenium control concepts.
A.5.2	Delineate and inventory ponds using 2011 aerial photos	SCD		Completed	X								~$4K	SCTF	Yes	Included perched, size, soils for Lower Uncompahgre, Lower reaches of North Fork to Delta
A.5.3	Analyze existing pond data and identify gaps and priority ponds or areas	USGS/NRCS/BOR		Not begun									~$100K	SCTF/ BOR/BSP	No	Ponds are included in current GIS model. Pending results, the SMP should have a discussion on the importance of pond seepage.
A.6	**Municipal and Industrial Sources**															
A.6.1	Explore options for selenium management from sewage treatment plants	Operators/ CDPHE		Not begun											No	SMP to evaluate need and benefits in future
A.6.2	Explore options for selenium management from Individual Sewage Disposal Systems	Operators/ CDPHE		Not begun											No	SMP to evaluate need and benefits in future
A.6.3	Delineate and inventory septic using GIS	USGS/SCTF/BOR		Completed	X								$15K	SCTF	partial	19,000+ systems identified. Looked at Tri-County water to estimate annual septic volume. To be published in FY21 as part of GIS Selenium and Salinity Model Report.
A.6.4	Explore options for selenium management involving gravel pits	Operators/ CDPHE		Not begun											No	Needs to be developed
A.7	**Public Lands**															

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
A.7.1	Public lands (administered by BLM)	BLM		Ongoing	X	X	X	X	X	X	X	X		BLM	Yes	The BLM-UFO's revised RMP includes a stipulation to require special design plans for development on soils mapped as saline/selenium soils.
PART B - OUTREACH AND EDUCATION																
	MITIGATE EXISTING SOURCES															
B.1	**Public Education and Outreach**															
B.1.1	Refine, distribute, & promote Best Management Practices (BMPs)	SMP/STF/ WWUC		Ongoing	X	X	X	X	X	X	X	X		BOR/ CRWCD	Partial	Information on BMPs has previously been provided to the public. Distribution of this information will continue into the future.
B.1.2	Minimize New Sources using BMPs and other methods (Ponds, Septic system & other sources)	SMP/STF		Ongoing	X	X	X	X	X	X	X	X	>$30K / year	Unk	No	Needs continued discussion by SMP workgroup. Also being addressed by Education and Outreach committee. See B.2.1.
B.1.3	SMP Education and Outreach Committee	STF/SMP	2013	Ongoing	X	X	X	X	X	X	X	X	~$5K	GBSTF/BOR/DCD/SCD/Others	Yes	Each agency cover costs of salaries for participation (in kind services)
B.1.4	Collaborate with the Lower Gunnison Basin Soil Health Team to educate the public about selenium reduction and soil health	STF/NRCS	2013	Underway	X	X	X	X	X	X	X	X	~$1K	CRWCD	Yes	CRWCD gave a presentation at the 2020 West Slope Soil Health Conference in Delta, Colorado.
B.2	**Water Users Education and Outreach**															
B.2.1	Present information/education activities	SMP/ WWUC/STF		Ongoing	X	X	X	X	X	X	X	X		BOR/ CRWCD	Partial	Lower Gunnison Wise Water Use Program underway funding exhausted in 2012. Additional information presented and archived on GunnisonRiverBasin.org.
B.2.2	Promote Soil Health Initiative	NRCS/DCD/SCD		Ongoing	X	X	X	X	X	X	X	X	UNK	UNK	No	SMP to work with existing and developing Soil Health Initiatives including BMPs Potential to reduce selenium loading

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
B.2.3	Collaborate with local water providers to educate stakeholders about selenium related issues and the importance of on-farm and off-farm selenium reduction activities	STF/SMP		Underway	X	X	X	X	X	X	X	X	>$5K / year	CRWCD/CWCB/NRCS	Yes	
B.2.4	Develop strategies to support, facilitate, encourage LG water users to undertake projects that have Se control benefits	SMP/BOR/CSCB	2015	Underway	X	X	X	X	X	X	X	X		Salinity Forum	Yes	State Field Salinity Coordinator
	PREVENT OR MINIMIZE IMPACTS FROM NEW, POTENTIAL SOURCES															
B.3	**Public Education and Outreach**															
B.3.1	Reclamation projects and actions	BOR		Ongoing	X	X	X	X	X	X	X	X		BOR	Partial	
B.3.2	BLM managed lands	BLM		Ongoing	X	X	X	X	X	X	X	X		BLM	Partial	
B.3.3	Other Federal actions	USFWS/ TBD		Ongoing	X	X	X	X	X	X	X	X		USFWS/TBD	Partial	
B.3.4	Counties/cities	Counties/ cities		Not begun	X	X	X	X	X	X	X	X				
B.3.5	Minimize New Sources using BMPs and other methods (Ponds, Septic system & other sources)	SMP/STF		Ongoing	X	X	X	X	X	X	X	X	Unk	Unk	No	Needs continued discussion by SMP workgroup. Also being addressed by Education and Outreach committee. See B.2.1.
B.4	**Water Users Education and Outreach**															
B.4.1	Reclamation FOA Workshops	BOR		Ongoing	X	X			X			X		BOR	Yes	To be held during next FOA (2022)
B.5	**Encourage Agency Management Actions to Minimize Loading from Proposed Activities**															

