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GUNNISON BASIN IMPLEMENTATION PLAN

Prepared for:

The Gunnison Basin Roundtable

For submittal to:

The Colorado Water Conservation Board

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Executive Summary

Objectives

This report 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 report 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 report 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 report 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 report. 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 report, 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 seven 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, strictly 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 West Slope, as well as the Front Range diverters.
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. Scenario planning should be used as the principal tool for water planning.
7. 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[1]	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 new irrigators understand how historical practices evolved through experience, and help maximize water available to irrigators throughout each tributary.

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:

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 2020; project does excellent job of meeting Basin Goals.
- **Tier 2:** implementation likely not feasible by 2020; 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 2020; 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

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

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 – Thirty eight sponsored 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; and strategic basin system improvements for improved crop yields, reduced operational inputs, improved water quality, and system reliability.

Goal 2: Discourage the conversion of productive agricultural land to all other uses within the context of private property rights – Eight 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 an existing reservoir; rehabilitation of an existing dam; 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 – Thirty sponsored 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 – Six sponsored 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 – Twelve sponsored 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 trout 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 – Two sponsored 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 – Thirteen sponsored 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 – Twenty eight sponsored 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 sponsored 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

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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.

Figure1 presents the general topography and layout of the Gunnison Basin.

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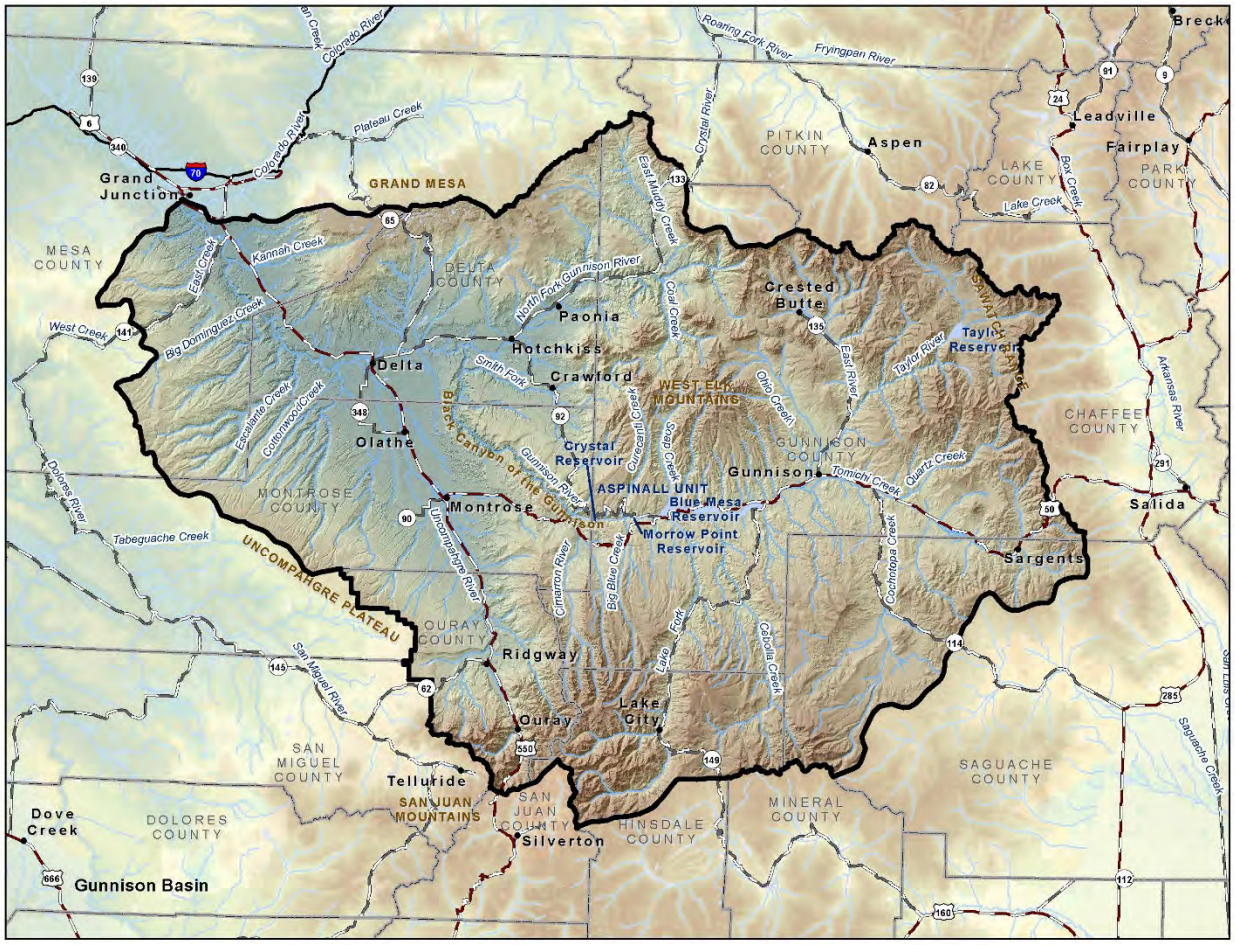


Figure 1. Gunnison River basin

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.

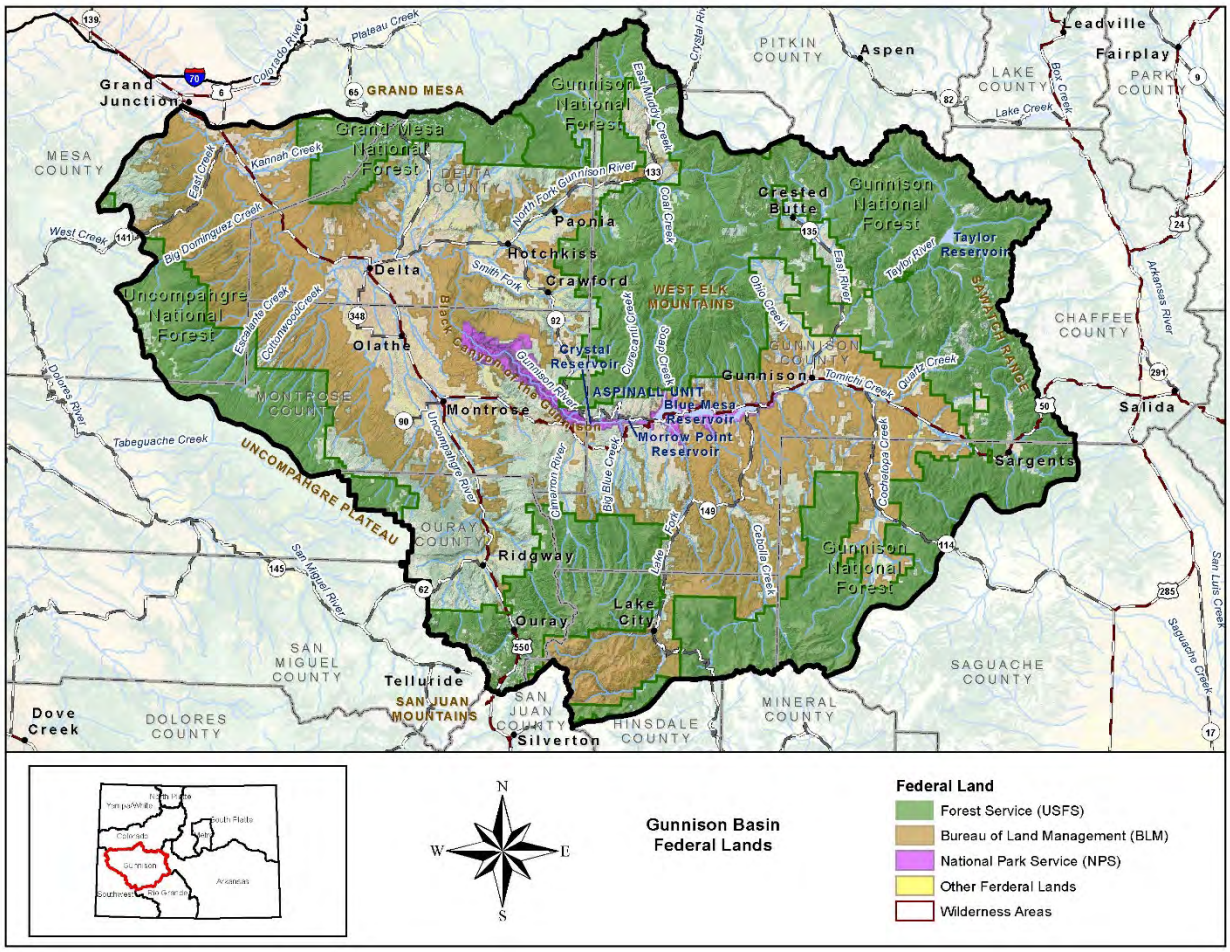


Figure 2. Gunnison Basin Federal Lands

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 60 percent of this flow is attributable to snowmelt runoff in May, June, and July.

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 diverts approximately 390,000 acre-feet per year to supply large irrigators 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). The reservoirs, with total capacities of 940,800 acre-feet, 117,190 acre-feet, and 25,240 acre-feet respectively, were constructed to normalize flows and meet the Upper Basin States' Colorado River Compact obligation to the lower basin in years of limited precipitation.

Other reservoirs in the Basin serve a variety of purposes. The Taylor Park Reservoir is predominately used to store water for supplemental irrigation water supply while also providing coordinated releases for environmental and recreational uses on the Taylor River. 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.

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.

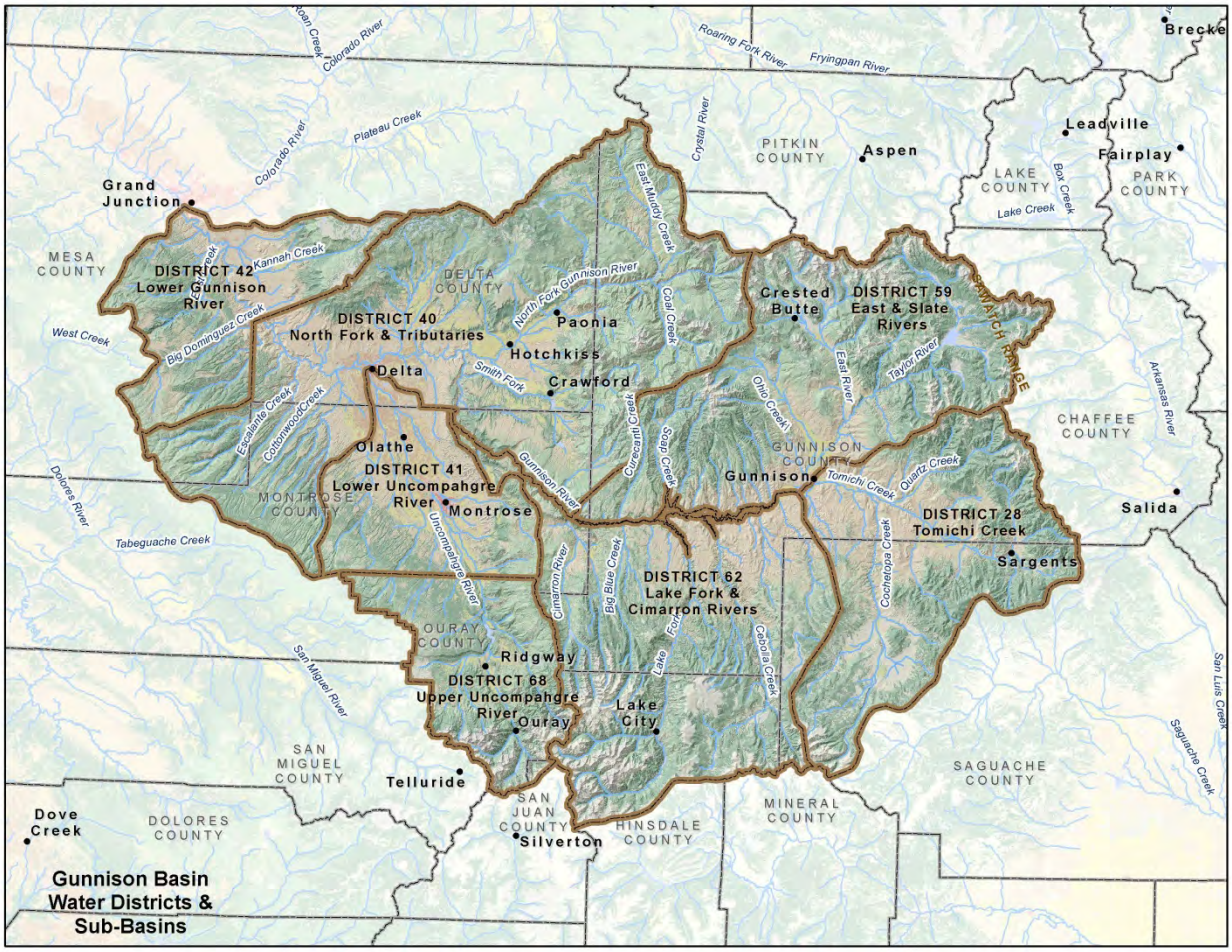


Figure 3. Gunnison Basin Water Districts and Sub-Basins

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 Conservancy District, and the Upper Gunnison River Water Conservancy District allows Upper Gunnison water users to deplete up to 60,000 acre-feet per year 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 per year in the drainage between Crystal and Morrow Point dams, 10,000 acre-feet of water per year in the drainage between Blue Mesa and Morrow Point dams, and 40,000 acre-feet of water per year in the drainage above Blue Mesa. Approximately 10,000 acre-feet of new depletions per year 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 springtime peak and shoulder flows.

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 2014, the ROD for the Aspinall Unit Operations Final Environmental Impact Statement (adopted in 2012) was implemented for the first time with the second highest peak flow target of 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 control of nonnative fish and their associated predation and competition impacts on the endangered species is also extremely important to the success of the recovery program. The most prevalent nonnative fish in the Gunnison include carp, fathead minnow, sand shiner, red shiner, bass, and pike. Current management efforts of the recovery program focus on 1) working with state partners to reduce the incidence of illegal introductions via changes in policy and regulation; 2) controlling efforts on known sources (e.g., spawning areas in upstream reservoirs and preferred riverine habitats); and 3) conserving native species strongholds (e.g., the Gunnison Rivers). Future management strategies could include must-kill regulations — in which anglers are legally obliged to kill nonnative species if caught. Though this is a common (and legal) management strategy in many States, Colorado has yet to institute this policy. **The GBRT recommends that Colorado explore a must-kill policy for nonnative fish control.**

In addition to the endangered fish species, the Gunnison sage-grouse is proposed to be listed as endangered, potentially affecting agricultural water use and municipal development in the Basin. The final deadline determining whether the Gunnison sage-grouse will be listed as threatened species—and consequently protected under the Endangered Species Act—was originally scheduled for May 2014; however the D.C. District Court granted a six month deadline extension. Predominate threats to the Gunnison sage-grouse include habitat loss, degradation, and fragmentation due to residential and commercial development as well as agricultural uses and predation. If listed, 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 Quality and Watershed Management

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.

Several regional watershed groups work in the Gunnison Basin to address 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 3.

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.

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 2 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 10 summarizes stream water quality designations and impairments in the Gunnison River basin by sub-basin.

Table 10. 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 4 demonstrates the relevant water quality data in the Gunnison Basin.

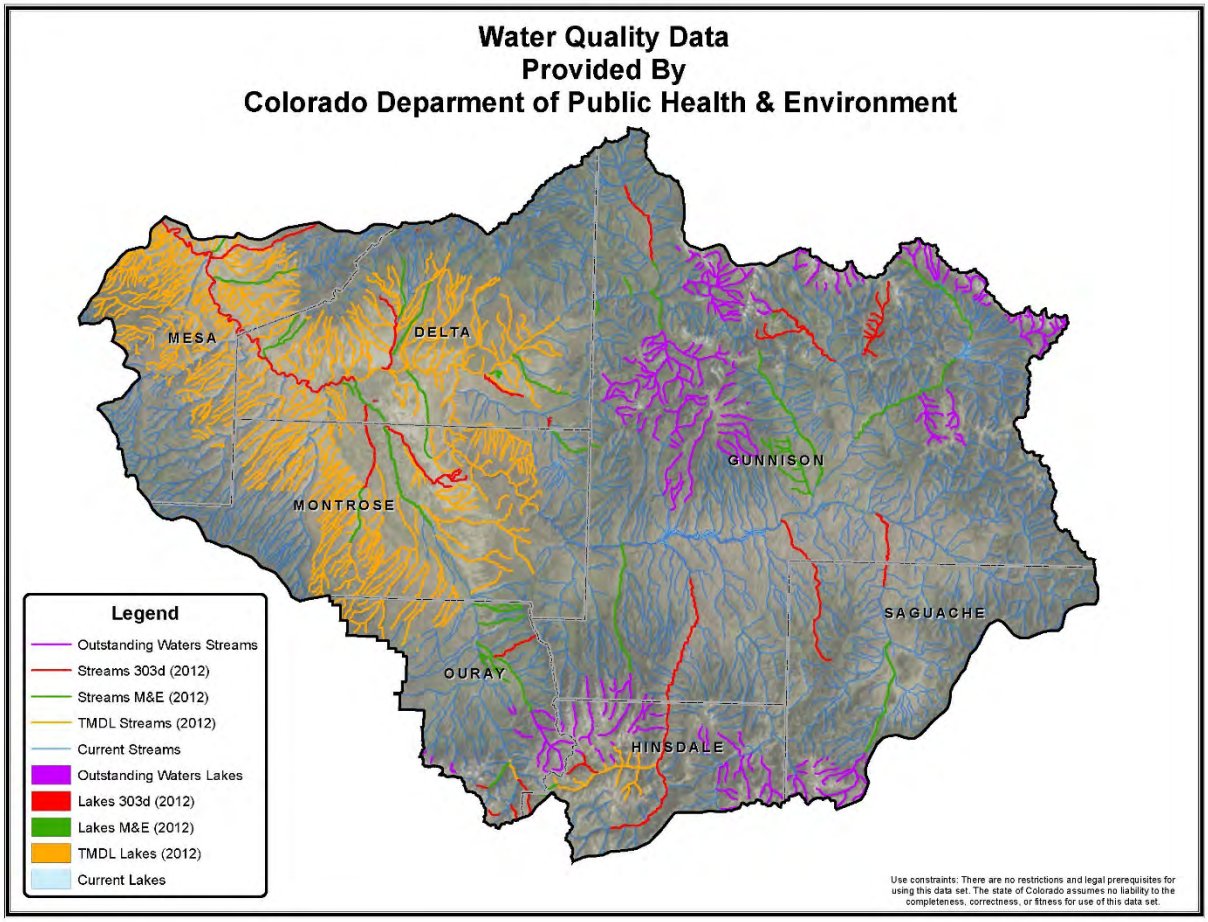


Figure 4. Water Quality Data in the Gunnison Basin

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.

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 3 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. The 2013 Report on the Health of Colorado's Forests by the CSFS details about 400,000 acres of Spruce Beetle infestation, making it the largest insect problem in the state for the second consecutive year. In contrast, the Mountain Pine Beetle infestation continues to decline.

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.

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.

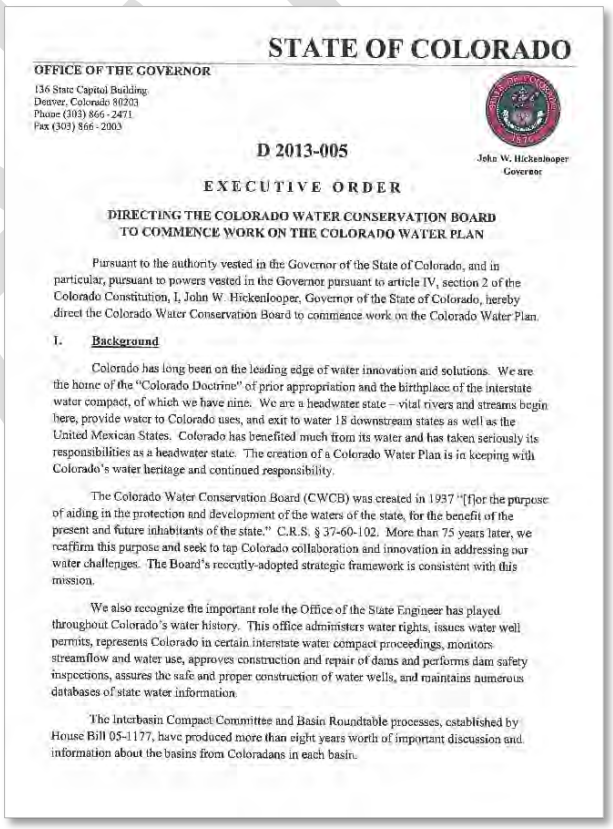
The Importance of Hydropower in the Basin: Hydropower is a significant nonconsumptive use of water and important economic driver in the Gunnison Basin. There are several major hydropower facilities in the Basin, the largest and most well-known being the three dams of the Aspinall Unit (including Blue 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 HB05-1177 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 HB05-1177. 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.

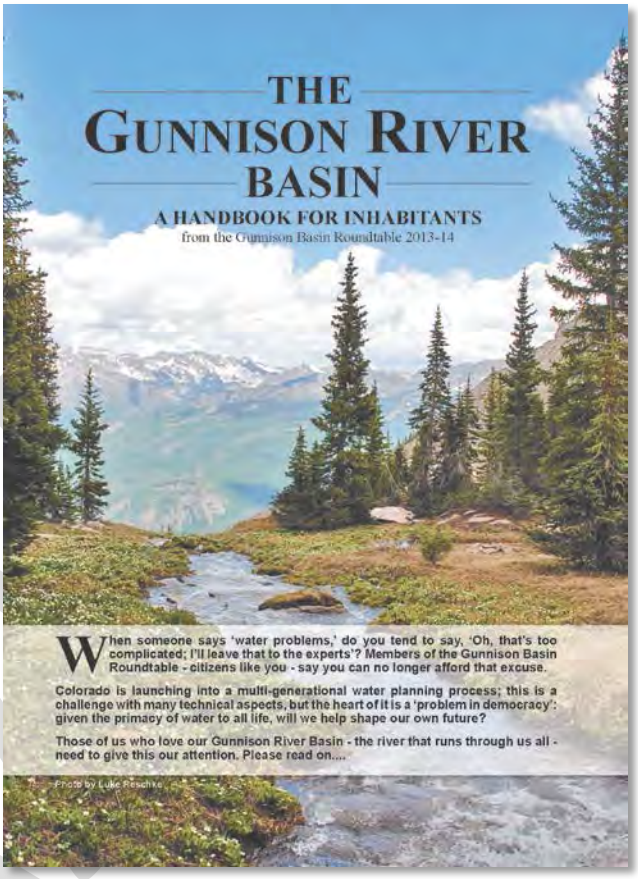
As described in Section 3, determining effective solutions relies partially on the use of the water supply planning tools of the Colorado Decision Support System (CDSS) that were previously developed for the Basin. Since these modeling tools represent a majority of the needs in the Basin over a long-term 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.

Outreach Process

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, during the past year 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 4. 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.

Appendix 4 summarizes outreach and education materials related to the GBIP, including: the 2015 GBRT Education Action Plan, Outreach Status Report (July 18, 2014), GBIP Input Survey, GBRT Progress Report (June 1, 2014), Public Meeting Comment Summary Table, and Summary of Survey Results. Overall input to date shows strong support for the GBIP Basin Goals and Statewide Principles outlined in Section 1.

Report 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 11.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	**Introduction** and **4. Basin Projects**
4.2 Watershed Health	
4.3 Conservation Projects and Methods	**4. Basin Projects**
4.4 New Multi-Purpose, Cooperative, and Regional Projects and Methods	
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 report. Appendix 2 lists references used for completion of this report. Appendix 3 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 3 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 3. The following information provides brief descriptions of the more essential documents and tools used to support completion of this report, 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 report.

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 reports 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

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Section 1: Basin Goals

1.1 Introduction

Past reports referenced in the introduction of this report include an initial assessment of water supply goals for the Gunnison Basin. These goals helped to enhance the discussion of the Basin's priorities for this plan. In addition, the GBRT has been an active participant in the IBCC process, helping to guide the conversation on the necessity and potential methods for anticipating and managing risks to existing water rights posed by the development of additional water supplies in the Colorado River Basin. These concepts, known as risk management, are an important element to the GBRT and its water supply priorities.

Due to the importance of risk management and related statewide water policy issues, the GBRT has identified Statewide Principles in this section along with their Basin Goals and measurable outcomes. The Statewide Principles section serves to document the GBRT's vision for major water policy issues in Colorado, with an emphasis on risk management. The Basin Goals focus on maintaining and protecting important historical water uses in the Basin. Both sections are intended to "inform and help drive the Colorado Water Plan" as indicated by the CWCB (2013).

The GBRT identified goals for its basin implementation plan early in the process. The first iteration came in the form of a document titled: *Gunnison Basin Roundtable - Principles, Policies, Priorities*. This document was discussed at the September 2013 GBRT meeting and provided the foundation for the goals and measurable outcomes identified in this plan. Input from GBRT members at subsequent GBRT meetings through December of 2013 helped with the refinement of the goals and measurable outcomes. To help guide this discussion and to manage the creation of the GBIP, the GBRT created a subcommittee. The subcommittee met in October, November, and December of 2013 to further refine the goals and measurable outcomes.

1.2 Basin Goals

Background

The Gunnison Basin Roundtable identified nine Basin Goals, divided into one primary goal and eight complementary goals (Table 12). The primary goal is the maintenance and protection of historical water use in the Basin. By maintaining historical water use 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.

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Table 12. 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 a scenario planning approach for regional and statewide water supply planning. 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 outcomes of these drivers into a complete picture of what the future might look like.

The analyses in this report includes 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.

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

The vitality of the Gunnison Basin depends on maintaining the historical and existing water uses that have allowed the Basin to prosper since its settlement. The protection of these uses was identified by the GBRT as the most important goal in the Basin. This report helps identify the baseline of current water use in Sections 2 and 3. 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/or shortages could increase. Therefore, this report provides an assessment of water supply impacts under different hydrologic scenarios in Section 3. It is also important to note that the existing mix of uses includes a variety of agricultural, municipal, industrial, environmental, and recreational uses, all of which must be balanced in the consideration of new water projects.

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
- 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 report. 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

Measurable Outcomes:

- Preserve the current baseline of 50,000 protected acres and expand by five percent by 2030

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 report 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 report 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)

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 2020

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 report 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 report, 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 and quantify shortages in time, frequency, and duration

- Recommend potential 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, 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, producing at least medium levels of conservation savings as defined in SWSI 2010 and employing relevant conservation strategies listed for both the low and medium levels of SWSI 2010

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 report. 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 report 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).

[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).

Process to Achieve Goal:

- Identify specific locations in the Gunnison Basin where identified environmental and recreational needs are not being met
- Quantify the needs in time, 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 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

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
- Reduce the level of general salinity in the lower reaches of the Gunnison River
- 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 environmental and recreational uses. Section 2 of this report describes how delayed irrigation return flows and the irrigation water stored in the soil, sometimes called the soil reservoir, provide some benefit to stream flows and environmental and recreational water uses in the Gunnison Basin. Environmental and recreational uses can benefit agricultural water uses. For example, agricultural rights downstream of the Gunnison River's confluence with the North Fork have seen more reliable flows and less operational issues with their diversions as a result of the Black Canyon minimum flow right. Numerous examples of mutually beneficial multipurpose projects are described and encouraged in the GBIP.

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
    - 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 meet multiple needs as identified in this report and other studies
- 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 historical 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 5 of this report include many efforts focused on the restoration, maintenance and modernization of existing water infrastructure.

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 Grand Mesa Reservoirs rehabilitation, lining of earthen delivery systems, etc

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 programs will be acquired or developed and applied at all levels in the public schools by 2025
- In recognition of the participation mandate in the public education, participation and outreach clause of HB05-1177, programs will be established in each conservancy district in the valley to enable family groups, non-water-related organizations, school classes, etc. to participate in annual river restoration programs and projects by 2025
- By 2025, the GBRT Education Committee will have in place 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, will attend water conferences, etc.
- 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

Measurable Outcomes:

- By 2025, the GBRT, working together with local conservancies, will have met with all County Commissioner Boards and/or their planning staffs, and all City Councils and/or their planning staffs 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
- By 2025, each sub-basin in the Gunnison Basin will have at least one water stewardship project ongoing, administered by the Gunnison Basin Water Leaders, involving high school students and other groups in a learning activity that will benefit the sub-basin and its water users (e.g. riparian improvements, wet-meadow restoration, etc.)

1.3 Statewide Principles

The GBRT believes that the success of its Basin Implementation Plan depends on statewide application of certain principles. Table 13 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 13. 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, strictly 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 West Slope, as well as the Front Range diverters.
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. Scenario planning should be used as the principal tool for water planning
7. 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 report: ***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, strictly 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 report 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, risk should be assessed in terms of a shortage of supply resulting in curtailment

[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.

under Colorado's prior appropriation system. 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 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 West Slope, as well as the Front Range diverters.

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 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
- 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:

- Entities must first reach at least medium 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 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 report 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 report 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 report, 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.[3]

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: Scenario planning should be used as the principal tool for water planning.

Scenario planning – A planning 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 (climate, population growth, water supply, etc.). Scenarios are formulated by assessing key drivers of uncertainty (e.g., economic and demographic growth, climate, environmental regulations, and social values and perspectives) and combining the outcomes of these drivers into a complete picture of what the future might look like.

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[3] "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).

To most effectively address various future uncertainties, the GBRT supports the use of a scenario planning approach for water supply planning. The analyses in this report include various future hydrologic and water demand scenarios. Though much of the analysis focuses on worst case scenario drought conditions to best examine future reliability issues, an investigation of wetter periods is also critical for a full analysis of reservoir operations. Modeling analysis should investigate the potential importance of reservoir storage to accommodate changing future hydrology. This approach builds on the work of the CWCB and IBCC through the Colorado's Water Supply Future Portfolio and Trade-off Tool. Therefore, this report explicitly considers various potential impacts of a climate variability, such as decreased water supplies, increased water demand, and a shift in the timing of runoff.

Implementation Steps:

- Incorporate the potential effects of climate change by using a scenario planning approach to future demands and hydrology (e.g. dry, average, wet scenarios)
- Include a scenario planning approach to population growth and related future water use in the Gunnison Basin

Principle 7: 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. The GBRT Education Committee will also further its education and outreach efforts throughout the state to ensure that the perspective of the Gunnison Basin provides vital input to future statewide water planning efforts.

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 goals of the Gunnison Basin Roundtable through the work of the Gunnison Basin Roundtable Education Committee

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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 report 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 report 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 5 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.

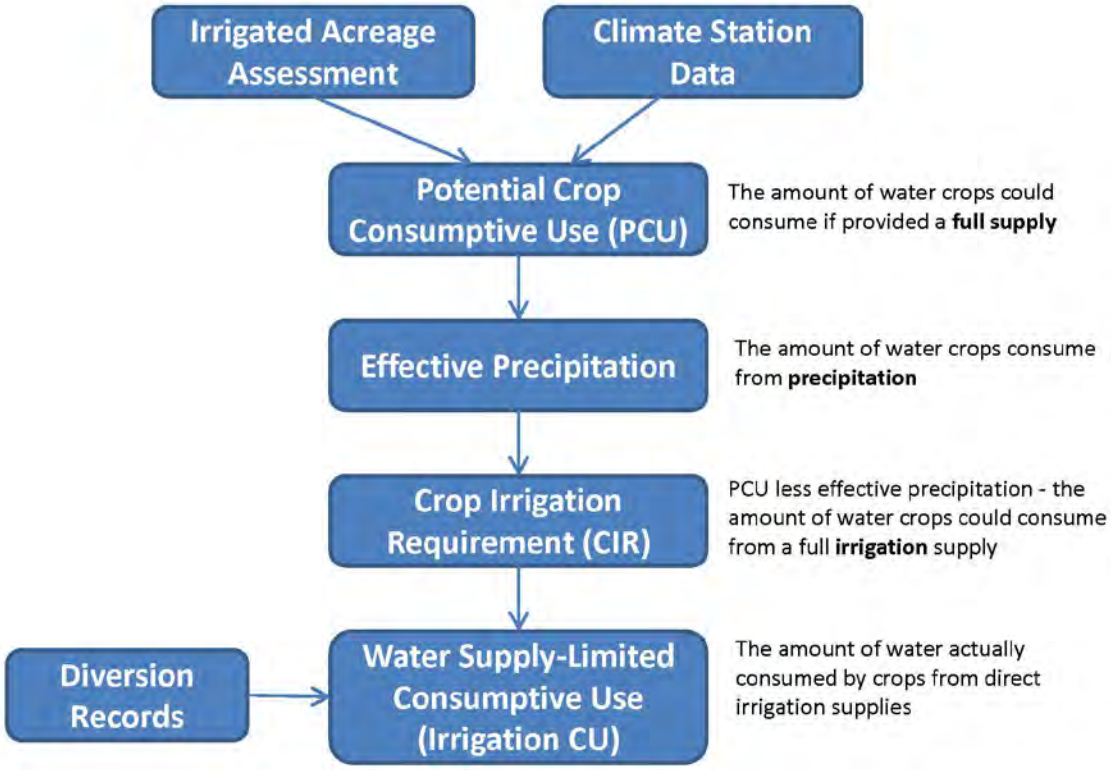

Figure 5. Consumptive Use Analysis Approach

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 report, 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 report.

The agricultural demands and shortages from the previous studies were refined for this report. 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 report. 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 14 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 14. 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 6 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.

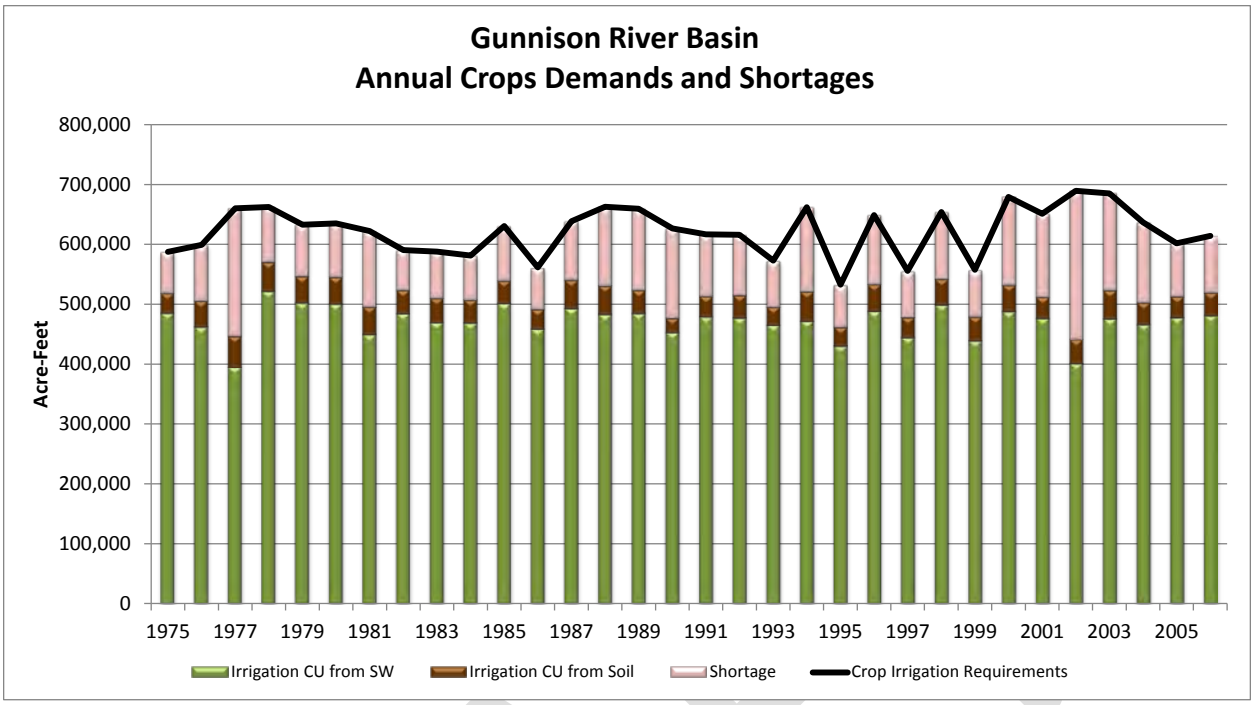

Figure 6. Annual Crop Demands and Shortages

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 6, 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 15. 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 15. 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 new irrigators understand how historical practices evolved through years of experience, and provide the most water available to irrigators** throughout each tributary.

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

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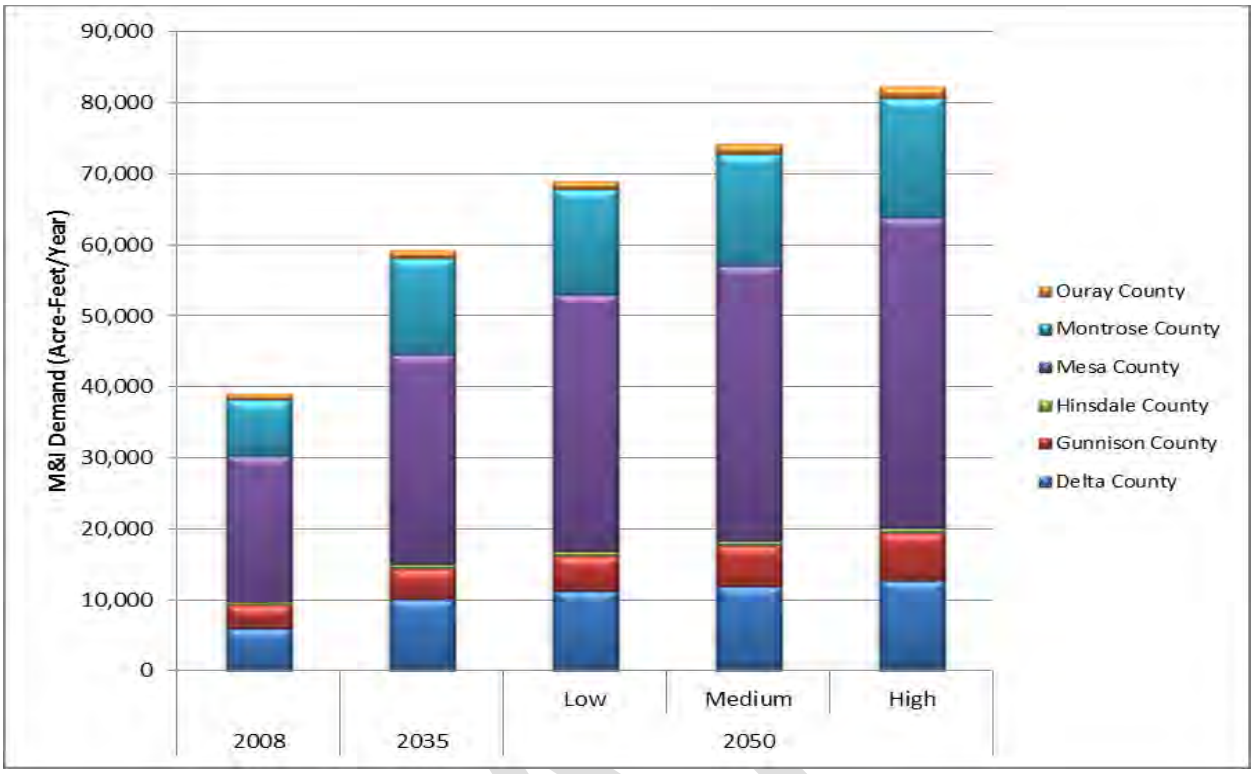

Figure 7. M&I Water Demands

* 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 16 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 report will help with the refinement projected needs during SWSI 2016.

Table 16. 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 12 stream segments particularly suited for future environmental/recreational and multipurpose projects. The Roundtable will maintain a focus on these segments 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 report 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 report, 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 report 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 '[4]). 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.

[4] 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 17). 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 17: Gunnison Basin 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
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;
- Metapopulation 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

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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 8, 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 9 shows average monthly results for the same time period.

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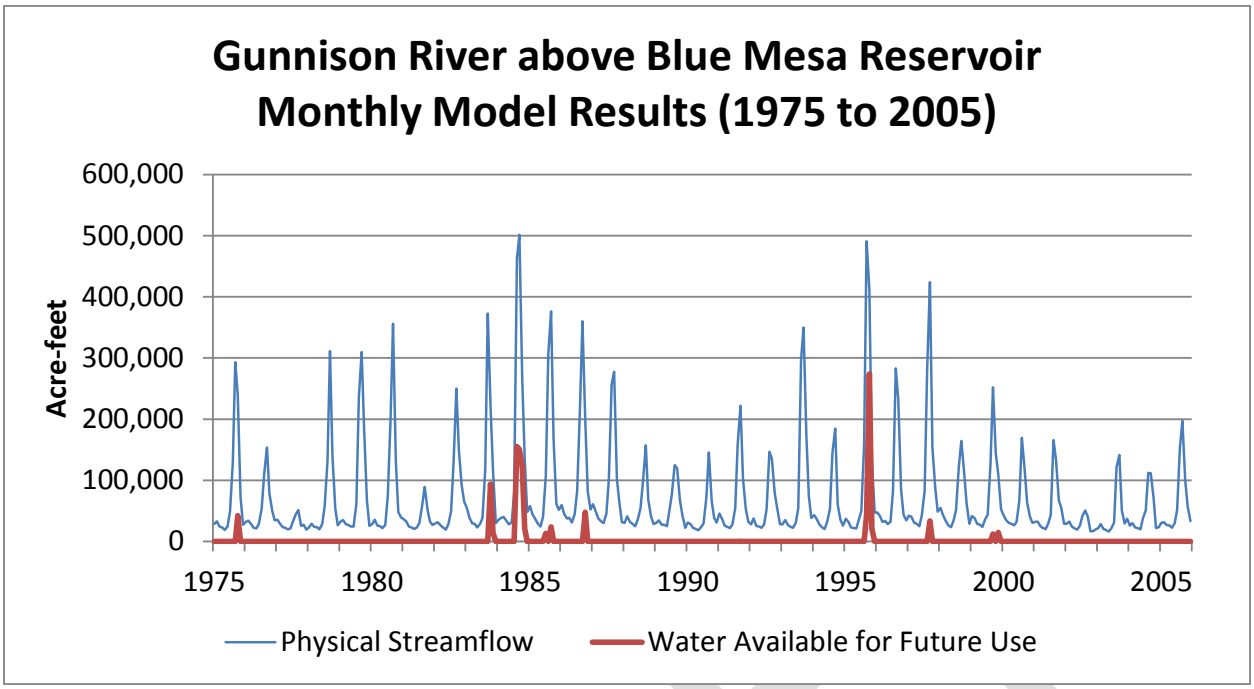

Figure 8. Physical Streamflow and Water Available – Gunnison River above Blue Mesa Reservoir

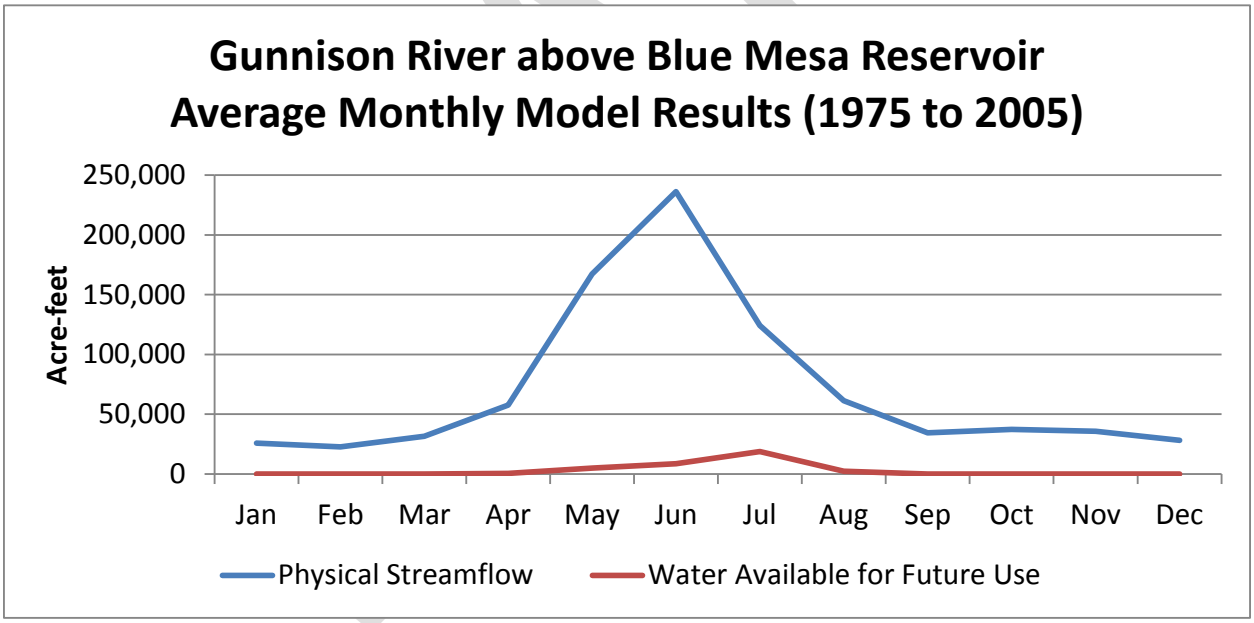

Figure 9. Physical Streamflow and Water Available – Gunnison River above Blue Mesa Reservoir

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 10 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.

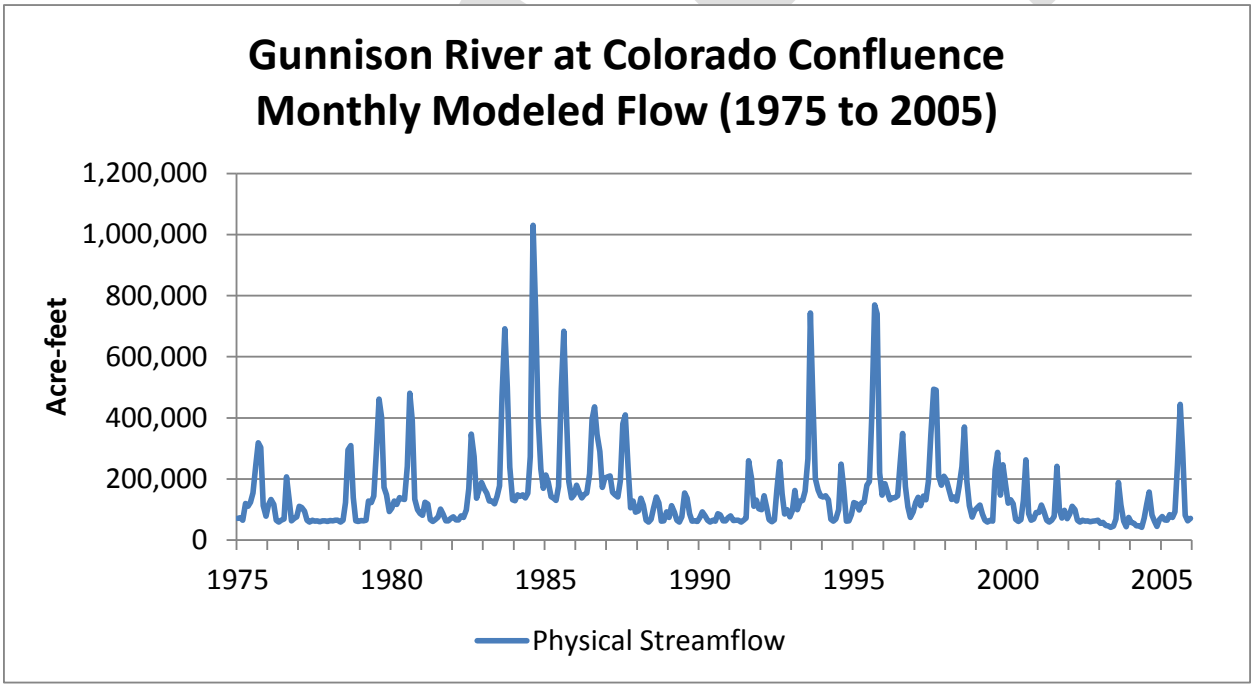

Figure 10. Physical Streamflow – Gunnison River at Colorado River Confluence

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 11 (monthly timeline) and Figure 12 (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.

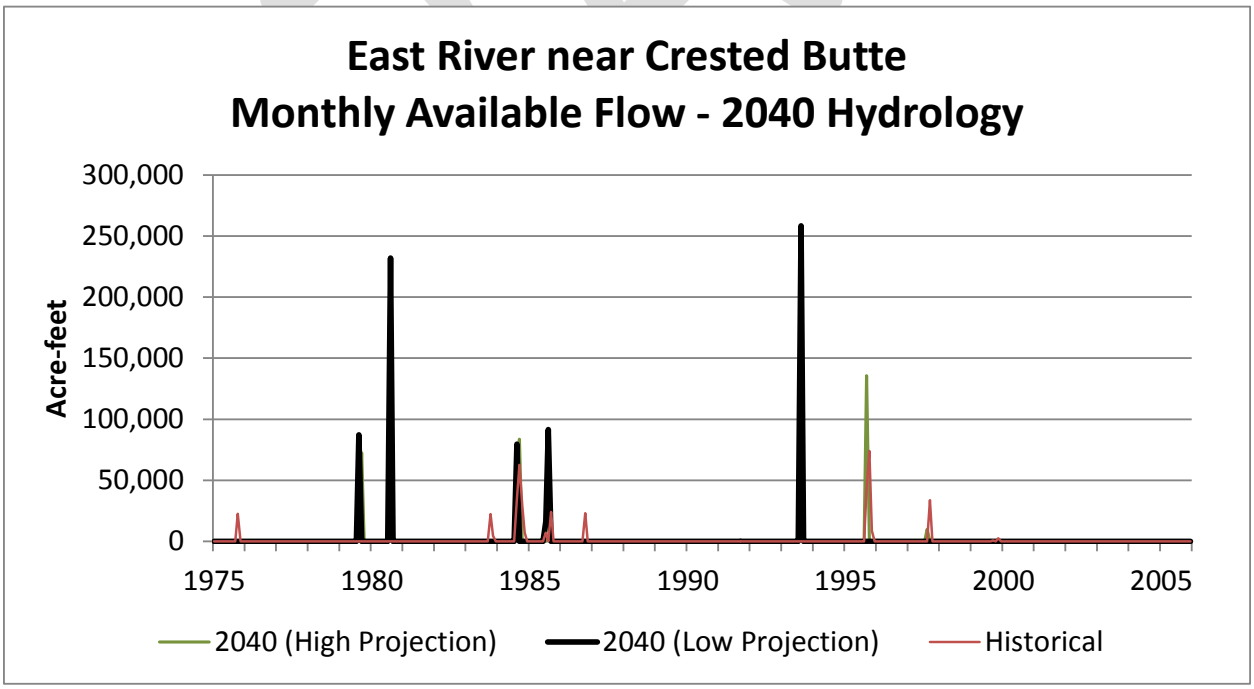

Figure 11. Climate Projected Water Available – East River near Crested Butte

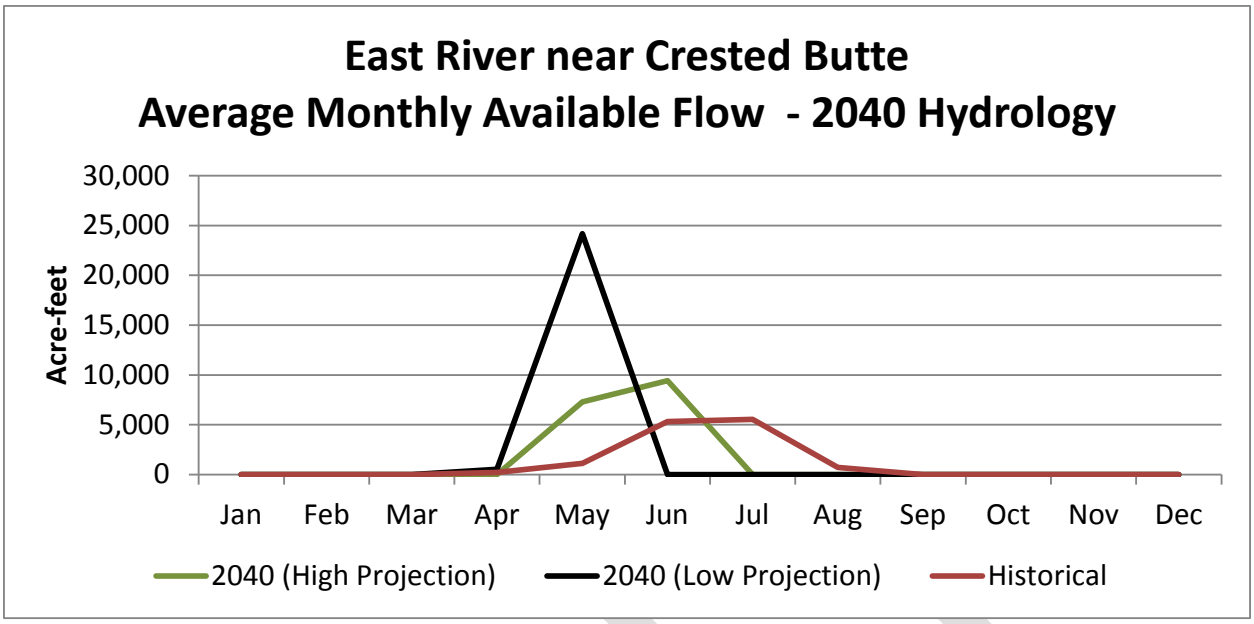

Figure 12. Climate Projected Water Available – East River near Crested Butte

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 and minimizing bank erosion. 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 13 (1975-2005) and Figure 14 (1977 and 2002) shows natural flow and modeled streamflow compared to the instream flow right.

