GUNNISON BASIN IMPLEMENTATION PLAN

Prepared for:

The Gunnison Basin Roundtable

For submittal to:

The Colorado Water Conservation Board

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Acronyms

ACE	Army Corps of Engineers
AF	Acre-Feet
AFY	Acre-Feet per Year
BIP	Basin Implementation Plan
BLM	Bureau of Land Management
BOR	Bureau of Reclamation
BRT	Basin Roundtable
CBMR	Crested Butte Mountain Resort
CCC	Colorado Coordination Council
CDPHE	Colorado Department of Public Health and Environment
CDSS	Colorado Decision Support System
CFS	Cubic Feet per Second
CIR	Crop Irrigation Requirement
CPW	Colorado Parks and Wildlife
CRCT	Colorado River Cutthroat Trout
CRJP	Colorado Joint Review Process
CRWAS	Colorado River Water Availability Study
CSFS	Colorado State Forest Service
CSU	Colorado State University
CU	Consumptive Use
CWCB	Colorado Water Conservation Board
CWP	Colorado Water Plan
CWPPs	Community Wildfire Protection Plans
CWT	Colorado Water Trust
DWR	Division of Water Resources
EAP	Education Action Plan
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPAT	Extreme Precipitation Analysis
GBEOC	Gunnison Basin Education and Outreach Committee
GBIP	Gunnison Basin Implementation Plan
GBRT	Gunnison Basin Roundtable
GIS	Geographic Information System
HB	House Bill
IBCC	Interbasin Compact Committee
IPP	Identified Project or Process
IWR	Irrigation Water Requirement
M&E	Monitoring and Evaluation
M&I	Municipal and Industrial

NC	Nonconsumptive
NCDC	National Climatic Data Center
NCNA	Nonconsumptive Needs Assessment
NEPA	National Environmental Policy Act
NPS	National Park Service
NRA	National Recreation Area
OW	Outstanding Waters
PBO	Programmatic Biological Opinion
PDF	Portable Document Format
PEPO	Public Education, Participation, and Outreach
RCCP	Regional Conservation Partnership Program
RICD	Recreational In-Channel Diversion
ROD	Record of Decision
SB	Senate Bill
SDO	State Demographer's Office
SSI	Self-Supplied Industrial
SWSI	Statewide Water Supply Initiative
TMDL	Total Maximum Daily Load
UGRWCD	Upper Gunnison River Water Conservancy District
UP	Use Protected
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UVWUA	Uncompahgre Valley Water Users Association
WFET	Watershed Flow Evaluation Tool
WQCC	Water Quality Control Commission
WQCD	Water Quality Control Division
WSRA	Water Supply Reserve Account

Executive Summary

Objectives

This plan is designed to follow the framework of the Basin Implementation Plan Guidance (December 10, 2013) provided by the Colorado Water Conservation Board. Application of the guidance to local issues in the Gunnison Basin and preparation of the report was overseen by the Gunnison Basin Roundtable and its Basin Implementation Plan Subcommittee. To improve consistency, coherence, and relevance to local issues some sections of the plan were restructured as appropriate. According to the Guidance:

> "*The purpose of the Basin Implementation Plans is for each basin [roundtable] to identify projects and methods to meet basin-specific municipal, industrial, agricultural, environmental, and recreational needs. The Basin Implementation Plans will inform and help drive Colorado's Water Plan.*"

The Gunnison Basin Roundtable is pleased to submit this Basin Implementation Plan for inclusion into the Colorado Water Plan process. The projects identified in this plan meet a variety of important needs in the Basin. Every effort was made to recognize the most appropriate goals, projects, and strategies to address the Basin's priorities. Despite the best efforts to comprehensively address water needs in the Basin, given the accelerated deadline and resource constraints, this plan inevitably falls short of adequately identifying all projects and issues in the Basin. It is also important to note, due to the inherent tradeoffs surrounding water use in Colorado all priorities and projects documented in this plan are not equally and unanimously supported by all members of the roundtable.

Background

The Gunnison Basin Implementation Plan (GBIP) was created by the Gunnison Basin Roundtable (GBRT) for submittal to the Colorado Water Conservation Board (CWCB). It is designed to support regional water planning through the roundtable process established by the Colorado Water for the 21st Century Act. The GBIP builds on previous roundtable work to propose and fund projects for meeting water needs. The GBIP also provides critical grassroots input to the forthcoming Colorado Water Plan (CWP).

To encourage locally-driven and balanced solutions to water supply challenges, the plan identifies water projects through targeted analyses of water issues in the Basin. The GBIP includes analyses of water shortages, water availability under variable hydrologic conditions, and various site-specific water supply issues. The ultimate purpose of the plan is to better identify water priorities in the Basin and highlight proposed projects that will excel at meeting these priorities in the near future.

The GBIP process continues the important public education, participation, and outreach work that the GBRT has been engaged with for almost ten years. The creation of the GBIP included targeted technical outreach to refine information on water needs and projects. It also included public outreach with local stakeholders to gather input on key elements of the plan. The GBRT's ongoing outreach and education efforts will be critical throughout the development of the CWP.

The structure of this document generally follows CWCB BIP guidelines with some modifications to better address local issues, streamline the plan, and focus on proposed projects.

- **Introduction:** summarizes the current planning process, related outreach, major Basin issues, and available information.
- **Section 1:** defines Basin Goals, Statewide Principles, and corresponding measurable outcomes.
- **Section 2:** summarizes water supply needs in the Basin.
- **Section 3:** describes options to analyze projects and case studies.
- **Section 4:** identifies proposed projects, related constraints, and strategies for implementation.
- **Section 5:** summarizes conclusions and recommendations.

Section 1: Basin Goals

The GBRT identified nine Basin Goals to establish priorities for water development and to maintain and protect the current balance of water use in the Gunnison Basin; each goal is paired with Measurable Outcomes and a process for their achievement to provide a concrete measurement of success (Table 1).

Table 1. Basin Goals

Primary Goal:

1. Protect existing water uses in the Gunnison Basin.

Complementary Goals (order does not indicate priority):

2. Discourage the conversion of productive agricultural land to all other uses within the context of private property rights.
3. Improve agricultural water supplies to reduce shortages.
4. Identify and address municipal and industrial water shortages.
5. Quantify and protect environmental and recreational water uses.
6. Maintain or, where necessary, improve water quality throughout the Gunnison Basin.
7. Describe and encourage the beneficial relationship between agricultural and environmental recreational water uses.
8. Restore, maintain, and modernize critical water infrastructure, including hydropower.
9. Create and maintain active, relevant and comprehensive public education, outreach and stewardship processes involving water resources in the six sectors of the Gunnison Basin.

The GBRT also identified six Statewide Principles (Table 2) to complement Basin Goals and to reflect the GBRT's vision for major water policy issues in Colorado. Basin Goals and Statewide Principles are collectively intended to inform and help drive the Colorado Water Plan as stated in the CWCB's Basin Implementation Plan Guidance Document.

Table 2. Statewide Principles

1. Future supply of Colorado River water is highly variable and uncertain; therefore any proponent of a new supply project from the Colorado River System must accept the risk of a shortage of supply however the shortage occurs, adhere to the prior appropriation doctrine, and protect existing water uses and communities from adverse impacts resulting from the new supply project.
2. It must be explicitly recognized that a new supply development from any location in the Colorado River System affects the entire System.
3. Any new supply project from the Colorado River System must have specifically identified sponsors and beneficiaries, and meet certain minimum criteria.
4. Local solutions must be utilized to meet Colorado's future water needs without a major state water project or related placeholder water right.
5. Water conservation, demand management, and land use planning that incorporates water supply factors should be equitably employed statewide.
6. Statewide discussion, outreach, and education concerning the Gunnison Basin Roundtable's vision for water development in Colorado should be continued.

Section 2: Basin Needs

The GBRT identified water needs by summarizing corresponding information from existing relevant sources and updates secured through targeted technical outreach with agricultural, municipal, industrial, environmental, and recreational entities.

Agricultural *shortages* are estimated to be approximately 116,000 AFY by 2050 (Table 3), prompting four primary water management needs, including improving water supply reliability; minimizing loss of agriculture to other uses; rehabilitating key water supply infrastructure, and developing public education programs (Table 4).

Table 3. Agricultural Needs (quantitative)

Analysis	Irrigated Acres	Crop Irrigation Requirement (CIR) (AFY)	Irrigation CU (AFY)	Shortage (AFY)	Non-Irrigation Demand (AFY)
Current	272,000	633,000	505,000	128,000	54,000
2050	244,000	573,000	457,000	116,000	48,000

Table 4. Agricultural Needs (qualitative)

- ❖ Improve agricultural water supplies to reduce shortages.
- ❖ Consider alternatives to growth patterns and identify creative solutions to minimize loss of agricultural land to other uses.
- ❖ Inventory existing dams, headgates, and canals; assess their current conditions; and prioritize rehabilitation and repairs.
- ❖ Develop an education program to help irrigators understand how historical practices evolved through experience and how to maximize the use of available water through collaboration and cooperation.

Municipal and Industrial (M&I) needs are estimated to be up to approximately 44,000 AFY—a 24,000 AFY increase from current levels—by 2050 (Table 5). These increased needs are generally expected to be managed with sufficient existing supplies and/or planned projects.

Table 5. M&I/SSI Needs

Demand Type	2008	2035	2050 Low	2050 Med	2050 High
M&I	20,000	33,000	36,000	39,000	43,000
SSI	260	650	650	650	650
Total	20,260	33,650	36,650	39,650	43,650

*All values in AFY. Source: SWSI 2010

Environmental and Recreational needs include the identification and inventorying of projects throughout the Basin and in 29 target stream reaches identified by the GBRT, as well as addressing water quality and watershed/forest health issues (Table 6).

Table 6. Environmental and Recreational Needs

Identify and inventory specific projects to address environmental and recreational needs in the following target reaches (other reaches may be added as appropriate at the discretion of project sponsors and the GBRT):

1. Blue Mesa, Morrow Point, Crystal Reservoirs (Aspinall Unit of the Colorado River Storage Project) and Gunnison River in Curecanti National Recreation Area
2. Gunnison River - Almont to Blue Mesa Reservoir
3. Gunnison River in Black Canyon of the Gunnison National Park
4. Gunnison River in Gunnison Gorge National Conservation Area downstream to Confluence with North Fork of the Gunnison River
5. Gunnison River - Confluence with North Fork Gunnison River to Hartland Diversion
6. Gunnison River - Hartland Diversion to Confluence Colorado River
7. North Fork of the Gunnison River - Paonia Dam to Confluence with the Gunnison River
8. Stream Segments on Headwaters Wilderness Areas
9. Coal Creek, Slate River and Tributaries
10. East River - Gothic to Almont
11. Henson Creek and Tributaries
12. Uncompahgre River and Tributaries - Headwaters to Ouray
13. Uncompahgre River - Ouray to South Canal Outfall and West Canal Flume
14. Grand Mesa Reservoirs on National Forest
15. Tributaries to Taylor Park Reservoir
16. Taylor Park Reservoir
17. Taylor River - Taylor Park Reservoir to Almont
18. Lake San Cristobal
19. Lake Fork of the Gunnison River - Lake San Cristobal to Blue Mesa Reservoir
20. Ridgway Reservoir
21. Upper East River and Tributaries - Headwaters to Gothic
22. Tomichi Creek (Sargents to confluence with Gunnison River)
23. Curecanti Creek (headwaters to confluence with Morrow Point Reservoir)
24. Smith Fork Creek
25. Ohio Creek (headwaters to confluence with Gunnison)

26. Cottonwood Creek (included in the Dominguez-Escalante Resource Management Plan)
27. Cow Creek (lower reach—last 5 miles)
28. East and West Dallas Creeks
29. Cimarron River and Blue Creek

Water quality and watershed health needs in the Gunnison Basin:

- CDPHE is implementing further Monitoring and Evaluation (M&E) of specific water quality parameters for 22 water body segments identified by CDPHE in the Gunnison Basin.
- CDPHE is developing Total Maximum Daily Load (TMDL) strategies for specified pollutants within water body segments identified in the Gunnison Basin, including point source projects and other scheduled improvements to help water quality issues.
- CSFS and USFS are addressing forest health projects related to forest management; forest insects, diseases, and disorders; and wildfire mitigation and education.

Section 3: Basin Evaluations

The GBRT used the Gunnison River basin Water Resources Allocation Model, case studies, and mapping overlays to evaluate projects and project constraints. Modeling tools allowed evaluation of impacts to the availability of water to individual users and projects based on variable hydrology, water rights, and operations (e.g., proposed diversions, reservoirs, and management strategies). The modeling tools helped to evaluate five case studies to investigate basin-wide issues and opportunities with specific projects (i.e., water availability analysis, Upper Basin irrigation decrees, agricultural impacts on streamflows, and instream flow analysis). Mapping overlays of project data and Basin needs were used to provide a consistent methodology to review potential projects, highlight options for multi-use projects, and identify projects that may compete for available water.

Section 4: Basin Projects

Projects are the primary focus of the GBIP and the mechanism for addressing Basin Goals. Section 4 summarizes projects highlighted for implementation. Developed in close coordination with the GBIP Subcommittee, the GBRT, and project proponents, the list of proposed projects is considered a current snapshot of potential Basin solutions that should be periodically refined with input from project sponsors. To strategically focus implementation efforts, projects are divided into 3 tiers:

- **Tier 1**: implementation likely feasible by 2025; project does excellent job of meeting Basin Goals.
- **Tier 2:** implementation likely not feasible by 2025; project would excel at meeting Basin Goals. Project may also have important conditional water rights and/or completed planning efforts.
- **Tier 3:** implementation likely not feasible by 2025; project in preliminary stages of planning and/or may meet Basin Goals to lesser degree.

Tier 1 projects are summarized in Table 7 showing which Basin Goals are met by the projects.

Table 7. Proposed Basin Projects (Tier 1) and Basin Goals Met

Ref. No.	Project	Basin Goals Met								
		1	2	3	4	5	6	7	8	9
1	Gunnison Basin Roundtable 2015 Education Action Plan Activities	✓	✓					✓		✓
2	Regional Conservation Partnership Program (RCPP)	✓	✓	✓		✓	✓	✓	✓	
3	Inventory of Irrigation Infrastructure Improvement Needs - District 28	✓		✓		✓		✓	✓	
4	Cole Reservoirs #4 and #5	✓		✓					✓	
5	Crawford Reservoir System Optimization Study and Prioritized Conveyance Improvements	✓		✓					✓	
6	Doughty #1 - Chipmunk Reservoir	✓	✓	✓					✓	
7	Fire Mountain Canal Delivery Efficiency Project	✓		✓		✓	✓	✓	✓	
8	Marcott Reservoir	✓	✓	✓					✓	
9	North Delta Canal	✓	✓	✓		✓		✓	✓	
10	Orchard Ranch Ditch	✓	✓	✓			✓		✓	
11	Overland Reservoir Enlargement (Part 2)	✓		✓				✓	✓	
12	Paonia Reservoir Sediment Removal and Outlet Modification Project	✓		✓			✓	✓	✓	
13	Young's Creek Reservoirs (#1 & #2) Rehabilitation	✓		✓					✓	
14	Granby Reservoirs (#5 and #11) Rehabilitation	✓		✓					✓	
15	Inventory of Irrigation Infrastructure Improvement Needs - District 40, Grand Mesa (Surface Creek)	✓		✓		✓		✓	✓	
16	Inventory of Irrigation Infrastructure Improvement Needs - District 40, Upper North Fork	✓		✓		✓		✓	✓	
17	Rehabilitation/Enlargement-28 Reservoirs LCWUA	✓		✓					✓	
18	Somerset Diversion Improvement	✓		✓	✓	✓				
19	Environmental/Recreational Project Identification and Inventory - North Fork Region	✓				✓	✓	✓		
20	Crawford Prioritized Conveyance Improvements and System Optimization Study	✓		✓					✓	
21	West Reservoir #1 Outlet Pipe Replacement	✓		✓					✓	
22	Cedar Mesa Ditch	✓	✓	✓		✓	✓			
23	Uncompahgre Valley Water Users System Optimization Projects (Canal Lining and Re-regulation of Reservoirs)	✓		✓			✓	✓	✓	
24	Project 7 - 10 kAF Raw Storage (Part 2)	✓			✓					
25	Redlands Pump Modernization and Hydropower Optimization Project	✓		✓		✓		✓	✓	
26	Hallenbeck Reservoir #1 (Purdy Mesa Reservoir)	✓		✓	✓				✓	
27	Dillsworth Ditch	✓	✓	✓					✓	
28	Meridian Lake Reservoir and Washington Gulch Storage Project	✓	✓	✓						
29	Water Conservation Planning Process for the Upper Gunnison Basin	✓			✓					
30	Cunningham Lake Reservoir Rehabilitation	✓	✓	✓				✓		
31	Gunnison Ohio Creek Canal Enlargement	✓		✓					✓	
32	Elk Home Ditch Improvement, Steuben Creek Flow Restoration	✓	✓	✓		✓	✓	✓	✓	
33	Rainbow Lake Potential Enlargement Project	✓	✓	✓					✓	
34	Inventory of Irrigation Infrastructure Improvement Needs - District 59	✓		✓		✓		✓	✓	
35	Inventory of Irrigation Infrastructure Improvement Needs - District 62	✓		✓		✓		✓	✓	
36	Environmental/Recreational Project Identification and Inventory - Lake Fork Region	✓				✓	✓	✓		
37	City of Ouray Water Efficiency and Conservation Plan	✓			✓				✓	
38	Ouray County Upper Uncompahgre Basin-Wide Augmentation Plan	✓	✓		✓				✓	
39	Inventory of Irrigation Infrastructure Improvement Needs - District 68	✓		✓		✓		✓	✓	
40	Environmental/Recreational Project Identification and Inventory - Upper Uncompahgre Region	✓				✓	✓	✓		
41	Environmental/Recreational Project Identification and Inventory - Upper Gunnison Region	✓				✓	✓	✓		
42	NoChicoBrush	✓	✓	✓			✓	✓	✓	
43	Gunnison Basin Selenium Management Plan and Gunnison Basin Selenium Task Force	✓		✓			✓		✓	
44	Colorado River Storage Project - MOA Projects	✓		✓			✓		✓	
45	Development of Upper Uncompahgre Water Supplies	✓		✓	✓				✓	
46	Improvements to Red Mountain Ditch	✓		✓	✓				✓	
47	Water Bank Project	✓	✓	✓					✓	
48	Regional Groundwater Monitoring Project	✓	✓	✓			✓	✓		
49	Weather Modification Program Enhancements	✓		✓	✓	✓				

Table 8 provides brief narrative descriptions discussing general relationships between identified Basin Goals and proposed Tier 1 Basin Projects. Most Basin Goals are fulfilled by numerous Basin Projects.

Table 8. Relationships between Basin Goals and Proposed Basin Projects

Goal 1: Protect existing water uses in the Gunnison Basin – All projects are expected to help fulfill this goal, many with the intent to maintain current irrigated acreage. The projects include community outreach and conservation planning to enable communities to reduce municipal and industrial water consumption; inventories of infrastructure and environmental/recreational needs and projects; and infrastructure improvements to reduce operational inputs, improve water quality, and address system reliability.

Goal 2: Discourage the conversion of productive agricultural land to all other uses within the context of private property rights – Sixteen projects are expected to help fulfill this goal with the intent to preserve current irrigated acreage. The projects include four miles of conveyance piping to overcome existing ditch leakage issues; enlargement of existing reservoirs; rehabilitation of existing dams; improvements of existing delivery systems; improvement of Sage Grouse habitat; providing new augmentation water; and strategic basin system improvements for improved crop yields, reduced operational inputs, improved water quality, and system reliability.

Goal 3: Improve agricultural water supplies to reduce shortages – Forty projects are expected to help fulfill this goal with the intent to reduce projected agricultural shortages. The projects include restoration, maintenance, or modernization of significant agricultural water supply infrastructure; enlargements of existing canals and reservoirs; improvement of existing canal delivery efficiency; removal of reservoir sediment; modification of reservoir outlet works; rehabilitation of an existing dam; development of water supplies for augmentation M&I, irrigation, hydropower, and instream flow enhancement; and strategic basin system improvements for improved crop yields, reduced operational inputs, improved water quality, and system reliability.

Goal 4: Identify and address municipal and industrial water shortages – Nine projects are expected to help fulfill this goal with the intent to reliably meet projected municipal demands and continue effective water conservation programs. The projects include enlargement of an existing reservoir; upgrades to an outlet structure of an existing reservoir; siting of two new reservoirs; community outreach and conservation planning to enable communities to reduce municipal and industrial water consumption; and development of water supplies for augmentation, irrigation, hydropower, and instream flow enhancement.

Goal 5: Quantify and protect environmental and recreational water uses – Eighteen projects are expected to help fulfill this goal with the intent to improve environmental and recreational focus areas in existing stream channels and to improve native fish and riparian species populations. The projects include the investigation of feasibility for nonconsumptive focus segments in four specific regions of the Gunnison Basin.

Goal 6: Maintain or, where necessary, improve water quality throughout the Gunnison Basin – Fifteen projects are expected to help fulfill this goal with the intent to maintain outstanding water quality in headwaters streams and improve site-specific water quality related to mining, selenium, and salinity issues. The projects include investigation of feasibility for nonconsumptive focus segments in four specific regions of the Gunnison Basin; and development of water supplies for augmentation, irrigation, hydropower, and instream flow enhancement.

Goal 7: Describe and encourage the beneficial relationship between agricultural and environmental and recreational water uses – Twenty two projects are expected to help fulfill this goal with the intent to complete new multi-purpose water projects in the Gunnison Basin that meet multiple needs. The projects include four miles of conveyance piping to overcome existing ditch leakage issues; rehabilitation of an existing dam; improvements of existing delivery systems; improvement of Sage Grouse habitat; and providing new augmentation water.

Goal 8: Restore, maintain, and modernize critical water infrastructure, including hydropower – Thirty six projects are expected to help fulfill this goal with the intent to implement at least one project every year in the Gunnison Basin focusing on the restoration, maintenance, and modernization of existing water infrastructure. The projects include restoration, maintenance, or modernization of significant agricultural water supply infrastructure; enlargements of existing canals and reservoirs; improvement of existing canal delivery efficiency; removal of reservoir sediment; modification of reservoir outlet works; rehabilitation of an existing dam; development of water supplies for augmentation, irrigation, hydropower, and instream flow enhancement; and strategic basin system improvements for improved crop yields, reduced operational inputs, improved water quality, and system reliability; improvements to conveyance, automation, and measurement infrastructure for an existing reservoir; and reconstruction of a tunnel and ditch piping.

Goal 9: Create and maintain active, relevant and comprehensive public education, outreach and stewardship processes involving water resources in the six sectors of the Gunnison Basin – One project is expected to help fulfill this goal with the intent to encourage participation in water education and leadership programs. The project includes community outreach and conservation planning to enable communities to reduce municipal and industrial water consumption.

Section 5: Basin Recommendations

Each project proposed for the Gunnison Basin requires a unique and systematic plan for implementation that includes discrete steps to maneuver the project from conception to completion. These implementation strategies typically involve two primary categories of action prior to completion of the project: *securing project acceptance* and *demonstrating project feasibility*. Each step in the project implementation process includes various challenges (constraints), or potential key issues or circumstances that may limit the ability of a project proponent to implement the proposed project. For each constraint, there exists a corresponding strategy to successfully complete the project. Table 9 summarizes strategies to overcome constraints related to securing project acceptance and demonstrating project feasibility to allow implementation of projects proposed for the Gunnison Basin. More detailed recommendations for each of these strategies is included in Section 5.

Table 9. Project Constraints and Implementation Strategies

Category	Constraint	Strategies
Project Acceptance	Conflict	Partnerships Cooperative Strategies
	Perception	Public Education and Outreach Incentive-Based Programs
	Regulations	Cooperative Strategies Regulatory Streamlining
Project Feasibility	Cost	Creative Funding Mechanisms Partnerships and Cooperative Strategies
	Water Availability	Water Availability Analyses Water Administration Strategies
	Constructability	Feasibility Analyses Engineering Design

Introduction

Overview of the Gunnison Basin

The Gunnison Basin is home to a broad range of water uses and infrastructure. From irrigated pastures to orchards to gold medal fisheries and growing communities, water supplies in the Basin are carefully balanced. The balanced use of this important resource has enabled the development of a diverse and stable economic base. Traditional agricultural water uses not only provide direct economic benefits but also help to drive the recreational economy by preserving the beautiful landscape enjoyed by the Basin's inhabitants and visitors. In turn, stimulated by the Basin's ranches and public lands, recreation, tourism, and growing communities promote a healthy economy. For this reason, the Gunnison Basin Roundtable seeks to build on this foundation of productive and balanced water use; protecting the diversity of existing water uses and their related benefits.

Layout and Land Ownership

The Gunnison River is a major tributary of the Colorado River, contributing on average a sixth of the Colorado River Basin's total annual flow. It is the largest river in Colorado whose basin lies entirely within the state. The river can be divided into three main contributing sections:

1) Upper Gunnison main stem, collecting water from a broad crescent of mountains including Colorado's highest and lowest segments of the Continental Divide
2) North Fork of the Gunnison, draining the south slopes of Grand Mesa and the West Elk Range
3) Uncompahgre River, accumulating flow from the north slopes of the San Juan Mountains.

Figure 1 presents the general topography and layout of the Gunnison Basin.

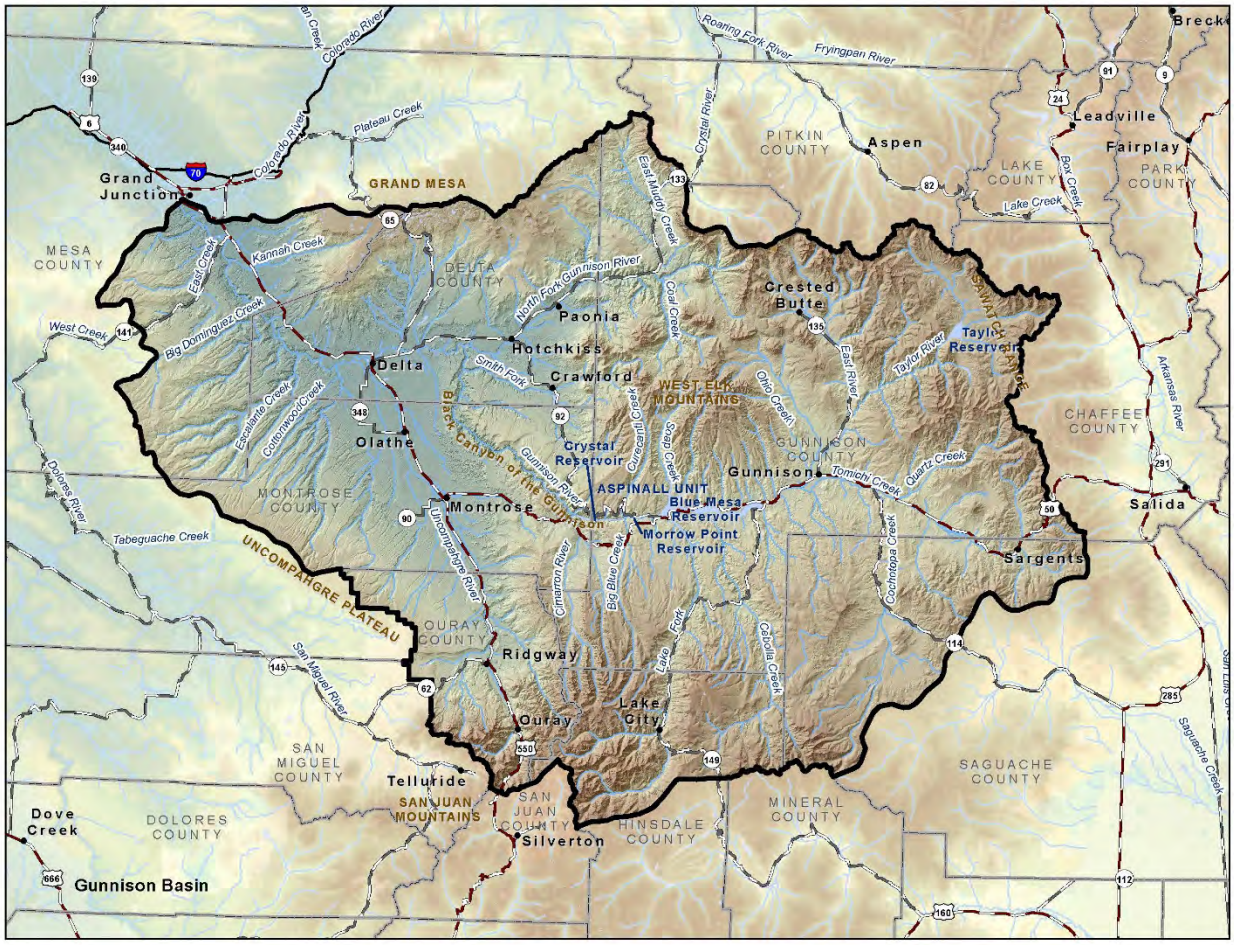


Figure 1. Gunnison River basin

The three main river sections are separated by mountains, high mesas, and a steep and deep canyon. Beyond the main stem confluence with the Uncompahgre and the North Fork of the Gunnison rivers near the City of Delta, the Gunnison River passes through a high desert until its *grand junction* with the Colorado River in the Grand Valley. The three main alluvial regions include:

1) Upland valleys above 7,000 feet that are ideal for hay and livestock production
2) North Fork valley, famous for its fruits and small-farm production
3) Lower Uncompahgre valley, producing a rich diversity of hay, fruit and grains

The Basin's heritage of agriculture and mining has been both augmented and challenged in the 20th century by growth of a robust recreational economy and an era of environmental concerns.

Over 70 percent of the land in the Gunnison Basin is under federal ownership as depicted in Figure 2. The Grand Mesa, Uncompahgre, and Gunnison National Forests comprise most of the Basin's headwaters and constitute approximately 40 percent of the Basin's land area. Other major federal holdings include Black Canyon of the Gunnison National Park and Curecanti National Recreation Area. In addition, the Bureau of Land Management (BLM) manages approximately 25 percent of the Gunnison

Basin, including the Gunnison Gorge National Conservation Area and Wilderness, and the Dominguez-Escalante National Conservation Area.

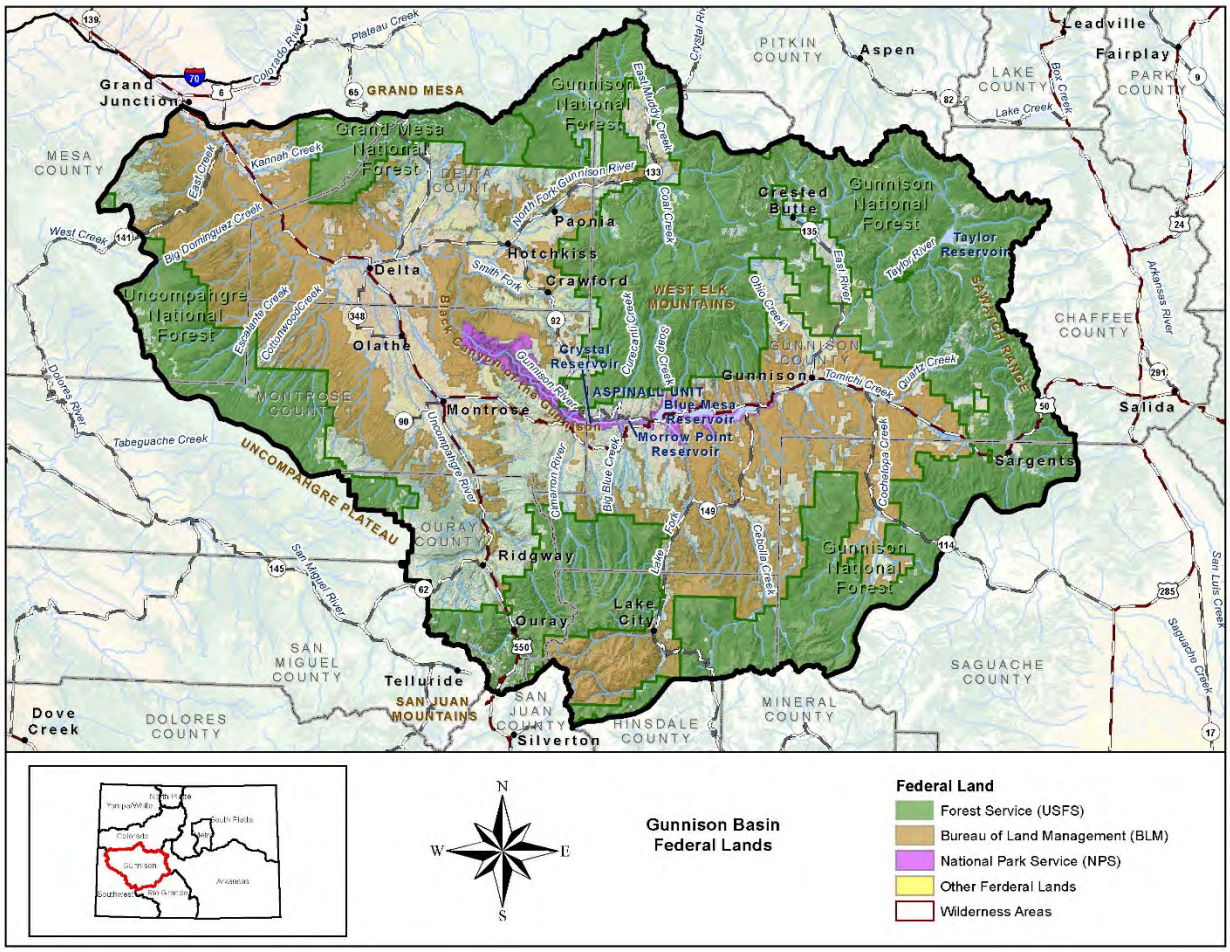


Figure 2. Gunnison Basin Federal Lands

Hydrology and Water Management

The Gunnison River begins at the confluence of the East and Taylor rivers, about ten miles upstream from the city of Gunnison. River flow increases due to Cochetopa Creek and Tomichi Creek inflows near the town of Gunnison. Just downstream from those confluences, the river has carved through Precambrian rock to form the Black Canyon of the Gunnison. Annual flow of the Gunnison River through the town of Gunnison is approximately 550,000 acre-feet per year (United States Geological Survey [USGS] gage near Gunnison). The Uncompahgre River, the largest tributary to the Gunnison River, enters from the south near the City of Delta. Average annual flow of the Uncompahgre near the confluence is approximately 220,000 acre-feet (USGS gage at Delta). The average annual flow of the Gunnison River near Grand Junction is over 1.8 million acre-feet (USGS gage near Grand Junction). Approximately 45 percent of this flow is attributable to snowmelt runoff in May and June.

Irrigation is the principal consumptive use of water in the Gunnison Basin. Over 250,000 acres are under irrigation growing hay varieties, fruit, corn, alfalfa, and small grains. While diversions from many of the small irrigation ditches average one to two thousand acre-feet per year, the Gunnison Tunnel is a transbasin diversion that takes approximately 390,000 acre-feet annually from the Gunnison River to supply irrigators and municipalities in the Uncompahgre River Basin.

The Aspinall Unit of the Colorado River Storage Project encompasses the major power plants within the Basin. Hydroelectric power plants are located in series at the dams of the Blue Mesa, Morrow Point, and Crystal reservoirs. The three power plants have the capability to generate up to 208,000 kilowatts of power.

Diversions in the Basin are also managed for municipal and industrial use for the cities of Delta and Montrose, as well as in a number of smaller towns. One major transbasin diversion, the Redlands Power Canal which has 850 cubic feet per second (cfs) of water rights, exports water from the Gunnison River basin to the Colorado Mainstem basin. The diversion can be used for irrigation and power generation. There are also a number of smaller transbasin diversions from one tributary drainage basin to another. In addition to the direct ditch diversions, there are eleven major reservoirs (each greater than 4,000 acre-feet in capacity) in the Gunnison River basin. Three of the largest reservoirs—Blue Mesa, Morrow Point, and Crystal—comprise the Aspinall Unit and were constructed pursuant to the Colorado River Storage Project Act (1956)(CRSPA). The reservoirs have total capacities of 940,800 acre-feet, 117,190 acre-feet, and 25,240 acre-feet respectively. CRSPA reservoirs were constructed to regulate river flows, make it possible for the Upper Colorado River Basin States to develop their Colorado River Compact apportionments and generate hydroelectric power.

Other reservoirs in the Basin serve a variety of purposes. The Taylor Park Reservoir is predominantly used to store water for supplemental irrigation water supply while also providing coordinated releases for environmental and recreational uses on the Taylor and Gunnison Rivers. Ridgway Reservoir is used for direct release to various uses as well as via exchange to store irrigation water for UVWUA while allowing its municipal owners to take water downstream at the Gunnison Tunnel. Other reservoirs, including Paonia, Crawford, Silverjack, Gould, Overland, and Fruitgrowers reservoirs, are predominantly used for irrigation.

Groundwater resources are not currently heavily used in the Gunnison Basin. Since most irrigated agriculture relies on surface water diversions, groundwater is primarily used in the form of exempt wells for small amounts of domestic use and livestock watering. This groundwater use is from sources that aretributary to surface water supplies. Therefore, groundwater use in the basin is not individually addressed in this plan. However, the GBRT notes the importance of groundwater quantity and quality as well as the need for more data collection. To help address this, Sections 4.5 and 4.7 of this plan include a project to install groundwater monitoring wells across the basin. These wells would provide the following benefits:

- Provide irrigators with subsurface water level information to assist with irrigation application planning and scheduling.

- Give Colorado Basin River Forecast Center more detail on soil moisture in an effort to improve runoff forecast accuracy.
- Maintain a baseline for groundwater quality in the event of future impairments due to hazardous waste spills, residential development, mining activity, and other potential impacts to water quality.

Water Rights Administration

Gunnison River basin water rights are administered by Division 4 of the Colorado Division of Water Resources (DWR), which includes seven Water Districts in the Gunnison River basin (28, 40, 41, 42, 59, 62, and 68) delineated in Figure 3 below.

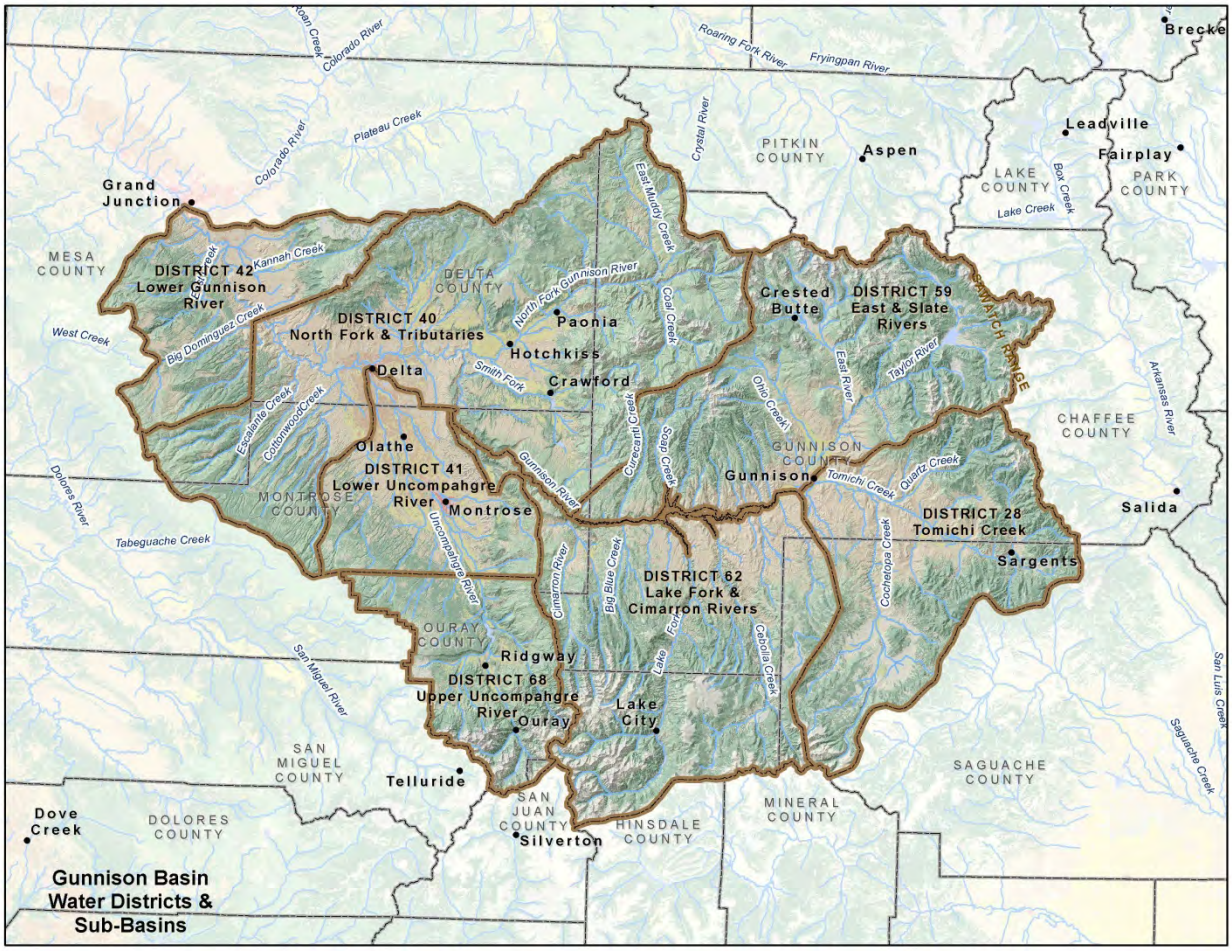


Figure 3. Gunnison Basin Water Districts and Sub-Basins

With the exception of Water District 40 (North Fork and Tributaries), historical water rights administration in the Gunnison Basin can be divided into three distinct time periods tied to the development of major infrastructure and corresponding water rights. The first time period was from 1902 through 1937 when the Gunnison Tunnel dominated administration. The senior direct flow rights

of the Uncompahgre Valley Water Users Association (UVWUA) on the Uncompahgre and Gunnison Rivers regularly called out junior diverters in both basins in the summer months. Late season irrigation shortages in the Uncompahgre River Basin were still relatively common even for those with senior water rights.

The second significant time period was from 1937 through 1966 when the Taylor Park Reservoir dominated administration. With the construction of Taylor Park Reservoir, junior diverters were still subjected to senior river calls by UVWUA. However, UVWUA typically had late season water that effectively eliminated the late summer shortages in the Uncompahgre River Basin except in extremely dry years.

The final significant time period started in 1966 with the construction of the Aspinall Unit which dominates flows in the Gunnison River. In addition, the 1975 Taylor Park Reservoir Operation and Storage Exchange Agreement gave UVWUA the ability to store its Taylor Park Reservoir water in Blue Mesa Reservoir, while enhancing recreation in the Taylor River through the adjusted timing of flows. The 1975 Agreement provided the foundation for the second fill decree obtained by the Upper Gunnison River Water Conservancy District in 1990. That decree authorizes a 106,230 acre-foot refill of Taylor Park Reservoir and releases for river health and supplemental irrigation in the Upper Basin.

Due to concerns regarding the large water right of the Aspinall Unit and its potential impact on future water rights development upstream, the United States agreed to subordinate Aspinall Unit water rights to in-basin users upstream. That agreement was finalized with the signing of the Aspinall Unit Subordination Agreement in 2000. This agreement between the United States, the Colorado State Engineer, the Colorado River Water Conservation District, and the Upper Gunnison River Water Conservancy District allows Upper Gunnison water users to deplete up to 60,000 acre-feet annually under water rights junior to the Aspinall Unit rights. More specifically, the Aspinall Unit water rights are subordinate to the depletion of up to 10,000 acre-feet of water annually in the drainage between Crystal and Morrow Point dams, 10,000 acre-feet of water annually in the drainage between Blue Mesa and Morrow Point dams, and 40,000 acre-feet of water annually in the drainage above Blue Mesa. Approximately 10,000 acre-feet of new depletions have been developed to date.

Environmental Flow Management

After years of negotiation, an agreement was finalized in 2008 to accommodate administration of the National Park Service (NPS) decreed reserved water right for instream flows on the Gunnison River through the Black Canyon of the Gunnison. The right establishes a minimum baseflow of 300 cfs through the Black Canyon of the Gunnison National Park and Gunnison Gorge National Conservation Area—except in severe drought when flow requirements can be decreased—as well as a range of shoulder flows and a 24-hour springtime peak flow, which vary in accordance with hydrologic conditions.

In 1988, the States of Colorado, Utah, and Wyoming, water users, hydropower customers, environmental organizations, and federal agencies developed a program to recover endangered species while protecting existing water use and allowing the development of up to 50,000 acre-feet per year of

new consumptive use. The endangered species included the Colorado pikeminnow, humpback chub, bonytail chub, and razorback sucker. As part of the recovery efforts, the Bureau of Reclamation (BOR) altered the timing and releases from the Aspinall Unit dams to help researchers refine habitat requirements of the endangered fish. In 2009, this research led to the preparation of a programmatic biological opinion on reservoir operations by the U.S. Fish and Wildlife Service (USFWS) under Section 7 of the Endangered Species Act.

In 2012, the Programmatic Biological Opinion (PBO) was incorporated into the Record of Decision (ROD) for the Aspinall Unit Operations Final Environmental Impact Statement. To avoid jeopardy to endangered species and assist with their recovery, the ROD requires releases from the Aspinall Unit to meet flow targets at the Whitewater Gage (Gunnison River above Grand Junction). The flow targets include base flows ranging from 750 to 1050 cfs and peak flows ranging from 900 to 14,350 cfs, with contingencies for variable hydrology. Future administration and reservoir operations in the Gunnison Basin will be affected by these releases.

The BOR determined that the preferred alternative selected in the ROD provides the best means to minimize or avoid environmental harm while meeting the purpose and need of the Aspinall Unit. Nonetheless, as described in the Environmental Impact Statement (EIS), certain adverse environmental effects of the selected alternative cannot be completely avoided. These are expected to include:

- Minor hydropower impacts
- Minor recreation and sport fisheries impacts
- Minor reduction in water stored in Blue Mesa Reservoir for beneficial uses

Precisely how endangered fish populations and critical habitat respond to the flow modifications proposed under the Aspinall Unit reoperations is unclear. For that reason, the selected alternative also includes an adaptive management process, supported by Recovery Program monitoring, to address new information about the subject endangered fish, their habitat, reservoir operations, and river flows. The selected alternative includes an adaptive process for potential refinement of operations if supported by relevant new information.

The ROD states that the following mitigation, monitoring, and enforcement commitments, which are detailed in the EIS, will be implemented as integral parts of the decision as a means of avoiding or minimizing adverse effects.

- The Aspinall Unit will continue to be operated to meet authorized purposes, and existing water and power contracts will be honored. Consistent with authorized purposes, the Aspinall Unit will be operated in accordance with water laws and water rights as decreed under the State of

Colorado and the Law of the River. Provisions are included to address severe drought conditions and emergency situations.

- Blue Mesa and Morrow Point power plants will continue to provide peaking power operations, and Crystal Dam and Reservoir will continue to reregulate upstream releases to minimize fluctuations in the downstream flows.
- The Aspinall Unit will continue to follow Corps of Engineers flood control criteria coordinating with the City and County of Delta. Blue Mesa Reservoir will be drawn down to 7,490 feet by the end of December to reduce chances of upstream ice jams and associated flooding.
- Reclamation will provide ramping rates on releases from Crystal Reservoir to protect resources as described in the final EIS.
- Reclamation will work with the Recovery Program to meet the requirements of the PBO to provide Endangered Species Act compliance for Gunnison Basin water uses, including implementing operations under the selected alternative, development and implementation of a selenium management program, and monitoring of endangered fish populations.
- Reclamation will provide for special operations to address severe droughts and to facilitate periodic maintenance and rehabilitation activities.
- Reclamation will provide for public and interested party input through open Aspinall Unit operation meetings held in January, April and August each year.

In 2012, the Record of Decision for the Aspinall Unit Operations Final Environmental Impact Statement was implemented. Peak flow targets were first required in 2014 when hydrologic conditions were considered 'moderately wet'. Based on forecasted inflows to Blue Mesa Reservoir exceeding 831,000 acre-feet, historically large releases were required to be made from the Aspinall Unit reservoirs in an attempt to reach the desired peak flow at the Whitewater Gage (Gunnison River above Grand Junction) of 14,350 cfs as specified in the ROD. Due to flooding concerns in Delta and Grand Junction and other complications, the releases resulted in a peakflow of 12,900 cfs at the Whitewater gage, with about 22 days of flows exceeding 8,070 cfs.

However, even with the reduced releases, the 2014 spill resulted in a significant amount of lost hydropower generation. Preliminary draft estimates from the Western Area Power Administration indicate that approximately 140,000 MWh and $5.4M in related revenue were lost to the bypassed flows in 2014. Since bypassed water affects generation on all three reservoirs of the Aspinall Unit, these high releases can have a compound impact. In 2014, a total of over 580,000 acre-feet of water was estimated to have been bypassed through the three reservoirs of the Aspinall Unit.

The ROD was designed to improve critical habitat for the identified endangered species. Spring runoff from the North Fork coupled with the ROD releases can result in greater hydrograph variability which in turn creates an environmental cue for spawning activity of the Colorado pikeminnow. Similarly, an increase of magnitude and duration in spring peak flows may also improve spawning habitat by flushing out fine sediment—thus improving egg and larvae survival. These flushing flows may result in improved water quality and a more hospitable environment for macroinvertibrates which are an integral part of the food web for the endangered fish. Furthermore, the flushing can help maintain channel complexity

by creating floodplain habitat for feeding and resting, particularly important to both the Colorado pikeminnow and the razorback sucker. Finally, while the increased flow improves endangered fish habitat, it can create an adverse environment for nonnative species, helping to control their population.

Nonnative Fish Impacts on Endangered Fish Species:
The GBRT recommends that Colorado explore a must-kill policy for nonnative fish control. A must-kill policy is one forbidding anglers from releasing back to Colorado waters fish species identified as a nuisance species when caught. The control of predation by nonnative fish on the endangered species is a cornerstone of the recovery program. Nonnative fish in the lower Gunnison River (below the confluence of the mainstem and the North Fork) include carp, fathead minnow, sand shiner, red shiner, and possibly northern pike. Collectively, these fish prey on the egg, larval and fry stages of the nonnative fish. Northern pike will take adult fish. Present recovery program management effort is focused on 1) cooperation with CPW and other state partners to reduce the incidence of illegal fish species introductions, including changes to policy and regulation; 2) population control at known spawning location and preferred river habitats; and 3) conservation of native species population strongholds. Nonnative fish management strategy should include the must-kill regulation for identified nonnative nuisance fish. Though this is a common management strategy in several states, Colorado has yet to institute this policy.