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
	PART C - SUPPORT ACTIVITIES															
	EXPAND KNOWLEDGE BASE															
C.1	**Studies**															
C.1.1.A	Characterization of Salinity and Selenium Loading and Land-Use Change in Montrose Arroyo, Western Colorado, from 1992 to 2010, phase 1	USGS/BOR		Completed in 2012	X								$98K	BOR	Yes	Characterization of Salinity and Selenium Loading and Land-Use Change in Montrose Arroyo, Western Colorado, from 1992 to 2010 http://pubs.usgs.gov/sir/2011/5106/
C.1.1.B	Characterization of Salinity and Selenium Loading and Land-Use Change in Montrose Arroyo, Western Colorado, from 1992 to 2013, phase 2	USGS/BOR	2011	Completed	X								$98K	BOR	Yes	Characterization of Salinity and Selenium Loading and Land-Use Change in Montrose Arroyo, Western Colorado, from 1992 to 2013 Report completed in 2015 https://pubs.er.usgs.gov/publication/sir20115106
C.1.2	Develop 5 Year Science Plan	USGS/SMP		Completed	X								$129k	SCTF/ USGS	Yes	Plan was finalized in 2014 approved by the SMP Workgroup. Workgroup to document and approve updates as needed.
C.1.3	Development of soil selenium interpretation	WNTSC		Completed	X									NRCS	Yes	Funding included in NRCS's general Technical Assistance.
C.1.4.A	Effects of Recharge and Dissolved Nitrate (Seq. Extract Study aka Column Study) (Phase I)	BOR/USGS		Completed	X								$185K	BOR	Yes	Funding from BOR Science & Technology Program & USGS Final Report was published in 2014

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
C.1.4.B	Geochemical characterization of selenium in Mancos Shale derived soils and shallow aquifer sediments in the Lower Gunnison River Basin (phase II)	BOR/USGS/SCTF/NRCS	2014	Completed	X								$199K	SCTF/USGS	Yes	Journal Report published in 2016 https://co.water.usgs.gov/cgi-bin/pubs?keyword=&author=mills&date=2016&date1=&date2=&series=All
C.1.5	Real-time Selenium Monitoring, 5 SW sites	CRWCD/USGS/BOR/BLM		Ongoing	X									USGS/BOR/CRWCD/CWCB	Yes	No additional funding is needed to continue this activity. The USGS Kansas Water Center has funded this activity.
C.1.6	Installation of 30-Well Eastside GW Monitoring Network and Monitoring	USGS/SCTF/BOR		Completed	X								$434K	SCTF/ USGS/ BOR	Partial	10 well installed in FY13 @ ~$190K including BOR Provo Drill Crew Costs; ~$144K (SCTF/USGS) & ~$100K (BOR) in FY14 for construction of the 20 additional.
C.1.6.A	Monitoring of 30-Well GW Network	USGS/SCTF/BOR/BLM		Underway	X	X	X	X	X			X	$67K 13 $139K14	SCTF/ USGS	Partial	FY13 Monitoring of 10 wells completed, FY 14-Five Year Proposal reviewed by Science Team. Volunteer has collected data through 2019. Received funds to obtain water levels and check network in 2019 (Completed).
C.1.6.B	Lower Gunnison Groundwater Characterization Report	USGS/SCTF	2016	Underway	X	X							$135K	USGS/SCTF	Yes	This report was published in 2019, and can be found here: https://pubs.er.usgs.gov/publication/sir20195029
C.1.7	Study of Influence of Water-table Elevated Changes on Selenium Concentrations in Saturated Mancos Shale Derived Soils of the Lower Gunnison River Basin, Colorado (Wetlands Study)	USGS/SCTF/BOR		Completed	X								$220K	SCTF/USGS/BOR	Yes	4 wells constructed in FY13 using BOR Provo Drill Crew, Monitoring being completed by USGS. The study was published in 2016, and can be found here: https://pubs.er.usgs.gov/publication/sir20165047
C.1.8	Bostwick Park System Optimization	USGS/CWCB/BOR	2014	Completed	X											Report produced in 2015
C.1.9	Investigate loading impacts of Non-Ag sources including ponds, ISDS & other point/non-point sources	USGS/SMP		Proposed	X								$15K	USGS/BOR/ SCTF	Yes	ISDS = individual septic disposal systems, Part of Model. To be published in FY21.