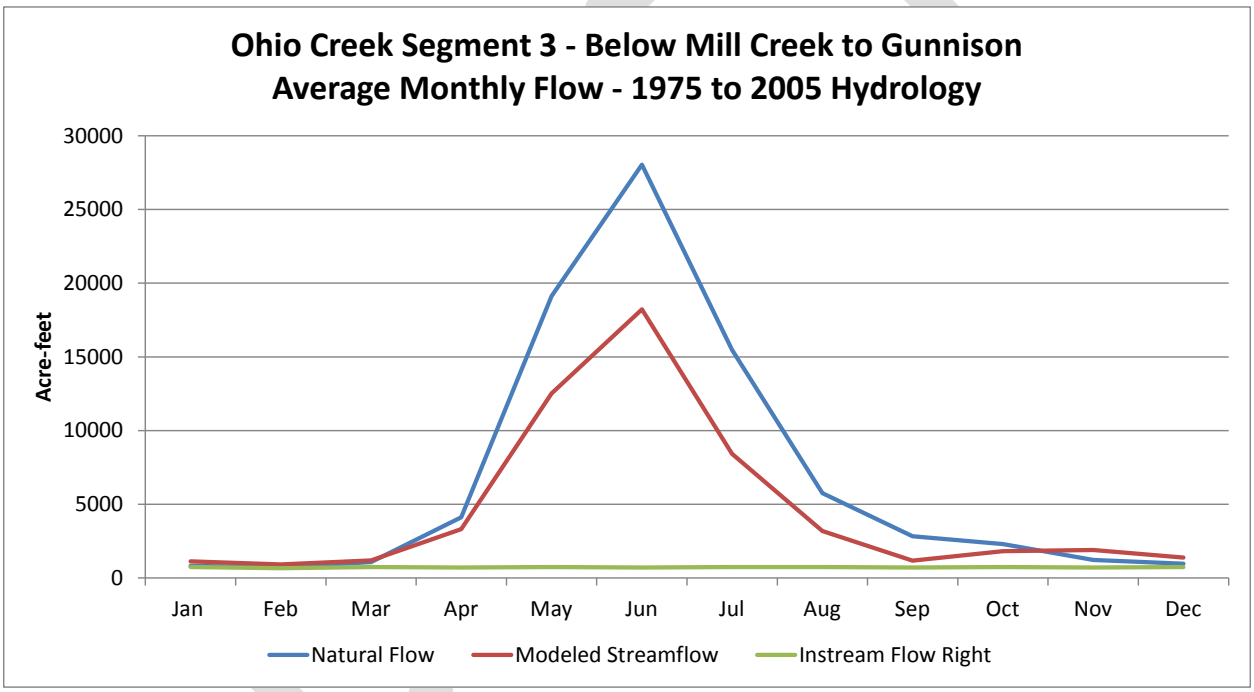

Figure 13. Streamflow (1975-2005) – Ohio Creek Segment 3 (Below Mill Creek to Gunnison)

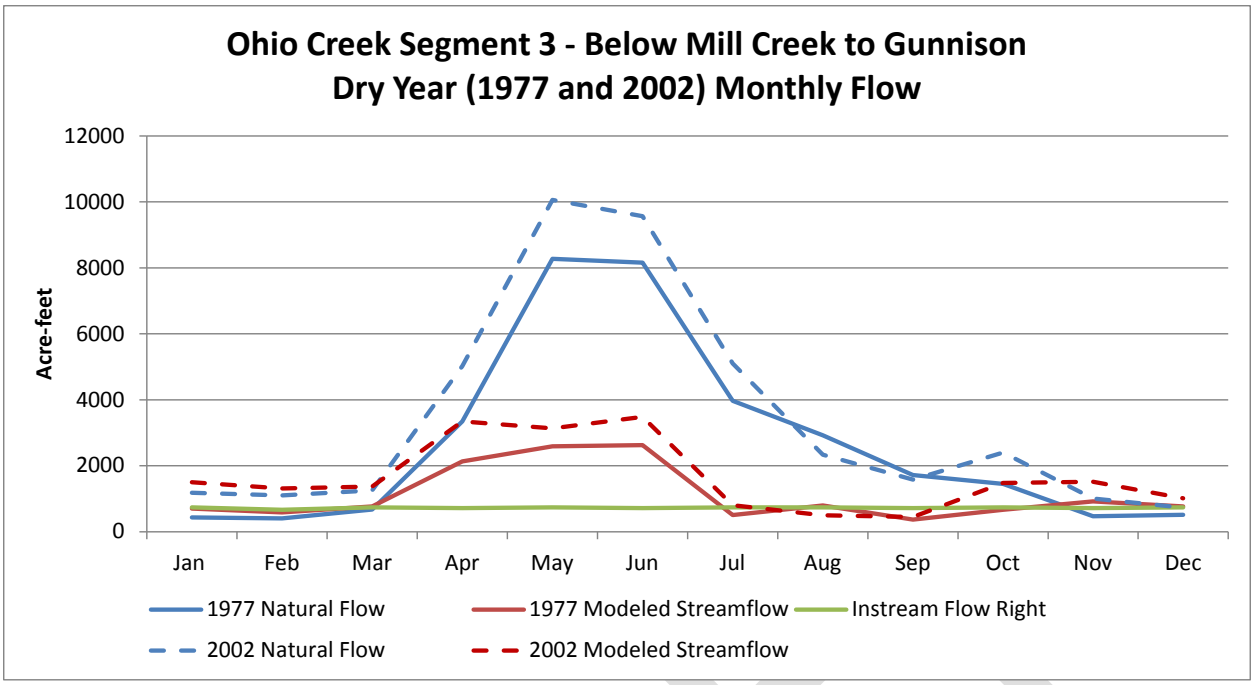

Figure 14. Streamflow (1977 and 2002) – Ohio Creek Segment 3 (Below Mill Creek to Gunnison)

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 report. 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.

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Section 4: Basin Projects

4.1 Introduction

Section 4 is the primary focus of the GBIP, designed to summarize planned and proposed projects to meet Basin Goals and present plans to guide their implementation. Projects are strategically selected to meet identified needs in the Basin. 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.

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.

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. For the purposes of this report the term projects replaces the previous CWCB terminology for water solutions including identified projects and processes, proposed projects and methods, and actions. As a plan focused on strategic implementation of future projects, all currently contemplated projects whether structural or nonstructural must be detailed enough to determine the feasibility of implementation. 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 2020 and excel at meeting identified Basin Goals are highlighted.

In addition, to note important successes, ongoing and recently completed projects are documented in Section 4.2. 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.

Section 4.2 provides a list of proposed basin projects; Section 4.3 provides a standard project template used to summarize proposed projects; Section 4.4 provides a compilation of standard project summaries for proposed projects. Project summaries in Section 4.4 include projects addressing various use types.

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The use types indicated on each project's summary sheet and their relation to the section numbers of the CWCB's BIP Guidance document are:

- Agricultural Projects: BIP Guidance Section 4.6
- Municipal and Industrial Projects: BIP Guidance Section 4.3 and 4.5
- Environmental and Recreational Projects: BIP Guidance Section 4.2 and 4.7
- Multi-Purpose Projects: BIP Guidance Section 4.4

Other items that the guidance document included in Section 4, but that are not directly related to the implementation of projects, are included elsewhere in this report. The report Introduction includes a discussion of education, participation, and outreach (Section 4.1 of the guidance) and watershed health (Section 4.2 of the guidance). In both cases, concrete projects related to these items are included in this section. For more information on how the structure of the GBIP compares to the guidance refer to the comparison table in the report Introduction (Table 11).

4.2 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.

Project information was collected through targeted technical outreach. Base project data from SWSI 2010 was refined through outreach to stakeholders and project proponents. To strategically focus implementation efforts of the GBIP, projects are divided into 3 tiers.

- **Tier 1** - Implementation is likely feasible by 2020, and project will clearly meet Basin Goals.
- **Tier 2** - Implementation is likely not feasible by 2020, however project would excel at meeting Basin Goals. Project may also have important conditional water rights and/or feasibility level planning efforts have been completed.
- **Tier 3** – Implementation is likely not feasible by 2020; the project is in more preliminary stages of planning and/or may meet Basin Goals to a lesser degree.

Projects in Tier 1 are highlighted with detailed project summary sheets in Section 4.4 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 report.

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.

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Table 18. Proposed Basin Projects

DRAFT Gunnison Basin Implementation Plan - Proposed Project List (7/31/14)

(Legend provided below table)

Ref #	Tier	Project	Project Sponsor	Water District	Sponsor Type	Use Type	Project Type	Basin Goal	Included in SWSI 2010?	Point of Contact: Name	Purpose	Volume of Water Gained or Saved (AF)	Estimated Completion Date	Estimated Budget
1	1	Inventory of Irrigation Infrastructure Improvement Needs - District 28	Upper Gunnison River Water Conservancy District	28	SE	MP	NS	1, 3, 5, 7, 8	N	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.	Not applicable	2018	100,000
2	1	Cole Reservoirs #4 and #5	Bill Martin	40	SE	AG	S	1, 3, 8	N	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
3	1	Crawford Reservoir System Optimization Study and Prioritized Conveyance Improvements	Crawford Water Conservancy District	40	SE	AG	S	1, 3, 8	N	Gary Kraai	Improve conveyance, automation, and measurement infrastructure as related to irrigation delivery systems.	Not applicable	2020	TBD
4	1	Doughty #1 - Chipmunk Reservoir	Perry Hotz	40	SE	AG	S	1, 2, 3, 8	N	Perry Hotz	Reconstruction of breached reservoir.	68	2018	125,000 - 205,000
5	1	Fire Mountain Canal Delivery Efficiency Project	Fire Mountain Canal Company	40	SE	AG	S	1, 3, 8	Y	Tom Alvey	Help meet deficit irrigation water in the North Fork of the Gunnison.	1,000 - 2,000 per yr.	2020	7,746,100
6	1	Marcott Reservoir	Grand Mesa Water Conservancy District	40	SE	AG	S	1, 2, 3, 8	N	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
7	1	North Delta Canal	North Delta Irrigation Company (NDIC)	40	P	AG	S	1, 3, 8	Y	Austin Keiser	Reconstruct a collapsed tunnel and pipe the ditch to restore water deliverability.	50 cfs	2020	2,000,000
8	1	Orchard Ranch Ditch	Orchard Ranch Ditch Company	40	SE	AG	S	1, 2, 3, 8	N	Robert Morris	Pipe approximately 2 miles of the ditch.	500 per year	2017	1,400,000
9	1	Overland Reservoir Enlargement (Part 2)	Overland Ditch and Reservoir Company	40	SE	AG	S	1, 3, 8	Y	Phillip Ceriani	Currently the reservoir stores 1,007 AF of an absolute water decree. The projects involves increasing the reservoir's storage to 7,171 AF in order to use a 1902 conditional decree for 971 AF.	1,009	2020	2,000,000
10	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	P	AG	S	1, 3, 8	Y	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 so investigate long-term sediment management options, with the intent of minimizing future losses and possibly restoring current capacity losses.	1,000 - 3,000	2020	8,000,000
11	1	Young's Creek Reservoirs (#1 & #2) Rehabilitation	Young's Creek Reservoir Company	40	P	AG	S	1, 3, 8	N	Bob Morris	Reservoir rehabilitation necessary due to existing DWR fill restrictions. Also, sinkholes present in left dam abutment.	785	2014	120,000
12	1	Granby Reservoirs (#5 and #11) Rehabilitation	Grand Mesa Water Conservancy District	40	P	MP	S	1, 3, 8	N	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
13	1	Inventory of Irrigation Infrastructure Improvement Needs - District 40, Grand Mesa (Surface Creek)	Grand Mesa Water Conservancy District	40	SE	MP	NS	1, 3, 5, 7, 8	N	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.	Not applicable	2018	75,000

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14	1	Inventory of Irrigation Infrastructure Improvement Needs - District 40, Upper North Fork	North Fork Water Conservancy District	40	SE	MP	NS	1, 3, 5, 7, 8	N	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.	Not applicable	2018	75,000
15	1	Rehabilitation/Enlargement-28 Reservoirs LCWUA (Part 2)	Leroux Creek Water Users Association	40	SE	MP	S	1, 3, 8	Y	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	2020	3,000,000 - 5,000,000
16	1	Somerset Diversion Improvement	Delta Conservation District/Somerset Domestic Waterworks District	40	P	MP	S	1, 3, 4, 5	No	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
17	1	Environmental/Recreational Project Identification and Inventory - North Fork Region	The Conservation Center	40	SE	NC	NS	1, 5, 7	N	Sarah Sauter	Investigate the feasibility of implementing specific projects targeted towards nonconsumptive focus segments.	Not applicable	2018	75,000
18	1	Uncompahgre Valley Water Users System Optimization Projects (Canal Lining and Reregulation of Reservoirs)	Uncompahgre Valley Water Users Association and Others	41	P	AG	S	1, 3, 8	Y	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 and help reduce agricultural shortages.	10,000	2020	125,000,000
19	1	Project 7 - 10 kAF Raw Storage (Part 2)	Project 7 WA	41	P	M&I	S	1, 4	N	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	2020	43,000,000
20	1	Redlands Pump Modernization and Hydropower Optimization Project	Redlands Water and Power Company	42	SE	MP	S	1, 3, 5, 7, 8	N	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
21	1	Dillsworth Ditch	Spann Ranches	59	SE	AG	S	1, 2, 3, 8	N	Spann Ranches	Repair the headgate's spill structure, thus restoring use of the ditch.	TBD	2014	15,952
22*	1	Meridian Lake Reservoir and Washington Gulch Storage Project	Mt CB Water & San Dist., UGRWCD	59	SE	AG	S	1, 2, 3	Y	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
23	1	Water Conservation Planning Process for the Upper Gunnison Basin	Upper Gunnison River Water Conservancy District	59	SE	M&I	NS	1, 4	N	Frank Kugel	Enable communities of the Upper Gunnison Basin to reduce municipal and industrial water consumption by 20 percent by 2030	Not applicable	2016	50,000

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24*	1	Cunningham Lake Reservoir Rehabilitation	Upper Gunnison River Water Conservancy District and Colorado Parks and Wildlife	59	P	MP	S	1, 2 ,3, 7	N	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	2020	2,000,000
25	1	Gunnison Ohio Creek Canal Enlargement	Upper Gunnison River Water Conservancy District and Trampe Ranches	59	P	MP	S	1, 3, 8	N	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	2020	TBD
26	1	Inventory of Irrigation Infrastructure Improvement Needs - District 59	Upper Gunnison River Water Conservancy District	59	SE	MP	NS	1, 3, 5, 7, 8	N	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.	Not applicable	2018	100,000
27	1	Inventory of Irrigation Infrastructure Improvement Needs - District 62	Upper Gunnison River Water Conservancy District and Colorado River Water Conservation District	62	P	MP	NS	1, 3, 5, 7, 8	N	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.	Not applicable	2018	40,000
28	1	Environmental/Recreational Project Identification and Inventory - Lake Fork Region	Lake Fork Valley Conservancy	62	SE	NC	NS	1, 5, 7	N	Camille Richard	Investigate feasibility of specific project implementation in nonconsumptive focus segments.	Not applicable	2018	40,000
29	1	City of Ouray Water Efficiency and Conservation Plan	City of Ouray	68	SE	M&I	S	1, 4, 8	N	Peter Foster Kathryn Sellars	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	2020	2660000 (avg. 266,142 per yr.)
30	1	Inventory of Irrigation Infrastructure Improvement Needs - District 68	Colorado River Water Conservancy District and Ouray County Water Users Association	68	SE	MP	NS	1, 3, 5, 7, 8	N	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.	Not applicable	2018	75,000
31	1	Environmental/Recreational Project Identification and Inventory - Upper Uncompahgre Region	Trout Unlimited	68	SE	NC	NS	1, 5, 7	N	Cary Denison	Investigate the feasibility of implementing specific projects targeted towards nonconsumptive focus segments.	Not applicable	2018	75,000
32	1	Environmental/Recreational Project Identification and Inventory - Upper Gunnison Region	High Country Conservation Advocates	28, 59	SE	NC	NS	1, 5, 7	N	Jennifer Bock	Investigate the feasibility of implementing specific projects targeted towards nonconsumptive focus segments.	Not applicable	2018	100,000
33	1	NoChicoBrush	Trout Unlimited and CRWCD	40, 41	P	MP	S	1, 2, 3, 8	N	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 multipart improvements such as increased hydroelectric production, and on- farm efficiency projects.	90,000	2020	211,000,000

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34	1	Gunnison Basin Selenium Management Plan and Gunnison Basin Selenium Task Force	USBR and River District	40, 41	P	NC	NS	1, 3, 6, 8	Y	Terry Stroh 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.	Not applicable	Ongoing	TBD
35	1	Colorado River Storage Project - MOA Projects	USBR & River District	40, 41, 62	P	MP	S	1, 3, 6, 8	N	Dave Kanzer	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	2020	12,347,000
36	1	Development of Upper Uncompahgre Water Supplies	City of Ouray and Partners in the Upper Uncompahgre River Basin	40, 68	P	MP	S, NS	1, 3, 4, 8	N	Marti Whitmore Kathryn Sellars	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	2020	1,750,000 (avg. 350,000 per yr.)
37	1	Improvements to Red Mountain Ditch	City of Ouray and other parties	40, 68	P	MP	S	1, 3, 4, 8	N	Kathryn Sellars	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	2020	1000000 (avg. 200,000 per yr.)
38	1	Gunnison Basin Roundtable 2015 Education Action Plan Activities	Gunnison Basin Roundtable	All	SE	MP	NS	1, 2, 7, 9	N	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.	Not applicable	Ongoing	TBD
39*	2	Upper Long Branch Reservoir	Upper Gunnison River Water Conservancy District	28	SE	AG	S	2, 7	N	Frank Kugel	This project provides supplemental irrigation water for Upper Tomichi Drainage.	1,600		
40	2	Duke Stomp		40		AG	S	8	Y	Tom Alvey				
41	2	Electric Mountain Reservoir	North Fork Water Conservancy District	40	SE	AG	S	8	Y	Tom Alvey		1,000		
42	2	Horse Ranch Reservoir	Dion & Dixie Luke	40	SE	AG	S	8	N	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		
43	2	Poison Gulch Reservoir	Grand Mesa Water Conservancy District	40	SE	AG	S	2	N	Austin Keiser	New reservoir construction.		2023	12,000,000
44	2	Smith Pasture		40		AG	S	8	Y	Tom Alvey				
45	2	Snowshoe	West Elk Mine	40	SE	AG	S	8	N	Kathy Welt	Project includes enlarging and lining a feeder ditch, and possibly enlarging the reservoir itself.			
46	2	Cactus Park Reservoir	Grand Mesa Water Conservancy District	40	SE	MP	S	2, 3, 7	Y	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

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47	2	East Beckwith Enlargement - Lost Lake Reservoir	Fire Mountain Canal, North Fork Water Conservancy District	40	P	MP	S	8, 5	Y	Tom Alvey				
48	2	Scotts Pasture Reservoir	Grand Mesa Water Conservancy District	40	SE	MP	S	2	N	Austin Keiser	New reservoir construction.		2025	12,000,000
49	2	West Fork Reservoir	Grand Mesa Water Conservancy District	40	SE	MP	S	2, 3, 7	N	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
50*	2	Brush/Farris Creek Reservoir	Trampe Ranches and Span Ranches	59	SE	AG	S	1,3,8	Y	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 Slate River.	3,000		
51	2	Ridgway Ditch Pipeline	Town of Ridgway	68	SE	MP	S	1, 3, 4, 6, 8	N	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
52	3	Enlargement of McDonough Reservoir #1	Upper Gunnison River Water Conservancy District	28	SE	AG	S		Y	Frank Kugel		1808		
53	3	Alfalfa Ditch	Alfalfa Ditch Company	40	SE	AG	S	7	N	Russ Reger	The project will improve conveyance by approximately 3 miles of the ditch.		2016	6,000,000
54	3	Beaver Reservoir	Surface Ditch and Reservoir Company	40	SE	AG	S	2, 7	Y	Keith Waibel	Reconstruct the reservoir.		2018	200,000
55	3	Big Ditch	Big Ditch Company	40	SE	AG	S	7	N	Robert Morris	The project will improve conveyance by approximately 1 mile of the ditch.		2018	500,000
56	3	Boulder Park Reservoir	Hart Basin Ranch	40	SE	AG	S	2, 7	N	Donnie Hebert	This reservoir needs to be completely rebuilt with a new dam, headgate and outlet pipe.			
57	3	Butte Ditch	Butte Ditch Company	40	SE	AG	S	2, 7	N	Jeff Wick	The project will improve conveyance by approximately 5 miles of the ditch.		2018	3,500,000
58	3	Cole Reservoir #2		40		AG	S	8	N		The reservoir's outlet valve needs repairs, coupled with leaks in the water pool area.			
59	3	Farmers Diversion		40	SE	AG	S		N					
60	3	Fogg Ditch	Fogg Ditch Company	40	SE	AG	S	2, 7	N	Jeff Widner	The project will improve conveyance by approximately 5 miles of the ditch.		2019	3,500,000
61	3	Forrest Ditch	Forrest Ditch Company	40	SE	AG	S	2, 7	N		The project will improve conveyance by approximately 8 miles of the ditch.		2020	6,000,000
62	3	Fruitgrowers Reservoir Pumpback	Grand Mesa Water Conservancy District	40	SE	AG	S	2, 7	Y	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
63	3	Fruitland Mesa Canal Siphon		40	SE	AG	S		Y	Donny Todd Paul Schrader				
64	3	Granby Ditch	Granby Ditch and Reservoir Company	40	SE	AG	S	2, 7	N		Pipe approximately 2 miles of the ditch where leaks are present.		2017	1,000,000
65	3	Greenwood Reservoir	Private Owners	40	SE	AG	S	2, 7	N		Leaks need to be repaired, thus requiring a partial rebuilding of the reservoir.		2015	350,000
66	3	Highline		40	SE	AG	S		N					
67	3	Last Chance Reservoir	Town of Cedaredge	40	SE	AG	S	2, 3	N					
68	3	Little Giant Reservoir	Town of Cedaredge	40	SE	AG	S	2, 3	N					
69	3	Little Jonah Reservoir	Town of Cedaredge	40	SE	AG	S	2, 3	N					
70	3	North Delta Ditch	North Delta Ditch Company	40	SE	AG	S	2, 7	N		Project involves piping of approximately 10 miles of the ditch.		2018	3,000,000

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71	3	Prioritized Conveyance Improvements and System Optimization Study	Crawford Water Conservancy District	40	P	AG	NS	8	N	Gary Kraai Dave Kanzer	The project incorporates improvements to conveyance, automation, and measurement infrastructure as related to delivery systems.			
72	3	Rogers Mesa Risk Project	North Fork Water Conservancy District	40	SE	AG	NS		N					
73	3	Ryan Reservoir	Robert Morris	40	SE	AG	S	2, 7	N	Robert Morris	The size of the reservoir needs to be increased in order to hold the decree.		2020	350,000
74	3	Stewart Canal HG		40	SE	AG	S	8	N					
75	3	Surface Creek Reservoirs	Grand Mesa Water Conservancy District	40	SE	AG	S	3, 5, 8	Y		Project includes the rehabilitation of 13 breached dams.			
76	3	Trickle Ditch	Trickle Ditch Company	40	SE	AG	S	2, 7	N	Doug Wist	The project will improve conveyance by approximately 2 miles of the ditch.		2016	1,250,000
77	3	Weir and Johnson	Private Owners	40	SE	AG	S	2, 7	N		The project will improve conveyance by approximately 2 miles of the ditch.		2020	1,000,000
78	3	West Reservoir #1 Outlet Pipe Replacement	West Reservoir and Ditch Company	40		AG	S	3, 8	Y	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.			426,317
79	3	Zig Zag Reservoir	Town of Cedaredge	40	SE	AG	S	2, 3	N					
80	3	Doughty #2 - Slide Rock Reservoir	Town of Cedaredge	40	SE	MP	S	2, 3, 7	N	Town of Cedaredge	This project includes reconstructing and repairing leaks in slide rock.		2019	250,000
81	3	Leon Lake Reservoir	Leon Lake Reservoir Company	40	SE	MP	S	7	N		The project will repair a damaged outlet tunnel which is severely restricting flow.		2020	2,000,000
82	3	Rebuilding Diversion Structure and Fish Screen for Benefit of CO CTT		40		NC	S	5	Y					
83	3	Prioritized Conveyance Improvements and System Optimization Planning Study	Bostwick Park Water Conservancy District	41	P	AG	NS	8	N	Allen Distel Dave Kanzer	The project incorporates improvements to conveyance, automation, and measurement infrastructure as related to delivery systems.			
84	3	Uncompahgre Valley Water Users In-System Reregulating Reservoirs and Supply Enhancements	Uncompahgre Valley Water Users Association	41	SE	AG	S	3, 8	Y			2000		
85	3	Town of Olathe Pipeline and Reservoir	Town of Olathe	41	SE	MP	S	3, 4	N	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.		2020	1,000,000
86	3	Uncompahgre Watershed Planning Partnership - Planned Process to Develop Remediation Plans		41		NC	NS	5	Y					
87	3	City of Grand Junction - Raw Flow Line	City of Grand Junction	42	SE	M&I	S	4	N	Bret Guillroy	This project will help replacing 46,000 linear feet of Raw Water Flow Line for the City of Grand Junction.			9,800,000
88	3	Planned Native Fish Population Restoration Project		42		NC	S	5	Y					
89	3	East River Number 2	Spann Ranches	59		AG	S	8	N		The ditch needs repair and this project helps achieve this goal.			
90	3	Leaps Gulch Reservoir	UGRWCD	59	SE	AG	S	8	Y					
91	3	Bank Stabilization & Fish Habitat Improvement		59		NC	S	5	Y					
92	3	Curecanti NRA Cottonwood Gallery		59		NC	NS	5	Y		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.			
93	3	River Restoration, Mine Remediation	Coral Creek Watershed Coalition	59		NC	S	5	Y	Anthony Poponi				
94	3	Washington Gulch Stream Rehabilitation		59		NC	S	5	Y					
95	3	Plan for Augmentation for Non-agricultural Purposes Using Aspinall Unit	Upper Gunnison River Water Conservancy District	62	SE	M&I	NS	4	Y			500		

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96	3	Lake San Cristobal Water Development	UGRWCD, Hinsdale County, Town of Lake City	62	P	MP	S		Y			950		9,000,000
97	3	Bank Stabilization & Fish Habitat Improvement		62		NC	S	5	Y					
98	3	Lake Fork Trail Stair Project		62		NC	S	5	Y		Install better stream access to reduce human impacts.	NA		
99	3	Expansion/Enlargement of the Ouray Hydro Plant Dam and Reservoir	City of Ouray	68	P	MP	S	4 , 8	N		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
100	3	Project 7- 10 MGD Water Treatment Plant at Ridgway Reservoir	Project 7 WA	28, 41, 68	P	M&I	S	4	N		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
101	3	Colorado River Basin Salinity Control Projects (Colorado River Basin Salinity Control Act of 1974)	USBR & River District	40, 41	P	NC		6	N	Dave Kanzer				
102	3	Planned Mining Remediation		41, 62, 68		NC	S	5	Y					
103	3	Water Bank Project	SWWCD, CRD, TNC, State of Colorado	All	P	MP	S		N	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.			
104	3	Lake Fork Fish Enhancements				NC	S	5	Y					
105	3	Lease/loan/purchase of water rights for instream flow				NC	NS	5	Y					

LEGEND

Sponsor Type – Single Entity (SE), Partnership (P)
Tier 1 - Implementation is likely feasible by 2020, and project will clearly meet Basin Goals
Tier 2 - Implementation likely not feasible by 2020, 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 2020; 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.**

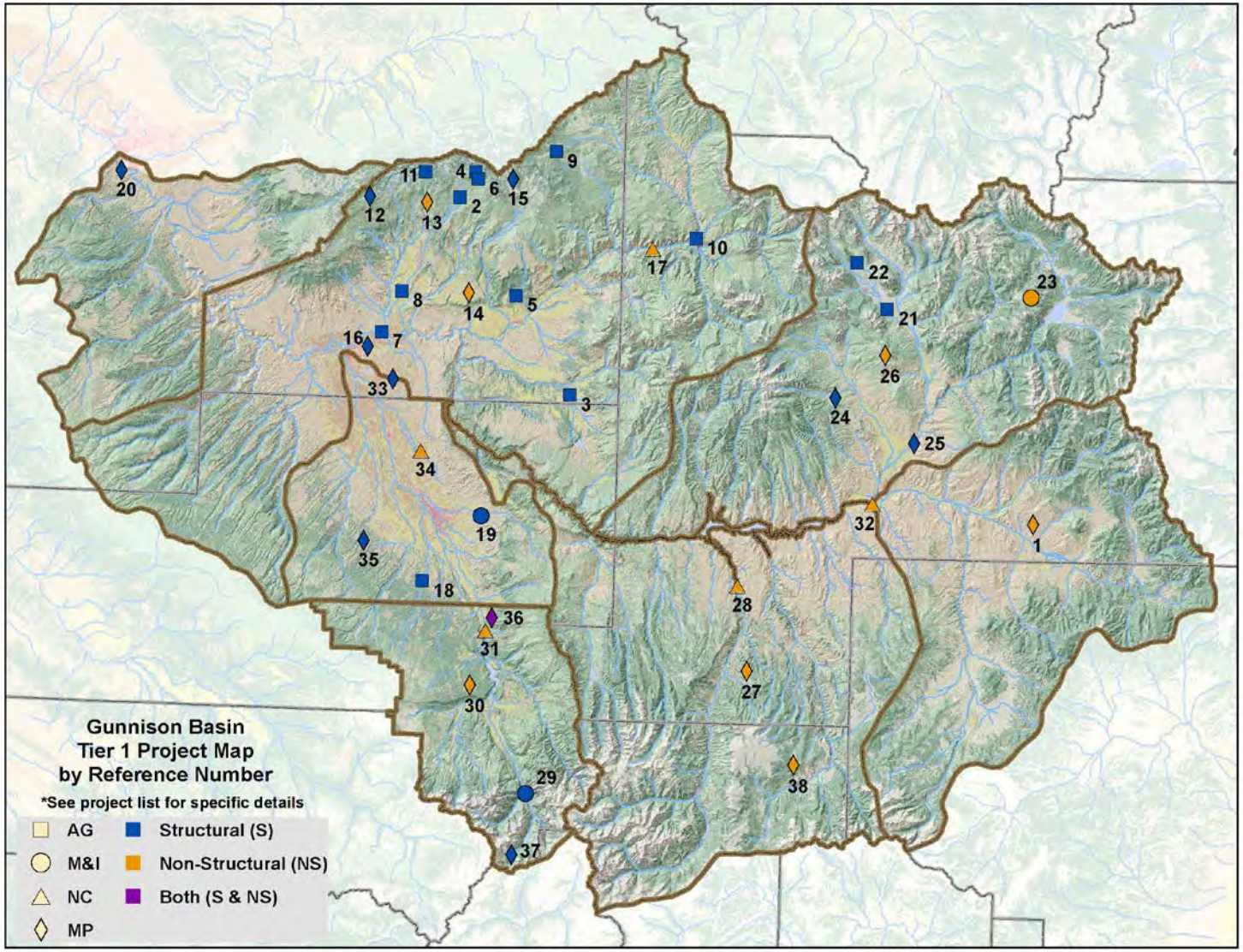

Figure 15. Proposed Tier 1 Basin Projects

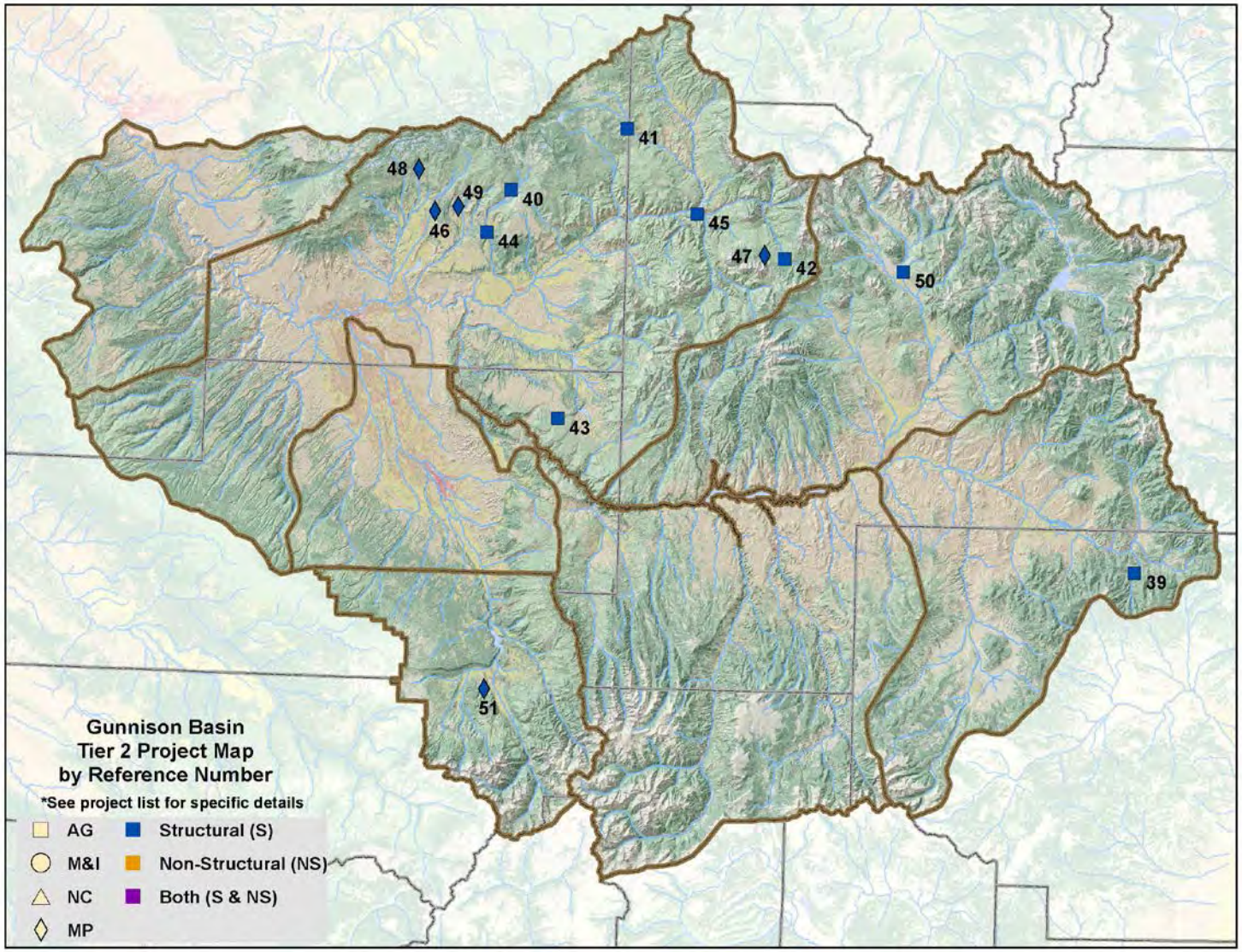

Figure 16. Proposed Tier 2 Basin Projects

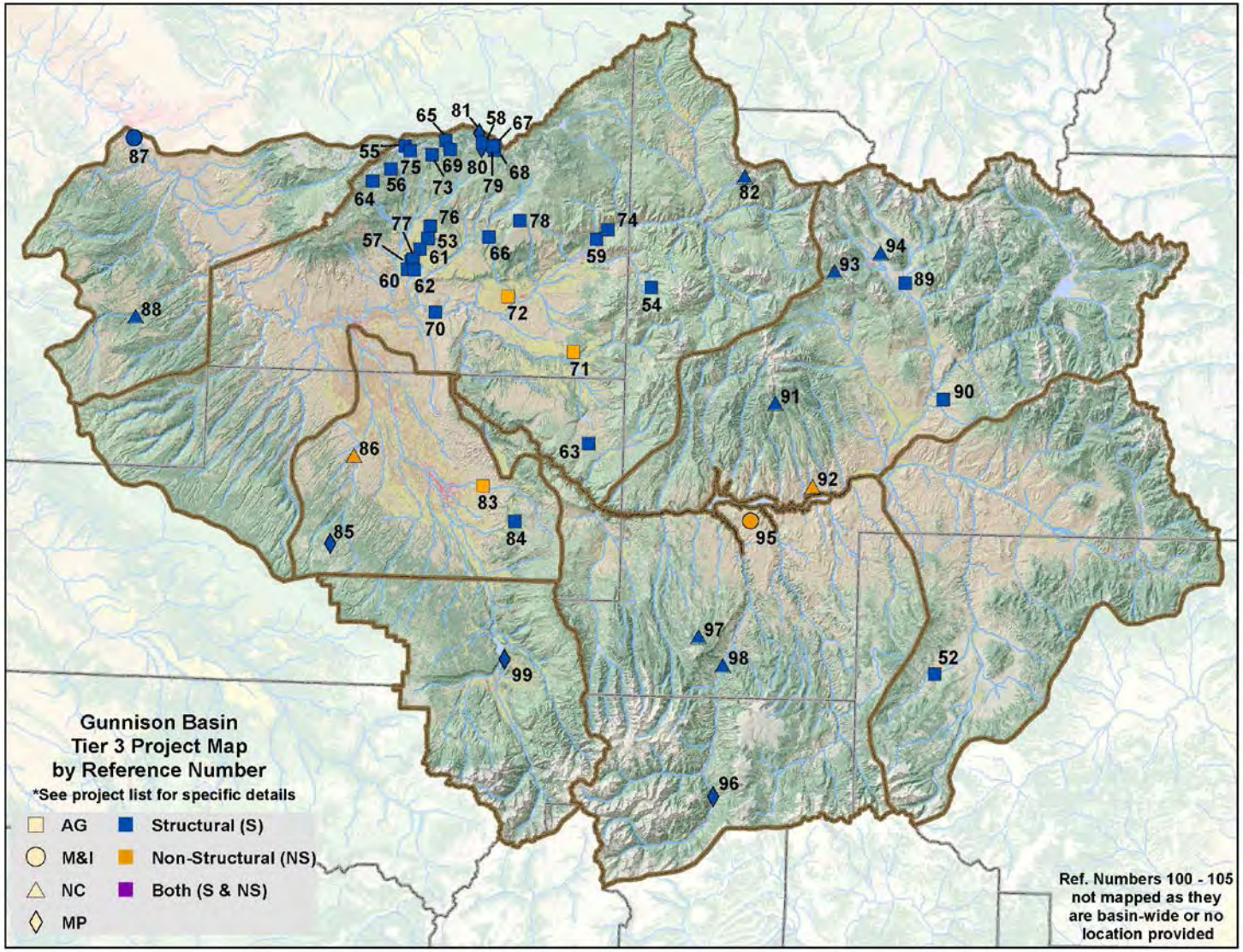

Figure 17. Proposed Tier 3 Basin Projects

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 the corresponding database described in Section 2.

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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.

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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

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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.		

4.3 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 2020 are highlighted in Section 4.4 with separate summary sheets. The project template is presented below.

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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.

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4.4 Project Summaries

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

Project Name	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).

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Project Name	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).

DRAFT

Project Name	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.
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).

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Project Name	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).

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Project Name	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.
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 improving the infrastructure using modern technology (Goal #8), the timing of the water diverted could more closely match the crop water demands – thus reducing agricultural shortages (Goal #3). Furthermore, improvements to system efficiency and reliability helps protect existing water uses in the Gunnison Basin (Goal #1).

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Project Name	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).

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Project Name	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	The North Delta Canal irrigates thousands of acres of row crops. Restoring its use (Goal #8) is critical to reducing agricultural shortages in the area (Goal #3) as well as protecting existing uses in the Basin (Goal #1).

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Project Name	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), discouraging the conversion of productive agricultural with respect to private party rights (Goal #2), and restoring critical water infrastructure (Goal #8).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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)

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Project Name	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.

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Project Name	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).

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Project Name	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.
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 Uncompaghre 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.

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	• **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).

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Project Name	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).

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Project Name	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: • Investigate Funding Mechanisms: CWCB grants, CWCB loans, USBR funding, CRWCD funding, etc. • 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

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	more accurate diversions this project could leave more water in the river to help identified environmental flows (Goal #5).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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.

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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).

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Project Name	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.

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	• 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).

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Project Name	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).

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Project Name	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.

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	• 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).

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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 report. 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 report 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 report, 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 historical 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 seven 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 report.

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 report 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 report. 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 2020; project does excellent job of meeting Basin Goals.
- **Tier 2:** Implementation likely not feasible by 2020; 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 2020; 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.

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Table 22. Proposed Basin Projects

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

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 – Thirty eight sponsored 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; and strategic basin system improvements for improved crop yields, reduced operational inputs, improved water quality, and system reliability.

Goal 2: Discourage the conversion of productive agricultural land to all other uses within the context of private property rights – Eight 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 an existing reservoir; rehabilitation of an existing dam; 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 – Thirty sponsored 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 – Six sponsored 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 – Twelve sponsored 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 trout 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 – Two sponsored 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 – Thirteen sponsored 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 – Twenty eight sponsored 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 sponsored 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.

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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

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Appendices

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Appendix 1: 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

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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

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Appendix 3: Available Reports and Information

Water Supply and Demand

1. Gunnison Basin Roundtable – Principles, Policies, Priorities, Gunnison Basin Roundtable, 2013. *Summary of Gunnison Basin Roundtable objectives, priorities and goals for the Basin Implementation Plan.*

2. Gunnison Basin Fact Sheet, CWCB, 2006. *Summarizes compact information, major storage projects, water management issues, basin growth and water demands.* Report Link

3. Gunnison River basin Information Report, CWCB, 2004. *General descriptions of Gunnison River Projects and Special Operations; water rights, diversions, and operations.* Report Link

4. Water Supply Needs Report for the Gunnison Basin, CWCB, 2006. *Inventories water supplies and demands in the Basin; helpful reference for general basin information; looks at projected water supplies and demands out to the year 2030; catalogs consumptive IPPs.* Report Link

5. Colorado's Water Supply Future Statewide Water Supply Initiative – Phase 2, CWCB, 2007. *Summarizes a range of solutions that will help meet future water supply needs through addressing water conservation and efficiency, alternative agricultural water transfer methods, delineating environmental and recreational resources and needs, and addressing the water gap.* Report Link

6. SWSI 2010 Gunnison Basin Report Basin Wide Consumptive and Nonconsumptive Water Supply Needs Assessment, CWCB, 2011. *Summarizes SWSI basin specific data and analysis of existing and projected consumptive and nonconsumptive water supply needs; and catalogs projects to meet needs (IPPs). Report* Link

7. Colorado River Basin Water Supply and Demand Study, United States Department of Interior, 2013. *Summarizes the next 50 years of current and future water supply and demand imbalances, including investigation of impacts of projected climate change.* Report Link

8. Colorado River Water Availability Study Phase I, CWCB, 2009. *Study to determine how much water is available to meet Colorado's future water needs considering possible climate change hydrology. Identifies the impact of potential climate change to agricultural demands.* Report Link

9. Gunnison River basin Water Resources Planning Model User's Manual, CWCB, 2009. *A reference manual that describes the CDSS model which can be used to understand basin operations and issues; evaluate the applicability to a planning or management issue; analyze a development or management scenario; or estimate conditions under current development over a range of hydrologic conditions.* Report Link

10. Historical Crop Consumptive Use Analysis for the Gunnison River basin, CWCB, 2009. *A reference manual providing approach and results to estimating historical crop consumptive use.* Report Link

11. Technical Memorandum: Reconnaissance Level Cost Estimates for Agriculture and New Supply Strategy Concepts, CWCB, 2010. *Summary of evaluations for agricultural transfer and new supply development strategies.* Report Link

12. Gunnison Basin Water: No Panacea for the Front Range, The Land and Water Fund of the Rockies, 2003. *Summarizes water rights in the Basin and reasons against a diversion to Front Range.* Report Link

13. Aspinall Study: Blue Mesa Reservoir Water Banking, CDM, 2013. *Summarizes model tool that was developed to assess the effectiveness of using excess capacity storage in the reservoir to avoid, forestall, and/or mitigate the magnitude and duration of potential Colorado River Compact curtailment.*

14. Aspinall Unit Operations Final Environmental Impact Statement, United States Department of Interior, 2012. *Summary of proposed action to modify reservoir operations that will result in higher and more natural downstream spring flows and moderate base flows.* Report Link

15. Curecanti National Recreation Area Water Resource Scoping Report, United States Department of Interior, 1995. *Summarizes analysis of water resource issues facing Curecanti NRA to help ensure and maintain appropriate reservoir levels.* Report Link

16. Considerations for Modeling a Water Bank at the Aspinall Unit with Current Environmental Flows Draft Report, Prepared for the Colorado River Program of the Nature Conservancy, Hydros Consulting, 2011. *Summarizes a review of computer models to assess their ability to simulate different water banking options and their effect on operations and environmental flows.* Report Link

17. Grand Valley Regional Water Conservation Plan, City of Grand Junction, Clifton Water District, and The Ute Water Conservancy District, 2012. *Summarizes a plan for development and utilization of strategies to help improve water use efficiency by addressing supply and demand issues.* Report Link

18. Tri-County Water Conservancy District Water Conservation Plan, Tri-County Water Conservancy District, 2012. *Summarizes a plan for the development and utilization of a set of strategies that provide water suppliers and local communities a means of using water resources in a wise and prudent manner.* Report Link

19. Nonconsumptive Toolbox Report, CWCB, 2013. *Provides a compilation of information and tools for use to address nonconsumptive needs and implementation of projects and methods.* Report Link

20. Assessing Streamflow Needs for Whitewater Recreation in the Gunnison River basin, American Whitewater, 2013. *Provides baseline information on stream flows and whitewater recreation that can be applied to evaluating how future water management actions or risk management strategies may impact whitewater recreation.* Report Link

Water Quality and Watershed Health

21. Statewide Water Quality Management Plan, CDPHE, 2011. *Summarizes current conditions of the state's surface waters on a basin scale; key water quality regulations and policies; and serves as an education tool for both current and future stakeholders.* Report Link

22. Integrated Water Quality Monitoring and Assessment Report, CDPHE, 2012. *Summarizes water quality conditions and corresponding standards to assess attainment over the past five years.* Report Link

23. Colorado Nonpoint Source Program 2012 Management Plan, CDPHE, 2012. *Identifies and prioritizes nonpoint source issues; summarizes coordinating resources and partners to address issues and track progress in water quality improvement; and addresses the priorities through on-the-ground watershed restoration efforts.* Report Link

24. Total Maximum Daily Load Assessment Gunnison River and Tributaries: Uncompahgre River and Tributaries: Delta/Mesa/Montrose Counties, CDPHE, 2011. *Summarizes assessment of TMDL of selenium and implementation action plans.* Report Link

25. GIS Map of Statewide Water Quality Data, CDPHE, 2013. *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.*

26. Water Quality Data Analysis and Interpretation: Curecanti National Recreation Area, National Park Service, 1995. *Summarizes water quality data collected and interpretation of the data.* Report Link

27. Final Gunnison River Programmatic Biological Opinion, United States Fish and Wildlife, 2009. *Summarizes biological opinion on modification of the operation of the Aspinall Unit to address flow needs for endangered fish.* Report Link

28. Selenium Watershed Management Plan Update, Gunnison Basin and Grand Valley Selenium Task Force, 2012. *Summarizes relevant background concerning selenium problem, historical planning and implementation activities, and recommended strategies for addressing existing and potential new sources of selenium loading as part of the on-going management plan.* Report Link

29. Selenium Management Program: Program Formulation Document Gunnison River basin, Colorado, prepared by the Selenium Management Workgroup complied by BLM, 2011. *Summarizes the Selenium Management Program including background and action plan.* Report Link

30. CWCB Watershed Flow Evaluation Tool Pilot Study for Roaring Fork and Fountain Creek Watersheds and Site Specific Quantification Pilot Study for Roaring Fork Watershed, CWCB, 2009. *Summarizes the pilot study to determine if the WFET process for examining ecological risk related to flow conditions is a viable option for Colorado.* Report Link

31. Uncompahgre Watershed Plan, Uncompahgre Watershed Partnership, 2013. *Summarizes the existing conditions; identifies and prioritizes issues; defines objectives of managements; and identifies protection and remediation strategies.* Report Link

32. Lake Fork Valley Conservancy Long Term Monitoring Plan 2012 to 2022, Alpine Environmental Consultants, 2012. *Summarizes monitoring goals and action plans for the watershed.* Report Link

33. Assessment of Riparian and Aquatic Habitat Associated with the Upper Gunnison River, Gunnison County, Colorado, Bio-Environs, 2010. *Summarizes assessment of the riparian habitat associated directly with the Upper Gunnison River channel.* Report Link

34. North Fork of the Gunnison River Watershed Plan Update, North Fork River Improvement Association, 2010. *Summarizes new water quality data, community concerns, and revised action plan for river-restoration.* Report Link

35. Coal Creek Watershed Protection Plan, Stantec Consulting, 2005. *Summarizes existing water quality data, known and potential pollution sources, management measures, implementation strategies and monitoring plan.* Report Link

36. Gunnison Basin and Grand Valley Selenium Task Forces. *Contains various resources and information pertaining to Selenium.* Web Link

37. Coal Creek Watershed Coalition. *Includes documents and data concerning the mine superfund site, water quality data, water shed protection plans (Slate and Coal Creek) and education and outreach information.* Web Link; Files and Publications Link

38. Lake Fork Valley Conservancy. *Includes documents and data relevant to the conservancy, Henson Creek, TMDL assessments, and critical wetlands surveys.* Web Link

39. Uncompahgre Watershed Partnership. *Various documents from the Uncompahgre Watershed Partnership including the watershed plan.* Web Link

40. Western Slope Conservation Center. *Various documents and water quality data including the North Fork Watershed Plan*. Web Link

41. Colorado State Forest Service Publications. *Information related to forest health; forest management; forest insects, diseases, and disorders; and wildfire mitigation and education.* Web Link

42. 2013 Report on the Health of Colorado's Forests, Colorado State Forest Service, 2013. *Updates on insect, disease, and wildfires and discussion on active forest management, forest restoration grant programs, effective use of beetle-kill trees, wildfire risk reduction, and community education programs.* Web Link

43. Colorado Statewide Forest Resources Assessment, Colorado State Forest Service, 2010. *A geospatial assessment of forest type and ownership including the data used to inform the assessment, the process followed, list of people engaged, and actions taken to address priority needs.* Report Link

44. Colorado Statewide Forest Resources Strategy, Colorado State Forest Service, 2010. *The strategy provides a platform for CSFS and partners to focus efforts on important forest landscapes and leverage limited resources to achieve positive and significant results.* Report Link

45. Grand Mesa Uncompahgre and Gunnison National Forests. *Includes the proposed forest plan.* Web Link

46. Rocky Mountain Region Forest and Grassland Health, U.S. Forest Service. *Information related to annual forest health reports, insects and disease, and forest health protection.* Web Link

Climate and Drought

47. Draft Climate Change in Colorado – A Synthesis to Support Water Resources Management and Adaptation, Version 3, CWCB, 2014. *Summarizes Colorado climate including observed variability and trends; overview of available climate models; and global model projections of potential climate futures. Summarizes the implications to water resources and discusses using the findings in vulnerability assessments and long-range water resource planning.* Report Link

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48. Gunnison Basin Climate Change Vulnerability Assessment for the Gunnison Climate Workgroup, The Nature Conservancy Colorado Natural Heritage Program and others, 2011. *Summarizes a land-scape vulnerability assessment to determine relative vulnerability of 24 ecosystems and 73 species of conservation concern.* Report Link