In addition to the endangered fish species, the Gunnison sage-grouse has been listed as a threatened species—and consequently protected under the Endangered Species Act. Predominant threats to the Gunnison sage-grouse are alleged to include habitat loss, degradation, and fragmentation due to residential and commercial development as well as agricultural uses and predation. The listing has been challenged in federal court by several parties. If the listing survives the legal challenge, future development and agricultural uses located in critical habitat areas will likely be required to follow strict federal guidelines. Such future guidelines regarding impacts of agricultural efficiency improvements related to sage-grouse habitat could conflict with recommendations in the GBIP supporting efficiency projects.

Water Related Recreation

The Gunnison Basin is home to a robust recreational economy, much of which is tied directly to water. The Basin has an abundance of world class fishing and boating, from the Taylor River to Gunnison County's Whitewater Park Recreational In-Channel Diversion (RICD) to flat-water boating in Curecanti National Recreation Area to the Gold Medal Fishery through Gunnison Gorge. Recreational attributes throughout the Basin were highlighted in the SWSI 2010 efforts. The GBIP seeks to maintain and improve recreational opportunities in the Basin by strategically focusing future water development.

Economic Impacts of Water Use

Water plays a pivotal economic role in the Gunnison Basin. Predominate water uses and revenue generators include agriculture, recreation, tourism, and hydropower generation. In the Upper Gunnison Basin, agriculture accounts for 97% of the water diversions and generates more than $46 million annually. Furthermore, it is considered to be the largest economic multiplier for the local economy. In addition to agriculture, tourism and water-related recreation (i.e., fishing, kayaking, rafting, and flat-water recreation) are also significant economic contributors – comprising 23% of the Basin economy, generating tens of millions of dollars and providing hundreds of jobs. Curecanti National Recreation Area and the Black Canyon of the Gunnison National Park are some of the top tourist destinations in Colorado and contribute largely to the local economy. In 2011, Curecanti National Recreation Area attracted more than 924,000 visitors, resulting in over $41M in spending, while the Black Canyon of the Gunnison National Park attracted nearly 169,000 visitors, resulting in $8.4M in spending. In addition, commercial river rafting on the Gunnison River had an economic impact of more than $2.7M in 2013 alone. Added together, these water-related industries are the lifeblood of the local economy.

The Economic Importance of Agriculture and Recent Trends:

Agriculture is critical to the economy of the Gunnison Basin. According to an Economic Development Report by CSU (Tadjion and Seidl, 2006), the cattle industry in Gunnison County alone generated a combined economic impact of over $46 million while supporting more than 360 jobs in 2003. A diverse agricultural base in the basin contributes to Colorado's $3.7 billion livestock industry as well as its entire $41 billion agricultural economy, employing nearly 80,000 people according to the Colorado Department of Agriculture. Yet despite strong historical economic performance, recent trends threaten agriculture in the basin, with ranching being particularly hard hit. A recent study by the United State Department of Agriculture shows a continual decline of younger generations in agriculture with only 4% of principle operators currently under the age of 35. In addition, across the country 1.6 acres of agricultural land are lost every minute.

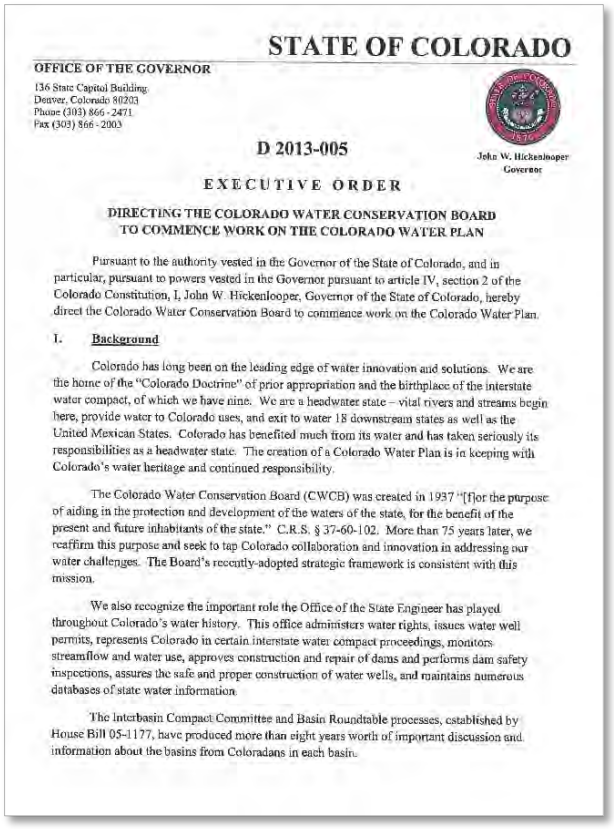
The Importance of Hydropower in the Basin: Hydropower is a significant nonconsumptive use of water and important economic driver in the Gunnison Basin. There are several major hydropower facilities in the Basin, the largest and most well-known being the three dams of the Aspinall Unit (including Blue Mesa Reservoir, Morrow Point Reservoir, and Crystal Reservoir), with hydropower facilities capable of producing over 200,000 kilowatts of power. The Aspinall Unit collectively has over 1 million acre-feet of storage, and direct hydropower rights on the order of 2,500 to 3,000 cfs at each of the dams. Hydropower is also generated through the historic Redlands Power Canal, which is capable of producing 1,600 kilowatts of power using direct flow rights decreed for a total of 850 cfs, which help to offset the costs of pumping irrigation water for its water users. Recent hydropower additions to the Basin include the Ridgway Dam Hydropower Project (8,000 kilowatts) and the Uncompahgre Water Users Association's (UVWUA) South Canal Hydroelectric Project. The UVWUA has successfully installed two hydropower facilities collectively producing 7,200 kilowatts. In addition, two sites are under construction which will produce about 7,500 kilowatts, while two others are in the permitting phase and will result in about 3,000 kilowatts of additional generation capacity. Studies are also underway to evaluate the feasibility of hydropower facilities at Taylor Park Dam. The number and magnitude of hydroelectric projects in the Basin highlights the importance of these operations and the need to incorporate them into current and future planning efforts.

Overview of the Gunnison Basin Implementation Plan

Purpose

The GBIP was created by the Gunnison Basin Roundtable to follow the framework provided by the Colorado Water Conservation Board set forth in the BIP Guidance and supplemental guidance documents (CWCB 2013). The BIPs are designed to advance regional water planning in each of Colorado's nine basins designated by the Colorado Water for the 21st Century Act in 2005, HB05-1177 (Section 37-75-101, et seq., C.R.S.). The BIPs seek to build on previous work to fulfill the roundtables' legislative mandate of 35-75-101 CRS to "propose projects or methods, both structural and nonstructural, for meeting those needs and utilizing those unappropriated waters where appropriate". In addition, the BIPs serve as essential grassroots input to the forthcoming Colorado Water Plan commissioned on May 14th, 2013 by Governor Hickenlooper's executive order D2013-005. In turn, the BIPs help the CWCB fulfill its statewide mission to conserve, develop, protect and manage Colorado's water for present and future generations.

The GBRT is one of nine grassroots water policy forums created by the Colorado Water for the 21st Century Act. The same legislation also created the Interbasin Compact Committee (IBCC) as a venue for the discussion of statewide water policy and management issues. The BIPs now seek to embody the intent of the legislation to – encourage locally driven collaborative solutions to water supply challenges. Though the GBRT has no authority to implement specific water supply strategies, it brings varying interests together to propose, coordinate, and support water supply solutions in the Basin.



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John W. Hickenlooper
Governor

D 2013-005

EXECUTIVE ORDER

DIRECTING THE COLORADO WATER CONSERVATION BOARD TO COMMENCE WORK ON THE COLORADO WATER PLAN

Pursuant to the authority vested in the Governor of the State of Colorado, and in particular, pursuant to powers vested in the Governor pursuant to article IV, section 2 of the Colorado Constitution, I, John W. Hickenlooper, Governor of the State of Colorado, hereby direct the Colorado Water Conservation Board to commence work on the Colorado Water Plan.

I. Background

Colorado has long been on the leading edge of water innovation and solutions. We are the home of the "Colorado Doctrine" of prior appropriation and the birthplace of the interstate water compact, of which we have nine. We are a headwater state – vital rivers and streams begin here, provide water to Colorado uses, and exit to water 18 downstream states as well as the United Mexican States. Colorado has benefited much from its water and has taken seriously its responsibilities as a headwater state. The creation of a Colorado Water Plan is in keeping with Colorado's water heritage and continued responsibility.

The Colorado Water Conservation Board (CWCB) was created in 1937 "[f]or the purpose of aiding in the protection and development of the waters of the state, for the benefit of the present and future inhabitants of the state." C.R.S. § 37-60-102. More than 75 years later, we reaffirm this purpose and seek to tap Colorado collaboration and innovation in addressing our water challenges. The Board's recently-adopted strategic framework is consistent with this mission.

We also recognize the important role the Office of the State Engineer has played throughout Colorado's water history. This office administers water rights, issues water well permits, represents Colorado in certain interstate water compact proceedings, monitors streamflow and water use, approves construction and repair of dams and performs dam safety inspections, assures the safe and proper construction of water wells, and maintains numerous databases of state water information.

The Interbasin Compact Committee and Basin Roundtable processes, established by House Bill 05-1177, have produced more than eight years worth of important discussion and information about the basins from Coloradans in each basin.

As described in Section 3, determining effective solutions relies partially on the use of the water supply planning tools of the Colorado Decision Support System (CDSS) that were previously developed for the Basin. Since these modeling tools represent a majority of the needs in the Basin over a long-term study period, they serve as an appropriate platform to analyze basin-wide issues. These tools allow for a detailed analysis of site-specific and project-specific water shortages and availability under different hydrologic conditions. In addition, they help to quantify and locate water supply options in the Basin through an analysis of multiple use opportunities, reservoir enlargements or reoperations, potential project competition, and the identification of other issues. When combined with projected

water supply needs and previously identified potential solutions, this modeling effort helps to identify and evaluate projects to meet the Basin's future water needs as described in Sections 3 and 4.

Plan Structure

The structure of this document generally follows the guidelines as laid out by the Colorado Water Conservation Board (CWCB 2013) with some modifications to improve consistency, coherence, and relevance to local issues. Section 1 defines basin priorities (goals) and outlines specific mechanisms and targets for achieving the priorities (measurable outcomes). Section 2 summarizes previously identified water supply needs in the Basin. Section 3 describes options to analyze projects that may address water supply needs. Section 4 identifies potential basin projects and strategies for their implementation. Section 5 provides summary conclusions on how proposed strategies meet Basin Goals along with general recommendations for project implementation.

Separate consulting teams have completed BIPs for eight major river basins (North Platte, Yampa/White, Colorado, Gunnison, San Juan/Dolores, Rio Grande, Arkansas, and South Platte/Metro). Varying priorities for each basin necessitate that the eight BIPs will differ in focus, structure, content, and detail. It is understood that the CWCB requires a certain level of consistency in the eight BIPs to be able to extract and use BIP information to draft portions of the Colorado Water Plan. The following table is therefore provided to correlate BIP sections recommended in CWCB guidance with sections of the GBIP.

Table 10. Relationship Between Recommended CWCB BIP Sections and the GBIP Sections

CWCB Guidance	Gunnison Basin Implementation Plan
Executive Summary	**Executive Summary**
1. Basin Goals and Measurable Outcomes	**1. Basin Goals**
2. Evaluate Consumptive and Nonconsumptive Needs	**2. Basin Needs**
2.1 Nonconsumptive Needs	2.4 Environmental and Recreational Needs
2.2 Consumptive Needs	2.2 Agricultural Needs 2.3 Municipal and Industrial Needs
3. Evaluate Consumptive and Nonconsumptive Constraints and Opportunities	**4. Basin Projects**
3.1 Current Basin Water Operations and Hydrology	**Introduction**
3.2 Water Management and Water Administration (Optional)	
3.3 Hydrologic Modeling (Optional)	**Introduction** and **3. Basin Evaluations**
3.4 Shortages Analysis	**2. Basin Needs** and **3. Basin Evaluations**
4. Projects and Methods	**4. Basin Projects**
4.1 Education, Participation & Outreach	4.2 Education, Participation, and Outreach
4.2 Watershed Health	4.3 Watershed Health
4.3 Conservation Projects and Methods	4.4 Conservation Projects and Methods
4.4 New Multi-Purpose, Cooperative, and Regional Projects and Methods	4.5 Project List 4.6 Project Summary Template 4.7 Project Summaries
4.5 M&I Projects and Methods	
4.6 Agricultural Projects & Methods	
4.7 Nonconsumptive Projects and Methods	
4.8 Interbasin Projects and Methods (Optional)	
5. Implementation Strategies for the Projects and Methods	**5. Conclusions and Recommendations**
6. How the plan meets the Roundtables' Goals and Measurable Outcomes	

Overview of Available Basin Information

A number of previous efforts identified water supply planning tools, needs, issues, and potential solutions in the Gunnison Basin. Most of the previous efforts focused on development of water supply planning tools or identification of water supply needs and issues with a preliminary look at solutions. In contrast, this report primarily focuses on basin solutions by using previously developed tools and information to identify and encourage implementation of the most effective strategies to meet basin needs.

A thorough inventory was conducted of existing water planning information and reports relevant to the Gunnison Basin. The inventory included a variety of documents referenced throughout this plan. Appendix 1 lists references used for completion of this plan. Appendix 2 is an inventory of additional reports and information provided as a useful reference guide on locating more detailed information pertaining to the Basin. Each referenced document in Appendix 2 includes a brief description and, where available, an online link to provide immediate access to a key organization or document. Note that there are several ongoing studies in various stages of completion that may be useful to the Gunnison Basin in continued planning efforts; studies that have not been completed are not included in Appendix 2. The

following information provides brief descriptions of the more essential documents and tools used to support completion of this plan, beginning with modeling tools.

Modeling Tools

Modern basin-wide water supply planning studies began in the Gunnison Basin with the development of modeling tools to assess the operations of the Aspinall Unit by the Colorado Water Resources and Power Development Authority in the 1980s. This model was recently used to support the ROD for the Aspinall Unit Operations Final EIS in April 2012.

More geographically detailed water supply planning tools were developed as part of the Colorado Decision Support System (CDSS). The CDSS consists of a database of hydrologic and administrative information related to water use in Colorado as well as a variety of tools and models for reviewing, reporting, and analyzing the data. The Gunnison River basin Water Resources Planning Model (Gunnison Model) is one of many CDSS water resources planning models for major river basins in Colorado.

The Gunnison Model is a water rights allocation model that determines availability of water to individual users and projects based on hydrology, water rights, and operating rules and practices. All CDSS models are implemented in the StateMod platform, a code developed by the State of Colorado for application in the CDSS project. The Gunnison Model Baseline data set currently extends from 1909 to 2005, with plans to incorporate more recent hydrologic data in the near future. It simulates current demands, current infrastructure and projects, and the current administrative environment as though they had been in place throughout the modeled period. As a tool designed to test the impacts of proposed diversions, reservoirs, water rights and/or changes in operations and management strategies, the CDSS models and their related documentation are an important complementary resource for this plan.

Basin Studies

The most recent basin study is the CWCB's Gunnison Basin Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessment, June 2011 (2011 Report). This report summarized basin-specific data from the Statewide Water Supply Initiative 2010 (SWSI 2010) and was the most complete analysis of water supply needs in the Basin to-date with input from various local stakeholders. In addition to identifying existing and projected water needs in the Basin, the 2011 Report cataloged projects and processes to meet these needs. No attempt was made, however, to determine which projects could be most effective at meeting the identified needs through the year 2050.

This plan builds on the Basin's identified priorities and framework for addressing future needs that were laid out in the 2011 Report. Goals in this section reiterate those basin priorities:

- Maintain agricultural viability
- Ensure adequate water for future needs (Municipal and Industrial [M&I], Agricultural, Environmental, and Recreational uses)
- Address aging infrastructure with the Basin

- Preserve open space
- Ensure Endangered Species Act compliance through Aspinall re-operations
- Develop and implement a selenium management plan
- Provide for in-basin augmentation
- Address compact delivery obligation impacts to existing and future in-basin water rights
- Continue dialogue/negotiations between the Gunnison and other basin roundtables

Another primary report that this study builds upon is the CWCB's Water Supply and Needs Report for the Gunnison Basin, June 2006 (2006 Report). Like the 2011 Report, the 2006 Report sought to inventory water supplies and demands in the Gunnison Basin. As the initial effort to comprehensively assess water use in the Basin for the SWSI process, the 2006 Report is a helpful reference for general basin information. The 2006 Report looked at projected water supplies and demands out to the year 2030. It cataloged consumptive projects, but did not look at environmental and recreational projects.

Where to find more information:

- Gunnison River basin Information Report, CWCB 2004. Web Link
- CWCB's Water Supply and Needs Report for the Gunnison Basin, CWCB 2006. Web Link
- Gunnison River basin Water Resources Planning Model User's Manual, CWCB 2009. Web Link
- SWSI 2010, Gunnison Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessment, CWCB 2011. Web Link

Section 1: Basin Goals

1.1 Introduction

The Gunnison Basin Roundtable members adopted a set of *intra*basin Goals for addressing issues of importance within the Basin, and a set of *inter*basin Statewide Principles to help shape the relationships among all of Colorado's river basins, especially on the matter of risk assumption in future water development. This work was done after Roundtable discussion, consideration of IBCC work and planning guidelines, and consultation with inhabitants of the Gunnison River Basin.

The Statewide Principles section serves to document the GBRT's vision for major water policy issues in Colorado, with an emphasis on risk management – primarily how risk should be defined and who should assume it in future development. The Basin Goals focus on maintaining and protecting important existing water uses in the Basin. Both sections are intended to "inform and help drive the Colorado Water Plan" as indicated by the CWCB (2013).

1.2 Basin Goals

Background

The Gunnison Basin Roundtable members identified nine Basin Goals: one primary goal and eight supporting goals (Table 11). The primary goal is the maintenance and protection of existing water use in the Basin. By maintaining these water uses the people of the Gunnison Basin will continue to sustainably use the Basin's water resources and consequently maintain a balanced and diverse economic base. The Basin Goals ultimately seek to promote a healthy and diversified economy long into the future.

Table 11. Basin Goals

Primary Goal:

1. Protect existing water uses in the Gunnison Basin

Complementary Goals (order does not indicate priority):

2. Discourage the conversion of productive agricultural land to all other uses within the context of private property rights
3. Improve agricultural water supplies to reduce shortages
4. Identify and address municipal and industrial water shortages
5. Quantify and protect environmental and recreational water uses
6. Maintain or, where necessary, improve water quality throughout the Gunnison Basin
7. Describe and encourage the beneficial relationship between agricultural and environmental recreational water uses
8. Restore, maintain, and modernize critical water infrastructure, including hydropower
9. Create and maintain active, relevant and comprehensive public education, outreach and stewardship processes involving water resources in the six sectors of the Gunnison Basin

Underlying these Basin Goals are the important aspects of scenario planning and risk management, as detailed further in the Statewide Goals section. To most effectively address various future uncertainties (climate, population growth, water supply, etc.), the GBRT supports the use of the scenario planning approach for regional and statewide water supply planning presented in the Draft Colorado Water Plan, Chapter 6.1. Scenario planning is a process that defines complete, plausible scenarios of the future. This concept differs from traditional planning, in which one future is defined without taking into account various uncertainties. Scenarios are formulated by assessing key drivers of uncertainty (e.g., economic and demographic growth, climate, environmental regulations, social values, and perspectives) and combining the various potential outcomes of these drivers into several possible pictures of what the future might look like.

The Draft Colorado Water Plan identifies and describes five future scenarios anticipating both natural and cultural variables for the State of Colorado which are acceptable for the Gunnison Basin planning effort:

- *Business as Usual:* The present state of economic, social and natural (climatic) trends continues into the future.
- *Weak Economy:* The economy globally continues to falter; growth is less than anticipated, but so are resources for water development and adaptation to climate changes.
- *Cooperative Growth:* Environmental stewardship becomes the global norm; growth is more rational; carbon emissions are reduced substantially; et cetera.
- *Adaptive Innovation:* Climate change accelerates, forcing more collaborative action to address its problems (escalating extreme weather, reduced food production in hot places); more local food production; probably more growth in Colorado headwaters due to lower temps; et cetera.
- *Hot Growth:* The economy heats up even faster than the accelerating global warming; regulation is relaxed in favor of economic expansion; wealth encourages urban sprawl; et cetera.

These five scenarios are described in more detail in Chapter 6.1 of the Draft Colorado Water Plan. As an initial attempt to incorporate scenario planning in the Gunnison Basin this plan includes analyses of varying future hydrologic and water demand scenarios. In addition to a scenario planning approach, any discussion of future development or new supply must be balanced with a discussion of how to manage the risks posed by such development. The GBRT believes risk management criteria must be developed to prevent harm to existing water rights while allowing for the full development of Colorado's entitlement under the Colorado River Compact and Upper Colorado River Basin Compact. The GBRT also acknowledges that, until there is more certainty on which scenarios are most likely to evolve in the coming decades, the guidelines in the Colorado Water Plan No/Low Regrets Portfolio for near-term projects (2015-2025) are a reasonable approach, and have been considered in developing the GBRT Plan Tier 1 (near-term) projects.

To provide a concrete measurement of success in meeting existing and future water needs, goals are paired with measurable outcomes. Each of the goals includes a brief narrative description, process for

achieving the goal, and specific measureable outcomes. In order to ensure that each measurable outcome is attainable and realistic, each goal includes processes for achievement. The goal processes include tasks, items for inclusion in the GBIP, and other steps or mechanisms necessary to help achieve the goal and ultimately the measurable outcomes.

Goal 1: Primary Basin Goal – Protect existing water uses in the Gunnison Basin

This goal reflects the agreement among Gunnison River Basin inhabitants that the existing water uses for agricultural, municipal, industrial, environmental, and recreational purposes throughout the Basin should be protected. This mix of existing uses includes both decreed and nondecreed water use. Fundamental to this goal is the preservation of the Basin's agricultural base. Agricultural water use in the basin provides substantial economic productivity and valuable open space that helps enhance the tourism industry. In addition, agricultural diversions help to attenuate heavy spring runoff and result in return flow patterns that aid flows later in the season to augment recreational uses and the environment. The alluvial water table maintained by agriculture is also important to some municipal water supplies. For example, the City of Gunnison recently purchased an adjacent ranch specifically to protect the water quality that recharges the City's wells. As a result of these diverse connections many of the agricultural projects detailed in Section 4 are being evaluated as multi-purpose projects.

It is important to note that existing uses are not constant from year to year, and may be more variable with a changing climate. For example, a hotter climate would increase crop demands compared to historical, and depending on future hydrology, consumptive use could increase and shortages could increase. Potential climate change impacts could include changes in total precipitation, altered timing of spring runoff, and elevated stream temperatures. These changes could also impact the health of stream ecosystems and should be considered when determining adequate instream flow protections. Therefore, this plan provides an assessment of water supply impacts under different hydrologic scenarios in Section 3. To maintain existing uses it is also critical to prevent the abandonment of important historical water rights. The GBRT plans to create a committee to work with the Colorado Division of Water Resources to review future abandonment lists in Division 4, attempt to identify the current water rights' owners responsible for the subject water rights, and work with the water rights' owners to navigate the protest process where appropriate.

The significant federal land and water rights ownership in the Basin also necessitates special consideration. Federal liaisons have participated in GBIP technical meetings and have been involved with the roundtable process since its inception. Federal water rights are considered in the modeling as discussed in the GBIP Introduction and Section 3. In addition, the issue of potential future contracts for water from a Colorado River Storage Project reservoir is preliminarily addressed in the GBIP Statewide Principles Section.

Process to Achieve Goal:

- Document existing baseline of major decrees, environmental compliance agreements, water rights administration regimes, and related operations

- Detail the projected effects of climate change that may require additional water development to protect existing uses. Water development includes measures taken to use existing supplies more efficiently or effectively, as well as seeking additional water.
- Assign and schedule GBRT committee responsibilities for Division 4 water rights abandonment list review and management
- Update and refine estimates for anticipated future water uses

Measurable Outcomes:

- Maintain current baseline of irrigated acreage in the Basin (246,632 acres) with only minor decreases (less than five percent) related to projected municipal growth onto irrigated lands through the year 2050
- Maintain all current municipal and industrial water rights and related infrastructure without losing any water rights to abandonment or water availability to infrastructure deterioration
- Maintain mileage and volume of instream flows for environmental and recreational uses

Complementary Basin Goals (order does not indicate priority)

Goal 2: Discourage the conversion of productive agricultural land to other uses within the context of private property rights.

The GBRT strongly opposes the dry-up of agricultural land in the Basin. However, the GBRT also recognizes the importance of private property rights in the successful operation of Colorado's long-standing water rights system. Therefore, the GBRT is committed to encouraging the preservation of agriculture through any effective voluntary means. This includes conservation easements and other efforts through heritage-protection organizations. To establish a baseline and catalog successful land and water preservation in the Basin, current conservation efforts are highlighted in Section 2 of this plan. Future education efforts of the GBRT (Goal 9) may also focus on encouraging the preservation of agricultural land in the Basin.

Process to Achieve Goal:

- Invite the directors of programs for conservation easements and other heritage-protection organizations to address the Roundtable about their work to date, and needs for the future. Draft a roundtable policy for supporting such work in the Basin
- Document the current baseline of local conservation easements and other heritage-protection efforts
- Periodically invite qualified experts to the GBRT to present financial options to protect agricultural producers from the effects of inheritance taxes
- Periodically invite qualified experts to the GBRT to discuss financing options and other ideas for enabling young agricultural producers to obtain agricultural land affordably

Measurable Outcomes:

- Preserve the current baseline of about 183,000 protected acres in the Gunnison Basin (according to estimates from the Gunnison Ranchland Conservation Legacy) and expand the participation in conservation easements by five percent by 2030 through programs like the Gunnison Ranchland Conservation Legacy.

Goal 3: Improve agricultural water supplies to reduce shortages.

The 2011 Report provided an initial analysis of agricultural water shortages in the Basin. While it is common for agricultural areas in Colorado to be water-short, the agricultural shortages represent a real need and opportunity for improvement. The analysis in this plan seeks to better define the agricultural gap in the Gunnison Basin. This fits with the CWCB's emphasis on extending the SWSI analysis to include agricultural and environmental/recreational gaps to complement the original municipal and industrial gap of previous efforts.

This plan includes an analysis of water availability in each of the Gunnison sub-basins. Existing planned projects and other site-specific solutions are matched with water availability to identify and recommend the most effective projects. An emphasis on multiple purpose projects is carried throughout the analysis, where applicable.

Process to Achieve Goal:

- Identify specific locations in the Gunnison Basin where agricultural shortages exist and quantify the shortages in times, frequency, and duration
- Recommend potential site-specific solutions in collaboration with local water users
    - Recommendations include an initial analysis of hydrology (water variability), cost, financing, and permitting
    - Recommended projects could include new storage, enlargement or repair of existing reservoirs, infrastructure to improve irrigation system efficiency, etc.
- Perform analyses to maximize efficacy of recommended solutions for meeting multiple objectives (i.e. consumptive and environmental/recreational uses)

Measurable Outcomes:

- Reduce basin-wide agricultural shortages by developing 10 projects from the list of recommended solutions in the GBIP by the year 2030
- Implement the Inventory of Irrigation Infrastructure Improvement Needs projects from the list of recommended solutions in the GBIP by 2025

Goal 4: Identify and address municipal and industrial (M&I) water shortages.

As the Gunnison Basin continues to grow, its M&I water needs must be identified and addressed. Though the Gunnison Basin has a relatively small population, it is likely to grow faster than most of Colorado with a projected annual average growth rate of between 1.6 percent and 2.0 percent to the year 2050, resulting in a doubling of the current population (CWCB 2011).

This plan documents the planned efforts and related water availability of major water providers in the Basin to meet needs projected through the year 2050. Potential major industrial needs, such as those related to large-scale oil and gas development are not included at this time. An emphasis on multiple purpose projects is carried throughout the analysis, where applicable. Water conservation efforts are also included as an important component of meeting municipal demands in the Basin. Projected population and water use data are pulled from SWSI 2010, with updated project information from water providers where available. The M&I water supply gap in the Basin is not recalculated for this plan, but will be updated during the forthcoming SWSI 2016 effort. Section 2 details issues with the projections for Ouray County from SWSI 2010 that should be addressed during the SWSI 2016 effort. These updated projections will continue to be based on refined economic modeling projections performed by the Colorado State Demography Office.

Process to Achieve Goal:

- Identify specific locations in the Basin where M&I shortages exist now and may exist in the future, and quantify the shortages in time, frequency, and duration
- Recommend potential solutions in collaboration with local water users. Recommendations could include an initial analysis of hydrology (water variability), cost, financing, and permitting. Such projects could include new storage, water right exchanges, efficiency measures, operational optimization, etc.
- Perform analyses to maximize efficacy of recommended solutions for meeting multiple objectives (i.e., consumptive and environmental/recreational)
- Work with major water providers in the Basin to identify and catalog projects to meet all forecasted water needs out to the year 2050
- Promote the development of voluntary regional water conservation plans to help smaller entities (delivering less than an annual 2,000 acre-feet) achieve water savings and related reductions in expenses related to treatment, distribution, and infrastructure

Measurable Outcomes:

- Reliably meet 100 percent of essential municipal water provider system demands in the Basin through the year 2050 and beyond
- Continue the current baseline of effective water conservation programs by covered entities[1] in the Basin, with the goal being high levels of conservation savings as defined in SWSI 2010

[1] "Covered entity" means each municipality, agency, utility, including any privately owned utility, or other publicly owned entity with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers, and that has a total demand for such customers of two thousand acre-feet or more. §37-60-126(1)(b) Colorado Revised Statutes (2012).

Goal 5: Quantify and protect environmental and recreational water uses.

Environmental and recreational water uses are critical to the economy and way of life in the Gunnison Basin. Based on the work of the Gunnison Basin Roundtable, the 2011 Report identified important environmental and recreational needs in the Gunnison Basin that are referenced in this plan. The 2011 Report also cataloged completed, ongoing, and planned environmental and recreational projects. The projects were then mapped along with the environmental and recreational needs in Figures 3-1 through 3-4 of the SWSI 2010 Report as an initial analysis of where identified environmental and recreational needs are most effectively addressed.

This plan seeks to further refine the analysis of an environmental and recreational gap in the Gunnison Basin by summarizing the findings of previous studies, providing an analysis of instream flow water rights in the Basin, referencing data on economic impacts of environmental and recreational water uses, and refining a list of environmental and recreational focus segments. An emphasis on multiple purpose projects is carried throughout the analysis, where applicable. Data is pulled from SWSI 2010, with selective updates such as the Colorado River Cutthroat Trout range (Section 2.4).

Process to Achieve Goal:

- Identify specific locations in the Gunnison Basin where identified environmental and recreational needs are not being met
- Quantify or otherwise describe the needs in time, frequency, and duration
- Recommend potential site-specific solutions in collaboration with local water users
    - Recommendations could include an initial analysis of hydrology (water variability), cost, financing, and permitting
    - Recommended projects could include improving instream flows through water rights leasing, restoration projects, diversion improvements, consumptive use efficiencies, or other improvements to environmental and recreational attributes
- Perform analyses to maximize efficacy of recommended solutions for meeting multiple objectives (i.e., consumptive and environmental/recreational)
- Reference previous studies on the economic impact of environmental and recreational water uses in the Gunnison Basin
- Update delineation of Colorado River Cutthroat Trout range and preserve current baseline of native trout populations
- Support existing watershed groups in the basin (Coal Creek Watershed Coalition, the Lake Fork Valley Conservancy, the Uncompahgre Watershed Partnership, and the Western Slope Conservation Center). Links to these organization's websites and watershed plans are provided in Appendix 2
- Participate in the public hearing and rulemaking processes of the Colorado Water Quality Control Division

Measurable Outcomes:

- Meet identified environmental and recreational needs basin-wide by developing 10 projects from the list of recommended solutions in the GBIP by the year 2030
- Implement the Environmental and Recreational Project Identification and Inventory projects from the list of recommended solutions in the GBIP by 2020
- Improve the current baseline of native trout and endangered fish populations in the Gunnison Basin through the year 2050

Goal 6: Maintain or, where necessary, improve water quality throughout the Gunnison Basin.

The Gunnison Basin has a wide range of water quality and corresponding issues. Most tributaries in the headwaters have excellent water quality, with the exception of mining impacts in some locations. Lower in the Basin, the Mancos Shale soils of the Uncompahgre Valley have resulted in selenium impacts exceeding federal standards. These impacts are being addressed by various projects to minimize the leaching of selenium from soils, sponsored by the Uncompahgre Valley Water Users Association, Reclamation, and the Colorado River Water Conservation District. Salinity (aka dissolved solids) is also an issue in lower reaches of the Gunnison Basin as addressed by the Colorado River Basin Salinity Control Act of 1974 that authorized the planning and construction of salinity-control projects in the Basin.

Process to Achieve Goal:

- Maintain the outstanding water quality in most headwater streams
- Maintain water quality in areas where hydraulic fracturing is employed, per state and federal regulations, while allowing for economic development of oil and gas resources
- Improve the quality of water leaking form abandoned mine sites in mining regions of the Basin
- Improve the quality of water returning to the river and its tributaries from agricultural, municipal, and residential areas with Mancos Shale soils (i.e., reduce selenium impacts). Support and expand the work of the Selenium Task Force and the Selenium Management Program
- Continue efforts to reduce the level of general salinity in the lower reaches of the Gunnison River where practical
- Support cooperative efforts to gather water quality data throughout the Basin such as those of the Upper Gunnison Basin Water Quality Monitoring Program
- Improve communication and coordination amongst Gunnison Basin water quality stakeholders, watershed groups, and state and federal agencies

Measurable Outcomes:

- Compliance with all applicable state and federal water quality standards
- As determined by ongoing water quality data collection, maintain outstanding water quality in headwaters streams and improve site-specific water quality related to mining, hydraulic fracturing, selenium, and salinity issues
- Safe Drinking Water: 100 percent of existing direct use and conveyance use reservoirs attain the applicable standards that protect the water supply use classification

Goal 7: Describe and encourage the beneficial relationship between agricultural and environmental and recreational water uses.

Previous discussions at the GBRT and IBCC have noted the beneficial effects that the extensive agricultural water uses in the Gunnison Basin have on recreational uses and the environment. Section 2 of this document describes how delayed irrigation return flows and the irrigation water stored in the soil provide a benefit to stream flows, recreational water uses, and the environment in portions of the Gunnison Basin.

Instream flows help maintain stream ecosystems while providing riparian habitat for a range of species and help minimize potential Endangered Species Act concerns. These environmental and recreational flow benefits also support river-based recreation and translate into substantial economic value.

Numerous examples of mutually beneficial multipurpose projects are described and encouraged in the GBIP. Thirty examples of mutually beneficial multipurpose projects are documented on the list of projects in Section 4 of this plan.

Process to Achieve Goal:

- Describe the nexus between agricultural uses and environmental/recreational uses
- Identify locations in the Gunnison Basin where environmental and recreational needs are sustained and supported by agricultural water use, and vice versa
- Encourage cooperative projects and agreements which both sustain agriculture and provide benefit to stream flows. This may include new storage projects which provide late season water for both environmental/recreational and agricultural uses

Measurable Outcomes:

- Complete at least five new multi-purpose water projects, including two storage projects, in the Gunnison Basin by 2025 that demonstrate the beneficial relationship between agricultural, environmental, and recreational uses
- Explore and develop recommendations on alternative sources of funding from recreational users within the Basin to support development of those multi-purpose water projects

Goal 8: Restore, maintain, and modernize critical water infrastructure, including hydropower.

To preserve critical existing water rights and use, current infrastructure in the Gunnison Basin must be restored, maintained, and modernized. It is particularly important to preserve infrastructure that enables the use of water rights that predate the Colorado River Compact. The maintenance of infrastructure is an efficient and prudent option to preserve existing uses. Furthermore, in many cases restoration or modernization efforts serve to address multiple purposes, such as improved diversion reliability and accuracy, the addition of hydropower generation, and improved fish and boat passage. Therefore the project recommendations in Section 4 of this plan include many efforts focused on the restoration, maintenance, and modernization of existing water infrastructure. The GBRT and Draft Colorado Water Plan encourage multipurpose projects where feasible. These projects include not only those benefiting agricultural and environmental or recreational uses, but also municipal uses as well.

Process to Achieve Goal:

- Identity specific locations in the Basin where infrastructure requires improvement or replacement to preserve existing uses
- Recommend potential solutions in collaboration with local water users. Evaluating solutions to infrastructure needs includes an initial assessment of cost, financing, permitting issues, and potential impacts to other water users. Examples include the rehabilitation of Grand Mesa Reservoirs rehabilitation and lining of earthen delivery systems.

Measurable Outcomes:

- Implement at least one project every year in the Gunnison Basin focusing on the restoration, maintenance, and modernization of existing water infrastructure

Goal 9: Create and maintain active, relevant and comprehensive public education, outreach and stewardship processes involving water resources in the six sectors of the Gunnison Basin.

The GBRT seeks to further educate and involve the people of the Gunnison Basin in their role in their water future. The GBRT will form an Education and Outreach Committee (GBEOC) made up of representatives from the six sectors of the Basin, incorporating where possible representation from existing organizations with education missions (e.g., watershed groups, conservancies, public schools, et cetera). To the greatest extent possible, the GBEOC education, outreach and stewardship programs will involve active engagement with the water resources rather than passive education, to help promote increasing public understanding and participation in important water issues in the Basin, state and region.

Process to Achieve Goal:

- Through coordination between the Gunnison Basin Roundtable Education Committee and the faculty and administration in the Basin's public schools, water education program materials will be made available at all levels in the public schools by 2025
- In recognition of the participation mandate in the public education, participation and outreach clause of the Colorado Water for the 21st Century Act, programs will be pursued in conservancy districts in the valley to enable family groups, non-water-related organizations, school classes, etc. to participate in annual watershed restoration programs and projects by 2025
- By 2025, the GBRT Education Committee will offer a water leadership program in the Basin's high schools and two colleges, encouraging students to consider water careers and offering scholarships and other training opportunities
- The GBRT will provide some of the leadership for river restoration projects and will attend water conferences.
- The GBRT Education Committee will prepare and present annual half-day State of the River seminars for local governments and planning staffs, with the objective of making sure that land-use decisions and new developments are made within the context of the Basin's probable water future
- To maximize efficiencies, the GBRT encourages like-minded water organizations within the basin to share existing materials and resources with regard to education and outreach programs.

Measurable Outcomes:

- By 2025, representatives from the GBRT will work with local water organizations to provide educational materials and serve as a resource for County Commissioner Boards, , City Councils, and related planning staff regarding local water supply and land development issues
- By 2025, all public schools in the Gunnison Basin (approximately 30) will have water education programs in place with some degree of coordination and oversight by the Gunnison Basin Roundtable Education Coordinator

1.3 Statewide Principles

The GBRT believes that the success of its Basin Implementation Plan depends on statewide application of certain principles concerning interbasin actions, projects and programs. Table 12 describes those principles and recommended steps for implementation. The measurable outcome is a Colorado Water Plan that fulfills the objectives of the Governor's Executive Order and reflects the GBRT's vision of Colorado in 2050 and beyond. Due to the broader nature of these statewide principles, the format and content of this section is different from the Basin Goals. Since these principles are aimed at statewide application they do not have discrete measurable outcomes or processes to achieve them. Instead, potential implementation steps are included for each principle.

In addition, the State of Colorado needs to support the continual improvement and development of water management tools. This support is important for the all Basin Implementation Plans. As technology changes, the State should provide funding to support updating technical programs and activities which will help meet the gap. Better management tools will optimize projects to meet multiple needs, minimize cost, and protect public health and safety. An example of this is the Extreme Precipitation Analysis Tool (EPAT). Reservoir storage restrictions currently cost the state some 74,000 acre feet in lost storage opportunities. An updated EPAT would provide cost savings by minimizing necessary dam spillway sizes and would streamline the permitting process.

Table 12. Statewide Principles

1. Future supply of Colorado River water is highly variable and uncertain; therefore any proponent of a new supply project from the Colorado River System must accept the risk of a shortage of supply however the shortage occurs, adhere to the prior appropriation doctrine, and protect existing water uses and communities from adverse impacts resulting from the new supply project
2. It must be explicitly recognized that a new supply development from any location in the Colorado River System affects the entire System.
3. Any new supply project from the Colorado River System must have specifically identified sponsors and beneficiaries, and meet certain minimum criteria
4. Local solutions must be utilized to meet Colorado's future water needs without a major state water project or related placeholder water right
5. Water conservation, demand management, and land use planning that incorporates water supply factors should be equitably employed statewide
6. Statewide discussion, outreach, and education concerning the Gunnison Basin Roundtable's vision for water development in Colorado should be continued

* Order does not indicate priority

For the purposes of this plan: ***new supply*** *means any water right appropriation within the Colorado River System after December 31, 2013. In addition, contracting for water from a Colorado River Storage Project reservoir should be considered a new appropriation with a priority determined by the date of the contract.* ***Colorado River System*** *indicates the portion of the Colorado River and its tributaries within the State of Colorado.*

Principle 1: Future supply of Colorado River water is highly variable and uncertain; therefore any proponent of a new supply project from the Colorado River System must accept the risk of a shortage of supply however the shortage occurs, adhere to the prior appropriation doctrine, and protect existing water uses and communities from adverse impacts resulting from the new supply project.

The GBRT has been a leader in the IBCC's discussion about the necessity of risk management criteria applying to development of all new supplies out of the Colorado River System. During the Roundtable's exercise with the CWCB's Portfolio and Trade-off Tool, the GBRT developed a document titled: *Risk Assessment Scenario for Portfolio Tool* to articulate the GBRT's position on Risk Management along with an initial list of potential criteria and example triggers. This plan seeks to further promote the GBRT's position on a Risk Management definition and criteria in the context of Colorado's 2015 Water Plan.

Upper Gunnison River Water Conservancy District
Policy on the Purposes and Benefits of the Aspinall Unit Reservoirs

The Congressionally authorized purposes of the Aspinall Unit Reservoirs are consistent with the interests of the Conservancy District.

Colorado River Storage Project reservoirs, including the Aspinall Unit, provide the Upper Basin's (hence Colorado's) "bank account" to maintain Lee Ferry flows as required by the Colorado River Compact.

The Aspinall Unit, especially Blue Mesa Reservoir, provides the following additional benefits to the Upper Gunnison River basin:

1. Recreation and fishery opportunities that are enjoyed by local residents and by visitors from throughout the State and Region, and inject approximately $45 million annually into the local economy
2. Operation of the 1975 Operation and Storage Exchange Agreement, which protects recreation, fishery, and supplemental irrigation benefits in the Taylor River
3. Provides a source of supply for plans for augmentation
4. Generation of hydropower
5. Protection of wildlife habitat in the ecosystem surrounding the reservoirs
6. Delivery of water in the Gunnison River to protect endangered fish and their critical habitat

The Aspinall Unit should be operated to continue to provide all of these benefits by balancing competing uses. The Board opposes any removal of water from the Aspinall Unit for transmountain diversion that diminishes these benefits in any way.

The ultimate risk from new development of Colorado River System water is over development of Colorado's entitlement under the Colorado River Compact and Upper Colorado River Basin Compact, resulting in curtailment of water uses in Colorado. However, because Colorado River Storage Project reservoirs have provided drought protection for Upper Basin states, Compact curtailment is not a near term risk.[2] Therefore, in preparing the 2015 Water Plan, new development planning should be focused on avoiding hydroelectric power

[2] Blue Mesa Reservoir contributes to this protection, which makes it possible for the Upper Basin states to utilize their Compact apportionments, a principal purpose of the Colorado River Storage Project Act. A "Blue Mesa Pumpback" thus creates a risk of over development equal to that of new appropriation for a transbasin diversion.

disruption, a Colorado River Compact deficit[3], or development in excess of Colorado's allocation under the Upper Colorado River Basin Compact. The GBRT believes that evaluating new development using this standard will leave Colorado well positioned to respond the ultimate risk of over development.

Planning efforts beyond 2015 should include risk management as a means to allow full development of Colorado's Compact entitlement while avoiding curtailment of water uses in Colorado. The GBRT believes that warning triggers and responses, as outlined in *Risk Assessment Scenario for Portfolio Tool*, must be part of any discussion of new water supply development out of the Colorado River System and incorporated in forthcoming iterations of Colorado's Water Plan. The GBRT will continue to contribute to efforts to develop risk management criteria and will engage in future policy and project discussions regarding potential new transmountain diversions.

Principle 2: It must be explicitly recognized that a new supply development from any location in the Colorado River System affects the entire System.

The GBRT believes that new transmountain diversions beyond those already contemplated under the Colorado River Cooperative Agreement, Windy Gap Firming Project Intergovernmental Agreement, and Eagle River Memorandum of Understanding present the greatest risk of exceeding the available supply of Colorado River System water because they are fully consumptive and are potentially large diversions. However, even though West Slope development would likely have less impact, the GBRT believes that consistent and equitable risk management criteria must be applied to all development of new supply from the Colorado River System.

The GBRT will continue to coordinate closely with all other West Slope Roundtables. This includes ongoing participation in IBCC meetings and meetings of the West Slope Caucus. In addition, this effort should include jointly authored policy positions on the effects of the Colorado River Compact and Upper Colorado River Basin Compact, future West Slope needs, and compensatory storage or other mitigation requirements in the event of further transmountain diversion of water from the Colorado River System.

Implementation Steps:

- The Gunnison Basin Roundtable will continue to work closely with the three other West Slope Roundtables following the development of this Basin Implementation Plan, and will attempt to coordinate its goals and outcomes with those of the other Roundtables, since any external impact on the waters of any of those basins is also an impact on the Gunnison Basin
- The Gunnison Basin Roundtable, through its Basin Implementation Plan Committee, will continue to participate in West Slope Caucus meetings organized through the Colorado River District

[3] A Colorado River Compact deficit occurs when flows at Lee Ferry fall below the obligation of the Upper Division States contained in Article III of the Colorado River Compact.

- The Gunnison Basin Roundtable will participate actively in Interbasin Compact Committee sessions

Principle 3: Any new supply project from the Colorado River System must have specifically identified sponsors and beneficiaries, and meet certain minimum criteria.

In addition to risk management assessment, the following criteria should apply to the development of all new supplies from the Colorado River System:

- Entities should first reach high levels of municipal and industrial water conservation as defined in SWSI 2010 prior to further development of Colorado River System water
- Entities must incorporate water supply factors into land use planning and development
- Entities must first execute viable projects as listed in SWSI 2010 and subsequent reports prior to further development of Colorado River System water
- Entities must first reuse all legally available reusable water supplies to the maximum extent possible prior to further development of Colorado River System water
- Any potential future development of water from the Colorado River System must not promote agricultural dry-up, utilize the power of eminent domain to condemn water rights, or otherwise affect existing uses in the Basin of origin

Principle 4: Local solutions must be utilized to meet Colorado's future water needs without a major state water project or related placeholder water right.

Ultimately, the M&I water supply gap will need to be addressed by local water providers. Specifically identifying where and when demand will exceed available supply, and whether the resources can be found to acquire additional supply, will provide a realistic assessment of what can be done to meet those local M&I gaps.

The GBRT strongly supports the use of local water supply solutions throughout the state to meet all existing and future water needs. Local solutions, such as those detailed in Section 4 of this plan as well as other the Basin Implementation Plans of other roundtables, are the most cost effective and least disruptive means of water development. The local solutions in this plan are supported by the GBRT and other entities.

Conversely, the GBRT strongly opposes any major State water right or related placeholder water right. The GBRT will work with other West Slope Roundtables to create consistent language concerning the opposition to any major State water project or related placeholder water right.

Implementation Step:

- Work with other West Slope Roundtables to create and adopt consistent language concerning the support of local water supply solutions and opposition to any major state water project or related placeholder water right

Principle 5: Water conservation, demand management, and land use planning that incorporates water supply factors should be equitably employed statewide.

The GBRT supports water conservation, demand management, and land use planning that incorporates water supply factors as essential and cost effective tools for meeting water supply needs in the Gunnison Basin and statewide. As used in this plan, water conservation means the more efficient use of an existing supply, and demand management means reducing or eliminating the need for additional supply.

The GBRT believes that the best way to promote statewide water conservation is through incentive-based measures as opposed to regulatory methods. To maximize water savings and avoid an unnecessary burden on smaller rural water providers, the GBRT recommends focusing demand management efforts on covered entities.[4] The Gunnison Basin currently has only one covered entity (Tri-County Water Conservancy District), but includes small portions of the service areas for two other covered entities (Ute Water and the City of Grand Junction).

Demand management strategies supported by the GBRT include growth only in proximity to existing or planned infrastructure, high density versus urban sprawl, and landscape limitations. Development in proximity to existing infrastructure should be encouraged only in non-productive, or the least productive, land in order to preserve productive agricultural land. The GBRT believes that land use policies are essential to promoting both water and land conservation. Local land use policies and regulations should discourage sprawl, link water supplies to development, and provide incentives for higher density developments.

Implementation Steps:

- Work with other Roundtables to support conservation, demand management, and the incorporation of water supply factors into land use planning and development
- Promote programs that encourage drought tolerant vegetation and discourage lawn irrigation

Principle 6: Statewide discussion, outreach, and education concerning the Gunnison Basin Roundtable's vision for water development in Colorado should be continued.

Ongoing participation in statewide water discussions and education about their importance is a critical effort for the GBRT. The GBRT will continue its efforts to promote these statewide goals at the IBCC, statewide Roundtable summits, the Colorado's Water Plan process, and other forums.

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[4] "Covered entity" means each municipality, agency, utility, including any privately owned utility, or other publicly owned entity with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers, and that has a total demand for such customers of two thousand acre-feet or more. §37-60-126(1)(b) Colorado Revised Statutes (2012).

Implementation Steps:

- Participate actively and vocally in all sessions of the Interbasin Compact Committee, statewide basin Roundtable meetings, and any other applicable venues
- Promote these statewide principles of the Gunnison Basin Roundtable through the work of the Gunnison Basin Roundtable representatives on the IBCC and the Gunnison Basin representative on the CWCB.

Section 2: Basin Needs

2.1 Introduction

Beyond identifying the Roundtable's goals or priorities, the first step in strategically implementing water projects and other management options in the Gunnison Basin is to identify needs. In order to focus on project implementation, this plan is designed to build on previous data of water needs from SWSI 2010 and other relevant sources. As stated in the Basin Implementation Plan Guidance: *this section will summarize existing reports and information that may be relevant to the Basin Implementation Plans (e.g., SWSI 2010 demands, IPPs, vulnerabilities from the drought plan)*.