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY19	FY20	FY21	FY22	FY23	FY24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
C.1.10	Investigate solutions & BMPs for Non-Ag sources	SMP		Proposed											No	
C.1.11	GIS Selenium and Salinity Model	CWCB/Forum/USGS	2015	Underway	X	X	X	X					$210k	CWCB/Forum/USGS	Yes	Report publication in water year 2021.
C.1.12	Synoptic Sampling of Gunnison River and Tributaries near Delta, Colorado	CWCB/USGS	2016	Completed	X								$145K	CWCB/USGS	Yes	The study was published in 2018, and can be found here: https://pubs.usgs.gov/sir/2018/5029/sir20185029.pdf
C.1.13	Sunflower Drain Groundwater/Surface Water Interaction Study	CWCB/USGS	2017	Completed	X	X	X						$342K	CWCB/USGS	Yes	The study was published in 2020, and can be found here: https://pubs.er.usgs.gov/publication/sir20205132
C.1.14	Selenium Ecosystem Model	CWCB/USGS	2016	Ongoing	X	X	X	X					$483K	CWCB/USGS	Yes	Report planned for 2021.
C.2	**Research and Testing of New Technologies**															
C.2.1	Investigate canal sealants	BOR/ UVWUA/USGS	1999	Completed	X									BOR	Yes	Worked with EPA on application rates. Application of PAM not permitted on Reclamation Projects or with Reclamation funding. Prelim Report: Fate and Transport of Polyacrylamide and Degradation Products of Polyacrylamide in Canals and Laterals of the Uncompahgre Valley, 1999-2003
C.2.2	S & T Bioreactor Bench Scale Study Proposal - FY 2006	BOR/Mesa State College/Golder Assoc.	2006	Completed	X									BOR S & T Program	Yes	Report: Pahler et al. 2007, Mesa State College and Golder 2007
C.2.2.A	S & T Bioreactor Pilot Study Proposal - FY 2008-09	BOR/Mesa State College/Golder Assoc.	2009	Completed	X								$92K	BOR S & T Program	Yes	Report: FINAL REPORT PASSIVE SELENIUM BIOREACTOR – PILOT SCALE TESTING BUREAU OF RECLAMATION SCIENCE AND TECHNOLOGY PROGRAM Project No. 4414, March 2010
C.2.3	S & T Passive GW Treatment for Se Pilot Study Proposal - FY 2018-19	BOR/USGS	2017	Completed	X								$15K	BOR S & T Program	Yes	Project Title: Feasibility of in Situ, Passive Groundwater Treatment to Reduce Selenium Impacts from Reclamation Projects. Project No. 7113
C.2.3.A	S & T Passive GW Treatment for Se Scoping Study Proposal - FY 2019	BOR/USGS	2019	Planned	X	X							TBD	BOR S & T Program	No	Follow-up Proposal to 2017 Scoping Study. Working on joint proposal with BOR, USGS, Sandia Labs & DOE. On hold as of 2019.
	MONITORING															

ID	Activity	Cooperating entities/programs	Start Date	Current Status	Prior years	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	Out years	Est. funding needs	Funding sources	Funds in place?	Comments and Deliverables (with additional needs highlighted)
C.3	**Water Quality**															
C.3.1	Collect periodic samples at core monitoring network (e.g., 6-9/yr.)	CRWCD/ USGS/BOR/ CDPHE/ NWCC		Ongoing	X	X	X	X	X	X	X	X			Partial	Please see Appendix C for a list of SW WQ sites
C.3.2	Operate continuous WQ monitors	CRWCD/ USGS/BOR		Ongoing	X	X	X	X	X	X	X	X			Partial	Please see Appendix C for a list of SW WQ sites
C.3.3	Collect periodic samples at ancillary sites	USGS,CRWCD, CDPHE, STF, Others		Ongoing	X	X	X	X	X	X	X	X			Partial	Please see Appendix C for a list of SW WQ sites
C.4	**Endangered Fish and Surrogate Species**															
C.4.1	Population Sampling	Recovery Program		Ongoing	X	X	X	X	X	X	X	X		FWS /BOR		Funding and investigations provided through UCRRIP
C.4.2	Fish tissue Plugs to determine selenium concentrations	FWS		Ongoing	X									FWS/ CPW	Partial	No fish were sampled in 2020.
C.4.3	USGS Open-File Report 2013-1104	USGS/FWS		Completed	X										Yes	Report entitled "Determination of Selenium in Fish from Designated Critical Habitat in the Gunnison River, Colorado, March through October, 2012"
C.5	**Annual Progress Report**															
C.5.1	Report annual progress	BOR/SMP Workgroup		Ongoing	X	X	X	X	X	X	X	X		BOR	Yes	Address WQ, updated load/concentration trend plots, biological monitoring, construction progress & outreach/education. Due to FWS annually.
C.5.2	Annual Selenium Trend Analysis Report	USGS		Ongoing	X	X	X	X	X	X	X	X	$29K	BOR	Yes	USGS Selenium Trend Analysis Reports are delivered to FWS once they are completed.
C.5.3	5-Year Selenium Trend Analysis Report	USGS		Completed	X									BOR	Yes	5-Year Selenium Trend Analysis Reports are delivered to FWS once they are completed. These reports are no longer being prepared. The USGS is preparing annual reports only.
	OTHER SUPPORT ACTIVITIES															
C.7	**Explore and Obtain Funding to Support Program Activities**															
C.7.1	Obtain funding for SMP activities	SMP		Underway	X	X	X	X	X	X	X	X			Partial	