49. The Colorado Drought Mitigation and Response Plan, CWCB, 2013. *Provides a blue print for how the State will monitor, mitigate and respond to drought.* Report Link

Public Outreach

50. The Gunnison River basin, A Handbook for Inhabitants, CWCB Gunnison River basin Roundtable, 2013-14. *A public outreach document with the purpose of educating citizens on water issues in the Gunnison River basin.* Report Link

51. Gunnison Basin Roundtable: 2012 Education Action Plan, 2012. *Summarizes the Gunnison Basin's education action plan.* Report Link

52. CWCB Gunnison Basin Round Table. *Contains information pertaining to the roundtable and various links.* Web Link

53. Upper Gunnison River Water Conservancy District. *Includes documents and data relevant to the Upper Gunnison River basin.* Web Link

54. Colorado River Water Conservation District. *Includes documents and data relevant to the Colorado River District boundaries, including the Gunnison River basin. Relevant information includes operations and on-going programs and projects.* Web Link

55. CWCB Web Link. *Contains links to relevant state documents.* Web Link

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Appendix 4: Public Outreach and Education Materials

Below is a Draft of the 2015 Education Action Plan.

~~~ Gunnison Basin Roundtable ~~~

Michelle Pierce – Chair
George Sibley – Public Education, Participation and Outreach Liaison

2015 – GUNNISON BASIN ROUNDTABLE EDUCATION ACTION PLAN – 2015

Overview: The Gunnison Basin Roundtable Education and Outreach Program will focus activities for 2015 on three areas:

A. Continue to keep decision-makers and interested general citizenry in the six sectors of the Basin informed on the development of the Gunnison Basin Plan and the Colorado State Plan.

B. Continue existing water education programs in any of the six sectors of the Basin that have such programs in place. Local watershed groups especially have initiated public education and participation programs addressing problems specific to their areas; these need support for continuity.

C. Lay the foundation for an Education Action Plan for the years 2016-2025, toward some specific goals described below to prepare the people of the Gunnison Basin for the cultural and economic changes that will probably take place through the decades of the planning period (2015-2050).
The underlying assumption here is that a possible doubling of population statewide, with a fixed or quite probably decreasing water supply, will require significant cultural and economic changes in Colorado life. The current "generation in charge" that is doing the planning will be retiring or otherwise leaving the active field by 2030-35; a new generation, now in school, will be taking over the actual execution of the Colorado Water Plan for its critical years. The next decade (2015-25) will be critical in developing a moving toward not just public awareness-raising, but the institutional changes necessary for a more proactive approach to the water problems we will face as the Southwest both "fills up and dries up."

TASK A: Continue to keep decision-makers and general citizenry in the six sectors of the Basin informed on the development of the Gunnison Basin Plan and the Colorado State Plan This will be achieved with continuity from the 2014 Education Action Plan:

- As benchmarks on the way toward the adoption of a Colorado Water Plan late in 2015 are reached, "GBRT Progress Reports" will be drafted by the PEPO Liaison, and distributed in paper and electronic format to City Councils, County Commissioners and other Basin decision-makers.
- An updated website with the evolving Basin and State plans will be maintained, with links from local water organization sites, and with online opportunity for public responses.
- Public meetings will be held in the six sectors of the Basin as benchmarks on the way toward adoption of a Colorado Water Plan are reached, and at other times when it seems desirable to do so.

TASK B: Continue existing water education programs in any of the six sectors that have such programs in place.

- The Basin watershed groups, conservancy districts and some water providers have education plans and programs in various stages of development.
- The public schools have some water education activities that should be not only continued, but also amplified on and expanded.

TASK C: Lay the foundation for an Education Action Plan for the years 2015-2025, at the end of which time these things will be in place for the rest of the planning period (2015-2050):

- Every school district in the Gunnison River basin will have an established water education program, involving 4th, 7th and 11th grades that will combine responsible field stewardship (watershed monitoring, stream cleanups, riparian restoration) with standards-based classroom education. This will involve all segments of the curriculum – natural sciences, social sciences, arts and humanities.
- All Basin governing bodies (municipal, county, water-related special districts, and their planning staffs) will participate in annual half-day seminars on "the state of the streams and water resources" in their sector of the Basin, and in the Basin, state and region at large.
- Each of the six sectors of the Gunnison River basin will have an annual spring or summer celebration focusing on the watershed streams and water resources, combining educational presentations (booths, films, readings or theater, etc.) with in-stream activities, displays and competitions. (Gunnison's River Festival or the North Fork's Float are examples.)
- Municipal and county governments, Chambers of Commerce, realtors, and others at the interface with new and existing residents will have informational materials prominently available to inform new and existing homeowners on basic personal water concerns and to help engage them in creating water-efficient and climate-appropriate homes and landscaping.

Toward those goals, these things will occur in 2015:

A. 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, 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.
B. 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.
C. 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. (See the attached exemplary model for youth water-ed needs from the Uncompahgre Watershed Partnership.)
D. 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.
E. 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.

F. 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.

G. 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.

The GBEOC will meet in February 2016, and in February each year following, to evaluate progress on those action items, and to determine what the next steps in each area of activity will be toward the goals above for the 2016-2025 decade.

~~ GUNNISON BASIN ROUNDTABLE ~~

Michelle Pierce, Roundtable Chair
George Sibley, PEPO Liaison
Frank Kugel, Chair of BIP Committee
Greg Johnson, BIP Consultant, Wilson Water Group

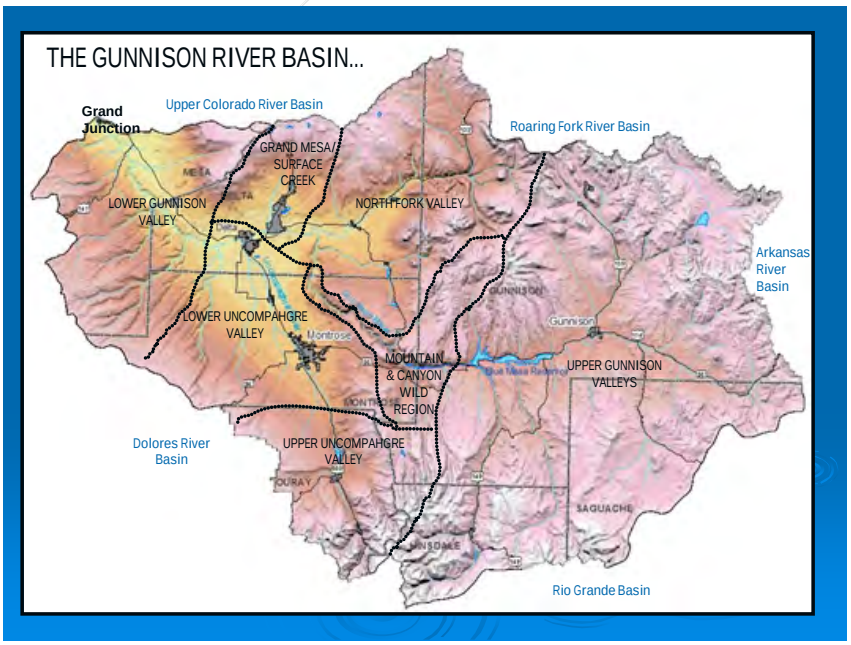
OUTREACH STATUS REPORT

July 18, 2014

Overview: This document, plus appendices, is the results to date of public input meetings held in the Gunnison Basin by Roundtable members. As indicated on the map below, the Gunnison Basin has six relatively distinct "tributary" areas, with relatively distinct economies, cultures (including "water cultures") and histories, so we are trying to hold public information-and-input meetings in each of those six areas. To date we have managed to complete three meetings in two of those areas, and have meetings scheduled in two other areas.

Our "ideal" was to hold two info-and-input meetings in each of the six areas. The meetings have been hard enough to schedule in some of the areas so that this might not happen everywhere, but we will have at least one meeting in each of the six areas to consider the evolving plan through the "Project Analysis" stage.

Greg Johnson of the Wilson Water Group, consulting with the Gunnison Basin Roundtable on this planning process, has also held a number of technical meetings in those same areas with agricultural, municipal/industrial and nonconsumptive stakeholder groups to assess local needs and identify potential projects or programs to address those needs. Information about those meetings is also included in this report.



Advance work for each meeting has involved contacting local newspapers and other media outlets to get a news release about the meeting published. Ads have also been used in "shopper" publications that do not carry news but which are widely read. The most important advance work, however, is personal contact through email, phone calls or "F2F" (face-to-face encounters). For each meeting, we prepare a "Progress Report" updated for where we are in the planning process, and distribute it electronically to people of local influence and everyone receiving email notice of the meeting, thus enabling people to show up with some idea of the meeting's purpose.

The public information-and-input meetings themselves all have had (and will have) a similar structure. Copies of the most recent "Progress Report" are available when participants arrive. One of the local Roundtable members provides a welcome, introduces the other Roundtable members present, and gives a short background summary on the evolving planning process in Colorado beginning with the State Water Supply Initiative in 2003 and leading up to the current intensive Colorado Water Plan process. That is followed by a presentation, either by a local member or by someone from the Basin Implementation Plan Committee, that uses maps and graphs to show both the state and local basin challenges, then summarizes the work to date on the BIP to address those challenges. Participants have been encouraged to raise a question or deliver a comment at any time during the presentation. A general question, comment and discussion session follows the conclusion of the presentation, with the local Roundtable members helping the presenter field and answer questions and comments. We try to have someone taking notes, but that did not happen in one of our meetings.

Public Meetings held to date, and attendance:

Basin Area & Location	***Date***	***Number***	***Notes about Participants***
Upper Gunnison *Commissioner Chamber Gunnison*	3/25	~35	Meeting on plan to date held in conjunction with County Commissioner Work Session. Three Commissioners, County Manager, Gunnison City Manager present. Others: two ag producers; 5 Roundtable members; one news writer (C.B. News); several members of two environmental groups.
Lake City	4/16	~25	Meeting on plan to date was a joint meeting of the Hinsdale County Commissioners and the Lake City Council. Other participants were primarily towns-people, including six businesspersons. No ag users.
North Fork *Hotchkiss Senior Center*	4/30	~80	General public meeting on plan to date, no public officials present. Participants were a relatively balanced mix of agricul-tural producers and town residents, including small business people.
Grand Mesa/Surface Cr. *Orchard City Town Hall*	5/13 1:30 p.m.	~25	General public meeting; two Orchard City town officials present; reporter present from *Delta County Independent*; one state representative candidate present; others ranged from Surface Creek farmers to curious second-home owners from elsewhere.
Grand Mesa/Surface Cr. *Cedaredge Town Hall*	5/14 7:00 p.m.	~40	General public meeting on plan to date; two Cedaredge town officials present; others ranged

			from upper Surface Creek farmers to second-home owners.
Gunnison City Council *Council Chamber*	5/20	9	Presentation on plan to Council by F. Kugel & G. Sibley; five council members (including Mayor), City Manager and City Clerk present, and two citizens.
Lower Uncompahgre *Holiday Inn Express Montrose*	June 2 7:00 p.m.	~60	A BIP input session in conjunction with the annual "State of the River" meeting put on collaboratively by the GBRT and the Colorado River District. About one-third of the participants were GBRT members; the rest were Lower Uncompahgre citizens.
Upper Uncompahgre *Ouray Town Hall*	June 10 7:00 p.m.	~40	Meeting on plan to date with the Ouray City Council, County Commissioners, & general public conducted by J. Fagan & M. Whitmore.

How has public input been reviewed and specifically incorporated into your BIP?

Comments from the public input meetings have been reviewed by the BIP Committee and incorporated into the BIP as seems appropriate. For example, participants in the meeting in the Upper Gunnison noted that water quality had not been explicitly dealt with in the Basin Goals. A goal was added to address that lapse.

At the North Fork meeting, participants observed that "fracking" and its impact on both water quality and quantity were not addressed – primarily a North Fork concern at this point, but a significant one, and one that might spread into other parts of the Basin. It needs to be addressed in at least the water quality portion of the BIP, with careful monitoring of its potential impact on water quantity as well. This has been brought into the plan as a water quality issue in need of careful monitoring (which is actually being done by the Western Slope Conservation Center).

Those considerations noted, participants seem to otherwise be satisfied with the goals and needs assessment in our BIP.

All of the meetings held thus far indicate two concerns about the situation beyond Basin boundaries: first, our ability to exert some influence in those areas; and second, what statements we want to make in those areas. The concerns involve two interrelated concerns: a) the removal of water from West Slope basins through transmountain diversion, and b) obligations to the Lower Basin.

For the first concern, our strategy to this point has been to join with other West Slope basins in setting very high standards for transmountain diversions (land use and construction policies to achieve upfront demand reduction, total reuse plans, participation with adjacent utilities in water authorities, et cetera to insure appropriate use of valuable water), compensation/mitigation for loss of West Slope opportunities, and full acceptance of the risk associated with a new diversion. We have not, however, stated outright that we oppose

transmountain diversion, period. That may be contrary to the will of people on the West Slope, which means either a more emphatic statement, or an effort to educate West Slope people on the legal limits of a "just say no" attitude, and the value of a strategy making legal options economically unaffordable.

The second concern seems primarily to involve a better education effort – perhaps a matter of a couple of powerpoint slides. West Slope people have been scaring ourselves since 1922 with the idea of a "Colorado River Compact call," an eventuality that is not even mentioned in the Compact. We have an obligation to "not cause the flow" at Lee Ferry to drop below 75,000 acre-feet over any rolling ten-year period, but no one knows what happens if the flow does drop below that number – and because of a drought, not because of Upper Basin uses – and it will probably take at least a decade for the seven Basin states to figure it out; a quarter-century is a more realistic period if it goes to court; the incentive will be for the seven states to negotiate something that will work for sharing what is available. Current thinking among many participants at the IBCC/CWCB level seems to be that this is too ambiguous a concern to be writing into the State Plan with "call" strategies. We need to better convey this to our Basin constituents.

Thus we are learning from our interactions with participants in the public information-and-input meetings, and incorporating it into our Basin planning process as we go.

Another round of meetings in the different areas of the Gunnison Basin will be planned for late summer and early fall, for discussion of the completed draft plan.

The following pages contain input received to date from those who have participated in the public information-and-input meetings.

_____

GBRT Public Education Meeting
Gunnison County Commissioners Work Session
March 25, 2014

Public Comment

Butch Clark: Large projects in Gunnison County are a threat to current water supply.
- Proposed mine at Whitepine – County population could double.
- Fracking – Could involve new demands on Blue Mesa.

Bill Nesbitt: Conservation – Does conserved water potentially go to the Front Range?

Phyllis: Non-consumptive use – Hydropower at Taylor Park may result in year round generation and reduced reservoir storage.
EPA – Has adverse impact on agriculture production. Education is important.

Jen Bock: BIP requires prioritization of our goals
- We should maximize utilization of WSRA grant money in basin.
- Be more aggressive in seeking funds for combined consumptive/non-consumptive use projects.

Marlene Zanatell: BCNP flows benefit many uses downstream, including fish.
Ranchers do not want us in their hair – want the ability to sell.

Ken Coleman: Asked if there was any unappropriated water in Gunnison Basin. Frank said Basin was over appropriated in 2003, but water is available in high flow years.

Ramon Reed: No reference to water quality in GBIP goals.
- Has been added since document was printed.

Gary Hausler: Is there unappropriated water in other West Slope basins?
- Yes, Yampa/White and San Juan

Marlene Zanatell: Aspinall provides an insurance policy against Colorado Compact curtailment. The Supreme Court said only 15,000 acre-feet was available.
- 'Not One Drop' still a valid approach.
- Do not dry up our pastures until there are no Front Range lawns.

Ramon Reed: New Supply – Take out "New Project…December 31, 2013." No TMD.

Gary Hausler: Colorado is working provincially. BRT process is a subterfuge. A better alternative to meet the gap is the Mississippi River. It should be investigated.

Butch Clark: There should be more coordination of Hazmat movement in our basin. This puts our water supply at risk. He recommends a warning system including irrigators, warning them to close headgates in the event of spill in the rivers.

Ken Coleman: Water is a finite resource and continued growth is unsustainable. Land use planning should address this issue.

Marlene Zanatell: Reuse needs to be stressed.

Gary Hausler: What happens after 2050? Are we planning beyond that?

Pete Dunda: What about desalinization as an option for lower basin states?

Ramon Reed: Constraints must be clarified under the Compact before CWP is adopted.

Bob Drexel: What is the process for assembling BIP plans into CWP?

NOTES FROM NORTH FORK VALLEY MEETING
April 30, 2014, 7:00, Hotchkiss Senior Center

~80 people were present for the meeting, including 5 members of the Gunnison Basin Roundtable.

The meeting went as described on Page 1. Wendell Koontz gave the welcome and introduction of the topic; George Sibley did the presentation of the plan for the BIP Committee. Neal Schweiterman took notes; Tom Alvey addressed many of the questions. Other Roundtable member present: Henry LeValley.

Comments, Questions discussed:
~ How would Colorado water supplies be curtailed in the event of a "Colorado River Compact Call"? (A number of responses were offered: Priority would be enforced, but junior water going to the cities would not be entirely shut off; how it would be curtailed remains to be worked out. The Compact itself makes no provisions for a "call." But California and Arizona have considerable power in Congress, should it come to legislation.)

~ Is the BIP taking into account the possible impacts of the EPA rule-making about "waters of U.S. interest"?

~ Will the BIP have specific projects listed? (The participants had the unedited and unfiltered list of potential projects assembled from the technical meetings and other input, but were warned that it was just to show what is on the table, and not to be considered a final list. Tom Alvey handled the question, observing that feasibility will be a big factor in determining which projects and programs go in the final BIP.)

~ Is more storage possible? (Opinions offered indicate that more storage is mostly a matter of whether larger entities – state or national governments – make it a priority; otherwise, probably limited to some enlargements and improved storage through infrastructure repair and maintenance.)

~ What is GBRT stance on transmountain diversion? (Variations on this occurred in subsequent questions – obviously on many people's minds. RT members indicated that there is probably "not one drop available" in the headwaters part of the Basin, and then went through all the conditions, risk factors and compensations Front Range diverters would have to address for West Slope RTs before there could be even a firming project, let alone a major TMD.)

~ Is rooftop collection (cistern use) legal? Will it or should it be? Under what conditions?

~ Should we be collecting fees or compensation for bottled water originating on the West Slope but sold elsewhere? (No one had an answer for that one.)

~ Will the Colorado Water Plan have the same structure and format as the BIPs? (No one knows for sure; mention was made of a possible "conflict committee" to resolve impasses.)

~ The fundamental problem is unfettered Front Range growth; how can they be made to live within their means? (Led to brief discussion of land use planning issues, the commitment to local control, the power of development proponents, etc.)

~ Is the BIP taking into account the tree-ring studies showing that the 20th century was unusually favored with above average precipitations? (Brief discussion of the need for low, medium and high water scenarios in planning.)

~ From a local small farmer: can the majority owners of a ditch company sell the ditch's water out from under small owners who would oppose the sale? (No one knew for sure – thought it probably depended on the bylaws of the ditch companies.)

~ Does the BIP address alluvial recharge of wells and springs? (Discussion of surface-ground waters, difficulty of establishing sources, etc. Shutdown of South Platte wells mentioned.)

~ If a farmer or rancher reduces his use through more efficient irrigation systems, can he lease or sell the saved water? (While there has been recent legislation about this, no one seemed to know for sure what has and has not been actually passed, what the actual situation is – need to be able to answer this one. It was noted that the farmer could do nothing to his system that injured other users.)

~ Has the GBRT decided to support or not support conservation of irrigation waters? (Could only say we support ag conservation measures that are consistent with the law, avoid injury to other users and their decrees, etc.)

~ Has the GBRT taken stand on Shell (and other energy companies) buying irrigation water rights for oil shale production? (Pointed out our goal to "discourage" conversion of ag water to anything else "within the context of private property rights." We don't stand in the way of "willing seller" situations.)

~ Are the small domestic water companies accounted for in the GBRT plan, and how will they be handled as they double their users? (Raised the idea under discussion in the Upper Gunnison, of a multi-district conservation plan bringing together all the "non-covered" (<2,000 af/yr) domestic water providers in a single conservation/efficiency plan, sharing consultant fees, resident expertise, and where possible, water supply. This would probably work in other parts of the Basin, and we need to make sure it is in the plan.)

INPUT FOR GUNNISON BASIN WATER PLAN

*The members of the **Gunnison Basin Roundtable** would appreciate your input on the Gunnison Basin Water Plan currently being prepared. We would encourage you to first read the Roundtable's "Basin Implementation Plan – Progress Report 1."*

This survey is also online, at **www.coloradomesa.edu/WaterCenter/GunniBasinPlan.html**.

STATE GOALS – The Governor has said the Colorado Water Plan must include the following goals:

A. A productive economy that supports vibrant and sustainable cities
B. Viable and productive agriculture
C. A robust skiing, recreation, and tourism industry
D. Efficient and effective water infrastructure promoting smart land use
E. A strong environment with healthy watersheds, rivers and streams, and wildlife

From your Gunnison Basin perspective, which of the five goals do you consider most important?	A B C D E
Which do you consider least important to the Gunnison Basin?	A B C D E
Do any of the five appear potentially harmful to your sense of the Gunnison Basin's future?	A B C D E No
If there proves to be insufficient water to fulfill all of those goals, which one(s) do you think should ***sacrifice*** a portion to fulfill the others? (None circled indicates a belief that there will be no need for such sacrifice.)	A B C D E

Indicate your agreement, disagreement or uncertainty about these statements:

The Gap is a state problem and should have state-level solutions in which all citizens share the burden statewide.	Agree	Not sure	Disagree
There is probably enough West Slope water for at least one more major transmountain diversion.	Agree	Not sure	Disagree
Any further Colorado River water development in/from *any* West Slope basin will negatively affect *all* West Slope basins.	Agree	Not sure	Disagree

GUNNISON BASIN USES AND GOALS

Indicate your agreement, disagreement or uncertainty about these statements:

The Gunnison Basin population will double by 2050.	Agree	Not sure	Disagree
This part of the Basin has a healthy economy.	Agree	Not sure	Disagree
This part of the Basin has a healthy environment.	Agree	Not sure	Disagree
This part of the Basin is sufficiently diversified economically.	Agree	Not sure	Disagree
A priority goal of ***protecting existing uses*** in the event of future development is appropriate for the Gunnison Basin.	Agree	Not sure	Disagree

Except for the Primary Goal, the Basin Roundtable's other planning goals have no priority assigned; however, we would like for you to indicate the relative importance you think they should have:

A. Discourage the conversion of currently productive agricultural land to all other uses within the context of private property rights.

B. Improve agricultural water supplies to reduce shortages.

C. Identify and address municipal and industrial water shortages.

D. Quantify and protect nonconsumptive water uses.

E. Maintain and, where necessary, improve water quality throughout the Basin.

F. Describe, quantify and encourage beneficial relationships between agricultural and environmental and recreational water uses.

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

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

Your priority rank for these goals: ___ ___ ___ ___ ___ ___ ___ ___

The Gunnison Basin Roundtable draft planners have identified water needs in the three areas below, as described on the 'Progress Report 2a.'
How would you prioritize projects to meet those needs (1,2,3, with 1 being "most important')?

Agricultural needs ___ Municipal/Domestic/Industrial needs ___ Nonconsumptive (enviro/rec) needs ___

Do you have concerns about the "Projects List" for your area? Something left off?

Do you have other concerns about the future of the Gunnison River and its water that you feel the Roundtable needs to consider? (Attach another sheet if necessary)

Personal information:

What Gunnison Basin county do you live in?

Mesa Delta Montrose Ouray Gunnison Saguache Hinsdale

What best describes the place where you live?

City Suburb Town Unincorporated Village Farm/Ranch Other Rural

What is your age? Under 20 20-29 30-49 50-65 Over 65

What best describes your role in the local community?

Agriculture Retail/Service Professional Education Student Government

Retiree "Lone Eagle" (living here, working elsewhere) Other _____

What is your principal interest(s) in water (other than domestic needs)? Agriculture Fishing

Whitewater Rec Flatwater Rec Water Professional Environmental Other _____

Please return this survey form to: Upper Gunnison River Water Conservancy District, 210 W. Spencer Ave., Suite B, Gunnison, CO 81230. (Or do the one on the Internet)

~~~The Gunnison Basin Roundtable~~~

GUNNISON BASIN WATER PLAN - PROGRESS REPORT - July 31, 2014

The Gunnison River Basin is a major tributary of the Colorado River, providing on average one-sixth of that river's part of the water supply for 35-40 million water users (mostly urban and outside the natural Basin), four million acres of irrigated land, and a great array of recreational adventures on and near the river.

Rugged geography and 10,000 feet of elevation changes make the Basin a very diverse region. Nine Wilderness Areas lie all or partly in the Basin - three of them more or less in the middle of the Basin. Yet the Basin also has large, rich alluvial valleys with some of Colorado's most productive agricultural land. High deserts with 10-12 inches annual precipitation are within a half-hour drive of mountain slopes that get 300 inches of winter snow on average. The Gunnison River and tributaries connect a great mix of working and playing landscapes. More than half the Basin is public land.

The Gunnison Basin Roundtable was formed by statute in 2005, under the "Colorado Water for the 21st Century" Act; it is one of nine similar Roundtables in Colorado, charged to "encourage locally driven collaborative solutions to water supply challenges," assess "basin-wide consumptive and nonconsumptive water supply needs," and "serve as a forum for education and debate regarding methods for meeting water supply needs." Its 32 members represent all local governments and significant economic and environmental actors in the Basin. *(For list of members: **cwcb.state.co.us** --> "Water Management" in top menu --> "Basin Roundtables" --> "Gunnison Basin".)*

Colorado's Water Planning Process actually began in 2003-4 with a "Statewide Water Supply Initiative" study (SWSI) by the Colorado Water Conservation Board (CWCB); a SWSI 2010 update, incorporating Roundtable work, indicated that by the mid-21st century, the state would be experiencing a gap of 200,000-600,000 acre-feet of water (65-200 million gallons) between projected water demand for new population (mostly in the metropolitan area) and the known supply. This moved Governor John Hickenlooper in 2013 to order the CWCB to develop a "Colorado Water Plan" for reconciling that gap by 2050. His executive order mandated a grassroots process, with each Basin Roundtable first creating a plan for addressing its own needs and goals, within the context of these statewide goals:

- A productive economy that supports vibrant and sustainable cities, viable and productive agriculture, and a robust skiing, recreation, and tourism industry;
- Efficient and effective water infrastructure promoting smart land use; and
- A strong environment that includes healthy watersheds, rivers and streams, and wildlife.

Basin draft plans were to be finished by July 2014, and incorporated into a Draft Colorado Water Plan by December 2014; the draft plan would be reworked through 2015, with a final Colorado Water Plan to 2050 submitted to the Governor by December 2015.

The Gunnison Basin Water Implementation Plan

*(See the completed Draft Plan at **coloradowaterplan.com** --> **'Communities'** in top menu --> **'Gunnison Basin'** page)*

Developing the Gunnison Basin Plan followed the major steps summarized below:

DEFINING GOALS: The first stage in drafting the plan at the Basin level was to define goals for the plan. The drafting committee began with ***Intrabasin Goals***, to guide the future internal development of water resources within the Basin, out to mid-century.

One priority Basin goal was established early in the discussion:

- ***Protect existing water uses in the Gunnison Basin.*** This signifies a general satisfaction with the mix of uses - agricultural, municipal and domestic, industrial, recreational, educational and environmental - in the Gunnison Basin today; any new projects should be evaluated in terms of potential impacts on the existing mix of uses.

That primary goal is to be supported or supplemented by the following goals, given no priority over each other:

- *Discourage the conversion of productive agricultural land to all other uses within the context of private property rights.*
- *Improve agricultural water supplies to reduce shortages.*
- *Identify and address municipal and industrial water shortages.*
- *Quantify and protect environmental and recreational water uses.*
- *Maintain or, where necessary, improve water quality throughout the Gunnison Basin.*
- *Describe and encourage the beneficial relationships between agricultural and environmental/recreational uses.*
- *Restore, maintain, and modernize critical water infrastructure, including hydropower.*
- *Maintain an active and comprehensive public education process about water resources in the Gunnison Basin.*

The committee then generated several *Statewide Principles* to guide the Basin in further developing its relationships with the other Basins on the West Slope, and with the rest of the state. These principles are summarized here:

- *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, strictly adhere to the prior appropriation doctrine, and protect existing water uses and communities from adverse project impacts.*
- *A new consumptive use development from any location in the Upper Colorado River System must be explicitly recognized as impacting the entire Upper Colorado River Basin, due to Colorado River Compact obligations still ambiguous or undefined.*
- *Any new supply project from the Colorado River System must have specifically identified sponsors and beneficiaries, and must meet certain minimum criteria concerning the subsequent use of that water.*
- *Local solutions must be utilized to meet Colorado's future water needs without a major state water project or related water right.*
- *Water conservation, demand management, & land use planning incorporating water supply factors must be employed statewide.*
- *Scenario planning should be used as the principal tool for water planning, given uncertainties like climate change.*
- *The Gunnison Basin Roundtable's vision for water development should be carried forward in statewide discussion and outreach.*

ASSESSING BASIN NEEDS: The second major planning task. Technical meetings were held with the Basin's agricultural and municipal/industrial consumptive users and recreational/environmental nonconsumptive users, to determine what water needs, shortages, gaps, et cetera exist in the Gunnison Basin. The following needs have been identified and catalogued (af=acre-feet):

- ***Agricultural water shortages*** have been identified in all Basin Water Districts, in three categories: a) ***Physical shortages*** mostly reflecting a need for storage of water for late-summer and fall irrigation; b) ***legal shortages*** due to calls from downstream senior users; and c) ***irrigation practice shortages*** caused by labor shortages, inefficient or deteriorating delivery systems or other infrastructure issues. SWSI 2010 estimates this Basin "ag gap" *currently* at ~128,000 acre-feet (>2 million acre-feet statewide).
- ***Municipal/domestic and industrial shortages*** will probably be modest in the Basin, despite a projected doubling of population (mostly urban), with M&I demand increasing from 24,000 af to ~44,000 af; SWSI 2010 projects M&I shortages at ~6,500 af/yr (~1% of the 2050 statewide shortage); most of this will probably be made up through conservation and infrastructure efficiency, some agricultural conversion (retiring ranchers). There are other M&I infrastructure needs, however. The largest M&I water supplier in the Basin, Project 7 serving 50,000 people in the Montrose-Delta Corridor, depends on water from the aging Gunnison Tunnel with only a 30-day reserve supply; a Uncompahgre Valley reservoir is needed. Other communities either have, or anticipate by mid-century, problems with aging infrastructure.
- ***Environmental and Recreational needs*** have been identified in 29 "Priority Stream Segments," which all need an inventory of specific projects to alleviate the identified needs. These segment needs run the gamut of environmental, recreational, scientific and educational uses; some involve problems of water shortages at critical times; others are water quality problems (sometimes exascerbated by water quantity problems). Endangered or threatened species problems are nearly all water-related - even for non-aquatic species like the Gunnison sage grouse which needs wet-meadow ecosystems, many of which have lost water tables to gullies over time. Quantifying environmental and recreational needs is difficult but necessary. It would be advantageous to agricultural users to better identify and quantify the ecosystem services provided by high-country irrigation.

In all of the technical meetings, users indicated an awareness that there were neither financial resources nor political will for addressing most of these identified shortages; the main concern expressed was that the shortages not grow significantly worse in the future, through either in-basin development or interbasin projects or programs.

IDENTIFYING AND ANALYZING PROJECTS AND METHODS: Roundtable members generated than 130 potential water projects and programs for addressing identified needs and goals; that list has been pared down to 102 projects and programs, and further sorted into three tiers.

Tier 1: The project or program will help meet Basin Goals and implementation is feasible by 2020.
Tier 2: The project or program would help meet Basin Goals but implementation is probably not feasible by 2020.
Tier 3: The project or program is unfeasible by 2020, in preliminary planning stages, or may have lesser impact on Basin Goals.

A summary of the tiered list is attached to this Progress Report; the full list with more description is online with the Plan. Further discussion of feasibility, constraints, and other analysis of the projects and programs will be in the full plan, now available at the website cited above. ***Your comments on, this "shopping list" of projects and programs will be appreciated.***

BASIN RECOMMENDATIONS AND CONCLUSIONS: The final section of the Basin Plan includes some analysis and evaluation of the proposed projects and programs for ***acceptance*** in the communities and for ***feasibility*** in terms of cost, water availability, et cetera.

What does the Gunnison Basin Roundtable need from you?

We need your input on these things: **1)** Are the ***Intrabasin Goals*** and ***Statewide Principles*** presented above consistent with your hopes for the future of the Basin and the State? Is anything missing? **2)** Do you perceive any ***water-related needs*** not covered above? **3)** What other ***projects and programs*** should be considered for meeting future needs?

The Roundtable planning committee also has a more formal survey ***online*** at **www.coloradomesa.edu/watercenter/GunniBasinPlan.html**. It will help us if you will take 10 minutes to engage with this survey. ***We need evidence from you of grassroots participation. This is an opportunity to help shape the world our children will grow up in.***

For more on this process, contact GBRT Outreach Chair George Sibley - george@gard-sibley.org, 970-641-4340. Or look up the Roundtable member from your area on the CWCB site, and invite him or her for a cup of coffee!

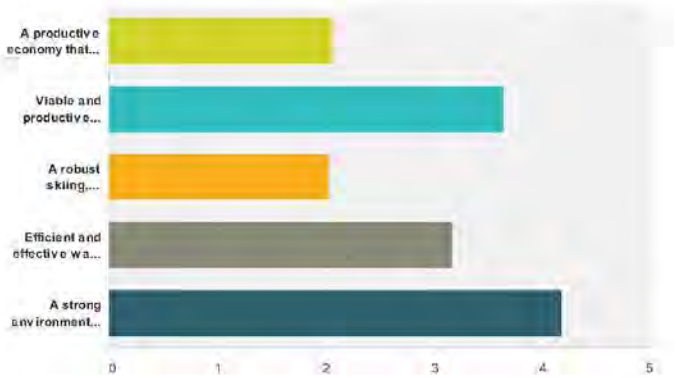
Source	Date/ Detail	What water issue(s) most concerns you?	What approach(es) do you favor to meeting future water needs?	Additional comments on the Colorado Water Plan or Colorado Basin Plan?	What county do you live in?	Which categories describe you?	"Other" category detail
CMU Water Course Session 3	2/17/2014	Statewide: Want water to be kept here for future generations	Gunni Basin: Preserve rural communities/ way of live; Statewide: our businesses rely on the Colorado River	We need to educate people in the urban corridor where water comes from; what conservation measures can be implemented now? Growth - done in a responsible way.	Mesa	Interested Citizen, Farmer/ Rancher	
CMU Water Course Session 3	2/17/2014	Gunni Basin: Protecting fish, recreation, water quality, wildness, enough water for the Black Canyon; Statewide: protect warm water endangered fish.	Gunni Basin: Development planning; Statewide: Conservation, growth planning	Someone said agriculture doesn't harm the state's water. Near where I live, nitrogen and selenium runoff from ag lands is heavily impacting the Uncompahgre & Colorado Rivers.	Montrose	Interested Citizen, Angler	Retired Government Employee
CMU Water Course Session 3	2/17/2014	Gunni Basin: Continuing supply; Statewide: Need supplemental water, how?	Statewide: Conservation - bluegrass to xeriscape		Mesa		Retired Water Professional
CMU Water Course Session 3	2/17/2014		Gunni Basin: building more storage; Statewide: building more storage and eliminating landscaping requirements that are water-intensive	I'm concerned about Mike King's comment that the plan neither precludes nor guarantees anything. If so, what good is it? It's crazy how NEPA has made it so hard to do projects we desparately need. It used to work - why don't we fix it?	Mesa	Interested Citizen, Water Professional, Farmer/ Rancher	
CMU Water Course Session 3	2/17/2014	Gunni Basin: Dominguez Reservoir; Statewide: Eastern Slope Storage/ it takes away storage in Powell & Mead	Statewide: Look outside the box		Mesa	Interested Citizen, Farmer/ Rancher	
CMU Water Course Session 3	2/17/2014	Statewide: Everything! Having enough water for all uses in 25 years	Statewide: Conservation, storage, transport		Mesa	Interested Citizen, Energy Sector Employee	
CMU Water Course Session 3	2/17/2014	Gunni Basin: Loss of water to population centers; Statewide: tendency for Front Range to keep growing without limit.	Gunni Basin and Statewide: Conservation, Storage	Too many people for the available resources	Mesa	Interested Citizen, Farmer/ Rancher, Angler	
CMU Water Course Session 3	2/17/2014	Statewide: The Front Range competing economically with the Western Slope for new businesses forcing them to demand more water to serve those new businesses that could be served with existing supplies on the Western Slope.	Statewide: The Front Range utilizing the resources available on the Front Range such as Two Forks Dam or near the Kansas & Nebraska borders		Mesa	Interested Citizen	Elected Official
CMU Water Course Session 3	2/17/2014	Statewide: Overall mismatch between supply & demand	Statewide: I would like to hear more about conservation efforts within agriculture	There was almost no discussion of water pricing and how to improve incentives for more efficient use.	Mesa	Interested Citizen	Agricultural Economist
CMU Water Course Session 3	2/17/2014	Gunni Basin: Lack of adequate water; Statewide: further taking of West water, east	Gunni Basin: Solidarity with other West Slope Basins; Statewide: development goes where the water IS		Mesa	Interested Citizen, Farmer/ Rancher	
CMU Water Course Session 3	2/17/2014	Gunni Basin: Dry up of stream segments during drought; Statewide: harmful effects of transbasin diversions on Colorado River system	Gunni Basin: Instream flow protections, efficiencies, improved infrastructure; Statewide: conservation, risk management, ag-enviro partnerships		Gunnison	Water Professional, Environmental Advocate, Boater	
CMU Water Course Session 3	2/17/2014	Gunni Basin: Ag - nonconsumptive use connection; Statewide: keeping Front Range growth from damaging the overall system	Gunni Basin: Seems like education & support will help folks with water rights decide to leave it on the West Slope; Statewide: Aggressive management of growth - take a 22nd c. viewpoint to address conservation and use issues.		Mesa	Interested Citizen, Angler	Education
Club 20 Spring Meeting	3/29/2014	Locally: environmental over protection (abuse)	Locally: storage; Statewide: storage		Mesa, Gunnison	Interested Citizen	Property Owner
Club 20 Spring Meeting	3/29/2014	Locally: Having enough water to support agriculture, personal & recreational uses; Statewide: Keeping our (local) water rights w/o the state/ front range assuming they have the right to take it	Locally: water storage/ self preservation to keep what we have & own; Statewide: water storage		Montrose	Government Employee	
Club 20 Spring Meeting	3/29/2014	Locally: sufficient water for local ag & rec use; Statewide: as the state goes, so goes local availability	Locally: Monstrose - develop our conditional water rights awarded in 2012 by building storage; Statewide: water banking, water conservation in urban areas.		Montrose	Government Employee	
Club 20 Spring Meeting	3/29/2014	Locally: impact of environmental community onw ater users; Statewide: same	Locally: additional storage; Statewide: additional storage		Gunnison	Water Professional	
Club 20 Spring Meeting	3/29/2014	Locally: quantity; Statewide: front range diversion	Statewide: Front Range Storage. We lot a lot of water leave the state this year.	Storage, storage.	Gunnison	Farmer/ Ranger, Government Employee, Boater, Angler	
On-line	04/01/2014	Diversion to Front Range			gunnison	Interested Citizen	
On-line	04/01/2014	Judication of water rights should stay as now. Agriculture water should not be taken away for municipal use. Water regulators should collaborate to establish one set of rules that are reasonable and logical for all of Colorado.	Educate the general public. Enforce current rules. Look toward the abundance of water in the mid-America rivers for use in eastern Colorado.	Revamp the storage areas on Grand Mesa. Historic reservoirs need to be usable again.	Montrose	Interested Citizen	

On-line	03/26/2014	Curtailment of existing ag water use on the west slope in order to meet compact obligations and/or front range shortages.	I believe this region needs to be proactive at the legislative and other levels to protect both the existing and future needs. I think the West Slope needs to join forces and take aggressive steps such as amending the constitution to disallow takings or curtailments of existing ag use on the west slope to satisfy Front Range shortages. Whether the shortages are driven by the "Gap" or by compact curtailment, the west slope ag water users should do what they can now to protect themselves.	I think the Colorado Water Plan and the Gunnison Basin Plan need to include a discussion on how compact curtailment would impact existing water uses. The potential for curtailment should be addressed in the plan given that both plans are using 2050 as the planning horizon. Even though is could be difficult to quantify the specific impacts of compact curtailment, the BIP and the CWP are looking at planning horizons that are in excess of 30 years from now, and curtailments due to falling storage levels in the CRSP system would occur during the same planning period. I also hope the plan addresses the fact that the Gunnison Basin is being targeted for new supply development (to meet Front Range needs) due to the fact that the Colorado mainstem is tapped out and the Yampa is less feasible.	Gunnison	Interested Citizen, Farmer/ Rancher	
On-line	03/26/2014	lack of planning for future basin uses	storage/storage/storage	planning for future growth and industrial uses is lacking	Gunnison	Water Professional, Boater	
On-line	03/26/2014	Fisheries health and riparian habitat health and recreation. Sustainable agriculture.	Improving and updating in stream diversion structures. Beginning a change in thinking about how ranchers irrigate>How much is really needed and what are the effects of over-irrigating.	I would like to see some aspect of education on the effects of water logged soils and how it relates to over-irrigating. As well as some education on creating drought resistant crops by occasionally drying up the hay meadows during the irrigation season. Can we begin a regime change with a "less is more- over the long run" approach to irrigating in the Gunnison valley?	Gunnison	Interested Citizen, Farmer/ Rancher, Boater, Angler	
On-line	03/25/2014	1)Taylor Reservoir and Blue Mesa Water levels. 2)Lake Powell & Lake Mead Levels 3)Irrigation for Farm/ranch uses	Logical/sensible approaches based on all data available	Looks reasonable based on first look. Lots of "glitteriing generalities" and maybe some "pie in the sky."	Gunnison County	Interested Citizen, Angler	
On-line	03/25/2014	Loss of aongricultural water Loss of instream water for recreation and the environment.	Keep the water in the basin of origin and help create storage that do esn't expose the water to so much evaporati		Gunnison	Interested Citizen	
On-line	03/25/2014	Compact call and water being transferred to the front range. Also, eminent domain of water rights senior to the compact by front range entities to protect their junior diversions from a compact call.	Human population growth mgt. in the SW United States.	I am concerned this is plan has the potential to do very little for western Colorado while allowing for the justification of more front range diversions developed through this process.	Gunnison	Farmer/ Rancher	
On-line	03/24/2014	Trans-mountain diversions that would severely limit future development in the Gunnison Basin and potentially dry-up streams and agriculture in the basin. Protections must include water QUALITY.	Conservation, increased efficiency for existing uses as well as new uses.		Gunnison	Interested Citizen, Environmental Advocate, Angler	
On-line	03/24/2014	The long-term outlook for our water supply seems to be uncertain.	Conservation and limited development.	Any proposal for new projects should fully demonstrate measures taken to conserve the resource and acknowledge the tenuous nature of future supply.	Gunnison	Government Employee	
On-line	02/10/2014	Environmental laws and constraints will prohibit the reasonable development of new water storage, causing a short sited look at resource usage.	Keep current Colorado water laws in tact and build more reservoirs. Restore existing reservoirs that have not been cost effective to rehabilitate in the past thereby preserving existing water rights.		Delta	Water Professional	
On-line	01/05/2014	1. not having majority water share holders sell the ditch rights, 2. in-stream flows	water use efficiency, erosion control, up-land care/land management	water is the most pressing concern in the west and will become more so. we must care for the land so that water quality is increased. we must share the water with other animals so that we will have a complete natural community	Delta	Interested Citizen, Farmer/ Rancher, Boater	
On-line	12/12/2013	Eastern Slope taking Western Slope water	Limit use and Eastern Slope growth		Gunnison	Interested Citizen	Home- and landowner
On-line	12/10/2013	preserving instream flows to protect water quality and the entire ecosystems of the rivers streams and creeks.	Conservation, conservation, conservation	the growing cities on the Front Range need to get their water from the Eastern side of the divide. Energy should be generated where it is consumed and water should be used from lcal sources without depleting aquifers, draining streams and rivers of their water. Very tough water cnservation measures need to be implemented Statewide. No lawns, no car washes, no golf courses, xeriscaped parks, even athletic fields need to be addressed. Its a tough sacrifaice but there is really no other choice. There is not enough water to go around already. And maintain all agricultural water rights. It should be illegal to sell agricultural rights to non ag uses. thanks	Delta	Interested Citizen, Farmer/ Rancher, Angler	
On-line	12/09/2013	environmentalist taking over water issues	Limit water draws down stream		Delta	Interested Citizen	
On-line	12/08/2013	The lack of incentives to conserve in Colorado water law. The "use it or lose it" law actually creates disincentives for conservation at a time when we need conservation more than ever.	Conservation and research into new agricultural technologies that will maintain or improve agricultural production while protecting in-stream flows.	The Front Range needs to live within their water means. I believe conservation should be the first and only method used for increased supply. Stop looking to the West Slope for the solutions to the perceived water problems on the East Slope. The recreational and environmental values of the whole State are centered around ater resources of the West Slope. These need to be protected.	Delta	Interested Citizen, Water Professional, Environmental Advocate, Farmer/ Rancher, Boater	
On-line	12/06/2013	Urban sprawl Oil & gas contaminstion	restrict the number of houses and all building and limit water to urban areas		Delta	Farmer/ Rancher	

Gunnison Basin Water Plan Input

Q1 STATE GOALS – The Governor has said the Colorado Water Plan must include the following goals. Please rank them (with 1 indicating most important) according to how important you feel they are to the Gunnison Basin.

Answered: 83 Skipped: 1



	1	2	3	4	5	Total	Average Ranking
A productive economy that supports vibrant and sustainable cities.	4.82% 4	4.82% 4	19.28% 16	33.73% 28	37.35% 31	83	2.96
Viable and productive agriculture.	30.49% 25	28.05% 23	21.95% 18	13.41% 11	6.10% 5	82	3.83
A robust skiing, recreation, and tourism industry.	1.20% 1	15.66% 13	12.05% 10	26.51% 22	44.58% 37	83	2.92
Efficient and effective water infrastructure promoting smart land use.	3.66% 3	34.15% 28	40.24% 33	18.29% 15	3.66% 3	82	3.16
A strong environment with healthy watersheds, rivers and streams, and wildlife.	60.24% 50	18.07% 15	7.23% 6	7.23% 6	7.23% 6	83	4.17

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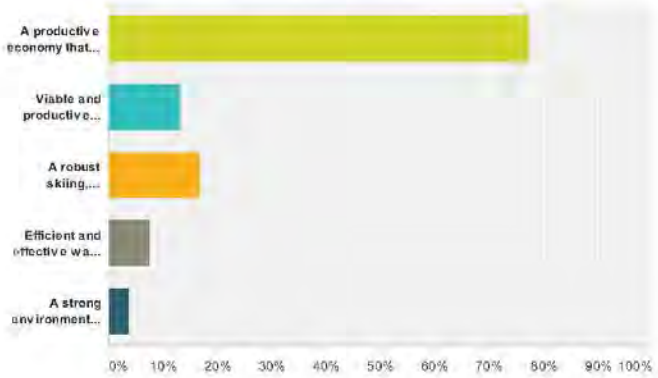
Gunnison Basin Water Plan Input

Q2 Do any of these goals appear potentially harmful to your sense of the Gunnison Basin's future? If so, which one(s)?

Answered: 53 Skipped: 31



Answer Choices	Responses	
A productive economy that supports vibrant and sustainable cities	77.36%	41
Viable and productive agriculture	13.21%	7
A robust skiing, recreation, and tourism industry	16.98%	9
Efficient and effective water infrastructure promoting smart land use	7.55%	4
A strong environment with healthy watersheds, rivers and streams, and wildlife	3.77%	2
Total Respondents: 53		

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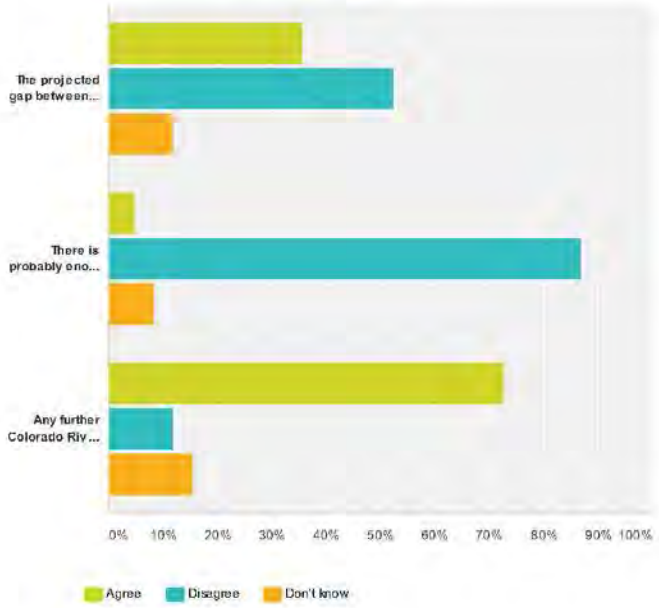
Gunnison Basin Water Plan Input

Q3 Please indicate your agreement, disagreement or uncertainty about these statements:

Answered: 84 Skipped: 0



	Agree	Disagree	Don't know	Total
The projected gap between urban water needs and developed supplies is a state problem and should have state-level solutions in which all citizens share the burden statewide.	35.71% 30	52.38% 44	11.90% 10	84
There is probably enough West Slope water for at least one more major transmountain diversion	4.82% 4	86.75% 72	8.43% 7	83
Any further Colorado River water development in/from any West Slope basin will negatively affect all West Slope basins.	72.62% 61	11.90% 10	15.48% 13	84

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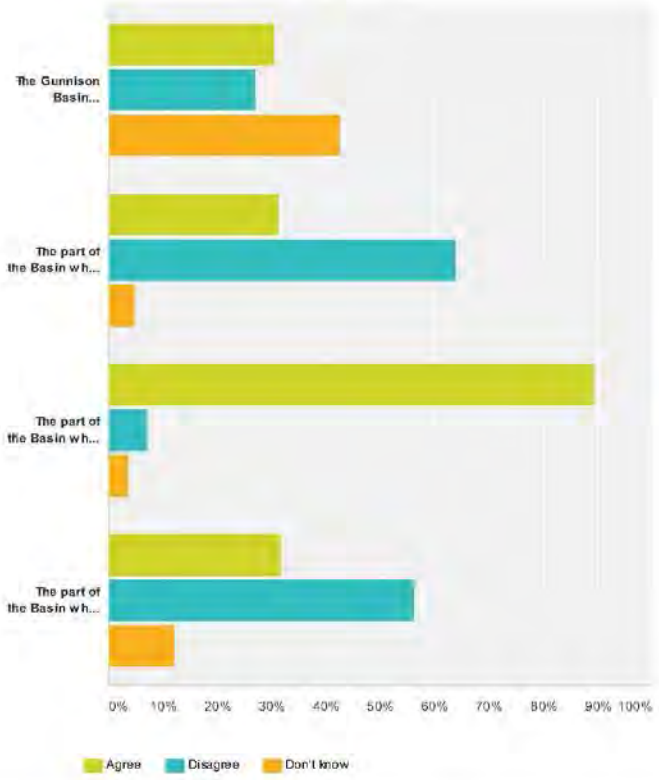
Gunnison Basin Water Plan Input

Q4 GUNNISON BASIN USES AND GOALS: Please indicate your agreement, disagreement or uncertainty about these statements:

Answered: 84 Skipped: 0

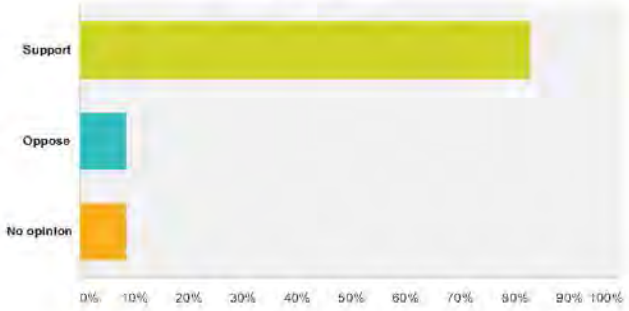


	Agree	Disagree	Don't know	Total
The Gunnison Basin population will double by 2050.	30.49% 25	26.83% 22	42.68% 35	82
The part of the Basin where I live has a healthy economy.	31.33% 26	63.86% 53	4.82% 4	83
The part of the Basin where I live has a healthy environment.	89.29% 75	7.14% 6	3.57% 3	84
The part of the Basin where I live is sufficiently diversified economically.	31.71% 26	56.10% 46	12.20% 10	82

Gunnison Basin Water Plan Input

Q5 The Gunnison Basin Roundtable's primary goal is to protect existing uses. Please indicate your level of support for this goal.