While the GBIP process does not include a systematic update of consumptive and environmental and recreational water needs, pertinent new information is included as noted. The CWCB plans to provide a comprehensive update of water needs to maintain its technical foundation for statewide water planning in the SWSI 2016 report. New information compiled in this plan will be further updated by the CWCB as part of the SWSI 2016 process.

Targeted technical outreach was performed to strategically refine information on water needs. Technical workshop meetings were held in locations known to have relatively large agricultural water shortages, including two workshops for the Upper Gunnison region and two in the North Fork Valley. These workshops focused on verifying tributary level data related to water shortages and planned projects. A technical workshop was also held to review environmental and recreational data. In addition to the workshops, targeted phone, personal, and e-mail communication helped to update information throughout the Basin. Updated information relating to water needs and environmental and recreational focus areas is detailed below, while project data resulting from the technical outreach process is summarized in Section 4.

2.2 Agricultural Needs

Summary of Process

To provide an analysis of existing agricultural water use and needs, the SWSI process used the Colorado Decision Support System (CDSS) modeling effort to provide a summary. The SWSI 2010 analysis then built on the CDSS modeling output to estimate current and future 2050 demands and shortages. Agricultural needs are defined as existing shortages and, in contrast to municipal needs, not projected future needs related to growth. The majority of irrigated agriculture in the Gunnison Basin does not and has not historically received a full supply needed by the crops.

A comprehensive analysis of current and historical agricultural demands and shortages was completed with the CDSS modeling efforts in the Gunnison Basin using StateCU, a data driven consumptive use model. The original consumptive use (CU) modeling effort was completed in the late 1990's and most recently updated in October of 2009. The recent update included more accurate estimates of irrigated acreage and incorporation of local studies aimed at better estimating crop demands. The results from the CU modeling effort are used to inform the surface water allocation model and summarize the agricultural conditions in the Basin.

Figure 4 provides a general schematic outlining the approach taken in the CU analysis. The analysis uses irrigated acreage, climate data (temperature and precipitation), growing season parameters (crop-specific temperature limitations), and crop coefficients to estimate Crop Irrigation Water Requirement (known as CIR) using the Original and Modified Blaney-Criddle methods on a monthly time step. The method has been adapted to unique conditions in the Gunnison River basin through the application of accepted elevation adjustments and the use of locally calibrated crop coefficients, outlined in the *Historical Crop Consumptive Use Analysis for the Gunnison River basin*, 2009.

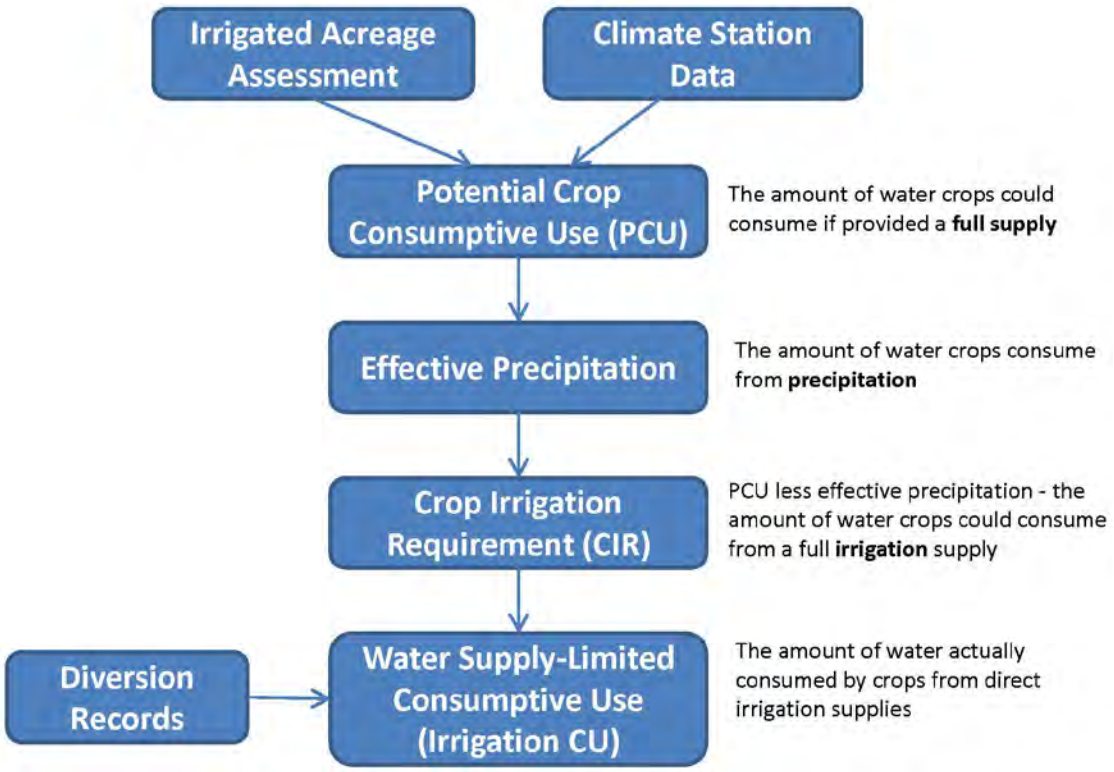


Figure 4. Consumptive Use Analysis Approach

Irrigated acreage in the Gunnison River basin was originally delineated by the Colorado DWR and BOR. This first effort to delineate irrigated acreage represented irrigated parcels in 1993 and was further attributed with crop type and diversion structure by DWR. This acreage information is stored under each diversion structure in Colorado's Water Resources Database, referred to as HydroBase and available in a GIS layer on the CDSS website. The State is in the process of finalizing GIS coverage

reflecting changes in irrigated acreage in 2005 and 2010. Due to relatively static irrigation patterns in the Gunnison River basin, the 1993 acreage assessment is sufficient for understanding irrigated acreage in the Basin. The variability of the crop irrigation requirement (CIR) is due primarily to variable climate over the 1950 through 2006 study period.

Climate data is recorded at multiple climate stations throughout the Basin, which are managed by the National Climatic Data Center (NCDC). Monthly temperature and precipitation data is used in the CIR calculation.

The analysis then uses the estimated CIR, water supply information, conveyance and application efficiencies, and soil reservoir considerations to estimate Water Supply-Limited Consumptive Use (Irrigation CU).

Water supply information (aka Diversion Records) includes diversions to irrigation for each structure as recorded by DWR and stored in HydroBase. Water supply information included in the CU analysis reflects irrigation diversions taken under direct rights and released from reservoirs. Estimates of conveyance loss and application efficiency reduce the total irrigation supply to simulate system losses experienced in the delivery of water to the crop. Diversions in excess of CIR, generally in the early season, are stored in the soil moisture reservoir and are available to the crops later in the season when diversions may not be available. Efficiency information allows the quantification of irrigation diversions not consumed by the crop, but returned to the river system often in months after diversion.

For the purposes of this plan, agricultural demand refers to CIR, or the amount of water crops would consume if given a full water supply. Irrigation CU refers to the amount of water actually consumed from irrigation supplies and agricultural shortage refers to the difference between CIR and irrigation CU. Therefore, shortages are defined for the entire growing season and consequently represents the amount of water the irrigator could have put to beneficial use if water was physically and legally available. (*Note, this standard definition is slightly different from the definition used in the SWSI 2010 report where "demand" was used to represent water supply-limited or irrigation CU.)*

Where to find more information:

- The *Historical Crop Consumptive Use Analysis for the Gunnison River basin* (rev. 2009) report and the StateCU Consumptive Use Analysis data set for the Gunnison Basin can be found on the CDSS website (cdss.state.co.us)

As discussed in the SWSI 2010 report, current agricultural demands, irrigation CU and shortages were based on averages of the most recent ten years of available information from the CDSS modeling effort. At the time of the SWSI analysis, this ten-year period reflected 1997 to 2006 estimates in the Gunnison River basin, and included one of the worst drought years on record (2002). For comparison, agricultural shortages basin-wide were approximately 20 percent on average over the ten year period, and over 35 percent in 2002. Selection of this time period and inclusion of the drought year in the analysis led to a conservative estimate of shortages in the Basin.

In addition to the crop CU estimated through the CDSS modeling efforts, SWSI 2010 includes CU associated with agricultural activity including livestock CU, evaporation from stock ponds, and CU incidental to delivering irrigation water. The CU estimates for these activities, defined as Non-Irrigation Demand, were originally developed in support of the annual Consumptive Use and Losses Report for tributaries to the Colorado River developed by Reclamation. Livestock CU and evaporation from stock ponds evaporation are small components of the total CU, generally less than one percent of agricultural use in the Basin. Incidental CU of water diverted for irrigation, however, was estimated to be ten percent of Irrigation CU in the SWSI 2010 analysis; this percentage is in accordance with the incidental factor used in the Consumptive Uses and Losses Report. Incidental losses include, but are not limited to, vegetative consumptive use that occurs along canals and in tailwater areas. SWSI 2010 reports the sum of Irrigation CU from the CDSS modeling effort plus the CU from agricultural activities for the most recent ten year period available as the current agricultural depletions.

Future 2050 irrigation CU in the SWSI 2010 report was developed by projecting the amount of irrigated acreage in the Gunnison River basin in 2050 and scaling the current irrigation CU by the ratio of the 2050 irrigated acreage to current irrigated acreage in the Basin. This approach assumes historical climate conditions will continue into the future and that irrigation CU is directly linear to irrigated acreage. Irrigated acreage in the Basin was projected to 2050 based on a variety of factors, as discussed in the SWSI 2010 report, including such things as urbanization of existing irrigated lands, agricultural to municipal water transfers, water management decisions, the subdivision of agricultural lands, and lifestyle farms.

Recent Updates

Irrigation CU and related shortages have been analyzed and summarized in many different ways. The summaries reported in the CDSS Historical Crop Consumptive Use Report and SWSI 2010 for the Gunnison River basin provide the magnitude of the historical, current, and potential future CIR, irrigation CU and related shortages. However, these reports do not discuss the seasonal variability of crop use, the impacts of variable hydrology, or why the shortages are occurring.

SWSI 2010 documents an average annual agricultural shortage of 128,000 acre-feet in the Gunnison River basin, and states that the GBRT believes this number is less than the actual shortfall in the Basin. The GBIP process included an effort to better educate the GBRT on how the CU analysis was performed to calculate use and shortages in the Basin. A technical outreach effort was also used to verify irrigated acreage data, get feedback on the magnitude and timing of estimated shortages, and to verify the list of planned and proposed projects. Specific technical outreach shortage information is provided in Appendix 8.

To verify the shortage information and focus on projects that could feasibly meet agricultural needs, the outreach focused on three categories of agricultural shortages:

> ***Physical*** shortages are due to lack of physical supply. Such shortages are often seen later in the irrigation season principally by irrigators on smaller tributaries. Though irrigation water rights may

be in priority, there is not enough supply. Although these shortages are exacerbated in dry years, on many of the tributaries physical flow is not sufficient to meet the CIR for the entire growing season even in wet years.

Legal shortages are those due to lack of legal supply; there may be physical supply at a headgate, but it must be bypassed to meet downstream senior water rights. This type of shortage is often seen later in the season by irrigators with junior water rights in average and wet years, and may be the situation for junior irrigators the entire growing season in dry years.

Irrigation Practice **"**shortages" result from specific irrigation practices; the irrigator may have physically and legally available supply but chooses not to irrigate. For example, some irrigators may need to reduce or cease irrigation to allow the land time to dry prior to haying or grazing. In addition, an irrigator may cease diverting because there is not enough time left in the growing season for an additional cutting. Note, though this a very different type of shortage, it is equally important to document. Identification of shortages related to irrigation practices helps to quantify the difference between CIR and actual consumptive use in SWSI and other statewide planning efforts. In addition, since irrigation practice shortages cannot be addressed by increased water supply, their identification helps to focus on the implementation of projects that meet physical and legal shortages.

Physical shortages are the most common in the Gunnison River basin, followed by legal shortages, and then irrigation practices.

The SWSI 2010 report did not characterize agricultural shortages as gaps. However, the GBRT has determined that agricultural shortages do constitute a legitimate and longstanding water supply gap in the Basin. Therefore, the GBRT defines the agricultural gap in the Basin as the full extent of the shortages identified by the analyses of SWSI 2010 and this plan.

The agricultural demands and shortages from the previous studies were refined for this plan. The CDSS modeling effort is used to analyze agricultural demands and shortages on a more detailed level than SWSI 2010, both spatially and temporally, as required for the analysis of proposed projects in this plan. The additional detail provides express representation of most of the ditches in the Basin, and calibrated model assessments of monthly CIR, Irrigation CU, and shortages for the entire 1950 to 2006 model period.

The GBIP analysis verified the accuracy of model data for irrigated acreage area and agricultural shortages through GBRT meetings and targeted technical outreach. The new and more detailed analyses discussed at these meetings included:

- The magnitude of demand and shortages were summarized by Water District, and in many cases by sub-basin
- Seasonal/monthly trends were investigated under different hydrological conditions (wet, dry, and average)

- Amount of CU met by direct diversions and from the soil moisture reservoir were summarized
- General commonalities and differences between Water Districts (and their causes) were discussed

These analyses helped educate water users of modeling data, operations, and capabilities as well as instill confidence in the CDSS tools. In addition to providing verification for the information, an important correction to the assignment of irrigated acreage in the model was made in the Slate River and East River areas. These efforts also prompted the need for tributary-specific case studies.

In the late irrigation season, diversions are frequently limited due to physical or legal flow constraints. Late season demands throughout the Basin are often partially met when crops use water stored in the soil reservoir originating from diversions during the runoff months. Often higher diversions during the runoff months are thought by non-irrigators as wasting water. However, the updated analysis shows that use of soil-zone stored water accounts for a relative large amount of the total irrigation CU in some areas (about 12 percent basin-wide). This irrigation practice was recognized in early decrees in Water Districts 28, 59, and 62 and further documented as a case study in Section 3.

As described above, recent updates focused on identifying shortages by tributary during the irrigation season, shortages due to varying hydrology, and the category (cause) of shortages. Shortages can vary widely from one tributary basin to the next, based on the availability of irrigation supply and supplemental storage supply, and the seniority of the irrigation rights in the Basin. Table 13 reflects the average annual CIR, agricultural CU, and the shortage for tributary basins over the 1975 to 2006 modeling period, based on the CDSS modeling efforts.

Table 13. Average Annual Agricultural Needs by Tributary (1975-2006)

Tributary (Water District)	Crop Irrigation Requirement (CIR) (AFY)	Irrigation CU (AFY)	Shortage (AFY)	Percent Shortage
Tomichi Creek (28)	62,400	49,800	12,600	20%
North Fork & Tributaries (40)	224,600	156,200	68,400	30%
Lower Uncompaghre River (41)	172,800	169,700	3,100	2%
Lower Gunnison River (42)	15,600	10,600	5,000	32%
East River Basin (59)	73,200	56,500	16,700	23%
Upper Gunnison River (62)	34,800	32,300	2,500	7%
Upper Uncompaghre River (68)	30,400	27,300	3,100	10%
Total Gunnison River basin	**613,800**	**502,400**	**111,400**	**18%**

Appendix 8 provides this information by tributary, which is required to evaluate the ability of specific projects to mitigate shortages. Figure 5 provides a summary of the Basin wide annual agricultural CU directly from diversions, CU from water stored in the soil reservoir during the runoff, and shortages.

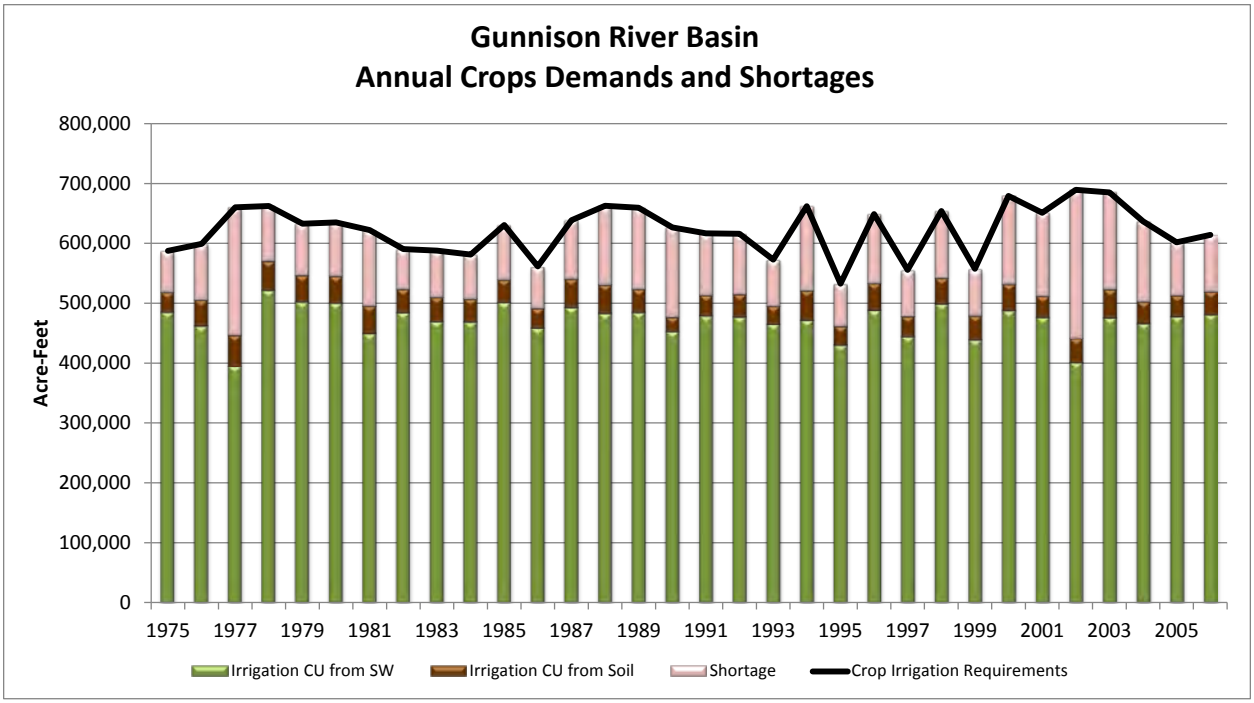


Figure 5. Annual Crop Demands and Shortages

To further emphasis the importance of agricultural use in the Basin and the real impact the agricultural shortage gap has on the Basin, the following provides a summary of CWCB conducted statewide drought surveys (2004, 2007, and 2013) which characterized Gunnison Basin agricultural impacts, adaptive capacities, and vulnerability for recent droughts as summarized below (detailed information is included in CWCB's 2013 *Colorado Drought Mitigation and Response Plan*). Although the study focused on extreme drought years such as 1977 and 2002 where severe shortages are clearly highlighted in Figure 5, the impacts highlighted by the study are applicable to some degree in areas of the Basin each year.

- *Historical Drought Impacts* (approximate percentage of agricultural entities reporting impacts):
  - Loss of crop yield (100 percent)
  - Loss of reliable water supply (85 percent)
  - Loss of operations revenues (85 percent)
  - Loss of system flexibility (80 percent)
  - Loss of livestock (75 percent)
  - Wells went dry or produced sand (65 percent)
  - Limited new construction (55 percent)
- *Adaptive Capacities* when faced with reduced surface water supplies:
  - Reduce irrigated acreage
  - Reduce irrigation amounts to the entire field (i.e., limited irrigation agriculture)
  - Include different crops that require less irrigation
  - Use stored cattle feed and/or purchase supplemental cattle feed
  - Change operations (i.e., move cattle herd to pastures not impacted by drought)
  - Cull the cattle herd

- *Drought Vulnerability* – County Drought Vulnerability Rankings:
  - Delta and Mesa Counties are ranked as a Number 2 Vulnerability where "agriculture is present but may not be the dominant activity in the county. Without significant tracts of crops and herds of cattle, these counties are not expected to experience devastating agricultural losses during a drought."
  - The remaining Gunnison Basin counties are ranked as a Number 1 Vulnerability where "agricultural activity is largely absent from the county or there is a small proportion compared to the size of the county". These counties are categorized in this manner with respect to the rest of the State as they are located in mountainous regions, which "have more dominant recreation and tourism sectors than agriculture."

Summary of Needs

The SWSI 2010 report estimated that irrigated acreage in the Gunnison River basin would decrease from its current amount of approximately 272,000 acres to between 251,000 to 244,000 acres in 2050. This eight to ten percent decrease by 2050 was attributed primarily to urbanization of existing lands. The SWSI 2010 analysis of current and future 2050 agricultural demand and shortages for the Gunnison River basin are summarized in Table 14. These needs require updating as new and refined basin water supply, demand, conservation, drought, and project information becomes available as described, for example, in the previous section.

Table 14. Agricultural Needs

Analysis	Irrigated Acres	Crop Irrigation Requirement (AFY)	Irrigation CU (AFY)	Shortage (AFY)	Non-Irrigation Demand (AFY)
Current	272,000	633,000	505,000	128,000	54,000
2050	244,000[1]	573,000	457,000	116,000	48,000

[1] Reflects adjusted value based on a ten percent reduction in current acreage. A ten percent decrease in irrigated acreage was reflected in Table 4-7 and Figure 4-6 in the Gunnison River basin SWSI 2010 report; however a 19 percent decrease (219,000 acres) was shown in Table 4-9 and Figure 4-7. Based on the analysis of the 2050 projected acreage in Table 4-7, it appears that the latter 19 percent was included in error and SWSI 2010 intended to report a ten percent decrease. Source: SWSI 2010.

The primary issues concerning agricultural needs in the Gunnison Basin include:

1. SWSI 2010 graphically illustrated the average annual shortage percentage for the larger structures to indicate the range in shortages relative to the amount of acreage served by each structure. Current shortages in these maps ranged from zero to over 50 percent, compared to an average of 20 percent for the Basin as a whole. The Gunnison BRT has identified a need to improve agricultural water supplies to reduce these shortages.

2. The SWSI 2010 analysis predicting irrigated acreage would decrease in the Basin appears to be inconsistent with the Gunnison Basin Goal 2—*discourage the conversion of productive agricultural land to all other uses within the context of private property rights*. This goal highlights the need to

consider alternatives to the growth patterns assumed in SWSI 2010 and to identify creative solutions to minimize loss of agricultural to other uses.

3. Interviews with agricultural water users during the technical outreach meetings highlighted issues with aging infrastructure in many parts of the Basin. A need was identified to inventory existing dams, head gates and canals, assess their current conditions, and prioritize rehabilitation and repairs.

4. Technical outreach meetings also highlighted concerns about the change of historical practices in the Basin that potentially change the flow and timing of flow in the river. A need was identified for an education program to help irrigators understand how historical practices evolved through years of experience and how to maximize the use of available water through collaboration and cooperation.

Where to find more information:

- The Colorado Drought Mitigation and Response Plan, CWCB, 2013. Web Link
- SWSI 2010, Gunnison Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessment, CWCB 2011. Web Link

2.3 Municipal and Industrial Needs

Summary of Process

In 2004, the Colorado Water Conservation Board (CWCB) completed the Statewide Water Supply Initiative (SWSI) Phase 1 Study (SWSI 1), which included a reconnaissance level water use forecast that evaluated water needs through 2030. The SWSI 1 report included an evaluation of Municipal and Industrial Demand (i.e., all of the water use of a typical municipal system including residential, commercial, industrial, irrigation, and firefighting) and Self-Supplied Industrial (SSI) Demand (i.e., large industrial water uses that have their own water supplies or lease raw water from others). Key sections of that report addressing M&I water needs include Section 5 (Projected Water Use), Section 6 (Water Needs Assessment), Appendix A (State of Colorado Population Projections 2000 to 2030), and Appendix E (Statewide M&I and SSI Water Demand Projections). The SWSI 1 activities related to M&I water use included:

- Collection of available statewide water use demographic and weather data
- Evaluation of available information to determine factors that influence M&I water use
- Review of M&I water use studies conducted throughout the state
- Preparation of a statewide forecast of future urban water use to the year 2030
- Assessment of the current level of conservation efforts by county

In 2006, the CWCB completed the Water Supply and Needs Report for the Gunnison Basin (2006 Report), which presented information contained in the SWSI 1 report specific to the Gunnison Basin as a starting point for the Gunnison Basin Roundtable to develop the needs assessment required by the

Interbasin Compact Process. Section 5 of that report describes the Consumptive Water Supply Needs in the Gunnison Basin.

In 2009, the CWCB published a draft report: *State of Colorado 2050 Municipal and Industrial Water Use Projections*, which reflects feedback received from the Basin Roundtables and other interest groups of the SWSI report. Also in 2009, the Gunnison Basin Roundtable completed a separate study to examine their consumptive needs in four specific areas – demands and supplies for smaller municipalities, rural domestic demands and supply, identified water supply vulnerabilities, and snowmaking demands. Information from this study was incorporated in the BRT's 2011 Report.

In 2011, the CWCB completed *Statewide Water Supply Initiative 2010* which includes Section 4 (Consumptive Needs Assessments) as an update of SWSI M&I water use projections using an extended forecast horizon of 2050. Also in 2011, the CWCB completed the Gunnison Basin Needs Assessment Report, which presented information contained in the SWSI 2010 Report specific to the Gunnison Basin. Key sections of that report that contributed to evaluation of M&I water needs include Section 4 (Gunnison Basin Consumptive Needs Assessment) and Appendix H (State of Colorado 2050 Municipal and Industrial Water Use Projections).

Appendix J (Technical Memorandum 2050 Municipal and Industrial Gap Analysis) of the SWSI 2010 Report extended the M&I and SSI gap analysis analyses from the year 2030 to 2050. It also incorporated updated information on Identified Projects and Processes (IPPs) that the CWCB collected through coordination with the Basin roundtables and water providers. Appendix J summarizes Gunnison Basin needs as follows:

> *In the Gunnison Basin, much of the M&I and SSI needs will be addressed through existing rights and new regional in-basin projects. The Tri-County Water Conservancy District, which serves much of Montrose, Delta, and Ouray counties, holds water rights in the Dallas Creek Project. Combined with water from the Project 7 Water Authority, these counties are anticipated to have adequate water supplies through 2050. The Upper Gunnison River Water Conservancy District (UGRWCD) provides augmentation for wells in a portion of the upper basin. The upper basin, like many headwater areas throughout the state, is projected to experience high growth rates. The Crested Butte area may experience significant growth if adequate water supplies for M&I and snowmaking can be developed. Augmentation of existing or proposed environmental and recreational water rights, such as CWCB instream flow rights and RICDs and senior agricultural and M&I water rights, will likely require the construction of storage in the upper areas of Gunnison River tributaries.*

It is important to note that both Ouray and Delta Counties have significant areas that are not serviced by the Project 7 Water Authority.

Appendix L (SWSI 2010 Municipal and Industrial Water Conservation Strategies) of the SWSI 2010 Report represents the latest effort by the CWCB to date to integrate water conservation into overall water supply planning. It also estimated statewide water conservation potential out to the year 2050.

The SWSI 2010 reports estimated M&I water demand forecasts by using county and statewide population projections as predictors of future growth. Future water needs were estimated by multiplying county population projections by aggregated data on per capita water use (gallons per capita per day). Low, medium, and high scenario population projections were developed using the forecasting process and models of the Colorado State Demographer's Office (SDO). It is important to note that water use data includes demands from transient and permanent populations, and for commercial and light industrial uses. Information was gathered from municipal water providers and reviewed with each basin roundtable. Estimated water savings from projected passive water conservation projections (i.e., water demand reductions associated with state and federal policy measures) were subtracted from the baseline water use estimates.

The Gunnison Basin is projected to increase in population from 105,000 (2008) to between 206,000 and 240,000 (2050). The SWSI 2010 Report indicates:

> *The Gunnison River basin is projected to grow by about 2.1 times between 2008 and 2050, under the medium scenario, with Mesa and Montrose Counties being the most populous in that region. Household basic jobs will grow at the fastest rate of any basic sector and will remain the largest source of employment in the Gunnison Basin by 2050, followed by tourism and regional and national services. Other sectors will grow at slower rates, with decreased employment anticipated in the mining sector by 2050.*

Figure 6 illustrates the M&I water demand projections (with passive conservation savings) for each of the counties in the Gunnison Basin.

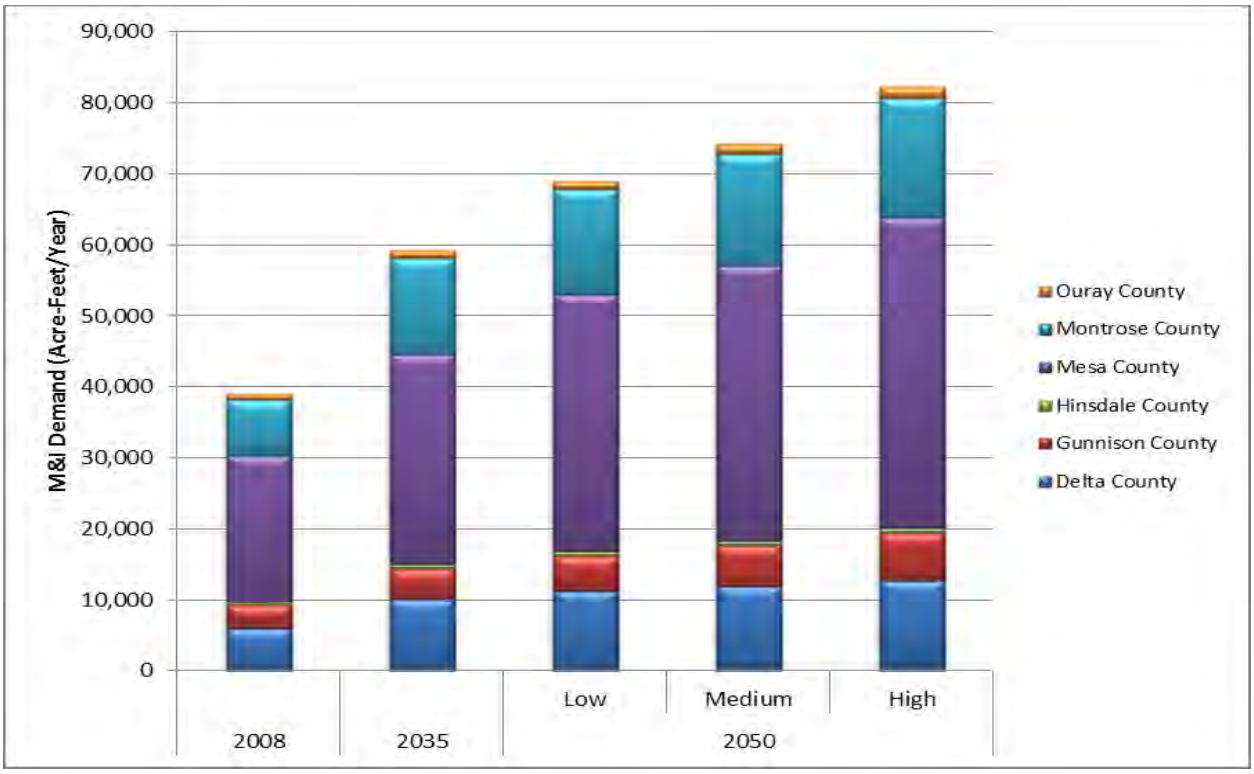


Figure 6. M&I Water Demands

* Mesa County estimates assume population/demand split between Gunnison Basin (10 percent) and Colorado Basin (90 percent). Source: SWSI 2010.

The Gunnison Basin's Self-Supplied Industrial water demands in SWSI 2010 included a small increase for snowmaking due to an expected increase in demand from the Crested Butte Mountain Resort (CBMR). CBMR currently holds absolute and conditional water rights and approvals through its 2013 master development plan that include a small increase in water use for future snowmaking on the main mountain. Future development within the CBMR permit boundary will require subsequent planning and approvals. In addition, CBMR has invested in significant modernization of its snowmaking equipment to maximize water use efficiency.

In addition to snowmaking, there is one additional potential SSI project (Oak Mesa Coal Mine located seven miles north of Hotchkiss, Colorado) being explored for operations in ten to 25 years, which may require up to 150 acre-feet per year in water supply. Similar existing in-basin coal mining operations are considered water neutral in that their water supply needs are generally met with water contained within the mines.

Recent Updates

The following water providers were contacted to solicit potential plans for raw water supply projects and status of water conservation efforts. Following is a brief summary of the updated information (refer to SWSI documentation for detailed information on each water provider):

- *Tri-County Water Conservancy District*
    - Sufficient water supply through the District's planning horizon
    - Actively implementing their own 2010 Water Conservation Plan
- *Project 7 Water Authority*
    - Created a list of potential water supply projects (see Section 4)
    - Participates in Tri-County Water Conservancy District's Water Conservation Plan and voluntary water conservation efforts through member agencies
- *City of Grand Junction*
    - Project being planned for replacement of raw water flow lines that deliver water from the Kannah Creek basin (tributary to the Gunnison River) to the water treatment plant in Grand Junction
    - Actively implementing the 2012 Grand Valley Regional Water Conservation Plan in combination with Clifton Water District, and Ute Water Conservancy District. In 2014, Grand Junction plans to perform six commercial/industrial water supply audits and approximately 100 residential irrigation audits.
- *Town of Crested Butte*
    - Over the coming three years, Crested Butte plans to complete the McCormick Ditch Diversion Project for water supply to municipal parks. This project is considered a multi-purpose project, as it includes the potential to promote lease-back water for Coal Creek instream flows for the purpose of recreation and habitat enhancement. The project currently has broad support and funding mechanisms from a combination of the Town of Crested Butte, the Gunnison Basin Roundtable, High Country Conservation Advocates, the Coal Creek Watershed Coalition, the Colorado Water Trust, the Upper Gunnison River Water Conservancy District, and local agricultural interests
    - Water conservation efforts are generally driven by town ordinances including specific timing for lawn irrigation and tiered water rates
- *Mt. Crested Butte Water and Sanitation District*
    - The District expanded their service area about 15 years ago to include an existing residential subdivision and privately owned reservoir with an approximate capacity of 100 acre-feet. The District has since constructed a pump station allowing additional surface water to augment the original source of water to the subdivision. More recently, a sonar depth survey of the reservoir resulted in a 92 percent increase in actual reservoir capacity. The District is currently in the design phase of new reservoir outlet structures to allow for restoration of the original reservoir water level (two feet above the current level). The District is also considering adding hydroelectric power to their infrastructure.

  - The District is currently developing a Water Conservation Program, and has received a grant from the CWCB. Completion of the plan is expected by the end of 2014.
- *City of Ouray*
  - Provided project information for City of Ouray Water Efficiency and Conservation Plan, development of Upper Uncompahgre water supplies, improvements to Red Mountain Ditch, and expansion/enlargement of the Ouray Hydro Plant Dam and Reservoir (see Section 4).
  - Engineers for the City of Ouray project that by 2050 the water demand for municipal, irrigation, and hot spring uses with the City and adjoining service areas will be between 8,500 and 10,000 acre-feet per year (Appendix 7).
- *Town of Ridgway*
  - Benefits from passive water conservation due to new construction, with one-half of the town's buildings being less than 20 years old, and a trend toward smaller lot sizes for new developments. The town has no formal water conservation plan, rather promotes voluntary use restrictions.
  - Planning to prepare a water conservation plan in the next couple of years.
  - Constructing a raw water storage project to address raw water supply needs when flow rights are out of priority or inadequate.
  - Currently implementing their 2013 source water protection plan.
  - Has a planned project to pipe the Ridgway Ditch with a potential hydropower component.
- *Town of Olathe*
  - Provided project summary information for a proposed pipeline and reservoir project (see Section 4)
- *Ouray County*
  - The Ouray County Attorney has requested that 2030 population projections for Ouray County are increased from SWSI projections of 6,392 to 9,000, 2050 population projections for Ouray County be 12,000, and that additional information on population projections, water needs, and proposed projects be secured for the Town of Ridgway and the City of Ouray. According to the County Attorney, this would lead to an assumption that additional water would need to be developed by the various water providers serving Ouray County. The amount and source of additional water, including any proposed projects, have not been determined by Ouray County at this time due to a lack of resources for an engineering analysis.
  - The Ouray County Attorney has also requested that further consideration be given to Ouray County agricultural needs and potential storage requirements that could lessen the impact of calls on the Uncompahgre River below Ridgway Reservoir.
  - Appendix 6 includes correspondence from the Ouray County Attorney regarding the information above. The requests described above have been included in Section 4 as a proposed project (Ouray County Water Supply Inventory and Feasibility Analysis).

As with agricultural use, M&I use is vulnerable to severe droughts. Without new M&I projects in some areas of the Basin, the projected increase in population will increase the impacts of droughts. The CWCB statewide drought surveys (2004, 2007, and 2013), also characterized Gunnison Basin M&I impacts, adaptive capacities, and vulnerability to recent droughts as summarized below (detailed information is included in CWCB's 2013 *Colorado Drought Mitigation and Response Plan*).

- *Historical Drought Impacts* – Municipal impacts with the highest level of concern include:
    - Loss of system flexibility
    - Significant loss in carryover storage
    - Increased staff time necessary to address drought
    - Decrease in raw water quality
- *Adaptive Capacities* – Gunnison Basin municipal survey respondents indicate:
    - 40 percent incorporate drought recurrence in water supply and conservation planning
    - 30 percent have drought management plans
    - 50 percent have conservation and raw or treated master plans
    - All have updated/developed plans following 2002 and 2012/2013 dry periods
    - None feel that there is sufficient funding to support water supply reliability, conservation, and drought planning
- *Drought Vulnerability* – M&I drought vulnerability could increase if drought is not effectively incorporated into water supply reliability planning. Major projects identified to address water supply needs that will be key to maintaining reliability and meeting drought demands include:
    - Firming In-Basin Rights
    - Regional In-Basin Projects
- *Improving Vulnerability Assessment in the Energy Sector* – Data gaps indicate a need to improve drought vulnerability assessments in the Energy Sector. State drought mitigation measures propose added data collection to improve future corresponding vulnerability assessments:
    - Mining
        - Total production value by county for all resources
        - Projected production value by county
        - Current/projected water use obtained directly from mines
        - Water rights volumes and priority dates
        - Water rights yield analysis under a range of drought scenarios
    - Power Producers
        - Total water rights portfolio yield on a plant by plant basis
        - Quantification of surplus water rights held and drought contingent rights
        - Verification of the water use estimates completed by USGS

Summary of Needs

Table 15 summarizes the Gunnison Basin's M&I and SSI water use for 2008 and projected needs (including reductions as a result of passive conservation measures) for 2035 and the 2050 low, medium, and high scenarios. M&I and SSI demands in the Gunnison Basin are expected to increase by **up to 23,000 acre-feet per year**. This need will be updated during the upcoming SWSI 2016 effort as new and refined basin water supply, demand, conservation, drought, and project information becomes available. Recent updates included in this plan will help with the refinement projected needs during SWSI 2016.

Table 15. M&I and SSI Needs

Demand Type	2008	2035	2050 Low	2050 Med	2050 High
M&I	20,000	33,000	36,000	39,000	43,000
SSI	260	650	650	650	650
Total	20,260	33,650	36,650	39,650	43,650

*All values in AFY. Source: SWSI 2010

Where to find more information:

- The Colorado Drought Mitigation and Response Plan, CWCB, 2013. Web Link
- Statewide Water Supply Initiative Phase 1 Study, CWCB 2004
- Water Supply and Needs Report for the Gunnison Basin, CWCB 2006
- State of Colorado 2050 Municipal and Industrial Water Use Projections, CWCB 2009
- Statewide Water Supply Initiative 2010, CWCB 2011
- Gunnison Basin Needs Assessment Report, CWCB 2011

2.4 Environmental and Recreational Needs

The Gunnison Basin Roundtable has built upon past work to focus attention on 21 stream segments particularly suited for future environmental/recreational and multipurpose projects. The Roundtable will maintain a focus on these segments along with others in its future funding and policy priorities. To address issues in these segments, four projects are included in Section 4 to inventory and investigate the feasibility of implementing specific projects. Since environmental and recreational interests are often financially limited, these studies and related future projects are good candidates for Roundtable funding. Whenever possible, environmental and recreational interests should find ways to partner with agricultural interests in the Basin to develop projects that benefit river flows while helping to sustain agriculture.

Summary of Process

The first statewide effort to comprehensively catalog environmental and recreational needs was conducted in 2007 as part of the Statewide Water Supply Initiative – Phase 2 (not to be confused with the Phase 2 Nonconsumptive Projects and Methods Assessment of the SWSI 2010). This plan was structured to build on the work of the 2003 Statewide Water Supply Initiative by summarizing the work of Technical Roundtables that were formed to provide a more detailed analysis of four key topics, Delineating and Prioritizing Colorado's Environmental and Recreational Resources and Needs, Water

Conservation and Efficiency, Alternative Agricultural Water Transfer Methods to Traditional Purchase and Transfer, and Addressing the Water Supply Gap.

The 2007 SWSI Phase 2 effort summarized initial environmental and recreational data and programs to serve as the technical platform for the roundtable-specific work of the Phase 1 Nonconsumptive Needs Assessment (NCNA). The NCNA was rolled out to fulfill the legislative requirement to identify environmental and recreational needs in each basin. This process allowed the GBRT to use detailed mapping of environmental and recreational attributes to identify environmental and recreational focus areas where future studies and environmental and recreational projects can be targeted. The NCNA process is described in more detail in SWSI 2010 and its appendices.

For the Gunnison Basin the environmental and recreational focus area mapping resulted in a unique map detailing environmental, recreational, environmental and recreational, and scientific and educational segments. The map was published as a Geospatial PDF file on the CWCB website, in order to allow access via free Adobe software to detailed spatial attribute information for each segment. The Gunnison Basin Roundtable identified numerous environmental and recreational attributes within the following categories:

1. Federally listed fish species
2. Water-dependent state endangered, threatened, and species of concern
3. Occurrence of Rare aquatic-dependent plants and significant riparian wetland plan communities
4. Special value waters
5. Whitewater and flat water boating
6. Riparian/wetland wildlife viewing and waterfowl hunting
7. Significant cold and warm-water fishing
8. High use recreation areas

In 2010, Phase 2 of the SWSI NCNA process centered on the identification of projects that help address the environmental and recreational needs detailed in the Basin-specific attributes of Phase 1. The GBRT took a unique approach to the Phase 2 process by identifying 21 focus segments where there was an aggregation of attributes from Phase 1. In the 2011 Report, each of the segments included a diverse summary of management strategies that are helping to address needs within each of the 21 segments. The Phase 2 NCNA process is described in more detail in SWSI 2010 and its appendices.

The 21 environmental and recreational focus segments identified in the Phase 2 process are:

1. Blue Mesa, Morrow Point, Crystal Reservoirs (Wayne N. Aspinall Unit of the Colorado River Storage Project) and Gunnison River in Curecanti National Recreation Area
2. Gunnison River in Black Canyon of the Gunnison National Park
3. Gunnison River in Gunnison Gorge National Conservation Area downstream to Confluence with North Fork of the Gunnison River
4. Gunnison River - Hartland Diversion to Confluence Colorado River
5. Gunnison River - Confluence with North Fork Gunnison River to Hartland Diversion

6. North Fork of the Gunnison River - Paonia Dam to Confluence with the Gunnison River
7. Stream Segments on Headwaters Wilderness Areas
8. Coal Creek, Slate River and Tributaries
9. East River - Gothic to Almont
10. Henson Creek and Tributaries
11. Uncompahgre River and Tributaries - Headwaters to Ouray
12. Uncompahgre River - Ouray to South Canal Outfall and West Canal Flume
13. Grand Mesa Reservoirs on National Forest
14. Tributaries to Taylor Park Reservoir
15. Taylor Park Reservoir
16. Taylor River - Taylor Park Reservoir to Almont
17. Gunnison River - Almont to Blue Mesa Reservoir
18. Lake San Cristobal
19. Lake Fork of the Gunnison River - Lake San Cristobal to Blue Mesa Reservoir
20. Ridgway Reservoir
21. Upper East River and Tributaries - Headwaters to Gothic

In addition to the GBRT's identification of focus segments, the CWCB performed the same analysis for the Phase 2 NCNA process that was done statewide. This analysis included the identification of projects through a detailed outreach and survey process that resulted in a list of 59 projects for the Gunnison Basin, of which 44 were within the Basin's designated focus areas. The following data was collected for each of the projects: name, location, type (project, information and flow protection), status (completed, ongoing, planned, or proposed), BRT attributes, project protections, and reach identification. As part of the process, priorities of the Colorado Division of Wildlife (now Colorado Parks and Wildlife) were also identified in the Gunnison Basin. All identified projects were documented and mapped.

The resulting identified projects contained:

- Projects identified by CWCB surveys and workshops
- Projects funded by CWCB watershed restoration programs
- Projects funded by CWCB's Water Supply Reserve Account grant program
- CWCB Instream Flows
- Information from the USGS study, Southwest Regional Gap Analysis Project
- Projects identified by the Colorado Division Wildlife (now Colorado Parks and Wildlife)

The next step in the Phase 2 NCNA process involved a simple initial analysis of the extent of protection provided by the listed projects. Projects were identified as providing direct protections (designed to improve a specific attribute) or indirect protections (not designed to directly improve the specific attribute but may still provide protection).

The final step in the Phase 2 NCNA process involved the creation of an initial map of environmental and recreational gaps. This map was prepared by overlaying the focus areas with the listed projects to

determine where focus areas are located without corresponding projects. These maps were not published at the time of the 2011 reports, but made available by the CWCB shortly thereafter.

In addition to CWCB's SWSI effort to identify environmental and recreational needs described above, and as described in the Introduction of this plan, CDPHE manages state water quality issues including the development of State water quality policies and protecting and restoring water quality for public health and the environment. Between 2011 and 2012, CDPHE developed a number of reports aimed at assessing water quality that includes the Gunnison River basin. Those reports identify stream and lake segments in the Gunnison Basin with special use designations, water quality impairments, and recommended future actions.

Recommended future actions are described in CDPHE literature include a high priority need for developing Total Maximum Daily Load (TMDL) for identified pollutants within specific water bodies and further Monitoring and Evaluation (M&E) for multiple stream and lake segments. The Upper and Lower Gunnison River Sub-Basins have six and 16 water body (stream and lake) segments, respectively, listed for M&E for dissolved oxygen, copper, cadmium, zinc, iron, selenium, sediment, E. coli, and lead. Exhibit 7-61 included in the Statewide Water Quality Management Plan (CDPHE 2011) provides a listing of completed, approved, and possible future TMDL strategies for the Basin. Exhibits 7-66 and 7-67 included in the same report provides a listing of point source projects and scheduled improvements to help water quality issues in the Basin. The State has generated a GIS map portraying stream and lake segments with Outstanding Water (OW) use classifications, 303(d) impairments, and TMDL and M&E designations.

In addition to water quality needs described above, watershed health also includes consideration for forest needs. The CSFS and the USFS are working to address forest health in the Gunnison Basin to include projects related to forest management, forest insects, diseases, and disorders as well as wildfire mitigation and education.

Recent Updates

As with agricultural and M&I use, environmental and recreational uses are vulnerable to severe droughts. The CWCB statewide drought surveys (2004, 2007, and 2013) also characterized environmental and recreational impacts, adaptive capacities, and vulnerability to recent droughts as summarized below (detailed information is included in CWCB's 2013 *Colorado Drought Mitigation and Response Plan*).

Environmental:

- *Historical Drought Impacts* – Statewide impacts reported by CPW staff during recent droughts:
    - Decrease in wildlife forage
    - Aquatic impacts due to low stream levels and higher water temperatures
    - Need to transfer endangered fish species to protected stream reaches
    - Increased incidence of wildfires
- *Adaptive Capacities* – Actions noted in the 2013 CWCB drought plan that could mitigate impacts:
    - Aquatic Habitat

        - Identify critical water bodies
        - Develop processes to monitor critical water bodies
        - Identify mitigation alternatives for critical water bodies
        - Provide emergency instream flow protection
        - Develop process for drought emergency closures and fishing restrictions
        - Monitor hatchery water levels and stocking conditions
    - Terrestrial Habitat
        - Identify priority areas and monitor drought impacts on species of concern
        - Identify and assess how drought may impact predator and human interactions
        - Evaluate process for compensating private landowners for game damage
        - Monitor waterfowl production impacts
    - Aquatic and Terrestrial Habitat
        - Evaluate and optimize state agency water use to best maintain habitat
        - Coordinate and research federal drought assistance funding
        - Educate water users on conservation practices to aid wildlife during drought
        - Continue close coordination between CPW, DWR, and WQCD
- *Drought Vulnerability* – Rankings by County:
    - Mesa County is ranked as a Number 3 Vulnerability with "an overall high vulnerability ranking for environment" where "a county must rank highly in several of the impact categories".
    - The remaining Gunnison Basin counties are ranked as a Number 1 or 2 Vulnerability where "the county has a mix of attributes that overall do not add up to high vulnerability. For example, there could be protected lands, the county may have impaired waters but not extremely so, there are instream flow rights, etc. The nature of the environmental analysis is that each metric is weighted equally, so unless most or all of the metrics indicate high vulnerability, the overall result will be moderate."

Recreation:

- *Historical Drought Impacts* – Statewide impacts that may occur during droughts:
    - Skiing – less than normal snowfall impacts revenues, higher operating costs, and lay-offs
    - Wildlife Viewing – animals may stay away from traditional viewing areas
    - Hunting, Fishing , and Camping:
        - Animals may stay away from traditional viewing areas
        - Animal population production may decrease
        - Hunters and anglers may be detracted in purchasing licenses; reduced revenue
        - Increased operating costs for fish hatcheries
        - Closure of campsites
    - Golfing – diminished course playability, higher operating costs, and less golfer interest
    - Boating – boaters may be detracted from visiting/registering boats; reduced revenue
    - Rafting – rafters may be detracted from participating; reduced revenue
- *Adaptive Capacities* – actions noted in CWCB drought literature that could mitigate impacts:
    - Skiing – snowmaking machines and cloud seeding

  - Wildlife Viewing – CPW feeding programs
  - Hunting, Fishing , and Camping – CPW feeding programs and species management
  - Golfing – chemical wetting agents and adjusted irrigation practices
  - Boating – local, state, and federal agency coordination to maintain recreational flows
  - Rafting – local, state, and federal agency coordination to maintain recreational flows
- *Drought Vulnerability* – Rankings by County:
  - Mesa County is ranked as a Number 3 Vulnerability, which "implies a distinct recreational draw to the county that is significant compared to the population. There may be adaptive capacities or sufficient diversification that a county has recreation exposure, but not necessarily high vulnerability to drought."
  - The remaining Gunnison Basin counties are ranked as a Number 2 Vulnerability where "there may be a distinct recreational draw to the county, but it is small compared to the population; and there is a diverse offering of recreational activities."