APPENDIX C – 2020 WATER QUALITY SAMPLE SITES

2020 USGS Water-quality sites in the Lower Gunnison Basin associated with the SMP

09129600 Smith Fork near Lazear, CO #

09128500 Smith Fork Near Crawford, CO #

384434107432701 Alum Gulch Near Hotchkiss, CO

384822107411201 Cottonwood Creek at County Road J75, Near Mouth

384200107381401 Smith Fork at 38.5 Road Bridge Near Hotchkiss, CO #

09136100 North Fork Gunnison River above mouth near Lazear, CO *

384624107570701 Gunnison River at 2200 Road Bridge, at Austin, CO #

09137500 Gunnison River near Cory, CO

09144200 Tongue Creek at Cory, CO

09146200 Uncompahgre River near Ridgway, CO #

09147500 Uncompahgre River at Colona, CO *

382802107513301 Montrose Arroyo at East Niagara Street

383041107544201 Cedar Creek near mouth

383926107593001 Loutsenhizer Arroyo at Hwy 50 near Olathe, CO

384202108032001 Dry Creek at mouth, near Delta

09149500 Uncompahgre River at Delta, CO *

09144250 Gunnison River at Delta, CO *

384448108070301 Cummings Gulch at mouth

09150500 Roubideau Creek at mouth near Delta, CO #

384527108152701 Gunnison River above Escalante Creek, near Delta, CO #

385011108225401 Gunnison River blw Dominguez Creek nr Whitewater, CO #

09152500 Gunnison River near Grand Junction, CO (aka Whitewater site) *

# Denotes site that are discontinued, unless additional funding is identified.
* Denotes real-time, continuous monitor sites using linear regression to calculate instantaneous dissolved selenium loads. The *'s are hyperlinked to the site's real-time USGS data site.

2020 Selenium Task Force water-quality sites in the Lower Gunnison Basin associated with the SMP

USGS 09146200	Uncompahgre River near Ridgway, CO
USGS 381716107454301	Billy Creek at Mouth
USGS 381933107455101	Onion Creek at County Rd 906A near Colona
USGS 382034107464501	Beaton Creek at Uncompahgre Rd near mouth
USGS 09137050	Currant Creek, near Read, CO (Bridge at mile marker 8 on Hwy 92)
USGS 384812107524501	Oasis Ditch at Hwy 92
USGS 384802107522201	Lawhead Gulch at Hwy 92
USGS 384752107502201	Sulphur Gulch at Hwy 92
USGS 384756107490801	Big Gulch at Hwy 92
USGS 384747107430501	Short Draw west of County Fairgrounds at Hotchkiss
USGS 384915107412101	Jay Creek at Hwy 133 near mouth

Note: All sites are active, but no samples were collected in FY2020

APPENDIX D – 2020 ASPINALL UNIT OPERATIONS

Aspinall Unit Operations for Calendar Year 2020 under the Gunnison River PBO

In water year 2020, Western Colorado experienced a near average snow season, followed by record dry conditions in spring, summer and fall. With the Record of Decision for the Final Aspinall Unit Operations EIS that was signed on May 3, 2012, peak and base flow targets were established for the Whitewater gage near Grand Junction, Colorado to aid in the recovery of four endangered fish; the Humpback Chub, Bonytail Chub, Razorback Sucker, and the Pikeminnow. This report will assess how well the 2020 operations of the Aspinall Unit provided sufficient releases of water at critical times and quantities necessary to avoid unnecessary harm to the endangered fish species and their essential habitat while continuing to meet the authorized purposes of the Aspinall Unit.

Peak Flows As mentioned previously, 2020 was considered a moderately dry year. Year type is determined by the forecasted April through July inflow volume to Blue Mesa Reservoir. Moderately dry years are defined as years where the forecasted inflow volume is greater than 381,000 acre-feet and less than 516,000 acre-feet. The April 1st issue of the runoff forecast predicted 525,000 acre-feet of inflow to Blue Mesa Reservoir, at the lower end of the average dry category. The actual April through July inflow volume for 2020 totaled 387,000 acre-feet, with runoff conditions declining with each new forecast after April 1st. The May 1 runoff forecast placed 2020 in the moderately dry year category with a peak flow target of 3,167 cfs at the Whitewater gage, and no duration day requirements for half bankfull or peak flow levels. Figure 1 shows the peak flow and duration day targets for the Gunnison River at Whitewater based on 2020 landing in the moderately dry year category.