Answered: 82 Skipped: 2



Answer Choices	Responses	
Support	82.93%	68
Oppose	8.54%	7
No opinion	8.54%	7
Total		82

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Gunnison Basin Water Plan Input

Q6 **Please indicate your degree of support for these additional planning goals:**

Answered: 65 Skipped: 1

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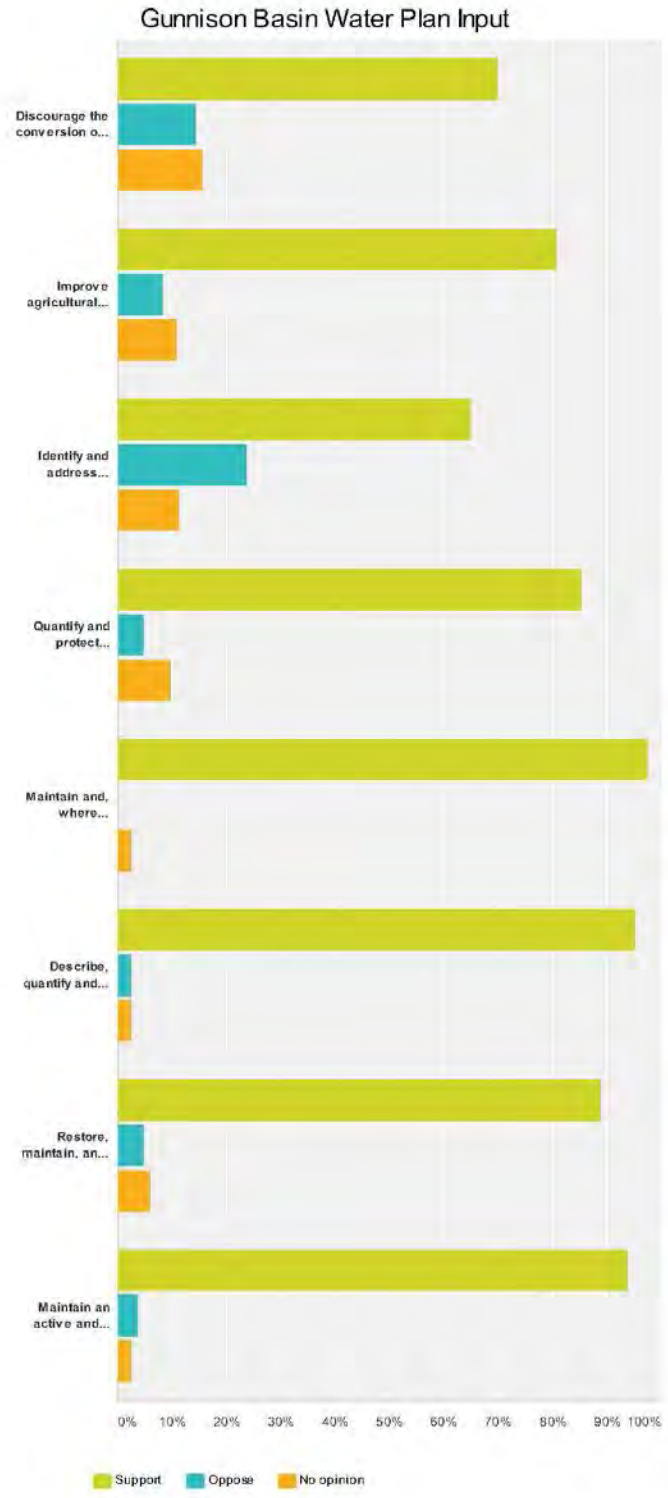
Gunnison Basin Water Plan Input
Discourage the conversion o...
Improve agricultural...
Identify and address...
Quantify and protect...
Maintain and, where...
Describe, quantify and...
Restore, maintain, an...
Maintain an active and...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Support
Oppose
No opinion

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Gunnison Basin Water Plan Input

	Support	Oppose	No opinion	Total
Discourage the conversion of currently productive agricultural land to all other uses within the context of private property rights	69.88% 58	14.46% 12	15.66% 13	83
Improve agricultural water supplies to reduce shortages	80.72% 67	8.43% 7	10.84% 9	83
Identify and address municipal and industrial water shortages	65.00% 52	23.75% 19	11.25% 9	80
Quantify and protect nonconsumptive water uses.	85.37% 70	4.88% 4	9.76% 8	82
Maintain and, where necessary, improve water quality throughout the Basin.	97.53% 79	0.00% 0	2.47% 2	81
Describe, quantify and encourage beneficial relationships between agricultural and environmental and recreational water uses	95.12% 78	2.44% 2	2.44% 2	82
Restore, maintain, and modernize critical water infrastructure, including hydropower	89.02% 73	4.88% 4	6.10% 5	82
Maintain an active and comprehensive public education process about water resources in the Gunnison Basin	93.90% 77	3.66% 3	2.44% 2	82

Gunnison Basin Water Plan Input

Q7 Do you have other concerns about the future of the Gunnison River Basin and its water that you feel the Roundtable needs to consider?

Answered: 34 Skipped: 10

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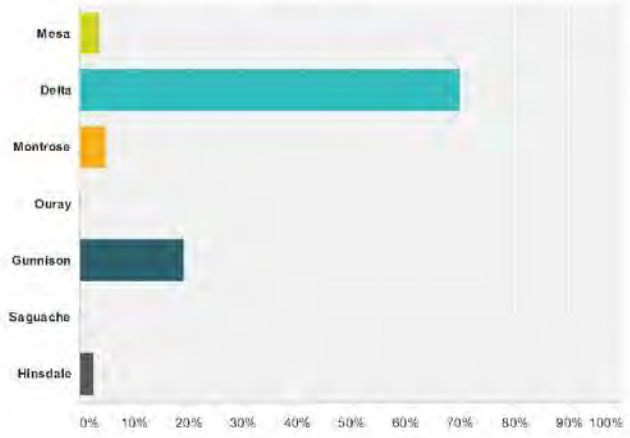
Gunnison Basin Water Plan Input

Q8 What Gunnison Basin county do you live in?

Answered: 83 Skipped: 1



Answer Choices	Responses	
Mesa	3.61%	3
Delta	69.88%	58
Montrose	4.82%	4
Ouray	0.00%	0
Gunnison	19.28%	16
Saguache	0.00%	0
Hinsdale	2.41%	2
Total		83

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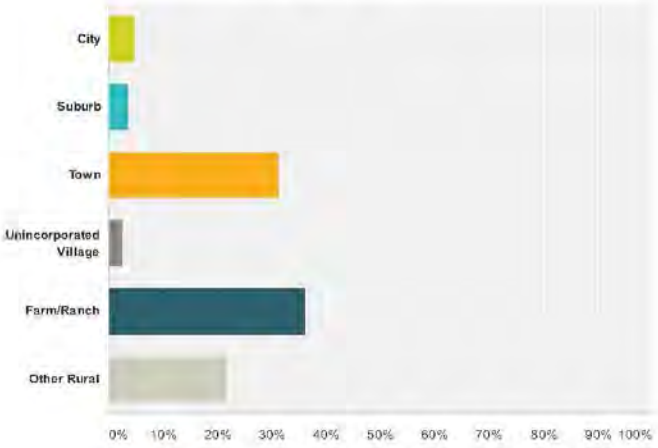
Gunnison Basin Water Plan Input

Q9 What best describes the place where you live?

Answered: 83 Skipped: 1

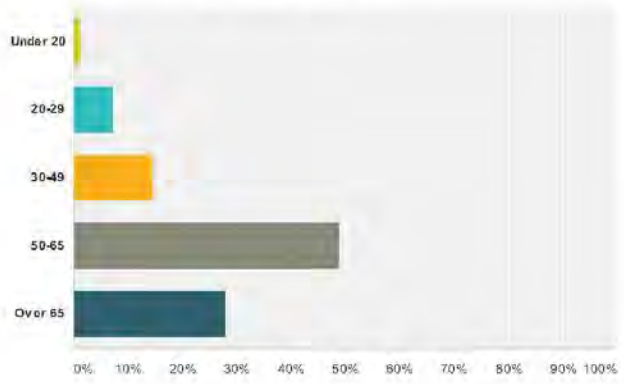


Answer Choices	Responses	
City	4.82%	4
Suburb	3.61%	3
Town	31.33%	26
Unincorporated Village	2.41%	2
Farm/Ranch	36.14%	30
Other Rural	21.69%	18
Total		83

Gunnison Basin Water Plan Input

Q10 What is your age?

Answered: 82 Skipped: 2

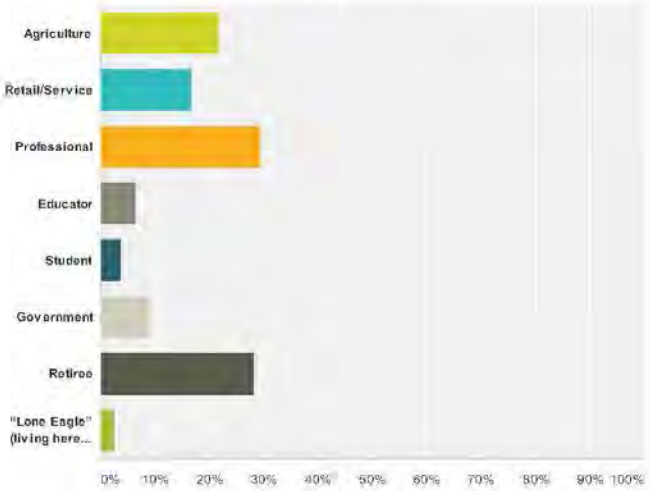


Answer Choices	Responses	
Under 20	1.22%	1
20-29	7.32%	6
30-49	14.63%	12
50-65	48.78%	40
Over 65	28.05%	23
Total		82

Gunnison Basin Water Plan Input

Q11 What best describes your role in the local community?

Answered: 78 Skipped: 6



Answer Choices	Responses	
Agriculture	21.79%	17
Retail/Service	16.67%	13
Professional	29.49%	23
Educator	6.41%	5
Student	3.85%	3
Government	8.97%	7
Retiree	28.21%	22
"Lone Eagle" (living here, working elsewhere)	2.56%	2
Total Respondents: 78		

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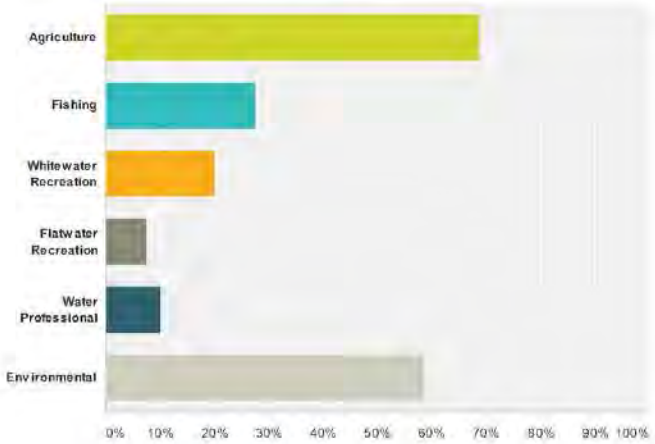
Gunnison Basin Water Plan Input

Q12 What describes your principal interest(s) in water (other than domestic needs)?

Answered: 80 Skipped: 4



Answer Choices	Responses	
Agriculture	68.75%	55
Fishing	27.50%	22
Whitewater Recreation	20.00%	16
Flatwater Recreation	7.50%	6
Water Professional	10.00%	8
Environmental	58.75%	47
Total Respondents: 80		

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Gunnison Basin Water Plan Input

Q13 If you would like to receive information and event announcements related to the Colorado Water Plan, please provide your email address below (will never be used for commercial purposes).

Answered: 35 Skipped: 49

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Appendix 5: Grand Mesa Water Conservancy District Letter on Permitting Issues

GRAND MESA WATER CONSERVANCY DISTRICT
P.O. BOX 129
CEDAREDGE, CO 81413

February 6, 2012

Congressman Scott Tipton
218 Cannon House Office Building
Washington, DC 20515

Re: Congressional Hearing on Western Water Storage

Dear Congressman Tipton,

The Grand Mesa Water Conservancy District (District) would like to have the following experience and issues logged into the public record at the hearing February 7, 2012 entitled "Water for Our Future and Job Creation: Examining Regulatory and Bureaucratic Barriers to New Surface Storage Infrastructure." The District serves an area encompassing the Grand Mesa and Surface Creek Valley, Delta County, Colorado. As a taxpayer funded water conservancy district, it is mandated to monitor and preserve the water sources and tributaries supplying this precious lifeblood to our diverse area. The interests currently served are municipal, agriculture, recreation and recently several inquiries from the energy field (hydroelectric and fossil fuel energy). In the fall of 2008, the District board of directors voted to embark on a plan to rehabilitate breached reservoirs on the Grand Mesa National Forest within its jurisdictional boundaries. As of this date, the District has completed approximately 35% of the Peak Reservoir project and 5% of the Blanche Park Reservoir Project. Note, due to weather conditions, site work is limited to the months of July through October.

The District has encountered a laundry list of regulations and studies that has taken several years to wade through. The agencies involved are the US Forest Service and The Army Corps of Engineers. When the first project, the Peak Reservoir was started, the US Forest Service gave us an outline of the studies required to be completed and told us that they could not address any of these studies until maybe the next year. If we were interested in seeing our project move forward, the District should consider hiring a private firm qualified and approved by the Forest Service to complete the work. There were a couple of the studies that the Forest Service, personnel were required to complete. The District contracted with an approved firm to complete the work which was done summer of 2010. The District was then billed by the Forest Service for the work despite that fact we hired private contractors thus double payments. With the Army Corps, they do not do anything on the ground. They require the applicant to hire qualified services to address the list of concerns the Corps has which is always subject to change. The District was able to take aggressive action with a company that had experience working on the issues at hand. To complete this leg of our project took until spring of 2011. It was determined that there had to be mitigation due to the wetland plants along a tiny stream that ran through this empty structure. With all the permits finally in hand, the spring of 2011, financing in place, contractor hired, work was set to begin July of 2012. Remaining was a timber cruse involving

approximately 150 trees. The timber turned out to be of no economic value, but the District was charged $6,000 for the right to remove them. Incidentally the Forest Service Timber personnel held up this entire project until late August because they did not have time to deal with our project. With the seven weeks of lost time, the construction was not able to be completed and over this winter, one of the grants that was held for this project was canceled. Part of the excess material from this project is scheduled to be used in the rebuilding of the Blanche Park Reservoir.

The District began the process to rebuild Blanche Park with the US Forest Service and the US Corps of Engineers during the fall of 2010. The engineering reports revealed that there would be enough excess material from the Peak Reservoir project to supply the needs for Blanche Park thus eliminating the need to disturb any surface area of the reservoir footprint except the dam structure. As before, the District hired a private firm to deal with the studies allowed by the Forest Service. The application for the project with the Forest Service was filed January of 2011. There was not even an acknowledgement received until January 2012 when a bill arrive for the work we had all ready completed. This project is being built on a "1891 Easement" however the access road has disappeared during the course of time. The District engineer has spent seven months attempting to identify a new access to the site and we still do not have a USFS accepted route. The distance is less than 2000 feet. The hope is that the permits can be secured for this project allowing us to move material a mile and a half from the Peak project to the Blanche Park project. If this cannot be accomplished, the excess material will have to be stockpiled and moved later, thus doubling the cost.

The District considers these huge tasks of studies and reviews as necessary if the District were building large reservoir structures. The Peak Reservoir project holds 35 acre feet of water on less than five acres. The Blanche Park Reservoir project hold 115 acre feet of water with only the dam site being disturbed. Despite the fact, these are small projects, the security these projects offer to the water supply of our service area is very important.

I hope these two examples provide insight to the frustration that is endured to accomplish any type of activity on the Federal Lands. Also, there are two very important issues that have faced our reservoir owners. First, the required studies and permits make what was simple repairs to the reservoirs a multi-year undertaking. Secondly, these are owned privately or under small corporations that do not have the financial ability to cover the costs of studies and permits now required. Most owners would have the ability to cover the cost of an actual repair but the cost incurred for now required engineering and studies have tripled what the actual cost should be. The District made a study in conjunction with the Grand Mesa Water Users Assn. of the water storage capacity that is currently under restriction for deferred dam maintenance and found 3800 acre feet of water storage is in jeopardy of being lost due mainly to cost of repairs. This figure represents approximately 15% of the total capacity of water storage on the Grand Mesa.

Please consider the damage these policies and regulations are placing upon our constituents living in the Surface Creek Valley, Delta County, Colorado

Respectfully Submitted,
Austin M. Keiser, President

Appendix 6: County of Ouray Feedback

OURAY COUNTY

COUNTY ATTORNEY

111 Mall Road P.O. Box28 Ridgway, Colorado 81432 970-626-3302 Fax 970-626-4439

May 5, 2014

Mr. Frank Kugel
Chair, Basin Implementation Plan Committee
Gunnison River Basin Roundtable

VIA Email: fkugel@ugrwcd.org

Re: Ouray County Population and Water Needs Projections for 2050

Dear Frank:

As you know, I have expressed concern that the population numbers and water needs assessment contained in the Colorado Water Conservation Board's 2010 Statewide Water Supply Initiative ("SWSI") understate the future water needs of Ouray County. The purpose of this letter is to document the data that should be considered and incorporated into the Basin Implementation Plan ("BIP") currently in draft form.

An under-representation of the needs of Ouray County is a disservice to the basin as it results in a perception that more water is available in the Gunnison River Basin, and the Colorado River Basin, than actually is likely to be available after providing for increased population, and fully providing for agricultural needs, and other miscellaneous needs such as mining, in the County. Additionally, any analysis of water availability in Blue Mesa Reservoir to meet Front Range supply needs should incorporate the ramifications of such a draw, not only on Compact compliance, but on operation of the Uncompahgre River, including the Upper Uncompahgre River and its tributaries in Ouray County, and the "domino effect" of calls, including calls from the Uncompahgre Water Users at the M&D Canal resulting from increased diversions from Blue Mesa, and how those calls will affect the water users in Ouray County.

SWSI 2010 projects a total population for Ouray County in 2030 of 6,392. (*See* Exhibit A, State of Colorado Population Projections). The current population is approximately 4,500, and I agree that the SWSI projection for 2016 of 5,198 may be fairly accurate, reflecting the economic downturn of the last seven years. However, assuming that economic conditions improve, the Theobald Study dated September, 2008, suggests that the number of housing units in Ouray County, *not including populations in the Town of Ridgway or the City of Ouray*, would be approximately 4800 in 2030 and over 6,000 by 2050. (*See* Exhibit B, Theobald Study Summary and Analysis). Even accounting for the lag-time of the economic downturn, and depending on the multiplier used for population per housing unit, clearly the population projections for Ouray County in the BIP need to be increased significantly. I would propose using a population of 9,000 by 2030 and 12,000 by 2050, in addition to the proposed population projections of the Town of Ridgway and the City of Ouray.

These population projections then lead to the assumption that additional water will 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 at this time due to a lack of resources for an engineering analysis.

Additional information and data should be sought from both the City of Ouray and the Town of Ridgway regarding their population projections, water needs, and proposed projects. In particular, SWSI understated the Town of Ridgway's storage project, Lake Otohawanda. That information may be obtained from Joanne Fagan, GRBRT representative for Ouray County municipalities.

Given the low projections for additional M&I supply, I would also like to request that the BIP consultants give close attention to the agricultural needs in Ouray County, including any storage requirements that could eliminate or assist with future calls on the Uncompahgre River below Ridgway Reservoir. It is possible that those needs have also been underreported.

Finally, Ouray County acknowledges the importance of non-consumptive uses of water in the county, especially for fishing. Ouray County's economy depends in large part on tourism, and fishing is an important component of tourism interest in the county. Based on current drafts, it appears that those uses are being considered carefully and fully.

Thank you for your consideration of this important data for inclusion in the BIP.

Best regards,

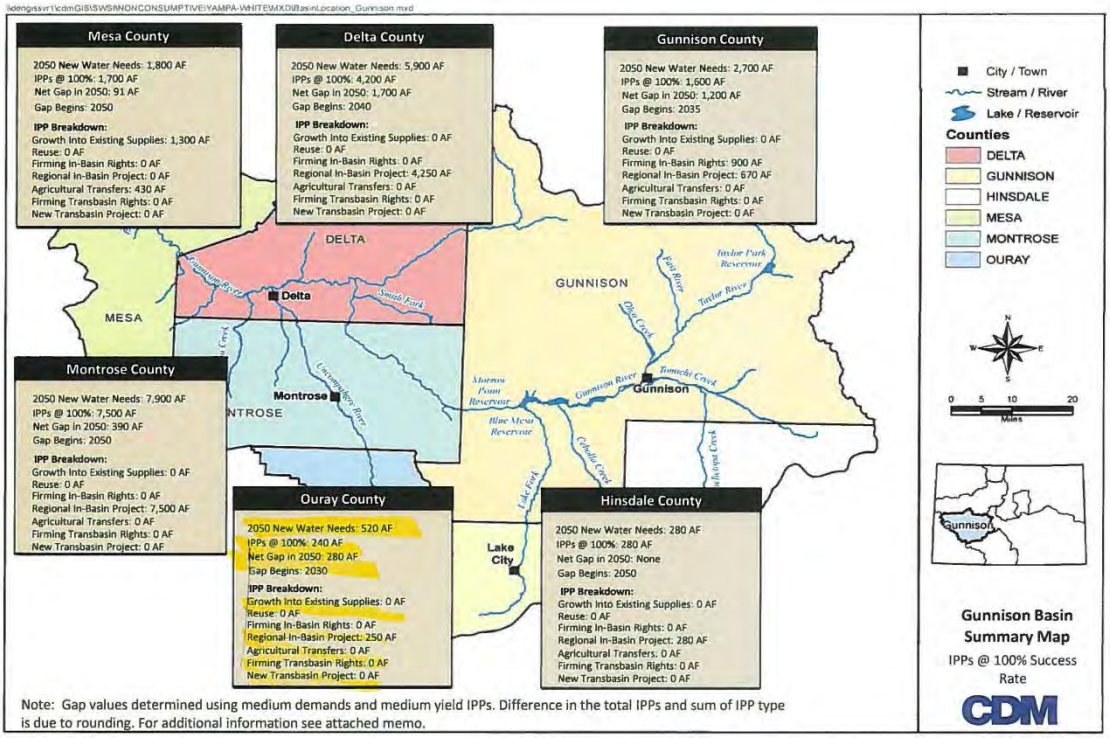
Martha P. Whitmore

Martha P. Whitmore

Appendix A
State of Colorado Population Projections 2000 to 2030

STATE OF COLORADO
POPULATION PROJECTIONS
2000 to 2030

Basin	County	Percent	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Arkansas	Baca		3,937	3,909	3,892	3,872	3,849	3,831	3,819	3,805	3,797	3,775	3,761	3,750	3,725	3,715	3,709
	Bent		6,515	6,539	6,570	6,594	6,617	6,648	6,673	6,688	6,711	6,727	6,745	6,759	6,764	6,760	6,750
	Chaffee		21,903	22,237	22,672	23,102	23,523	23,955	24,378	24,796	25,205	25,632	26,034	26,440	26,831	27,210	27,579
	Cheyenne	38%	763	758	754	751	748	744	738	739	733	732	728	726	722	716	715
	Crowley		5,704	5,704	5,699	5,697	5,693	5,701	5,712	5,715	5,712	5,716	5,713	5,711	5,710	5,702	5,687
	Custer		5,814	5,987	6,174	6,346	6,530	6,705	6,884	7,063	7,231	7,409	7,587	7,749	7,921	8,077	8,239
	El Paso		662,849	672,332	682,078	691,809	701,193	710,519	720,354	730,233	740,537	750,808	761,078	771,279	781,447	791,600	801,721
	Elbert	31%	11,229	11,702	12,191	12,681	13,203	13,729	14,265	14,814	15,356	15,895	16,427	16,921	17,380	17,892	18,215
	Fremont		58,840	59,900	61,043	62,166	63,301	64,426	65,563	66,664	67,789	68,904	69,903	70,887	71,865	72,843	73,797
	Huerfano		10,355	10,521	10,684	10,853	11,008	11,169	11,338	11,487	11,645	11,784	11,887	11,980	12,076	12,157	12,228
	Kiowa		1,428	1,426	1,414	1,411	1,407	1,407	1,402	1,391	1,390	1,385	1,370	1,371	1,357	1,357	1,355
	Lake		12,072	12,501	12,946	13,362	13,820	14,285	14,754	15,243	15,736	16,207	16,674	17,127	17,569	18,027	18,458
	Las Animas		20,234	20,567	20,910	21,251	21,593	21,925	22,264	22,554	22,834	23,107	23,367	23,631	23,893	24,150	24,396
	Lincoln	61%	5,378	5,423	5,468	5,493	5,531	5,577	5,623	5,668	5,703	5,749	5,784	5,821	5,860	5,893	5,932
	Otero		21,219	21,394	21,584	21,762	21,891	22,019	22,145	22,247	22,352	22,422	22,482	22,558	22,620	22,669	22,724
	Prowers		15,484	15,602	15,706	15,804	15,900	16,000	16,114	16,211	16,313	16,419	16,513	16,617	16,709	16,806	16,890
	Pueblo		163,964	166,989	190,016	193,091	196,110	199,172	202,222	205,271	208,314	211,369	214,407	217,430	220,416	223,360	226,311
	Teller	51%	14,714	15,011	15,292	15,582	15,829	16,097	16,353	16,609	16,882	17,114	17,368	17,603	17,833	18,061	18,278
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Colorado	Eagle		65,980	67,533	69,076	70,624	72,157	73,696	75,227	76,742	78,218	79,673	81,141	82,589	84,020	85,440	86,842
	Garfield		68,960	70,891	72,836	74,766	76,705	78,748	80,778	82,832	84,877	86,922	88,976	91,008	93,007	94,997	96,969
	Grand		20,143	20,712	21,296	21,918	22,532	23,153	23,758	24,390	25,018	25,678	26,327	26,969	27,600	28,226	28,834
	Mesa	90%	148,699	152,308	155,926	159,569	163,230	166,969	170,741	174,573	178,456	182,389	186,369	190,361	194,363	198,360	202,338
	Pitkin		21,326	21,763	22,210	22,647	23,083	23,508	23,949	24,370	24,781	25,204	25,608	26,013	26,400	26,784	27,152
	Summit		37,619	38,537	39,464	40,419	41,372	42,322	43,268	44,191	45,123	46,040	48,953	47,836	48,716	49,582	50,421
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Dolores/ San Juan	Archuleta		17,512	18,087	18,675	19,246	19,813	20,390	21,018	21,676	22,382	23,140	23,942	24,737	25,522	26,293	27,048
	Dolores		2,311	2,339	2,369	2,401	2,431	2,458	2,491	2,523	2,563	2,597	2,630	2,663	2,699	2,733	2,760
	La Plata		63,054	64,409	65,735	67,071	68,385	69,692	70,978	72,250	73,500	74,726	75,928	77,134	78,305	79,461	80,598
	Montezuma		31,798	32,418	33,032	33,652	34,273	34,885	35,502	36,118	36,724	37,319	37,920	38,522	39,104	39,640	40,157
	Montrose	10%	5,083	5,218	5,354	5,489	5,626	5,761	5,894	6,020	6,175	6,290	6,405	6,516	6,626	6,730	6,830
	San Juan		629	633	640	641	645	649	647	647	646	648	648	649	653	657	662
	San Miguel		10,341	10,582	10,819	11,057	11,291	11,515	11,758	12,000	12,240	12,479	12,704	12,930	13,182	13,369	13,586
Gunnison	Delta		39,057	39,840	40,634	41,480	42,325	43,178	44,022	44,830	45,615	46,400	47,194	47,967	48,732	49,472	50,215
	Gunnison		16,423	16,675	16,925	17,171	17,457	17,748	17,972	18,201	18,426	18,655	18,879	19,089	19,295	19,498	19,682
	Hinsdale		988	1,008	1,036	1,058	1,067	1,090	1,108	1,125	1,140	1,148	1,178	1,200	1,221	1,237	1,250
	Mesa	10%	16,522	16,923	17,325	17,730	18,137	18,552	18,971	19,397	19,830	20,265	20,710	21,151	21,596	22,040	22,482
	Montrose	90%	45,746	46,956	48,185	49,404	50,630	51,853	53,045	54,179	55,574	56,608	57,649	58,648	59,630	60,571	61,474
	Ouray		5,196	5,300	5,400	5,502	5,601	5,698	5,781	5,873	5,960	6,026	6,112	6,184	6,253	6,317	6,392
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
North Platte	Jackson		1,790	1,806	1,833	1,847	1,866	1,881	1,896	1,909	1,926	1,933	1,943	1,958	1,954	1,979	1,986
			2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Rio Grande	Alamosa		18,883	19,172	19,444	19,732	20,015	20,303	20,590	20,868	21,154	21,441	21,731	22,017	22,311	22,609	22,901
	Conejos		9,253	9,311	9,373	9,427	9,485	9,543	9,605	9,663	9,711	9,766	9,815	9,856	9,899	9,948	9,990
	Costilla		4,212	4,247	4,284	4,311	4,339	4,367	4,391	4,414	4,445	4,476	4,505	4,525	4,548	4,580	4,606
	Mineral		1,048	1,068	1,085	1,092	1,111	1,116	1,128	1,138	1,146	1,151	1,158	1,158	1,160	1,155	1,144
	Rio Grande		14,218	14,334	14,450	14,562	14,691	14,800	14,911	15,009	15,107	15,189	15,271	15,335	15,409	15,479	15,532
	Saguache		7,628	7,715	7,798	7,873	7,955	8,037	8,105	8,170	8,232	8,292	8,358	8,417	8,485	8,515	8,575



Note: Gap values determined using medium demands and medium yield IPPs. Difference in the total IPPs and sum of IPP type is due to rounding. For additional information see attached memo.

STATE OF COLORADO
POPULATION PROJECTIONS
2000 to 2030

Basin	County	Percent	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Arkansas	Baca		4,516	4,514	4,413	4,347	4,286	4,234	4,204	4,166	4,147	4,112	4,085	4,061	4,036	4,003	3,983	3,954
	Bent		5,971	5,865	6,089	6,120	6,134	6,158	6,180	6,208	6,241	6,275	6,308	6,347	6,385	6,434	6,459	6,492
	Chaffee		16,298	16,522	16,737	16,915	17,142	17,418	17,797	18,182	18,576	18,962	19,348	19,743	20,144	20,542	20,943	21,386
	Cheyenne	38%	848	847	841	834	824	815	809	804	798	791	784	780	776	771	769	764
	Crowley		5,513	5,491	5,838	5,807	5,778	5,755	5,748	5,740	5,731	5,723	5,711	5,709	5,698	5,700	5,699	5,699
	Custer		3,540	3,686	3,779	3,828	3,934	4,062	4,205	4,348	4,497	4,638	4,797	4,951	5,117	5,282	5,447	5,638
	El Paso		520,572	533,526	541,491	547,567	554,428	561,849	569,919	578,616	587,654	596,881	606,147	615,477	624,763	634,082	643,480	652,992
	Elbert	31%	6,258	6,650	6,819	6,906	7,113	7,381	7,649	7,927	8,203	8,490	8,783	9,140	9,505	9,892	10,323	10,768
	Fremont		46,439	47,209	47,561	47,820	48,264	48,806	49,491	50,242	51,067	51,899	52,847	53,812	54,783	55,761	56,756	57,759
	Huerfano		7,861	7,857	8,056	8,104	8,254	8,461	8,664	8,866	9,043	9,201	9,369	9,530	9,691	9,861	10,020	10,188
	Kiowa		1,617	1,598	1,578	1,563	1,539	1,529	1,517	1,501	1,495	1,486	1,476	1,469	1,459	1,443	1,440	1,436
	Lake		7,908	7,878	7,924	7,940	7,977	8,034	8,331	8,630	8,935	9,233	9,554	9,956	10,374	10,791	11,213	11,650
	Las Animas		15,276	15,550	15,879	16,122	16,376	16,633	16,933	17,256	17,574	17,887	18,216	18,552	18,873	19,216	19,548	19,897
	Lincoln	81%	4,998	4,955	4,973	4,933	4,929	4,954	5,007	5,040	5,086	5,117	5,145	5,188	5,229	5,263	5,305	5,343
	Otero		20,244	19,976	19,771	19,659	19,587	19,622	19,714	19,819	19,915	20,031	20,151	20,315	20,489	20,668	20,843	21,030
	Prowers		14,434	14,240	14,219	14,216	14,225	14,292	14,394	14,498	14,604	14,718	14,830	14,937	15,055	15,165	15,275	15,389
	Pueblo		142,054	144,383	147,264	149,386	151,561	153,986	156,376	158,836	161,339	163,900	166,522	169,324	172,189	175,095	178,047	180,978
	Teller	51%	10,784	11,132	11,244	11,343	11,457	11,671	11,904	12,148	12,404	12,669	12,947	13,230	13,504	13,800	14,103	14,409
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Colorado	Eagle		43,354	44,824	45,944	46,978	48,216	49,601	51,069	52,535	53,981	55,410	56,816	58,298	59,769	61,326	62,878	64,436
	Garfield		44,267	46,173	47,447	48,483	49,619	50,900	52,402	53,901	55,418	56,928	58,558	60,235	61,918	63,625	65,338	67,043
	Grand		12,884	13,253	13,458	13,639	13,879	14,264	14,787	15,301	15,790	16,249	16,740	17,258	17,838	18,414	18,988	19,566
	Mesa	90%	105,891	107,965	110,112	111,951	114,147	116,451	118,910	121,396	123,944	126,512	129,232	132,175	135,231	138,424	141,731	145,179
	Pitkin		15,913	16,197	16,301	16,352	16,483	16,822	17,214	17,647	18,071	18,490	18,906	19,319	19,719	20,124	20,528	20,923
	Summit		25,725	26,355	26,641	27,075	27,606	28,247	28,963	29,781	30,673	31,559	32,427	33,284	34,125	34,977	35,846	36,722
Dolores/ San Juan			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
	Archuleta		10,028	10,548	10,942	11,318	11,676	12,100	12,565	13,032	13,491	13,968	14,449	14,927	15,402	15,874	16,353	16,934
	Dolores		1,844	1,844	1,881	1,888	1,915	1,966	2,002	2,036	2,083	2,103	2,127	2,144	2,181	2,213	2,237	2,272
	La Plata		44,566	45,616	46,239	46,793	47,494	48,259	49,396	50,776	52,155	53,517	54,881	56,256	57,628	58,988	60,347	61,696
	Montezuma		23,864	23,999	24,282	24,610	25,017	25,546	26,069	26,566	27,105	27,629	28,182	28,764	29,363	29,965	30,571	31,178
	Montrose	10%	3,367	3,460	3,553	3,622	3,717	3,812	3,910	4,014	4,121	4,228	4,337	4,458	4,580	4,702	4,825	4,948
	San Juan		558	560	565	561	568	576	583	591	591	602	600	603	611	623	617	623
	San Miguel		6,666	6,956	7,154	7,322	7,520	7,775	8,012	8,244	8,473	8,699	8,919	9,156	9,384	9,609	9,866	10,106
Gunnison	Delta		28,009	28,709	29,276	29,738	30,279	30,830	31,464	32,114	32,861	33,628	34,405	35,197	35,946	36,717	37,495	38,273
	Gunnison		13,967	14,012	14,037	14,021	14,040	14,100	14,251	14,429	14,620	14,796	14,968	15,182	15,398	15,663	15,918	16,166
	Hinsdale		791	794	812	807	813	820	831	840	853	870	883	899	914	939	961	974
	Mesa	10%	11,766	11,996	12,235	12,439	12,683	12,939	13,212	13,488	13,772	14,057	14,359	14,686	15,026	15,380	15,748	16,131
	Montrose	90%	30,299	31,141	31,978	32,600	33,453	34,305	35,188	36,122	37,085	38,048	39,034	40,122	41,220	42,321	43,428	44,534
	Ouray		3,771	3,888	3,948	3,968	4,059	4,180	4,291	4,391	4,491	4,567	4,648	4,722	4,816	4,910	5,010	5,101
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
North Platte	Jackson		1,586	1,620	1,607	1,602	1,604	1,632	1,655	1,671	1,682	1,707	1,720	1,729	1,741	1,758	1,763	1,778
			2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Rio Grande	Alamosa		15,139	15,282	15,419	15,596	15,816	16,040	16,285	16,508	16,752	17,005	17,255	17,509	17,786	18,055	18,326	18,601
	Conejos		8,400	8,401	8,423	8,421	8,461	8,498	8,558	8,598	8,669	8,739	8,804	8,886	8,961	9,028	9,114	9,185
	Costilla		3,675	3,723	3,756	3,778	3,807	3,841	3,884	3,898	3,941	3,971	4,011	4,042	4,070	4,116	4,157	4,187
	Mineral		833	843	867	874	889	911	924	937	951	971	989	1,004	1,016	1,031	1,039	1,039
	Rio Grande		12,434	12,518	12,593	12,584	12,618	12,767	12,916	13,041	13,143	13,251	13,359	13,499	13,643	13,799	13,929	14,071
	Saguache		5,954	6,100	6,212	6,281	6,412	6,562	6,686	6,783	6,883	6,975	7,070	7,172	7,270	7,369	7,454	7,542

Theobald/RPI Study Group

Scenarios and indicators for Ouray County build-out analysis (revised 9/08)
David M. Theobald, Ph.D., NREL, Colorado State University

Summary and Analysis

The "Executive Summary" prepared by Dr. David Theobald of his report *Scenarios and indicators for Ouray County build-out analysis , Revised September 2008* provides an overview of the goal, process, and major findings of his study.

The summary and analysis presented below summarizes basic data and illustrates current and future conditions with selected examples from the maps provided by Dr. Theobald. In addition, the increase in the number of housing units that the County may have to absorb, based on two different projections of growth, 3% and 4.7%, is used as a way of understanding the challenges the County will be facing by 2015 (RPI study endpoint) and 2025 (a prominent endpoint in the Theobald study).

The information in this build-out study provides the basis for several kinds of analysis and should be extremely valuable as the County moves forward. The map layers in the final report allow users to study land use alternatives in considerable detail.

Current status of Ouray County land use:

The 50% of private land in Ouray County is divided into 2,662 parcels on 162,457 acres. There are 1,269 housing units on parcels in the unincorporated County and, if the towns are included, there are 2,047 total housing units in the County. There are 896 platted parcels that do not currently contain housing units. There are an estimated 9,300 acres of mining claims, not including those protected by the Red Mountain Project.

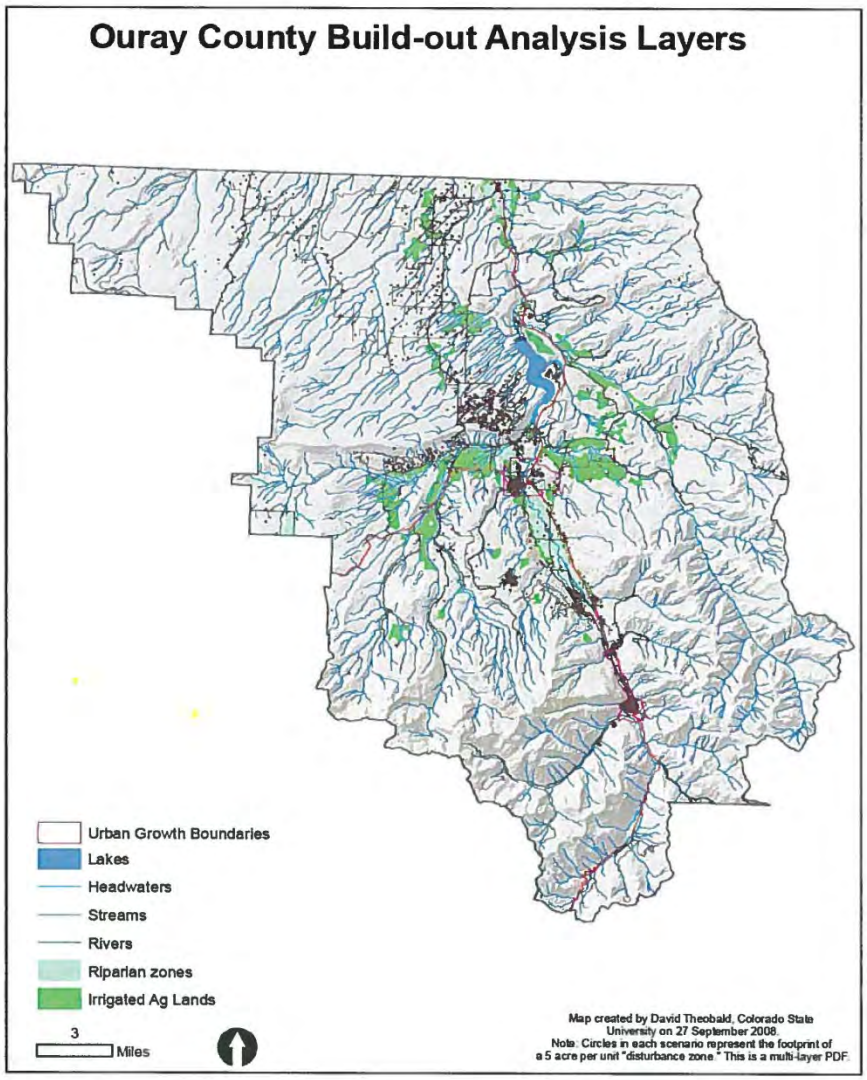
According to the Ouray County Master Plan, land use planning should seek to preserve agricultural land, especially irrigated agricultural land; important wildlife habitat; riparian areas; and scenic vistas. The following maps show the current status of housing units and Master Plan values in Ouray County.

Map 1: The first map contains three layers: irrigated agricultural land (green), riparian areas (turquoise), and housing units (brown dots). Urban growth boundaries are outlined in red. Parcels and cluster preference areas are not shown.

Map 2: The second map shows winter range for economically important wildlife species—deer, elk, sheep.

Map 3: The third map shows locations for rare and imperiled species—bald eagle, lynx, miscellaneous species.

Map 4: The fourth map shows locations of scenic corridors as defined by the stakeholders group at the beginning of the study.

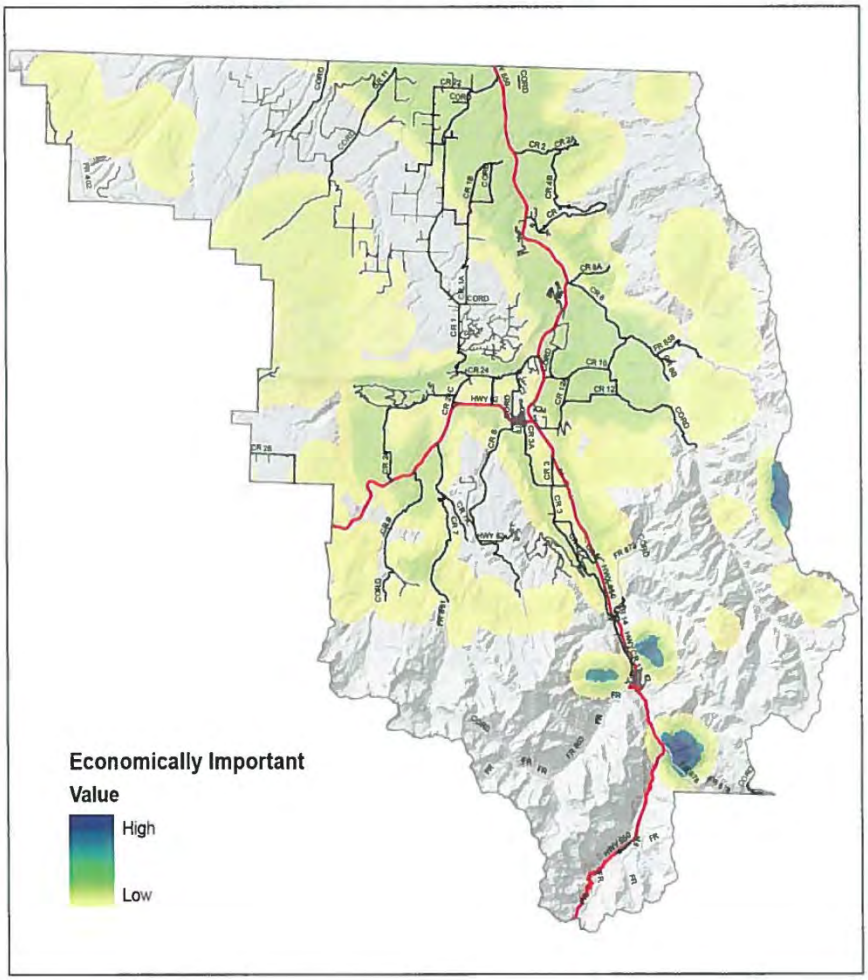


Map 1: Irrigated Agriculture, Riparian, and Current Housing Units

2

Economically-important Wildlife Species

Ouray County Build-out Analysis



5 Miles

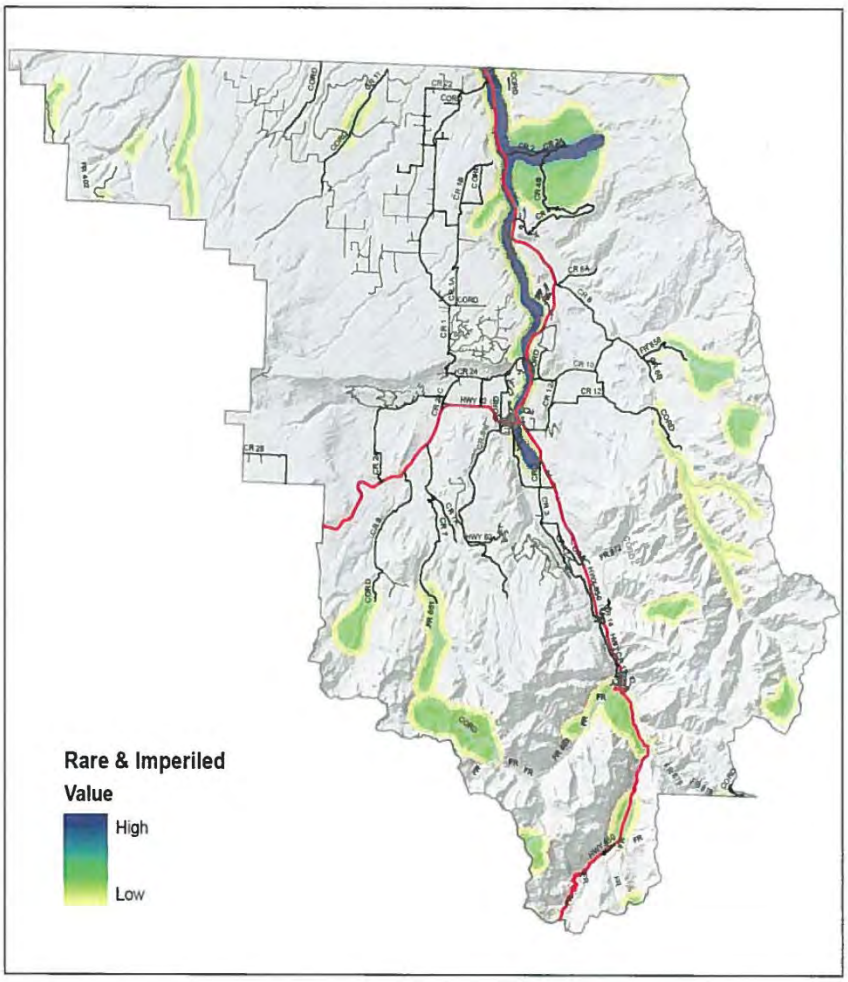
Data source: Colorado Division of Wildlife's NDIS/WRIS database. Mule deer and elk winter concentration areas and bighorn sheep winter concentration areas.
Map created by David Theobald, Natural Resource Ecology Lab, Colorado State University on 1 September 2006

Map 2: Economically important wildlife species

3

Rare and Imperiled Species

Ouray County Build-out Analysis



5 Miles

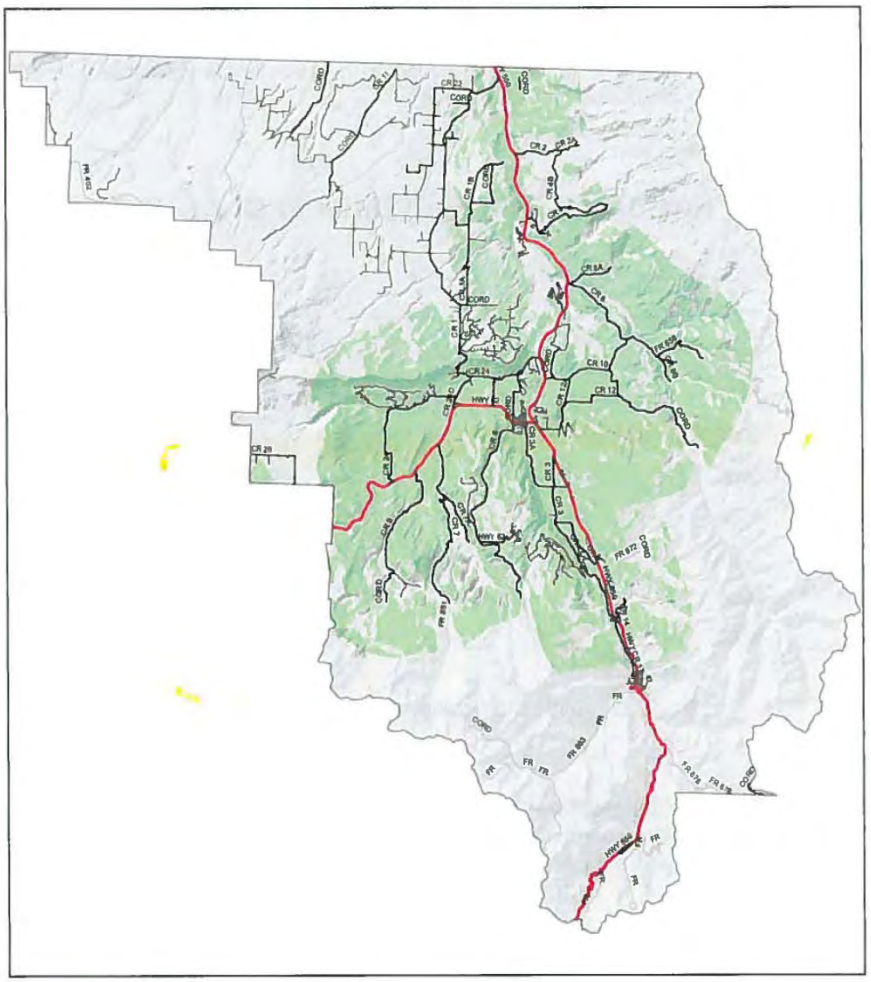
Data source: Colorado Division of Wildlife's NDIS/WRIS database and the Colorado Natural Heritage Program's Potential Conservation Areas. Map created by David Theobald, Natural Resource Ecology Lab, Colorado State University on 1 September 2006.

Map 3: Rare and Imperiled Wildlife Species

4

Scenic corridors

Ouray County Build-out Analysis



Viewshed w/in 1.5 miles

5 Miles

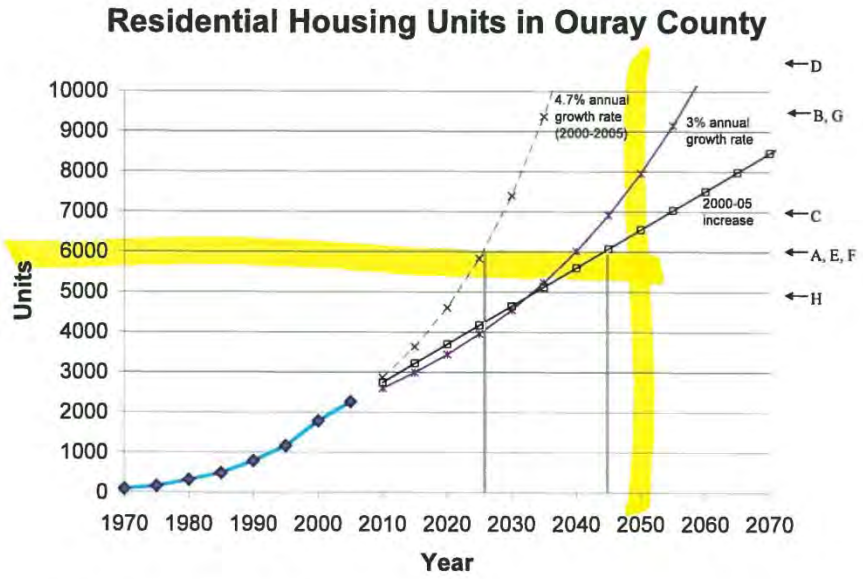
Data source: Created from roads and 30 m Digital Elevation Model
Map created by David Theobald, Natural Resource Ecology Lab,
Colorado State University on 1 September 2006

Map 4: Scenic Corridors

5

It is apparent from a comparison of these maps that there is a great deal of overlap in the location of irrigated agricultural, riparian, wildlife, and scenic values. Both people and animals like to occupy valleys along rivers or streams, especially in the winter. Likewise, irrigated agriculture is likely to be located in such areas. The scenic corridors overlap also but cover a somewhat broader swath. The current approximately 2,000 housing units are concentrated in the towns and subdivisions with the remainder widely scattered (see Theobald, Table 2, page 3, for exact zone locations). This is the current status of housing units and Master Plan values in Ouray County.