Since the environmental and recreational efforts of SWSI 2010 (Phase 1 and Phase 2), the CWCB created two interim work products to assist with the Basin Implementation Plan process. The first product was the Nonconsumptive Toolbox, published in July 2013. This document was designed as a resource for the Basin Implementation Plans by providing a tool to help plan, design, target, and execute environmental and recreational projects and methods. The Nonconsumptive Toolbox includes appendices detailing relevant scientific information, examples of measurable outcomes, tools and resources for project planning, updated basin environmental and recreational maps, funding opportunities, case studies, and existing programs.

The second interim work product from the CWCB was a preliminary environmental and recreational gap analysis delivered at the February 2014 BIP coordination meeting. This analysis provided a broad categorization of environmental and recreational gaps according to a three tier system: high priority projects gap, medium priority projects gap, and low priority projects gap. If any environmental and recreational attributes were identified in a segment, it was assigned to one of the three categories based on the existence of a project (e.g. no project = high priority) and the nature of the project (e.g., indirect protections = high priority; studies = medium priority; direct protections with no state listed species = low priority).

Because of the wide variability in approach taken by the roundtables during Phase 1 and Phase 2 of the SWSI environmental and recreational process, the CWCB preliminary gap analysis resulted in large differences between basins, and corresponding range of applicability to the BIP process.

A GBRT environmental and recreational workgroup reviewed the additional information provided to support the BRT process and considered it in the refinement of basin environmental and recreational needs. To better target future environmental and recreational projects in the Basin, the workgroup identified additional environmental and recreational focus segments where future environmental and recreational or multi-purpose projects could have the largest beneficial impacts.

The additional segments were identified as areas for nonconsumptive project attention and funding prioritization, but the GBRT recognizes that such attention does not preclude future consumptive project development on these same segments. Indeed, many of these segments offer the opportunity for multipurpose projects beneficial to both nonconsumptive and agricultural and municipal interests. For example, on the North Fork of the Gunnison River, the Inventory of Irrigation Infrastructure Improvement Needs offers the opportunity to integrate stream connectivity and other nonconsumptive interests into a consumptive project. Likewise, the Upper Long Branch Reservoir on Tomichi Creek addressing irrigation shortages could also serve a nonconsumptive function by providing stream flows in the late summer. The Roundtable supports finding multipurpose opportunities like these on all identified focus segments, and encourages recreational and environmental interests to work with agriculture and municipal interests to develop these ideas.

Existing protections and planned projects for many of these segments are detailed in Section 4. In addition, Section 4 includes four planned inventory projects in different sub-basins designed to assess the feasibility of specific potential projects for meeting needs in these segments.

These segments were subsequently combined with the previous 21 segments identified in the Phase 2 NCNA process to provide a comprehensive list of focus segments. The resulting updated list of environmental and recreational focus segments in the Gunnison Basin includes:

1. Blue Mesa, Morrow Point, Crystal Reservoirs (Aspinall Unit of the Colorado River Storage Project) and Gunnison River in Curecanti National Recreation Area
2. Gunnison River - Almont to Blue Mesa Reservoir
3. Gunnison River in Black Canyon of the Gunnison National Park
4. Gunnison River in Gunnison Gorge National Conservation Area downstream to Confluence with North Fork of the Gunnison River
5. Gunnison River - Hartland Diversion to Confluence Colorado River
6. Gunnison River - Confluence with North Fork Gunnison River to Hartland Diversion
7. North Fork of the Gunnison River - Paonia Dam to Confluence with the Gunnison River
8. Stream Segments on Headwaters Wilderness Areas
9. Coal Creek, Slate River and Tributaries
10. East River - Gothic to Almont
11. Henson Creek and Tributaries
12. Uncompahgre River and Tributaries - Headwaters to Ouray
13. Uncompahgre River - Ouray to South Canal Outfall and West Canal Flume
14. Grand Mesa Reservoirs on National Forest
15. Tributaries to Taylor Park Reservoir
16. Taylor Park Reservoir
17. Taylor River - Taylor Park Reservoir to Almont
18. Lake San Cristobal
19. Lake Fork of the Gunnison River - Lake San Cristobal to Blue Mesa Reservoir
20. Ridgway Reservoir

21. Upper East River and Tributaries - Headwaters to Gothic
22. Tomichi Creek (Sargents to confluence with Gunnison River)
23. Curecanti Creek (headwaters to confluence with Morrow Point Reservoir)
24. Smith Fork Creek
25. Ohio Creek (headwaters to confluence with Gunnison)
26. Cottonwood Creek (included in the Dominguez-Escalante Resource Management Plan)
27. Cow Creek (lower reach—last 5 miles)
28. East and West Dallas Creeks
29. Cimarron Creek and Blue Creek

Finally, an investigation of flows related to whitewater recreation in the Gunnison River basin is included in a report prepared by American Whitewater: *Assessing Streamflow needs for Whitewater Recreation in the Gunnison River*. The report looks at preferred recreational flow conditions at 17 locations in the Basin based on a survey conducted with 331 individuals regarding their recollection of flow estimates during recent river trips. While information from this plan was carefully reviewed, the GBIP subcommittee recommended additional information be gathered prior to adopting the 17 locations as focus segments or performing further analysis. Nonetheless this study provides an important first step in defining a quantitative metric to allow needs associated with whitewater boating to be assessed under future water supply and demand scenarios. The GBRT encourages future studies that could include a more robust survey process and an analysis to understand the economic impacts associated with different boating types.

Colorado River Cutthroat Trout

Colorado River Cutthroat Trout (CRCT) is a state-listed species of special concern in Colorado, Wyoming, and Utah, and also is characterized as a sensitive species by federal land management agencies (BLM and USFS) who manage habitats where CRCT occurs. Colorado Parks and Wildlife (CPW) works closely with Utah, Wyoming, and federal land managers to manage for the recovery and persistence of CRCT throughout their historic range, guided by a multi-pronged conservation strategy that articulates the steps that if implemented, would be most likely to preserve CRCT in perpetuity ('CRCT Conservation Strategy '[5]). Implementation of the CRCT Conservation Strategy and showing progress on measurable benchmarks has allowed the U.S. Fish and Wildlife Service (USFWS) to maintain its opinion that CRCT is 'not warranted' for listing under the Endangered Species Act of 1973, as amended. Such a finding has been beneficial to state wildlife management agencies in order to maintain state management authority for this species, but is also of critical importance to water managers so that consultation with the USFWS under Section 7 of the ESA is not required for projects in CRCT-occupied waters.

[5] CRCT Coordination Team, 2006. Conservation strategy for Colorado River cutthroat trout (*oncorhynchus clarkii pleuriticus*) in the States of Colorado, Utah, and Wyoming. Colorado Division of Wildlife, Fort Collins, CO, 24p. http://cpw.state.co.us/Documents/Research/Aquatic/pdf/CRCT_Conservation_Strategy_Jun06.pdf.

The Gunnison and Uncompahgre River basins both have numerous populations of CRCT that are being managed in accordance with the Conservation Strategy, as shown by the map located at the following website: http://ndismaps.nrel.colostate.edu/stockingrestrictions/. The map portrays which basins have existing populations of CRCT and where stocking restrictions limit the chance that existing populations could be further compromised by competition from other salmonids or genetic introgression from rainbow trout or non-Colorado River cutthroat species.

In general, the Conservation Strategy focuses on the following objectives:

- Identify populations of CRCT and characterize the level of genetic introgression;
- Secure and enhance 'conservation' and 'core conservation' populations (< 10% introgression and <1 % introgression, respectively) from further genetic dilution or inter-specific competition (e.g., barrier construction, reclamation, stocking restrictions);
- Maintain and/or enhance watershed conditions, including streamflow protection, riparian buffers, or habitat projects;
- Public outreach and education;
- Monitoring & data exchange between state fish managers & federal land management agencies;
- Coordination of all CRCT activities amongst the same agencies and NGO partners.

The following streams within the Gunnison Basin Roundtable planning area are included in the stocking regulations that prohibit stocking of fish in native cutthroat trout waters (Table 16). As outlined in the Conservation Strategy, maps, regulations, and CRCT conservation waters are continually being updated as new monitoring data and research unfolds. Of current interest is the further delineation of historic native cutthroat trout into two distinct lineages reflecting pre-settlement occupation endemic to the Yampa-White river basins ('blue' lineage) or the Colorado-Gunnison-Dolores basins ('green' lineage). Regardless of the nomenclature for particular genotypes of native cutthroat trout, the conservation partners will continue to evolve management strategies to address new challenges (e.g., climate change) and research findings.

Table 16: Streams with Colorado River Cutthroat Trout & Related Stocking Regulations

WATER NAME	COUNTY	DESCRIPTION
ANTELOPE CREEK, WEST	Gunnison	Headwaters to confluence with Antelope Creek
ANTHRACITE CR, NORTH FK	Gunnison	Headwaters to confluence with Anthracite Creek
BEAVER CR	Gunnison	Headwaters to Blue Mesa Reservoir
BEAVER CR, SOUTH, E FORK	Saguache	Headwaters to confluence with Beaver Creek, South
BEAVER CR, WEST	Gunnison	Headwaters to confluence with Beaver Creek
BEAVER DAMS CREEK	Montrose	Headwaters to confluence with E Fork Dry Creek
CUNNINGHAM CREEK	Delta	Headwaters to confluence with W Fork Terror Creek
DEEP CREEK	Gunnison	Headwaters to Paonia Reservoir
DEER BEAVER CREEK	Saguache	Headwaters to confluence with S Beaver Creek
DOUG CREEK	Montrose	Headwaters to confluence with Muddy Creek
DRY CREEK, EAST FK	Montrose	Headwaters to confluence with Dry Creek
DYKE CREEK	Delta	Headwaters to confluence with W Fk Muddy Creek
GUNNISON R, SMITH FK, N	Gunnison	Headwaters to confluence with Smith Fk Gunnison River
HENDERSON CR	Gunnison	Headwaters to confluence with E Muddy Creek
HUBBARD CREEK, MAIN	Delta	Headwaters to confluence with Overland Ditch
HUBBARD CREEK, MID FK	Delta	Headwaters to confluence with Overland Ditch
NATE CREEK	Ouray	Headwaters to confluence with Cow Creek
PRYOR CREEK	Montrose	Headwaters to confluence with E Fk Dry Creek
ROAD BEAVER CREEK	Gunnison	Headwaters to confluence with Cebolla Creek
ROBERTS CREEK	Gunnison	Headwaters to confluence with E Muddy Creek
ROCK CREEK	Gunnison	Headwaters to confluence with Clear Fk Muddy Creek
SECOND CREEK	Delta	Headwaters to confluence with Smith Fk of Gunnison River
TERROR CREEK, WEST	Delta	Headwaters to confluence with Terror Creek
WEST STEUBEN CREEK	Gunnison	Headwaters to confluence with East Steuben Creek
YOUNGS CREEK RES #2 (1&2)	Delta	Grand Mesa
YOUNGS CREEK RES #3	Delta	Grand Mesa

Three Species Agreement

Three other native fish species that inhabit the lower Gunnison River and Uncompahgre basins are also the subject of a special management strategy: the roundtail chub, bluehead sucker, and flannelmouth sucker. Concerns about declines in the three species within the entire Colorado River Basin prompted resource agencies to draft and adopt a multi-state, multi-agency, range-wide conservation and strategy agreement that provides the framework for conservation actions designed to preserve these species across their historic range ('Three Species Agreement', 2006). The State of Colorado and five other Colorado River Basin states that are part of the range-wide distribution of these species, along with the United States Forest Service (USFS), Bureau of Land Management (BLM), Bureau of Reclamation (BOR), and sovereign tribes, are also signatories to the Three Species Agreement. In addition, the range-wide declines described in the Three Species Agreement speak to the species' potential for listing by the U. S. Fish and Wildlife Service (USFWS) as threatened or endangered under the Endangered Species Act of 1973, as amended (ESA). The USFWS relies on implementation of the multi-state Three Species Agreement to protect and conserve these three native warm-water species. Similar to the Conservation Strategy for Colorado River Cutthroat Trout, water users who operate or develop facilities within the

habitats of these species are protected from Section 7 consultation with the USFWS by the partners' implementation of the conservation measures described in the Three Species Agreement.

Within the Gunnison Basin, these species are present in the mainstem Gunnison River predominantly below the confluence with the North Fork of the Gunnison and in the Uncompahgre downstream of Montrose. Recent research has indicated that spring runoff from tributaries to these reaches may provide important seasonal habitats for spawning and fry dispersal, and indicates that the sucker species, in particular flannelmouth suckers, may travel great distances to favorable spawning areas.

The Three Species Agreement articulates that within their jurisdictional authority, signatories are responsible for taking action to conserve native fish, coordinating status assessments, developing and maintaining data sets on occupancy and genetics, and documenting conservation measures taken on behalf of the three species. It encourages all signatories to cooperate on science, research, education and outreach to send a clear and consistent message about conservation of these species. The agreement is predicated on the concept that collectively, local, state, and federal agencies, and other willing partners can work together with the communities most affected by a potential listing to develop and implement voluntary actions that pre-empt the need for federal listing of any of these species under the ESA.

The Three-Species Agreement identifies the following population viability factors important to address as implementation proceeds. Other appropriate factors may be added to this list in the future as monitoring and research continues.

- Known and potential threats;
- Available habitat(s);
- Habitat stability;
- Genetic stability;
- Meta-population connectivity and stability;
- Reproductive opportunity and potential, including recruitment into the effective population;
- Potential to expand population sizes and distribution.

Colorado Parks and Wildlife (CPW) is currently developing a state-specific strategy that describes how Colorado is implementing management actions that will help conserve these species. This strategy prioritizes geographic opportunities in the following ways:

1. Intact native fish assemblages containing all three species without the presence of non-native sucker, primarily white sucker and longnose sucker, which can hybridize with both flannelmouth and bluehead suckers;
2. Watersheds supporting two of the three species without the presence of non-native suckers;
3. Watersheds supporting all three species with non-native sucker species present;
4. Watersheds with roundtail chub present with or without non-native sucker species.

Monitoring of populations remains critical to determine the status of the fishery and the persistence of threats to these populations. Population metrics that are used include the following:

- Fishery abundance (quantifiable metric where possible - fish/mi, catch-per-unit-effort; lbs/ac);
- 'Young of year' or larval fish present;
- Age Class Structure - presence of multiple age classes of fish, including juveniles and adults;
- Expanded distribution of fish;
- Reduction in interspecific threats, including non-native sucker species, smallmouth bass, brown trout, or other invasive predator/ competitor species (sunfish, carp, bullhead, catfish).

Because these fish tend to be located lower in watersheds that have already undergone upstream water development, it is imperative that fishery managers work with water managers to continue to implement the actions articulated in the Three Species Agreement. In the Gunnison, flow protection provided by downstream senior water rights (e.g., the Redlands Water and Power Company water rights) become an important means of maintaining the native fishery.

Summary of Needs

Ideal solutions to address environmental and recreational needs in the focus segments and beyond would address flow and water quality issues while preserving existing agricultural uses. Projects to meet the flow and water quality needs could include:

- Diversion infrastructure improvements that increase accuracy and reduce maintenance costs while preserving stream connectivity
- Temporary and voluntary instream flow leasing arrangements that sustain flows during critical drought periods
- Voluntary partial instream flow donations that maintain historical irrigation practices on a more limited basis
- Multipurpose storage projects that include operational flow agreements and/or dedicated environmental and recreational flow components

In addition to the segments defined above, the GBRT recognizes the need to monitor and/or manage other important river segments to ensure they do not deteriorate. In some cases, CWCB instream flows could potentially be secured for high value segments with native fish populations or native fish restoration possibilities. In other cases, currently degraded streams that are not currently identified as a priority could be good candidates for multi-purpose projects.

The Taylor River was included as one of the environmental and recreational focus segments. There is also an effort currently underway to examine biological flow needs on the Taylor River below Taylor Park. The GBRT recognizes the need to monitor this ongoing effort.

In addition, the GBRT recognizes the need to continue to support the following on-going projects and processes by State and Federal agencies that address water quality and watershed health needs in the Gunnison Basin:

1. CDPHE's implementation of further Monitoring and Evaluation (M&E) of specific water quality parameters for 22 water body segments identified by CDPHE.
2. CDPHE's development of Total Maximum Daily Load (TMDL) strategies for specified pollutants within water body segments identified by CDPHE, including point source projects and scheduled improvements to help water quality issues.
3. CSFS and USFS addressing forest health projects related to forest management; forest insects, diseases, and disorders; and wildfire mitigation and education

Where to find more information:

- The Colorado Drought Mitigation and Response Plan, CWCB, 2013. Web Link
- Statewide Water Quality Management Plan, CDPHE, 2011. Web Link
- Integrated Water Quality Monitoring and Assessment Report, CDPHE, 2012. Web Link
- Total Maximum Daily Load Assessment Gunnison River and Tributaries: Uncompahgre River and Tributaries: Delta/Mesa/Montrose Counties, CDPHE, 2011. Web Link
- 2013 Report on the Health of Colorado's Forests, Colorado State Forest Service, 2013. Web Link

Section 3: Basin Evaluations

3.1 Introduction

There are many tools available to help assess opportunities and constraints to meeting the water needs of the Gunnison River basin. The primary tool used to evaluate hydrologic opportunities and constraints is the Gunnison River basin Water Resources Allocation Model, developed by CWCB. Case studies, primarily using this model, were used as tools to investigate basin-wide issues and opportunities with specific projects. In addition, mapping overlays were a useful tool to highlight options for multi-use projects and identify projects that may be competing for the available water.

In this section, case studies are presented to illustrate examples of how available tools can be used to identify opportunities and projects, and to investigate constraints basin-wide and at specific locations. The types of tools and analyses presented in this section support the project specific analyses summarized in Section 4.

3.2 Gunnison River basin Water Resources Allocation Model

The Gunnison River basin Water Resources Planning Model (Gunnison Model) is a water allocation model developed as part of the CDSS process. It is designed to assess the availability of water to individual users and projects, based on hydrology, water rights, and operating rules and practices. The model is implemented in StateMod, a code developed by the State of Colorado for application in the CDSS project. The Gunnison Model Baseline data set extends from 1909 to 2006. It simulates current demands, current infrastructure, and the current administrative environment as though they had been in place throughout the hydrologic modeled period.

The Gunnison Model was developed as a tool to test the impacts of proposed diversions, reservoirs, water rights and/or changes in operations and management strategies. The model simulates proposed changes based on the highly variable hydrology of the historic data set as constrained by the administration of existing water rights. The Baseline data serves as the starting point for analyzing potential future changes in the Basin. Model variations can include changes in current demands, new or enlarged storage projects, changes in current irrigation practices, changes to water rights or operating criteria, and changes in hydrology. The model changes can then be compared to the Baseline simulation results to determine their performance and effects.

The Gunnison Model was used for the Colorado River Water Availability Study (CRWAS) to examine future hydrologic variability under different scenarios. The study included a range of natural flow

hydrology reflecting current estimates of projected climate change. As part of the CRWAS, information generated by the baseline Gunnison Model under both historical and climate projected hydrology was made available through the CRWAS report and CRWAS model data sets. Over 20 parameters are available at modeled locations including natural flow (streamflow absent the effects of man), physical streamflow, and flow that would be legally available for diversion under a new water right (physical streamflow not required to meet downstream senior water-right demands). There are over 500 node locations representing diversions, reservoirs, stream gages, and instream flow reaches.

The Gunnison Model was used directly to identify flow-based issues and make preliminary estimates of water available for projects in the GBIP. The model was then revised to include new projects (e.g., to investigate the yield of a proposed reservoir), have the ability to assess the impacts of changes to irrigation efficiencies, and determine how changed reservoir operations could improve streamflows through critical reaches.

Note, the current Gunnison Model has not been updated since the ROD for the Aspinall Unit Operations Final Environmental Impact Statement was signed in April 2012. The model continues to operate based on previous BOR operating criteria prior to the changes associated with the ROD. Therefore, the amount of water available for future development shown in the Appendix 9 graphs likely overstates future availability to uses above the Aspinall Unit reservoirs not covered under the Aspinall Subordination Agreement, especially in a high runoff year as was have seen in 2014. Furthermore, the uses not covered under the Subordination Agreement include any transfers out of the Gunnison River basin.

Similarly, the Gunnison Model represents existing uses throughout the Basin. When new in-basin uses above the Aspinall Unit reservoirs are considered in planning efforts, they are incorporated based on the terms of the Aspinall Subordination Agreement. New in-basin uses are modeled senior in priority to Aspinall Unit storage and hydropower demands to represent the agreed subordination. As indicated in the agreement, only future in-basin uses are provided this protection. Planning scenarios that include transbasin diversions are modeled based on a current priority and are junior to other uses in the Basin.

The CWCB has funding to both extend the Gunnison Model through 2013, and to incorporate changes to basin operations and administration associated with the ROD. CWCB has committed to work with Reclamation, the Division of Water Resources, and basin representatives during the model update.

Where to find more information:

- The Gunnison River basin Water Resources Planning Model User's Manual (rev. 2009) report and the StateMod Surface Water Allocation Model for the Gunnison Basin can be found on the CDSS website (http://cdss.state.co.us)
- The Colorado River Water Availability Study report (March 2012) is available on the CWCB website (http://cwcb.state.co.us/)

3.3 Case Studies

Case Study: Water Availability Analysis (Historical Hydrology)

As noted above, the Gunnison Model data can be used to identify both physical streamflow and water available for potential development at over 500 locations in the Basin under varying hydrologic conditions. The model results are especially useful on tributaries and reaches that do not have long-term stream gage measurements. Physical streamflow and water available for potential development at 10 key locations, based on identified needs, project, and methods, are shown graphically in Appendix 9 based on the historical hydrologic variability from 1975 through 2005.

The Gunnison River above Blue Mesa Reservoir was selected to represent general water availability in the Upper Basin. Other locations were selected to represent nodes higher up in tributaries above existing agricultural shortages to better show water available to meet these needs. This analysis is a departure from previous SWSI availability analyses that examined water availability near the confluence of major tributaries. The SWSI approach often did not reflect realistic amounts available to meet identified needs higher up in the system. Locations for this analysis included:

- East River near Crested Butte
- Ohio Creek at Baldwin
- Tomichi Creek at Sargents
- Lake Fork at Gateview
- Cimarron River below Cimarron Canal
- Smith Fork near Crawford
- West Muddy Creek below Overland Ditch
- Surface Creek near Cedaredge
- Uncompahgre River near Ridgway
- Gunnison River at Colorado Confluence

The following analysis for the Gunnison above Blue Mesa Reservoir provides an explanation of the difference in physical and available flow intended to assist in understanding the graphs in Appendix 9. Figure 7, extracted directly from model results, shows physical streamflow and legally available flow on the Gunnison River near Gunnison from the period 1975 through 2005. Figure 8 shows average monthly results for the same time period.

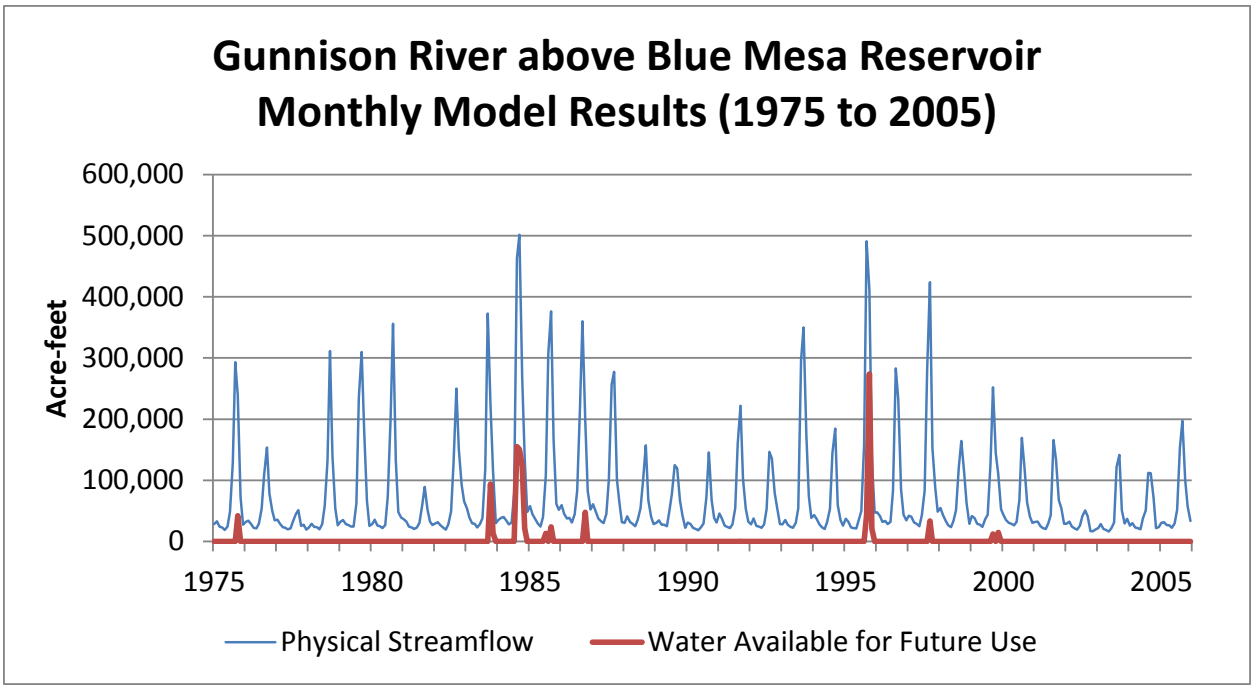


Figure 7. Physical Streamflow and Water Available – Gunnison River above Blue Mesa Reservoir

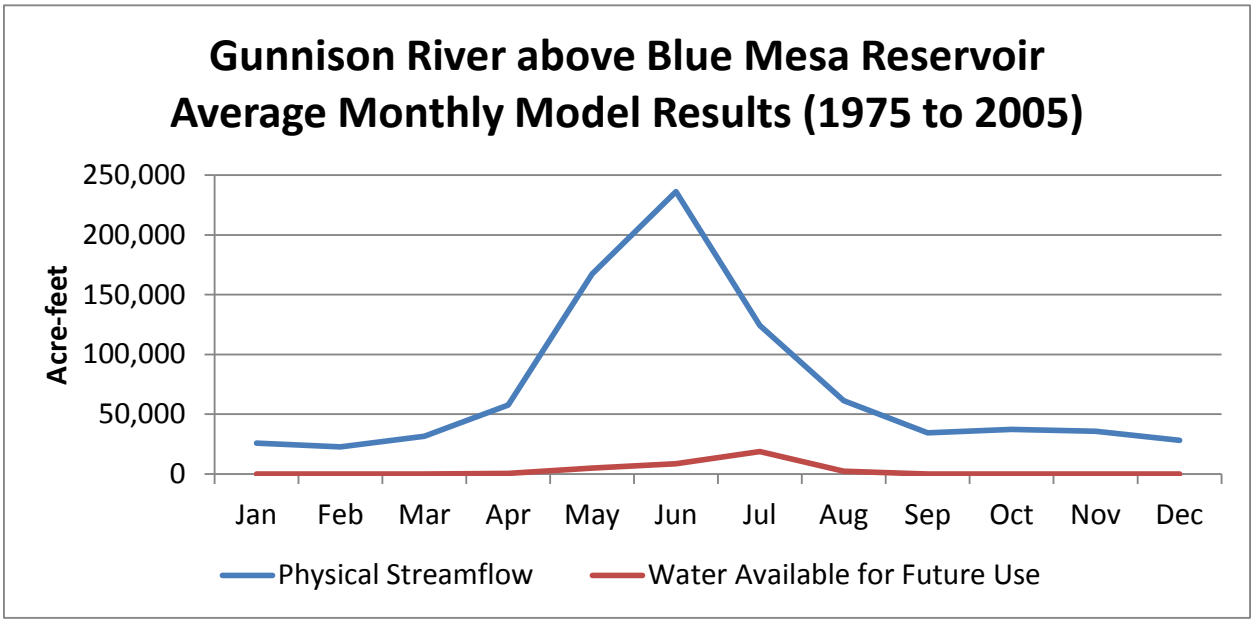


Figure 8. Physical Streamflow and Water Available – Gunnison River above Blue Mesa Reservoir

The differences between physical streamflow and the amount of water that is available for future use reflects water that must be bypassed to meet downstream uses holding valid water rights, including the following significant uses:

- Gunnison Tunnel demand for Uncompahgre Valley Water Users Association
- Redlands Irrigation and Power demands

- Storage in Blue Mesa, Crystal, and Morrow Point Reservoirs
- Blue Mesa, Crystal, and Morrow Point Reservoirs hydropower rights
- National Park Service Black Canyon of the Gunnison minimum streamflow requirements

Based on the hydrology of the last 30 years, the model results indicate the average annual amount of water available for future use above Blue Mesa Reservoir is minimal. Small amounts of water are essentially available only one in 13 years.

The amount of physical streamflow and available flow for future use based on recent hydrology varies from location to location throughout the Basin. The graphs shown in Appendix 9 include observations for each location, providing an understanding of where and when water is available to meet the agricultural, M&I, and non-consumptive needs outline in Section 2.

Figure 9 shows the monthly modeled flow that leaves the Gunnison Basin and flows in the Colorado River near Grand Junction. The flow shown reflects depletions from current basin uses superimposed on the past 30 years of historical hydrology. The Gunnison River contributes to approximately 40% of the flow of the Colorado River at the state line gage based on the 1975 through 2005 period.

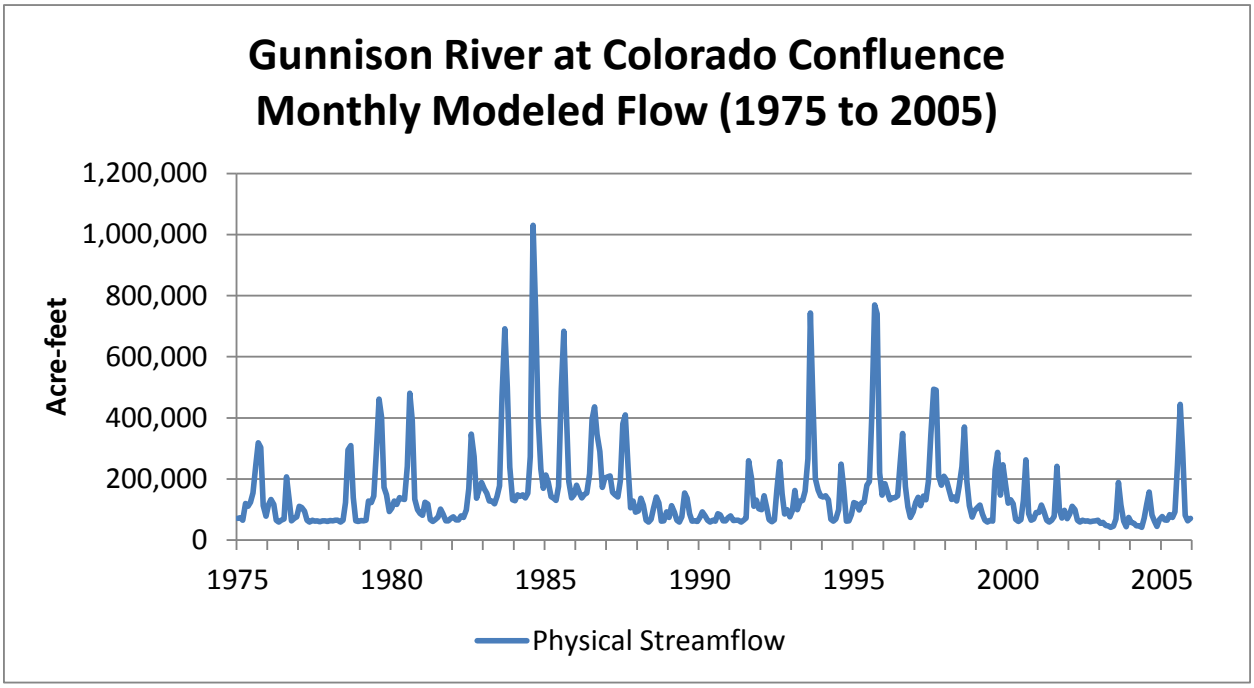


Figure 9. Physical Streamflow – Gunnison River at Colorado River Confluence

Case Study: Water Availability Analysis (CRWAS Projected Climate Hydrology)

The historical period between 1975 and 2005 provided a wide range of streamflows including significant wet and dry periods, but may not represent the future flow regime in the Gunnison River basin. To investigate possible future flows, the CRWAS used global climate models to represent the range of temperature, precipitation, and natural flow projections based on two future horizons – 2040 and 2070.

The projected changes to irrigation demands and natural flows, both influenced by changes in temperature and precipitation, where incorporated in the Gunnison Model. When the CRWAS was developed, there were 112 global climate model projections available for the Colorado River Basin; CRWAS investigated five models for each future horizon that represented 80 percent of the range shown in the 112 projections.

The 2040 horizon was chosen for this case study to consider both the supply and demand effects of projected future climate change in the Gunnison as-if the projected 2040 temperature increases and changes in precipitation had occurred prior to 1975; and then the Basin experienced the same natural climate variability as seen in the 1975 through 2005 historical record. Graphs presenting water available for future development under the two climate projections that bracket the low flow and high flow projections for 2040 are shown in Appendix 10 at the same locations selected to investigate historical flows. Historical water available for future use based on the 1975 through 2005 period is also shown on each graph for comparison.

The following analysis for the East River near Crested Butte provides an explanation of the difference in available flow intended to assist in understanding the graphs in Appendix 10. Extracted directly from CRWAS climate projected model results, Figure 10 (monthly timeline) and Figure 11 (average monthly) shows legally available flow on the East River near Crested Butte for the 2040 High Projection, the 2040 Low Projection, and historical for comparison. The High Projection is the global climate model that represents the 90th percentile flows in the Basin; whereas the Low Projection is based on the global climate model that represents the 10th percentile flows in the Basin.

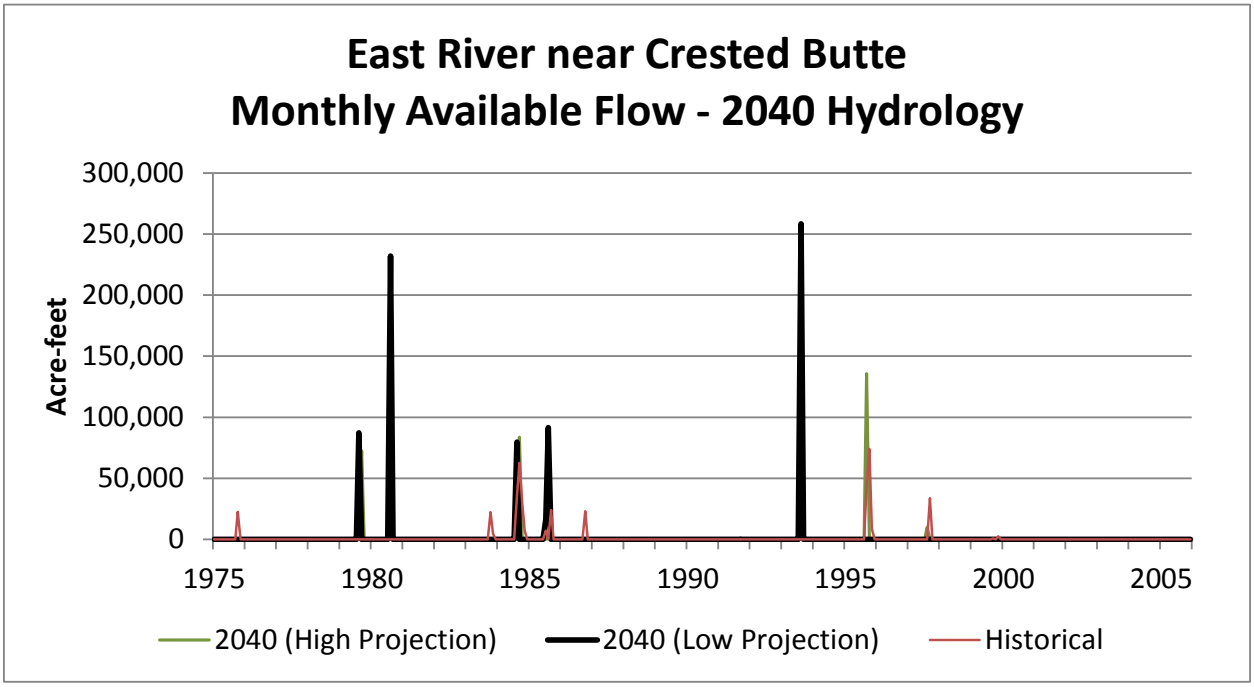


Figure 10. Climate Projected Water Available – East River near Crested Butte

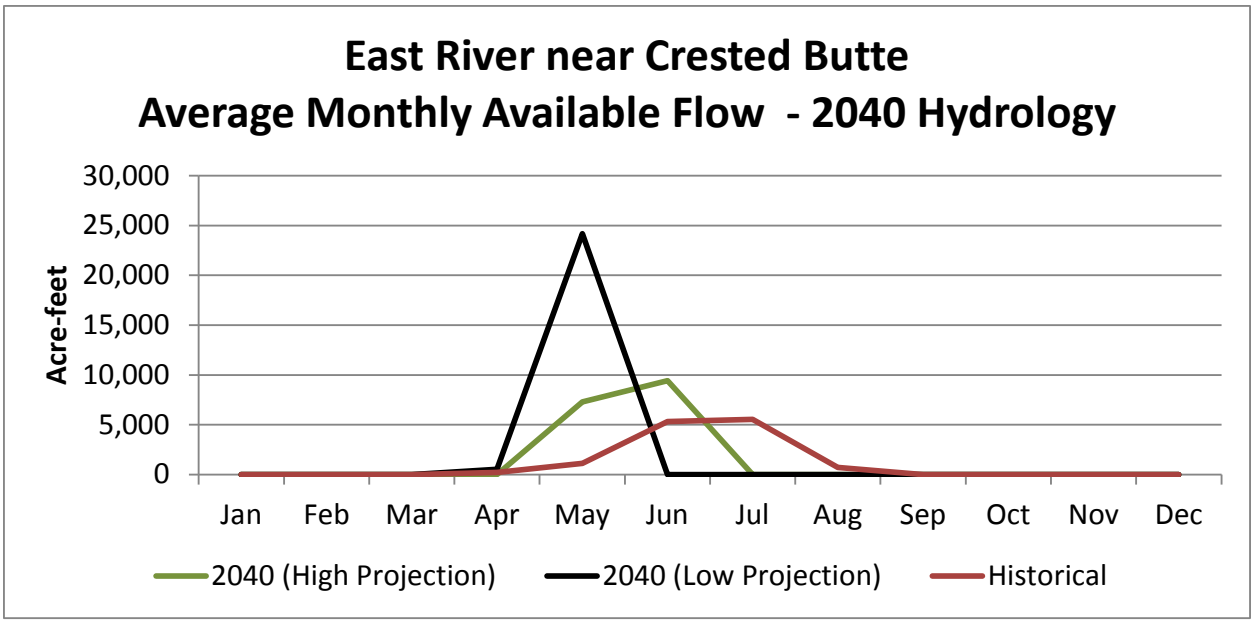


Figure 11. Climate Projected Water Available – East River near Crested Butte

The differences between physical streamflow and the amount of water that is available for future use reflects water that must be bypassed to meet downstream uses holding valid water rights, including the following significant uses:

- The Low Projection indicates that on average the runoff on East River would occur earlier and more flow compared to historically would only be available for future use in May
- The High Projection results in more average annual available flow than historically, and also shows more water available earlier than historically
- The climate projections generally follow the same annual patterns as historically; however there are less years when water would be available for future use after meeting the downstream senior uses

The amount of physical streamflow and available flow for future use based on future climate projections varies from location to location throughout the Basin. The graphs shown in Appendix 10 include observations for each location, providing an understanding of how projected climate change may affect both where and when water would be available to meet the agricultural, M&I, and non-consumptive needs outline in Section 2.

Case Study: Upper Basin Irrigation Decrees

Due to a number of natural factors, irrigation diversions in the Upper Gunnison Basin are higher than most other regions in Colorado. Although the acre-feet per acre diversions may seem high compared to uses in other areas of Colorado, the need for larger diversions in this region has been well documented in water court decrees from Division 4 in both Water District 28 (Tomichi Creek) and Water District 59 (East River and Slate River). The requirement for higher head gate diversions does not necessarily result

in higher consumptive use or wasting water, as the unused portion seeps back to the river and is re-diverted downstream. Even though the decrees allow for higher acre-feet per acre diversions, these tributaries in the Upper Gunnison are still water-short.

In the East River basin, decree CA2021 includes two exhibit documents that reference a water use ratio of one cfs per ten acres and ten cfs per 100 acres. The following are excerpts from the decree's documented testimony regarding the nature of the land and resulting water required: "Scattered tracts, thin sandy top soil, sand, stone, cobblerock. Requires 10 cu. Ft. per 100 acre" and "Very rocky, porous, soil, light, underlain with rock and gravel. Requires 1 cu. Ft to 10 acres." Web Link

In the Tomichi Creek basin, decree CA2079 contains approximately 18 exhibit documents referencing a required water use ratio of one cfs per ten acres. The decree's documented testimony states "Sandy Loam, porous, water sinks rapidly requires 1 cu. Ft to 10 acres". In addition, some of the decree's report/exhibits state that they require the whole capacity of the ditch to irrigate, while others indicate that they require more than one cfs per ten acres to meet irrigation requirements. Web Link

Case Study: Multipurpose Win-Win Projects

To illustrate the kinds of mutually beneficial multipurpose projects encouraged by the GBIP and CWCB three successful projects in the Basin are highlighted below. These projects may provide inspiration for future efforts and serve to address the GBIP Goal 7—describe and encourage the beneficial relationship between agricultural and environmental and recreational water uses.

Hartland Diversion Dam Reconstruction with Boat and Fish Passage:

Bringing together multiple partners, including the GBRT, this project west of Delta eliminated the last major fish blockage issue for an important 15-mile reach in the Lower Gunnison River drainage. The removal of this 6 foot high fish migration barrier significantly improved the health of the river by reconnecting fragmented river habitat for the direct benefit of three fish species of special concern as well as other native species. At the same time, this project helped to ensure that the Hartland Irrigation Company can reliably maintain complete access to their senior pre-Colorado River Compact water rights with minimal operations and maintenance costs. In addition, the project greatly improves human safety at a structure that has been responsible for multiple fatalities, while eliminating boater trespassing issues on private property.

Relief Ditch Headgate Reconstruction with Recreational Improvements:

Sponsored by Trout Unlimited with GBRT funding, this project installed a new sustainable diversion structure for the Relief Ditch while removing hazardous instream infrastructure, minimizing bank erosion, and improving fish passage and the measurement and control of diverted water. The project involved the rehabilitation and stabilization of eroded areas, along with the restoration of riparian habitat through the reduction of downstream sedimentation. In addition, the new structure allows for safe boater and fish passage, and significantly reduced costs for the Relief Ditch Company by eliminating the need for annual bulldozing of the channel bed.

McKinley Ditch/Little Cimarron River Flow Restoration Project:

The McKinley Ditch/Little Cimarron River Flow Restoration Project provides flow and ecological benefits to the Little Cimarron River while keeping agricultural lands in production. The Colorado Water Trust (CWT) purchased 1.5 shares in the McKinley Ditch in January 2014. Diverting from the Little Cimarron River approximately 20 miles east of Montrose in the Gunnison Basin, the ditch shares provided the opportunity for a multipurpose project to provide flows through a 5-mile segment of a frequently dry stream, helping to reconnect habitat and enable fish migration. The CWT plans to use the shares for instream flow in the late summer and early fall, while maintaining historic irrigation in the spring and early summer. The CWT has obtained approval to use the shares for instream flows via the CWCB's Short Term Lease Program and is currently seeking water court approval for the new instream flow use.

Case Study: Instream Flow Analysis

To demonstrate important in-basin needs related to existing instream flow water rights, this case study examines how well existing CWCB instream flows are being met at 12 locations throughout the Basin. Locations were selected where reaches are represented in the Gunnison Model, but there are no nearby stream gages for CWCB to use for verification or DWR to use for administration. Because there are no nearby measurement gages, the modeled data is believed to be the best information available for the actual flows seen in the river.

The analysis provides a comparison of the instream flow water rights to natural flow and modeled stream flow under average (1975-2005) and dry year conditions (1977 and 2002). Natural flow is estimated flow without the effects of man; for example prior to depletions for irrigation or storage and releases from reservoirs. The instream flow locations for this analysis included:

- Slate River Segment 4 – Slate River near Crested Butte Gage to East River
- Cement Creek – Headwaters to East River
- Ohio Creek Segment 2 – Below Pass Creek Ditch to Mill Creek
- Ohio Creek Segment 3 – Mill Creek to Gunnison River
- Tomichi Creek Segment 1 – Headwaters to Marshall Creek
- Tomichi Creek Segment 2 – Marshall Creek to Quartz Creek
- Quartz Creek Segment 2 – Below Metroz No 1 Ditch to Tomichi Creek

- Cebolla Creek – Cebolla Creek at Powderhorn Gage to Gunnison River
- Cimarron River – Below Silverjack Reservoir to below Veo Ditch
- North Fork Gunnison River – Below Paonia Reservoir to Minnesota Creek
- Beaver Creek – Headwaters to East Fork Dallas Creek
- West Fork Dallas Creek – Headwaters to Burkhart Eddy Ditch

Natural flow shown is at the upper end of each reach and represents the minimum natural flow through the reach. Likewise, modeled streamflow presented is the minimum within the reach. In some cases, this may be the flow at the upper end of the reach but more often is the flow below diversions within the reach.

The following analysis for the Ohio Creek Segment 3 provides an explanation of the information intended to assist in understanding the graphs in Appendix 11. Extracted directly from Gunnison Model results, Figure 12 (1975-2005) and Figure 13 (1977 and 2002) shows natural flow and modeled streamflow compared to the instream flow right.

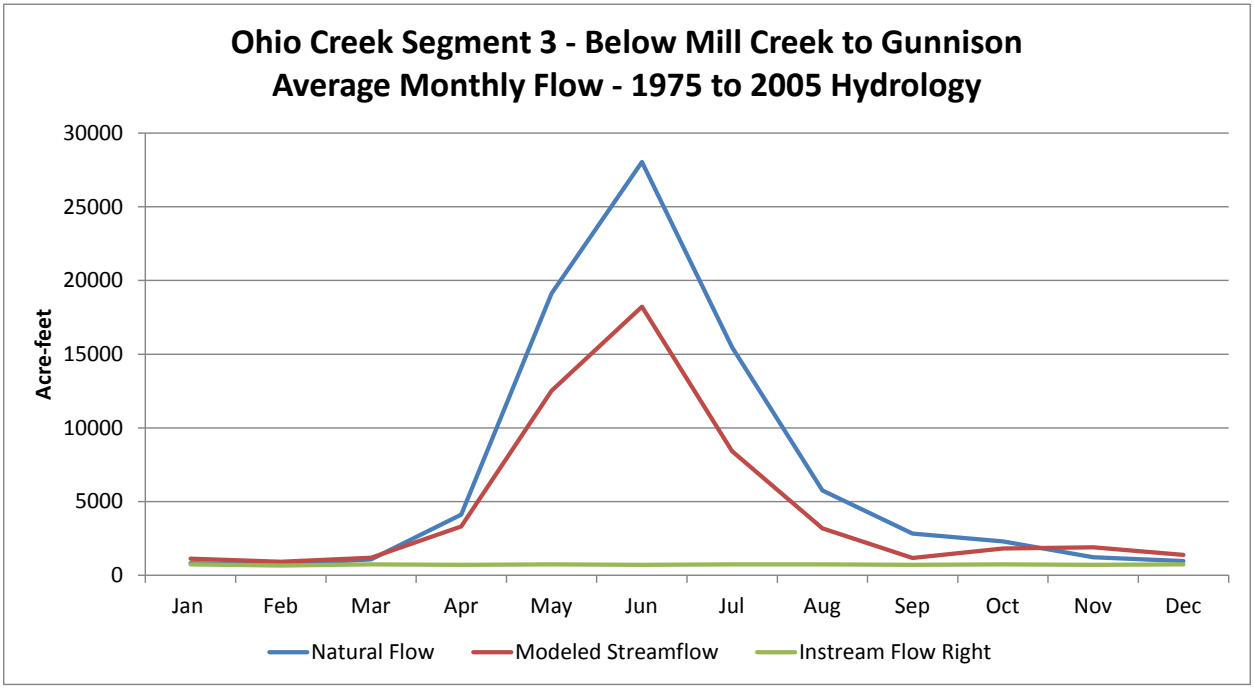


Figure 12. Streamflow (1975-2005) – Ohio Creek Segment 3 (Below Mill Creek to Gunnison)

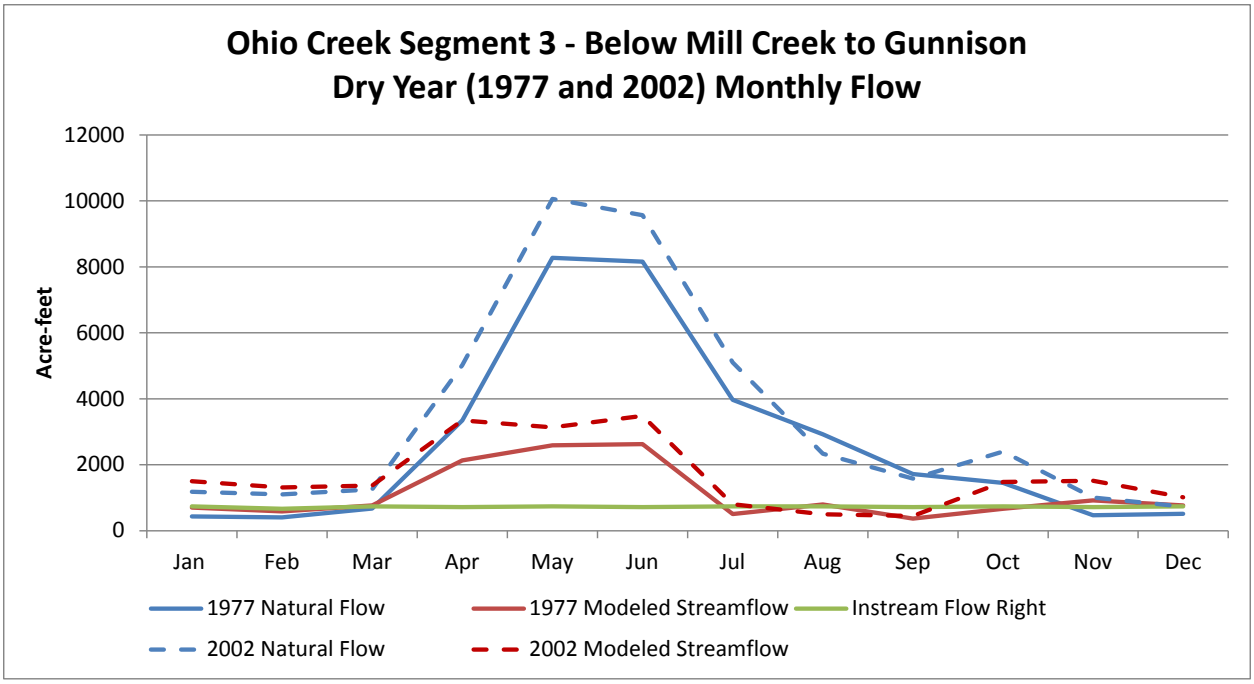


Figure 13. Streamflow (1977 and 2002) – Ohio Creek Segment 3 (Below Mill Creek to Gunnison)

When the modeled streamflow is less than the instream flow right, the instream flow right is not fully met likely due to upstream senior uses. When the natural flow is less than the instream flow right, the instream flow right is not fully met due only to hydrologic conditions. In those instances, only a new or re-operated upstream reservoir would allow the instream flow right to be fully satisfied. Nearly all of the instream flow reaches presented have physical flow availability during some months that could be stored and released to meet shorted instream flows as part of a multi-use storage project.