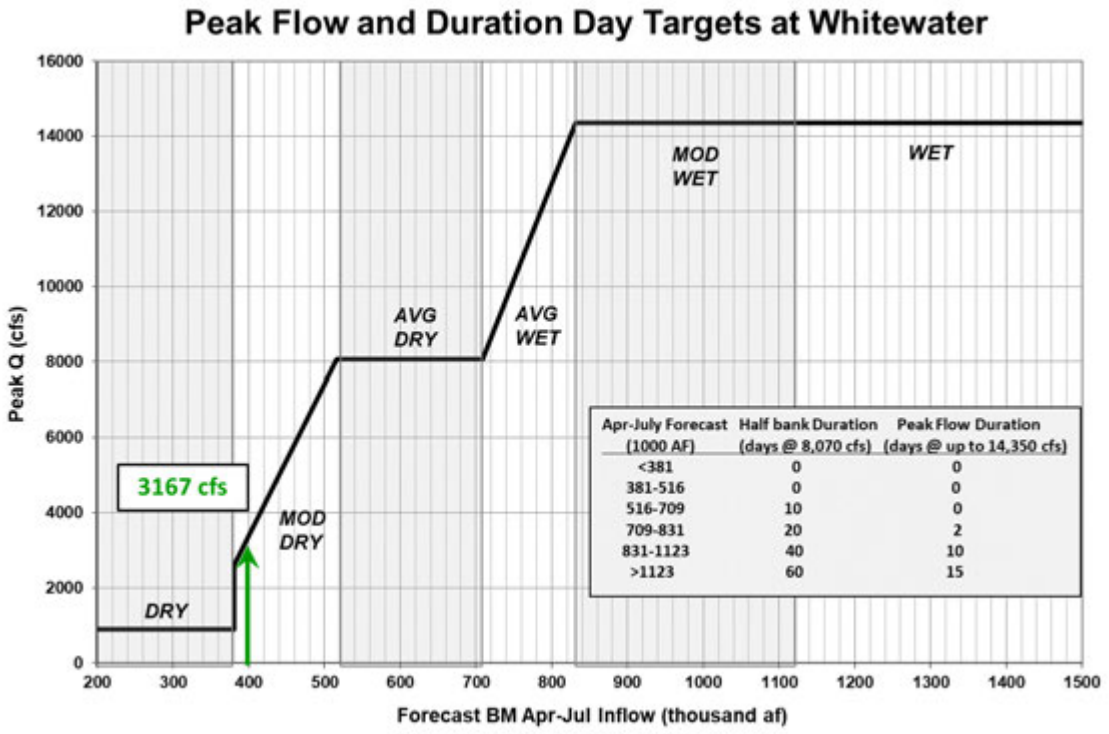

Figure 1. Peak flow and duration day targets at the Whitewater gage as determined by April-July Forecasted Inflow.

A peak flow of 4,515 cfs was reached on the Gunnison River at Whitewater on May 20th. This peak flow was primarily in response to greater than anticipated tributary flows downstream from the Aspinall Unit.

Half Bankfull Flow Duration The recommended number of duration days at half-bankfull flows and at peak flow are also dependent on the forecasted inflow volume to Blue Mesa Reservoir. The table insert in Figure 1 shows the recommended duration of days at peak flow and half bankfull flows for ranges of forecasted inflow volume to Blue Mesa Reservoir. In moderately dry years, there are no requirements for a duration at half bankfull flow levels.

Base Flows Base flow recommendations were determined by a study conducted by the Fish and Wildlife Service (Figure 2). Year type for base flow is also determined by the April-July forecasted inflow volume to Blue Mesa Reservoir, so 2020 followed the targets for a moderately dry year based on the spring forecasts for April through July inflow volume to Blue Mesa Reservoir. Since 2019 was considered a moderately wet year, the moderately wet year baseflow targets are carried over for the January-March time period as the hydrology of these months is more dependent on the previous year's hydrology than the current year. Per the drought rules in the Aspinall Operations EIS, the baseflow target for July and August was lowered to 900 cfs. The drought rule states that in Dry and Moderately Dry years, when the content of Blue Mesa Reservoir is below 600,000 acre-feet, the baseflow target is reduced from 1,050 cfs to 900 cfs. The content of Blue Mesa Reservoir dropped below 600,000 acre-feet on June 26th.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	1050	1050	1050	1050	1050	1500	1500	1500	1050	1050	1050	1050
Mod Wet	1050	1050	1050	1050	1050	1500	1500	1500	1050	1050	1050	1050
Avg Wet	1050	1050	1050	1050	1050	1500	1500	1050	1050	1050	1050	1050
Avg Dry	1050	1050	1050	1050	1050	1500	1500	1050	1050	1050	1050	1050
Mod Dry*	750	750	750/790	750/890	750/890	1050	1050	1050	750/890	750/790	750/790	750
Dry*	750	750	750/790	750/890	750/890	1050	1050	750/890	750/890	750/790	750/790	750

*During March through November in Moderately Dry and Dry type years, additional releases will be made as necessary to provide flows above the 750 cfs anticipated to be diverted by the Redlands Water and Power Company, for the fish ladder and fish screen as shown.

Figure 2. Base flow recommendations to support critical flows and habitat for the endangered fish.

Baseflow targets were exceeded for almost every day of 2020 with a combination of releases from the Aspinall Unit and tributary flow contributions to the mainstem Gunnison River. Flows in the Gunnison River at Whitewater dropped below the baseflow target level for only a few days during the year. Release adjustments at the Aspinall Unit were made to increase river flows when flows were forecast to remain below the baseflow target for an extended period of days.