Future land use issues:



Using the graph "Residential Housing Units in Ouray County" on page 17 of the Theobald report as the basis for the rate of growth in relation to the increase in the number of housing units required, the following figures can be determined.

By the year 2015

3% rate of growth	1,000 additional housing units
4.7% rate of growth	1,800 additional housing units

By the year 2025

3% rate of growth	2,000 additional housing units
4.7% rate of growth	4,000 additional housing units

Working from the knowledge of how many housing units the County will need to absorb and when this need is likely to occur, the information in the scenarios and indicators can suggest alternative land use planning strategies and their impacts.

The nine scenarios calculated and mapped by Dr. Theobald consider four different housing densities: 1 house per 17.5 acres (B), 1 house per 26 acres on lots over 105 acres (C), 1 house per 35 acres (A, Colorado use by right), and 1 house per 70 acres (H). In addition, the impact of clustering and transferring development rights to the urban growth boundary were calculated and mapped for some scenarios (D, E, G1, G2). The impacts of the nine scenarios on the values expressed in the Ouray County Master Plan are presented by Dr. Theobald in the following Table 10. Note that all of the numbers represent total build out of that particular scenario. The black numbers are increases in housing units; the red numbers are losses in acres of land; and the green numbers have been converted from red to green to indicate the lowest numbers among the losses for an individual indicator.

Results

Table 10. Results of indicators for all zones (including mining claims), excluding towns of Ouray & Ridgway.

	Scenarios								
Indicators	A. Existing zoning	B. 35 ac at 17.5 per unit	C. 105 ac at 26 per unit	D. Urban Growth Boundaries	E. Scenic corridor	F. Scenic corridor transfer to UGB	G1. Cluster (1 unit per 35 acres)	G2. Cluster (1 unit per 17.5 acres)	H. Low-density (1 per 70 acres)
No. of units (county only) *1,269 in 2006	6,648	10,102	7,787	10,902	6,648	6,648	6,648	10,102	5,053
No. of units (Alpine, High Mesa & Valley Zones only)	5,611	9,036	6,741	9,840	5,611	5,327	5,611	9,036	4,026
Irrigated Ag	-2,175	-3,824	-2,700	-2,558	-2,175	-1,232	-595	-1,062	-1,472
Ag Land Use	-17,351	-33,756	-22,886	-17,624	-17,351	-15,265	-8,678	-16,881	-9,656
Econ. Important Species Habitat	-17,453	-29,983	-21,572	-17,789	-17,536	-14,941	-16,973	-29,534	-11,787
Rare & Imperiled Species Habitat	-2,347	-3,400	-2,682	-2,495	-2,353	-1,524	-1,597	-2,604	-1,872
Riparian Areas	-1,769	-2,747	-2,064	-2,110	-1,769	-1,307	-1,083	-1,312	-1,374
VMT w/~830 % mining claims[1]									
- 100%	**1,234**	**2,064**	**1,493**	**2,137**	**1,234**	**1,234**	**1,234**	**2,064**	**873**
- 75%	1,161	1,983	1,418	2,038	1,161	1,161	1,161	1,983	804
- 50%	1,089	1,902	1,343	1,940	1,089	1,089	1,089	1,902	734
- 25%	1,016	1,820	1,268	1,842	1,016	1,016	1,016	1,820	665

The figures in Table 10 suggest that any of the scenarios at build-out would provide more than the maximum number of housing units needed to absorb 3-4.7% growth (1,000-1,800 units by 2015 and 2,000-4,000 units by 2025). In reality, it is unlikely that any single

[1] VMT computed assuming 100%, 75%, 50%, and 25% of mining claims built. This compares to 242 (1000s vehicle miles traveled per day) for 2006.

scenario will be selected by property owners and buyers to absorb all the growth. Rather, a combination of scenarios that reflect individual choice and response to incentives and regulations is likely to represent where growth will actually occur. The question is: which scenarios does the County want to encourage through incentives and regulation because they preserve more of the values in the Ouray County Master Plan? And where does the County want to encourage these scenarios?

Based on the figures in Table 10, Scenario G1, 1/35 with clustering, loses the least number of acres of irrigated agricultural land, non-irrigated agricultural land, and riparian areas. G1 results in a low, but not the least, loss of wildlife habitat for economically important wildlife and for rare and imperiled species. G1 shows the power of clustering when compared to Scenario A, 1/35, which is the same density without clustering. Scenario H, 1/70, with its very low density preserves the most wildlife habitat for economically important species. Scenario F, transfer to UGB from the scenic corridor, produces some favorable results in preserving the values of the Master Plan, but note that whenever you transfer to the UGB, irrigated agriculture and riparian areas are being sacrificed; however, since the density is so much higher in the UGB (7 units per acre), many more housing units are absorbed in less land area than in any other alternative.

To illustrate, using a smaller section of the County--the valley between Ridgway and Ouray, map layers have been enlarged to 300% and presented below for comparison.

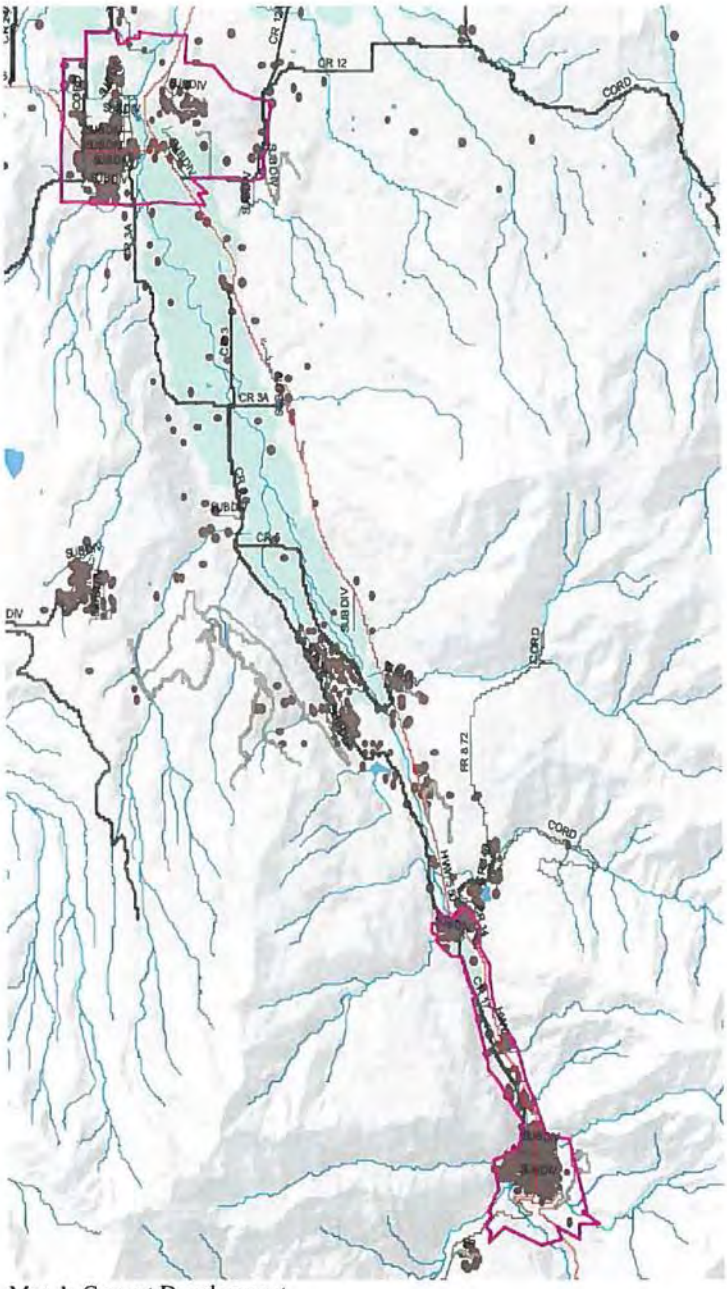
Map 1: The first map is a section of the County along 550 between Ridgway and Ouray as it currently exists.

Map 2: The second map is the same area built out at the current 1/35 zoning (Scenario A).

Map 3: The third map is the same area developed with clustering (Scenario G1) to preserve the values of irrigated agricultural lands, riparian areas, and ridgelines.

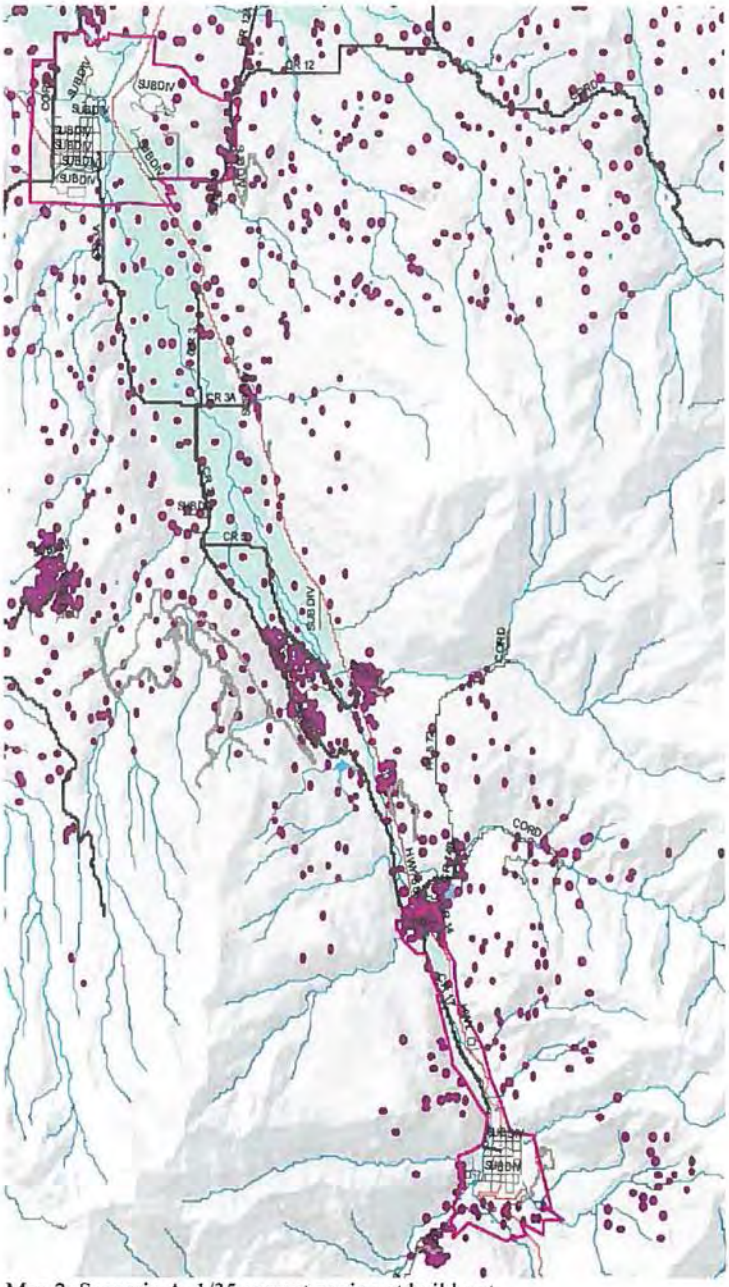
Map 4: The fourth map applies the scenic corridor preservation of Scenario F.

Reminder: each dot represents a structure and its 5-acre area of impact or influence (radius of 80 meters), including driveways, access roads, outbuildings, and adjacent vegetation that is modified. This area of influence will have a wildlife impact that could be greater or smaller depending on the species involved. Each dot has to be located within a parcel and in the area of least impact on the values being studied. Parcel lines are not represented on these maps for clarity, but there is a layer available for that element. Also, the dots do not represent current actual locations of buildings within a parcel.



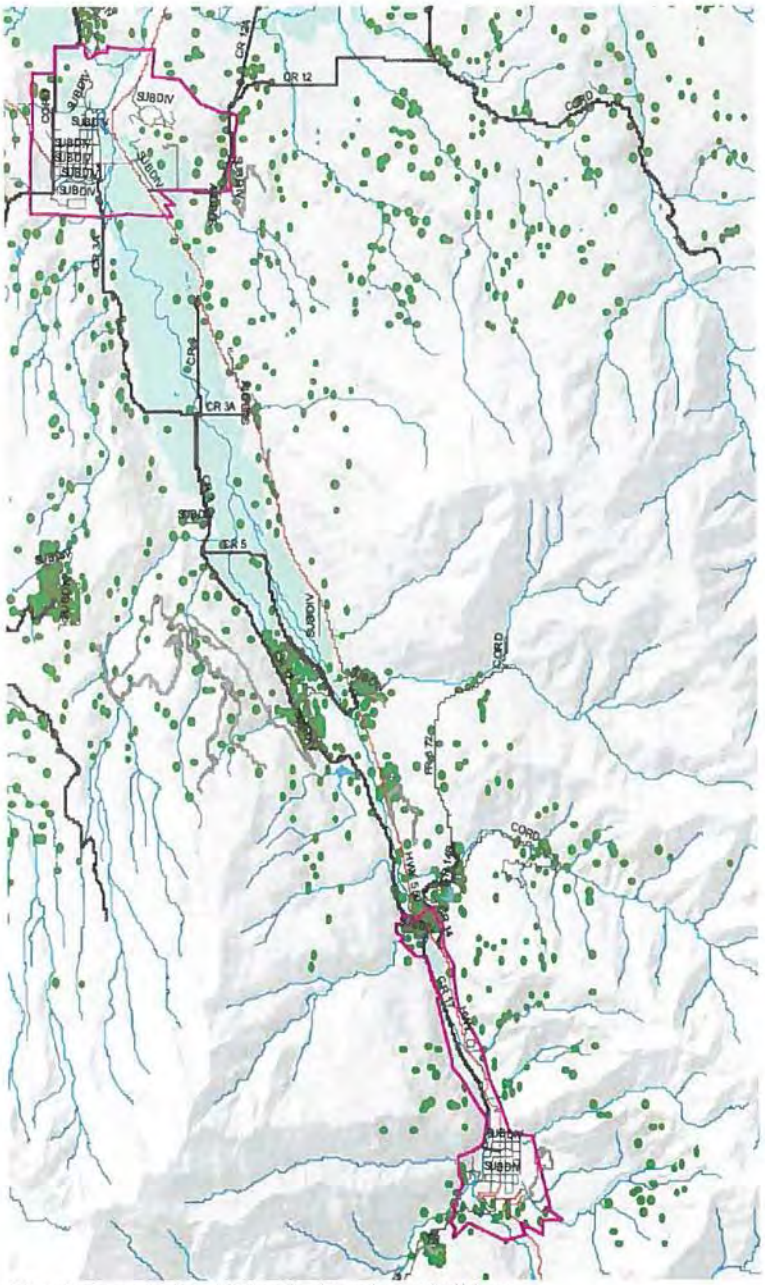
Map 1: Current Development

9



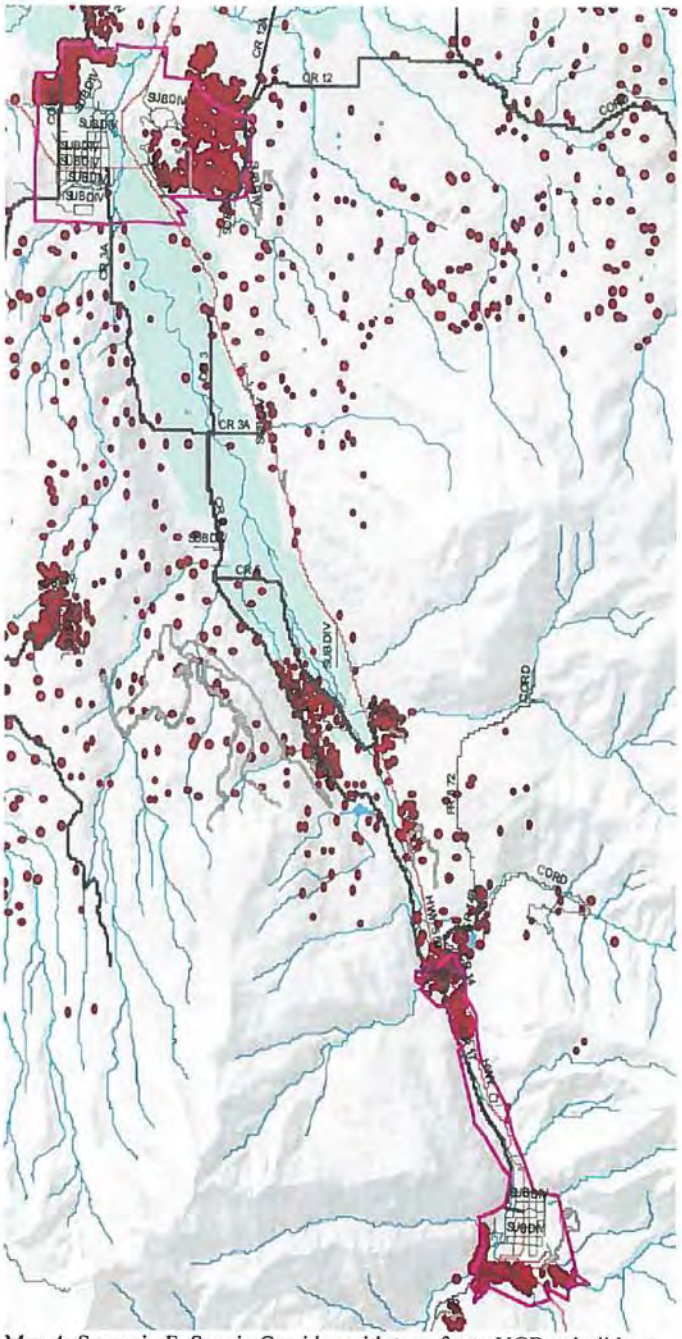
Map 2: Scenario A, 1/35 current zoning at build-out.

10



Map 3: Scenario G1, 1/35 with clustering at build-out.

11



Map 4: Scenario F, Scenic Corridor with transfer to UGB at build out.

12

The scenic corridor scenario appears to preserve a slightly greater area than clustering, but either is much better than a straightforward 1/35 in preserving the values of the Master Plan. Since this is a valuable riparian area and scenic corridor, the County may wish to at least encourage clustering for any development in this strip, or, better yet, facilitate putting as much as possible into conservation easements. Riparian areas are also often protected by zoning overlays or setbacks. This illustrates how different options may be selected for different locations, depending on the values involved and the current condition of the area.

It would be instructive to use the maps provided in the Theobald study to do a similar comparison for other areas of the County identified as of special interest, such as Log Hill Mesa or scenic corridors.

Recommendations:

In order to preserve the values in the Ouray County Master Plan, future growth should:

- Be directed toward already platted developments (there are currently 896 un-built platted lots) and adjacent to already established infrastructure, such as towns and existing subdivisions;
- Create incentives for effective clustering in any new developments, such as density bonuses;
- Encourage siting of structures to minimize impact on the total open space and scenic corridors;
- Encourage the continued use of conservation easements as an additional preservation tool;
- Evaluate TDR's (transfer of development rights) and PDR's (purchase of development rights) as means of preserving areas of high importance;
- Initiate a study of how to preserve water rights in the County.

Appendix 7: City of Ouray Feedback

WWE
Wright Water Engineers, Inc.
1666 N. Main Avenue, Suite C
Durango, Colorado 81301
(970) 259-7411 TEL
(970) 259-8758 FAX
www.wrightwater.com
e-mail: pfoster@wrightwater.com

July 8, 2014

Via email: greg.johnson@wilsonwatergroup.com

Greg Johnson
Wilson Water Group
165 S. Union Blvd.
Suite 5220
Lakewood, CO 80228

Re: City of Ouray Future Water Demand Estimates

Dear Greg:

Wright Water Engineers, Inc. (WWE) is providing you with this letter on behalf of the City of Ouray (City). Please use this information to incorporate the City's future water demand estimates into the Basin Implementation Plan documents.

WWE calculates that the City of Ouray's year 2050 water demand is between 8,500 and 10,000 acre-feet per year. This includes water for municipal, irrigation, and hot spring uses within the City and adjoining service areas.

WWE also recommends including Water Efficiency and Conservation Measures as an Identified Project and Processes (IPP) for the City. The City is in the process of preparing a Water Efficiency Plan and will work to implement measures such as system meters, replacement of lines, and a leak detection study.

Please let us know if you have any questions.

Very truly yours,

WRIGHT WATER ENGINEERS, INC.

By

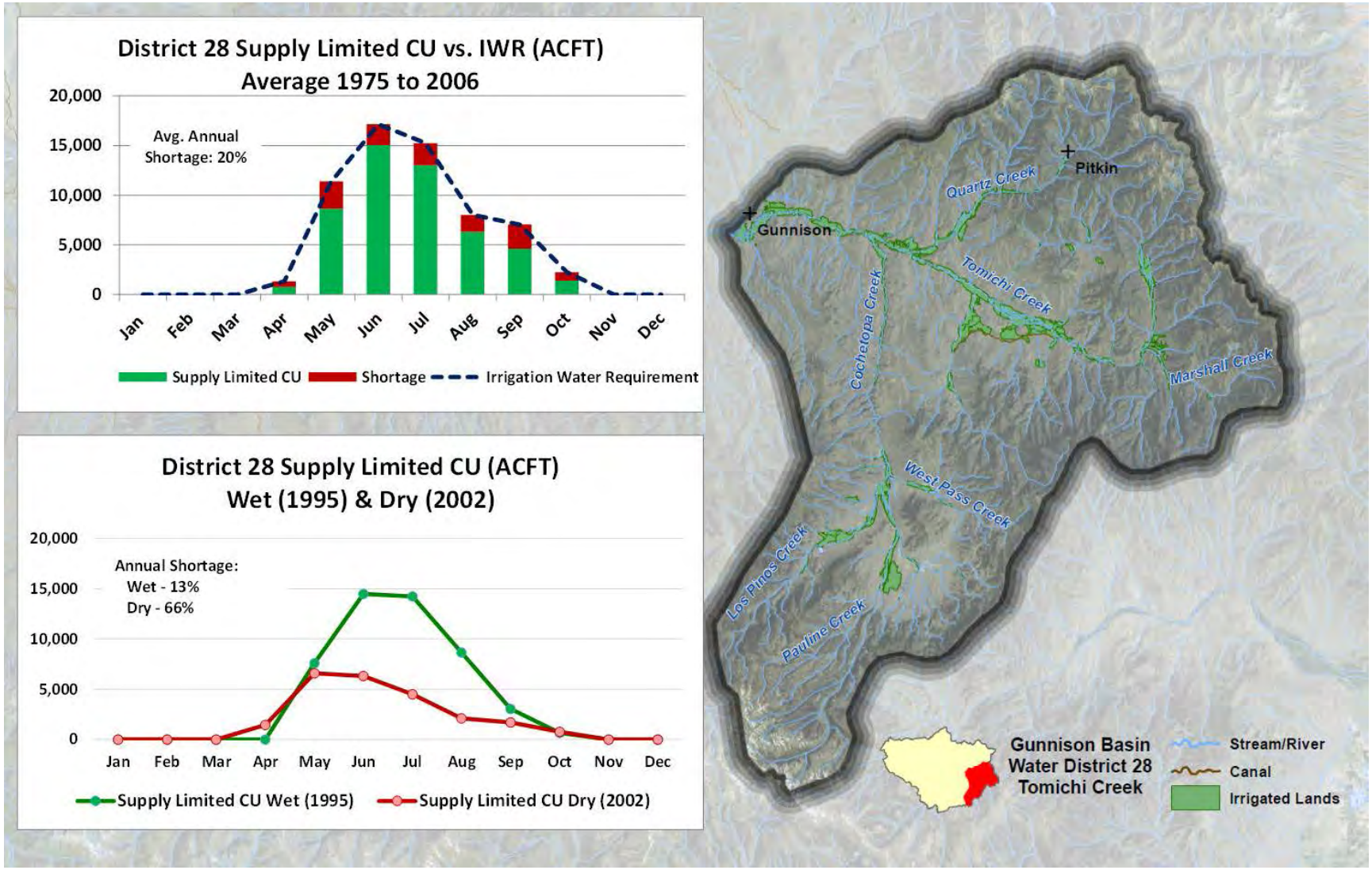
Peter R. Foster, P.E.
Vice-President

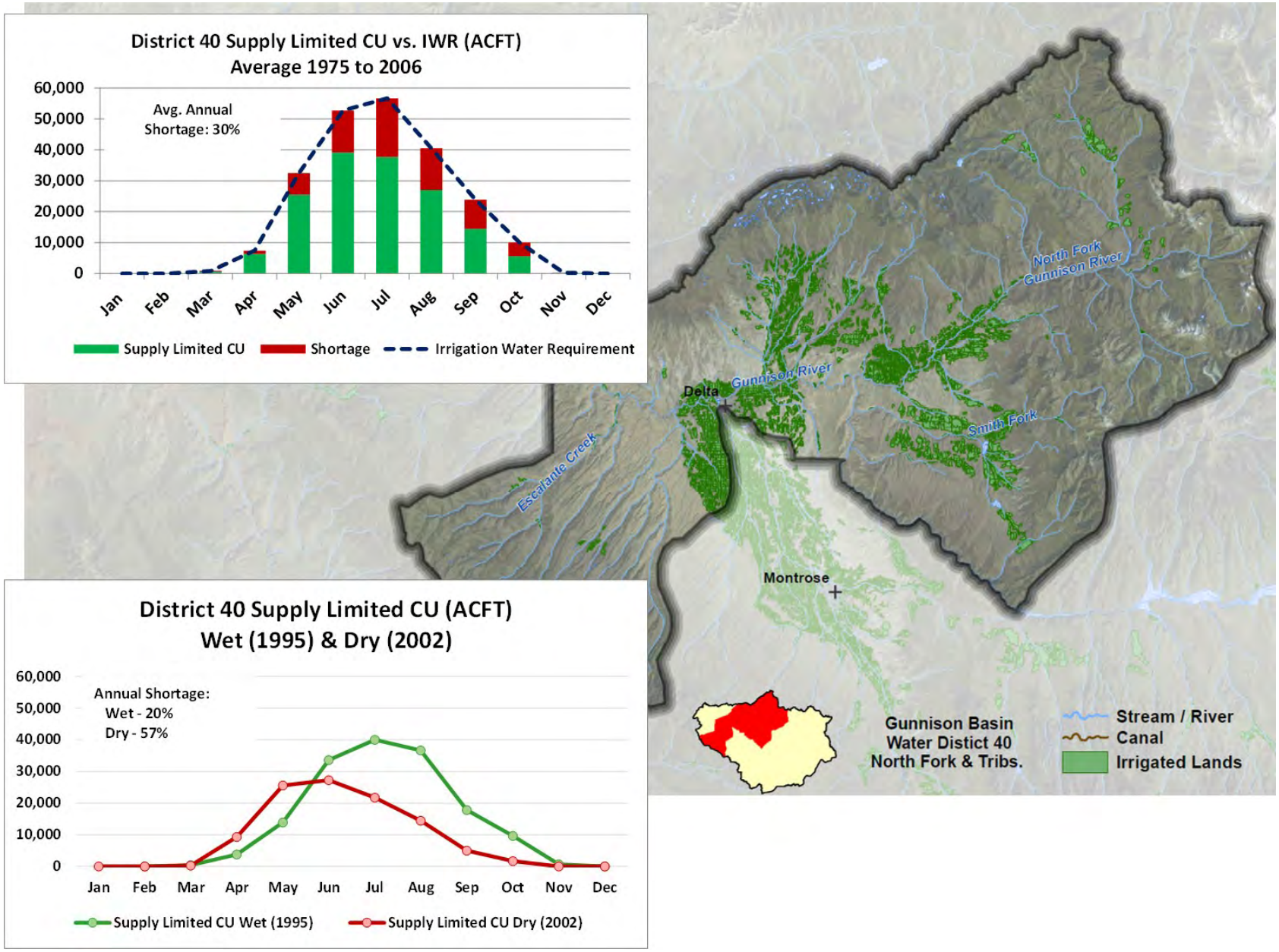
cc: Patrick Rondinelli, City of Ouray Administrator

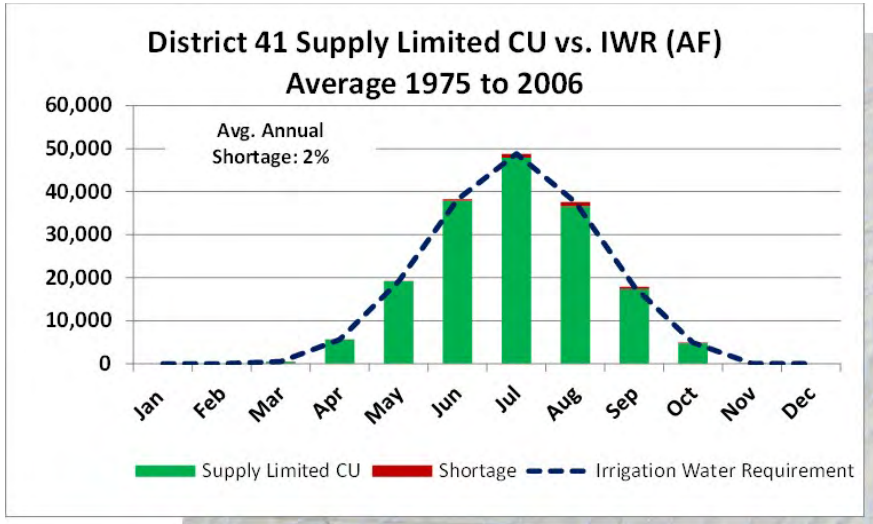
P:\051-036\000 Water Right Inventory\Basin Implementation Plan - 2014\City of Ouray Future Water Demand for BIP.docx

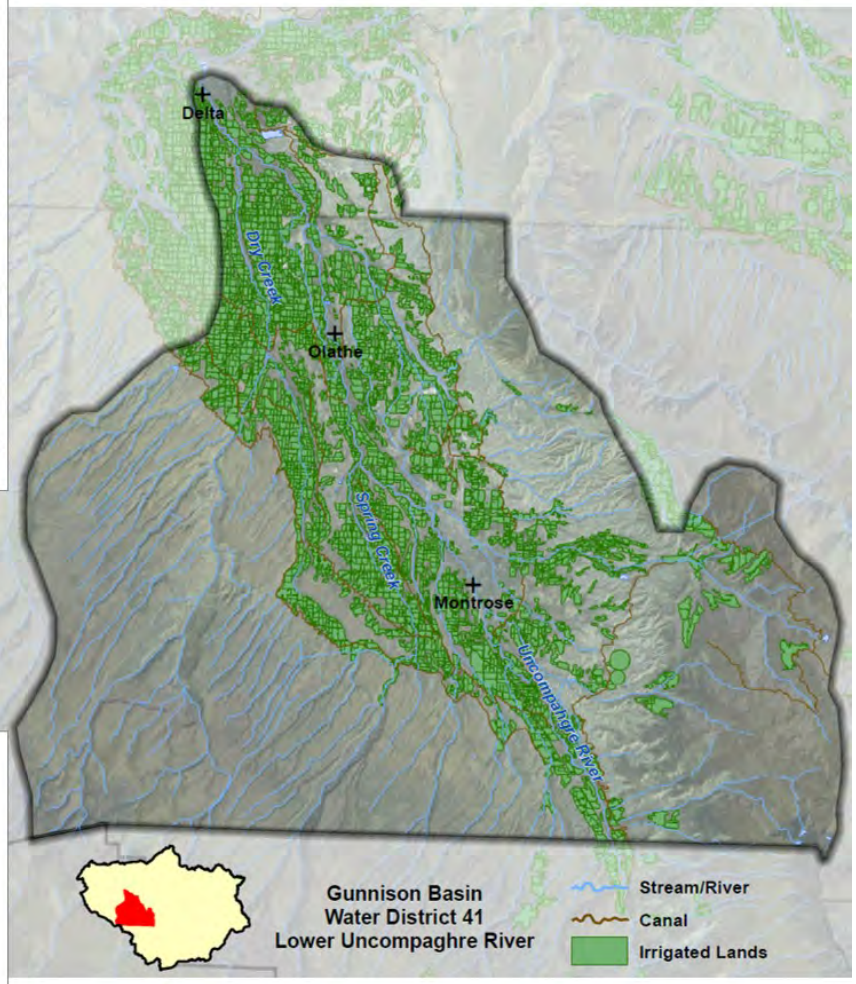
DENVER
(303) 480-1700 TEL (303) 480-1020 FAX
GLENWOOD SPRINGS
(970) 945-7755 TEL (970) 945-9210 FAX

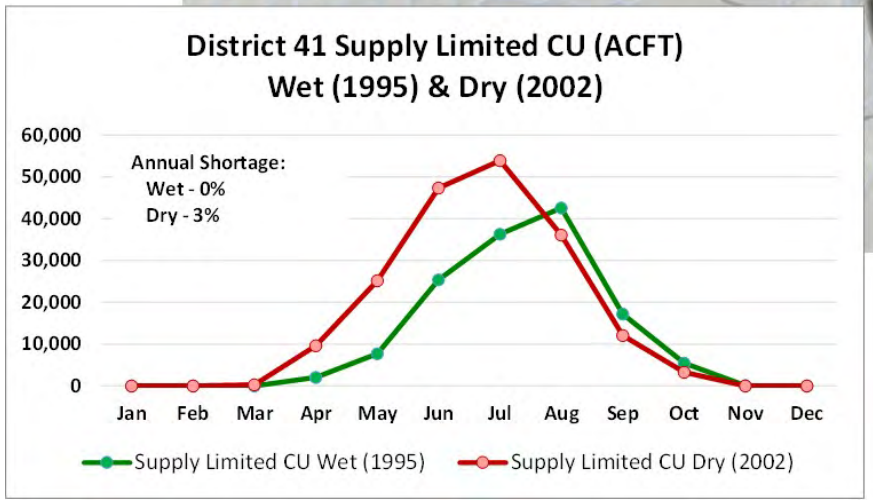
Appendix 8: Agricultural Water Use and Needs by Tributary

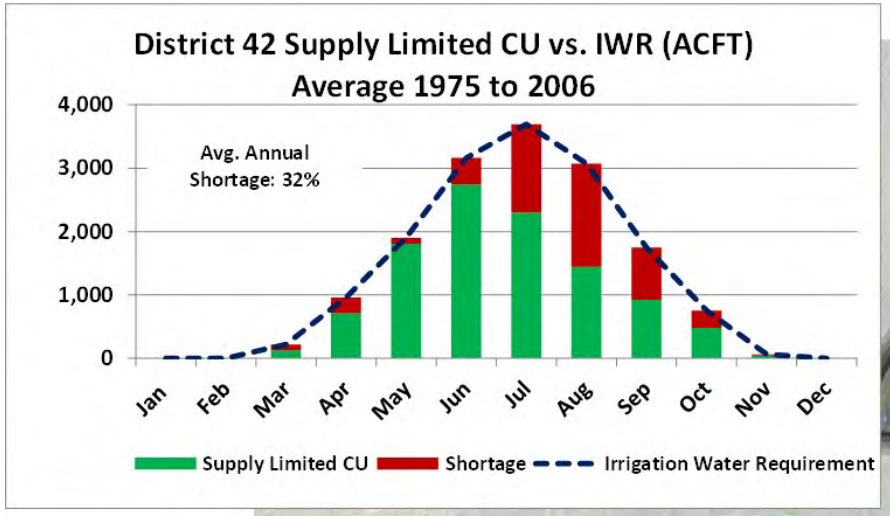


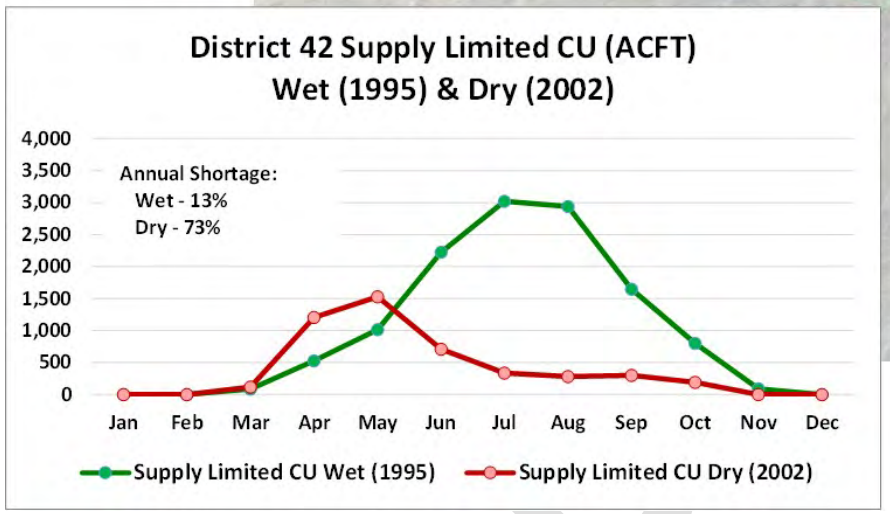

District 40 Supply Limited CU vs. IWR (ACFT)
Average 1975 to 2006
Avg. Annual
Shortage: 30%
60,000
50,000
40,000
30,000
20,000
10,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply Limited CU
Shortage
Irrigation Water Requirement
North Fork
Gunnison River
Gunnison River
Delta
Smith Fork
Escalante Creek
Montrose
Gunnison Basin
Water Distict 40
North Fork & Tribs.
Stream / River
Canal
Irrigated Lands
District 40 Supply Limited CU (ACFT)
Wet (1995) & Dry (2002)
Annual Shortage:
Wet - 20%
Dry - 57%
60,000
50,000
40,000
30,000
20,000
10,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply Limited CU Wet (1995)
Supply Limited CU Dry (2002)

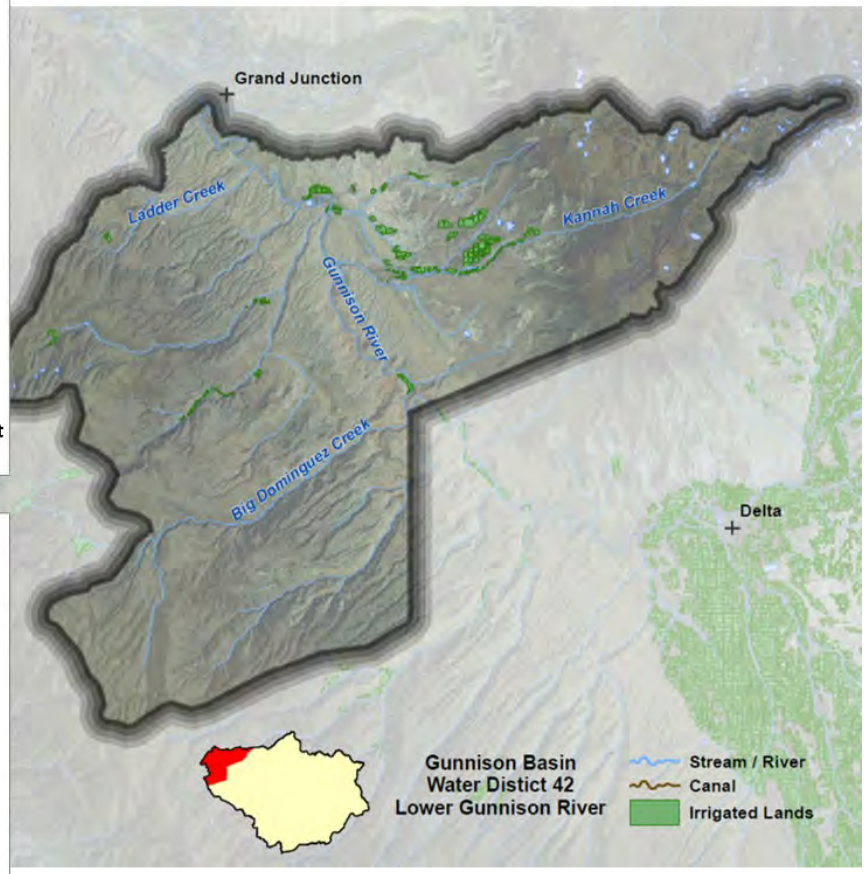

District 41 Supply Limited CU vs. IWR (AF)
Average 1975 to 2006
Avg. Annual
Shortage: 2%
60,000
50,000
40,000
30,000
20,000
10,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply Limited CU
Shortage
Irrigation Water Requirement

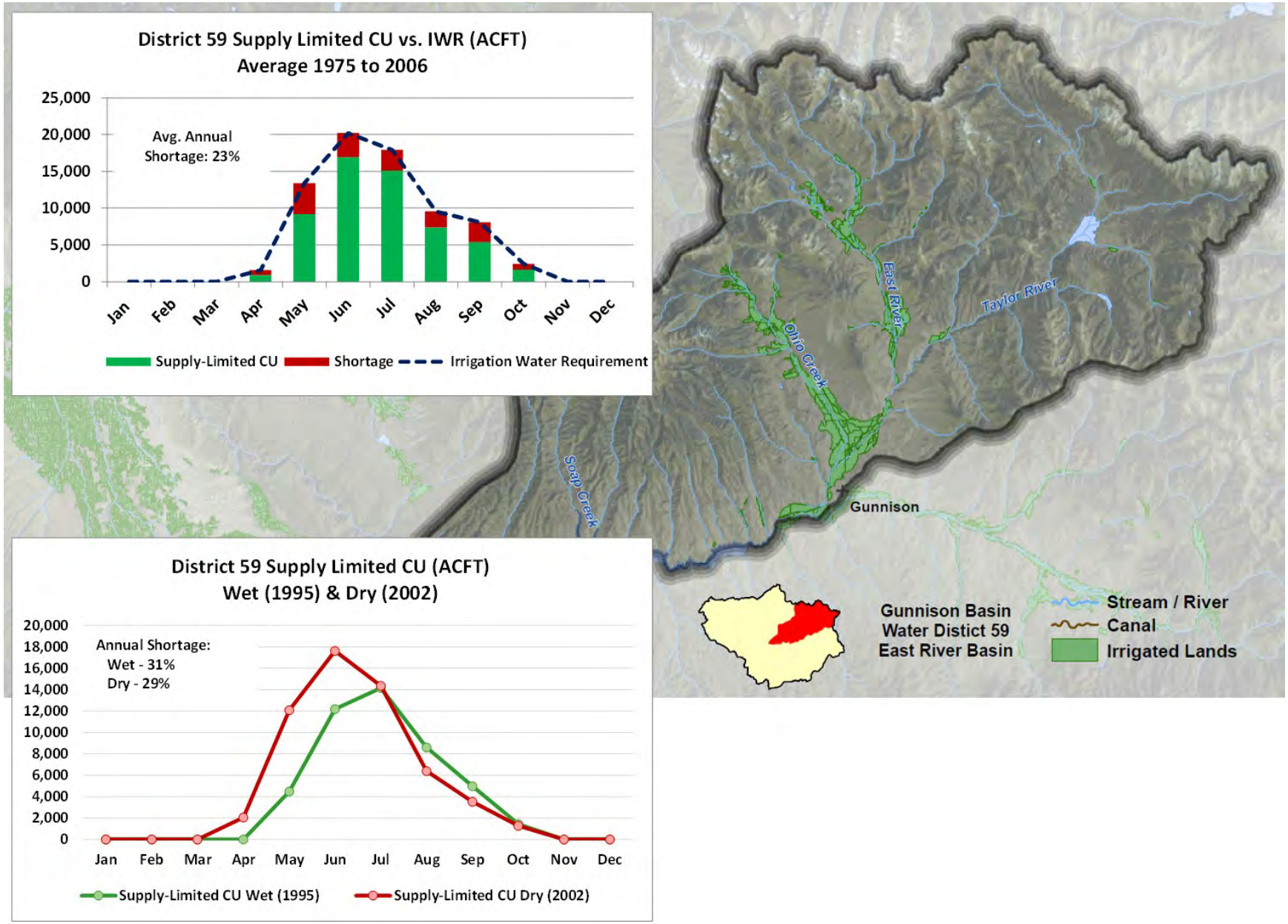

Delta
Dry Creek
Olathe
Spring Creek
Montrose
Uncompahgre River
Gunnison Basin
Water District 41
Lower Uncompaghre River
Stream/River
Canal
Irrigated Lands

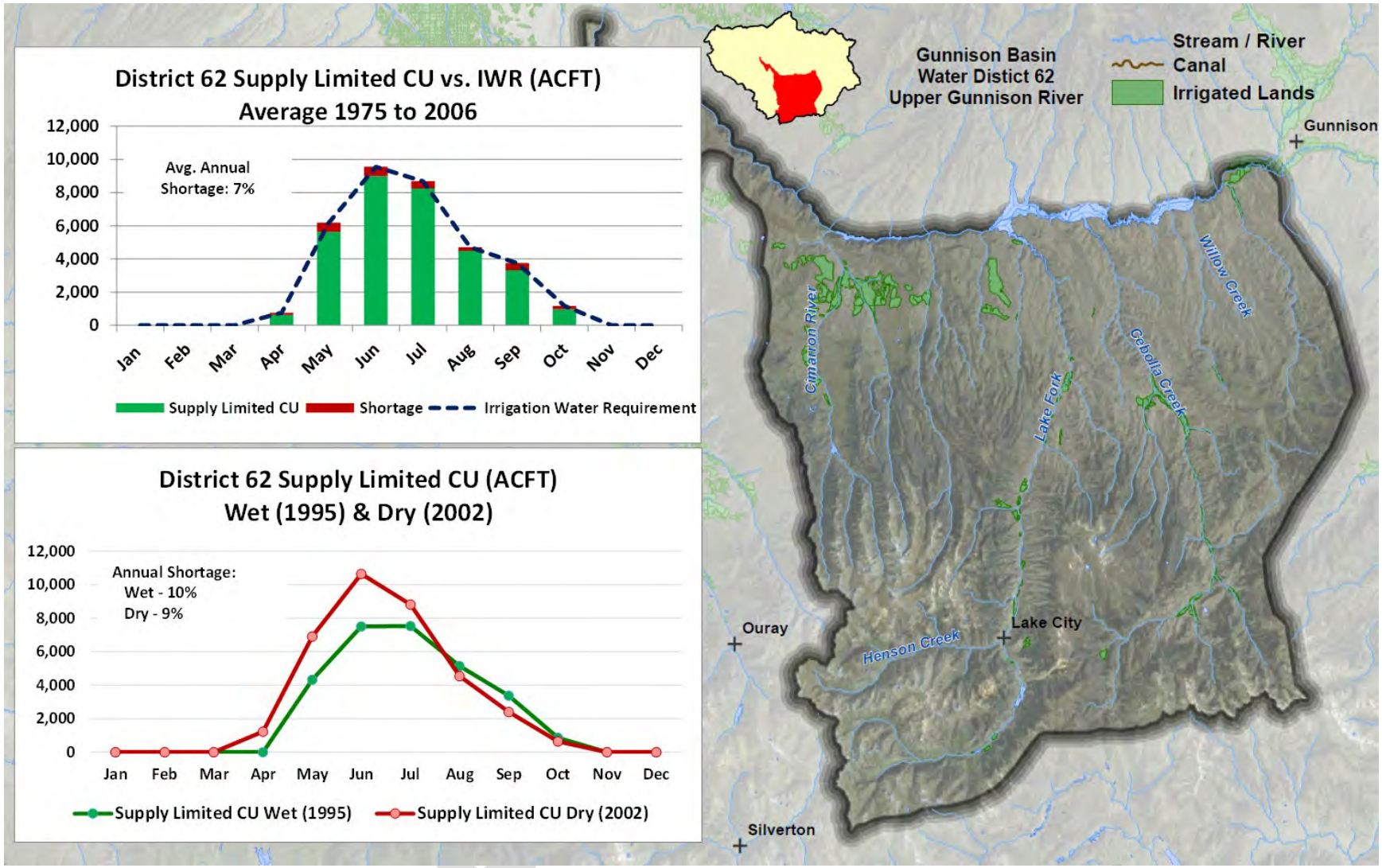

District 41 Supply Limited CU (ACFT)
Wet (1995) & Dry (2002)
Annual Shortage:
Wet - 0%
Dry - 3%
60,000
50,000
40,000
30,000
20,000
10,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply Limited CU Wet (1995)
Supply Limited CU Dry (2002)

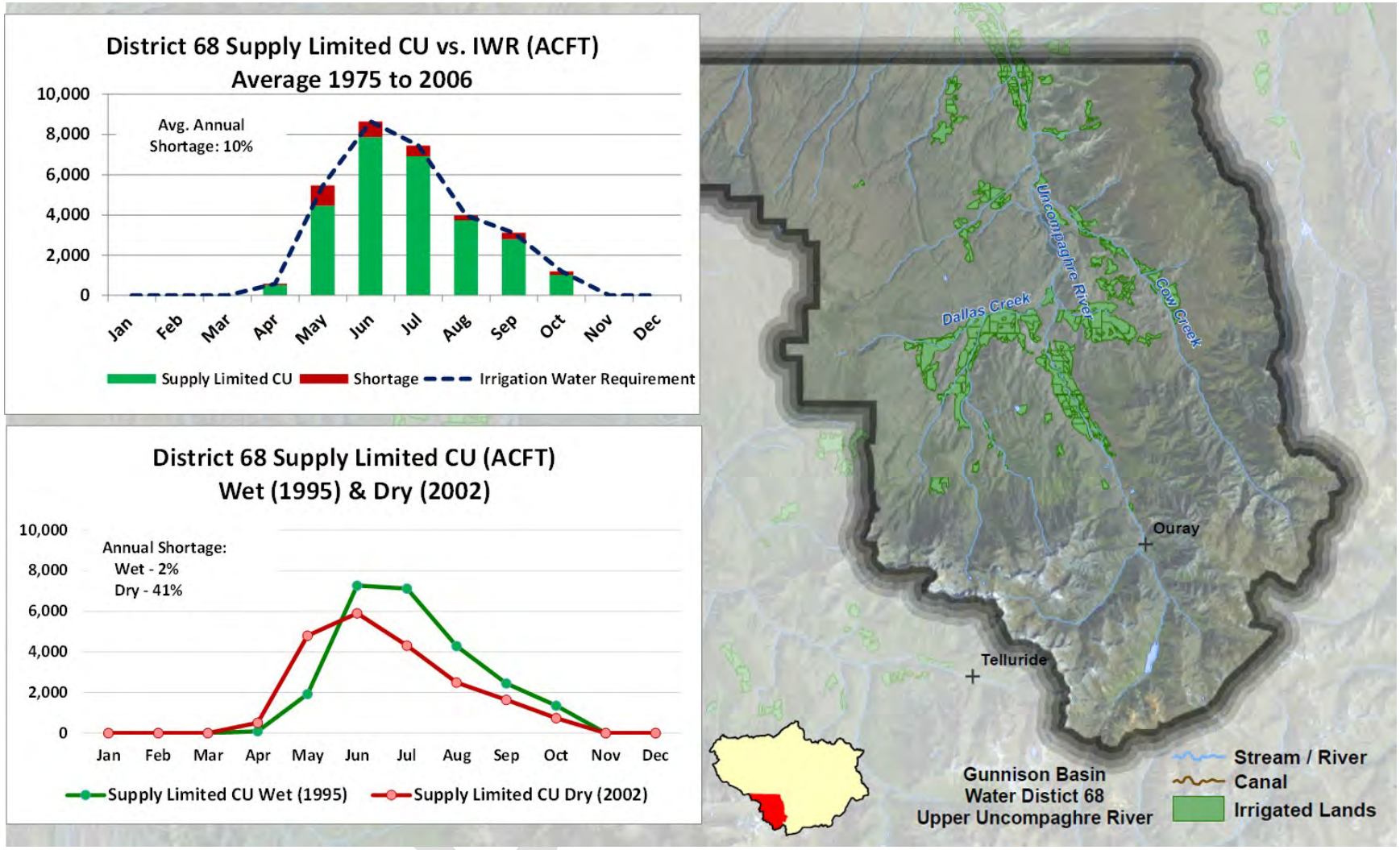

District 42 Supply Limited CU vs. IWR (ACFT)
Average 1975 to 2006
4,000
3,000
2,000
1,000
0
Avg. Annual
Shortage: 32%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply Limited CU
Shortage
Irrigation Water Requirement