The Ohio Creek Segment 3 instream flow right analysis shows the following:

- The average natural flow is greater than the instream flow right in every month
- On average, there is enough physical flow in the river to meet the instream flow right every month
- Natural flow in 1977, representing a very dry year, was less than the instream flow right in the winter months (November through February)
- Senior irrigation diversions reduced river flows below the instream flow right in late irrigation season during the very dry years

Shortages to instream flow rights generally follow the pattern of the more senior irrigation rights. Because the analyses performed by the CWCB to determine the instream flow right requests consider and are limited to the flow available in most years, instream flow rights in the Gunnison Basin can generally be met each year during average and wet years. The hydrology of the Basin does not allow instream flows to be met every month of every year and similar to agricultural demands, they are generally shorted in the late season during dry years. In addition, instream flow rights often experience shortages in winter months during dry years.

3.4 Mapping Overlays

A consistent methodology was used to review potential projects for this plan. The first step involved assembling and overlaying all available data from the SWSI 2010 process. Data included environmental and recreational needs, environmental and recreational projects, and consumptive projects throughout the Basin. Data for agricultural shortages was refined and presented as described in Section 2. Project data was screened to include only planned and proposed projects (i.e., exclude ongoing or completed projects) and highlight flow-based environmental and recreational projects to better identify potential candidates for more detailed flow modeling analysis.

Including consumptive and non-consumptive needs and projects on the same overlay provided the ability to better analyze potential opportunities for multi-purpose projects, plus helped convey the concept that consumptive use projects have the potential to benefit flow-based environmental and recreational projects. Finally, more detailed maps were prepared for each existing project summarizing available information and data gaps. Feedback from the targeted technical outreach process was used to refine the project list and select projects that can benefit from more detailed flow analyses as described in Section 4.

Section 4: Basin Projects

4.1 Introduction

Section 4 is the primary focus of the GBIP, designed as a plan summarizing proposed projects that will meet Basin Goals and Measurable Objectives described in Section 1. Projects are strategically selected to meet identified needs in the Basin.

These projects have been identified and selected in light of the scenario planning and adaptive management processes outlined in Chapter 6.1 of the Draft Colorado Water Plan. The initial phase of the adaptive management process is a strategic focus on a portfolio of 'no and low regrets' actions and strategies that can be implemented in the near-term. By definition, these projects make sense to undertake despite future variability related to climate change, population growth, or other factors. This 'No/Low Regrets Portfolio' of planning processes has the following goals:

- Minimize statewide agricultural acres transferred and implement agricultural sharing projects
- Plan and preserve options for existing and new supply
- Establish low to medium conservation strategies
- Implement nonconsumptive projects
- Have a high success rate for identified projects and processes
- Implement storage and other infrastructure
- Implement reuse strategies

The No/Low Regrets Portfolio is quite consistent with GBIP projects, which have been "tiered" in three groups:

- **Tier 1** – Implementation of these projects is likely feasible by 2025; the projects are consistent with the near-term No/Low Regrets Portfolio; and clearly meets Basin Goals.
- **Tier 2** – Implementation of these projects is probably not feasible by 2025; however the projects would excel at meeting Basin Goals, and most of them are consistent with the near-term No/Low Regrets Portfolio. These projects may also have important conditional water rights, and/or some feasibility-level planning has been completed.
- **Tier 3** – Implementation of these projects is not feasible by 2025, and they are not analyzed in the context of the near-term No/Low Regrets Portfolio; the projects are in more preliminary stages of planning and/or may meet Basin Goals to a lesser degree.

Project information was collected through targeted technical outreach. Base project data from SWSI 2010 was refined through outreach to stakeholders and project proponents. The agricultural shortage analysis detailed in Section 2 was the background for technical outreach to agricultural stakeholders.

This analysis was used to inform the selection of agricultural projects that most effectively address shortages and meet Basin Goals identified in Section 1. M&I as well as environmental and recreational needs detailed in Section 2 were also used to inform the selection of projects that meet the goals identified in Section 1.

For simplicity, all items identified to meet water needs are referred to as projects. Projects include both structural solutions such as reservoirs and irrigation ditches, and nonstructural solutions including conservation planning, flow agreements, and other processes or policies.

Section 4.5 provides a list of proposed basin projects; Section 4.6 provides a standard project template used to summarize proposed projects; Section 4.7 provides a compilation of standard project summaries for proposed projects. Project summaries in Section 4.7 include projects addressing various use types as indicated on the list and each summary sheet. Use types include::

- Agricultural Projects
- Municipal and Industrial Projects
- Environmental and Recreational Projects
- Multi-Purpose Projects

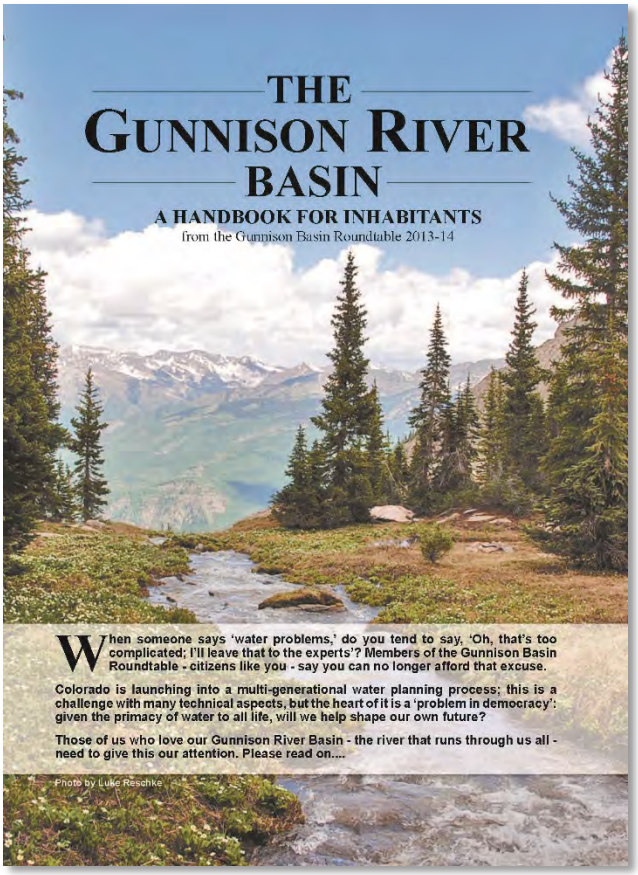
In addition, to note important successes, ongoing and recently completed projects are documented in Section 4.5. This includes a list of important environmental/recreational protections and monitoring as well as projects funded through the Roundtable (Water Supply Reserve Account) and other major grant programs in the Basin.

More background on issues related to projects focusing on: education, participation, and outreach; watershed health; and conservation projects and methods is detailed in Sections 4.2, 4.3, and 4.4. However, concrete projects related to these items are included in Section 4.5 and 4.7.

4.2 Education, Participation, and Outreach

The GBIP process continues the public education, participation, and outreach work that the GBRT has been engaged with for almost ten years. These activities include:

- Annual State of the River meetings co-hosted with the River District.
- Numerous roundtable meetings in Montrose, Gunnison, and Hotchkiss. Meetings are typically held monthly except for January, July, and September.
- The preparation and distribution of a booklet titled: *The Gunnison River basin, A Handbook for Residents* (shown to the right). This widely distributed handbook includes a compendium of basic information about water use, water law, and water organizations in the Basin.



In addition to monthly GBRT roundtable meetings, GBRT members have created information-and-input opportunities throughout the Basin as part of the BIP process. These meetings included both targeted technical outreach meetings with specific groups of stakeholders (farmers and ranchers, municipal and industrial providers, recreation interests, environmental interests, etc.) to identify specific water needs and projects, and meetings with the general public to obtain responses to the goals, needs assessments, and proposed projects. Outreach activities included town hall meetings in different sub-basins, as well as newspaper articles and online surveys available at multiple websites (summarized in Appendix 4). The GBRT's ongoing outreach and education efforts will be critical throughout the development of the CWP.

In 2013 and 2014, the Public Education, Participation, and Outreach (PEPO) Workgroup of the IBCC and the Basin Roundtable Education Liaisons worked with their basins to develop and implement updated Education Action Plans (EAPs) to reach out to decision makers. Goals of the activities outlined in the EAPs are being used to inform decision makers in the Basin how they are currently represented by the Roundtable process and how they can effectively participate. Furthermore, EAP activities are being used to inform stakeholders about key elements of the BIPs, including status of Basin water operations, Basin consumptive and nonconsumptive needs, potential water supply constraints associated with variable hydrology, and proposed projects.

The draft 2015 EAP is also focused on engaging non-Roundtable stakeholders to contribute input and feedback on these key BIP elements. Where appropriate, this effort is helping the GBRT reach out to potential new project proponents and partnerships needed to meet the Basin's future water needs. A detailed draft of the 2015 EAP is provided in Appendix 3. Note, the GBIP is not intended to answer or address all public comments, rather it is intended to help provide context for basin stakeholder participation and input as the GBIP project implementation process matures.

Due to limited resources, the successful continuation of education and outreach activities will require careful coordination with existing organizations, programs, and resources. To help address the water needs detailed in this plan the draft 2015 EAP encourages the near term implementation of various education and outreach concepts and activities by 2025, including such things as:

- *Education for the Next Generations:* Given the long term nature of water planning and the age of many currently involved in the process the GBRT recommends encouraging the involvement and recruitment of younger members. Future water leaders will need a comprehensive orientation in balancing the multiple uses of water in a complex modern society. This could be partially accomplished by creating vertically integrated school water education programs (e.g. 5^{th}, 8^{th} and 11^{th} grades).
- *Water Leaders Program:* A new program in the basin could engage interested high school and college students in a diverse water curriculum and related activities. This experience could be enhanced by the inclusion of a mentoring component with local water professionals.
- *Continuing Education for Colorado's Political and Economic Leaders:* Working with other water organizations, the GBRT can help to provide leadership, information exchange, education opportunities, and materials to help educate political officials, planning commissions, developers, contractors, and others engaged in land use designation and development.
- *Bootstrap Research and Education* – A diverse collection of studies, research, and experimentation can help to educate all types of water users on water challenges and opportunities. This can begin with the implementation of the ten tier one projects in this plan that involve studies of future needs (both irrigation and nonconsumptive). In addition, a regional water conservation planning process for the Upper Gunnison is also included as a tier one project and would help to educate various water users on conservation opportunities. New studies that explore potential agricultural conservation without reducing agricultural productivity could also help to educate water users while addressing supply limitations. Current studies in the basin, such as the Water Bank and NoChicoBrush studies, are beginning to explore opportunities provided by fallowing, deficit irrigation, and other strategies.
- *Research and Public Education on Anticipating, Mitigating and/or Adapting to Climate Changes:* Research and education on the water supply impacts of climate change will help communities in the basin adjust to variable hydrologic conditions such as decreasing flows. Education could be targeted to strategically examine options that protect existing uses and help mitigate adverse economic impacts.

Appendices 3 and 4 summarize outreach and education materials related to the GBIP, including: the 2015 GBRT Education Action Plan, summary and record of public meetings, letters of critique, letters of support, GBIP Input Survey, Summary of Survey Results, and other summary information. In addition, Appendix 4 also includes a list of public comments on the Draft Colorado Water Plan received at the Senate Bill 115 hearing in Gunnison on June 18, 2014. Overall input to date shows strong support for the GBIP Basin Goals and Statewide Principles outlined in Section 1.

The project list detailed in Section 4.5 and 4.7 includes the Gunnison Basin Roundtable 2015 Education Action Plan Activities.

4.3 Watershed Health

Chapter 7.1 of the Draft Colorado Water Plan states that: "watershed health can be broadly defined as a measure of ecosystem structure and function." As such, watershed health is a comprehensive view of water planning that incorporates water quality, land use, water availability, and numerous other factors. This section seeks to summarize some of the primary issues related to watershed health and set the stage for various projects (multipurpose, environmental, and recreational) encouraged by the GBIP that will help to maintain and restore watershed health in the basin.

The Gunnison Basin has high water quality in numerous headwater streams, many of which have been designated as outstanding waters by the Water Quality Control Commission (WQCC). These headwater streams have maintained their high quality in harmony with traditional grazing practices. However, many stream segments are impaired by heavy metal pollution from historical hard-rock mining, the mobilization of selenium in soil through irrigation practices, and nutrient (nitrogen and phosphorus) loading primarily from non-point sources with the influence of some municipal effluent. Stakeholders in the Gunnison Basin have been active both in recognizing and supporting appropriate outstanding waters designations, and working with the state to provide data and input on the state's development of its 303(d) list of impaired waters.

Existing Organizations and Actions Promoting Watershed Health

Several local watershed groups work in the Gunnison Basin to address general watershed health and specific water quality challenges. These include the Coal Creek Watershed Coalition, the Lake Fork Valley Conservancy, the Uncompahgre Watershed Partnership, and the Western Slope Conservation Center. These organizations have developed comprehensive watershed plans and accessed state and federal funding to undertake restoration projects, monitoring efforts, and outreach. Links to these organization's websites and watershed plans are provided in Appendix 2. One national organization, Trout Unlimited, has also been engaged in several local watershed-level stream restoration and flow improvement projects.

In addition to local watershed organizations, the Gunnison Basin Selenium Task Force is implementing their Selenium Watershed Management Plan. This group of private, local, state, and federal interests

continues to successfully identify and remediate selenium loading through a number of funding sources. The GBIP seeks to maintain and improve water quality by encouraging the coordination of data collection, promoting collaboration amongst stakeholders, and integrating water quality considerations into consumptive and environmental/recreational project development.

There are also a number of environmental advocacy organizations that are involved in the maintenance and improvement of Gunnison Basin watershed health, usually with a more regional focus: High Country Conservation Advocates, Western Colorado Congress, and statewide organizations that often focus on issues in Western Colorado and the Gunnison Basin, including Conservation Colorado, Western Resource Advocates, American Rivers, and Protect the Flows. These organizations tend to work more in the legislative and regulatory arenas, but also participate in local watershed efforts.

Water Quality

A number of organizations are tasked with monitoring and managing water quality and watershed issues in the Gunnison River basin, from the Federal and State level to the watershed level, such as USGS, Colorado River Watch, and the Colorado Department of Public Health and Environment (CDPHE). CDPHE includes two State organizations tasked with managing state water quality issues: The WQCC develops State water quality policies; and the Water Quality Control Division (WQCD) helps protect and restore water quality for public health and the environment. Between 2011 and 2012, the WQCD developed a number of reports aimed at assessing water quality that included the Gunnison River basin. The information that follows draws largely from one of those reports, the 2011 Statewide Water Quality Management Plan. Appendix 1 includes several other references that focus on water quality and watershed issues.

The WQCC has classified uses (i.e., Agriculture, Water Supply, Recreation, and Aquatic Life) and special water body designations (i.e., Outstanding Waters [OW] or Use Protected [UP]) for the Gunnison River basin in *Regulation No. 35: Classifications and Numeric Standards for the Gunnison and Lower Dolores River Basins*. The WQCC has also classified water quality impairments related to specific parameters in *Regulation No. 93: Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List*. Table 17 summarizes stream water quality designations and impairments in the Gunnison River basin by sub-basin.

Table 17. Water Quality Designations and Impairments

	Upper Gunnison Sub-Basin[1]		Lower Gunnison Sub-Basin[1]	
	# Stream Segments	# Stream Miles	# Stream Segments	# Stream Miles
Outstanding Waters	3	400.50	3	209.24
Use Protected	1	1.71	15	2,073.15
Impaired[2]	8	66.70	14	1,922.39

[1] For water quality planning purposes, CDPHE subdivides the Gunnison River basin into the Upper Gunnison Sub-Basin (headwaters to Blue Mesa Reservoir inlet) and Lower Gunnison Sub-Basin (Blue Mesa Reservoir inlet to the confluence with the Colorado River).

[2] Upper Gunnison Sub-Basin impairments include zinc, cadmium, copper, lead, pH, and manganese primarily from mining and other upstream sources. Lower Gunnison Sub-Basin impairments include selenium primarily from Mancos Shale soil sources.

In addition, the Lower Gunnison sub-basin has three lake segments (369.90 acres) impaired by dissolved oxygen, mercury, and selenium. There are no impaired lakes in the Upper Gunnison River Sub-Basin. Development of the Total Maximum Daily Loads (TMDL) for stream and lake impairments is currently considered by CDPHE as a high priority. A TMDL is the maximum amount of a pollutant that a water body can receive and still maintain water quality standards.

The Upper and Lower Gunnison River sub-basins also have six stream segments and 16 water bodies listed for further Monitoring and Evaluation (M&E) for dissolved oxygen, copper, cadmium, zinc, iron, selenium, sediment, E. coli, and lead. Exhibit 7-61 included in the CDPHE WQCD Statewide Water Quality Management Plan provides a listing of completed, approved, and possible future TMDL strategies for the Basin. Exhibits 7-66 and 7-67 in the same report provide a listing of point source projects and scheduled improvements to help water quality issues in the Basin. See the 2011 Statewide Water Quality Management Plan referenced and linked in Appendix 2 for more information.

The State has generated a GIS map portraying stream and lake segments with Outstanding Water (OW) use classifications, 303(d) impairments, and TMDL and Monitoring and Evaluation (M&E) designations. Figure 14 demonstrates the relevant water quality data in the Gunnison Basin.

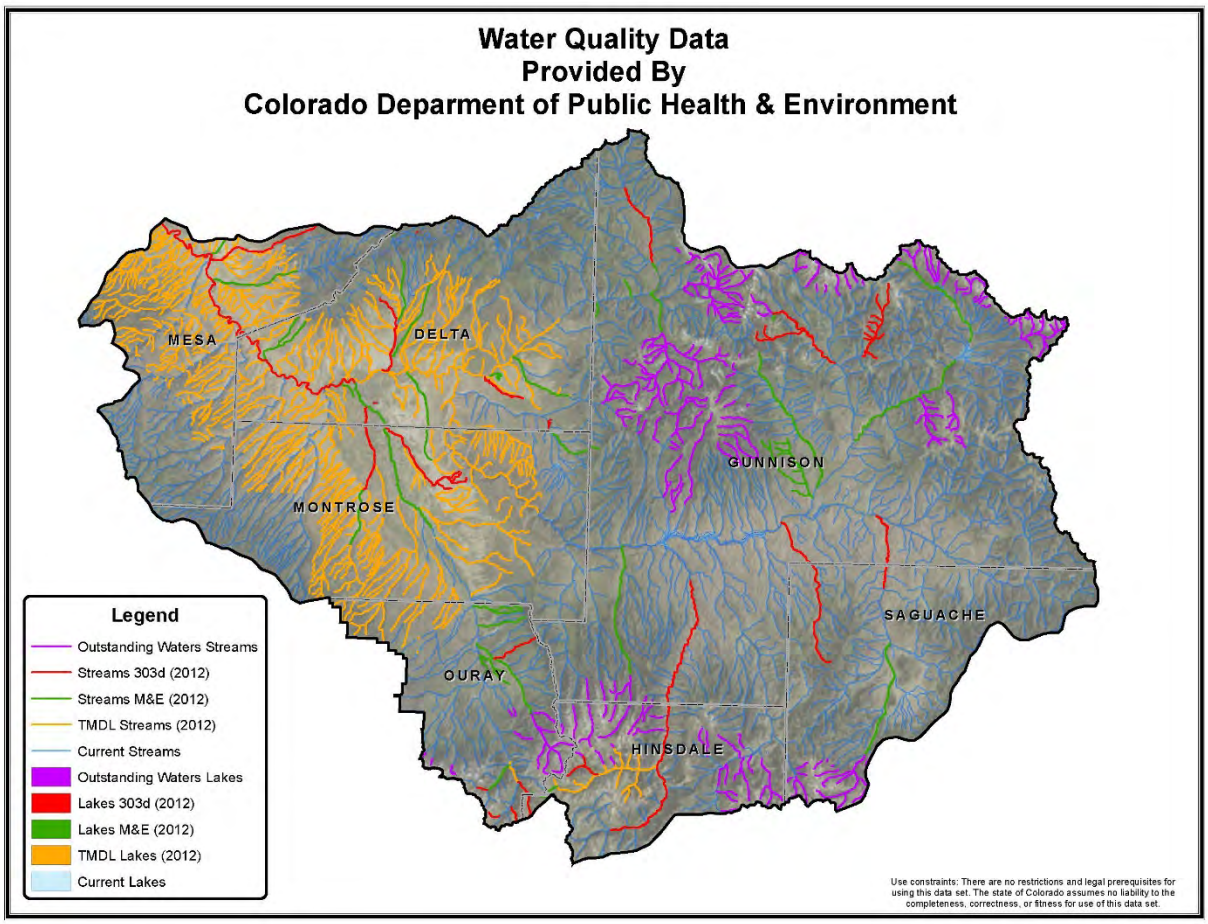


Figure 14. Water Quality Data in the Gunnison Basin

The Colorado River Salinity Control Program is an on-going effort to decrease salinity levels from the upper Colorado River basin main stem and its tributaries. BOR and the Natural Resources Conservation Service have recommended a variety of salinity control measures in the lower Gunnison Basin; including the Uncompahgre River Valley, that could affect future irrigation methods and basin operations.

Forest Health

In addition to water quality issues described above, watershed health also includes consideration for forest issues. A wealth of information is available from the Colorado State University (CSU), Colorado State Forest Service (CSFS), the U.S. Department of Agriculture (USDA), and U.S. Forest Service (USFS). Appendix 2 provides internet links to many CSFS and USFS documents and sources of information related to forest health, forest management, forest insects, diseases, and disorders, as well as wildfire mitigation and education.

To date, the Gunnison Basin has been almost entirely spared of infestation by the Mountain Pine Beetle that has devastated some other basins in the state. However, the Spruce Beetle and its related impacts have been creeping into Gunnison Basin, particularly in the San Juan Mountains, and to a lesser degree in the Elk Mountains and Grand Mesa area. According to the USFS 2014 Forest Health Annual Aerial Survey Report, the Spruce Beetle infestation is a growing problem, with 485,000 acres affected in 2014, up from the 400,000 acres detailed in the 2013 Report on the Health of Colorado's Forests by the CSFS. As such, it the largest insect problem in the state for the third consecutive year. In contrast, the Mountain Pine Beetle infestation continues to decline, reaching its lowest level since 1996.

A number of efforts on underway to address forest health in the Gunnison Basin. The most comprehensive effort involves Community Wildfire Protection Plans (CWPPs). CWPPs originated in the 2003 with the Healthy Forest Restoration Act (Senate Bill 09-001). This legislation placed an increased emphasis on community planning by requiring counties to identify wildfire hazards in unincorporated areas. To date, about 45 county-wide plans have been created (along with numerous community plans), all of which are on the CSFS website. In the Gunnison Basin all counties and many communities have CWPPs in place at varying stages of implementation.

Since forest health issues and related water supply problems are currently less critical in the Gunnison Basin than in many other areas of the state, the GBRT did not participate in the Watershed Health Basin Plan Working Group during the current Basin Implementation Plan (BIP) process. Participants included members from the Arkansas, Metro, South Platte, and Rio Grande roundtables. Helpful information and materials generated during this process will serve as a useful reference material for future watershed health efforts in the Gunnison Basin.

The project list detailed in Section 4.5 and 4.7 includes 30 multipurpose projects that will help to address watershed health, including the following projects designed to specifically examine needs in more detail:

- Environmental/Recreational Project Identification and Inventory - North Fork Region (The Conservation Center)

- Environmental/Recreational Project Identification and Inventory - Lake Fork Region (Lake Fork Valley Conservancy)
- Environmental/Recreational Project Identification and Inventory - Upper Uncompahgre Region (Trout Unlimited)
- Environmental/Recreational Project Identification and Inventory - Upper Gunnison Region (High Country Conservation Advocates)

4.4 Conservation Projects and Methods

As detailed in the GBIP Basin Goal #4 and Statewide Principle #3 and #5, the GBRT supports water conservation, demand management, and land use planning that incorporates water supply factors as essential and cost effective tools for meeting water supply needs in the Gunnison Basin and statewide.

In addition, the GBRT believes that the best way to promote statewide water conservation is through incentive-based measures as opposed to regulatory methods. To maximize water savings and avoid an unnecessary burden on smaller rural water providers, the GBRT recommends focusing demand management efforts on covered entities.[6] The Gunnison Basin currently has only one covered entity (Tri-County Water Conservancy District), but includes small portions of the service areas for two other covered entities (Ute Water and the City of Grand Junction).

Municipal water conservation is currently addressed in the following ways by the following major entities in the basin:

- Tri-County Water Conservancy District - Actively implementing their own 2010 Water Conservation Plan
- Project 7 Water Authority - Participates in Tri-County Water Conservancy District's Water Conservation Plan and voluntary water conservation efforts through member agencies
- Town of Crested Butte - conservation efforts are generally driven by town ordinances including specific timing for lawn irrigation and tiered water rates
- Mt. Crested Butte Water and Sanitation District - developing a Water Conservation Program, and has received a grant from the CWCB
- City of Ouray – project for new conservation plan included on GBIP project list
- Town of Ridgway - Planning to prepare a water conservation plan in the next couple of years
- Ute Water Conservancy District and City of Grand Junction - Actively implementing the 2012 Grand Valley Regional Water Conservation Plan (also including Clifton Water District.

[6] "Covered entity" means each municipality, agency, utility, including any privately owned utility, or other publicly owned entity with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers, and that has a total demand for such customers of two thousand acre-feet or more. §37-60-126(1)(b) Colorado Revised Statutes (2012).

The project list detailed in Section 4.5 and 4.7 includes the following new conservation projects:

- Water Conservation Planning Process for the Upper Gunnison Basin (Upper Gunnison River Water Conservancy District)
- City of Ouray Water Efficiency and Conservation Plan (City of Ouray)

Though agricultural water conservation faces more complex legal and administrative issues in Colorado, the project list also includes two projects that are beginning to explore opportunities provided by fallowing, deficit irrigation, and other strategies:

- Water Bank Project (Colorado River Water Conservation District, Southwestern Water Conservation District, The Nature Conservancy, and the State of Colorado)
- NoChicoBrush Project (Trout Unlimited and Colorado River Water Conservation District)

To help with the implementation of municipal water conservation, the GBRT encourages water providers to use available reference materials such as:

- Municipal Water Efficiency Plan Guidance Document, CWCB 2012
- Sample Municipal Water Efficiency Plan, CWCB 2012
- Guidebook of Best Practices for Municipal Water Conservation in Colorado, CWCB 2010
- SWSI 2010 Municipal and Industrial Water Conservation Strategies, Appendix L, CWCB 2010

4.5 Project List

Proposed Projects

The proposed projects listed in Table 18 and located on Figure 15 are the heart of the GBIP. These various projects will serve to strategically meet important and diverse water needs identified in the Gunnison Basin. The list includes projects of all use types: agricultural, municipal and industrial, environmental and recreational, and multi-purpose. Though projects are categorized within the 3 tiers in an attempt to strategically focus implementation efforts, relative rank within each tier does not indicate a higher priority. Developed in close coordination with the GBIP Subcommittee and Gunnison Basin Roundtable, the information contained in this section is considered a current snapshot of potential basin solutions that is expected to be continually refined by project sponsors after publication of this GBIP. Future refinements of the GBIP may update project information and refine strategic implementation plans.

Listed projects may or may not have a committed sponsor, preliminary planning, design, conditional or absolute water rights, rights of way, and/or negotiations captured in writing with local governments or other water users. Projects that can be implemented by 2025 and excel at meeting identified Basin Goals are highlighted.

Projects in Tier 1 are highlighted with detailed project summary sheets in Section 4.7 while Tier 2 and 3 projects are outlined in Table 18. In addition, a handful of projects were identified through the BRT

process as candidates for modeling analysis. These projects, denoted with an asterisk in Table 18, include:

- Fire Mountain Canal Delivery Efficiency Project
- Meridian Lake Reservoir and Washington Gulch Storage Project
- Cunningham Lake Reservoir and Rehabilitation
- Upper Long Branch Reservoir
- Brush/Farris Creek Reservoir

Additionally, streamflow on the Gunnison River below Redlands Canal was analyzed. All modeling results are presented in Appendix 12 – Appendix 17. Note, modeling of two additional projects—including the West Fork Reservoir— was completed; however the results are currently under review and, therefore, are not included in this plan.

As part of the BRT and technical outreach process, numerous stakeholders indicated projects are necessary to meet their needs, however further work is needed to identify more detailed information on potential projects. To help address this need, Table 18 includes a number of inventory projects that will be sponsored by regional entities. These projects will systematically examine and prioritize projects to strategically meet water needs throughout the Basin.

Table 18. Proposed Basin Projects

Gunnison Basin Implementation Plan - Proposed Project List (4/17/15)

Note: Relative rank within each tier does not indicate a higher priority. Legend provided below table

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
1	1	Gunnison Basin Roundtable 2015 Education Action Plan Activities	Gunnison Basin Roundtable	All	AG, M&I, NC	NS	1, 2, 7, 9	George Sibley	Creation and implementation of the 2015 GBRT Education Action Plan (EAP) to include such items as: active education or stewardship programs for high school students, a Basin Water Leaders program at universities in the Basin for college students to develop and deliver education programs for public K-12 schools, printed materials about "comfortable and intelligent desert living", sub-basin-specific half-day programs and printed materials for decision makers, etc.	NA	Ongoing	TBD
2	1	Regional Conservation Partnership Program (RCPP)	CRWCD, TU, TNC, UVWUA, NFWCD, CWCD, BPWCD	40, 41	AG, NC	S, NS	1, 2, 3, 5, 6, 7, 8	Cary Denison	Modernize and improve off and on farm water transmission and application infrastructure in Lower Gunnison to accurately meet agricultural water demands while improving flow and water quality.	TBD	Ongoing	50,000,000
3	1	Inventory of Irrigation Infrastructure Improvement Needs - District 28	Upper Gunnison River Water Conservancy District	28	AG, NC	NS	1, 3, 5, 7, 8	Frank Kugel	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow.	NA	2018	100,000
4	1	Cole Reservoirs #4 and #5	Bill Martin	40	AG	S	1, 3, 8	Bill Martin	This project involves the repair or replacement of the main headgate diversion from Surface Creek and cleaning of the associated inlet ditch. It would preserve and restore the use of an important pre-Compact water right.	146	2015	50,000
5	1	Crawford Reservoir System Optimization Study and Prioritized Conveyance Improvements	Crawford Water Conservancy District	40	AG	S	1, 3, 8	Gary Kraai	Improve conveyance, automation, and measurement infrastructure as related to irrigation delivery systems.	NA	2025	TBD
6	1	Doughty #1 - Chipmunk Reservoir	Perry Hotz	40	AG	S	1, 2, 3, 8	Perry Hotz	Reconstruction of breached reservoir.	68	2018	125,000 - 205,000
7*	1	Fire Mountain Canal Delivery Efficiency Project	Fire Mountain Canal and Reservoir Company	40	AG, NC	S	1, 3, 5, 6, 7, 8	Tom Alvey	Improve efficiency of canal system along with diversion structure. This will improve flows on the North Fork as well as remove a fish barrier and reduce fish entrainment in the canal.	1,000 - 2,000 per yr.	2025	7,746,100
8	1	Marcott Reservoir	Grand Mesa Water Conservancy District	40	AG	S	1, 2, 3, 8	Milan Armstrong	Leaks in the reservoir need to be repaired - thus allowing the reservoir to hold its decree. The outlet pipe also needs extensive repair.	330	2015	135,000 - 175,000

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
9	1	North Delta Canal	North Delta Irrigation Company (NDIC)	40	AG, NC	S	1, 2, 3, 5, 7, 8	Cary Denison	Per recent engineering report pursue alternative conveyance option, such as pumping water from Gunnison River near North Delta to serve water users at end of system while improving portions of the delivery system using Basin States Salinity funding.	50 cfs	2025	2,000,000
10	1	Orchard Ranch Ditch	Orchard Ranch Ditch Company	40	AG	S	1, 2, 3, 6, 8	Robert Morris	Pipe approximately 2 miles of the ditch to improve conveyance efficiency and reduce salinty and selenium in the Tongue Creek System.	500 per year	2017	1,400,000
11	1	Overland Reservoir Enlargement (Part 2)	Overland Ditch and Reservoir Company	40	AG, NC	S	1, 3, 7, 8	Phillip Ceriani	Currently the reservoir stores 1,007 AF of an absolute water decree. The project involves increasing the reservoir's storage to 7,171 AF in order to use a 1902 conditional decree for 971 AF. This could include modifications to the reservoir along with dam height increase that allow the reservoir to spill or deliver excess water to Cow Creek. Coupling the project with ditch improvements would improve efficiencies and the supply of water to agricultural users while saving storage in the reservoir.	1,009	2025	2,000,000
12	1	Paonia Reservoir Sediment Removal and Outlet Modification Project (Part 2)	North Fork Water Conservancy District (NFWCD) and Fire Mountain Canal and Reservoir Company (FMCC)	40	AG, NC	S	1, 3, 6, 7, 8	Tom Alvey	Paonia Reservoir was designed to store 21,000 AF of water, which is used for irrigation, flat-water recreation, fishing, augmentation, and improved late season flows to the North Fork of the Gunnison. Over the last fifty years, the reservoir has lost 24% of its total capacity due to sedimentation build up. The goal of this project is to investigate long-term sediment management options, with the intent of minimizing future losses and possibly restoring current capacity losses. Without improvement to the outlet works the FMCC and NFWCD stand the risk of losing control of the reservoir which could result in considerable water quality impact for the river and downstream users.	1,000 - 3,000	2025	8,000,000
13	1	Young's Creek Reservoirs (#1 & #2) Rehabilitation	Young's Creek Reservoir Company	40	AG	S	1, 3, 8	Bob Morris	Reservoir rehabilitation necessary due to existing DWR fill restrictions. Also, sinkholes present in left dam abutment.	785	2016	120,000
14	1	Granby Reservoirs (#5 and #11) Rehabilitation	Grand Mesa Water Conservancy District	40	AG, M&I	S	1, 3, 8	Austin Keiser	This project will line the outlet pipe of the reservoir and repair a leak in the headgate structure.	688	2016	100,000 - 150,000
15	1	Inventory of Irrigation Infrastructure Improvement Needs - District 40, Grand Mesa (Surface Creek)	Grand Mesa Water Conservancy District	40	AG, NC	NS	1, 3, 5, 7, 8	Austin Keiser	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow.	NA	2018	75,000

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
16	1	Inventory of Irrigation Infrastructure Improvement Needs - District 40, Upper North Fork	North Fork Water Conservancy District	40	AG, NC	NS	1, 3, 5, 7, 8	Tom Alvey	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow.	NA	2018	75,000
17	1	Rehabilitation/Enlargement-28 Reservoirs LCWUA (Part 2)	Leroux Creek Water Users Association	40	AG, NC	S	1, 3, 8	Tom Alvey	Already have priority list of most needed repairs. Some dam repairs begun (Hanson and Miller/Holt reservoirs). Need funding for next series of repairs. Plan is to ultimately rehab all reservoirs in system to allow for another 100 yrs.	5,000	2025	3,000,000 - 5,000,000
18	1	Somerset Diversion Improvement	Delta Conservation District/Somerset Domestic Waterworks District	40	NC, M&I	S	1, 3, 4, 5	Mike Drake	The purpose of this project is to improve the efficiency of the diversion, reduce the intake of sediment, improve fish and boater passage/safety, and improve the river/riparian habitat. The second purpose is to develop additional public access to the North Fork of the Gunnison River between the Paonia Reservoir and Paonia.	TBD	2018	1,500,000
19	1	Environmental/Recreational Project Identification and Inventory - North Fork Region	The Conservation Center	40	AG, NC	NS	1, 5, 6, 7	Sarah Sauter	Investigate the feasibility of implementing specific projects targeted towards nonconsumptive focus segments.	NA	2018	75,000
20	1	Prioritized Conveyance Improvements and System Optimization Planning Study	Bostwick Park Water Conservancy District	41	AG	NS	1, 2, 3, 8	Allen Distel Dave Kanzer	The project incorporates improvements to conveyance, automation, and measurement infrastructure as related to delivery systems.	TBD	Ongoing	TBD
21	1	West Reservoir #1 Outlet Pipe Replacement	West Reservoir and Ditch Company	40	AG	S	1, 3, 8	Nick Hughes	West Reservoir is currently under a no fill restriction from the State engineers office because of concerns about a deteriorating outlet pipe. The owners propose to replace the existing pipe and restore the reservoir to use, thus helping preserve a pre-1922 water right.	TBD	2025	426,317
22	1	Cedar Mesa Ditch	Cedar Mesa Ditch Company	40	AG	S	1, 2, 3, 5, 6, 8	Jerry Figueroa	Pipe the last 5 miles of the 12 mile ditch to reduce 35% shrink and reduce salt and selenium. Also to pressurize the ditch to allow for more efficient irrigation methods.	TBD	2025	TBD
23	1	UVWUA System Optimization Projects (Canal Lining and Automation, and Reregulation Reservoirs)	Uncompahgre Valley Water Users Association and Others	41	AG, NC	S	1, 3, 6, 7, 8	Steve Fletcher	This project includes repairing and lining prioritized Uncompahgre Project canals as well as the re-regulation of 2 reservoirs. The goal is to improve efficiency, help reduce agricultural shortages, and improve water quality and related impacts on fisheries.	10,000	2025	125,000,000

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
24	1	Project 7 - 10 kAF Raw Storage (Part 2)	Project 7 WA	41	M&I	S	1, 4	Adam Turner	Enlargement of existing Fairview Reservoir for net gain of 500 AF. Project includes upgrading outlet structure (or siphon) of existing Cerro Reservoir for useful gain of 800 AF and siting 2 new reservoirs above South Canal to provide hardened supply for one-year out.	10,000	2025	43,000,000
25	1	Redlands Pump Modernization and Hydropower Optimization Project	Redlands Water and Power Company	42	AG, NC	S	1, 3, 5, 7, 8	Chuck Mitisek	This project involves the replacement of relocation of the main pumps into the tail race area of the current hydro plant to increase power generation capacity and efficiency, while also reducing pumping costs and providing more accurate and reduced diversions.	TBD	2018	1,000,000
26	1	Hallenbeck Reservoir #1 (Purdy Mesa Reservoir)	City of Grand Junction	42	AG, M&I	S	1, 3, 4, 8	Rick Brinkman	Dam repair to preserve important existing storage for municipal use and continued irrigation.	659	2016	
27	1	Dillsworth Ditch	Spann Ranches	59	AG	S	1, 2, 3, 8	Spann Ranches	Repair the headgate's spill structure, thus restoring use of the ditch.	TBD	2016	15,952
28*	1	Meridian Lake Reservoir and Washington Gulch Storage Project	Mt CB Water & San Dist., UGRWCD	59	AG	S	1, 2, 3	Frank Glick	This project involves enlarging the Meridian Lake Reservoir, often called Long Lake, to a capacity of 1,381 AF. In addition to the enlargement, a 2.3 mile feeder canal from Washington Gulch to the reservoir would be constructed. The water gained from the enlargement will be used to meet downstream irrigation shortages.	890	2017	7,303,000
29	1	Water Conservation Planning Process for the Upper Gunnison Basin	Upper Gunnison River Water Conservancy District	59	M&I	NS	1, 4	Frank Kugel	Enable communities of the Upper Gunnison Basin to reduce municipal and industrial water consumption by 20 percent by 2030	NA	2016	50,000
30*	1	Cunningham Lake Reservoir Rehabilitation	Upper Gunnison River Water Conservancy District and Colorado Parks and Wildlife	59	AG, NC	S	1, 2 ,3, 7	Frank Kugel David Graf	Rehabilitation of existing dam, which will improve delivery systems into and out of reservoir, reduce irrigation shortages and improve Sage Grouse habitat.	80	2025	2,000,000
31	1	Gunnison Ohio Creek Canal Enlargement	Upper Gunnison River Water Conservancy District and Trampe Ranches	59	AG, NC	S	1, 3, 8	UGRWCD	Increase the capacity of the irrigation canal to allow for direct irrigation contemplated under the decree in direct years and/or possibly deliver to lower Ohio Creek—allowing continuous diversion by upstream irrigators.	TBD	2025	TBD
32	1	Elk Home Ditch Improvement, Steuben Creek Flow Restoration	Trout Unlimited	59	AG, NC	S, NS	1, 2, 3, 5, 6, 7, 8	Jesse Kruthaupt	Pipe the Elk Home Ditch to improve efficiencies, maximize deliveries, minimize maintenance, and enable the Elk Home 2 Ditch water rights to help baseflows (and a population of Colorado Cutthroat Trout) in Steuben Creek by not being diverted.	168	2015	500,000
33	1	Rainbow Lake Potential Enlargement Project	Upper Gunnison River Water Conservancy District	59	AG, NC	S	1, 2, 3, 8	Frank Kugel	Raise dam to capture an additional 100 AF (200 AF total storage). Enlargement to enable partial development and use of conditional WR.	100	2025	TBD

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
34	1	Inventory of Irrigation Infrastructure Improvement Needs - District 59	Upper Gunnison River Water Conservancy District	59	AG, NC	NS	1, 3, 5, 7, 8	Frank Kugel	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow.	NA	2018	100,000
35	1	Inventory of Irrigation Infrastructure Improvement Needs - District 62	Upper Gunnison River Water Conservancy District and Colorado River Water Conservation District	62	AG, NC	NS	1, 3, 5, 7, 8	Frank Kugel	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow.	NA	2018	40,000
36	1	Environmental/Recreational Project Identification and Inventory - Lake Fork Region	Lake Fork Valley Conservancy	62	NC	NS	1, 5, 6, 7	Camille Richard	Investigate feasibility of specific project implementation in nonconsumptive focus segments.	NA	2018	40,000
37	1	City of Ouray Water Efficiency and Conservation Plan	City of Ouray	68	M&I	S	1, 4, 8	Peter Foster David Masters	The Water Efficiency and Conservation Plan outlines a plan for updating aging infrastructure and identifies areas in which conservation is both feasible and economical – critical to the development of the City of Ouray.	TBD	2025	2660000 (avg. 266,142 per yr.)
38	1	Ouray County Upper Uncompahgre Basin-Wide Augmentation Plan	Ouray County	68	M&I	NS	1, 2, 4	Peter Foster	Creation of a regional augmentation plan to serve a variety of water uses in the Upper Uncompahgre Basin without adverse impacts to existing uses.	TBD	2025	TBD
39	1	Inventory of Irrigation Infrastructure Improvement Needs - District 68	Colorado River Water Conservancy District and Ouray County Water Users Association	68	AG, NC	NS	1, 3, 5, 7, 8	Dave Kanzer	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow. Recommended projects may include: diversion structures, measuring devices, ditch lining/piping, ditch realignment, conveyance loss studies, reservoir restoration, and reservoir enlargements. Cost estimates and funding opportunities will be identified.	NA	2018	75,000
40	1	Environmental/Recreational Project Identification and Inventory - Upper Uncompahgre Region	Trout Unlimited	68	NC	NS	1, 5, 6, 7	Cary Denison	Investigate the feasibility of implementing specific projects targeted towards nonconsumptive focus segments.	NA	2018	75,000

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
41	1	Environmental/Recreational Project Identification and Inventory - Upper Gunnison Region	High Country Conservation Advocates	28, 59	NC	NS	1, 5, 6, 7	Julie Nania	Investigate the feasibility of implementing specific projects targeted towards nonconsumptive focus segments.	NA	2018	100,000
42	1	NoChicoBrush	Trout Unlimited and CRWCD	40, 41	AG, M&I, NC	S	1, 2, 3, 6, 7, 8	Steve Shrock Dave Kanzer Cary Denison	The project incorporates system improvements, including solutions such as canal lining, piping, on farm/system storage, and system optimizations as well as more multi-part improvements such as increased hydroelectric production, and on- farm efficiency projects. The project will help to address agricultural shortages as well as improve water quality in the Uncompahgre and Gunnison Rivers.	90,000	2025	211,000,000
43	1	Gunnison Basin Selenium Management Plan and Gunnison Basin Selenium Task Force	USBR and River District	40, 41	NC	NS	1, 3, 6, 8	Steve Fletcher, Dave Kanzer, Sonja Baca	The goal of the Selenium Management Plan and Task Force is to reduce selenium concentrations in the Lower Gunnison River Basin, thus improving water quality and helping in the recovery of federally listed endangered fish.	NA	Ongoing	TBD
44	1	Colorado River Storage Project - MOA Projects	USBR & River District	40, 41, 62	AG, NC	S	1, 3, 6, 8	Dave Kanzer, Ted Dunn	The Upper Colorado River Basin Fund MOA projects encompass a range of projects throughout Colorado. The projects pertinent to the Gunnison Basin that are not already included in the Gunnison Basin Implementation Plan Project List as individual projects are the Bostwick Park Project, Paonia Project and Smith Fork Project.	Project dependent	2025	12,347,000
45	1	Development of Upper Uncompahgre Water Supplies	City of Ouray and Partners in the Upper Uncompahgre River Basin	40, 68	AG, M&I	S, NS	1, 3, 4, 8	Marti Whitmore	This project serves to address municipal shortages and maintain water infrastructure, including hydropower. It also permits the City to assist in agricultural and other shortages in the Upper Uncompahgre Basin with its partners.	200 - 300	2025	1,750,000 (avg. 350,000 per yr.)
46	1	Improvements to Red Mountain Ditch	City of Ouray and other parties	40, 68	AG, M&I	S	1, 3, 4, 8	Peter Foster	This project includes piping, shaping and lining of the ditch to improve stability and carrying capacity, and the installation of waste gates to protect the ditch from overtopping and installation of improved measuring devices.	50 - 225	2025	1000000 (avg. 200,000 per yr.)
47	1	Water Bank Project	SWWCD, CRD, TNC, State of Colorado	All	AG, NC	S	1, 2, 3, 8	Dan Birch Taylor Hawes	Increase certainty across all sectors and reduce the potential for crises by working to delay, minimize, or prevent a compact shortage, and in the event of a shortage, operate to allow certain post-compact uses to continue. The Water Bank uses a market-based approach to accomplish this by compensating willing water rights owners to fallow or deficit irrigate their fields and then use this water towards Colorado's obligations under the Colorado River Compact.	TBD	2025	TBD

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
48	1	Regional Groundwater Monitoring Project	UGRWCD and others	All	AG, NC, M&I	S, NS	1, 2, 3, 6, 7	Frank Kugel	Provide irrigators with subsurface water level information to assist with irrigation application planning and scheduling. Give Colorado Basin River Forecast Center more detail on soil moisture in an effort to improve runoff forecast accuracy. Maintain a baseline for groundwater quality in the event of future impairments due to hazardous waste spills, residential development, mining activity, and other potential impacts to water quality.	NA	2025	TBD
49	1	Weather Modification Program Enhancements	UGRWCD, Gunnison County, Water Enhancement Authority, and others	All	AG, NC, M&I	S	1, 3, 4, 5	Frank Kugel	Enhance weather modification programs throughout Colorado with state of the art equipment and technology. Build on recent research demonstrating how to maximize the effectiveness and efficiency of weather modification. Increase snowpack and resulting water supply within the basin.	NA	2020	TBD
50	2	Duke Stomp		40	AG	S	8	Tom Alvey				
51	2	Electric Mountain Reservoir	North Fork Water Conservancy District	40	AG	S	8	Tom Alvey		1,000		
52	2	Horse Ranch Reservoir	Fire Mountain Canal and Reservoir Company	40	AG	S	8	Dion & Dixie Luke	Conditional storage right for 12,000 acre ft., adjudication 3/31/06, appropriation date of 3/3/04. Site is on Gunnison National Forest land and would flood part of Kebler Pass Road.	12,000		
53	2	Poison Gulch Reservoir	Grand Mesa Water Conservancy District	40	AG	S	2	Austin Keiser	New reservoir construction.		2023	12,000,000
54	2	Smith Pasture		40	AG	S	8	Tom Alvey				
55	2	Snowshoe	West Elk Mine	40	AG	S	8	Kathy Welt	Project includes enlarging and lining a feeder ditch, and possibly enlarging the reservoir itself.			
56	2	Cactus Park Reservoir	Grand Mesa Water Conservancy District	40	AG, NC	S	2, 3, 7	Austin Keiser	Lower elevation reservoir intended to capture early runoff and store extra flow during off peak use. It will be used in concert with the West Fork Reservoir.		2027	15,000,000
57	2	East Beckwith Enlargement - Lost Lake Reservoir	Fire Mountain Canal and Reservoir Company, North Fork Water Conservancy District	40	AG, NC	S	8, 5	Tom Alvey				
58	2	Scotts Pasture Reservoir	Grand Mesa Water Conservancy District	40	AG, NC	S	2	Austin Keiser	New reservoir construction.		2025	12,000,000

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
59	2	West Fork Reservoir	Grand Mesa Water Conservancy District	40	AG, NC	S	2, 3, 7	Austin Keiser	A new lower elevation reservoir intended to capture early runoff and store extra flow during peak use.	20,000	2025	56,000,000
60	2	Hayes Teague Ditch	Trout Unlimited, Colorado Parks and Wildlife	68	AG, NC	S	1, 2, 3, 5, 6, 7, 8	Cary Denison	Piping and pressurizing irrigation ditch to improve access to water while reducing impacts on Cow Creek.			
61	2	Uncompahgre Watershed Planning Partnership - Planned Process to Develop Remediation Plans	Uncompahgre Watershed Partnership, Trout Unlimited	41	NC	NS	5	Cary Denison	Improve water quality in Uncompahgre watershed through mine reclamation and watershed restoration projects. Implement public water education.			
62*	2	Brush Creek Reservoir	Trampe Ranches and Spann Ranches	59	AG, NC	S	1,3,8	Bill Trampe	Development of two on-channel reservoirs (Farris Creek Reservoirs 1 and 2) on Farris Creek. These reservoirs would provide late season supply to irrigation diversions both upstream and downstream on East River.	3,000		
63	2	Ridgway Ditch Pipeline	Town of Ridgway	68	M&I, Ag	S	1, 3, 4, 6, 8	Joanne Fagan	This project will protect and improve raw water quality, reduce seepage and evaporation losses, and more efficiently transport the Town's water from the diversion on Beaver Creek to Lake Otonowanda.	100		2,000,000
64	2	Fruitland Irrigation Ditch - Upper and Lower Tunnels	Fruitland Irrigation Company	40	AG	S	2, 7	Danny Todd	Project will repair upper and lower tunnels (total length is 1/2 mile)			
65	3	Enlargement of McDonough Reservoir #1	Upper Gunnison River Water Conservancy District	28	AG	S	1, 2, 3, 8	Frank Kugel		1808		
66	3	Alfalfa Ditch	Alfalfa Ditch Company	40	AG	S	1, 2, 3, 8	Russ Reger	The project will improve conveyance by approximately 3 miles of the ditch.		2016	6,000,000
67	3	Beaver Reservoir	Surface Ditch and Reservoir Company	40	AG	S	1, 2, 3, 8	Keith Waibel	Reconstruct the reservoir.		2018	200,000
68	3	Big Ditch	Big Ditch Company	40	AG	S	1, 2, 3, 8	Robert Morris	The project will improve conveyance by approximately 1 mile of the ditch.		2018	500,000
69	3	Boulder Park Reservoir	Hart Basin Ranch	40	AG	S	1, 2, 3, 8	Donnie Hebert	This reservoir needs to be completely rebuilt with a new dam, headgate and outlet pipe.			
70	3	Butte Ditch	Butte Ditch Company	40	AG	S	1, 2, 3, 8	Jeff Wick	The project will improve conveyance by approximately 5 miles of the ditch.		2018	3,500,000
71	3	Cole Reservoir #2		40	AG	S	1, 2, 3, 8		The reservoir's outlet valve needs repairs, coupled with leaks in the water pool area.			
72	3	Farmers Diversion Improvement Project		40	AG, NC	S	1, 2, 3, 8		Improve diversion structure to improve efficiency, maintenance issues, and remove fish/recreation barrier.			