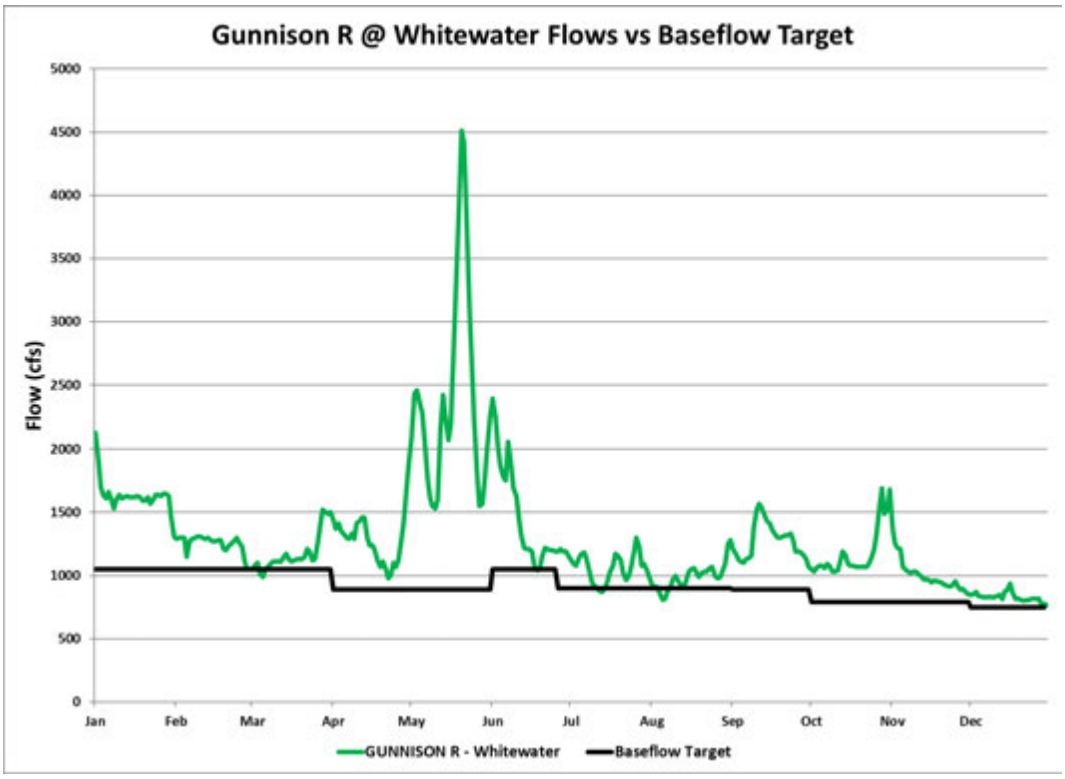

Figure 3. 2020 Base Flow Target vs. Actual Flows at Whitewater Gage. https://nwis.waterdata.usgs.gov/co/nwis/uv?cb_00060=on&cb_00065=on&format=gif_default&site_no=09152500&period=&begin_date=2020-01-01&end_date=2020-12-31

Gunnison River Flow differences between the Gunnison River at Whitewater and the Gunnison River below the Redlands Diversion Dam are primarily due to the diversion of water to the Redlands Canal. 2020 was a moderately dry year and flows on the lower Gunnison River were often below 300 cfs during the summer months. With the drought rule provision that lowers the baseflow target to 900 cfs during July and August, it is difficult to have flows at 300 cfs below the Redlands Diversion Canal when the canal is diverting at near capacity. Figure 4 shows the flows in the Gunnison River below the Redlands Diversion Dam, along with the diversion rate at the Redlands Canal.