District 42 Supply Limited CU (ACFT)
Wet (1995) & Dry (2002)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Annual Shortage:
Wet - 13%
Dry - 73%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply Limited CU Wet (1995)
Supply Limited CU Dry (2002)

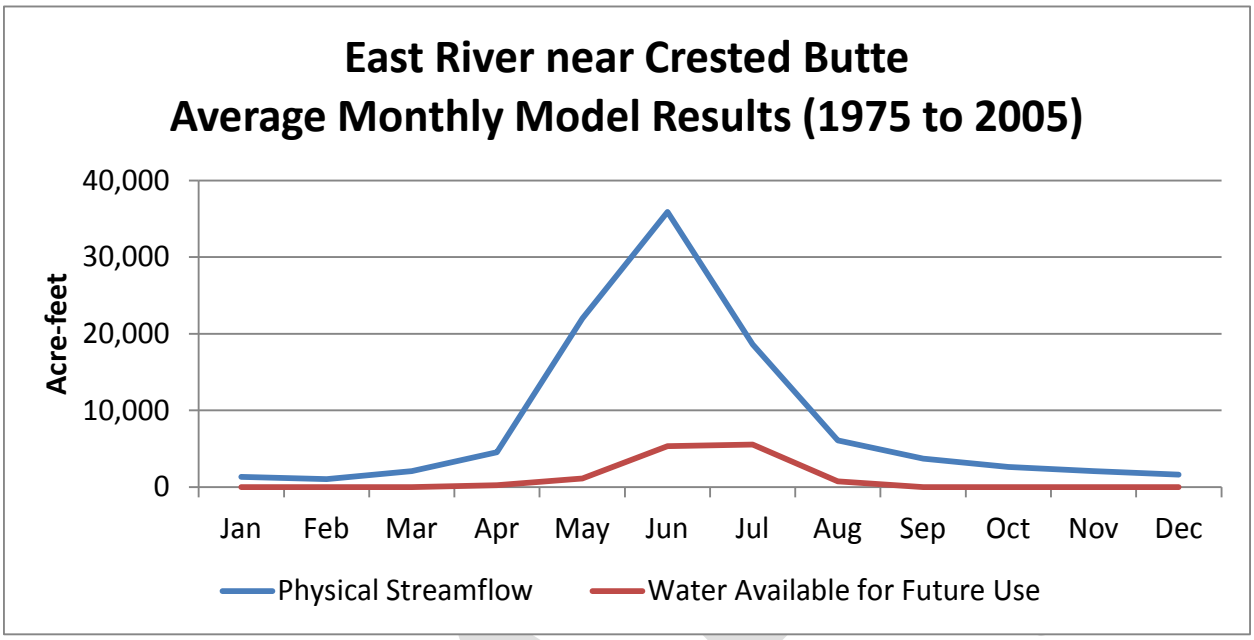

Grand Junction
Ladder Creek
Kannah Creek
Gunnison River
Big Dominguez Creek
Delta
Gunnison Basin
Water Distict 42
Lower Gunnison River
Stream / River
Canal
Irrigated Lands

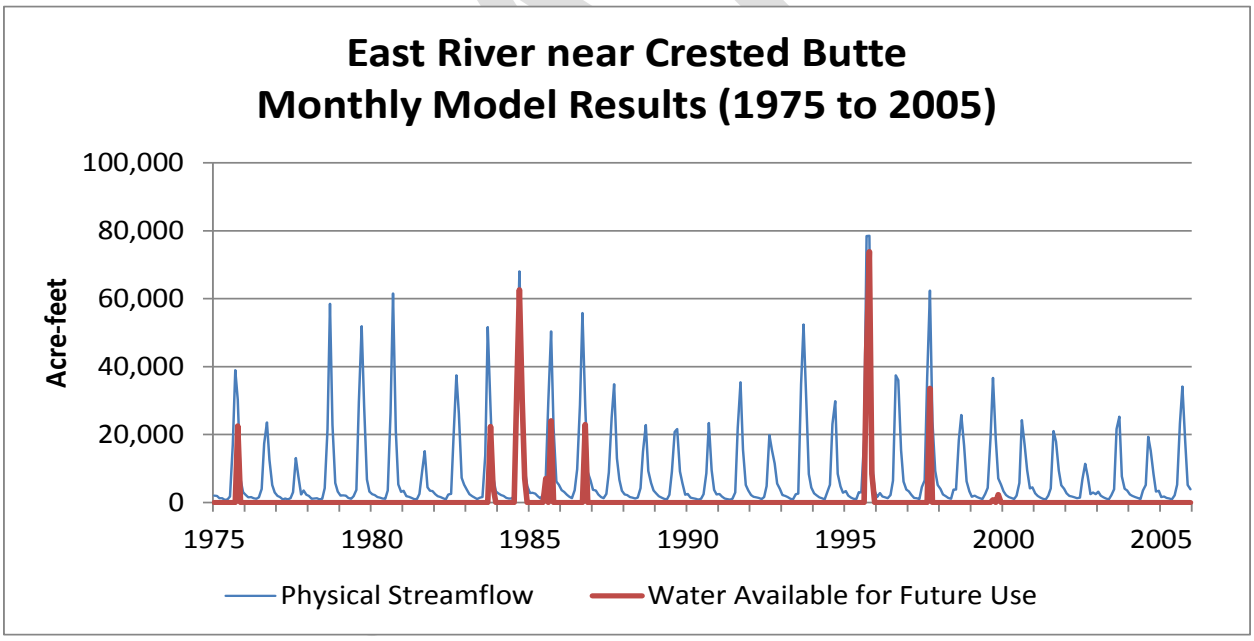

District 59 Supply Limited CU vs. IWR (ACFT)
Average 1975 to 2006
25,000
20,000
15,000
10,000
5,000
0
Avg. Annual
Shortage: 23%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply-Limited CU
Shortage
Irrigation Water Requirement
Soap Creek
Ohio Creek
East River
Taylor River
Gunnison
Gunnison Basin
Water Distict 59
East River Basin
Stream / River
Canal
Irrigated Lands
District 59 Supply Limited CU (ACFT)
Wet (1995) & Dry (2002)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Annual Shortage:
Wet - 31%
Dry - 29%
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply-Limited CU Wet (1995)
Supply-Limited CU Dry (2002)


District 62 Supply Limited CU vs. IWR (ACFT)
Average 1975 to 2006
Avg. Annual
Shortage: 7%
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply Limited CU
Shortage
Irrigation Water Requirement
District 62 Supply Limited CU (ACFT)
Wet (1995) & Dry (2002)
Annual Shortage:
Wet - 10%
Dry - 9%
Supply Limited CU Wet (1995)
Supply Limited CU Dry (2002)
Gunnison Basin
Water Distict 62
Upper Gunnison River
Stream / River
Canal
Irrigated Lands
Gunnison
Cimarron River
Lake Fork
Cebolla Creek
Willow Creek
Henson Creek
Lake City
Ouray
Silverton


District 68 Supply Limited CU vs. IWR (ACFT)
Average 1975 to 2006
Avg. Annual
Shortage: 10%
10,000
8,000
6,000
4,000
2,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Supply Limited CU
Shortage
Irrigation Water Requirement
District 68 Supply Limited CU (ACFT)
Wet (1995) & Dry (2002)
Annual Shortage:
Wet - 2%
Dry - 41%
Supply Limited CU Wet (1995)
Supply Limited CU Dry (2002)
Uncompahgre River
Cow Creek
Dallas Creek
Ouray
Telluride
Gunnison Basin
Water Distict 68
Upper Uncompahgre River
Stream / River
Canal
Irrigated Lands

Appendix 9: Physical Streamflow and Water Available for Future Use (Historical Hydrology)



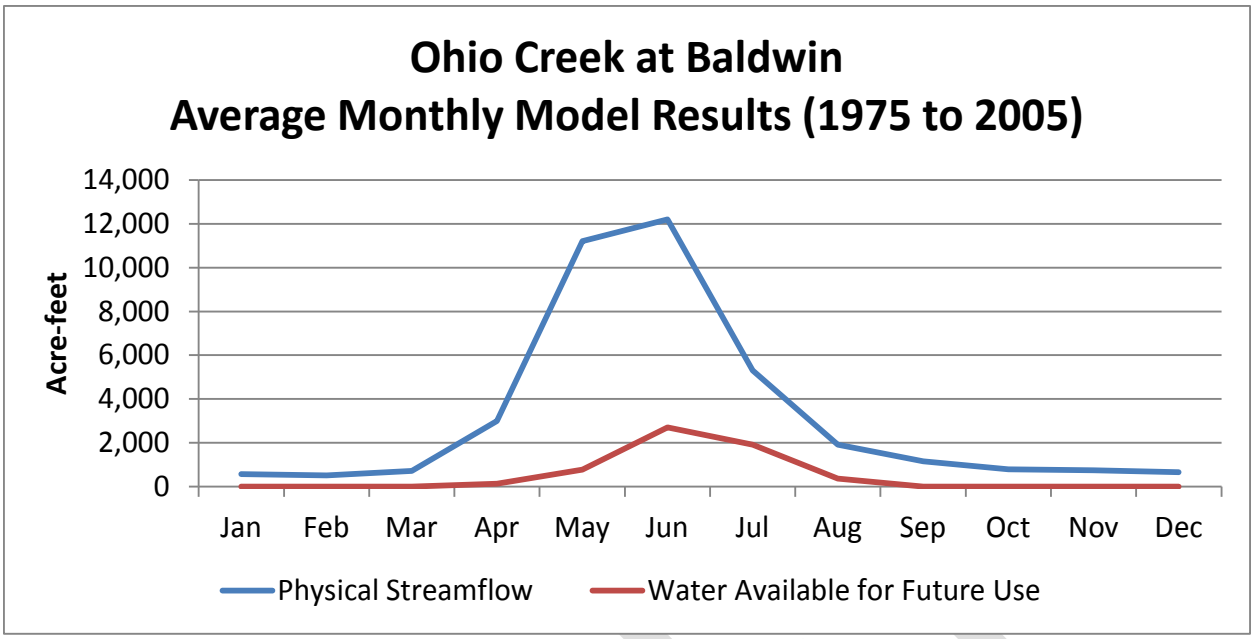


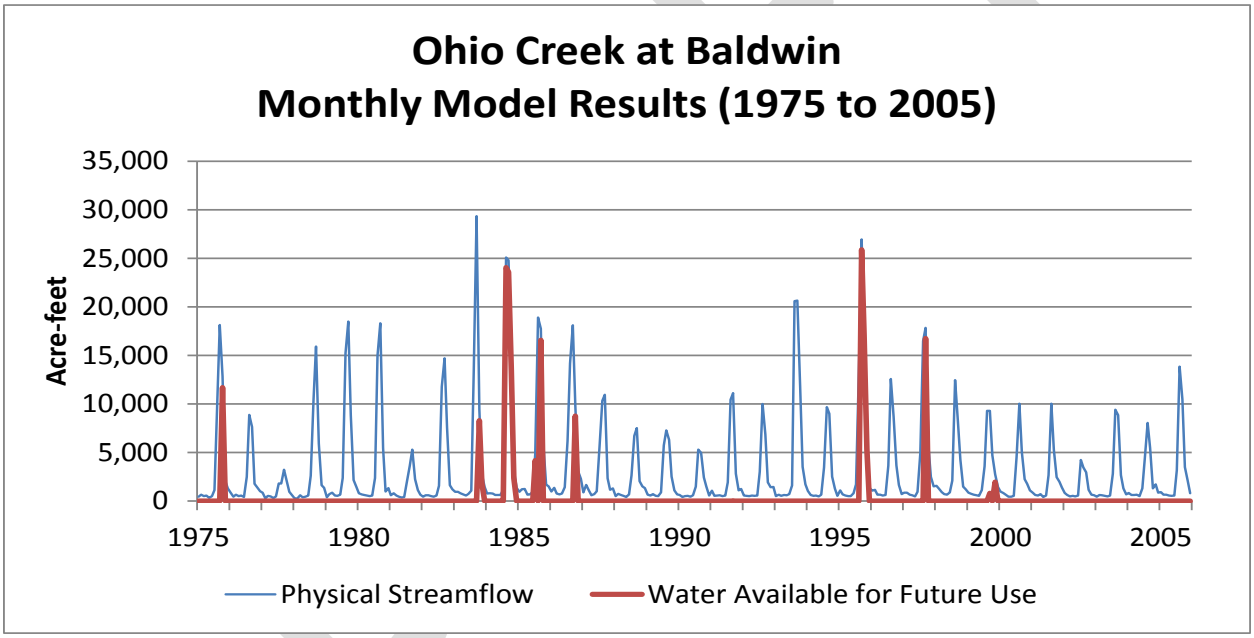
East River near Crested Butte Observations

- Most of the physical flow on the East River is dedicated to downstream senior water rights including the Gunnison Tunnel rights, Aspinall Unit storage and hydropower rights, and Black Canyon of the Gunnison minimum flow rights
- Some of the physical flow could be developed for in-basin use under the Upper Gunnison Basin subordination agreement

- Flow for a new junior right without Aspinall project subordination, for example a new transbasin diversion, is only available in extremely wet years

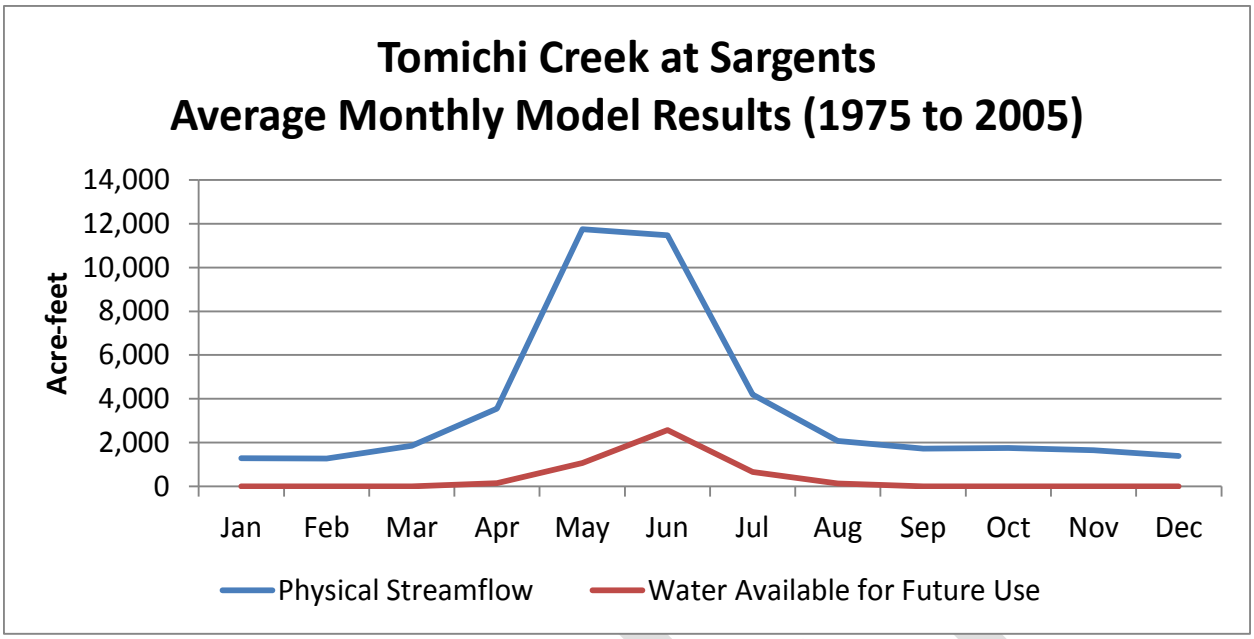
DRAFT

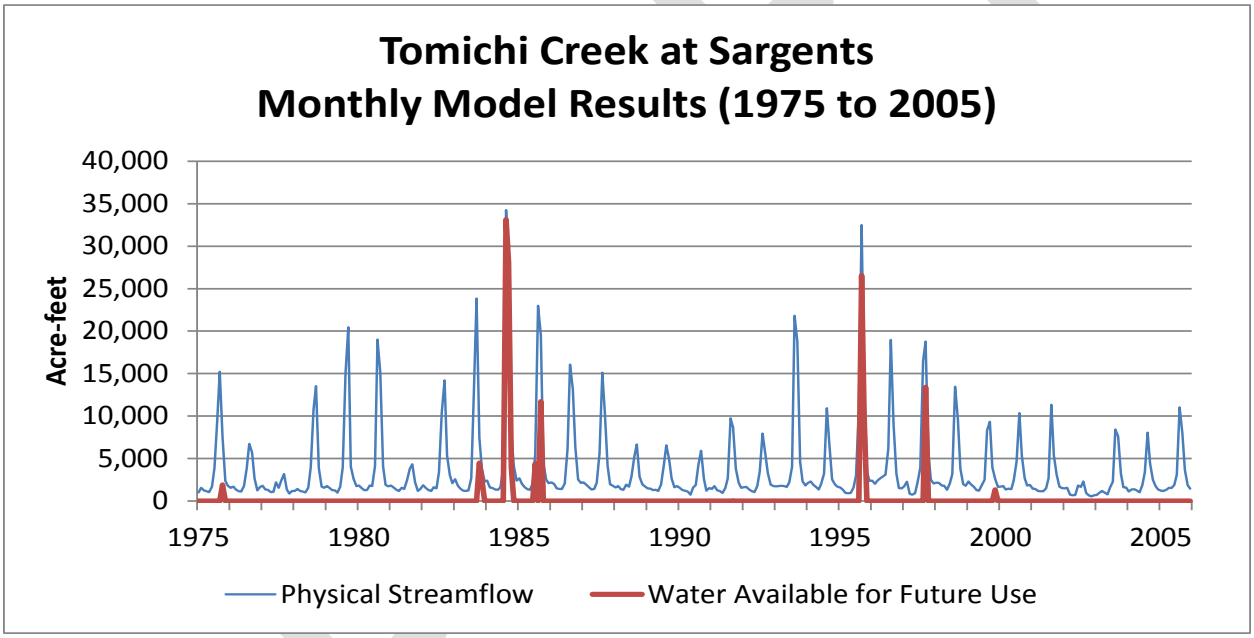




Ohio Creek at Baldwin Observations

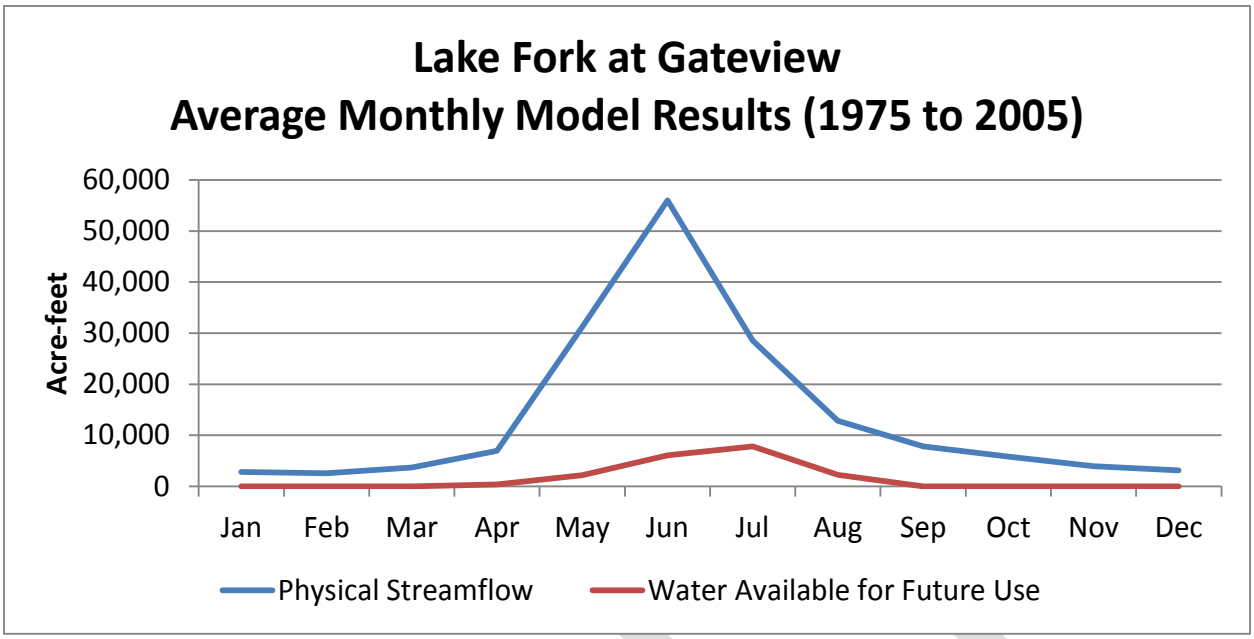
- Similar to the East River (and all tributaries above Blue Mesa Reservoir) , most of the physical flow on Ohio Creek is dedicated to downstream senior water rights including the Gunnison Tunnel rights, Aspinall Unit storage and hydropower rights, and Black Canyon of the Gunnison minimum flow rights
- Some of the physical flow could be developed for in-basin use under the Upper Gunnison Basin subordination agreement
- Flow for a new junior right without Aspinall project subordination, for example a new transbasin diversion, is only available in extremely wet years

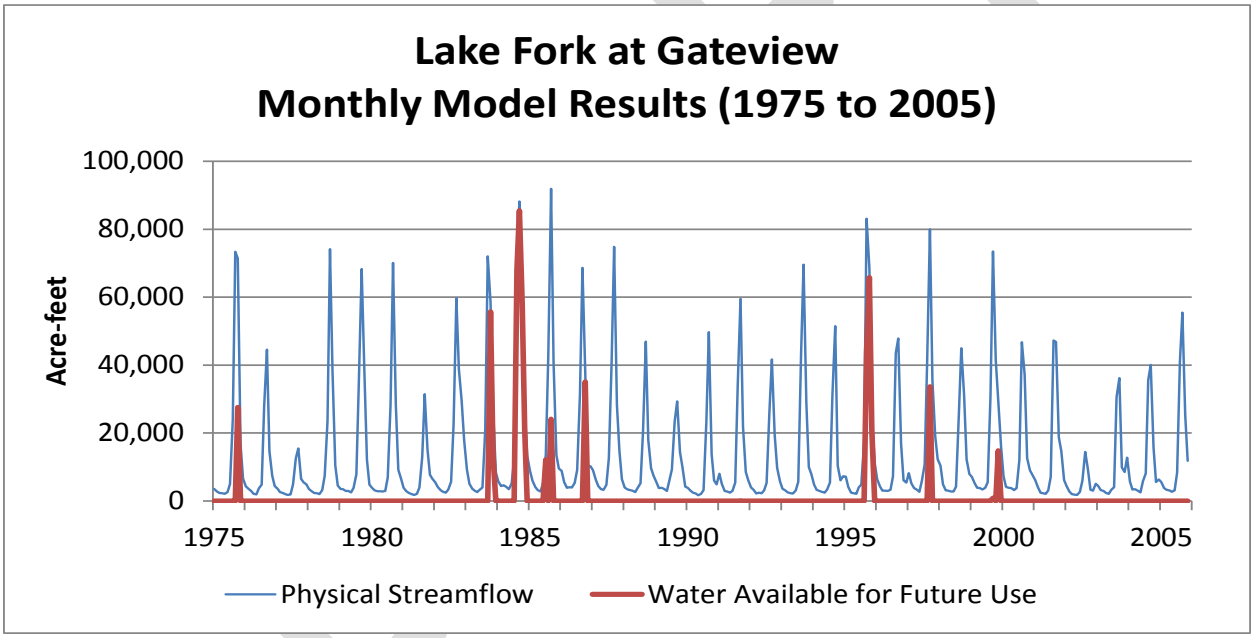




Tomichi Creek at Sargents Observations

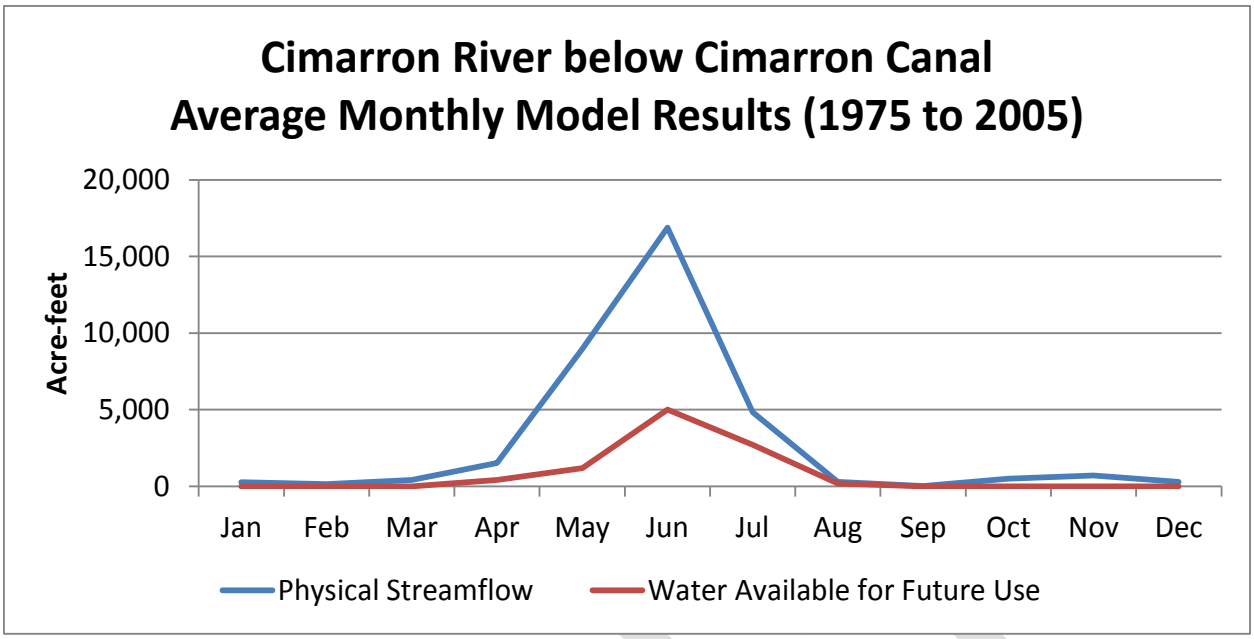
- As with other tributaries above Blue Mesa Reservoir, most of the physical flow on Tomichi Creek is dedicated to downstream senior water rights including the Gunnison Tunnel rights, Aspinall Unit storage and hydropower rights, and Black Canyon of the Gunnison minimum flow rights
- Some of the physical flow could be developed for in-basin use under the Upper Gunnison Basin subordination agreement
- Flow for a new junior right without Aspinall project subordination, for example a new transbasin diversion, is only available in extremely wet years

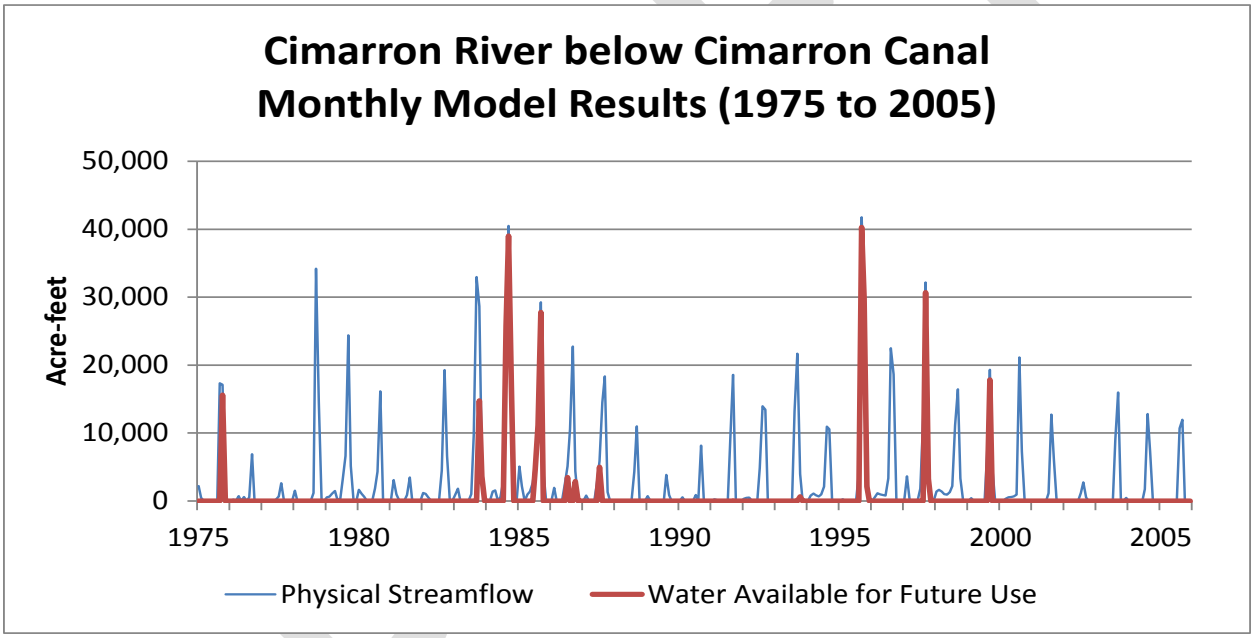




Lake Fork at Gateview Observations

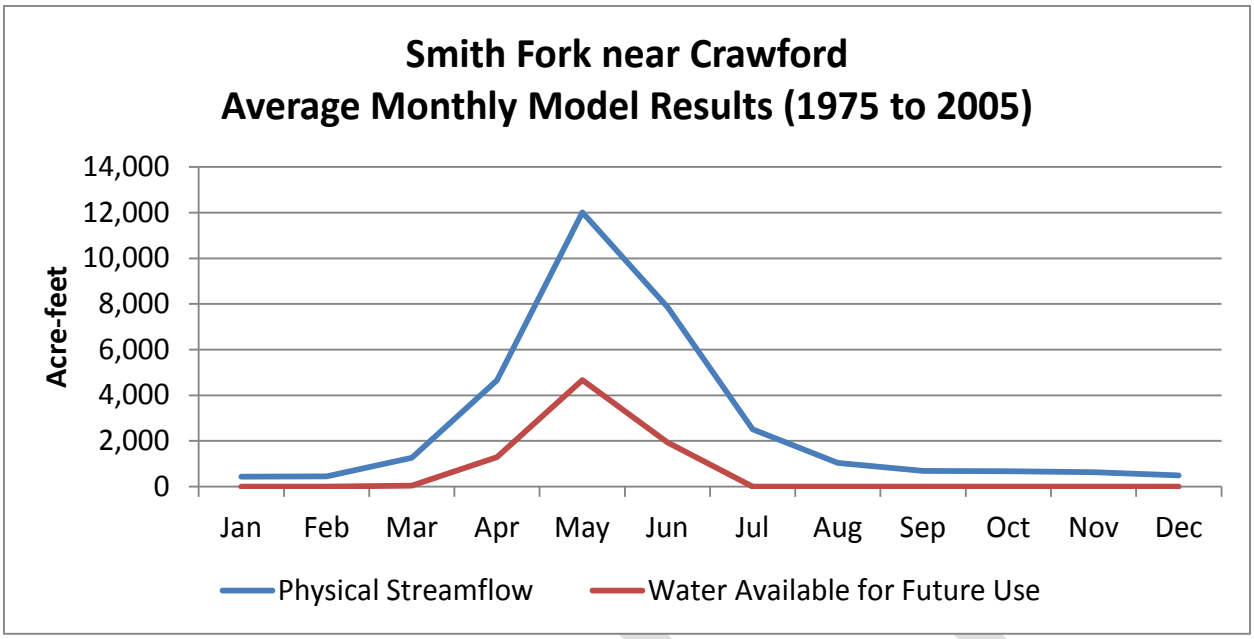
- As with other tributaries above Blue Mesa Reservoir, most of the physical flow on Lake Fork is dedicated to downstream senior water rights including the Gunnison Tunnel rights, Aspinall Unit storage and hydropower rights, and Black Canyon of the Gunnison minimum flow rights
- Some of the physical flow could be developed for in-basin use under the Upper Gunnison Basin subordination agreement
- Flow for a new junior right without Aspinall project subordination, for example a new transbasin diversion, is only available in extremely wet years

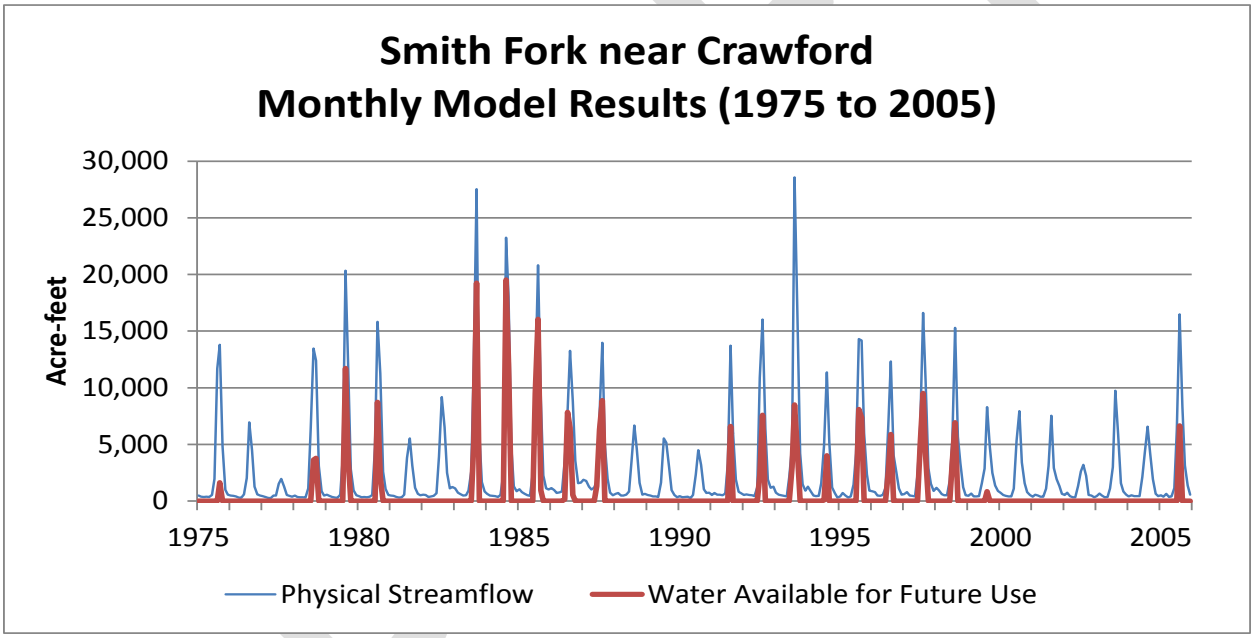




Cimarron River below Cimarron Canal Observations

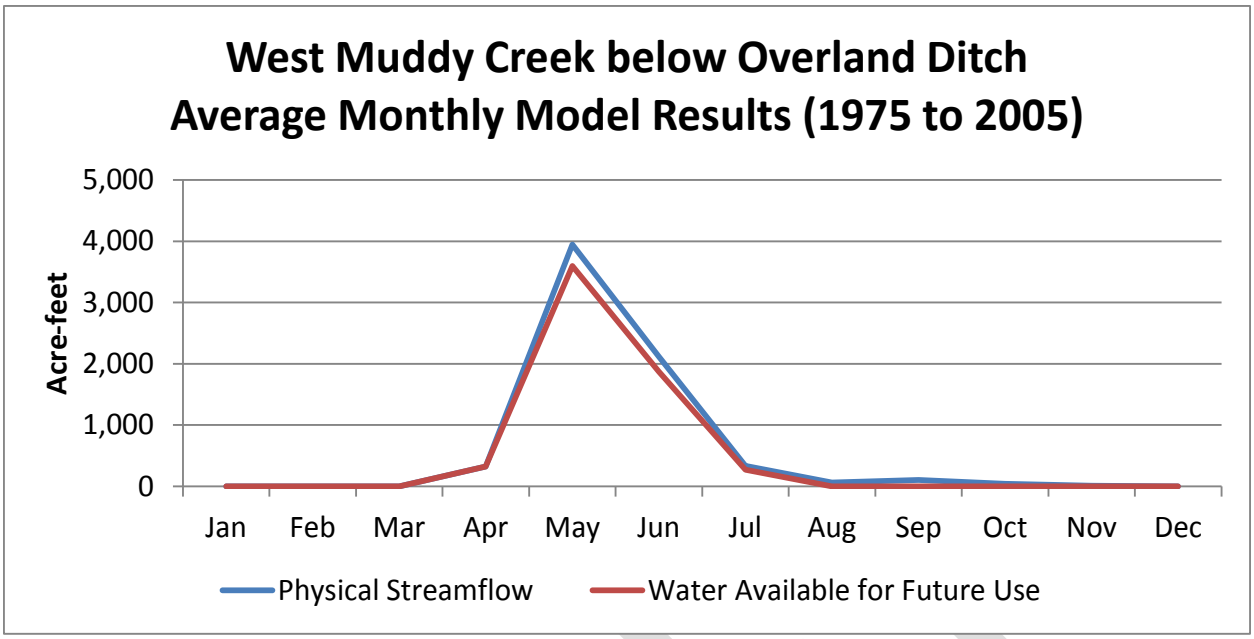
- Most of the physical flow on the Cimarron River not diverted through the Cimarron Canal is dedicated to downstream senior water rights including the Gunnison Tunnel rights, Crystal and Morrow Points storage and hydropower rights, Black Canyon of the Gunnison minimum flow rights, and Redlands Canal power rights
- Some of the physical flow could be developed for in-basin use under the Upper Gunnison Basin subordination agreement
- Flow for a new junior right without Aspinall project subordination is only available in extremely wet years

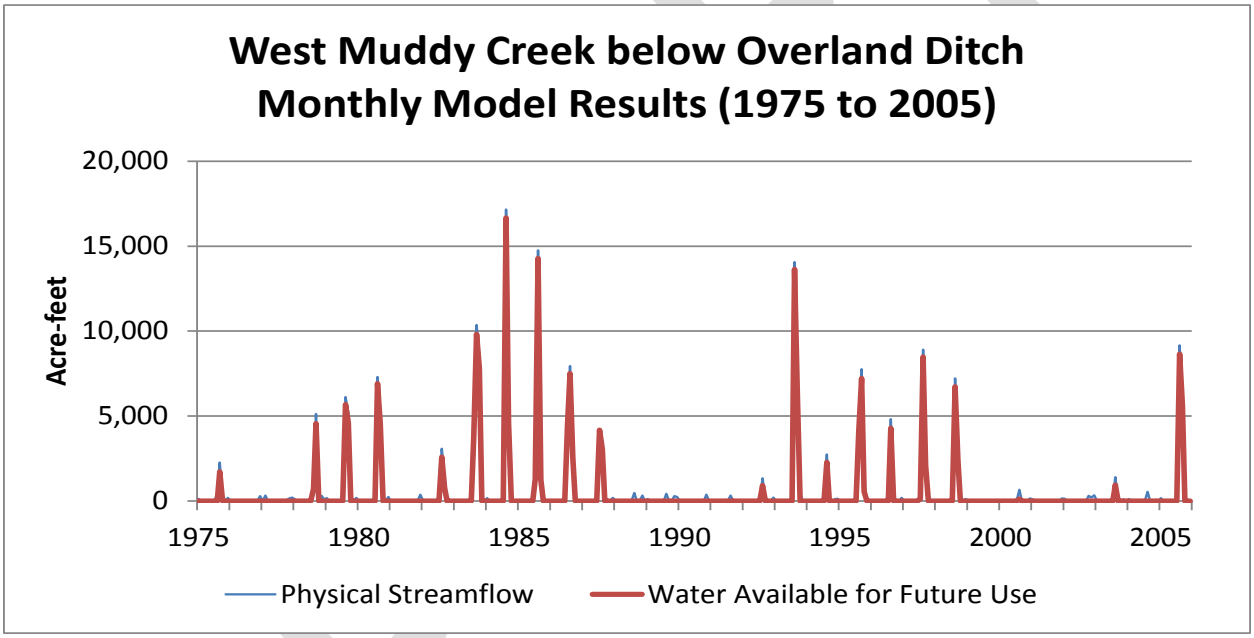




Smith Fork near Crawford Observations

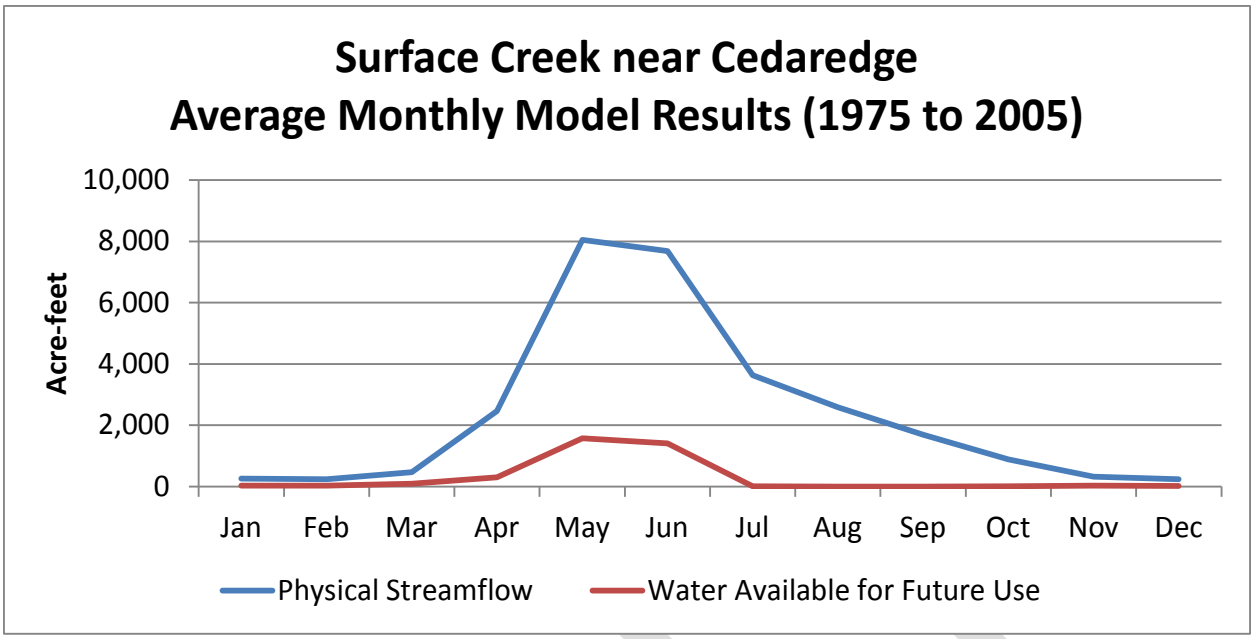
- Most of the physical flow on the Smith Fork is dedicated to downstream senior water rights on Smith Fork including irrigation rights, reservoir rights (Smith Fork Feeder Canal to Crawford Reservoir) and exchange rights associated with the Smith Fork Project
- Unlike the tributaries above the Gunnison Tunnel and Aspinall reservoirs, some water is available during runoff about 50 percent of the years in the study period, and could potentially be developed to meet in-basin consumptive and/or non-consumptive needs

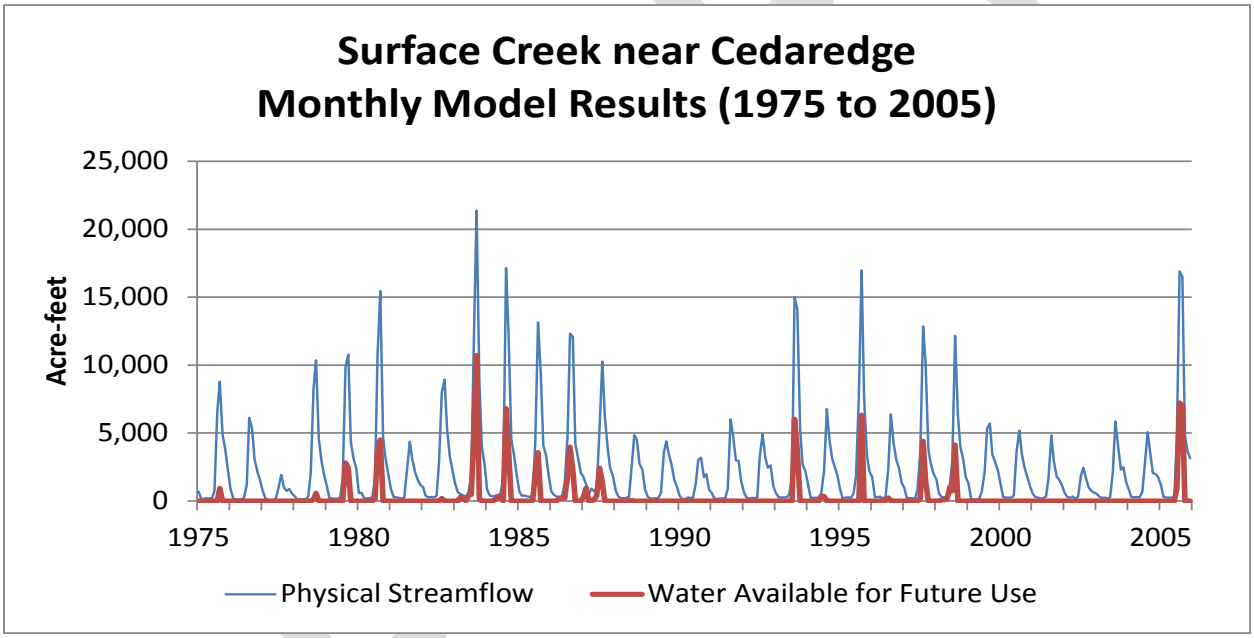




West Muddy Creek below Overland Ditch Observations

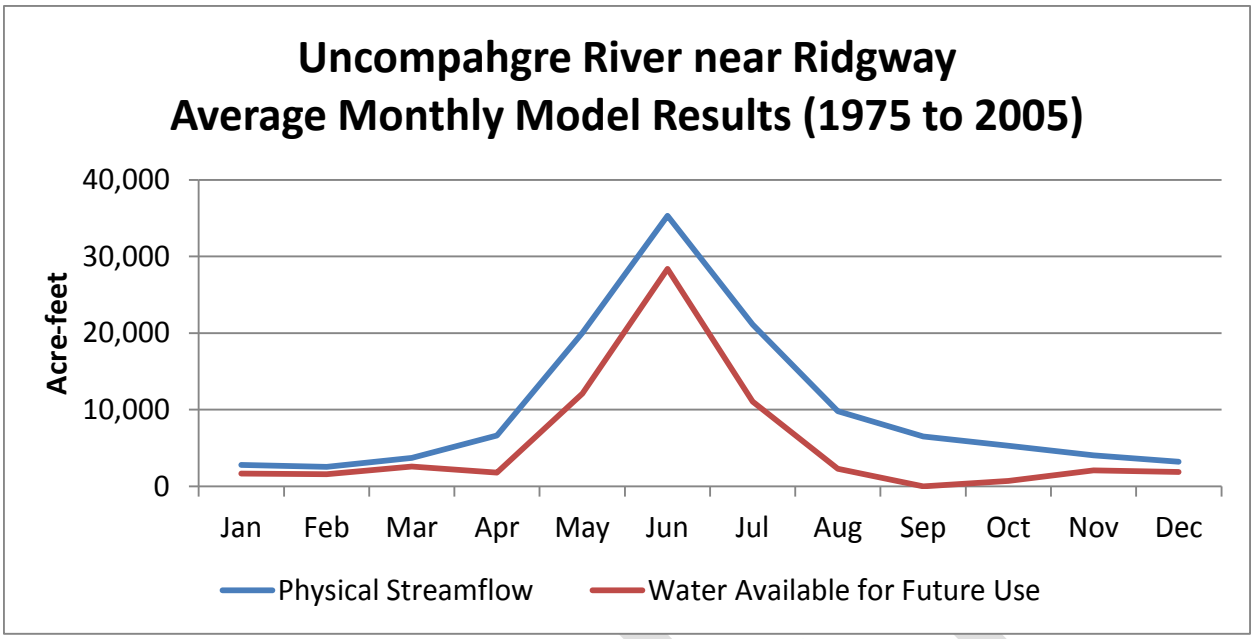
- Unlike most tributaries in the Basin, Muddy Creek tributaries above Paonia Reservoir have limited physical flow; in most years all physical flow is diverted for irrigation on Muddy Creek tributaries
- Physical streamflow and water available for future use are essentially the same; there is physical water available during the runoff in less than 50 percent of the years in the study period
- The minimal physical streamflow means there are less opportunities to develop water beyond the existing direct uses and exchanges associated with the Paonia Project and Overland Ditch uses

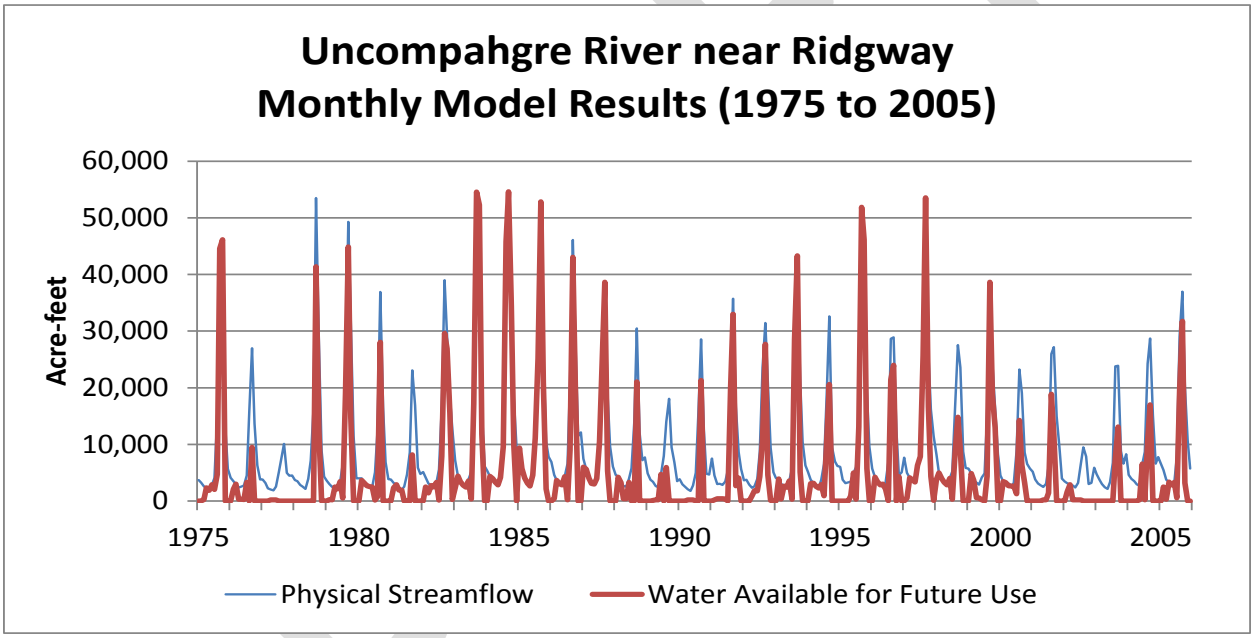




Surface Creek near Cedaredge Observations

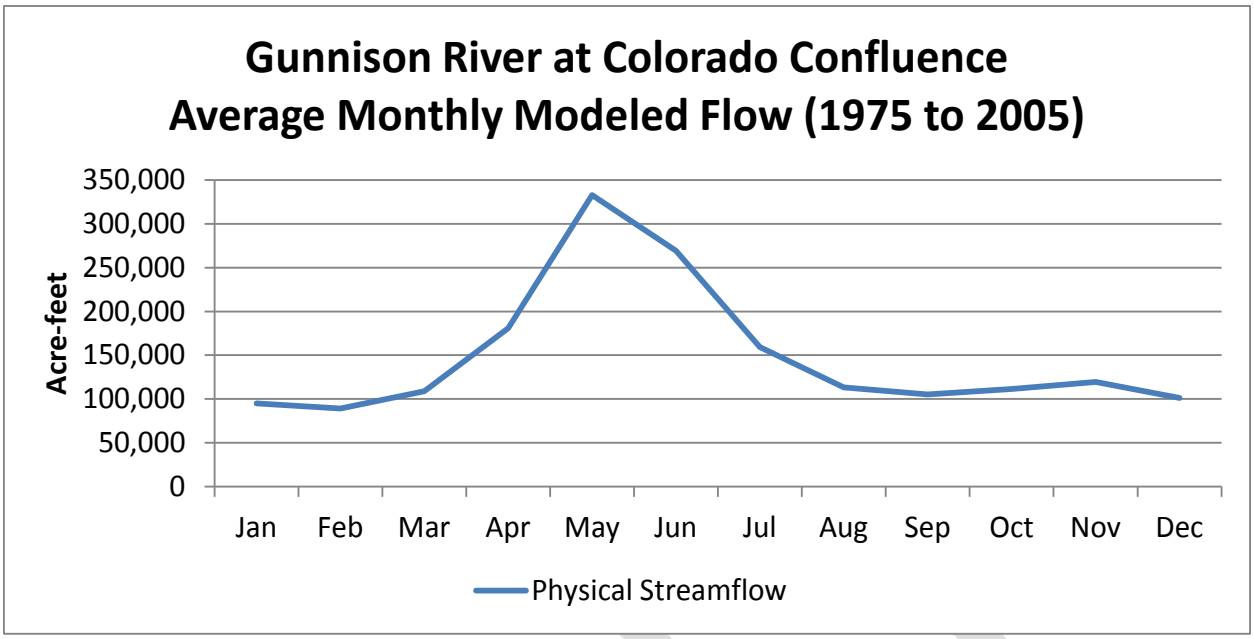
- Most of the physical flow on Surface Creek is dedicated to downstream senior water rights on Surface Creek and Tongue Creek, including irrigation and storage uses on Alfalfa Run
- Minimal water is available during runoff about 40 percent of the years in the study period; potential new projects would only have flow available in very wet years