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
73	3	Fogg Ditch	Fogg Ditch Company	40	AG	S	1, 2, 3, 8	Jeff Widner	The project will improve conveyance by approximately 5 miles of the ditch.		2019	3,500,000
74	3	Forrest Ditch	Forrest Ditch Company	40	AG	S	1, 2, 3, 8		The project will improve conveyance by approximately 8 miles of the ditch.		2025	6,000,000
75	3	Fruitgrowers Reservoir Pumpback	Grand Mesa Water Conservancy District	40	AG	S	1, 2, 3, 8	Austin Keiser	Project will pump water from Gunnison River under a 20 cfs decree held by OCID to fill and maintain water levels in Fruitgrowers Reservoir.		2025	10,000,000
76	3	Granby Ditch	Granby Ditch and Reservoir Company	40	AG	S	1, 2, 3, 8		Pipe approximately 2 miles of the ditch where leaks are present.		2017	1,000,000
77	3	Greenwood Reservoir	Private Owners	40	AG	S	1, 2, 3, 8		Leaks need to be repaired, thus requiring a partial rebuilding of the reservoir.		2015	350,000
78	3	Last Chance Reservoir	Town of Cedaredge	40	AG	S	2, 3					
79	3	Little Giant Reservoir	Town of Cedaredge	40	AG	S	2, 3					
80	3	Little Jonah Reservoir	Town of Cedaredge	40	AG	S	2, 3					
81	3	Rogers Mesa Risk Project	North Fork Water Conservancy District	40	AG	NS	1, 2, 3, 8					
82	3	Ryan Reservoir	Robert Morris	40	AG	S	1, 2, 3, 8	Robert Morris	The size of the reservoir needs to be increased in order to hold the decree.		2025	350,000
83	3	Stewart Canal HG		40	AG	S	1, 2, 3, 8					
84	3	Surface Creek Reservoirs	Grand Mesa Water Conservancy District	40	AG	S	3, 5, 8		Project includes the rehabilitation of 13 breached dams.			
85	3	Trickle Ditch	Trickle Ditch Company	40	AG	S	1, 2, 3, 8	Doug Wist	The project will improve conveyance by approximately 2 miles of the ditch.		2016	1,250,000
86	3	Weir and Johnson	Private Owners	40	AG	S	1, 2, 3, 8		The project will improve conveyance by approximately 2 miles of the ditch.		2025	1,000,000
87	3	Zig Zag Reservoir	Town of Cedaredge	40	AG	S	1, 2, 3					
88	3	Doughty #2 - Slide Rock Reservoir	Town of Cedaredge	40	AG, M&I	S	2, 3, 7	Town of Cedaredge	This project includes reconstructing and repairing leaks in slide rock.		2019	250,000
89	3	Leon Lake Reservoir	Leon Lake Reservoir Company	40	AG	S	1, 2, 3		The project will repair a damaged outlet tunnel which is severely restricting flow.		2025	2,000,000
90	3	Rebuilding Diversion Structure & Fish Screen for Colorado Cutthroat Trout	Trout Unlimited, Colorado Parks and Wildlife	40	NC	S	5	Cary Denison	Reduce entrainment and improve habitat for Colorado Cutthroat Trout			

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
91	3	Cedar Mesa Ditch Stilling Pond	Cedar Mesa Ditch Company	40	AG	S	1, 2, 3, 5	Jerry Figueroa	Develop 20 AF stilling pond for the Cedar Mesa Ditch at mile 5 to allow reduced fluctuations in ditch levels and provide a constant flow of water to the AG land below.			
92	3	Town of Olathe Pipeline and Reservoir	Town of Olathe	41	AG, M&I	S	3, 4	Wayne Trounce	Olathe is at the juncture of trying to address the best use of some of their water rights which have multiple associated uses. The project will help them decide the best use of the water for the district - possibly including system rehabilitation.		2025	1,000,000
93	3	City of Grand Junction - Raw Flow Line	City of Grand Junction	42	M&I	S	4	Rick Brinkman	This project will help replacing 46,000 linear feet of Raw Water Flow Line for the City of Grand Junction.			9,800,000
94	3	Planned Native Fish Population Restoration Project		42	NC	S	5					
95	3	East River Number 2	Spann Ranches	59	AG	S	1, 2, 3, 8		The ditch needs repair and this project helps achieve this goal.			
96	3	Leaps Gulch Reservoir	UGRWCD	59	AG	S	1, 2, 3					
97	3	Bank Stabilization & Fish Habitat Improvement		59	NC	S	5					
98	3	Curecanti NRA Cottonwood Gallery		59	NC	NS	5		The relationship between discharge and cottonwood gallery is presently being monitored; however no data exists to support the idea of flow protection. This project involves such data collection and analysis.			
99	3	River Restoration, Mine Remediation	Coal Creek Watershed Coalition	59	NC	S	5	Zach Vaughter				
100	3	Bank Stabilization & Fish Habitat Improvement		62	NC	S	5					
101	3	Lake Fork Trail Stair Project		62	NC	S	5		Install better stream access to reduce human impacts.	NA		

Ref #	Tier	Project	Project Sponsor	Water District	Use Type	Project Type	Basin Goals	Point of Contact: Name	Purpose	Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
102	3	Expansion/Enlargement of the Ouray Hydro Plant Dam and Reservoir	City of Ouray	68	M&I, Hydro	S	4 , 8	Eric Jacobson	The City of Ouray wishes to work with the owner of the hydroelectric plant to expand the capacity of the reservoir that provides the water for the plant.	18	2030	2,500,000
103	3	Lake Fork Fish Enhancements		62	NC	S	5					
104	3	Project 7- 10 MGD Water Treatment Plant at Ridgway Reservoir	Project 7 WA	28, 41, 68	M&I	S	4	Adam Turner	Build and maintain 10 MGD of surface water treatment for a backup source to the Gunnison river water that supplies the main WTP upon which 46,000 people rely for daily needs.			43,000,000
105	3	Colorado River Basin Salinity Control Projects (Colorado River Basin Salinity Control Act of 1974)	USBR & River District	40, 41	NC		6	Dave Kanzer				
106	3	Planned Mining Remediation		41, 62, 68	NC	S	5					

LEGEND

Use Type – Agriculture (AG), Municipal and Industrial (M&I), Nonconsumptive (NC), Hydropower (Hydro)
Project Type - Structural (S), Nonstructural (NS)
Tier 1 - Implementation is likely feasible by 2025, and project will clearly meet Basin Goals
Tier 2 - Implementation likely not feasible by 2025, but would excel at meeting Basin Goals. Also may have important conditional water rights and/or completed planning efforts
Tier 3 - Implementation is likely not feasible by 2025; the project is in more preliminary stages of planning and/or may meet Basin Goals to a lesser degree
1. Protect existing water uses in Gunnison Basin
2. Discourage the conversion of productive agricultural land to all other uses within the context of private party rights
3. Improve agricultural water supplies to reduce shortages
4. Identify and address municipal and industrial water shortages
5. Quantify and protect nonconsumptive water uses
6. Maintain or, where necessary, improve water quality throughout the Gunnison Basin
7. Describe and quantify the beneficial relationship between agricultural and nonconsumptive water uses
8. Restore, maintain, and modernize critical water infrastructure, including hydropower
9. Maintain active and comprehensive public education process about water resources in the Gunnison Basin
Point of Contact – Person well versed with project; responsible for providing information to BIP consulting team in sufficient detail to complete the Project Template
Purpose - Brief description of the project/objective
***Additional technical analysis has been completed with the results provided in Appendix 12 - Appendix 17.**

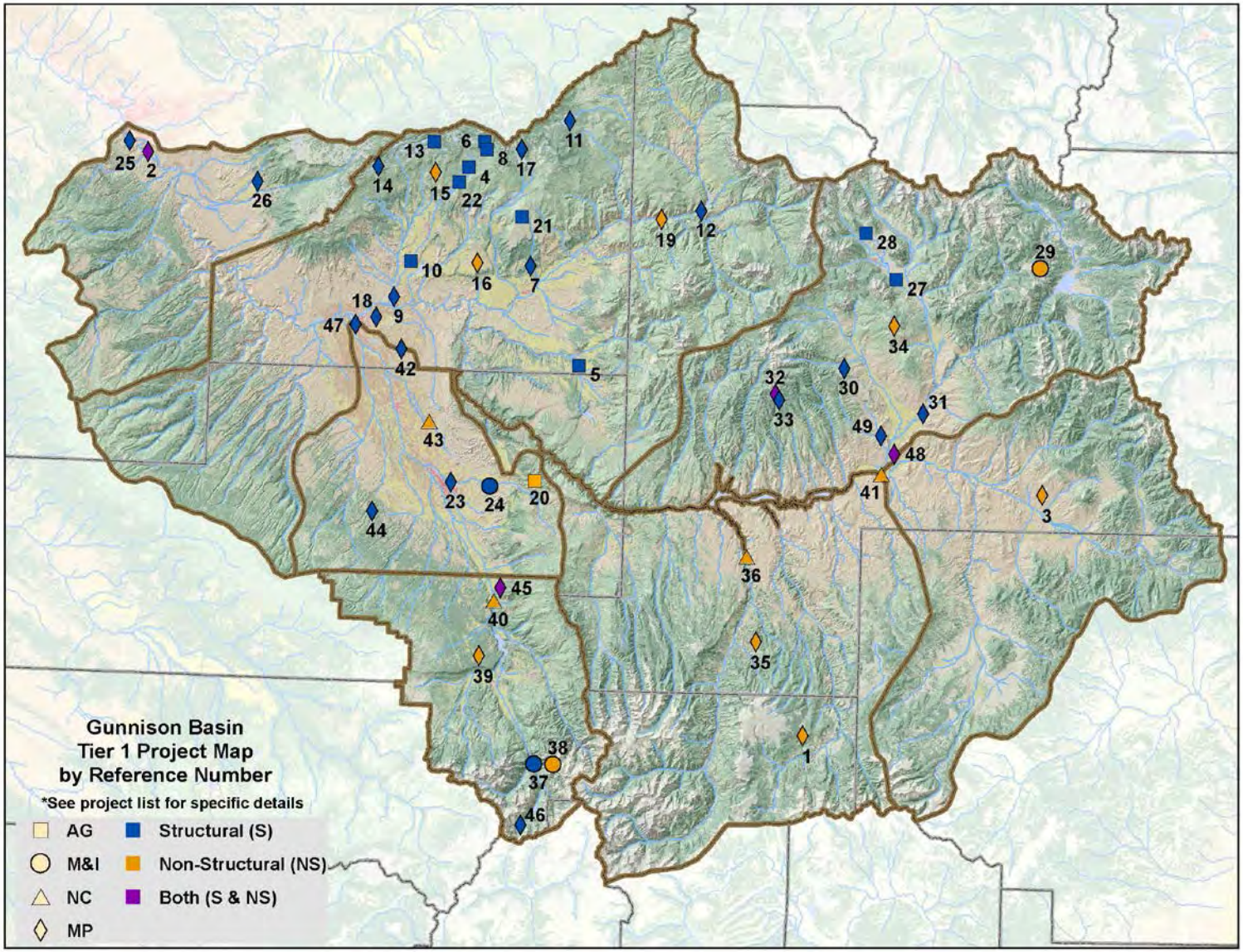


Figure 15. Proposed Tier 1 Basin Projects

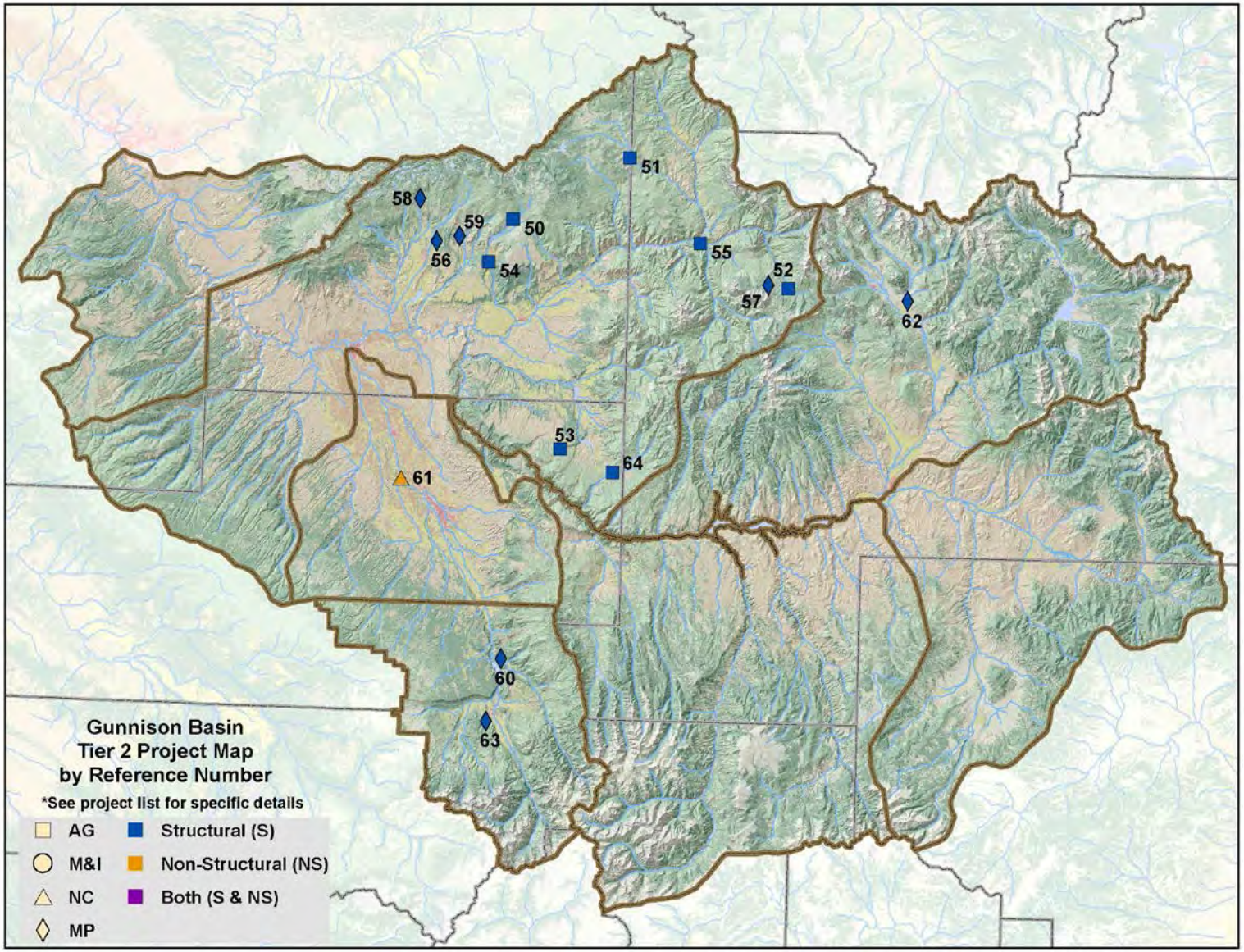


Figure 16. Proposed Tier 2 Basin Projects

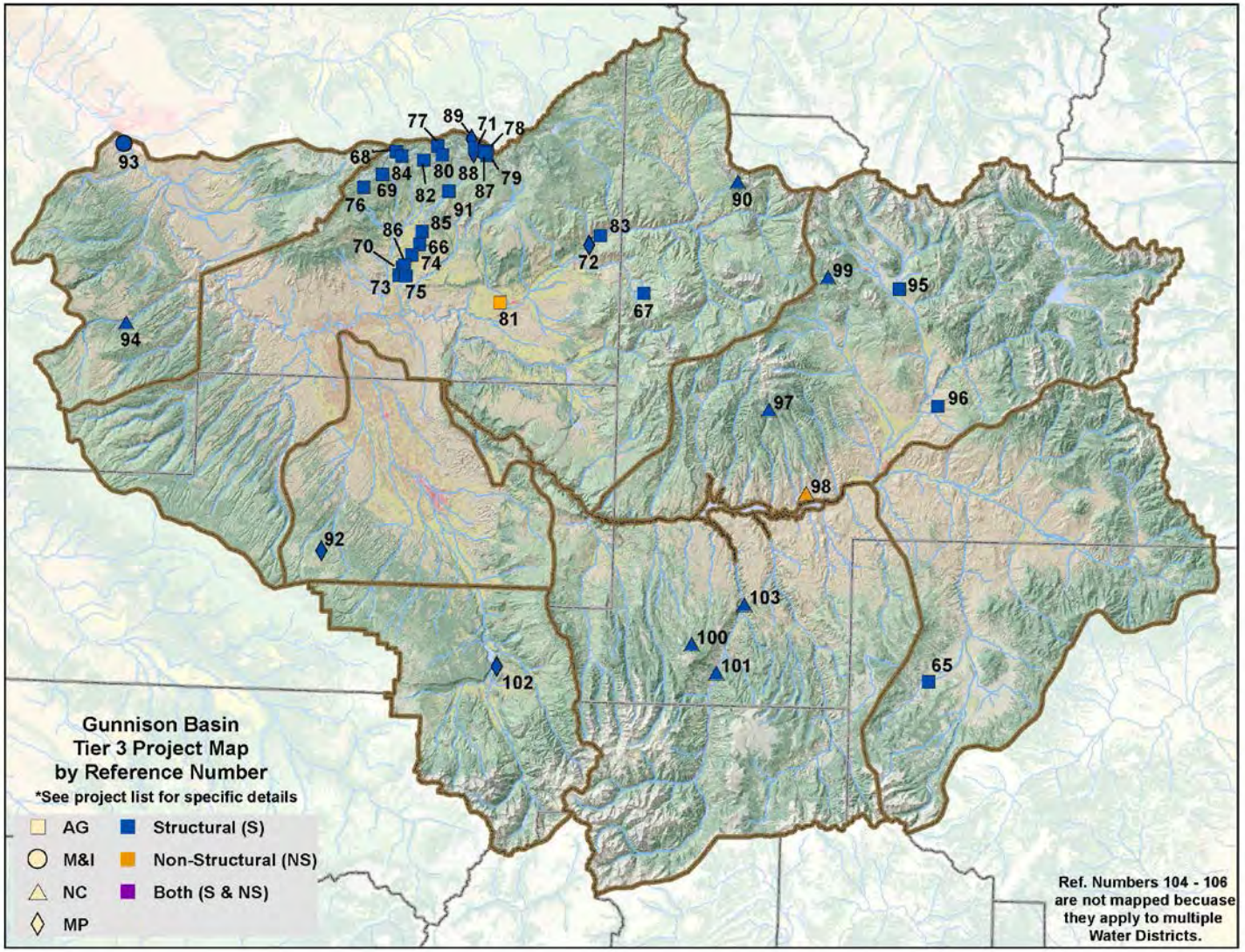


Figure 17. Proposed Tier 3 Basin Projects

Environmental Protections and Monitoring

Table 19 details important ongoing environmental protections and monitoring. Though these do not fit on a list of future planned projects, they are critical for maintaining and in some cases enhancing environmental and recreational attributes in the Basin. Most of these items were included in Phase 2 of the SWSI environmental and recreational process and corresponding database described in Section 2.

Table 19. Environmental Protections and Monitoring

DRAFT Gunnison Basin Implementation Plan - Nonconsumptive Protection & Monitoring Project List (7/31/14)
(Legend provided below table)

Ref #	Project	Project Sponsor	Water District	Basin Goal	Purpose
1	HCCA Project		40		
2	North Fork River Improvement Association - NFRIA		40	5	
3	Fish Screen & Ladder at Redlands Power Canal	RWAPA (formerly USBR & FWS)	42	5	Fish ladder and screen allow for endangered fish migration while preventing migration by nonnative fish.
4	Redlands Water and Power Canal	Redlands Power and Water Company	42	5	
5	NPS WQ, Curecanti NRA (Aspinall Reservoirs) Sites		59		NPS effort to protect aquatic life and recreational Colorado WQ standards in Curecanti NRA and Black Canyon of the Gunnison NP.
6	ONRW Designation -- Streams Draining West Elks (heading in and flowing within Gunnison County only) to Curecanti NRA		59	5	NPS effort to protect quality and aquatic life of Curecanti NRA.
7	Roaring Judy	CPW	59	5	Protect autumn minimum discharge needs for upstream migration of kokanee salmon.
8	Taylor Park Reservoir: 4 Party Agreement Controlling Lake Levels and Stream Flows to Benefit Fish and Wildlife Habitat and Boating Recreation		59	5	
9	Wilderness designation		59		

DRAFT Gunnison Basin Implementation Plan - Nonconsumptive Protection & Monitoring Project List (7/31/14)
(Legend provided below table)

Ref #	Project	Project Sponsor	Water District	Basin Goal	Purpose
10	Aspinall Unit Ramp Up (25 percent per day) & Ramp Down (15 percent per day)	USBR & NPS	62		Ramp rates are included in Aspinall EIS. As the down ramp rate is critical to aquatic protections, it is important to understand how the ramp down rates impact both aquatic species as well as pool elevation's in Blue Mesa.
11	Aspinall Unit Reoperations EIS	USBR & FWS	62	5, 8	
12	Intergovernmental Agreement Coordinating Outlet to Control Lake Level and Stream Flows in Lake Fork		62	5	Implemented to benefit trout ponds and instream flows.
13	Monitoring and DNA sampling for Quagga Mussel, Aspinall Unit Reservoirs		62		
14	Morrow Point Boat Tour		62	5	Stage at about 7,160 results in maximum power generation efficiency, thus tour boat need fits within BOR/WAPA reservoir level/power generation strategy.
15	NPS WQ Monitoring, Crystal Reservoir Tributary Sites		62		
16	NPS WQ monitoring, Morrow Point Tributary Sites		62		
17	Invasive Species Control Program - Quagga and Zebra Mussels	CPW & USBR	40, 59, 62	5	
18	BOR fish habitat mitigation	USBR	40, 41, 42, 59, 62	5	
19	Protection of Lower Basin Recreation Flows		40, 42	5	
20	Protection of Lower Gunnison River Water Supply, Aquatic Life and Recreation Flows		40, 42	5	This would examine whether (or not) current nonconsumptive discharge is required to meet new State standards for nutrients (and hence temperature and dissolved oxygen).
21	Wilderness Designation		40, 42		
22	NPS WQ Monitoring, Gunnison River Sites		40, 50, 62		

DRAFT Gunnison Basin Implementation Plan - Nonconsumptive Protection & Monitoring Project List (7/31/14)
(Legend provided below table)

Ref #	Project	Project Sponsor	Water District	Basin Goal	Purpose
23	Managing Lake Trout populations of brown trout, rainbow trout and kokanee salmon	NPS & CPW	59, 62	5	
24	NPS WQ monitoring, Blue Mesa Tributary Sites	NPS	59, 62		
25	National Park Service Water Rights Utilized to Preserve Ecological Values in Park	NPS	59, 62, 40	5	
26	Cebolla Creek Instream Flow				
27	Coleman Easement Min Flow				
28	Little Cimarron Creek Instream Flow				
29	Special management designation - protected as wilderness				
30	Tomichi Real Estate Purchase				
31	Travel Management Plan - reduction of roads in water influx zones				
32	Travel Management Plan - reduction of roads in water influx zones				
33	USFS Fish Hatchery	USFS		5	Help ensure spring flows hatchery are between 5-11 cfs
34	USFWS Fish Hatchery	USFS		5	

LEGEND

Sponsor Type – Single Entity (SE), Partnership (P)

1. Protect existing water uses in Gunnison Basin

2. Discourage the conversion of productive agricultural land to all other uses within the context of private party rights

3. Improve agricultural water supplies to reduce shortages

4. Identify and address municipal and industrial water shortages

5. Quantify and protect nonconsumptive water uses

6. Maintain or, where necessary, improve water quality throughout the Gunnison Basin

7. Describe and quantify the beneficial relationship between agricultural and nonconsumptive water uses

8. Restore, maintain, and modernize critical water infrastructure, including hydropower

9. Maintain active and comprehensive public education process about water resources in the Gunnison Basin

Purpose - Brief description of the project/objective

Completed and Ongoing Projects

Since the beginning of the Basin roundtable process in 2005, many diverse water projects have been successfully funded and completed. These projects have gone a long ways towards meeting the diversity of water needs and associated Basin Goals in the Gunnison Basin. Table 20 lists recent projects since the creation of the Gunnison Basin Roundtable in 2005 that have been or are currently being funded through the grant programs of the CWCB's Water Supply Reserve Account, the Upper Gunnison River Water Conservancy District, and the Colorado River Water Conservation District.

Table 20. Completed and Ongoing Projects

DRAFT Gunnison Basin Implementation Plan - Completed and Ongoing Project List (7/31/14)

Funding Year	Project	Description	Amount Funded	Funding Source
2007	Lake San Cristobal Controlled Outlet Structure (Part 1)	Hinsdale County and the Upper Gunnison River Water Conservancy District (UGRWCD) explored the feasibility of constructing a new permanent control structure at the outlet of Lake San Cristobal. The new structure allows for more controlled releases to regulate the lake level and prevent failure of the structure during flood events. The additional stored water resulting from the project will be used primarily as augmentation water within the Lake Fork of the Gunnison River. Other beneficial uses may include agriculture, recreation, and releases for instream flows.	40,000	WSRA
2007	Off-System Raw Water Storage Project 7 Water Authority/Uncompahgre Valley Water Users Association (Part 1)	The proposed new reservoir would be located on BLM and/or private land in the vicinity of Fairview Reservoir would have a capacity sufficient to supply P7 customers with domestic water for up to one full year. A detailed evaluation and comparative analysis of the potential sites was performed to identify the best reservoir location.	56,700	WSRA
2007	Orchard City Water Reservoir Project (Task 1-3)	This project involves the design of an approximately 500 acre foot off-channel reservoir to serve the municipal/domestic needs of Orchard City.	60,000	WSRA
2007	Orchard City Water Reservoir Project (Remaining Tasks)		480,000	WSRA
2007	Overland Reservoir Dam Expansion/Restoration (Part 1)		68,000	WSRA
2007	Paonia-Feldman Diversion Reconstruction; North Fork of the Gunnison River (Part 1 and 2)		110,700	WSRA
2007	Safety and Serviceability Needs Inventory for Reservoirs in the Leroux Creek Drainage Basin (Part 1)		60,000	WSRA
2007	Sedimentation Management Study For Paonia Reservoir - North Fork of the Gunnison (Part 1)		309,000	WSRA
2008	Lake San Cristobal Outlet Structure Modification (Part 2)		120,960	WSRA
2008	Engineering for Lake San Cristobal Outlet Modification (Part 3)		75,265	WSRA
2009	Barz Pond	150' x 150'x 9'6" Deep Augmentation Pond Construction	35,000	UGRWCD
2009	Development of Augmentation Supplies		50,000	WSRA
2009	Hartland Diversion Dam Fish Passage Feasibility Study		22,100	WSRA

DRAFT Gunnison Basin Implementation Plan - Completed and Ongoing Project List (7/31/14)

Funding Year	Project	Description	Amount Funded	Funding Source
2009	Juniata Reservoir Spillway Modification		97,000	WSRA
2009	Ridgway Ditch and Lake Otonawanda Improvement Project	The Lake Otonowanda feasibility study assessed options to meet the town water needs when the Town's water rights were out of priority or physical shortage and recommended increasing the capacity of the lake. Currently under construction.	109,500	WSRA
2010	75 Ditch Diversion Improvements and Feature Enhancements	Construction of a multi-purpose structure on the Gunnison River at the location of the 75 Ditch Diversion, improving the year-round delivery of water to the 75 Ditch.	(A) 34000.00 (B) 46,100	(A) UGRWCD (B) WSRA
2010	Augmentation and Water Storage at the Rocky Mountain Biological Laboratory	Installation of 20,000 gallon water tank to address water storage issues. Also, installation of underground pipes from water source to water treatment plant and from water treatment plant throughout the core part of the townsite. This will aid in replacing failing system as well as making it one system that is public and capable of operating year round.	40,000	UGRWCD
2010	Campbell Ditch Rehabilitation Project	Repair of Campbell Ditch that has fallen into disrepair, increasing grazing capacity on Eagle Ridge Ranch. Also will enhance Sage Grouse leak as new grasses replace sage brush near the ditch.	17,500	UGRWCD
2010	Hanson Reservoir Outlet Rehabilitation		50,000	WSRA
2010	Lake San Cristobal Outlet Structure (Part 4)		150,000	WSRA
2010	Pioneer Irrigation Ditch Diversion	Replace gravel diversion, headgate and partial flume to stabilize the creek, reduce annual in-stream maintenance, and improve water quality on Tomichi Creek.	16,702	UGRWCD
2011	Agricultural Weather Data Delivery Improvements to Uncompahgre Valley Irrigators		112,000	WSRA
2011	Basin Roundtable Project Exploration Committee: Flaming Gorge		9142.83	WSRA
2011	Halazon Ditch Diversion Reconstruction	Reconstruction of the amazon Ditch diversion which is used for irrigation by the Town of Crested Butte.	2,712	UGRWCD
2011	Hartland Dam Improvements		2,200,000	WSRA, USFWS, CRD, Walton Family Foundation
2011	Hyzer Ditch Cooperative Reclamation	Modify the point of diversion on Hyzer Ditch to enhance the ditch's conveyance of water and to secure the channel and banks within the reach of the diversion.	4,425	UGRWCD
2011	Lining Outlet Pipe for Grand Mesa Reservoir #6		19,840	WSRA
2011	Relief Ditch Diversion Dam Design		800,000	WSRA, CRD, TU and Walton Family Foundation
2011	Taylor Park Marina Repair	Heavy equipment rental and purchase of materials needed to repair shore erosion from high water conditions. Also, purchase of materials needed to repair beach access stair damage.	2,334	UGRWCD

DRAFT Gunnison Basin Implementation Plan - Completed and Ongoing Project List (7/31/14)

Funding Year	Project	Description	Amount Funded	Funding Source
2011	The Rehabilitation of Blanche Park Reservoir		75,000	WSRA
2011	The use of excess storage capacity in Blue Mesa Reservoir to avoid or reduce the impact of a Co River Compact curtailment in Co		24,500	WSRA
2011	Tomichi Creek Fish Passage and Diversion Improvement	Dam removal, stream bank restoration and diversion improvement of Owen No. 1 ditch.	4,695	UGRWCD and Trout Unlimited
2011	Water Distribution System at Rocky Mountain Biological Laboratory	Upgrading of the Rocky Mountain Biological Laboratory water delivery system in order to increase water efficiency by reducing loss of water due to breaks.	50,000	UGRWCD
2012	Cottonwood Creek Water Quality Improvement	Reduce non-point sources of sedimentation to Cottonwood Creek which is caused by erosion from BLM Road 3309. This will include the installation of diversion prevention dips for controlling runoff from the road.	10,313	UGRWCD
2012	Crested Butte Water Ditch	Redesign of the diversion structure and develop alternatives and cost estimates for reconstruction in the Crested Butte Water Ditch.	6,000	UGRWCD
2012	Enhancing Ecosystem Resilience of Riparian/Wetlands Habitat in the Upper Gunnison Basin	Implementation of a climate adaptation project to restore and enhance resilience of riparian/wetlands areas in order to enhance adaptive capacity of the Gunnison Sage-Grouse.	34,634	UGRWCD
2012	Government and Strachan Ditch Reclamation	Reclamation of reaches along Los Pinos Creek to ensure decreed amounts of water are conveyed to the Government and Strachan Ditches.	7,675	UGRWCD
2012	Gunnison Basin Roundtable Education Program		19,750	WSRA
2012	Gunnison Middle School Water Resources Learning Lab	Conversion of irrigation retention pond into outdoor learning center	27,749	UGRWCD
2012	North Fork of the Gunnison Invasive Week Removal		20,000	WSRA
2012	Town of Ridgway Lake Otonowanda Renovation Project	Enlargement of the Lake increasing the capacity from about 100 acre feet to over 600 AF and installing a new outlet system to replace the outlet that collapsed decades ago.	1,800,000+	WSRA, CWCB, DOLA EIAF, Town cash
2012	Tunnel Reconstruction Project		730,110	WSRA
2013	Crested Butte Municipal Water Diversion Reconstruction	Design a sustainable alternative to the existing in-stream diversion dam to minimize the need for regular disturbance of the creek bed, deliver a full decree of irrigation water the Crested Butte water ditch, reduce sedimentation at the diversion box, and allow for fish passage at all flow levels.	12,872	UGRWCD

DRAFT Gunnison Basin Implementation Plan - Completed and Ongoing Project List (7/31/14)

Funding Year	Project	Description	Amount Funded	Funding Source
2013	Dam Outlet Structure Repair		31,372	WSRA
2013	Enhancing Resilience of Riparian/Wetlands Habitats in the Upper Gunnison Basin: Part II	Implementation of a climate adaptation project to restore and enhance resilience of riparian/wetlands areas in order to enhance adaptive capacity of the Gunnison Sage-Grouse.	29,997	UGRWCD
2013	Gunnison River - Ohio Creek Irrigating Ditch Improvement	Installation of pipe to carry the Gunnison River - Ohio Creek Irrigating Ditch through the Lost Canyon Resort as this area of the ditch if prone to failure and severe leakage. This will provide a more efficient water delivery system.	25,000	UGRWCD
2013	Henson Creek and Lake Fork Confluence Channel Improvement		289,086	WSRA
2013	Lake San Cristobal Inlet Preservation and Fishing Access		1,670,000	WSRA
2013	Monism Ranch Ditch Reclamation	Reclamation of reaches along Carbon, Owens, Cabin, and Kubler ditches to ensure decreed amounts of water are efficiently conveyed to the meadows and pastures these ditches service.	17,465	UGRWCD
2014	Deldorita Ranch Irrigation Improvement	Improve the existing irrigation system on Deldorita Ranch to provide better control of irrigation water and minimize fish mortality in irrigation ditches.	2,366	UGRWCD
2014	Elmer Ditch #1 Point of Diversion and Ditch Reclamation	Bring headgate and diversion levee into working condition, rebuild diversion levee to capture low flow and attenuate higher flows, rebuild degraded ditch bank to promote effective channel flows.	12,197	UGRWCD
2014	Hydroperiod changes of high altitude ponds and impacts on pond organisms	Replace 44 water height date loggers at Mexican Cut pomnds and Kettle Ponds.	22,880	UGRWCD
2014	Upper Ohio Creek Flow Restoration	Improve irrigation water use efficiency for water diverted from Castle Creek into Acme Ditch in order to maintain a minimum flow in Castle Creek.		UGRWCD & TU
-	Project 7 - 5 MGD Emergency Alluvial Wells	To strategically locate, build, and maintain 5 MGD of alluvial groundwater for a backup source to the Gunnison river water that supplies the main WTP upon which 46,000 people rely for daily needs.		
-	Bank Stabilization & Riparian Restoration			
-	Blanche Park Reservoir	Total reconstruction of breached reservoir.		
-	Bonita Reservoir	Outlet pipe leaks around headgate - reservoir under no fill restriction.		
-	City of Ouray Supply Ditch Improvement			
-	Fish Screen & Ladder at Redlands Power Canal			
-	Leon Park Reservoir	Project includes A) permanently attaching a new precast gate structure to existing conduit, B) installing a new wheelhouse and gate stem-pipe to said gate structure, C) improve downstream outlet to allow for improved monitoring.	15,000	WSRA

DRAFT Gunnison Basin Implementation Plan - Completed and Ongoing Project List (7/31/14)

Funding Year	Project	Description	Amount Funded	Funding Source
-	McCormick Ditch Reconstruction	This project would construct a new diversion structure for McCormick Ditch in the Town of Crested Butte. Currently water is diverted by means of a push up rock and gravel dam which must be worked on each year. The project would have both consumptive and non consumptive benefits, helping the Town of Crested Butte and agricultural water users as well as benefitting the stream.		
-	McKinley Ditch Project			
-	Ouray Storage & Hydro Reservoir			
-	Overland Ditch			
-	Park Reservoir	Line the last 30 feet of the outlet pipe		
-	Peak Reservoir	Total reconstruction of dam		
-	Skinned Horse Reservoir	Many leaks in the water pool that are in slide rock		
-	Standard Superfund Site			
-	Stewart Mesa Water Company Improvement Project	Task 1 includes the installation of improvements to the Main Line, the McFarland Service Branch, and the Travie Service Branch while task 2 involves completing engineering analysis of delivery systems defining issues such as system capacity, improvements req. to increase capacity, prioritizing improvements to reduce maintenance and enhance system sustainability, leak analysis including recommendations.		
-	SWSI Aquatic Wildlife Management Plan			
-	SWSI Aquatic Wildlife Management Plan			
-	SWSI Aspinall Unit Operations EIS			
-	Boyd Reservoir	Total reconstruction of breached reservoir.		
-	Boyd Reservoir	Total reconstruction of breached reservoir.		

4.6 Project Summary Template

To systematically present detailed project information, a standard project summary template was developed. The template enables the review and comparison of projects through a concise summary of project information, including projects constraints, implementation strategies and how well the project meets the Basin Goals. Proposed projects included in Tier 1 that will clearly meet Basin Goals and can be implemented by the year 2025 are highlighted in Section 4.4 with separate summary sheets. The project template is presented below.

Table 21. Project Summary Sheet

Project Name	
Project Sponsor	
Category	**Sponsor Type:** ☐ Single Entity ☐Partnership **Use Type:** ☐ NC ☐Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☐ Non-Structural **Geographic Extent:** ☐ Single District ☐ Multi-District ☐ Transbasin
Water Districts	Colorado Division of Water Resources Water District
Volume of Water Gained or Saved	
Purpose	Brief description of project purpose. Typically 1-2 sentences.
Est. Completion Date	
Est. Total Budget	
Constraints and Challenges	Issues or circumstances limiting project implementation. May include: • **Acceptance (conflicts, adverse impacts, disincentives)** • **Feasibility (cost, land ownership, hydrology, water rights administration)** • **Regulations (permitting, limitations, restrictions)**
Implementation Steps and Project Scope	Systematic plan to implement the proposed project. May include: • **Partnerships and Cooperative Strategies** • **Technical and Feasibility-Level Analysis** • **Permitting, Design, and Construction** • **Funding Mechanisms** • **Public Education, Outreach, and Acceptance**
Effectiveness at Meeting Basin Goals	Description of how well the project meets specific GBIP Basin Goals and Measurable Outcomes.

4.7 Project Summaries

The Project Summary Sheets for all Tier 1 projects are presented below.

Project Name	1. Gunnison Basin Roundtable 2015 Education Action Plan Activities
Project Sponsor	Gunnison Basin Roundtable
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☐ Single District ☒ Multi-District ☐ Transbasin
Water Districts	All – 28, 40, 41, 42, 59, 62, 68
Volume of Water Gained or Saved	Not applicable.
Purpose	Creation and implementation of the 2015 GBRT Education Action Plan (EAP) to include such items as: active education or stewardship programs for high school students, a Basin Water Leaders program at universities in the Basin for college students to develop and deliver education programs for public K-12 schools, printed materials about "comfortable and intelligent desert living", sub-basin-specific half-day programs and printed materials for decision makers, etc.
Est. Completion Date	Ongoing
Est. Total Budget	TBD
Constraints and Challenges	Not foreseeable challenges at this point.
Implementation Steps and Project Scope	• A Gunnison Basin Education and Outreach Committee (GBEOC) will be organized, composed of a representative from each of the six sectors of the Gunnison Basin (Upper Gunnison, North Fork, Surface Creek/Grand Mesa, Upper Uncompahgre, Lower Uncompahgre, and Lower Gunnison). For sectors with existing watershed groups, the education facilitator from that group should ideally be a GBEOC member. The Roundtable Public Education, Participation and Outreach Liaison will also be a member. This group will meet quarterly (February, May, August and November), prior to Gunnison Basin Roundtable meetings, and as necessary between those meetings. • The six sector representatives will explore partnership opportunities in their sector, identifying organizations and individuals interested in participating in the water future of their area, either financially in supporting project activities or through providing volunteers for program field activities, or in other more specific participatory ways. • The six sector representatives, working with funds provided by the CWCB and Roundtable, will assess the perceived education needs in their sector, for youths,

	adults, and specifically targeted groups (city councils, county commissions, business organization, etc.), and will report that to the full committee. • The GBEOC will prepare activities for the Roundtable, and possibly for selected other Basin organizations, to spur discussion on water-related issues requiring clarified or changed thinking. An example will be the challenge of gradually freeing up some water from agriculture for other uses over the 35-year time period without diminishing the acreage under irrigation in the Basin. • The GBEOC will (presumably working with other basins and state organizations) develop an education program for enlarging basin inhabitants' thinking about M&I water providers, bringing them to acknowledging that water providers are not selling water by the gallon, but are providing a service with fixed costs independent of individual use decreases. • The GBEOC will initiate an inventory of Gunnison Basin land-use planning codes, regulations and guidelines as those codes, et cetera, relate to the relationship between land and water. Once this is complete, a follow-up study will pull together "Best Practice" analysis of alternatives that will try to balance land development with water sufficiency. • The GBEOC representatives in the Upper Gunnison and Lower Gunnison sectors, together with other representatives, will initiate discussion with relevant college faculty and officials at Western State Colorado University and Colorado Mesa University, and organizations like the Youth Corps Association, to initiate a "Water Leaders" program for the Basin, utilizing college students to work in the Basin's public schools, assisting in delivering educational programs, and leading small field groups in stewardship activities.
Effectiveness at Meeting Basin Goals	As an ongoing education project, this project increases water resource awareness in the Basin and effectively meets the Basin goal targeted at educational outreach (Goal #9). Additionally, the EAP indirectly discourages the conversion of productive agricultural land to all other uses (Goal #2), encourages the protection of existing uses in the Basin (Goal #1), and raises awareness regarding the beneficial relationship between agricultural and nonconsumptive water uses (Goal #7).

Project Name	2. Regional Conservation Partnership Program (RCPP): **Modernizing Agricultural Water Management in the Lower Gunnison River Basin: a Cooperative Approach to Increased Water Use Efficiency and Water Quality Improvement**
Project Sponsor	CRWCD, TU, TNC, UVWUA, NFWCD, CWCD, BPWCD
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☒ Non-Structural **Geographic Extent:** ☐ Single District ☒ Multi-District ☐ Transbasin
Water Districts	40, 41
Volume of Water Gained or Saved	Significant, but yet to be calculated.
Purpose	The RCPP is a large federal funding program through the NRCS to promote coordination between the NRCS and its partners deliver conservation assistance to producers and landowners. This complex project involves the funding of agricultural efficiency improvements in four systems: Crawford Water Conservancy District, Uncompahgre Valley Water Users Association, Fire Mountain Canal and Reservoir Company, and Bostwick Park Water Conservancy District. **All four of the individual projects are also included independently on the GBIP project Tier 1 list with more detail.** Funding for these projects will help to modernize and improve off and on farm water transmission and application infrastructure in Lower Gunnison to accurately meet agricultural water demands while improving flow and water quality in an area with saline and seleniferous soils. This will be accomplished by significantly increasing water use efficiency by coordinating expanded efforts and by integrating off-farm irrigation conveyance system and on-farm water application efficiency improvements. The project directly addresses the four identified CCA resource concerns in the Colorado River Basin **1)** Water Quality Degradation: Excessive salts in surface waters and ground waters, **2)**Insufficient Water: Inefficient use of irrigation water; **3)** Soil Quality Degradation: Concentration of salts and other chemicals, and **4)** Inadequate Habitat for Fish and Wildlife: Habitat degradation
Est. Completion Date	Ongoing
Est. Total Budget	$50,000,000
Constraints and Challenges	Coordination of funding entities, sponsors, and construction firms will be complicated. Various planning documents and environmental permitting requirements may add complexity, costs, and delays. Land ownership and easement issues may also need to be addressed.
Implementation Steps and Project Scope	1. Reduce selenium loading by a significant and measureable amount to the designated critical habitat for the endangered fishes over the project timeline, as measured at the mouth of the Gunnison River relative to pre-project conditions. 2. Reduce salt loading by a significant tonnage over the project timeline, as measured at

	the mouth of the Gunnison River relative to pre-project conditions. 3. Improve, modernize, and optimize irrigation water conveyance systems in the four focus areas such that water managers and producers can (a) more efficiently use storage facilities as measured by the number of additional days that supplemental irrigation water is available compared to historical averages, (b) reduce diversions as measured by improved stream flows at multiple strategic locations compared to historical averages (c) increase water availability in critical habitat, (d) conserve a significant volume of water in the four identified focus areas. 4. Upgrade an estimated 800 acres throughout the project area from flood irrigation systems to higher efficiency irrigation systems (e.g. laser leveled, highly managed improved surface systems, sprinkler or micro-irrigation systems) with corresponding irrigation water management/conservation plans. 5. Upgrade many canals and laterals in the four focus areas from open earthen ditches to enclosed, pressurized pipelines, where appropriate. 6. Enroll an estimated 1200 acres throughout the project area in a Conservation Activity Plan with soil health components (as appropriate) that includes one or more of the following elements: cover crops, mulching, nutrient management, and no till or reduced till management.
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, this multi-prong project will help maintain agricultural land (Goal #2), while meeting agricultural shortages (Goal #3), protecting water quality (#6) and nonconsumptive uses (Goal #5). Finally, the project will help to demonstrate the beneficial relationship between agriculture and the environment (Goal #7).

Project Name	3. Inventory of Irrigation Infrastructure Improvement Needs - District 28
Project Sponsor	Upper Gunnison River Water Conservancy District
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	28
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow.
Est. Completion Date	2018
Est. Total Budget	$100,000
Constraints and Challenges	Funding mechanisms – project beneficiaries are unable to contribute to funding and cannot afford a major project.
Implementation Steps and Project Scope	Projects will be identified through technical meeting discussions. Furthermore, local landowners will be able to submit projects or sites in need. Once identified, measurable outcomes and metrics will need to be developed to help evaluate and prioritize potential projects.
Effectiveness at Meeting Basin Goals	This inventory identifies infrastructure improvement projects spanning agricultural projects that improve agricultural water supplies and reduce shortages (Goal #3), projects protecting nonconsumptive water uses (Goal #5), as well as projects that will restore, maintain, and modernize critical water infrastructure (Goal #8). The inventory also results in a better understanding of the beneficial relationship between agricultural and nonconsumptive water users (Goal #7). Furthermore, the inventory highlights projects that help protect existing water uses in the Basin (Goal #1).

Project Name	4. Cole Reservoirs #4 and #5
Project Sponsor	Bill Martin
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	Significant, but yet to be calculated. Repairs would enable the use of the pre-Compact 146 acre-foot storage water right that has been unavailable due to existing structural deterioration.
Purpose	This project involves the repair or replacement of the main headgate diversion from Surface Creek and cleaning of the associated inlet ditch. It would preserve and restore the use of an important pre-Compact water right.
Est. Completion Date	2015
Est. Total Budget	$50,000
Constraints and Challenges	Issues limiting project implementation may include: • *Cost/Funding* – project costs and limited owner resources may limit project scope or delay timing. Outside funding may be necessary for project implementation. • *Regulations* – permitting requirements may limit construction activities and potentially increase cost and timing.
Implementation Steps and Project Scope	Project components may include: • Engineering design work for the repair or replacement of the deteriorated headgate diversion structure on Surface Creek for Cole Creek Reservoir #4 and #5. • Construction of recommended structural changes. • Cleaning of reservoir inlet ditch. • Potential Investigation of Funding Mechanisms: CWCB grants, CWCB loans, etc.
Effectiveness at Meeting Basin Goals	This project helps protect a critical existing pre-Compact water right in the Basin (Goal #1). In addition it could help increase agricultural water supplies to reduce shortages (Goal #3), while clearly restoring critical existing infrastructure (Goal #8).

Project Name	5. Crawford Reservoir System Optimization Study and Prioritized Conveyance Improvements
Project Sponsor	Crawford Water Conservancy District
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	Not applicable for study.
Purpose	Systematically examine and prioritize projects to improve conveyance, automation, and measurement infrastructure as related to irrigation delivery systems. This project is part of the Regional Conservation Partnership Program (RCPP) Modernizing Agricultural Water Management in the Lower Gunnison River Basin: a Cooperative Approach to Increased Water Use Efficiency and Water Quality Improvement, which is providing a significant amount of funding.
Est. Completion Date	2020
Est. Total Budget	To be determined.
Constraints and Challenges	Funding – the study will likely need grant funding assistance. Implementation of the prioritized projects will then likely require significant funding assistance (not included in this project's scope).
Implementation Steps and Project Scope	• Identify projects through technical meeting outreach, research, and input from local stakeholders. • Prioritize projects based on GBRT Basin goals and measureable outcomes. This may require varying degrees of project-specific research to better understand scope, feasibility, design, funding, and necessary permitting.
Effectiveness at Meeting Basin Goals	This study identifies infrastructure improvement projects related to conveyance, automation and measurement infrastructure. The study will highlight and prioritize projects that improve/maintain critical water infrastructure (Goal #8) as well as those that improve agricultural water supplies, consequently reducing shortages (Goal #3). Once implemented, these projects will help protect existing water uses in the Basin (Goal #1).