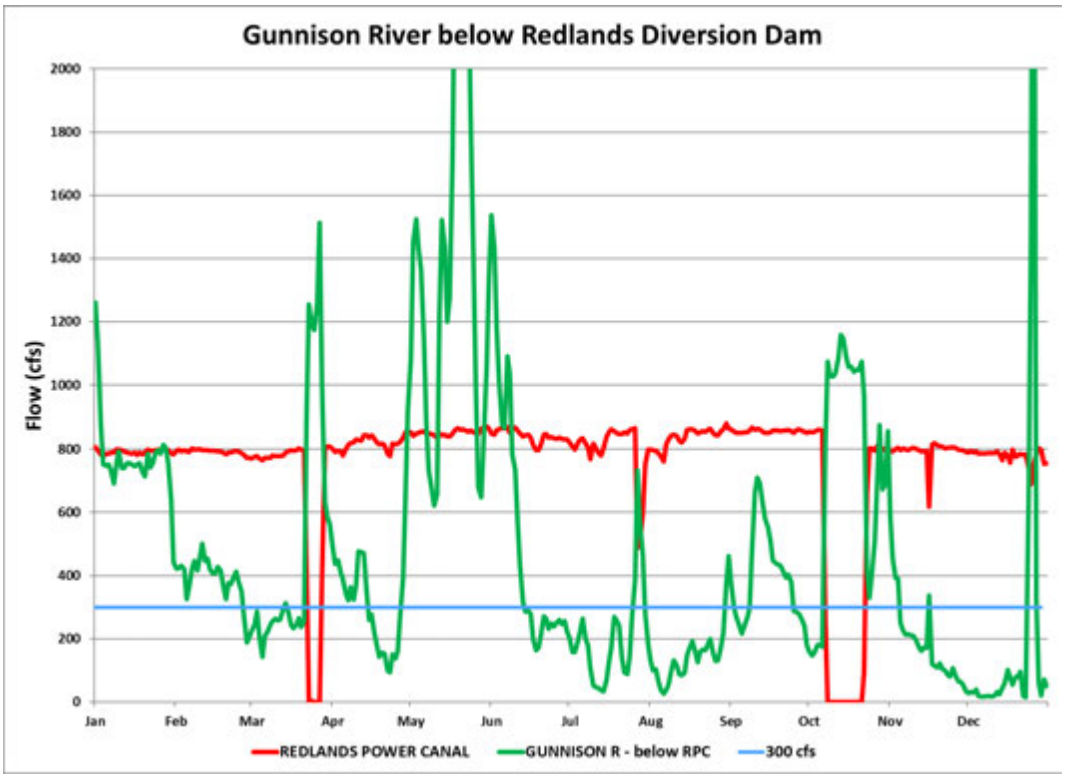

Figure 4. Gunnison River flows as measured below the Redlands Diversion Dam.

Operational Issues There were no operational issues that impeded flows from the Aspinall Unit to the Whitewater gage during the 2020 water year.

Summary In 2020, hydrologic conditions remained in the moderately dry category once the runoff season began. Conditions throughout the Gunnison Basin were very dry during the spring and summer. The dry conditions required additional releases from the Aspinall Unit to sustain the baseflow target levels in the lower Gunnison River as measured at the Whitewater gage. By the end of the year, storage in Blue Mesa Reservoir was well below a normal end of year level.

APPENDIX E – 2020 ANNUAL FLOW MANAGEMENT AND CONSERVATION STATUS OF THE DOLORES RIVER

Annual Flow Management of the Dolores River and Status of Conservation Recommendations Water Year 2020

Background: In 1975, the Dolores River was designated as a component of the National System of Wild and Scenic Rivers. Nearly 40-years later the San Juan Public Lands Center (SJPLC) began revising their San Juan National Forest Resource Management Plan. A requirement of the planning process was that all planning area rivers be assessed for their eligibility, classification, and suitability for inclusion in the National Wild and Scenic River System. The San Juan Public Lands Draft Land Management Plan (DLMP) found the Dolores River from the outlet of McPhee Reservoir to Bedrock Colorado to be preliminarily suitable for inclusion in the National Wild and Scenic River System. Outstanding Remarkable Values (ORV's) identified in the DLMP for this section of the Dolores River include fish and wildlife resources, recreation, scenery, and other geological, ecological, and archeological values. Some of the specific ORV's are the roundtail chub, rafting, New Mexico privet, canyon treefrog, and Eastwood's monkeyflower. Since the Dolores River Dialogue (DRD) had been focusing on the lower Dolores River, the SJPLC felt that the DRD had potential to find an alternative to the Wild and Scenic suitability designation that would achieve similar protections for the stream and its ORV's.

In 2008, the SJPLC asked the DRD for assistance in protecting the ORV's and in considering alternatives to Wild and Scenic suitability. The DRD in conjunction with the SJPLC established the Lower Dolores River Working Group (LDWG) and began a process of understanding the human, ecological, and political dynamics at play on the lower Dolores River and how to best address the needs of the ORV's.

As an outcome of the LDWG, a legislative committee was established to consider an alternative to Wild and Scenic designation. A National Conservation Area was considered the most promising alternative and language was being drafted for legislative consideration. While drafting the language, it was determined that in order to protect the native fish ORV, assistance would be needed from native fishery experts. The "A Way Forward" committee was established and a team of scientists (Bill Miller, Kevin Bestgen, and Phaedra Budy) was hired to review existing data and summarize the status and trends of the three species from McPhee Dam to the confluence with the San Miguel River. The final report presented nine potential management opportunities that may assist with the improvement of the native fish. They are: spill management, base flow management, sediment transport flows, habitat maintenance flows, thermal regime modification, reducing the effects of introduced coldwater species, reducing the effects of introduced warm water species, and supplementing native fishes.

Upon completion of the A Way Forward final report, a Monitoring and Recommendation Team (MRT) consisting of water managers, NGOs, and State and Federal Agencies was formed to find ways to implement the nine recommendations. The MRT, with financial assistance of the Colorado Water Conservation Board, completed its first iteration of "The Lower Dolores River Implementation, Monitoring and Evaluation Plan for Native Fish" (IME Plan) in August 2012. Public comments to the plan were received, and the second iteration was published in June 2014.