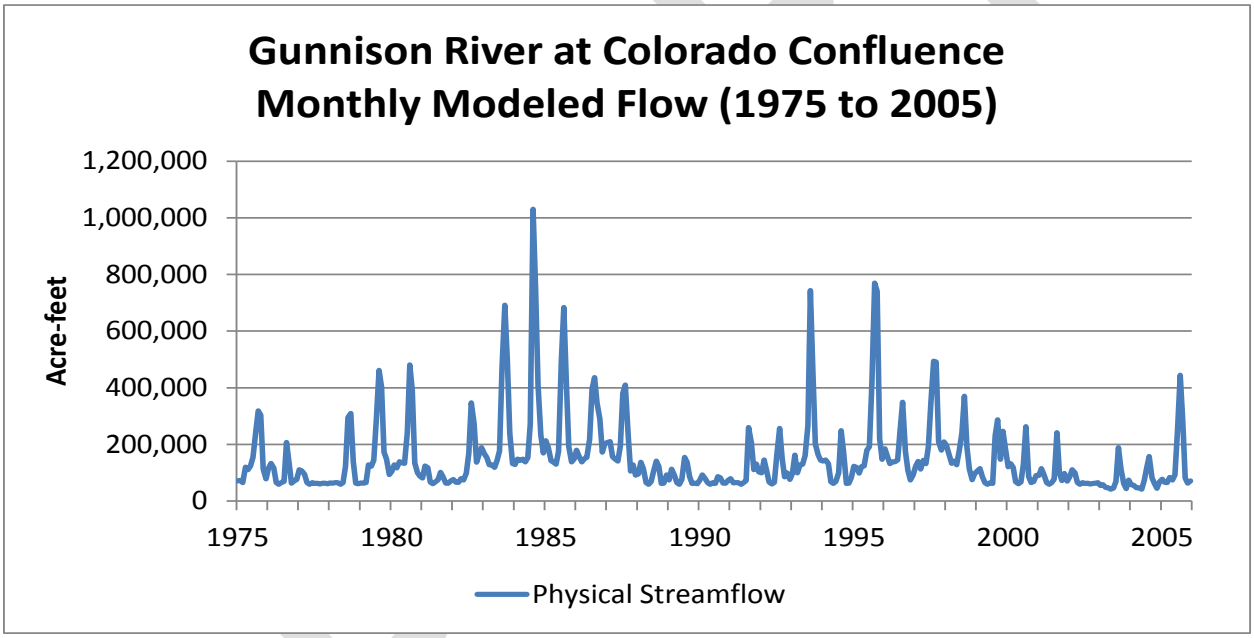




Uncompahgre River near Ridgway Observations

- On average much of the physical flow is also available for future use, however in dry years there is no water available
- Potential new projects in the Upper Uncompahgre basin would not yield water during dry years and would require carry-over storage to produce a firm supply

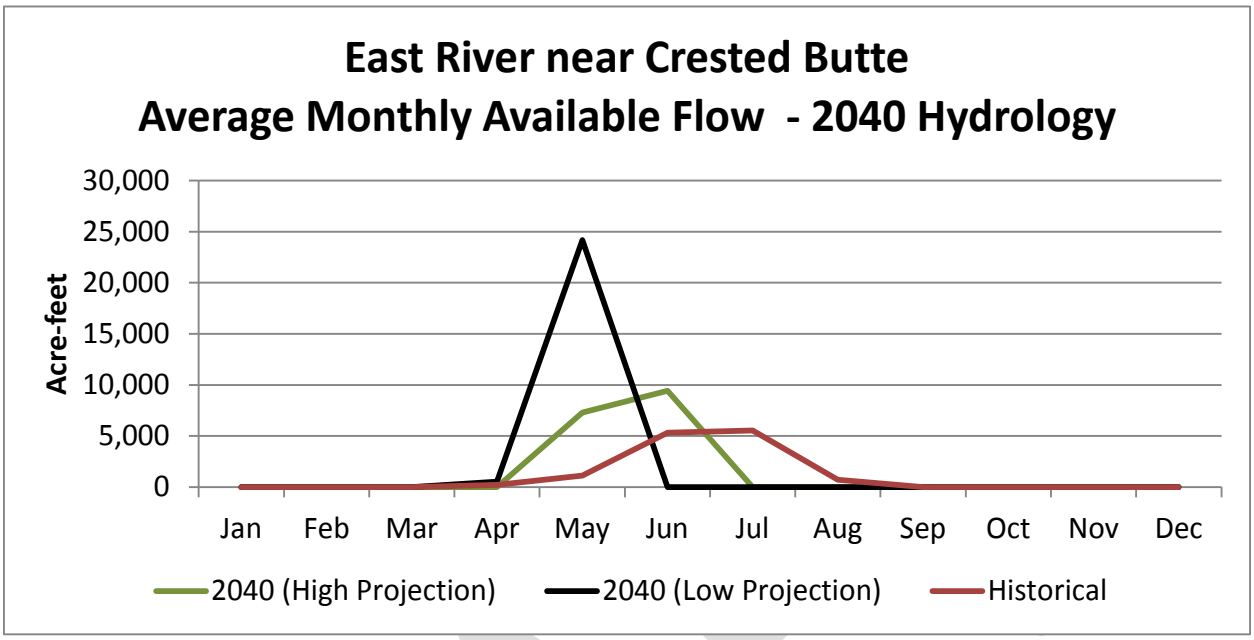


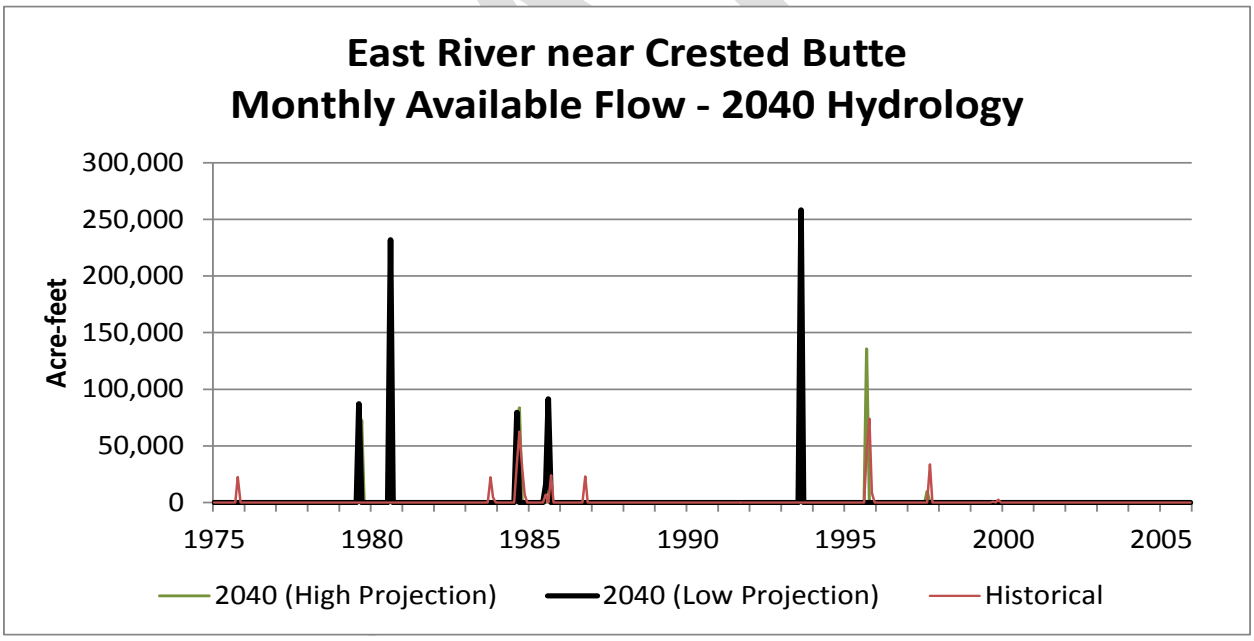


Gunnison River at Colorado Confluence Observations

- The physical streamflow is the same as water available for future use, since no downstream water rights or demands are represented in the model
- 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.

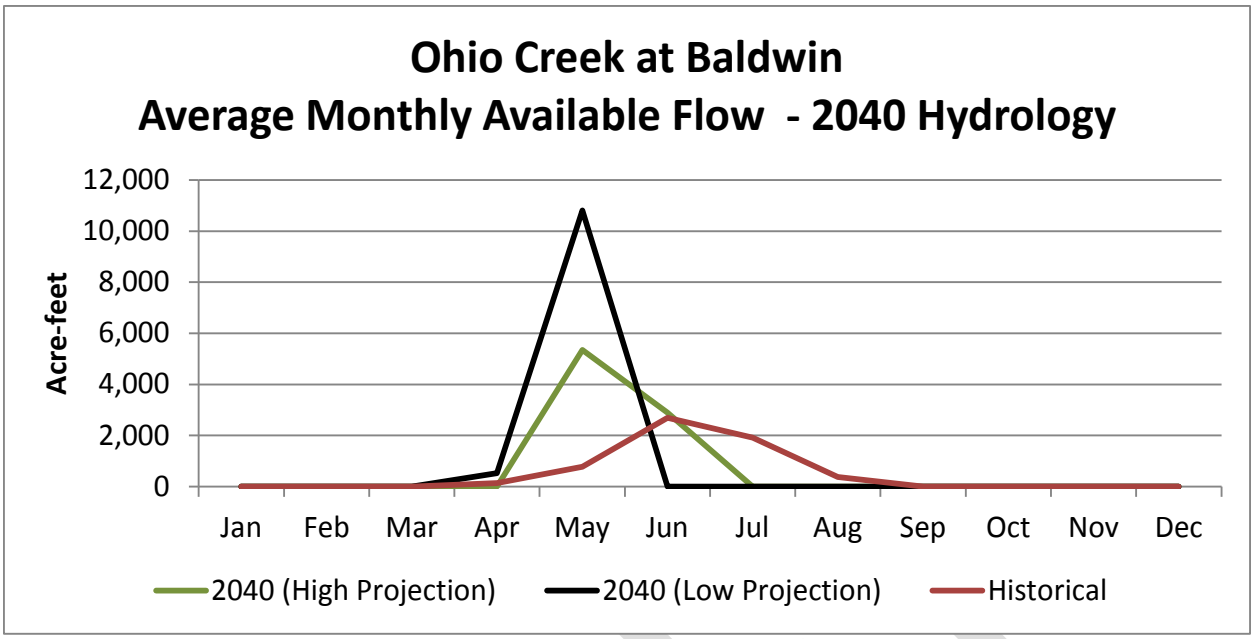
Appendix 10: Water Available for Future Use (Climate Projected Hydrology)

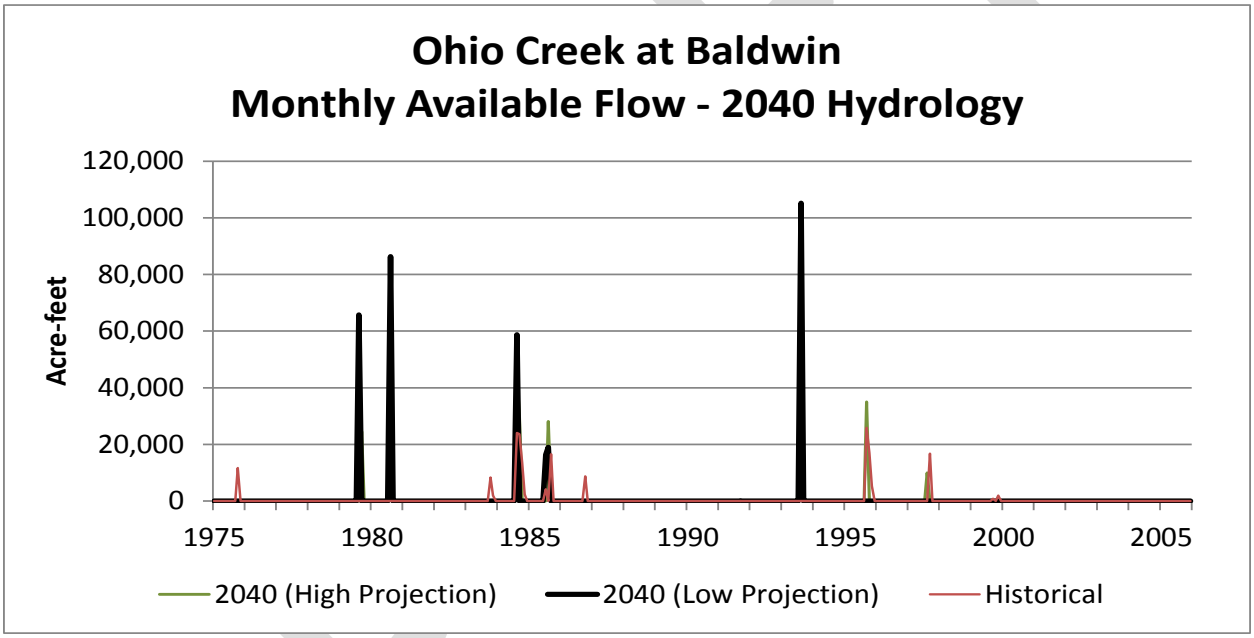




East River near Crested Butte Observations

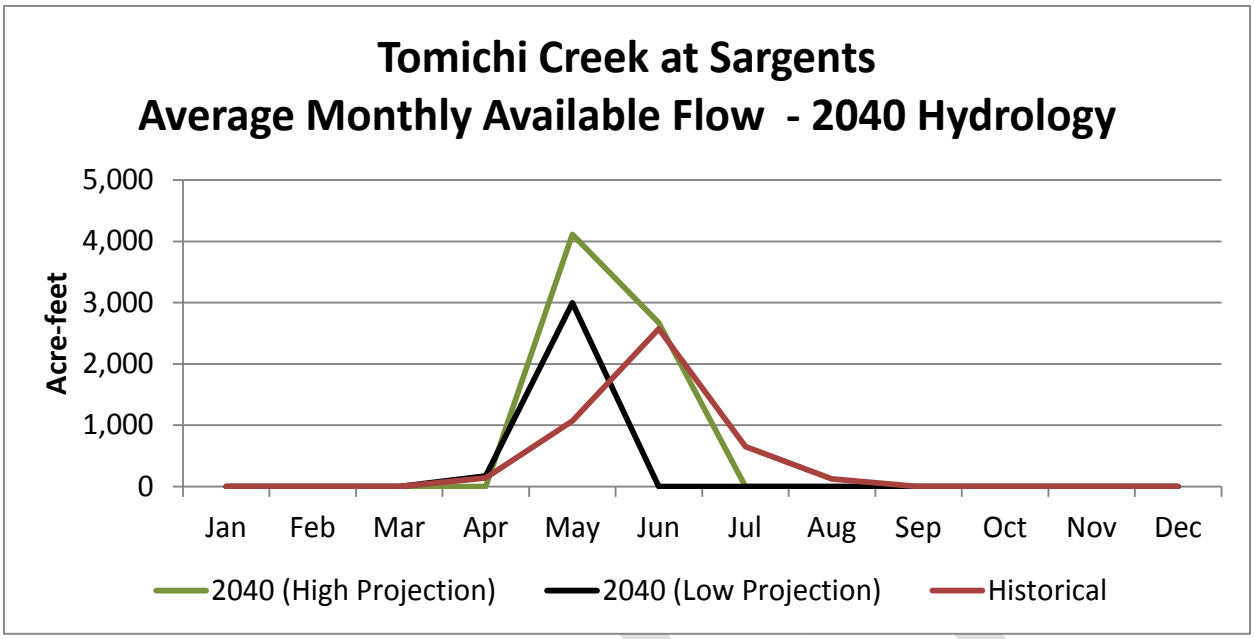
- The Low Projection indicates that on average the runoff on East River would occur earlier and more flow would only be available for future use in May than historically
- The High Projection results in more average annual available flow than historically, and also shows more water available earlier than historically
- The 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

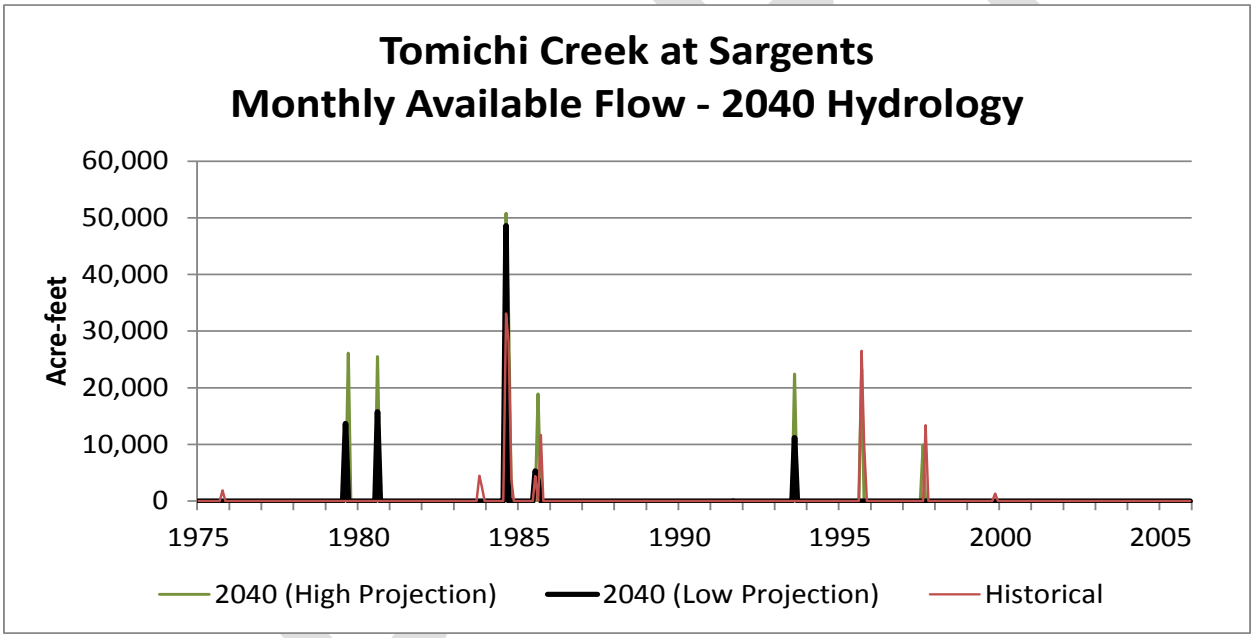




Ohio Creek at Baldwin Observations

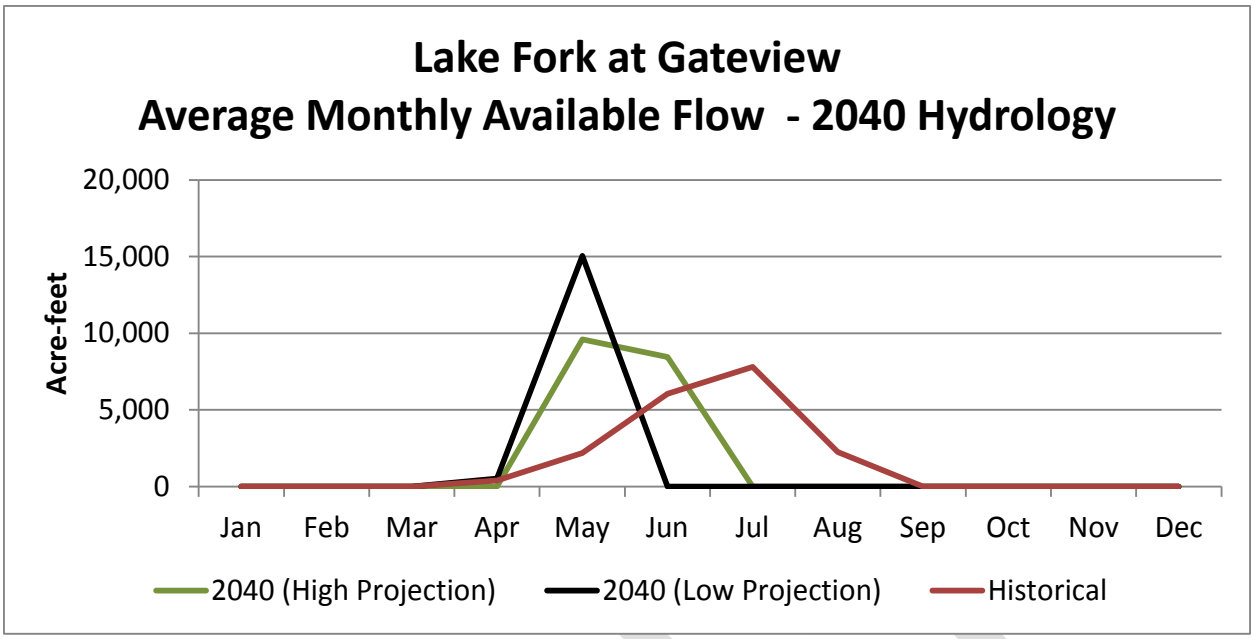
- Both the Low Projection and High Projections indicate that on average the runoff on Ohio Creek would occur one month earlier and more flow would be available for future use in May than historically
- The High Projection results in more average annual available flow than historically
- The climate projections 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

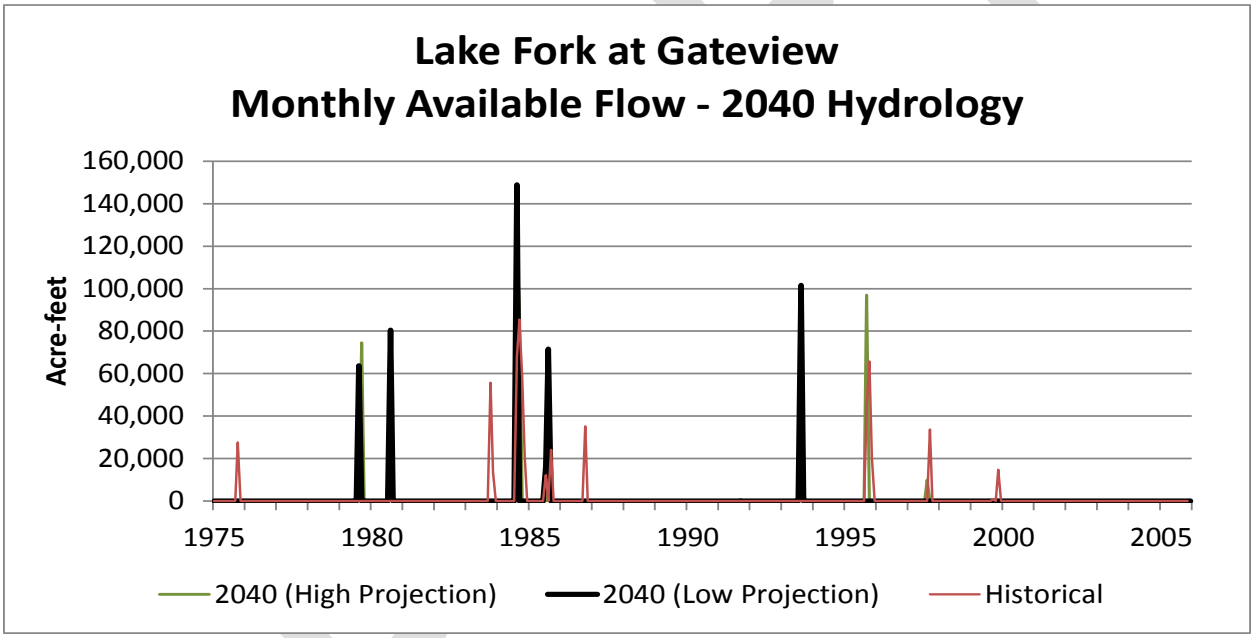




Tomichi Creek at Sargents Observations

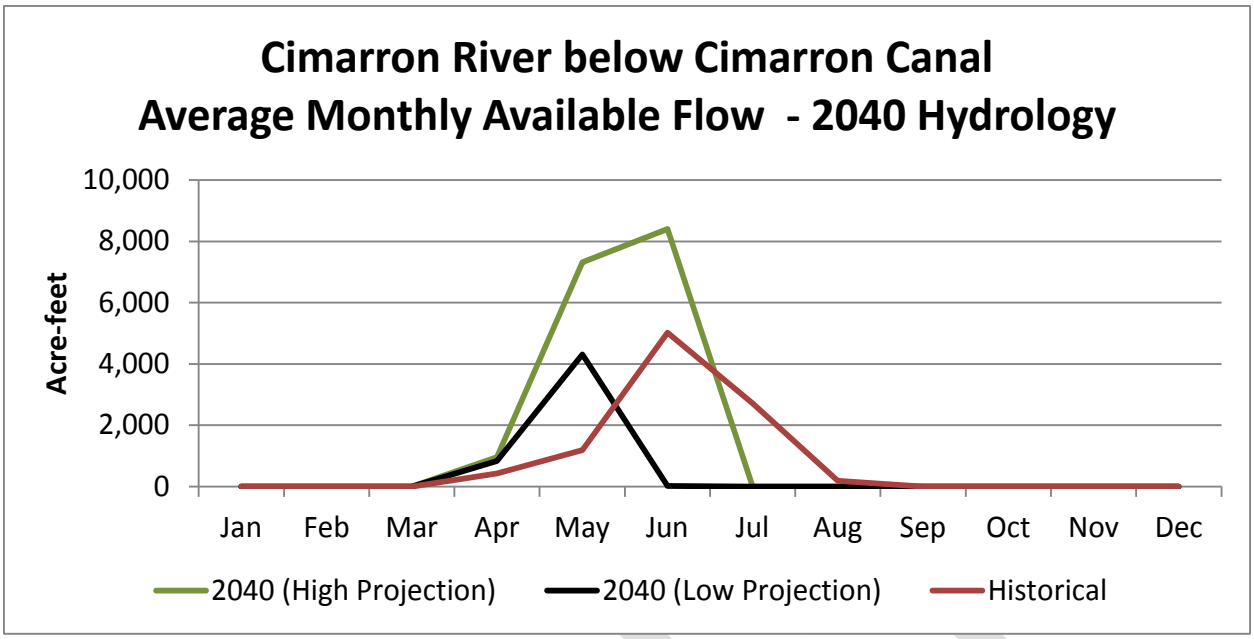
- Both the Low Projection and High Projections indicate that on average the runoff on Tomichi Creek would occur one month earlier and more flow would be available for future use in May than historically
- The High Projection results in more annual available flow than historically
- The climate projections 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

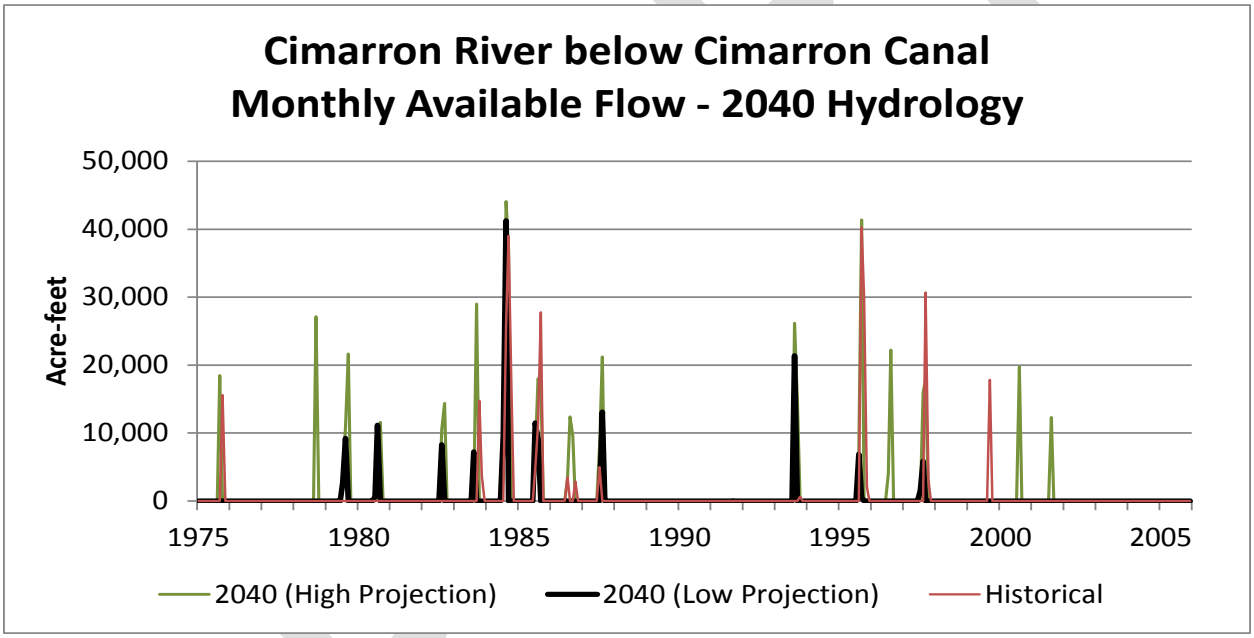




Lake Fork at Gateview Observations

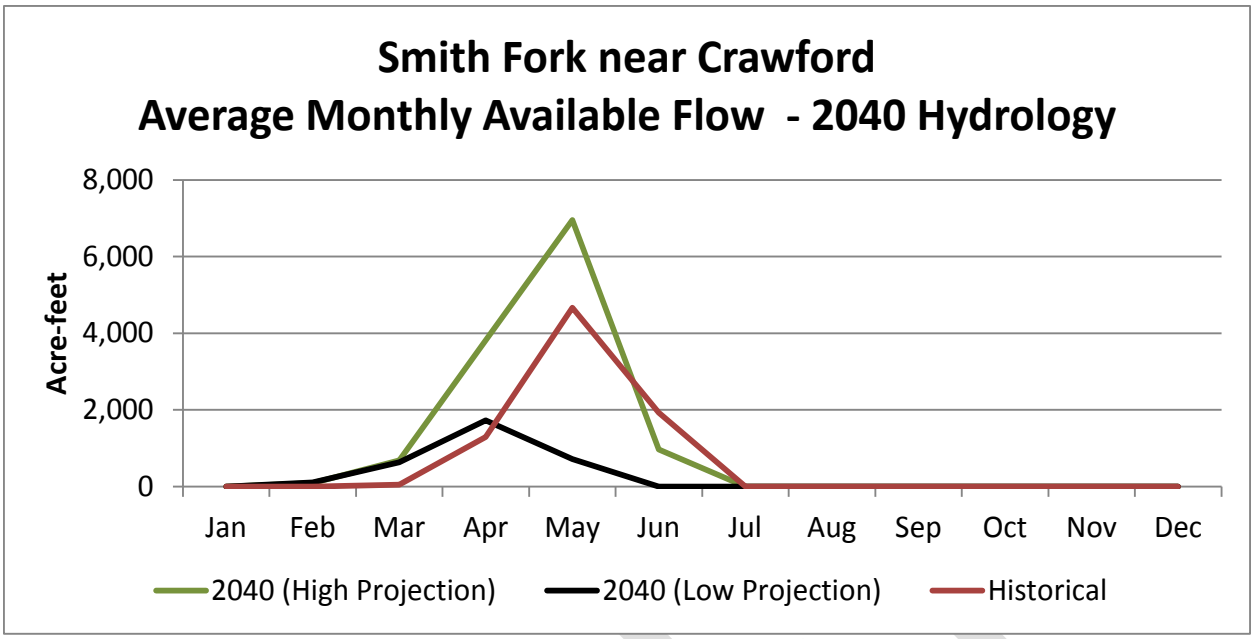
- Both the Low Projection and High Projections indicate that on average the runoff on Lake Fork would occur earlier and more flow would be available for future use in May than historically
- The High Projection results in more average annual available flow than historically
- The climate projections 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

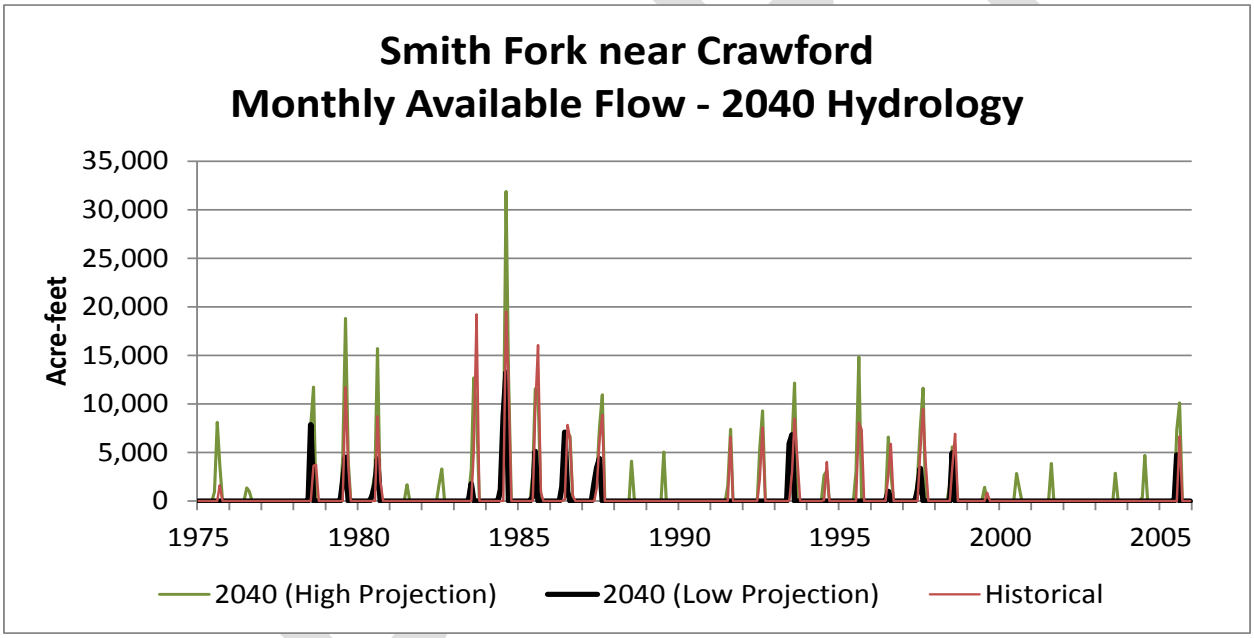




Cimarron River below Cimarron Canal Observations

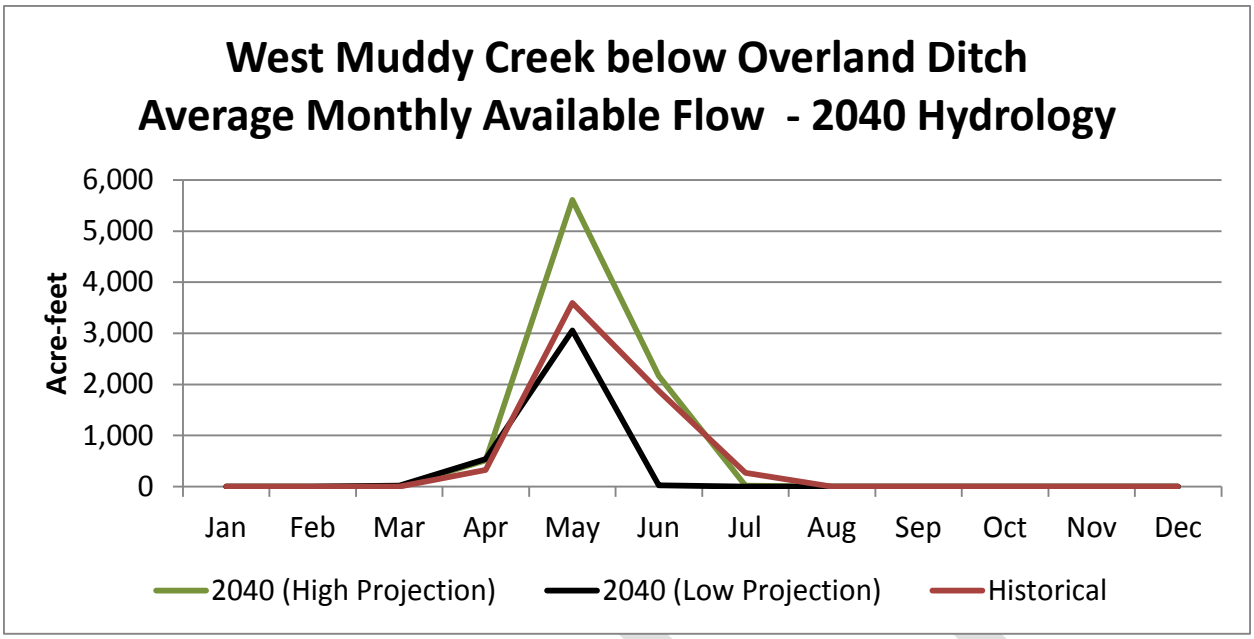
- The Low Projection indicate that on average the runoff on the Cimarron River would occur earlier and more flow would be available for future use in May than historically
- The High Projection results in more average annual available flow than historically and more years with available flow than historically

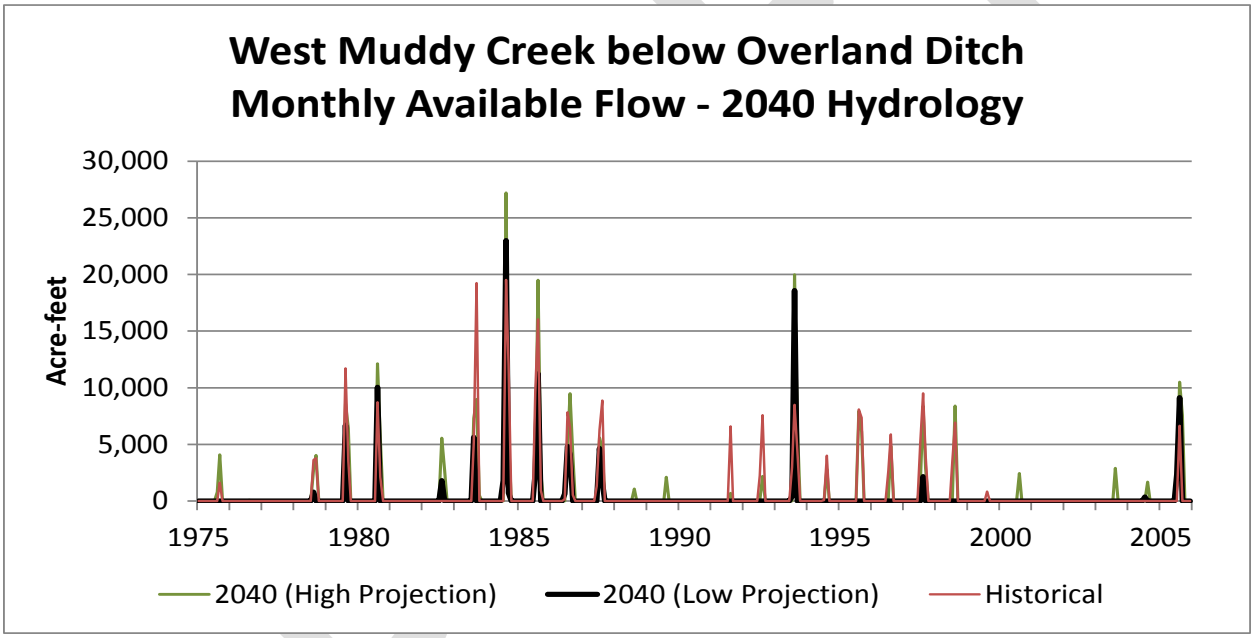




Smith Fork near Crawford Observations

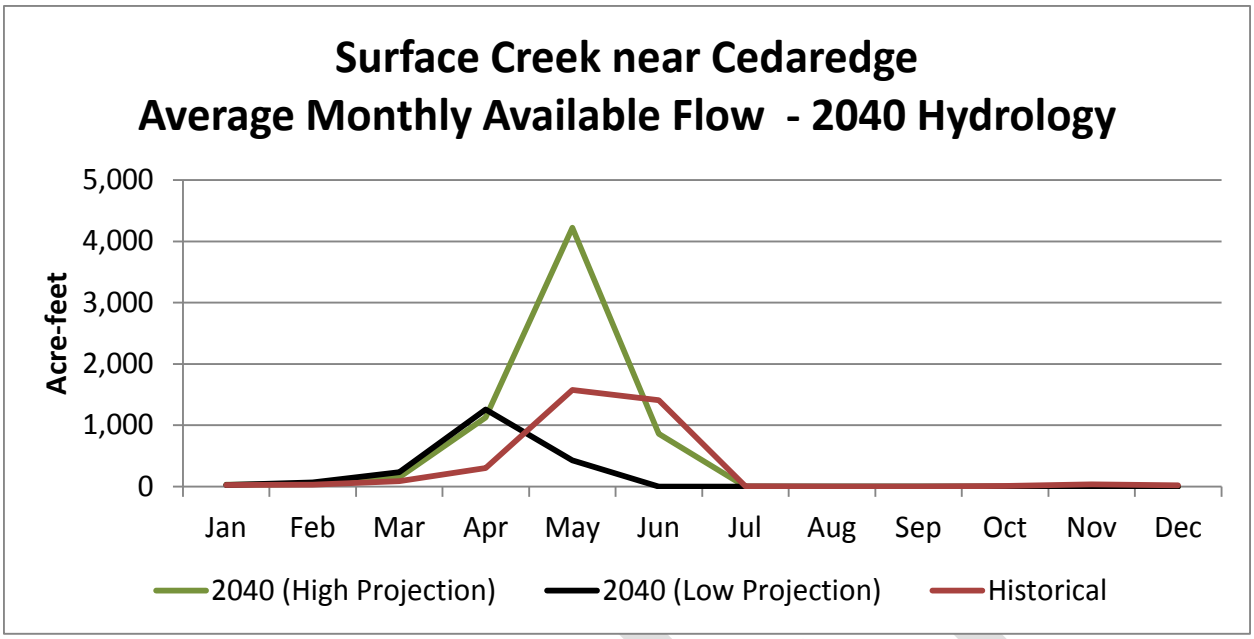
- The Low Projection indicate that on average the runoff on Smith Fork would occur earlier and more flow would be available for future use in April than historically
- The High Projection results in more average annual available flow than historically and more years with available flow than historically

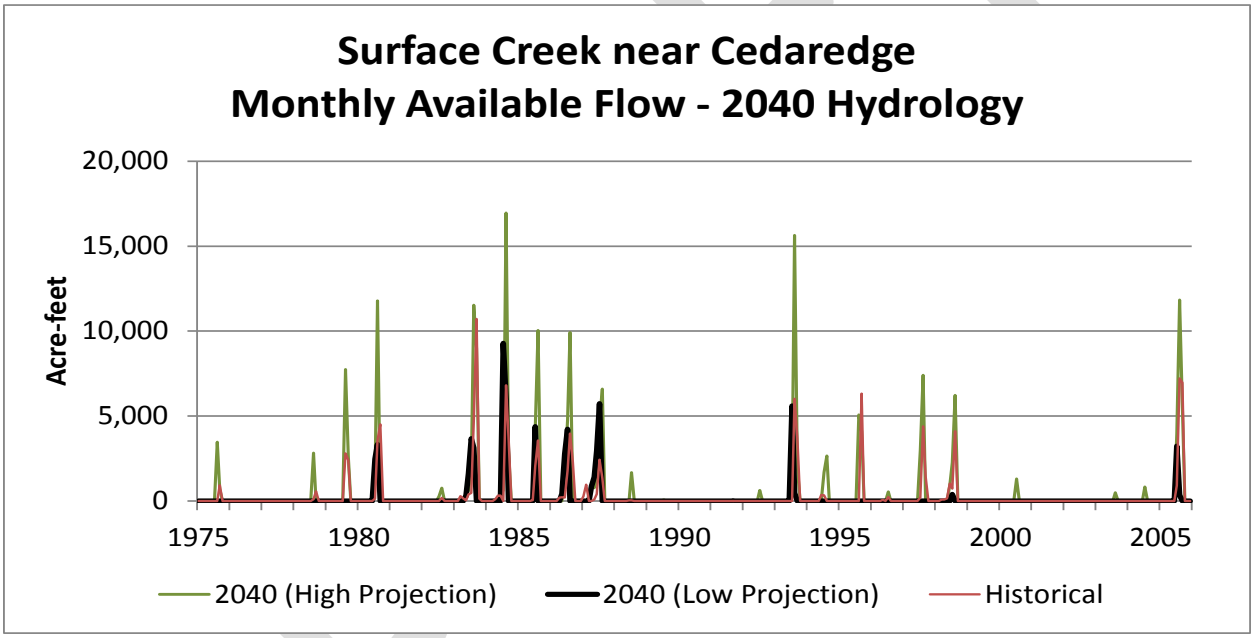




West Muddy Creek below Overland Ditch Observations

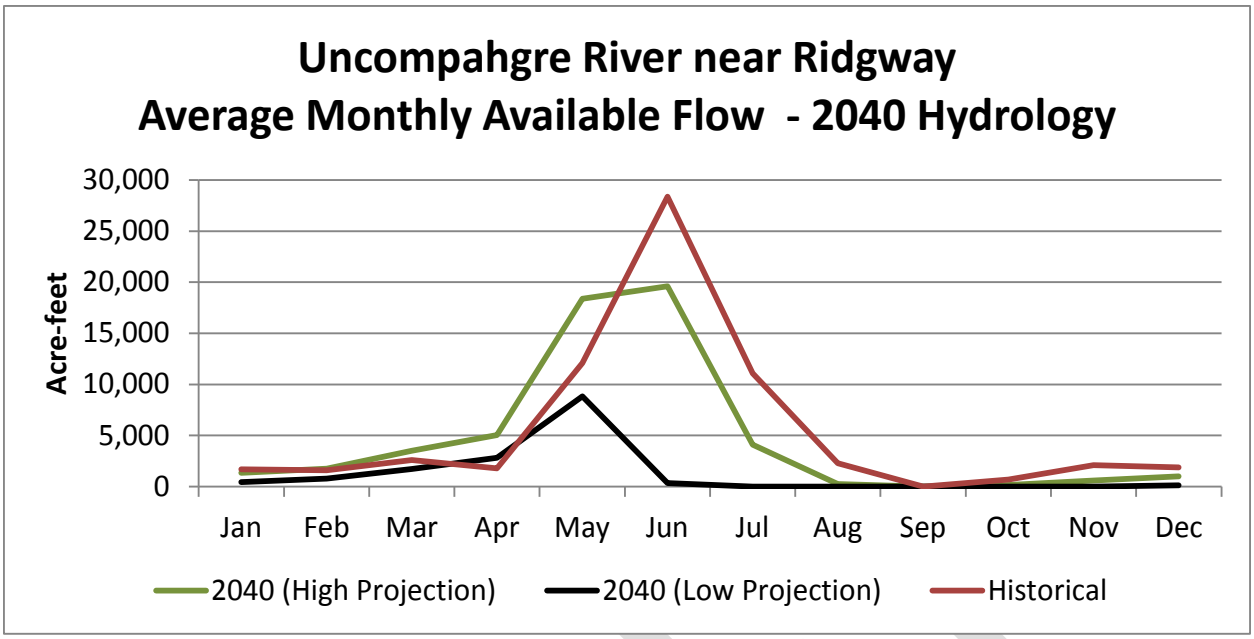
- Unlike other tributaries, neither climate change projections indicate an earlier shift in runoff and available flow for future use
- The High Projection results in more average annual available flow than historically and a few more years with available flow than historically

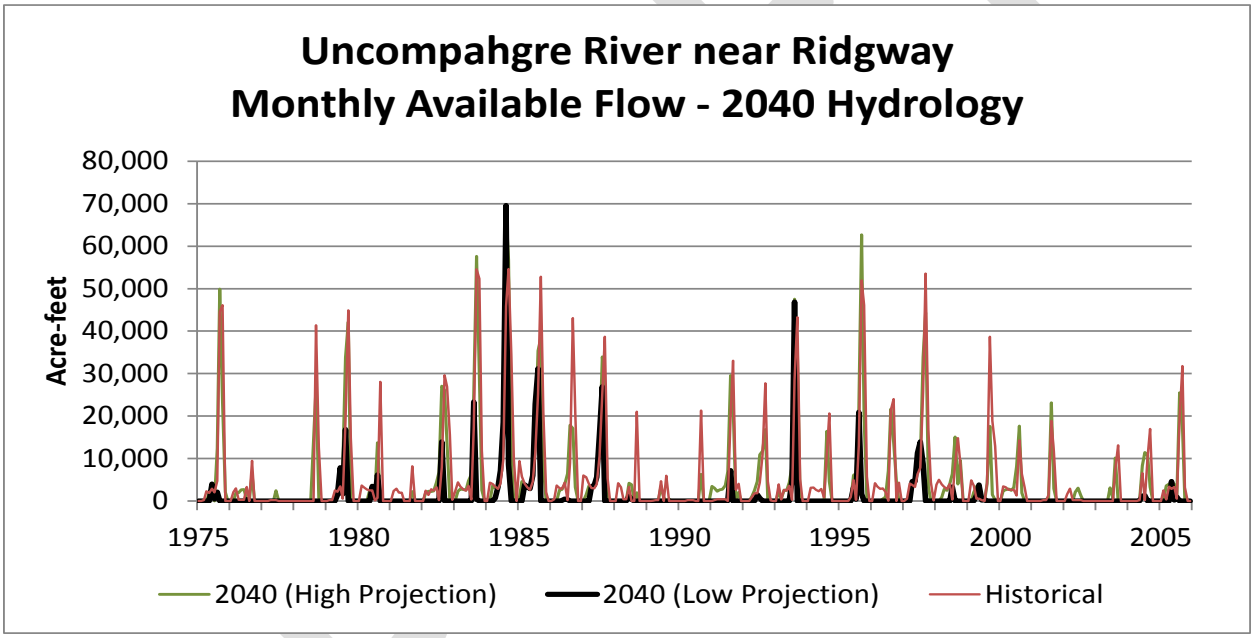




Surface Creek near Cedaredge Observations

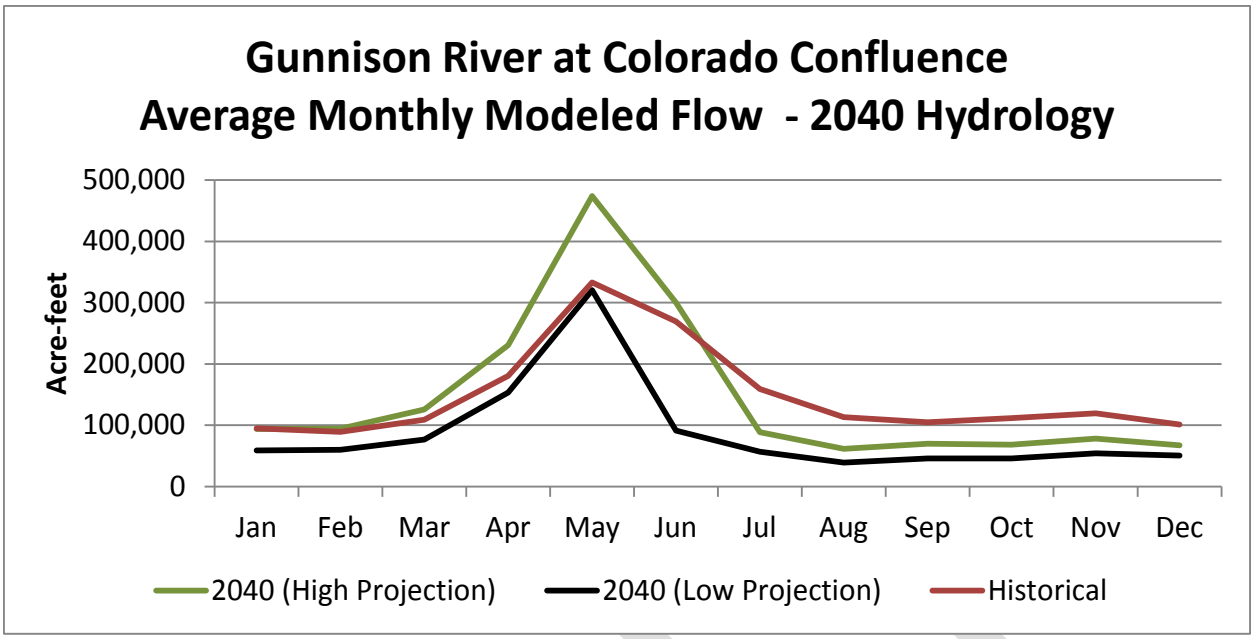
- The Low Projection indicate that on average the runoff on Surface Creek would occur earlier and more flow would be available for future use in April than historically
- The High Projection results in more average annual available flow than historically and a few more years with available flow than historically