Project Name	6. Doughty #1 - Chipmunk Reservoir
Project Sponsor	Perry Hotz
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	Fixing the breached reservoir will result in approximately 55 AF of stored water which can be used to meet irrigation demands. Reservoir could be enlarged to store the full decreed amount of 68 AF.
Purpose	Reconstruction of breached reservoir with potential enlargement to store the full decreed amount.
Est. Completion Date	2018
Est. Total Budget	$125,000 for repairing the breached reservoir. Additional $80,000 for enlargement.
Constraints and Challenges	• Funding • Verify project meets current State and Federal regulations – especially in regards to wetlands
Implementation Steps and Project Scope	• Preliminary engineering analysis is complete – needs to be revisited prior to project implementation. • Forest Service permit has been approved. • Apply for funding. • Hire a contractor to complete project.
Effectiveness at Meeting Basin Goals	As of now, the reservoir is unable to store water. Once fixed, or enlarged, the reservoir will be able to store water to meet irrigation demands – which will discourage the conversion of productive agricultural land to all other uses (Goal #2) and reduce agricultural shortages by improving water supplies (Goal #3). Additionally, this project restores critical water infrastructure in the Basin (Goal #8) and helps protect existing uses in the Basin (Goal #1).

Project Name	7. Fire Mountain Canal Delivery Efficiency Project
Project Sponsor	Fire Mountain Canal Company
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	1,000 – 2,000 AF per year
Purpose	This project is a multifaceted project, allowing more efficient use of irrigation water in the North Fork of the Gunnison. This project is part of the Regional Conservation Partnership Program (RCPP) Modernizing Agricultural Water Management in the Lower Gunnison River Basin: a Cooperative Approach to Increased Water Use Efficiency and Water Quality Improvement, which is providing a significant amount of funding.
Est. Completion Date	2020
Est. Total Budget	$7,746,100
Constraints and Challenges	• Funding • Buy in from local irrigators to utilize better deliveries • Project design
Implementation Steps and Project Scope	• **Improve safety and reliability of existing canal** — includes improvements to a critical section of the Fire Mountain Canal and installation of canal measurement, monitoring, and automated wasteway operation improvements in the critical section and at other locations in the upper portion of the canal. One of the most problematic sections of the canal is located just above Terror Creek along Garvin Mesa where there are multiple active landslide areas and rockfall zones. A geotechnical engineer from Reclamation's TSC inspected the above canal section on August 22, 2013. A conceptual design was developed based on the findings of the inspection that includes slope stabilization components and canal improvements. Significant specific components include pipe placement and canal lining, underdrain improvements, lining of upstream ponds and drainage improvements, landslide excavation, ground and slope anchors, and access road improvements. Estimated cost: $ 4,178,000 • **Maximize efficiency of deliveries** — includes automation and monitoring. This allows for more of a demand managed system, creating a surplus of water which could be used later in the growing season. The proposed monitoring and automation improvements include automation of six wasteways and three diversion structures, monitoring of canal levels at multiple locations, and associated SCADA hardware and software. Estimated cost included in previous bullet. • **Replacement of Fire Mountain Canal diversion** — an engineering consultant has developed conceptual designs for two replacement alternatives. Estimated cost: $2,873,000 • **Planning study on long-term delivery system improvements and implementation of said recommendations** — would include a comprehensive evaluation of long-term future improvements that would allow for efficient demand management of the delivery system to include lining and piping all 27 miles of the Fire Mountain Canal and certain laterals, measurement improvements, expanded remote monitoring/control/automation, vegetation control, etc. The study results would

	provide a road map for phased implementation of system improvements to plan for funding and best utilize resources. Estimated cost: $695,100
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, this project will help meet agricultural shortages (Goal #3), while protecting water quality (#6) and meeting nonconsumptive (Goal #5). Finally, the project will help to demonstrate the beneficial relationship between agriculture and the environment (Goal #7).

Project Name	8. Marcott Reservoir
Project Sponsor	Grand Mesa Water Conservancy District
Category	Sponsor Type: ☒ Single Entity ☐Partnership Use Type: ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) Project Type: ☒ Structural ☐ Non-Structural Geographic Extent: ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	Enables the reservoir to store its full decree of 330 AF.
Purpose	Marcott Reservoir has leaks that need to be repaired – allowing the reservoir to hold its decree. Furthermore, the outlet pipe needs extensive repair.
Est. Completion Date	2015
Est. Total Budget	$135,000 - $175,000
Constraints and Challenges	• Cost/Funding – expensive to transfer material to reservoir site as it is located in the mountains. Additionally, instead of breaching the dam to repair the outlet, in-situ piping is being considered as a more preferable but costly option. Grand Mesa Water Conservancy District is prepared to match 100% if they can get funding assistance. • Regulations – permitting is not a prohibitive issue as a maintenance agreement with the Forest Service is already in place.
Implementation Steps and Project Scope	• The reservoir is inspected annually to monitor whether the pipe is on the verge of buckling. Due to the risk of this occurring and causing a potential crisis, this project is time sensitive and should be completed as soon as possible. • Companies that complete in-situ piping have been identified, however they do not usually perform such work on reservoirs. In order to assist the contracted company, external engineering analysis must be completed. • Next steps include solidifying funding, contracting a company to complete the repairs and subcontracting an external engineering company to perform any necessary engineering.
Effectiveness at Meeting Basin Goals	Repairs to the reservoir help preserve the decreed water, which is primarily used for irrigation (Goal #1). By protecting the existing uses, this project discourages the conversion of productive agricultural land to other uses within the context of private party rights (Goal #2). Furthermore, the repairs result in the storage of more water, which help meet irrigation demands and reduce associated shortages (Goal #3). The project also focuses on maintaining and restoring critical water infrastructure (Goal #8).

Project Name	9. North Delta Canal
Project Sponsor	North Delta Irrigation Company (NDIC)
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	50 cfs
Purpose	In 2011, a century old tunnel collapsed, blocking delivery to 94% of the irrigation company's shareholders. Currently, the North Delta Canal gets half of the water through a newly installed pipe. The project includes tunnel reconstruction and piping of the ditch.
Est. Completion Date	2020
Est. Total Budget	$2,000,000
Constraints and Challenges	This project has many challenges. After the tunnel collapsed, an engineering company installed 48'' pipe through the collapsed tunnel; however the solution did not yield any water. They then laid 500' of 54'' pipe upstream of the tunnel to gain head which did not ameliorate the issue. Another engineering company was contracted to survey the piping work and discovered 3 alignment issues obstructing flow through the tunnel. These efforts cost nearly $1,575,000 which came from BRT and CWCB grants as well as a CWCB loan. Funding will likely pose a huge challenge for this project as the project may have already maxed out its borrowing capacity. Furthermore, the pipe has been buried under the gravel hillside—making it very difficult to remove.
Implementation Steps and Project Scope	The NDIC knows the current issues/flaws with the previous work done on this project. A feasibility study coupled with a cost-benefit analysis could be beneficial to help understand the pros and cons of implementing alternative solutions versus ameliorating the piping that has been installed. One alternative is to pump the decreed water into an upstream reservoir which bypasses the tunnel altogether.
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, this multi-prong project will help maintain agricultural land (Goal #2), while meeting agricultural shortages (Goal #3) and nonconsumptive uses (Goal #5). Finally, the project will help to demonstrate the beneficial relationship between agriculture and the environment (Goal #7).

Project Name	10. Orchard Ranch Ditch
Project Sponsor	Orchard Ranch Ditch Company
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	500 acre feet per year saved from deep percolation.
Purpose	Project consists of piping approximately 2 miles of earthen ditch and upgrading the ditch's aging diversion structure
Est. Completion Date	2017 — contingent on funding availability in 2015
Est. Total Budget	$1,400,000
Constraints and Challenges	Funding is the main constraint and challenge. Other constraints and challenges such as preliminary design and shareholder approval have largely been resolved during a previous Bureau of Reclamation salinity control funding cycle.
Implementation Steps and Project Scope	We will apply for funding from the Bureau of Reclamation and other sources in early 2015. If we are funded design and environmental analysis will occur in 2015 and early 2016. Construction will begin in fall of 2016 and conclude in spring of 2017.
Effectiveness at Meeting Basin Goals	This project meets the Basin Goals by protecting existing water uses in the Gunnison Basin (Goal #1), improving agricultural water supplies to reduce shortages (Goal #3), protecting water quality (#6), discouraging the conversion of productive agricultural with respect to private party rights (Goal #2), and restoring critical water infrastructure (Goal #8).

Project Name	11. Overland Reservoir Enlargement (Part 2)
Project Sponsor	Overland Ditch and Reservoir Company
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	1,009 AF
Purpose	Currently the reservoir stores 6163 AF for agricultural use. The project involves increasing the existing reservoir storage an additional 1009 AF to a combined storage 7,172 AF. All water decrees are absolute. 80% of storage is pre-compact (1921) water decrees.
Est. Completion Date	2020
Est. Total Budget	$2,000,000+
Constraints and Challenges	• 0.06 acres of FENS wetlands impacted in new high water zone • Little or no science on the impact of impoundment of water on wetlands • EPA expected to veto the project based on wetlands concerns • Permitting costs approaching $350K and expected to double. As a small water company the costs may be not manageable. This is a simple enlargement project of an existing structure that engineering wise is an ideal project • Experience to date is that supply projects on Federal Lands may be too expensive or impossible to permit
Implementation Steps and Project Scope	• The project is now 8 years into the permitting process • Filing for the permit application for the 404 permit expected late 2014 • The USFS has accepted the Special Use Permit Application • The NEPA process is starting • FS has mandated a full Environmental Impact Statement with expected costs in the 250K range • Cost recovery meetings being held in June 2014
Effectiveness at Meeting Basin Goals	This is the only major storage project in the North Fork of the Gunnison drainage of this size. The project is identified as an expansion of an existing structure which is optimal from a cost to build structure (Goal #8). Additional storage is mostly pre-compact call water which enhances future value for the Colorado River Basin, protects existing uses in the Basin (Goal #1), and helps reduce agricultural shortages (Goal #3). The project will also help to demonstrate the beneficial relationship between agriculture and the environment (Goal #7).

Project Name	12. Paonia Reservoir Sediment Removal and Outlet Modification Project (Part 2)
Project Sponsor	North Fork Water Conservancy District (NFWCD) and Fire Mountain Canal and Reservoir Company (FMCC)
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	1,000 – 3,000 AF
Purpose	Paonia Reservoir was designed to store 21,000 AF of water which is used for irrigation, flat-water recreation, fishing, augmentation, and improved late season flows to the North Fork of the Gunnison. Over the last fifty years, the reservoir has lost 24% of its total capacity due to sedimentation build up. The goal of this project is so investigate long-term sediment management options with the intent of minimizing future losses and possibly restoring current capacity losses.
Est. Completion Date	2020
Est. Total Budget	$8,000,000
Constraints and Challenges	— Funding — Permitting — Engineering
Implementation Steps and Project Scope	• Currently in planning stage • Continue partnership with Bureau of Reclamation for funding and planning. • Funds available to start working on outlet modifications (potentially 2015). • The outlet works inlet and bulkhead was inspected by staff from Reclamation's Materials Engineering and Research Laboratory in November 2013. Future engineering will need to be completed prior to project implementation. • Other upgrades and improvements to existing dam structure also planned. • Outlet modifications will allow greater sediment passage and potential for flushing of accumulated sediment.
Effectiveness at Meeting Basin Goals	By decreasing further losses due to sedimentation, and potentially restoring some of the losses already incurred, this project improves agricultural water supplies – thus reducing shortages (Goal #3). Furthermore, the project restores critical water infrastructure in WD 40 (Goal #8) which helps protect existing water uses in the Basin (Goal #1). In addition this project will help to protect water quality (#6) and help to demonstrate the beneficial relationship between agriculture and the environment (Goal #7).

Project Name	13. Young's Creek Reservoirs (#1 & #2) Rehabilitation
Project Sponsor	Young's Creek Reservoir Company
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	785 AF
Purpose	The reservoir is used to meet downstream irrigation demands and is currently under fill restriction. Furthermore, it has sinkholes in the left dam abutment.
Est. Completion Date	2014
Est. Total Budget	$120,000
Constraints and Challenges	None present at this time.
Implementation Steps and Project Scope	• Prior engineering studies are being updated which suggest a synthetic liner is installed over sinkhole area as a solution. • Further test scheduled to finalize solution. • Permitting will not be a problem as a repair agreement is already in place with the Forest Service – access will not be a problem. • Estimated completion date is November 2014.
Effectiveness at Meeting Basin Goals	This reservoir is a critical water supply for many farms and ranches. Completion of this project will save water already inventoried in the Basin (Goal #1), it will help reduce irrigation shortages (Goal #3), and will restore critical water infrastructure in WD 40 (Goal #8).

Project Name	14. Granby Reservoirs (#5 and #11) Rehabilitation
Project Sponsor	Granby Ditch and Reservoir Company
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☐ NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	688 AF per year
Purpose	This project will line the outlet pipe of the reservoir and repair a leak in the headgate structure. This is pertinent as the reservoir is currently under a no fill restriction; however the water in the reservoir has already been counted in the Basin's inventory – further highlighting the imminent need for repair.
Est. Completion Date	2016 – contingent upon 2015 start
Est. Total Budget	$100,000 – 150,000
Constraints and Challenges	No major constraints or challenges currently present.
Implementation Steps and Project Scope	• A video inspection of the outlet pipe and headgate was completed in 2013. • The dam safety inspector did not put a fill restriction on the reservoir**.** • The reservoir is currently being monitored for any change – it is only a matter of time before the reservoir has to be fixed.
Effectiveness at Meeting Basin Goals	By repairing the reservoir and, consequently, lifting the no fill restriction, this project improves agricultural supplies and reduces shortages (Goal #3). Additionally, this project protects existing water uses in the Gunnison Basin (Goal #1) while also focusing on restoring and maintaining critical water infrastructure (Goal #8).

Project Name	15. Inventory of Irrigation Infrastructure Improvement Needs - District 40, Grand Mesa (Surface Creek)
Project Sponsor	Grand Mesa Water Conservancy District
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	This project will systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. The inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow. Recommended projects may include: diversion structures, measuring devices, ditch lining/piping, ditch realignment, conveyance loss studies, reservoir restoration, and reservoir enlargements.
Est. Completion Date	2018
Est. Total Budget	$75,000
Constraints and Challenges	Issues or circumstances limiting project implementation. • Buy in from many water users • Water rights administration • Regulations
Implementation Steps and Project Scope	Systematic plan to implement the proposed project. • Involve all major diverters from North Fork • Technical and Feasibility-Level Analysis • Funding Mechanisms • Public Education, Outreach, and Acceptance
Effectiveness at Meeting Basin Goals	Important project to assess the condition of major infrastructure in the Grand Mesa Area. It would have multiple benefits for agriculture, environment and recreation. More specifically, the inventory identifies infrastructure improvement projects spanning agricultural projects that improve water supplies and reduce shortages (Goal #3), projects protecting nonconsumptive water uses (Goal #5), as well as projects that will restore, maintain, and modernize critical water infrastructure (Goal #8). The inventory also results in a better understanding of the beneficial relationship between agricultural and nonconsumptive water users (Goal #7) while highlighting projects that help protect existing water uses in the Basin (Goal #1).

Project Name	16. Inventory of Irrigation Infrastructure Improvement Needs - District 40, Upper North Fork
Project Sponsor	North Fork Water Conservancy District
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	This project will systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. The inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow. Recommended projects may include: diversion structures, measuring devices, ditch lining/piping, ditch realignment, conveyance loss studies, reservoir restoration, and reservoir enlargements.
Est. Completion Date	2018
Est. Total Budget	$75,000
Constraints and Challenges	Issues or circumstances limiting project implementation. • Buy in from many water users • Water rights administration • Regulations
Implementation Steps and Project Scope	Systematic plan to implement the proposed project. • Involve all major diverters from North Fork • Technical and Feasibility-Level Analysis • Funding Mechanisms • Public Education, Outreach, and Acceptance
Effectiveness at Meeting Basin Goals	Important project to assess condition of major infrastructure in NF. Would have multiple benefits for agriculture, environment and recreation. Specifically, the inventory identifies infrastructure improvement projects spanning agricultural projects that improve agricultural water supplies and reduce shortages (Goal #3), projects protecting nonconsumptive water uses (Goal #5), as well as projects that will restore, maintain, and modernize critical water infrastructure (Goal #8). The inventory also results in a better understanding of the beneficial relationship between agricultural and nonconsumptive water users (Goal #7). Furthermore, the inventory highlights projects that help protect existing water uses in the Basin (Goal #1).

Project Name	17. Rehabilitation/Enlargement-28 Reservoirs LCWUA
Project Sponsor	Leroux Creek Water Users Association
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	Protects and maintains 5,000 acre-feet
Purpose	To continue use of aging reservoirs with some possible storage gains
Est. Completion Date	2020
Est. Total Budget	3,000,000 - 5,000,000
Constraints and Challenges	• Permitting • Funding • Timing
Implementation Steps and Project Scope	• Already have priority list of most needed repairs. • Some dam repairs begun (Hanson and Miller/Holt reservoirs). • Need funding for next series of repairs. • Plan is to ultimately rehab all reservoirs in system to allow for another 100 years.
Effectiveness at Meeting Basin Goals	• Addresses aging infrastructure (Goal #8) • Prevents and reduced agricultural shortages (Goal #3) • Maintains agricultural use of pre-1922 water rights (Goal #1)

Project Name	18. Somerset Diversion Improvement
Project Sponsor	Delta Conservation District/Somerset Domestic Waterworks District
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☐Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	The improved diversion efficiency should result in more water staying in the river at the diversion site and less excess water diverted and then returned to the river downstream of the diversion. The exact volume has not yet been determined.
Purpose	The purpose of this project is to improve the efficiency of the diversion, reduce the intake of sediment, improve fish and boater passage/safety, and improve the river/riparian habitat. The second purpose is to develop additional public access to the North Fork of the Gunnison River between the Paonia Reservoir and Paonia.
Est. Completion Date	2018
Est. Total Budget	$1,500,000
Constraints and Challenges	• To this point, all the stakeholders are support of the project. There are no known conflicts, adverse impacts, or disincentives. • There are no issues with the project feasibility relevant to cost, land ownership, hydrology, water rights administration. However, the development of public access has multiple issues to be worked out. • There are no know permitting, limitations, or restrictions impacting the project
Implementation Steps and Project Scope	Systematic plan to implement the proposed project include: • Partnerships and Cooperative Strategies have been developed and continue to be refined • Technical and Feasibility-Level Analysis is currently underway • Permitting, Design, and Construction will be pursued upon completion of the feasibility study • Funding Mechanisms have been defined for the entire project and will be developed upon completion of the feasibility study • Public Education, Outreach, and Acceptance has started before the feasibility study and will continue throughout the project.
Effectiveness at Meeting Basin Goals	This project helps ensure and improve the efficiency of M&I water supplies (Goal #4), provides nonconsumptive improvements to the river (Goal #5), protects existing uses in the Basin (Goal #1), and restores important water infrastructure (Goal #8). The measurable outcomes include the improved efficiency of the diversion, the level of sediment reduction, and the amount of improve public access to the river.

Project Name	19. Environmental/Recreational Project Identification and Inventory – North Fork Region
Project Sponsor	The Conservation Center
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☐Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	This project inventories, assesses, and prioritizes the feasibility of implementing projects targeted towards specific environmental/recreational focus segments and other areas of interest.
Est. Completion Date	2018
Est. Total Budget	$75,000
Constraints and Challenges	• Funding – the inventory will likely need grant funding assistance. Implementation of the inventoried projects will then likely require significant funding assistance (not included in this project's scope).
Implementation Steps and Project Scope	• Identify projects through technical meeting outreach, research, and input from local environmental/recreational interests. Potential projects may also be individually submitted. • Prioritize projects based on GBRT focus segments, Basin Goals, and measureable outcomes. This may require varying degrees of project-specific research to better understand scope, feasibility, design, funding, and necessary permitting.
Effectiveness at Meeting Basin Goals	This project inventories potential projects located on environmental/recreational focus segments targeted towards protecting environmental/recreational water uses (Goal #5). By better understanding environmental/recreational needs and the range of potential projects available for implementation, more informed choices on which projects to prioritize and implement can be made – thus better protecting existing water uses in the Basin (Goal #1). Additionally, an increased understanding of potential environmental/ recreational projects will help to highlight the beneficial relationship between agricultural and environmental/recreational water users (Goal #7). In addition, this project will help to protect water quality (Goal #6).

Project Name	20. Prioritized Conveyance Improvements and System Optimization Planning Study
Project Sponsor	Bostwick Park Water Conservancy District
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	41
Volume of Water Gained or Saved	Significant, but yet to be calculated.
Purpose	Systematically examine and prioritize projects to improve conveyance, automation, and measurement infrastructure as related to irrigation delivery systems. This project is part of the Regional Conservation Partnership Program (RCPP) Modernizing Agricultural Water Management in the Lower Gunnison River Basin: a Cooperative Approach to Increased Water Use Efficiency and Water Quality Improvement, which is providing a significant amount of funding.
Est. Completion Date	2020
Est. Total Budget	To be determined.
Constraints and Challenges	Coordination of funding entities, sponsors, and construction firms will be complicated. Various planning documents and environmental permitting requirements may add complexity, costs, and delays. Land ownership and easement issues may also need to be addressed.
Implementation Steps and Project Scope	Identify projects through technical meeting outreach, research, and input from local stakeholders. Prioritize projects based on GBRT Basin goals and measureable outcomes. This may require varying degrees of project-specific research to better understand scope, feasibility, design, funding, and necessary permitting.
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, this project will help maintain agricultural land (Goal #2), while meeting agricultural shortages (Goal #3).

Project Name	21. West Reservoir #1 Outlet Pipe Replacement
Project Sponsor	West Reservoir and Ditch Company
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	To be determined.
Purpose	West Reservoir is currently under a no fill restriction from the State Engineers Office because of concerns about a deteriorating outlet pipe. The owners propose to replace the existing pipe and restore the reservoir to use, thus helping preserve a pre-1922 water right.
Est. Completion Date	2025
Est. Total Budget	$426,317
Constraints and Challenges	Issues limiting project implementation may include: *Cost/Funding* – project costs and limited owner resources may limit project scope or delay timing. Outside funding may be necessary for project implementation. *Regulations* – permitting requirements may limit construction activities and potentially increase cost and timing.
Implementation Steps and Project Scope	Project components may include: • Engineering design work for the repair or replacement of the deteriorated outlet pipe. • Construction of recommended structural changes. • Potential Investigation of Funding Mechanisms: CWCB grants, CWCB loans, etc.
Effectiveness at Meeting Basin Goals	This project helps protect a critical existing pre-Compact water right in the Basin (Goal #1). In addition it could help increase agricultural water supplies to reduce shortages (Goal #3), while clearly restoring critical existing infrastructure (Goal #8).

Project Name	22. Cedar Mesa Ditch
Project Sponsor	Cedar Mesa Ditch Company
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	40
Volume of Water Gained or Saved	To be determined.
Purpose	Pipe the last 5 miles of the 12 mile ditch to reduce 35% shrink and reduce salt and selenium. Also to pressurize the ditch to allow for more efficient irrigation methods.
Est. Completion Date	2025
Est. Total Budget	To be determined.
Constraints and Challenges	Issues limiting project implementation may include: *Cost/Funding* – project costs and limited owner resources may limit project scope or delay timing. Outside funding may be necessary for project implementation. *Regulations* – permitting requirements may limit construction activities and potentially increase cost and timing.
Implementation Steps and Project Scope	Project components may include: • Engineering design work for the new pipe. • Construction of recommended structural changes. Potential Investigation of Funding Mechanisms: CWCB grants, CWCB loans, etc.
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, this project will help maintain agricultural land (Goal #2), while meeting agricultural shortages (Goal #3), protecting water quality (#6) and nonconsumptive uses (Goal #5).

Project Name	23. Uncompahgre Valley Water Users System Optimization Projects
Project Sponsor	Uncompahgre Valley Water Users Association (UVWUA) and Others
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	41
Volume of Water Gained or Saved	10,000 AF
Purpose	This project includes repairing and lining prioritized Uncompahgre Project canals as well as the re-regulation of 2 reservoirs. The goal is to improve efficiency and help reduce agricultural shortages. This project is part of the Regional Conservation Partnership Program (RCPP) Modernizing Agricultural Water Management in the Lower Gunnison River Basin: a Cooperative Approach to Increased Water Use Efficiency and Water Quality Improvement, which is providing a significant amount of funding.
Est. Completion Date	2020
Est. Total Budget	$125,000,000
Constraints and Challenges	Funding is a constraint for this project. UVWUA has submitted two proposals have approved for MOA revenues funding totaling $4,870,000 – however not all of the funds are allocated for this project.
Implementation Steps and Project Scope	The irrigation Training and Research Center at California Polytechnic State University completed an Integrated Assessment, Comprehensive Implementation Planning, and System Optimization Analysis for the Uncompahgre Project. The preliminary draft report includes detailed descriptions of the proposed projects, cost estimates, and a prioritized implementation plan. The prioritization of the projects is expected to change in future drafts. Thus far, the following 10 canals have been identified for lining and/or repairs but are subject to change: • **EO South and EQ Lateral Pipelines** — replace two sections of the existing open channel laterals with pipe. The EO South Pipeline conceptual design includes 22,493 feet of 12- inch diameter pipe. The EQ Lateral Pipeline conceptual design includes 8,554 feet of 8-inch diameter pipe and 7,181 feet of 15-inch diameter pipe. • **EO North and GK Lateral Pipelines** — replace two sections of existing open channel laterals with pipe. Two conceptual designs for this have been identified and include: pumping from the GK Lateral and not piping any of it or piping a portion of the GK Lateral to provide pressure and no pumping for the proposed EO North Pipeline.

	• **AM South Pipeline** — replace an open channel section of the AM Lateral with pipe. The conceptual design for this item includes sections of 15-inch through 36-inch diameter pipe totaling 16,294 feet. • **Lower Loutsenhizer Canal Pipeline** — replace a significant portion of the existing open channel canal with pipe. The conceptual design includes sections of 8-inch through 48-inch diameter pipe totaling 37,753 feet. • **AM North Pipeline** — replace an open channel section of the AM Lateral with pipe. The conceptual design for this item includes sections of 8-inch through 42-inch diameter pipe totaling 54,277 feet. • **Lower Selig Canal Pipeline** — replace open channel section of canal with pipe. The conceptual design for this item includes sections of 8-inch through 48-inch diameter pipe totaling 89,390 feet. Operation of this item relies on the proposed re-regulation of the Selig Canal Reservoir. • **AB and AB-K Lateral Pipeline** — replace the existing open channel laterals with pipelines. The conceptual design includes sections of 10-inch through 48-inch diameter pipe totaling 51,839 feet. • **GH/H Pipeline** — includes replacing the entire open channel GH Lateral and approximately 50 percent of the open channel Garnet Canal with pipe, plus installation of a new drainage pipeline. The conceptual design includes sections of 8-inch through 48-inch diameter pipe totaling 63,858 feet. • **EC Lateral Pipeline** — includes replacing the existing unlined section of the EC Lateral's open channel with pipe, and installation of a supplemental "on-demand" pipeline. The conceptual design includes sections of 10-inch through 48-inch diameter pipe totaling 39,284 feet. • **East Canal Lining 7** — includes lining the entire length of the East Canal (10.6 miles) with combined geotextile and shotcrete materials. The existing open channel will be enlarged and reshaped to increase capacity and the Item 12 regulating reservoir will act as a buffer to compensate for varying flow rates. The latter eight items also include easements, road crossings, pressure regulators, turnouts, meters, SCADA, etc. Additionally, regulating reservoirs have been identified: the Selig Canal Regulating Reservoir and the East Canal Regulating Reservoir. The Selig Canal Regulating Reservoir is where the Selig Canal will transition from open channel to the proposed pipeline to buffer flow variations providing operational flexibility. The planned reservoir capacity is 80 acre-feet and it will be constructed with three cells. Similarly, the East Canal Regulating Reservoir is a new regulating reservoir with a capacity of 60 acre-feet and respective inlet and outlet capacities of 140 cfs and 90 cfs. The reservoir will allow for increased flexibility in operating the East Canal laterals. The conceptual design includes excavation, reservoir lining, inlet and outlet features (conduit, structures, automation, SCADA, etc.), drains, and land purchase.
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, the Uncompaghre Project is used primarily for irrigation purposes—therefore upgrading infrastructure helps increase supply and, consequently, reduce agricultural shortages (Goal #3). In addition this project will help to protect water quality (#6) and help to demonstrate the beneficial relationship between agriculture and the environment (Goal #7).

Project Name	24. Project 7 - 10 kAF Raw Storage
Project Sponsor	Project 7 WA
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☐ NC ☐Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	41
Volume of Water Gained or Saved	10,000 AF water storage - mostly for timing. The availability will not change volume of water used.
Purpose	Enlargement of existing Fairview Reservoir for net gain of 500 AF. Project includes upgrading outlet structure (or siphon) of existing Cerro Reservoir for useful gain of 800 AF and siting 2 new reservoirs above South Canal to provide hardened supply for one-year out. This project helps fix the reliance on single a source and 6.2 mile tunnel which is over 100 years old.
Est. Completion Date	Step-wise implementation. Enlargement and siphon upgrade can start in 2015, new reservoirs as permitted.
Est. Total Budget	Original feasibility was $43 million.
Constraints and Challenges	Funding

Implementation Steps and Project Scope	• Preliminary risk analysis has been completed
	• Further analysis needs to be completed before the project moves forward. This includes:
	  o Engineering
	  o Feasibility
	  o Risk
	• Secure funding

Effectiveness at Meeting Basin Goals	By improving supply availability and reliance, this project helps mitigate potential M&I shortages (Goal #4) and protects existing water uses in the Basin (Goal #1).

Project Name	25. Redlands Pump Modernization and Hydropower Optimization Project
Project Sponsor	Redlands Water and Power Company
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	42
Volume of Water Gained or Saved	Significant, but yet to be calculated. New variable frequency drive pumps, SCADA system, and flow meters would enable reduced and more accurate diversions.
Purpose	This project involves the replacement of relocation of the main pumps into the tail race area of the current hydro plant to increase power generation capacity and efficiency, while also reducing pumping costs and providing more accurate and reduced diversions.
Est. Completion Date	2018
Est. Total Budget	$1,000,000
Constraints and Challenges	Issues limiting project implementation may include: • Cost/Funding: Due to extensive project costs and limited company/shareholder resources, significant funding, likely from a variety of sources, is necessary for project implementation. • Acceptance: Shareholders may not support potential cost increases necessary to provide matching funds for grant or loan funding. • Regulations: permitting requirement may limit construction activities and potentially increase cost and timing.
Implementation Steps and Project Scope	Project components may include: • Replacement of existing outdated pumps with significantly more efficient variable frequency drive pumps. • Move pump inlet location to tailrace of current hydro facility to increase generation capacity (i.e. make all system water pass through hydropower facility). • Install SCADA and flow metering equipment to maximize efficiency of new pumps by decreasing pumping and diversions when not needed. • Maximize project design by coordinating proposed project components with currently ongoing GIS infrastructure mapping project.
Effectiveness at Meeting Basin Goals	This project would help protect a critical existing water right in the Basin (Goal #1). In addition, it helps increase agricultural water supplies to reduce shortages (Goal #3), restores important existing infrastructure (Goal #8), and helps quantify the relationship between agricultural and nonconsumptive water users (Goal #7). Finally, by providing more accurate diversions this project could leave more water in the river to help identified environmental flows (Goal #5).

Project Name	26. Hallenbeck Reservoir #1 (Purdy Mesa Reservoir)
Project Sponsor	City of Grand Junction
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	42
Volume of Water Gained or Saved	659 AF
Purpose	Dam repair to preserve important existing storage for municipal use and continued irrigation.
Est. Completion Date	2016
Est. Total Budget	To be determined
Constraints and Challenges	No foreseeable constraints or challenges at this time.
Implementation Steps and Project Scope	Project components may include: • Engineering design work for the repair. • Construction of recommended structural changes.
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, this project will help meet M&I (Goal #4) and agricultural shortages (Goal #3).

Project Name	27. Dillsworth Ditch
Project Sponsor	Spann Ranches
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	59
Volume of Water Gained or Saved	Not yet quantified.
Purpose	This project involves repairing the headgate's spill structure, thus restoring full functionality of the ditch.
Est. Completion Date	2014
Est. Total Budget	$15,952
Constraints and Challenges	No foreseeable constraints or challenges at this time.
Implementation Steps and Project Scope	The necessary engineering and design has been completed for the project. Furthermore, funding has been secured. This project will be implemented as soon as possible, with a 2014 estimated completion date.
Effectiveness at Meeting Basin Goals	The project restores the use of Dillsworth Ditch (Goal #8) which is used for irrigation. By doing so, the project effectively discourages the conversion of productive agricultural land to all other uses within the context of private party rights (Goal #2), consequently protecting existing uses in the Basin (Goal #1). Furthermore, headgate repairs help restore the functionality of the ditch, thus increasing agricultural supplies and hereby reducing shortages (Goal #3).

Project Name	28. Meridian Lake Reservoir Enlargement
Project Sponsor	Mt CB Water & San Dist., UGRWCD
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	59
Volume of Water Gained or Saved	890 acre-feet
Purpose	This project involves enlarging the Meridian Lake Reservoir, often called Long Lake, to a capacity of 1,381 AF. In addition to the enlargement, a 2.3 mile feeder canal from Washington Gulch to the reservoir would be constructed. The water gained from the enlargement will be used to meet downstream irrigation shortages.
Est. Completion Date	2017
Est. Total Budget	$7,303,000
Constraints and Challenges	• Access to the reservoir is difficult and requires a Special Use Permit from the Forest Service. This would automatically trigger NEPA documentation. • Wetlands and rare plant species would be impacted by the project—posing potential challenges.
Implementation Steps and Project Scope	• Reconnaissance-level design has been complete. This includes: o Environmental inventory of issues important to permitting o Geological evaluation of the site visit o Limited tomographic surveying • Preliminary designs have been developed. • Additional site analysis needs to be completed in conjunction with a cost-benefit analysis.
Effectiveness at Meeting Basin Goals	This project increases storage which can be used to reduce irrigation shortages in the region (Goal #3) while helping protect existing uses in the Basin (Goal #1). Furthermore, it contributes to improving critical water infrastructure (Goal #8).

Project Name	29. Water Conservation Planning Process for the Upper Gunnison Basin
Project Sponsor	Upper Gunnison River Water Conservancy District
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☐Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	59
Volume of Water Gained or Saved	Not applicable for planning process.
Purpose	Enable communities of the Upper Gunnison Basin to reduce municipal and industrial water consumption by 20 percent by 2030.
Est. Completion Date	2016
Est. Total Budget	$50,000
Constraints and Challenges	No foreseeable constraints.
Implementation Steps and Project Scope	Technical discussions and public outreach can be used to identify areas in which water conservation is feasible. Once these areas are identified, specific methods and ways to achieve water reductions will be developed. Some of the methods may include leak detection and repairing existing infrastructure. Note, the aforementioned budget only covers the planning process and does not address infrastructure upgrades or project implementation. Additional steps are needed to enact the implementation of the proposed plan.
Effectiveness at Meeting Basin Goals	As part of the conservation planning process, this project highlights means to reduce water usage and identifies methods to address shortages (Goal #4). Additionally, conservation inherently protects existing water uses in the Basin (Goal #1).

Project Name	30. Cunningham Lake Reservoir Rehabilitation
Project Sponsor	Upper Gunnison River Water Conservancy District and Colorado Parks and Wildlife
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	59
Volume of Water Gained or Saved	80 AF
Purpose	This project involves the rehabilitation of an existing dam, which will improve delivery systems into and out of the reservoir, reduce irrigation shortages, and improve Sage Grouse habitat.
Est. Completion Date	2020
Est. Total Budget	$2,000,000
Constraints and Challenges	• Investigate permitting requirements and/or environmental studies, specifically addressing any Sage Grouse habitat issues. • Negotiate land easements and right-of-ways for site access, canal alignment, and reservoir area. • Capital and long-term costs will be a challenge; cost-sharing agreements by project sponsors will ease the funding impact on a single entity.
Implementation Steps and Project Scope	• Scoping effort that addresses canal and dam design, permitting requirements, proposed reservoir operations, identification of project beneficiaries/users, estimated construction costs and schedule. • Meet with Division 5 staff discuss project operations, file for new water right, and develop reservoir accounting. • Negotiate reservoir operator agreements and cost-sharing agreements for construction and O&M costs.
Effectiveness at Meeting Basin Goals	This project would discourage conversion of productive agricultural land to other uses (Goal #2) and improve agricultural water supplies to reduce shortages (Goal #3) by providing supplement irrigation supplies in the Ohio Creek basin, and would encourage beneficial relationships between agricultural and environmental uses (Goal #7) by improving Sage Grouse habitat. Furthermore, it helps protect the existing uses in the Basin (Goal #1).

Project Name	31. Gunnison Ohio Creek Canal Enlargement
Project Sponsor	Upper Gunnison River Water Conservancy District and Trampe Ranches
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	59
Volume of Water Gained or Saved	Depends on the size of the canal enlargement. The additional water could be used to directly irrigate approximately 175 acres contemplated under the decree, or the water could be delivered to Ohio Creek to help reduce upstream agricultural shortages.
Purpose	Increase the capacity of the irrigation canal to allow for direct irrigation contemplated under the decree in dry years and/or possibly deliver to lower Ohio Creek—allowing continuous diversion by upstream irrigators.
Est. Completion Date	2020
Est. Total Budget	Not yet determined.
Constraints and Challenges	• Permitting: enlarging the canal involves major construction on three culverts. Permitting could be challenging as the two of the culverts run under a county road, while the other culvert runs under a state highway. • Funding: this project currently does not have funding and will likely be costly due to the required permitting and construction.
Implementation Steps and Project Scope	• Complete feasibility and engineering analysis • Perform cost-benefit analysis • Apply for the appropriate permits • Select contractor
Effectiveness at Meeting Basin Goals	This project involves enlarging Gunnison Ohio Creek Canal to provide direct irrigation to land under the decree that normally receives return flows and seepage from ditches. In dry years, this land is not irrigated—thus this project helps protect existing uses in the Basin (Goal #1) as well as reducing agricultural shortages (Goal #3). Alternatively, the additional water could be delivered to Ohio Creek, also reducing upstream agricultural shortages and improving streamflow in the lower Ohio Creek. The enlargement of the canal also contributes to improving critical water infrastructure in the Basin (Goal #8).

Project Name	32. Elk Home Ditch Improvement, Steuben Creek Flow Restoration
Project Sponsor	Trout Unlimited
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	59
Volume of Water Gained or Saved	168
Purpose	Pipe the Elk Home Ditch to improve efficiencies, maximize deliveries, minimize maintenance, and enable the Elk Home 2 Ditch water rights to help baseflows (and a population of Colorado Cutthroat Trout) in Steuben Creek by not being diverted.
Est. Completion Date	2015
Est. Total Budget	500,000
Constraints and Challenges	No foreseeable constraints or challenges at this time.
Implementation Steps and Project Scope	This project is a collaborative effort between Jim, Paul, and Steve Pike (hereafter referred to as the Pikes), Bechco Enterprises LLC (hereafter referred to as Bechco), Trout Unlimited, the United States Forest Service, and Colorado Parks and Wildlife. This project is located approximately 13 miles north of Blue Mesa Reservoir on the southern boundary of the West Elk Wilderness near Gunnison, CO. It will pipe the Elk Home Ditch (7.25cfs, adjudicated date of 1906) and protect the Elk Home 2 Ditch right (7.25 cfs, adjudication date of 1906) through the CWCB instream flow program. The goals of this project are to improve access and reliability of pre-compact water rights, reduce ditch impacts to National Forest and Wilderness, and protect base flows for a core Conservation population of Colorado River Cutthroat Trout.
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, this project will help maintain agricultural land (Goal #2), while meeting agricultural shortages (Goal #3), protecting water quality (#6) and nonconsumptive uses (Goal #5). Finally, the project will help to demonstrate the beneficial relationship between agriculture and the environment (Goal #7).

Project Name	33. Rainbow Lake Potential Enlargement Project
Project Sponsor	Upper Gunnison River Water Conservancy District
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	59
Volume of Water Gained or Saved	100
Purpose	Raise dam to capture an additional 100 AF (200 AF total storage). Enlargement will help to enable the partial development and use of an existing conditional water right.
Est. Completion Date	2025
Est. Total Budget	To be determined.
Constraints and Challenges	Funding mechanisms – project beneficiaries are unable to contribute to funding and cannot afford a major project.
Implementation Steps and Project Scope	Project components may include: • Feasibility analysis and engineering design work for the raising the dam height. • Construction of recommended structural changes. Potential Investigation of Funding Mechanisms: CWCB grants, CWCB loans, etc.
Effectiveness at Meeting Basin Goals	By restoring and maintaining critical water infrastructure in the Basin (Goal #8), this project helps protect existing water uses (Goal #1). Additionally, this project will help maintain agricultural land (Goal #2), while meeting agricultural shortages (Goal #3).

Project Name	34. Inventory of Irrigation Infrastructure Improvement Needs - District 59
Project Sponsor	Upper Gunnison River Water Conservancy District
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	59
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow.
Est. Completion Date	2018
Est. Total Budget	$100,000
Constraints and Challenges	Funding mechanisms – project beneficiaries are unable to contribute to funding and cannot afford a major project.
Implementation Steps and Project Scope	Projects will be identified through technical meeting discussions. Furthermore, local landowners will be able to submit projects or sites in need. Once identified, measurable outcomes and metrics will need to be developed to help evaluate and prioritize potential projects.
Effectiveness at Meeting Basin Goals	This inventory identifies infrastructure improvement projects spanning agricultural projects that improve agricultural water supplies and reduce shortages (Goal #3), projects protecting nonconsumptive water uses (Goal #5), as well as projects that will restore, maintain, and modernize critical water infrastructure (Goal #8). The inventory also results in a better understanding of the beneficial relationship between agricultural and nonconsumptive water users (Goal #7). Furthermore, the inventory highlights projects that help protect existing water uses in the Basin (Goal #1).

Project Name	35. Inventory of Irrigation Infrastructure Improvement Needs - District 62
Project Sponsor	Upper Gunnison River Water Conservancy District and Colorado River Water Conservancy District
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	62
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	Systematically examine and prioritize projects to restore, maintain, or modernize significant agricultural water supply infrastructure. Inventory will target proposed projects to maximize impact on meeting agricultural shortages, preserving existing uses, and in some cases meeting other purposes such as stream connectivity and flow.
Est. Completion Date	2018
Est. Total Budget	$40,000
Constraints and Challenges	Funding mechanism – project beneficiaries are unable to contribute to funding and cannot afford a major project.
Implementation Steps and Project Scope	Projects will be identified through technical meeting discussions. Furthermore, local landowners will be able to submit projects or sites in need. Once identified, measurable outcomes and metrics will need to be developed to help evaluate and prioritize potential projects.
Effectiveness at Meeting Basin Goals	This inventory identifies infrastructure improvement projects which, when addressed, will improve agricultural water supplies and reduce shortages, and will restore, maintain, and modernize critical water infrastructure.

Project Name	36. Environmental/Recreational Project Identification and Inventory – Lake Fork Region
Project Sponsor	Lake Fork Valley Conservancy
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☐Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	62
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	This project inventories, assesses, and prioritizes the feasibility of implementing projects targeted towards specific environmental/recreational focus segments and other areas of interest.
Est. Completion Date	2018
Est. Total Budget	$40,000
Constraints and Challenges	• Funding – the inventory will likely need grant funding assistance. Implementation of the inventoried projects will then likely require significant funding assistance (not included in this project's scope).
Implementation Steps and Project Scope	• Identify projects through technical meeting outreach, research, and input from local environmental/recreational interests. Potential projects may also be individually submitted. • Prioritize projects based on GBRT focus segments, Basin Goals, and measureable outcomes. This may require varying degrees of project-specific research to better understand scope, feasibility, design, funding, and necessary permitting.
Effectiveness at Meeting Basin Goals	This project inventories potential projects located on environmental/recreational focus segments targeted towards protecting environmental/recreational water uses (Goal #5). By better understanding environmental/recreational needs and the range of potential projects available for implementation, more informed choices on which projects to prioritize and implement can be made – thus better protecting existing water uses in the Basin (Goal #1). Additionally, an increased understanding of potential environmental/ recreational projects will help to highlight the beneficial relationship between agricultural and environmental/recreational water users (Goal #7). In addition, this project will help to protect water quality (Goal #6).

Project Name	37. City of Ouray Water Efficiency and Conservation Plan
Project Sponsor	City of Ouray
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☐ NC ☐Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	68
Volume of Water Gained or Saved	Not yet quantified.
Purpose	The Water Efficiency and Conservation Plan outlines a plan for updating aging infrastructure and identifies areas in which conservation is both feasible and economical – critical to the development of the City of Ouray.
Est. Completion Date	Plan will be approved by end of 2014. Implementation will begin in 2015.
Est. Total Budget	$2,660,000 with an average of $266,142 per year—contingent on funding availability.
Constraints and Challenges	Currently there are no foreseeable challenges or constraints as the plan has been well received throughout the process.
Implementation Steps and Project Scope	The City is in the process of finalizing and approving the Water Efficiency and Conservation Plan. This is expected to be approved by August 2014, with implementation of the goals beginning as soon as possible. The goals include: enhancing water use, data collection and monitoring, assessing cost versus operations, decreasing water distribution losses, and enhancing public awareness and acceptance. The City of Ouray is solidifying funding for implementation – potential sources include BRT or CWCB.
Effectiveness at Meeting Basin Goals	This plan targets feasible and economical conservation measures – which ultimately helps address M&I shortages (Goal #4). Additionally, it focuses on restoring and maintaining critical water infrastructure (Goal #8), important to beneficially using decreed water and, thus, protecting existing uses in the Basin (Goal #1).

Project Name	38. Ouray County Upper Uncompahgre Basin-Wide Augmentation Plan
Project Sponsor	Ouray County
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	68
Volume of Water Gained or Saved	To be determined.
Purpose	Creation of a regional augmentation plan to serve a variety of water uses in the Upper Uncompahgre Basin without adverse impacts to existing uses. This project would seek to identify potential supplies in the basin; then quantify supplies and develop the augmentation timing, if applicable, of these supplies in support of the augmentation plan.
Est. Completion Date	2025
Est. Total Budget	To be determined.
Constraints and Challenges	Funding mechanisms – project beneficiaries may need additional funding assistance to execute the project.
Implementation Steps and Project Scope	Project components may include: • Feasibility analysis and engineering report to examine availability, location, and timing of augmentation needs and potential augmentation sources. • Water court application process for potential change of use of water rights and/or new water rights. Potential Investigation of Funding Mechanisms: CWCB grants, CWCB loans, etc.
Effectiveness at Meeting Basin Goals	This project will help to protect existing water uses (Goal #1) by providing a supplemental supply. Additionally, this project will help meet M&I needs (Goal #4) and potentially preserve existing agricultural land (Goal #2) by providing an alternative to buy and dry.

Project Name	39. Inventory of Irrigation Infrastructure Improvement Needs - District 68
Project Sponsor	Colorado River Water Conservancy District and Ouray County Water Users Association
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	68
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	Preservation of existing water uses and meeting agricultural shortages by systematically modernizing agricultural water supply and delivery infrastructure. The existing inventory will be updated and prioritized to produce a list of water efficiency projects that sustain the long term viability of historical water uses. Proposed projects will be aim to meet multiple purposes including increased stream connectivity, reliability, water quality and minimum flows where appropriate.
Est. Completion Date	2018
Est. Total Budget	$75,000
Constraints and Challenges	The inventory itself does not have any foreseeable constraints or challenges. The implementation of the inventoried projects proves more challenging due to permitting, financing, and potential legal issues where water right filings (e.g., transfers, exchanges, etc.) might be required.
Implementation Steps and Project Scope	Outreach, research, project screening, feasibility analysis, design, funding, permitting and implementation for on- and off-farm water use efficiency projects that meet the stated objectives.
Effectiveness at Meeting Basin Goals	This inventory identifies infrastructure improvement projects spanning agricultural projects that improve agricultural water supplies and reduce shortages (Goal #3), projects protecting nonconsumptive water uses (Goal #5), as well as projects that will restore, maintain, and modernize critical water infrastructure (Goal #8). The inventory also results in a better understanding of the beneficial relationship between agricultural and nonconsumptive water users (Goal #7). Furthermore, the inventory highlights projects that help protect existing water uses in the Basin (Goal #1).

Project Name	40. Environmental/Recreational Project Identification and Inventory - Upper Uncompahgre Region
Project Sponsor	Trout Unlimited
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☐Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	68
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	This project inventories, assesses, and prioritizes the feasibility of implementing projects targeted towards specific environmental/recreational focus segments and other areas of interest.
Est. Completion Date	2018
Est. Total Budget	$75,000
Constraints and Challenges	• Funding – the inventory will likely need grant funding assistance. Implementation of the inventoried projects will then likely require significant funding assistance (not included in this project's scope).
Implementation Steps and Project Scope	• Identify projects through technical meeting outreach, research, and input from local environmental/recreational interests. Potential projects may also be individually submitted. • Prioritize projects based on GBRT focus segments, Basin Goals, and measureable outcomes. This may require varying degrees of project-specific research to better understand scope, feasibility, design, funding, and necessary permitting.
Effectiveness at Meeting Basin Goals	This project inventories potential projects located on environmental/recreational focus segments targeted towards protecting environmental/recreational water uses (Goal #5). By better understanding environmental/recreational needs and the range of potential projects available for implementation, more informed choices on which projects to prioritize and implement can be made – thus better protecting existing water uses in the Basin (Goal #1). Additionally, an increased understanding of potential environmental/ recreational projects will help to highlight the beneficial relationship between agricultural and environmental/recreational water users (Goal #7). In addition, this project will help to protect water quality (Goal #6).