An electronic version of this plan and appendices can obtained from the Dolores River Dialogue website: http://ocs.fortlewis.edu/drd/pdf/Lower-Dolores-River-Implementation-Monitoring-and-Evaluation-Plan-for-Native-Fish-June%202014.pdf

A July 2018 Reclamation report prepared for the U.S. Fish and Wildlife Service entitled "Flow Management and Endangered Fish in the Dolores River during 2012 – 2017" concluded that "…available information appears

insufficient to identify linkages between Reclamation's flow management at McPhee and endangered fish recovery" on the lower reaches of the Dolores River. However, coordinated efforts between the Colorado Parks and Wildlife (CPW), Reclamation and district managers to meet IME Plan targets for native fish habitat maintenance and improvement are ongoing.

Downstream Releases: Managers provided a full Project water supply of 31,798 AF below McPhee Dam. Downstream releases for water year 2020 ranged from 25 cubic feet per second (CFS) to 50 CFS. There was insufficient runoff for a release in excess of the project water supply.

Conservation Recommendation No. 1. *We recommend that Reclamation continue support efforts of the three species conservation strategy on a range-wide basis, including conservation efforts on the Dolores River.*

The Bureau of Reclamation has been an active participant of the Dolores River Dialogue since its inception in 2004, and is currently an active member of the Monitoring and Recommendation Team (MRT), formerly the Implementation Team. The MRT provides management recommendations, to Reclamation, related to releases to the lower Dolores River (from McPhee Dam to the confluence of the San Juan Miguel River) for the native and non-native fishes and rafting, and promulgates additional monitoring downstream to help inform future recommendations.

Conservation Recommendation No. 2. *We recommend that Reclamation continue to work with the Biology Committee to consider spill and flow management options to benefit the native fishery in the middle and lower Dolores River while continuing to honor commitments related to downstream rafting.*

The Biology committee was setup as an advisory committee for fishery pool management only. Reclamation and the Dolores Water Conservancy District are actively involved with the DRD and MRT in performing downstream release management.

Reclamation takes an active role in the Biology Committee in identifying base needs and possibilities. Annual base release budgets are drafted by CPW and recommendations are made to project operators.

Conservation Recommendation No. 3. *We recommend that Reclamation continue to take an active role in the Dolores River Dialogue, in particular activities related to native fish.*

See background narrative. A hydrograph of the Dolores Project operations has been included as Figure 1.

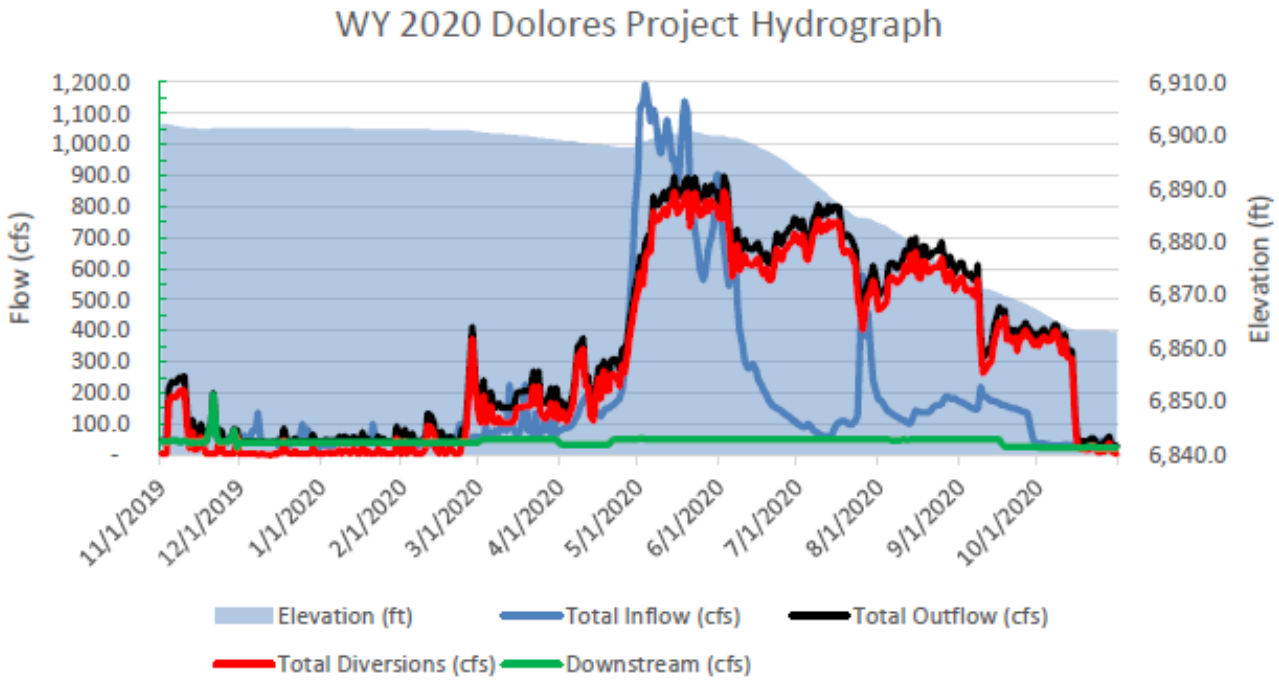

Figure 1. A hydrograph of Dolores Project operations.