Project Name	41. Environmental/Recreational Project Identification and Inventory - Upper Gunnison Region
Project Sponsor	High Country Conservation Advocates
Category	**Sponsor Type:** ☒ Single Entity ☐Partnership **Use Type:** ☒ NC ☐Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☐ Single District ☒ Multi-District ☐ Transbasin
Water Districts	28, 59
Volume of Water Gained or Saved	Not applicable for inventory portion of the project.
Purpose	This project inventories, assesses, and prioritizes the feasibility of implementing projects targeted towards specific environmental/recreational focus segments and other areas of interest.
Est. Completion Date	2018
Est. Total Budget	$100,000
Constraints and Challenges	• Funding – the inventory will likely need grant funding assistance. Implementation of the inventoried projects will then likely require significant funding assistance (not included in this project's scope).
Implementation Steps and Project Scope	• Identify projects through technical meeting outreach, research, and input from local environmental/recreational interests. Potential projects may also be individually submitted. • Prioritize projects based on GBRT focus segments, Basin Goals, and measureable outcomes. This may require varying degrees of project-specific research to better understand scope, feasibility, design, funding, and necessary permitting.
Effectiveness at Meeting Basin Goals	This project inventories potential projects located on environmental/recreational focus segments targeted towards protecting environmental/recreational water uses (Goal #5). By better understanding environmental/recreational needs and the range of potential projects available for implementation, more informed choices on which projects to prioritize and implement can be made – thus better protecting existing water uses in the Basin (Goal #1). Additionally, an increased understanding of potential environmental/ recreational projects will help to highlight the beneficial relationship between agricultural and environmental/recreational water users (Goal #7). In addition, this project will help to protect water quality (Goal #6).

Project Name	42. NoChicoBrush
Project Sponsor	Cary Denison, Trout Unlimited
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☐ Single District ☒ Multi-District ☐ Transbasin
Water Districts	40 and 41
Volume of Water Gained or Saved	90,000 acre feet
Purpose	To improve efficiency on and off farm to improve water quality, storage, and instream flow.
Est. Completion Date	2020
Est. Total Budget	$211,000,000
Constraints and Challenges	• Social acceptance of water efficiency and conservation as a tool to address water demands throughout Colorado River basin • Costs - success hinges in part on large structural improvement not just to Bureau projects or salinity reduction areas • Education- changing the approach to water use and applications practices
Implementation Steps and Project Scope	• On and off farm analysis of crop demands • Outreach and education for water users and managers • Project design • Project Funding
Effectiveness at Meeting Basin Goals	This project addresses the needs and goals of Gunnison Basin by addressing agricultural water shortages (Goal #3), discouraging the conversion of productive agricultural (Goal #2), protecting existing uses in the Basin (Goal #1), providing long term supply for future uses, addressing non-consumptive needs as well as risk management. The project also restores critical water infrastructure (Goal #8). In addition this project will help to protect water quality (#6) and help to demonstrate the beneficial relationship between agriculture and the environment (Goal #7).

Project Name	43. Gunnison Basin Selenium Management Plan and Gunnison Basin Selenium Task Force
Project Sponsor	USBR and River District
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☐Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☐ Single District ☒ Multi-District ☐ Transbasin
Water Districts	40 and 41
Volume of Water Gained or Saved	Not applicable.
Purpose	The goal of the Selenium Management Plan and Task Force is to reduce selenium concentrations in the Lower Gunnison River basin, thus improving water quality and helping in the recovery of federally listed endangered fish.
Est. Completion Date	Ongoing
Est. Total Budget	TBD
Constraints and Challenges	Funding — while many funding opportunities exist, currently the project does not have a permanent source of funding. The task force has identified sources of funding and is working on solidifying a more permanent solution. Funding is critical as this is an ongoing project, requiring monitoring and annual progress reports.
Implementation Steps and Project Scope	The primary goal of the program is to enhance water quality such that is meets state standards for dissolved selenium measured at the Whitewater gage. By reducing selenium concentrations and improving water quality, the Task Force hopes to assist in the long-term recovery of the Colorado pikeminnow and razorback sucker. This will be accomplished by ensuring selenium levels in the Lower Gunnison River do not impede external recovery goals. Additionally, the Task Force aims to support continued water uses in the Basin by ensuring public and private water users benefit from regulatory certainty. These goals will be achieved via a three part Action Plan. The implementation and scope of the Action Plan is briefly outlined below. **(1) Reduce the existing selenium loads** a. Off-farm projects i. Participate in the Salinity Program – Lower Gunnison Comprehensive Plan effort ii. Identify and prioritize target areas and potential projects. iii. Encourage/facilitate remaining phases of piping/lining East Side Laterals.

	iv. Encourage/facilitate off-farm projects in other high selenium loading areas in the v. Basin b. On-farm projects c. Non-agricultural sources **(2) Identify actions that prevent, minimize, and mitigate new selenium loading** a. Develop and refine existing BMPs, distributing them to the proper audiences and promote their use. b. Conduct well thought-out public information/education and wise water use programs which increase awareness, provide technical assistance, and possibly, identify and promote suitable incentives. c. Implement management actions to control new loading. Federal and local agencies will develop methods to prevent/minimize/mitigate new loading in all local decisions and actions. **(3) Monitor and support activities** a. Expand knowledge base b. Monitor water quality c. Monitor endangered fish d. Obtain funding for program activities e. Develop new technology f. Report annual progress
Effectiveness at Meeting Basin Goals	This project enhances water quality by reducing selenium concentrations in the Lower Gunnison River (Goal #6). In doing so, critical water infrastructure will be restored (Goal #8) — some of which will help increase agricultural supplies, reduce shortages (Goal #3), and protect existing uses in the Basin (Goal #1).

Project Name	44. Colorado River Storage Project - MOA Projects
Project Sponsor	USBR & River District
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☐ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☐ Single District ☒ Multi-District ☐ Transbasin
Water Districts	40, 41, 62
Volume of Water Gained or Saved	Project dependent.
Purpose	The Upper Colorado River Basin Fund MOA projects encompass a range of projects throughout Colorado. The projects pertinent to the Gunnison Basin that are not already included in the Gunnison Basin Implementation Plan Project List as individual projects are the Bostwick Park Project, Paonia Project and Smith Fork Project.
Est. Completion Date	2020
Est. Total Budget	$12,347,000
Constraints and Challenges	Funding is the predominant constraint as there is a gap between funding demand and available MOA funds.
Implementation Steps and Project Scope	Below is breakout of the critical prioritized maintenance items for each of the MOA projects. These were derived through meetings with Reclamation and the entities charged with maintaining and operating the associated project facilities. Note, the prioritized items do not include those already listed in the GBIP as individual projects. ***Bostwick Park Project*** • **Replacement of Cimarron Ditch diversion structure** — new diversion structure has been designed. The design has been submitted to JUB Engineers for review. • **Installation of Cimarron Ditch inflow measurement structures** — installation of prefabricated measurement flume with automatic water level sensing and data logging features. • **Reregulation reservoir study and implementation of said recommendations** — multiple sites would be evaluated including Cerro Reservoir. If selected, means for releasing from Cerro Reservoir to Vernal Mesa Ditch would have to be implemented. ***Paonia Project***

	• **Dam elevator repairs** — includes repairs to the elevator shaft concrete walls and replacement of corroded metal components within the shaft. *Continued* ***Smith Fork Project*** • **Aspen Canal piping** — replace all open channel sections of the Aspen Canal with pipe, and removing and replacing the existing piped section because of problems with the existing pipe. Conceptual design has been completed. • **Dam outlet works improvement** — a low flow bypass has been considered as an option. This low flow conceptual design includes connection of a 12-inch diameter bypass pipe, removing existing concrete encasement to expose the existing 32-inch diameter pipe, removal of a section of the existing pipe, concrete encasement of new pipe, and a 12-inch butterfly valve and manhole access. • **Increase capacity of feeder canal siphon** — increase the siphon capacity by 40 to 50 cfs in order to meet current demands and the proposed canal. The conceptual design for the siphon modification includes removing the existing pipes and inlet/outlet structures, and installing two 48-inch diameter pipes and new inlet/outlet structures. However, vertical re-alignment to lower the siphon outlet and reduce pipe diameters should be evaluated during final design. • **Reservoir inflow measurement and telemetry** — the installation of flow measurement features to allow for monitoring total inflow to Crawford Reservoir in real time. The conceptual designs for this item includes installation of a long-throated flume at the bottom of the Feeder Canal and either the same or a stream gaging station on Iron Creek. For Clear Creek and Mud Creek, it is assumed small prefabricated flumes could be placed in the channels above the reservoir high water level. • **Daisy/Feeder Canal capacity increase study and implementation of said recommendations** — develop a master plan for improving the efficiencies of their systems in order to conserve water and reduce salt transport. One of the options to be considered under the master plan includes diverting more water into Crawford Reservoir via the Daisy/Feeder Canal. This could allow for abandonment of one of the other Smith Fork Creek diversions thus reducing associated conveyance losses.
Effectiveness at Meeting Basin Goals	The MOA projects target many of the Basin Goals. In general, these projects help protect existing water uses in the Basin (Goal #1) by improving, restoring, and maintaining critical water infrastructure (Goal #8). The infrastructure improvements enhance efficiency – which helps increase agricultural supply and reduce shortages (Goal #3). Similarly, water quality benefits from many of the projects (Goal #6).

Project Name	45. Development of Upper Uncompahgre Water Supplies
Project Sponsor	City of Ouray and Partners in the Upper Uncompahgre River Basin
Category	**Sponsor Type:** ☐Single Entity ☒Partnership **Use Type:** ☐NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☒Structural ☐Non-Structural **Geographic Extent:** ☐Single District ☒Multi-District ☐ Transbasin
Water Districts	40 and 68
Volume Water Gained or Saved	Development of 200 AF of additional water yield, 100 AF firm yield during a severe drought, in the Upper Uncompahgre Basin to offset depletions by the City of Ouray and provide water for M&I and agricultural uses in Ouray County.
Purpose	Numerous augmentation alternatives have been identified by the City of Ouray including improvements to existing reservoirs including Oak Creek Reservoir and the New Reservoir. In addition, several other water rights and reservoir sites have been evaluated.
Est. Completion Date	2020
Est. Total Budget	Total: $1,750,000 by 2020 with an average of $350,000 per year (contingent on available funds). $250,000 for additional feasibility analysis and conceptual design and $1,500,000 for final design, permitting and construction.
Constraints and Challenges	Potential key issues or circumstances that may limit the ability of the Gunnison Basin to implement the proposed project. These limitations may include conflicts that preclude implementation of projects previously thought feasible. Generally include: • Acquisition and/or easements of sites not owned by the City of Ouray • Potential acceptance and conflicts with further development of transbasin diversion and interbasin water rights conflicts. • Regulatory constraints by U.S. Forest Service, Army Corps of Engineers, State Engineers Dam Safety Branch.
Implementation Steps and Project Scope	Systematic plan to implement the proposed project including structured steps for: • Project includes further alternatives and feasibility analysis including conceptual design. • Project will include public and stake holder outreach in identifying preffered alternative and conceptual design • City of Ouray will work with identified stakeholders and public to provide outreach and gain acceptance for selected projects

	• City of Ouray has already partnered with Ouray County on joint water supply projects and will work with additional partners including M&I and Agricultural Users in the Upper Uncompahgre Basin. City of Ouray will also work with CWCB to enhance flows in appropriated instream flow reaches where possible. • Project includes technical and feasibility level analysis both in conceptual design phase and preliminary design phase. • Selected project with include any identified permitting and authorizations needed, conceptual, preliminary and final design stages, and construction. • Funding Mechanisms include CWCB Water Supply Reserve Account, Water and Power Authority, Department of Local Affairs, and private funding.
Effectiveness at Meeting Basin Goals	This project serves to address municipal shortages (Goal #4) and maintain water infrastructure, including hydropower (Goal #8). It also permits the City to assist in agricultural and other shortages in the Upper Uncompahgre Basin with its partners (Goal #3) while protecting existing uses in the Basin (Goal #1).

Project Name	46. Improvements to Red Mountain Ditch
Project Sponsor	City of Ouray and other parties
Category	Classification of the proposed project by: **Sponsor Type:** ☐Single Entity ☒Partnership **Use Type:** ☐NC ☒Ag ☒ M&I **Project Type:** ☒Structural ☐Non-Structural **Geographic Extent:** ☐Single District ☐Multi-District ☒ Transbasin
Water Districts	40 (Ditch), 68, Division 7 (Water)
Volume of Water Gained or Saved	Based on gage records adjusted to Red Mountain Ditch drainage area improvements could yield 50 AF to 225 AF annually depending upon snowpack and runoff.
Purpose	The City of Ouray has already rehabilitated the Red Mountain Ditch from damage that occurred in 2005. The City leases the water in the ditch to ag users in District 40 where the water from the Ditch was historically used. The City has pending applications in both Divisions 4 and 7 to address the City's desire for a junior water right on the ditch for multiple purposes and City's need for augmentation. The City will continue to need to maintain the ditch and enlarge it to its historical decreed water usage. Part of this project may include piping of the Ditch, shaping and lining to improve stability and carrying capacity, installation of waste gates to protect the ditch from overtopping and installation of improved measuring devices.
Est. Completion Date	2020
Est. Total Budget	Costs of the proposed project to include capital, operations and maintenance, and life-cycle costs for steps listed in the Implementation Plan. Present value of costs is estimated at $1,000,000 by 2020 with an average of $200,000 per year (contingent on available funds).
Constraints and Challenges	Feasibility: requires the approval of the water court in Division 7 to approve a junior right to the ditch and also requires continued cooperation with the USFS to approve some activities related to the Ditch.
Implementation Steps and Project Scope	The City has consistently and will continue to work with its partners in relation to the Ditch. The City has several partnerships in place in this respect including the USFS, other local governments and private entities.
Effectiveness at Meeting Basin Goals	The Red Mountain Ditch is a transbasin diversion that brings additional water into the Basin. The City is committed to maintaining that diversion (Goal #8). Getting approval of a junior water right that would include municipal and industrial uses would assist the City in avoiding the need to purchase water to augment in dry years and have additional water for storage and other uses during wet years (Goal #1 and Goal #4). The current water right is for agricultural use and therefore, the diversion brings additional agricultural water into the Basin (Goal #3).

Project Name	47. Water Bank Project
Project Sponsor	Southwestern Water Conservation District, Colorado River Water Conservation District, Trout Unlimited, State of Colorado
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☒ Single District ☐ Multi-District ☐ Transbasin
Water Districts	All
Volume of Water Gained or Saved	Significant but yet to be determined.
Purpose	Increase certainty across all sectors and reduce the potential for crises by working to delay, minimize, or prevent a compact shortage, and in the event of a shortage, operate to allow certain post-compact uses to continue. The Water Bank uses a market-based approach to accomplish this by compensating willing water rights owners to fallow or deficit irrigate their fields and then use this water towards Colorado's obligations under the Colorado River Compact.
Est. Completion Date	2025
Est. Total Budget	To be determined.
Constraints and Challenges	This project is currently exploring various constraints and challenges.
Implementation Steps and Project Scope	The Water Bank Working Group recently obtained CWCB funding for a new phase of this project: Agricultural Field Studies and Estimates of Saved Consumptive Use. The project has two identified purposes. One purpose is to expand current agronomic feasibility assessments of partial and full season reductions to irrigated alfalfa and grass hay, as part of a Colorado Water Bank. By expanding the current study on alfalfa and grass hayfields, the project will help agricultural producers and the Water Bank Workgroup understand opportunities to save water through reduced irrigation, without adversely affecting long-term agronomic sustainability. The other purpose is to measure the irrigation water management (IWM) on project fields to calculate the amount of applied water (e.g., irrigations) and saved consumptive use (CU), for comparison with similar fields across their respective regions. Objectives: 1. Understand the recovery period associated with bringing grass pastures and alfalfa fields back into production, after multiple (1, 2 and 3) years of reduced irrigation. 2. Determine the impacts to forage yield and quality on alfalfa and grass hayfields, after multiple years of reduced irrigation. 3. Derive estimates of saved applied water (e.g., irrigations) and saved CU that may be credited to

	alfalfa and grass hayfields where split-season irrigation is practiced under structured guidelines.
Effectiveness at Meeting Basin Goals	This project will help to ultimately maintain the viability of existing infrastructure in the Basin (Goal #8), while also protecting existing water uses (Goal #1). Additionally, this multi-prong project will help maintain agricultural land (Goal #2), while meeting agricultural shortages (Goal #3).

Project Name	48. Regional Groundwater Monitoring Project
Project Sponsor	UGRWCD and others
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☐ Structural ☒ Non-Structural **Geographic Extent:** ☐ Single District ☒ Multi-District ☐ Transbasin
Water Districts	All
Volume of Water Gained or Saved	Not applicable
Purpose	Provide irrigators with subsurface water level information to assist with irrigation application planning and scheduling. Give Colorado Basin River Forecast Center more detail on soil moisture in an effort to improve runoff forecast accuracy. Maintain a baseline for groundwater quality in the event of future impairments due to hazardous waste spills, residential development, mining activity, and other potential impacts to water quality.
Est. Completion Date	2025
Est. Total Budget	To be determined.
Constraints and Challenges	Funding mechanisms – project beneficiaries will likely need additional funding assistance to execute the project.
Implementation Steps and Project Scope	To be determined. Project could include partnership with various entities in the basin and/or federal partners.
Effectiveness at Meeting Basin Goals	By monitoring and protecting groundwater resources in the basin this project helps protect existing water uses (Goal #1), while preserving agricultural land (Goal #2) and continuing to help meet agricultural shortages (Goal #3). In addition, this project will help to protect water quality (#6) as well and demonstrate some of beneficial relationships between agriculture and the environment (Goal #7).

Project Name	49. Weather Modification Program Enhancements
Project Sponsor	UGRWCD, Gunnison County, Water Enhancement Authority, and others
Category	**Sponsor Type:** ☐ Single Entity ☒Partnership **Use Type:** ☒ NC ☒Ag ☒ M&I (check multiple if Multi-Purpose) **Project Type:** ☒ Structural ☐ Non-Structural **Geographic Extent:** ☐ Single District ☒ Multi-District ☐ Transbasin
Water Districts	All
Volume of Water Gained or Saved	To be determined.
Purpose	Enhance weather modification programs throughout Colorado with state of the art equipment and technology. Build on recent research demonstrating how to maximize the effectiveness and efficiency of weather modification. Increase snowpack and resulting water supply within the basin.
Est. Completion Date	2020
Est. Total Budget	To be determined.
Constraints and Challenges	Funding mechanisms – project beneficiaries will likely need additional funding assistance to execute the project.
Implementation Steps and Project Scope	To be determined. Long term program enhancements include modernizing equipment, building partnerships between programs/sponsors, and engaging local support and sponsors.
Effectiveness at Meeting Basin Goals	By modernizing and enhancing weather modification programs in the basin this project will ultimately result in measurable yield increases therefore helping to protect existing water uses (Goal #1), while meeting agricultural shortages (Goal #3), M&I needs (Goal #4), and environmental and recreational needs (Goal #5).

Section 5: Conclusions and Recommendations

5.1 Introduction

The Gunnison Basin Implementation Plan (GBIP) was created by the Gunnison Basin Roundtable (GBRT) for submittal to the Colorado Water Conservation Board (CWCB). It is designed to support regional water planning through the roundtable process established by the Colorado Water for the 21st Century Act. The GBIP builds on previous roundtable work to propose and fund projects for meeting water needs. The GBIP also provides critical grassroots input to the forthcoming Colorado Water Plan (CWP).

To encourage locally-driven and balanced solutions to water supply challenges, the plan identifies water projects through targeted analyses of water issues in the Basin. The GBIP includes analyses of water shortages, water availability under variable hydrologic conditions, and various site-specific water supply issues. The ultimate purpose of the plan is to better identify water priorities in the Basin and highlight proposed projects that will excel at meeting these priorities in the near future.

The GBIP process continues the important public education, participation, and outreach work that the GBRT has been engaged with for almost ten years. The creation of the GBIP included targeted technical outreach to refine information on water needs and projects. It also included public outreach with local stakeholders to gather input on key elements of the plan. The GBRT's ongoing outreach and education efforts will be critical throughout the development of the CWP.

Section 5.2 provides conclusions of key GBIP information and how proposed projects meet Basin Goals; and Section 5.3 provides recommendations for project implementation strategies.

5.2 Conclusions

This section summarizes key information contained in the plan and articulates how proposed Basin Projects (Section 4) meet Basin Goals (Section 1). The structure of this document generally follows CWCB guidelines with some changes to better address local issues, streamline the plan, and focus on proposed projects.

- **Introduction:** summarizes planning process, outreach, major issues, and available information.
- **Section 1:** defines Basin Goals, Statewide Principles, and corresponding measurable outcomes.
- **Section 2:** summarizes water supply needs in the Basin.
- **Section 3:** describes options to analyze projects and case studies.
- **Section 4:** identifies proposed projects, related constraints, and strategies for implementation.
- **Section 5:** summarizes conclusions and recommendations.

Section 1: Basin Goals

The GBRT identified nine Basin Goals (Table 12) to establish priorities for water development and to maintain and protect important existing water uses in the Gunnison Basin. Each goal is paired with Measurable Outcomes and a process for their achievement (Pg. 31-38) to provide a concrete measurement of success. The GBRT also identified six Statewide Principles (Table 13) to complement Basin Goals and to reflect the GBRT's vision for major water policy issues in Colorado. Basin Goals and Statewide Principles are collectively intended to inform and help drive the Colorado Water Plan.

Section 2: Basin Needs

The GBRT identified water needs by summarizing corresponding information from existing relevant sources and updates secured through targeted technical outreach with agricultural, municipal, industrial, environmental, and recreational entities.

- Agricultural *shortages* are estimated to be approximately 116,000 AFY by 2050 (Table 15), prompting four primary water management needs including improving water supply reliability, minimizing loss of agriculture to other uses, rehabilitating key water supply infrastructure, and developing public education programs.
- Municipal and Industrial needs are estimated to be up to approximately 44,000 AFY (a 24,000 AFY increase from current levels) by 2050 (Table 16), which are generally expected to be managed with sufficient existing supplies and/or through planned projects.
- Environmental and recreational needs include identification and inventorying of specific projects throughout the Basin and in 29 target stream reaches as well as addressing specific water quality and watershed/forest health issues. These needs likely include shortages which may be identified through the nonconsumptive inventory projects described Section 4 of this plan.

Section 3: Basin Evaluations

The GBRT used the Gunnison River basin Water Resources Allocation Model, case studies, and mapping overlays to evaluate projects and project constraints. Modeling tools allowed evaluation of impacts to the availability of water to individual users and projects based on variable hydrology, water rights, and operations (e.g., proposed diversions, reservoirs, and management strategies). The modeling tools helped to evaluate five case studies to investigate basin-wide issues and opportunities with specific projects (i.e., water availability analysis, upper basin irrigation decrees, agricultural impacts on streamflows, and instream flow analysis). Mapping overlays of project data and basin needs were used to provide a consistent methodology to review potential projects, highlight options for multi-use projects, and identify projects that may compete for available water. Section 3 of this plan provides details on how these evaluations were conducted.

Section 4: Basin Projects

Projects are the primary focus of the GBIP and the mechanism for addressing Basin Goals established in Section 1 of this plan. Section 4 summarizes projects that the GBRT would like to highlight for implementation. Developed in close coordination with the GBIP Subcommittee and GBRT, the list of proposed projects is considered a current snapshot of potential water solutions that should be periodically refined with input from project sponsors. To strategically focus implementation efforts, projects are divided into 3 tiers:

- **Tier 1**: Implementation likely feasible by 2025; project does excellent job of meeting Basin Goals.
- **Tier 2:** Implementation likely not feasible by 2025; project would excel at meeting Basin Goals. Project may also have important conditional water rights and/or completed planning efforts.
- **Tier 3:** Implementation likely not feasible by 2025; project in preliminary stages of planning and/or may meet Basin Goals to lesser degree.

Tier 1 projects are summarized below in Table 22 showing which Basin Goals are met by the projects.

Table 22. Proposed Basin Projects (Tier 1) and Basin Goals Met

Ref. No.	Project	Basin Goals Met								
		1	2	3	4	5	6	7	8	9
1	Gunnison Basin Roundtable 2015 Education Action Plan Activities	✓	✓					✓		✓
2	Regional Conservation Partnership Program (RCPP)	✓	✓	✓		✓	✓	✓	✓	
3	Inventory of Irrigation Infrastructure Improvement Needs - District 28	✓		✓		✓		✓	✓	
4	Cole Reservoirs #4 and #5	✓		✓					✓	
5	Crawford Reservoir System Optimization Study and Prioritized Conveyance Improvements	✓		✓					✓	
6	Doughty #1 - Chipmunk Reservoir	✓	✓	✓					✓	
7	Fire Mountain Canal Delivery Efficiency Project	✓		✓		✓	✓	✓	✓	
8	Marcott Reservoir	✓	✓	✓					✓	
9	North Delta Canal	✓	✓	✓		✓		✓	✓	
10	Orchard Ranch Ditch	✓	✓	✓			✓		✓	
11	Overland Reservoir Enlargement (Part 2)	✓		✓				✓	✓	
12	Paonia Reservoir Sediment Removal and Outlet Modification Project	✓		✓			✓	✓	✓	
13	Young's Creek Reservoirs (#1 & #2) Rehabilitation	✓		✓					✓	
14	Granby Reservoirs (#5 and #11) Rehabilitation	✓		✓					✓	
15	Inventory of Irrigation Infrastructure Improvement Needs - District 40, Grand Mesa (Surface Creek)	✓		✓		✓		✓	✓	
16	Inventory of Irrigation Infrastructure Improvement Needs - District 40, Upper North Fork	✓		✓		✓		✓	✓	
17	Rehabilitation/Enlargement-28 Reservoirs LCWUA	✓		✓					✓	
18	Somerset Diversion Improvement	✓		✓	✓	✓				
19	Environmental/Recreational Project Identification and Inventory - North Fork Region	✓				✓	✓	✓		
20	Crawford Prioritized Conveyance Improvements and System Optimization Study	✓		✓					✓	
21	West Reservoir #1 Outlet Pipe Replacement	✓		✓					✓	
22	Cedar Mesa Ditch	✓	✓	✓		✓	✓			
23	Uncompahgre Valley Water Users System Optimization Projects (Canal Lining and Re-regulation of Reservoirs)	✓		✓			✓	✓	✓	
24	Project 7 - 10 kAF Raw Storage (Part 2)	✓			✓					
25	Redlands Pump Modernization and Hydropower Optimization Project	✓		✓		✓		✓	✓	
26	Hallenbeck Reservoir #1 (Purdy Mesa Reservoir)	✓		✓	✓				✓	
27	Dillsworth Ditch	✓	✓	✓					✓	
28	Meridian Lake Reservoir and Washington Gulch Storage Project	✓	✓	✓						
29	Water Conservation Planning Process for the Upper Gunnison Basin	✓			✓					
30	Cunningham Lake Reservoir Rehabilitation	✓	✓	✓				✓		
31	Gunnison Ohio Creek Canal Enlargement	✓		✓					✓	
32	Elk Home Ditch Improvement, Steuben Creek Flow Restoration	✓	✓	✓		✓	✓	✓	✓	
33	Rainbow Lake Potential Enlargement Project	✓	✓	✓					✓	
34	Inventory of Irrigation Infrastructure Improvement Needs - District 59	✓		✓		✓		✓	✓	
35	Inventory of Irrigation Infrastructure Improvement Needs - District 62	✓		✓		✓		✓	✓	
36	Environmental/Recreational Project Identification and Inventory - Lake Fork Region	✓				✓	✓	✓		
37	City of Ouray Water Efficiency and Conservation Plan	✓			✓				✓	
38	Ouray County Upper Uncompahgre Basin-Wide Augmentation Plan	✓	✓		✓				✓	
39	Inventory of Irrigation Infrastructure Improvement Needs - District 68	✓		✓		✓		✓	✓	
40	Environmental/Recreational Project Identification and Inventory - Upper Uncompahgre Region	✓				✓	✓	✓		
41	Environmental/Recreational Project Identification and Inventory - Upper Gunnison Region	✓				✓	✓	✓		
42	NoChicoBrush	✓	✓	✓			✓	✓	✓	
43	Gunnison Basin Selenium Management Plan and Gunnison Basin Selenium Task Force	✓		✓			✓		✓	
44	Colorado River Storage Project - MOA Projects	✓		✓			✓		✓	
45	Development of Upper Uncompahgre Water Supplies	✓		✓	✓				✓	
46	Improvements to Red Mountain Ditch	✓		✓	✓				✓	
47	Water Bank Project	✓	✓	✓					✓	
48	Regional Groundwater Monitoring Project	✓	✓	✓			✓	✓		
49	Weather Modification Program Enhancements	✓		✓	✓	✓				

Project Effectiveness in Meeting Goals and Measurable Outcomes

Table 23 provides brief narrative descriptions discussing general relationships between identified Basin Goals and proposed Tier 1 Basin Projects. Most Basin Goals are fulfilled by numerous Basin Projects.

Table 23. Relationships between Basin Goals and Proposed Basin Projects

Goal 1: Protect existing water uses in the Gunnison Basin – All projects are expected to help fulfill this goal, many with the intent to maintain current irrigated acreage. The projects include community outreach and conservation planning to enable communities to reduce municipal and industrial water consumption; inventories of infrastructure and environmental/recreational needs and projects; and infrastructure improvements to reduce operational inputs, improve water quality, and address system reliability.

Goal 2: Discourage the conversion of productive agricultural land to all other uses within the context of private property rights – Sixteen projects are expected to help fulfill this goal with the intent to preserve current irrigated acreage. The projects include four miles of conveyance piping to overcome existing ditch leakage issues; enlargement of existing reservoirs; rehabilitation of existing dams; improvements of existing delivery systems; improvement of Sage Grouse habitat; providing new augmentation water; and strategic basin system improvements for improved crop yields, reduced operational inputs, improved water quality, and system reliability.

Goal 3: Improve agricultural water supplies to reduce shortages – Forty projects are expected to help fulfill this goal with the intent to reduce projected agricultural shortages. The projects include restoration, maintenance, or modernization of significant agricultural water supply infrastructure; enlargements of existing canals and reservoirs; improvement of existing canal delivery efficiency; removal of reservoir sediment; modification of reservoir outlet works; rehabilitation of an existing dam; development of water supplies for augmentation M&I, irrigation, hydropower, and instream flow enhancement; and strategic basin system improvements for improved crop yields, reduced operational inputs, improved water quality, and system reliability.

Goal 4: Identify and address municipal and industrial water shortages – Nine projects are expected to help fulfill this goal with the intent to reliably meet projected municipal demands and continue effective water conservation programs. The projects include enlargement of an existing reservoir; upgrades to an outlet structure of an existing reservoir; siting of two new reservoirs; community outreach and conservation planning to enable communities to reduce municipal and industrial water consumption; and development of water supplies for augmentation, irrigation, hydropower, and instream flow enhancement.

Goal 5: Quantify and protect environmental and recreational water uses – Eighteen projects are expected to help fulfill this goal with the intent to improve environmental and recreational focus areas in existing stream channels and to improve native fish and riparian species populations. The projects include the investigation of feasibility for nonconsumptive focus segments in four specific regions of the Gunnison Basin.

Goal 6: Maintain or, where necessary, improve water quality throughout the Gunnison Basin – Fifteen projects are expected to help fulfill this goal with the intent to maintain outstanding water quality in headwaters streams and improve site-specific water quality related to mining, selenium, and salinity issues. The projects include investigation of feasibility for nonconsumptive focus

segments in four specific regions of the Gunnison Basin; and development of water supplies for augmentation, irrigation, hydropower, and instream flow enhancement.

Goal 7: Describe and encourage the beneficial relationship between agricultural and environmental and recreational water uses – Twenty two projects are expected to help fulfill this goal with the intent to complete new multi-purpose water projects in the Gunnison Basin that meet multiple needs. The projects include four miles of conveyance piping to overcome existing ditch leakage issues; rehabilitation of an existing dam; improvements of existing delivery systems; improvement of Sage Grouse habitat; and providing new augmentation water.

Goal 8: Restore, maintain, and modernize critical water infrastructure, including hydropower – Thirty six projects are expected to help fulfill this goal with the intent to implement at least one project every year in the Gunnison Basin focusing on the restoration, maintenance, and modernization of existing water infrastructure. The projects include restoration, maintenance, or modernization of significant agricultural water supply infrastructure; enlargements of existing canals and reservoirs; improvement of existing canal delivery efficiency; removal of reservoir sediment; modification of reservoir outlet works; rehabilitation of an existing dam; development of water supplies for augmentation, irrigation, hydropower, and instream flow enhancement; and strategic basin system improvements for improved crop yields, reduced operational inputs, improved water quality, and system reliability; improvements to conveyance, automation, and measurement infrastructure for an existing reservoir; and reconstruction of a tunnel and ditch piping.

Goal 9: Create and maintain active, relevant and comprehensive public education, outreach and stewardship processes involving water resources in the six sectors of the Gunnison Basin – One project is expected to help fulfill this goal with the intent to encourage participation in water education and leadership programs. The project includes community outreach and conservation planning to enable communities to reduce municipal and industrial water consumption.

5.3 Recommendations

Each project proposed for the Gunnison Basin requires a unique and systematic plan for implementation that includes discrete steps to maneuver the project from conception to completion. These implementation strategies typically involve two primary categories of action prior to completion of the project: *securing project acceptance* and *demonstrating project feasibility*. Each step in the project implementation process includes various challenges (constraints), or potential key issues or circumstances that may limit the ability of a project proponent to implement the proposed project. For each challenge or constraint, there exists a corresponding strategy to successfully complete the project. Table 24 summarizes strategies to overcome constraints related to securing project acceptance and demonstrating project feasibility to assist in the implementation of projects proposed for meeting water needs in the Gunnison Basin.

Table 24. Project Constraints and Implementation Strategies

Category	Constraint	Strategies
Project Acceptance	Conflict	Partnerships Cooperative Strategies
	Perception	Public Education and Outreach Incentive-Based Programs
	Regulations	Cooperative Strategies Regulatory Streamlining
Project Feasibility	Cost	Creative Funding Mechanisms Partnerships and Cooperative Strategies
	Water Availability	Water Availability Analyses Water Administration Strategies
	Constructability	Feasibility Analyses Engineering Design

This section includes an initial summary of the potential strategies listed in Table 24 to assist with the implementation of proposed projects in the Gunnison Basin. Examples of some existing projects in the Gunnison Basin are included to provide representative illustrations of constraints that are being actively managed by project sponsors. This section is provided to help inform decision-makers on common project challenges and potentially help guide future decisions for the more effective implementation of proposed projects.

Project Acceptance

Conflict – Conflict can be a constraint to securing acceptance of a project. For example, on one hand, the Gunnison Basin has established a primary goal of *discouraging the conversion of productive agricultural land to all other uses*. On the other hand, financial incentives are available for an aging agricultural workforce to fallow or sell productive agricultural land to municipalities or to enter into conservation easement agreements. Moreover, there can be potential conflicting priorities between different water uses (agricultural, municipal, environmental, and recreational). These competitive circumstances can generate conflict that may limit the ability of a project sponsor to implement a

proposed project. Partnerships and cooperative strategies that can effectively address conflicts are summarized in Table 25.

Table 25. Strategies to Address Conflict

Partnerships:

- Form beneficial relationships between agricultural and M&I water interests to identify land use policies and incentive-based measures such as planning higher density developments as a strategy to discourage the conversion of productive agricultural land to municipal uses.
- Form beneficial relationships between agricultural and environmental & recreational water interests to identify land use policies and incentive-based measures
    - Cooperative agreements can sustain agriculture and provide benefit to stream flows, including new storage projects which provide late season water for both environmental & recreational uses and agricultural uses.
    - Delayed irrigation return flows and irrigation water stored in soil moisture, aka the soil reservoir, provides benefits to stream flows and environmental & recreational water uses.
    - Agricultural rights downstream of the Gunnison River's confluence with the North Fork have experienced more reliable flows and less operational issues with diversions as a result of the Black Canyon minimum flow right.
    - Alternative irrigation strategies and water diversion & application improvements and efficiencies for lands near priority stream segments can provide mutual benefits.
    - Conservation easements through heritage-protection organizations could be partially facilitated through coordination between program directors and the GBRT.

Cooperative Strategies:

- Maximize opportunities for recommended solutions to meet multiple objectives
- Combine multiple water uses in collaboration with local water users
- Encourage dialogue, collaboration, and negotiations between GBRT and water entities
- Form incentive-based measures to encourage competing interests to collaborate

Example Project – West Fork Reservoir Project (Grand Mesa Water Conservancy District)

The Grand Mesa Water Conservancy District is refining plans for the 20,000 acre-foot West Fork Reservoir Project in the Surface Creek drainage, for which the District has a conditional decree. The project site is located off-channel in a remote area, primarily on private land with a small portion on BLM land. The reservoir could provide early-season water, act as a Water Bank, and provide multiple sites for hydropower generation. The project would address agricultural water shortages projected to be over 17,000 acre-feet each year, thereby providing adequate water supplies to discourage conversion of existing agricultural lands. In addition, it could also help address potential municipal and industrial shortages, improve water quality, and provide temporary storage to assist reconstruction projects on other reservoirs. Work for this project, including preliminary design and geological site evaluations, was completed approximately ten years ago, and may need updating. With available funding the project could proceed with core drilling, site evaluation, and final design, all of which could be completed within one year. Hydrology and water administration do not appear to cause significant constraints. The District has been active in outreach, expressing the need for additional water storage in the area, and is interested in discussing partnerships. Funding would require cooperative strategies, combining funding from grants, hydropower revenue, and/or regional stakeholders and water users interested in a water bank or other regional benefits.

Additionally, the U.S. Department of Agriculture recently launched the Regional Conservation Partnership Program (RCPP) which supports public-private partnerships promoting conservation activities. The goal of the RCPP is to encourage locally-driven innovation projects highlighting the importance and efficacy of voluntary, private land conservation. Targeted partnerships include, but are not limited to, those improving soil health, water quality, water use efficiency, and wildlife habitat on private lands. Nearly $400M in funding is available for RCPP projects – thus providing an additional and alternative option for project funding in the Gunnison Basin.

Perception – Perception can be a constraint to securing the acceptance of a project. Representatives of competing water interests (agricultural, municipal, industrial, environmental, or recreational) typically have a fair amount of knowledge on their own project needs, but may lack specific knowledge and/or have differing perspectives on the needs of competing water interests. Lack of knowledge and differing perspectives may generate an adverse perception of competing needs that may limit the ability of a project sponsor to implement a proposed project. Public education, outreach, and incentive-based programs can help address adverse perceptions as summarized in Table 26.

Table 26. Strategies to Address Perception

Public Education and Outreach:

- Work closely with organizations that specialize in the facilitation of public education and outreach programs (e.g. the Colorado Foundation for Water Education)
- Increase public understanding and participation in important basin water issues through GBRT subcommittee efforts
- Capitalize on the GBRT Education Committee's previous efforts (e.g., *Gunnison River basin: A Handbook for Inhabitants*)
- Plan future efforts with public schools, Project WET, conservancy districts, annual river restoration programs
- Plan future efforts focused on encouraging the preservation of agricultural land and GBRT policies supporting such work
- Develop a water leadership program in public high schools and regional colleges encouraging water careers and offering scholarships or training opportunities, including participation in river restoration projects and water-conference sessions

Incentive-Based Programs:

- Form beneficial relationships between agricultural and M&I water interests to identify land use policies and incentive-based measures such as planning higher density developments as a strategy to discourage the conversion of productive agricultural land to municipal uses
- Form beneficial relationships between agricultural and environmental & recreational water interests to identify land use policies and incentive-based measures that provide mutual benefits
- Explore other local, state, and federal incentive-based measures to overcome adverse perceptions amongst competing water interests

Regulations – Regulations can be a constraint to securing acceptance of a project.

Over 70 percent of the land in the Gunnison Basin is under federal ownership. Grand Mesa, Uncompahgre, and Gunnison National Forests comprise most of the Basin's headwaters and constitute approximately 40 percent of the Basin's land area. Other major federal holdings in the Basin include Black Canyon of the Gunnison National Park and Curecanti National Recreation Area. The BLM manages about 25 percent of the Gunnison Basin including the Gunnison Gorge National Conservation Area and Wilderness and the Dominguez-Escalante National Conservation Area.

Federal lands are subject to restrictions (beyond those applied to non-Federal lands) to project development, construction, maintenance, and modernization. Some examples include USFS special use permit restrictions for the maintenance of small storage reservoirs and Endangered Species Act limitations of water use and development through the Upper Colorado River Endangered Fish Recovery Program. Recent regulatory decisions (e.g., potential listing of the sage grouse, and EPA/ACE definitions of Waters of the United States) could pose additional challenges to the implementation of projects.

Such regulatory bureaucracy and environmental impact requirements may generate excessive project time and cost expenditures that can limit the ability of a project sponsor to implement a proposed project, regardless of the relative scale of project scope. Regulatory streamlining and cooperative strategies can effectively address regulatory constraints as summarized in Table 27.

Table 27. Strategies to Address Regulations

Cooperative Strategies:

- Establish a GBRT subcommittee or focus group to lead efforts to engage regulatory decision-makers
- Engage elected representatives to understand regulatory challenges encountered on existing projects in the Gunnison Basin
- Engage Federal and State agency representatives to understand the multiple steps required for project implementation
- Facilitate dialogue, negotiations, and collaboration between the GBRT, water entities, and regulatory agencies
- Collaborate with local water users to proactively consider combining projects for multiple purposes
- Collaborate with CWCB to identify technical support mechanisms for Federal permitting activities

Regulatory Streamlining:

- Identify methods to proactively address potential regulatory pitfalls that generate excessive time delays and added costs
- Identify methods to streamline regulatory processes between multiple agencies with proactive, time-dependent deadlines
- Collaborate with CWCB to identify financial support mechanisms for Federal permitting activities

Example Project – Overland Reservoir Project (Overland Ditch and Reservoir Company)

Overland Reservoir has 1,007 acre-feet of absolute water rights for agricultural use, 80 percent of which are pre-1922 water rights. The Overland Ditch and Reservoir Company is planning the enlargement of the reservoir for an anticipated total annual firm yield of 1,009 acre-feet at an estimated total project cost of about $2,000,000. The project, which has the potential to impact

wetlands, is now eight years into the permitting process, which includes a US Forest Service (USFS) Special Use Permit (accepted by the USFS), an Army Corps of Engineers Permit pursuant to Section 404 of the Clean Water Act (anticipated filing in 2014), and a NEPA Environmental Impact Statement with the USFS as the lead agency (slated to start in 2014). The Overland Ditch and Reservoir Company expects the EPA to challenge the project. As a result of permitting complications, the Overland Ditch and Reservoir Company has expressed a need for State assistance in the permitting process indicating that "the State needs to understand that if any supply projects are to be completed on the Western Slope, the permitting process needs to be streamlined. Regional permitting for projects on the Grand Mesa is mandatory in the future."

Recommendation – The Colorado Joint Review Process and Colorado Coordination Council:
The Colorado Joint Review Process (CRJP) was a non-regulatory program created in 1983 that focused on streamlining environmental permitting. Outlined in §34-10-101, et. seq., C.R.S., the CRJP was largely focused on energy development and originally grew out of the Colorado Review Process which was formed by Governor Lamm to streamline the permitting of ski area development. The CRJP sought to formalize coordination between existing regulatory state and federal agencies, and developers of natural resources. Related agencies included the US Forest Service, Bureau of Land Management, Colorado Division of Mining Reclamation and Safety, Colorado Oil and Gas Commission, and environmental programs in the Colorado Department of Public Health and Environment. The CJRP legislation was allowed to expire in 1996 because it was never fully completed for any project, potentially due to the collapse of the energy industry.

A similar program, called the Colorado Coordination Council (CCC), was created by legislation in 2003 and allowed to expire in 2013 due to a lack of use. However, the sunset review study of the CCC performed by the Colorado Department of Regulatory Affairs Studies suggests that the CCC was never publicly announced or marketed. As a result, entities that could have used the process were unaware of its existence. In addition, participating regulatory entities have indicated support for a process like the CCC or CJRP to help increase cooperation and communication between local, state, and federal agencies. Such a process benefits the public interest by enhancing the quality of permitting processes while also greatly increasing efficiencies.

Due to the numerous benefits to future water resource projects, the Gunnison Basin Roundtable recommends the reinstatement of a process similar to the Colorado Joint Review Process or Colorado Coordination Council.

Project Feasibility

Cost – Cost can be a constraint to demonstrating feasibility of a project. Water providers must constantly balance the water needs of their constituency, the technical challenges of project activities, and the financial costs to implement projects. Each type of water interest (agricultural, municipal, industrial, environmental, or recreational) has different forms and amounts of revenue by which to finance projects. And as described above in Table 27, regulatory requirements can add costs to a proposed project far beyond that required for standard project planning and construction needs. The complex balance of water needs, technical challenges, types and amounts of revenue, and regulatory

requirements generates financial costs that may limit the ability of a project sponsor to implement a proposed project. Creative funding mechanisms, partnerships, and cooperative strategies can help to address common constraints posed by project costs as summarized in Table 28.

Table 28. Strategies to Address Cost

Creative Funding Mechanisms:

- Apply for CWCB financing (loan and grant) programs (Web Link).
  - Water Project Loan Program
  - Water Efficiency Grants
  - Water Supply Reserve Account Grants
  - Colorado Healthy Rivers Fund Grants
  - Severance Tax Trust Fund Operational Account Grants
  - Colorado Watershed Restoration Grants
  - Agricultural Emergency Drought Response Program
  - Alternative Agricultural Water Transfer Methods Grants
  - Fish and Wildlife Resources Fund Grants
  - Weather Modification Grants
  - Non-Reimbursable Project Investment Grants
  - Invasive Phreatophyte Control Program
  - Wild and Scenic Rivers Fund
- Pursue numerous other federal, state, and local funding opportunities, such as:
  - Listed funding opportunities on the Colorado Watershed Assembly Website (http://www.coloradowater.org/Funding%20Opportunities%20List)
  - Colorado Water Resources and Power Development Authority funding (http://www.cwrpda.com/)
  - Listed funding opportunities in the CWCB's Nonconsumptive Toolbox Document (http://cwcbweblink.state.co.us/weblink/0/doc/172701/Electronic.aspx?searchid=b764b205-1125-4f18-b3e8-998e5e025e10)
- Engage water stakeholders to enter into public-private partnerships to finance, build, and operate public projects
- Consider the addition of small hydropower generation capabilities to dam and reservoir projects to increase revenue

Partnerships and Cooperative Strategies:

- Prioritize the most effective projects (cost/benefit analyses) to optimize cost savings
- Facilitate regulatory streamlining and cooperative strategies
- Collaborate with local water users to proactively consider combining projects for multiple purposes
- Develop voluntary regional water conservation plans and efforts that could allow smaller entities to realize cost savings

Example Project – Peak Reservoir and Blanche Park Reservoir Projects (Grand Mesa Water Conservancy District)

In 2008, the Grand Mesa Water Conservancy District board of directors voted to rehabilitate two breached reservoirs on the Grand Mesa National Forest, including Peak and Blanche Park Reservoirs. Despite the relatively small size of the projects (35 and 115 acre-feet, respectively), the reservoirs provide essential water reliability for the District's service area. To-date, the District has completed approximately 35 percent of the Peak Reservoir Project and 5 percent of the Blanche Park Reservoir Project. The District has encountered many regulatory challenges from the US Forest Service and

Army Corps of Engineers (ACE) that has made time and cost expenditures excessive for the relatively small size of the projects. The District contracted with a private firm approved by the USFS to complete necessary USFS compliance work in 2010. In addition, the District contracted with a private firm approved by the ACE to complete necessary ACE compliance work in 2011. Multiple time delays associated with the regulatory review and approval process held the project up through 2012, resulting in increased costs and the cancellation of a project grant. Many other reservoirs may have similar permitting and cost issues, since a total of 3,800 acre-feet of water storage capacity on the Grand Mesa (15 percent of the total capacity) is currently under restriction for deferred dam maintenance. Appendix 5 contains a letter from the District to Congressman Scott Tipton with further detail on these projects.

Water Availability – Lack of availability to water in times of need can be a constraint to demonstrating the feasibility of a project. Water providers must constantly balance the unpredictable timing of water supply and demand. Each type of water interest (agricultural, municipal, industrial, environmental, or recreational) has different demand patterns and different infrastructure, operating rules, and water rights available to them to manage the variable nature of water supply. Water availability is therefore considered a product of both physical and legal water supplies that vary in both location and timing. Physical water availability is dictated by highly variable hydrologic patterns and complex operations of water supply infrastructure. Legal water availability is dictated by the Prior Appropriation Doctrine mandated by Colorado's Constitution and administrated by the Colorado DWR.

The complex balance of water supply and demand patterns, infrastructure operations, and water rights generates highly variable physical and legal water availability that may limit the ability of a project sponsor to implement a proposed project. Water availability analyses and water administration strategies can effectively address the challenging nature of water availability as summarized in Table 29.

Table 29. Strategies to Address Water Availability

Water Availability Analyses:

- Use the Colorado Decision Support System to analyze timing, location, and conditions of limited water availability
- Use water availability analyses results to identify issues, inform stakeholders, and guide decisions about optimal relationships between water operations and water administration regimes
- Identify local projects with water availability to recommend effective collaborative strategies
- Identify hydrologic runoff patterns that are in excess of demands and can be strategically stored and beneficially used
- Identify river dry-up points to ascertain necessary headgate improvements
- Identify irrigation scheduling issues to improve diversion and delivery reliability and accuracy
- Identify excessive water deliveries to improve water diversion and delivery efficiencies to assist junior or instream supply
- Identify potential impacts of climate variability on water availability

Water Administration Strategies:

- Protect private property rights that contribute to the successful operation of Colorado's long-standing water rights system
- Set growth policies that require water rights to be tied to the land
- Facilitate effective water rights exchanges to optimize water availability

- Facilitate water rights leasing programs for environmental and recreational uses
- Transfer agricultural water rights to new irrigated acreage or shorted irrigated acreage
- Identify important historical water rights at risk for abandonment

Constructability – Numerous technical challenges affect the ease and efficiency of project construction or implementation and ultimately the feasibility of a project. These challenges surface throughout the concept phase and construction of a project. Proposed projects in the Gunnison Basin include a variety of new construction, enlargements, upgrades, rehabilitation, restoration, maintenance, or modernization of reservoirs, dams, outlet works, headgates, canals, and piping. Constructability for these types of projects requires a highly technical demonstration that appropriate measures are taken to safely and effectively plan, design, and construct the project. An inadequate demonstration of constructability may limit the ability of a project sponsor to implement the proposed project. Adequate feasibility analyses and engineering design can effectively demonstrate constructability as summarized in Table 30.

Table 30. Strategies to Address Constructability

Feasibility Analyses:

- Hire a reputable engineering firm to analyze the feasibility of the project, demonstrating that:
  - The project can overcome previously identified constraints (see Tables 24 - Table 28)
  - Required land, space, labor, equipment, and materials are accessible, suitable, and proven

Engineering Design:

- Hire a reputable engineering firm to design the project with consideration for site conditions and feasibility results