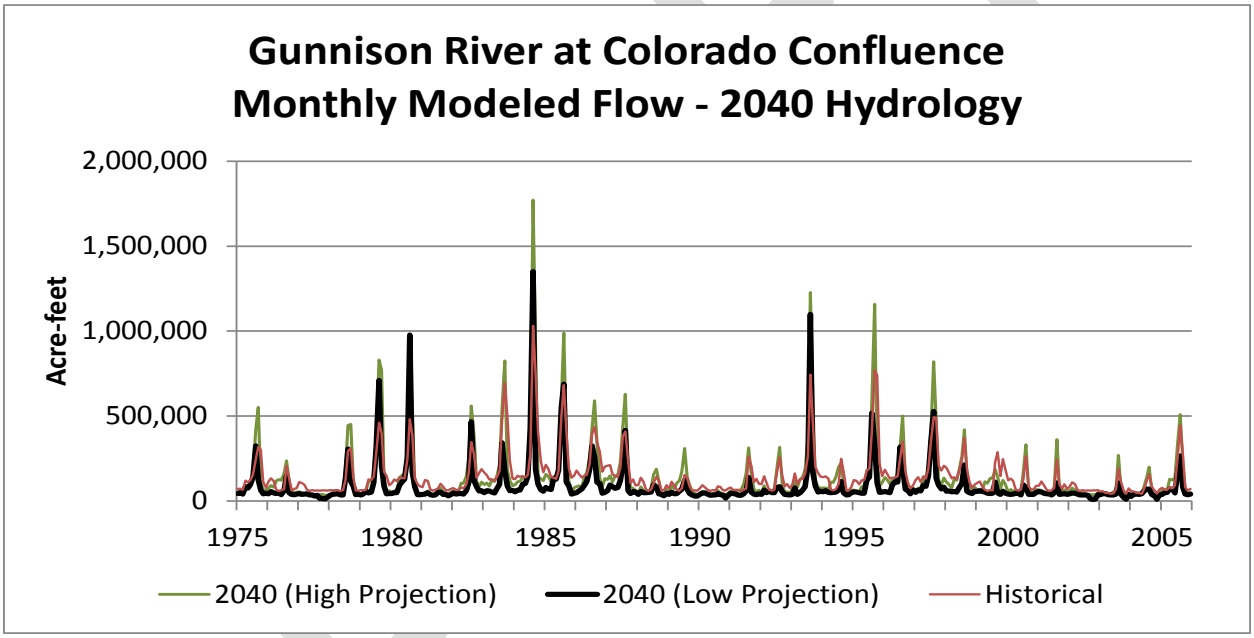




Uncompahgre River near Ridgway Observations

- Both climate projections indicate that on average the runoff on the Uncompahgre River would occur earlier
- Both climate projections result in less average annual available flow for future use than historically
- The High Projection has available flow the same years as historical, but generally it is less; the Low Projections has fewer years with available flow

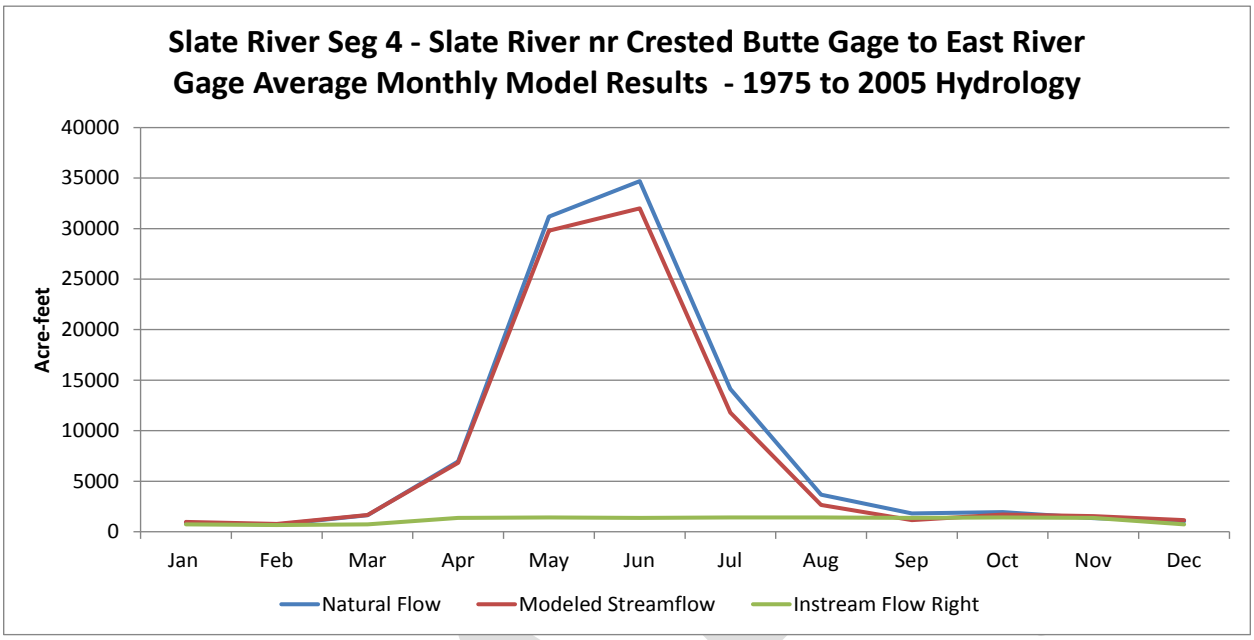


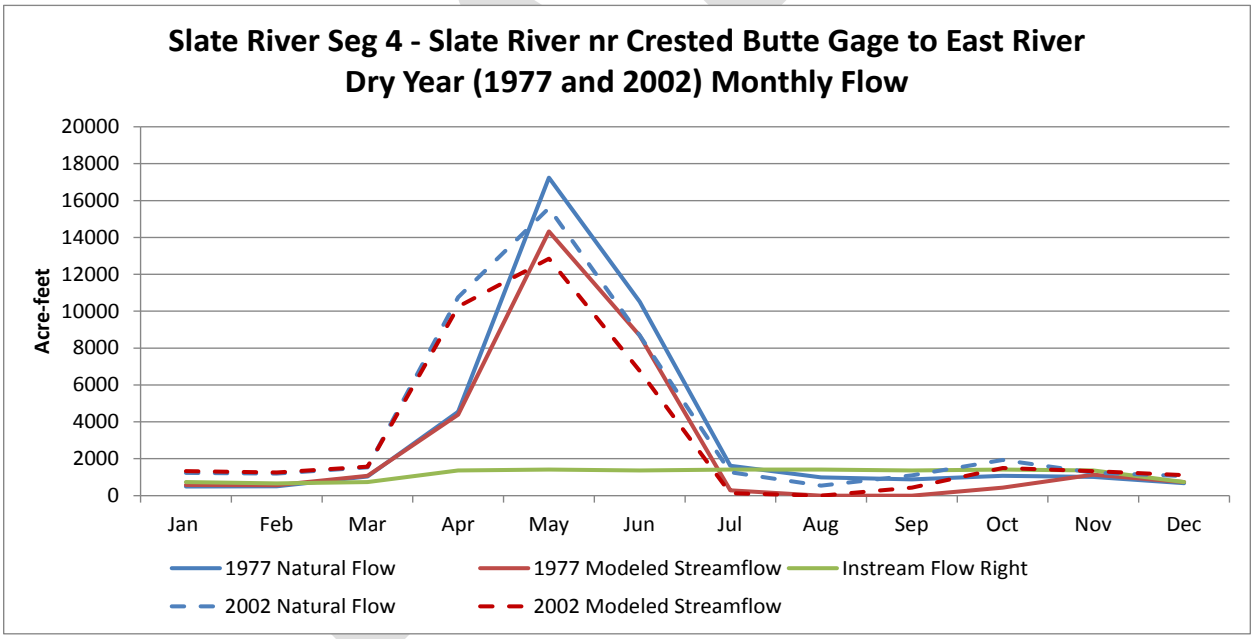


Gunnison River at Colorado Confluence Observations

- The High Projection yields the same average annual flow as historical; however the runoff pattern is different
- On average, the High Projection results in more flow in April and May, and less flow during the summer and fall months
- The Low Projection has similar May runoff as historically, however results in less flow in every other month

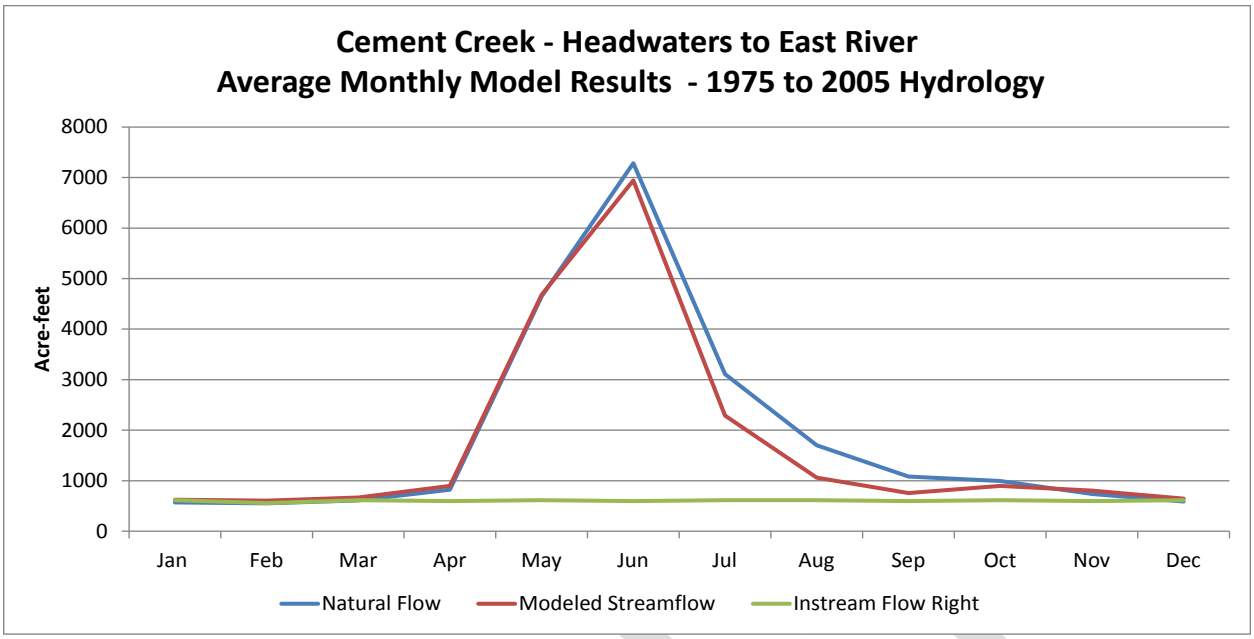
Appendix 11: Instream Flow Analyses

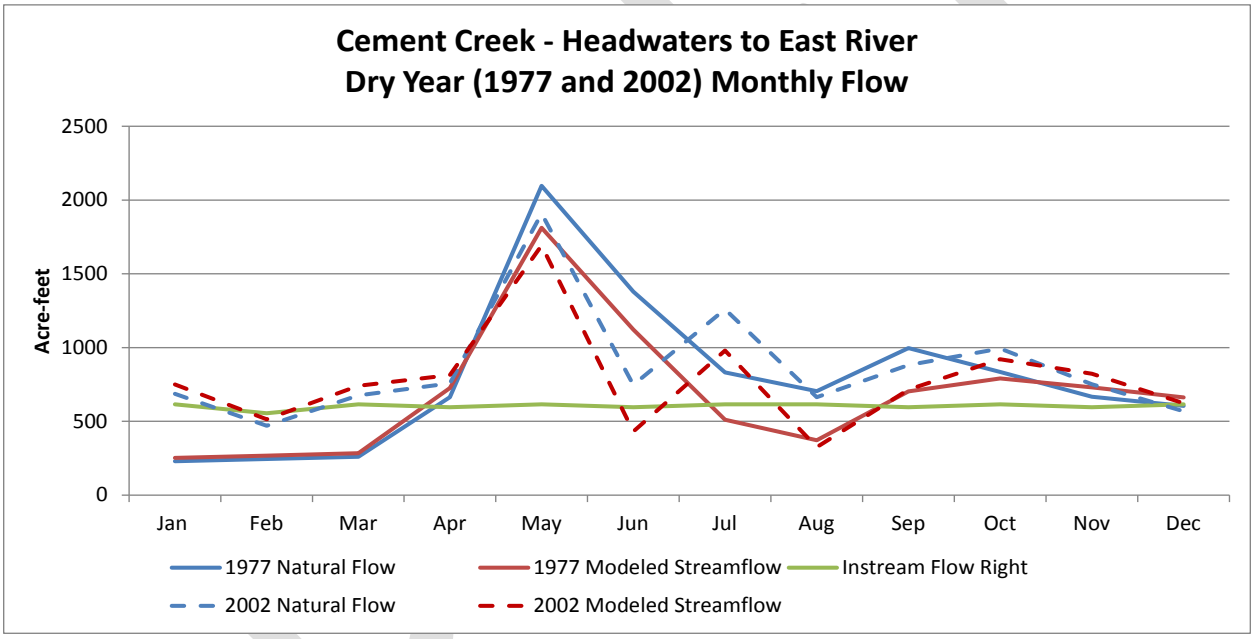




Slate River Segment 4 Instream Flow Observations

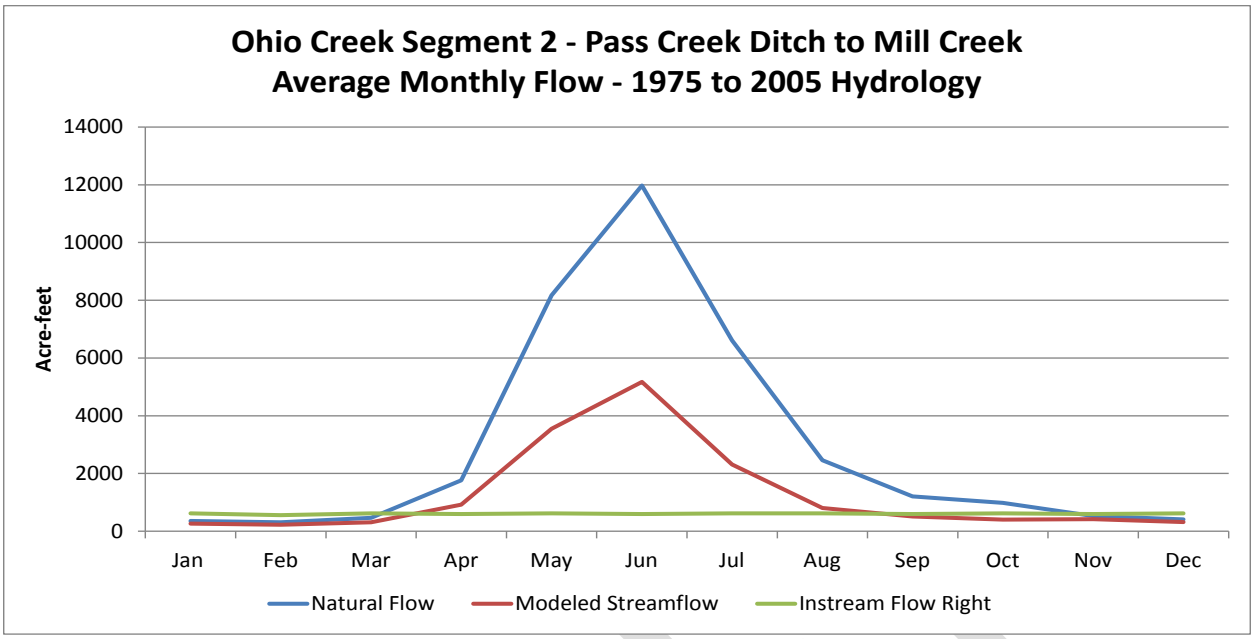
- The average natural flow is greater or equal to the instream flow right in every month
- On average, there is enough physical flow in the river to meet the instream flow right every month except September
- Natural flow was less than the instream flow right in the late irrigation season (August through September) in the dry years of 1977 and 2002
- Senior irrigation diversions reduced river flows below the instream flow right from July through October during the dry years

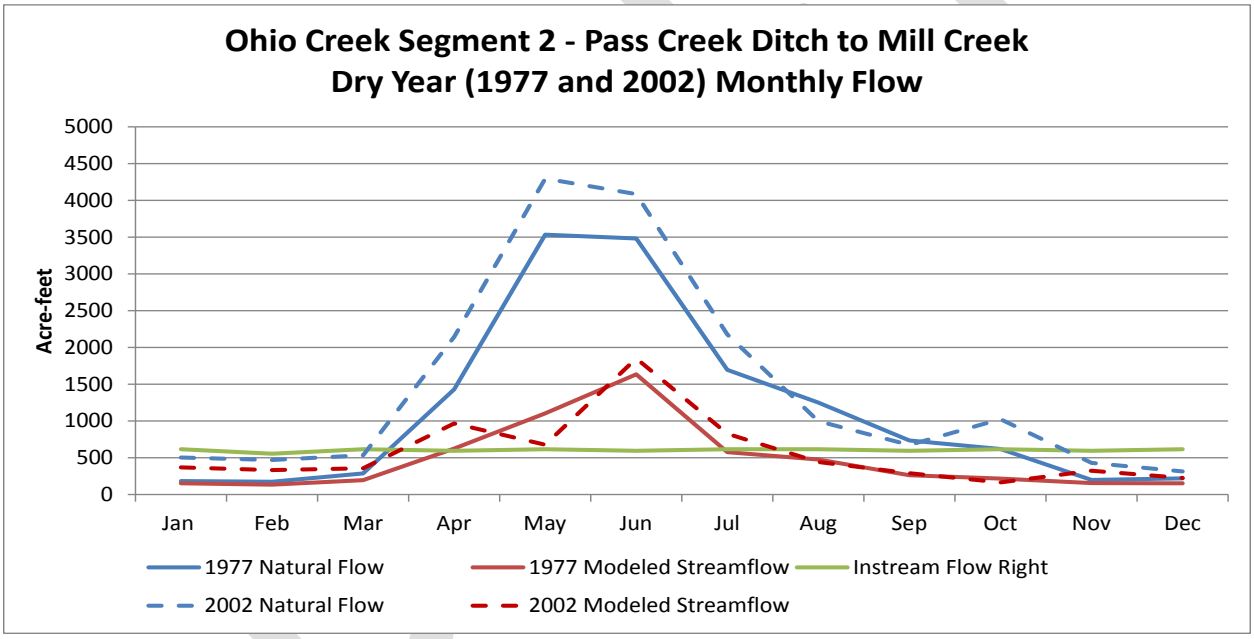




Cement Creek Instream Flow Observations

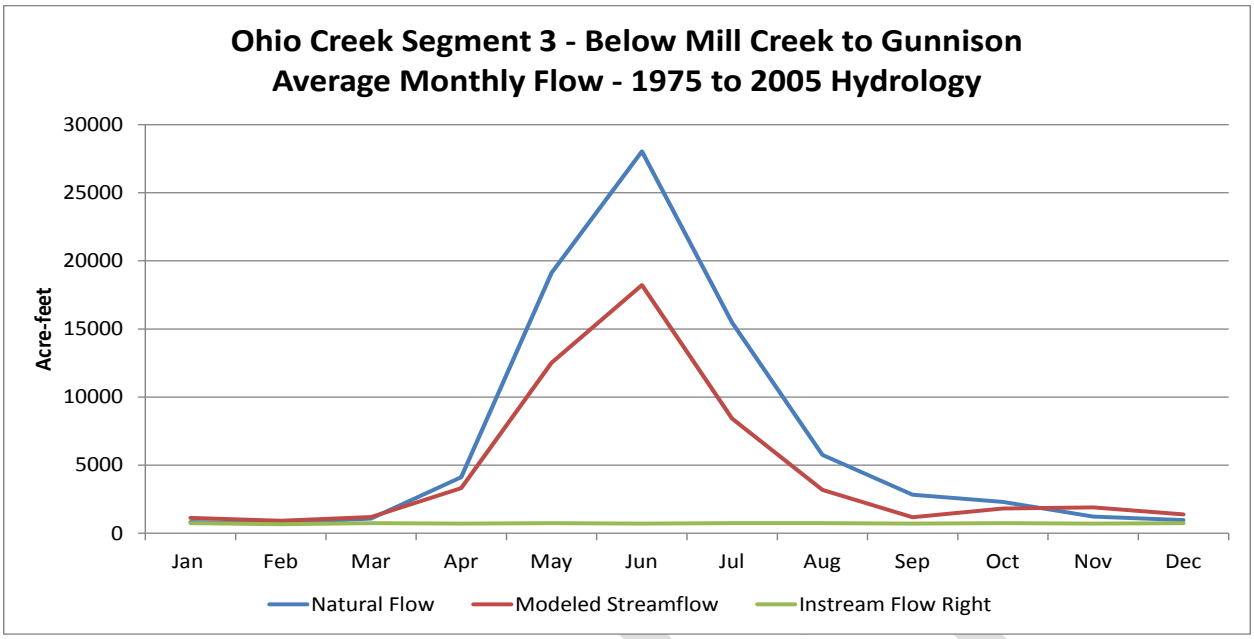
- The average natural flow is greater or equal to the instream flow right in every month
- On average, there is enough monthly physical flow in the river to meet the instream flow right
- Natural flow was less than the instream flow right in the winter months (January through March) during 1977; in 2002 the natural flow was generally greater than the instream flow right
- Senior irrigation diversions reduced river flows below the instream flow right in July through August of 1997; there appears to have been some significant precipitation over the Cement Creek watershed that provided flow to meet the instream flow right in July of 2002

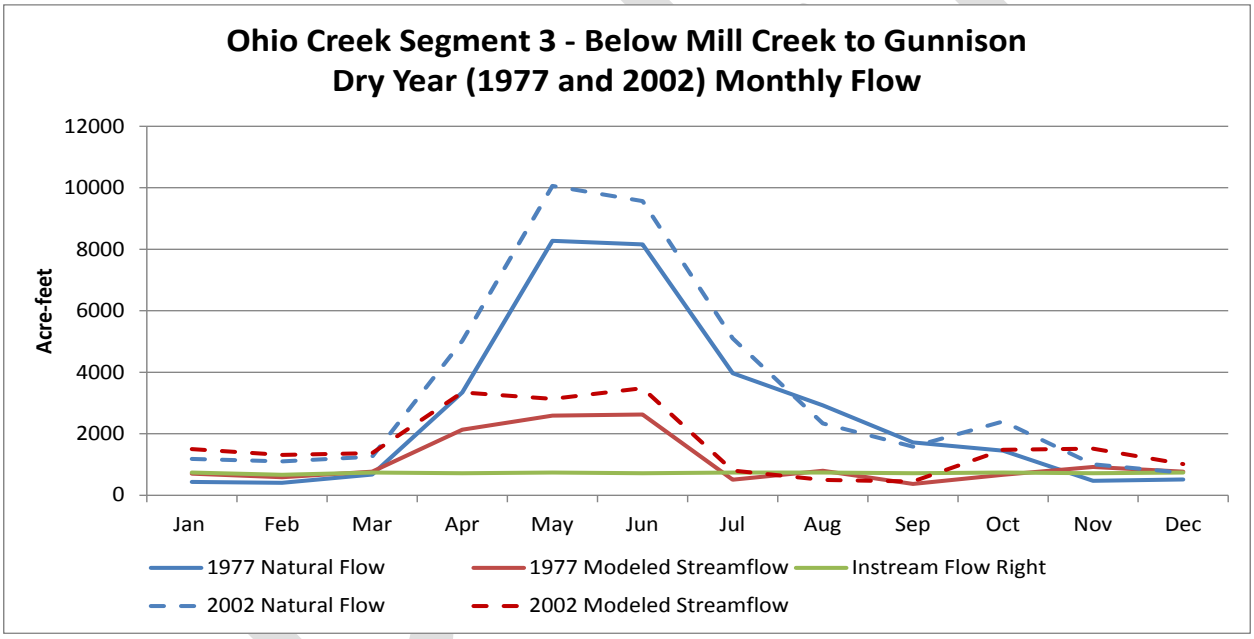




Ohio Creek Segment 2 Instream Flow Observations

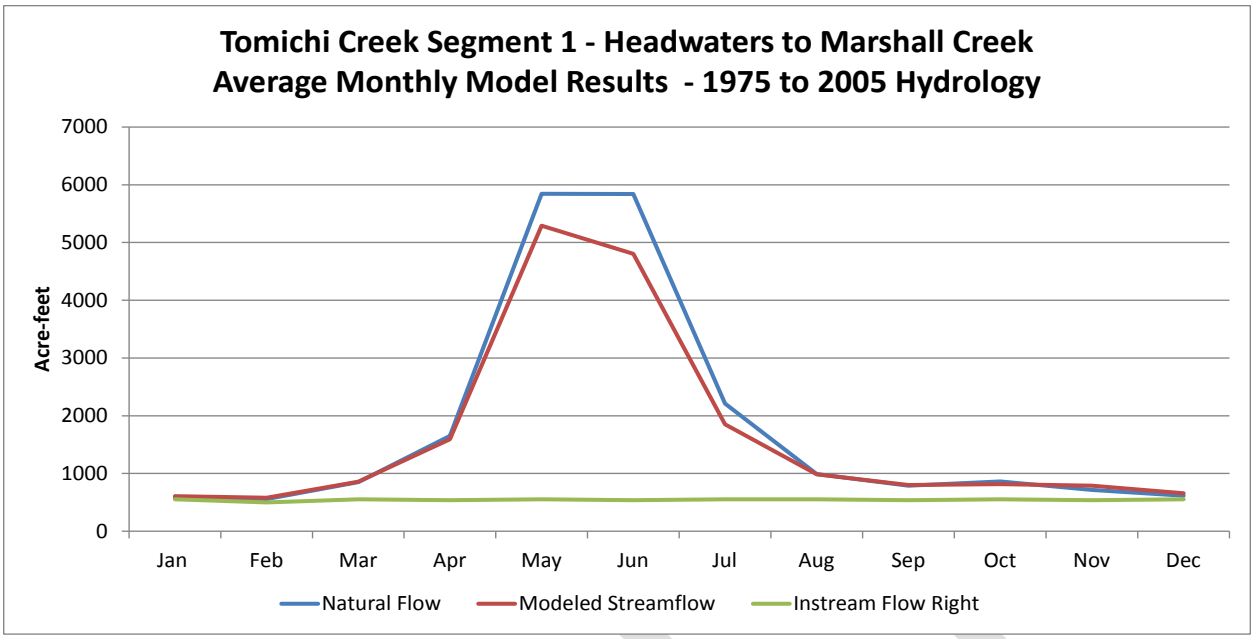
- The average natural flow is greater or equal to the instream flow right in every month
- On average, there is enough physical flow in the river to meet the instream flow right every month except September
- Natural flow was less than the instream flow right in the late irrigation season (August through September) in the dry years of 1977 and 2002
- Senior irrigation diversions reduced river flows below the instream flow right from July through October during the dry years

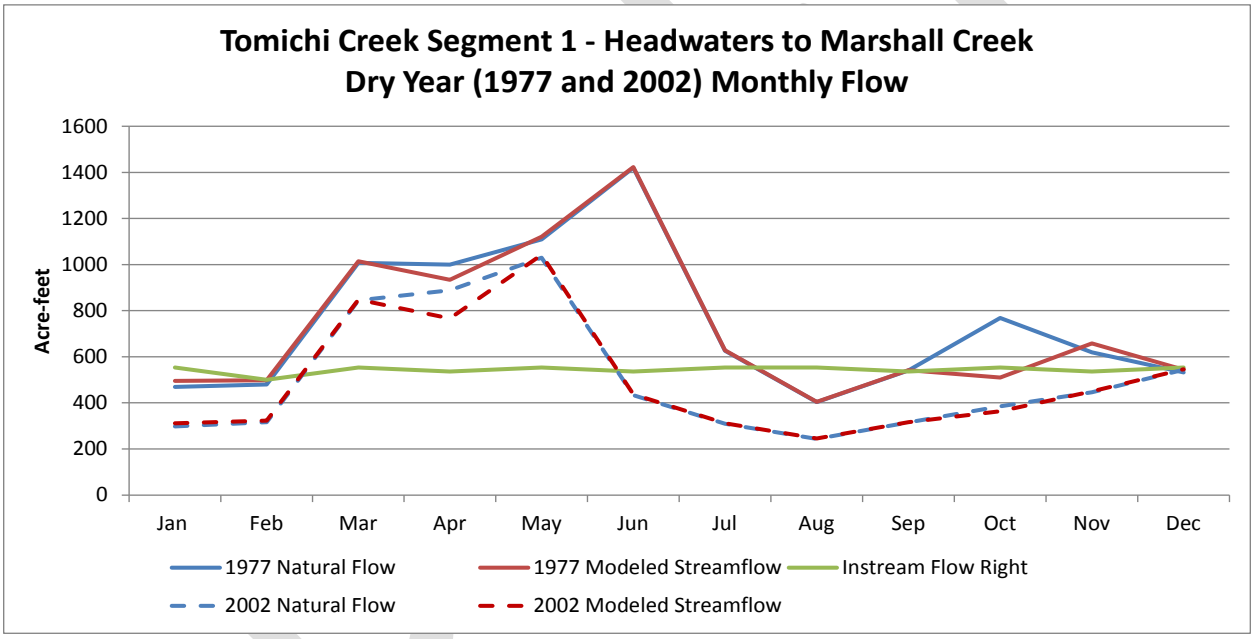




Ohio Creek Segment 3 Instream Flow Observations

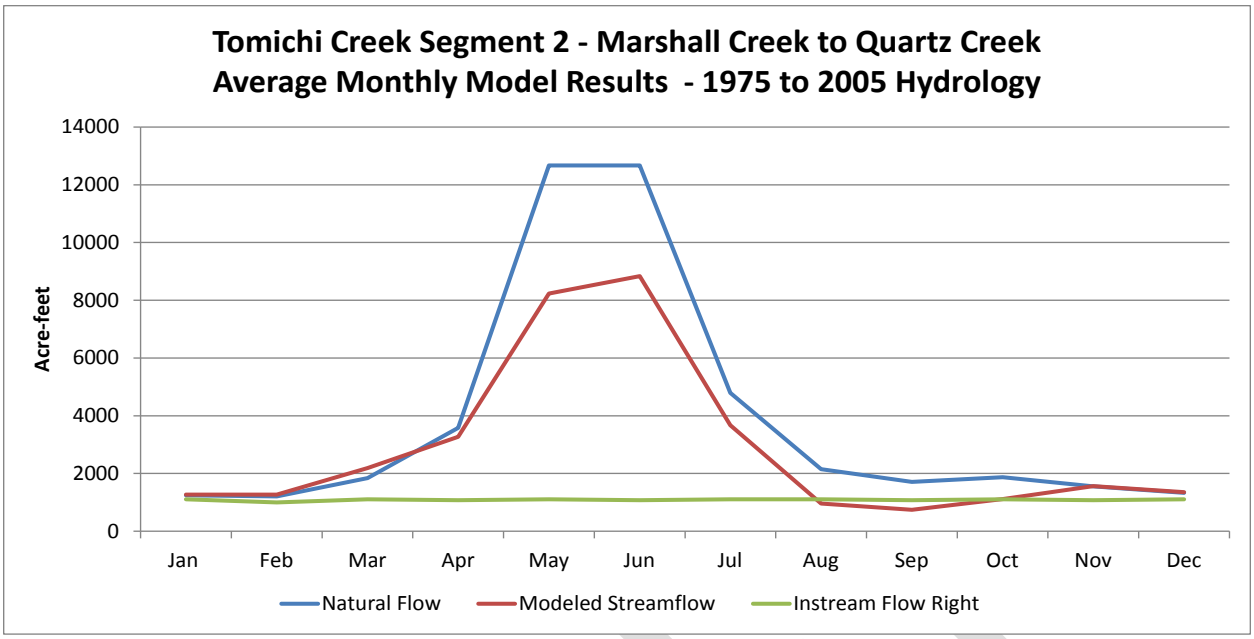
- The average natural flow is greater than the instream flow right in every month
- On average, there is enough monthly physical flow in the river to meet the instream flow right
- Natural flow in 1977 was less than the instream flow right in the winter months (November through February)
- Senior irrigation demands reduced river flows below the instream flow right in late irrigation season (July through September) during the very dry years
- Lagged return flows from irrigation provide increased flow in November and December compared to natural flow absent irrigation

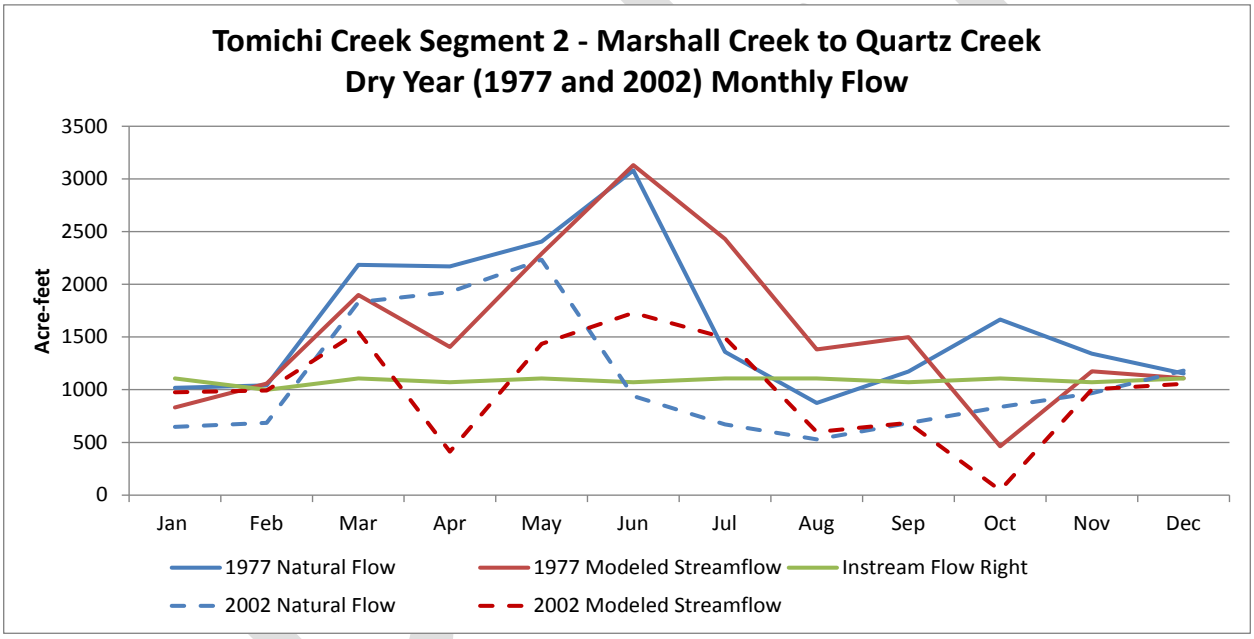




Tomichi Creek Segment 1 Instream Flow Observations

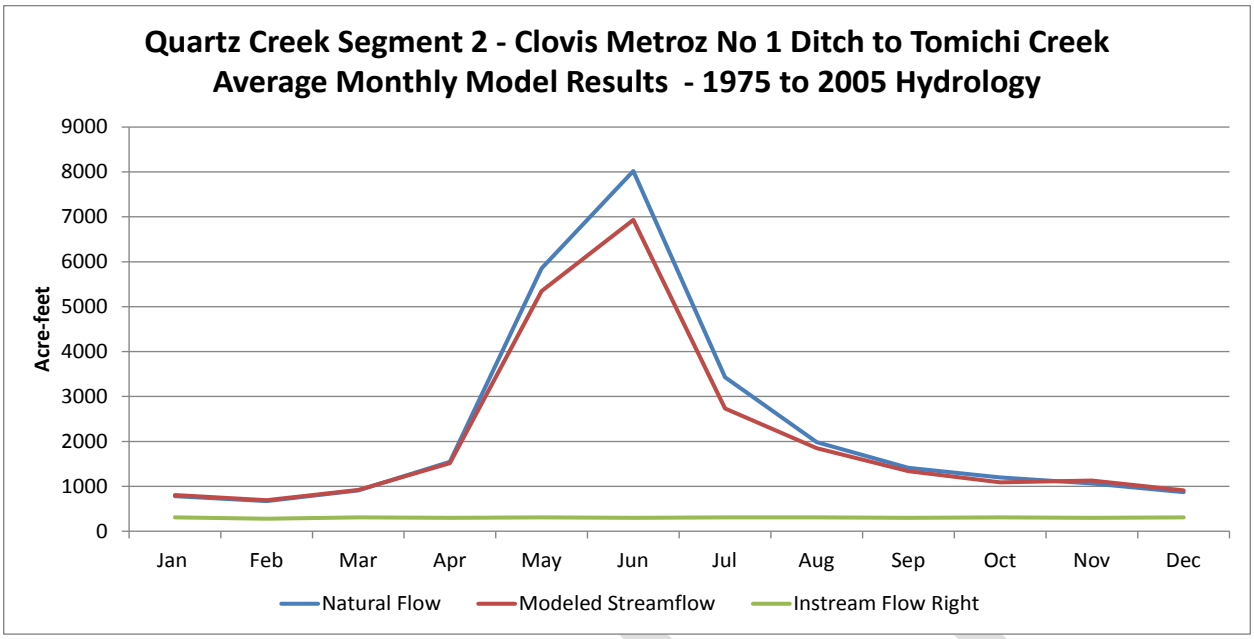
- The average natural flow is greater than the instream flow right in every month
- On average, there is enough monthly physical flow in the river to meet the instream flow right
- Natural flow in 2002 was less than the instream flow right from June through February; because natural flow was so low, there was essentially no flow available for senior irrigation uses; therefore physical flow was the same as natural flow most months
- Natural flow was less than the instream flow right in January and July in 1977.

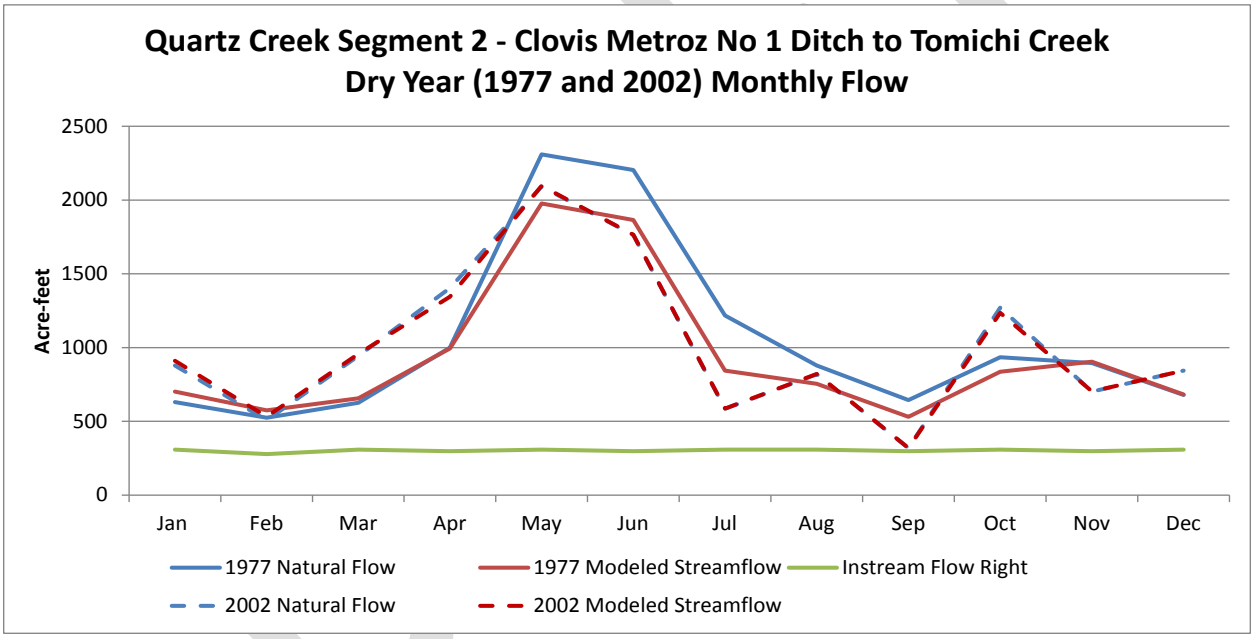




Tomichi Creek Segment 2 Instream Flow Observations

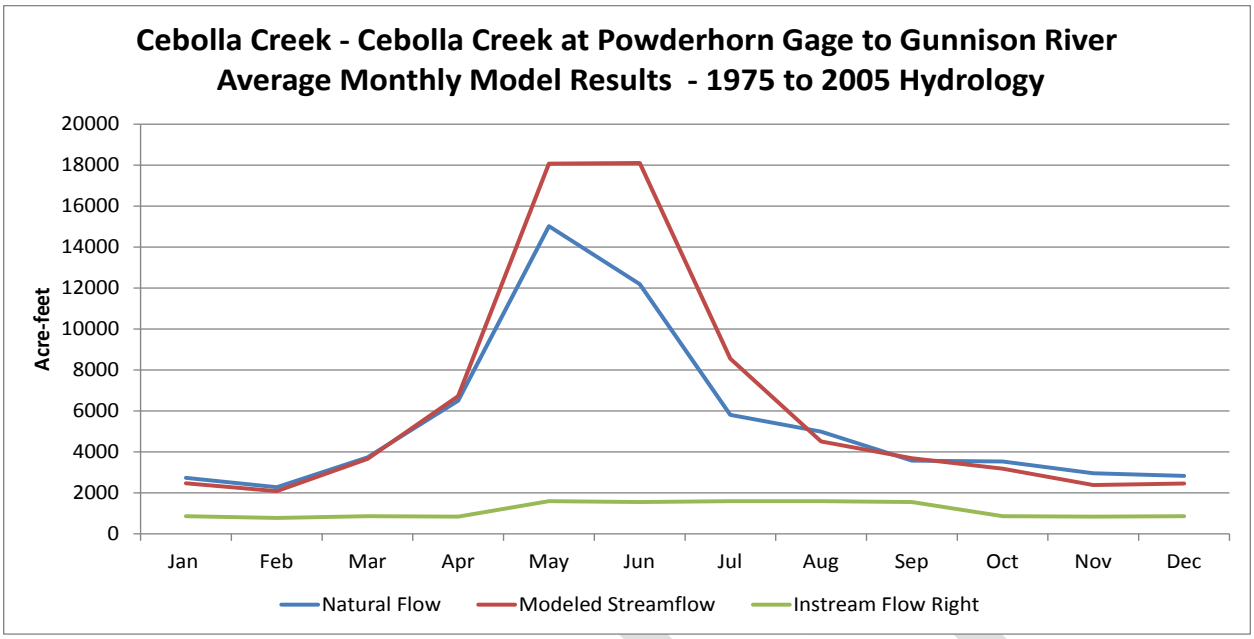
- The average natural flow is greater than the instream flow right in every month
- On average, there is enough monthly physical flow in the river to meet the instream flow right except in the late irrigation season months (August and September)
- Natural flow in 2002 was less than the instream flow right from June through February; because natural flow was so low, there was essentially no flow available for senior irrigation diversions except in April and May
- The lagged return flows associated with the 2002 April and May irrigation diversions increased the physical flow to above the instream flow right in June and July; if those diversions had not occurred, the instream flow right would not have been satisfied during those months.

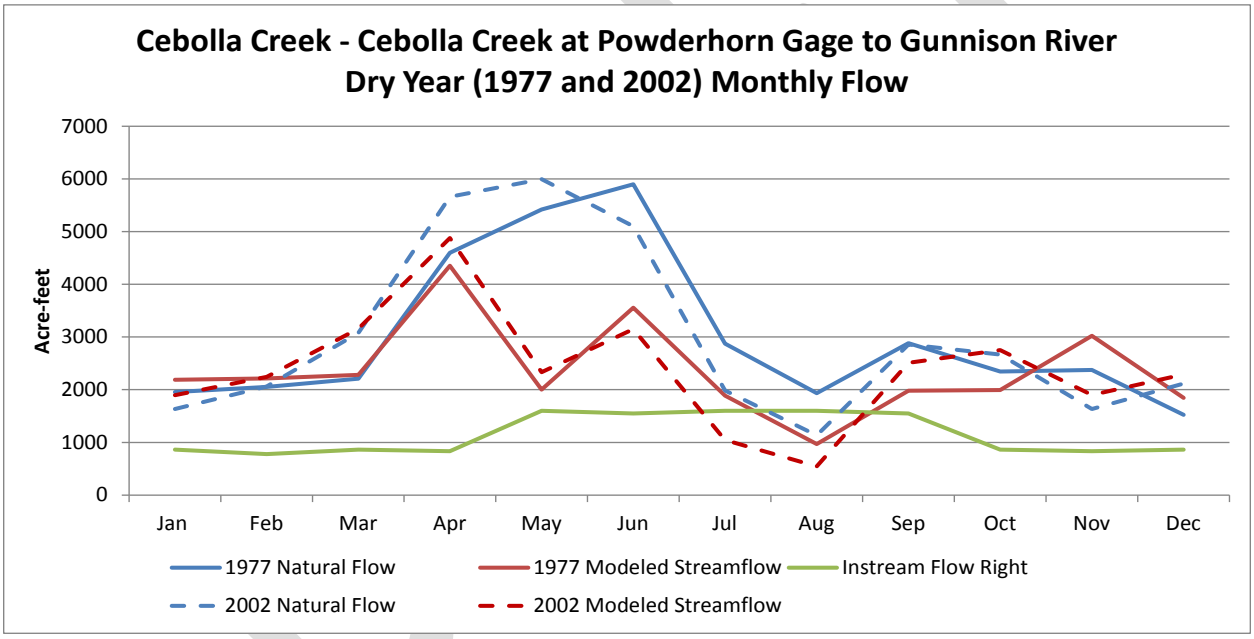




Quartz Creek Segment 2 Instream Flow Observations

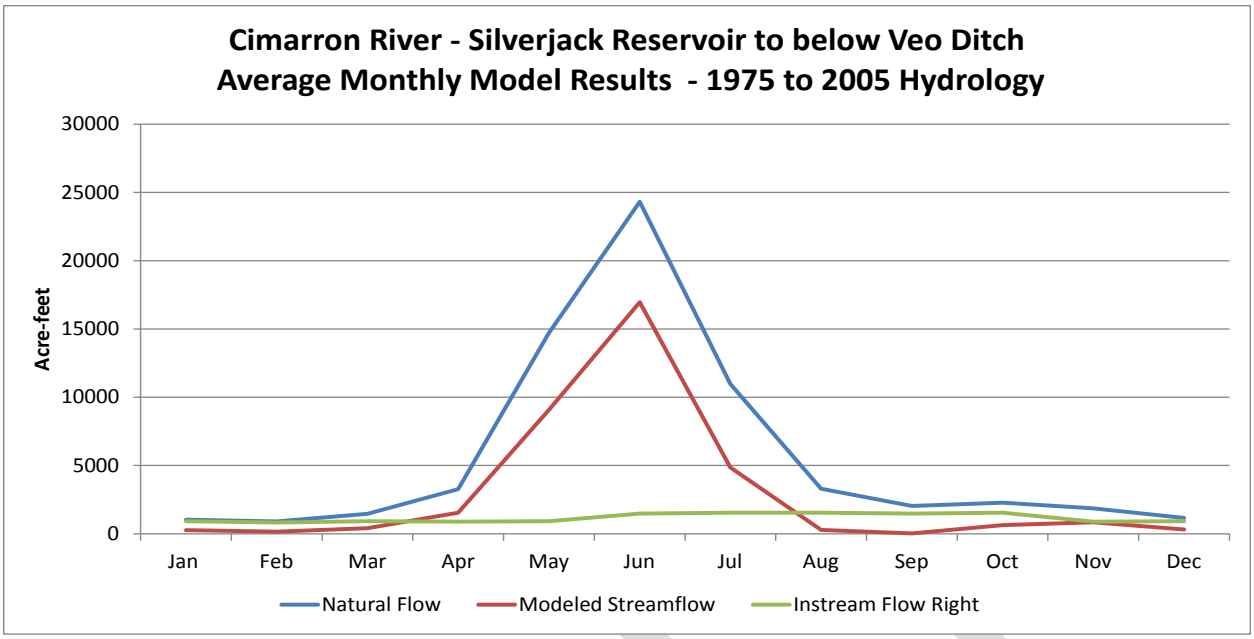
- The average and in dry years, natural flow is greater than the instream flow right in every month
- On average and in dry years, there is enough monthly physical flow in the river to meet the instream flow right

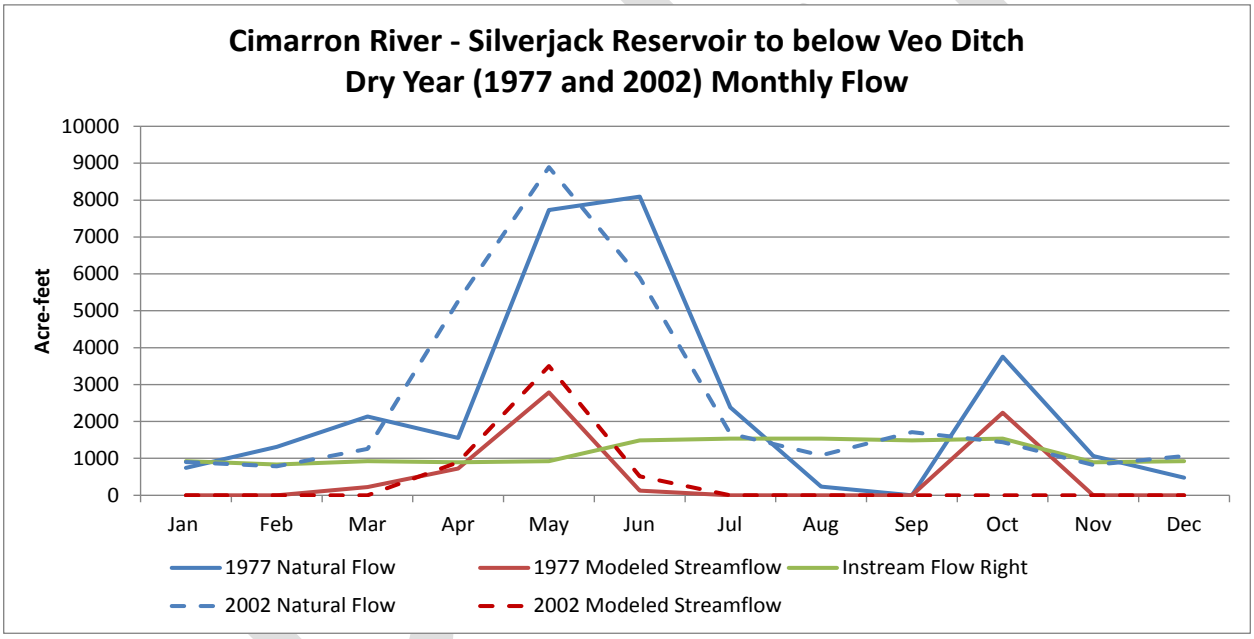




Cebolla Creek Instream Flow Observations

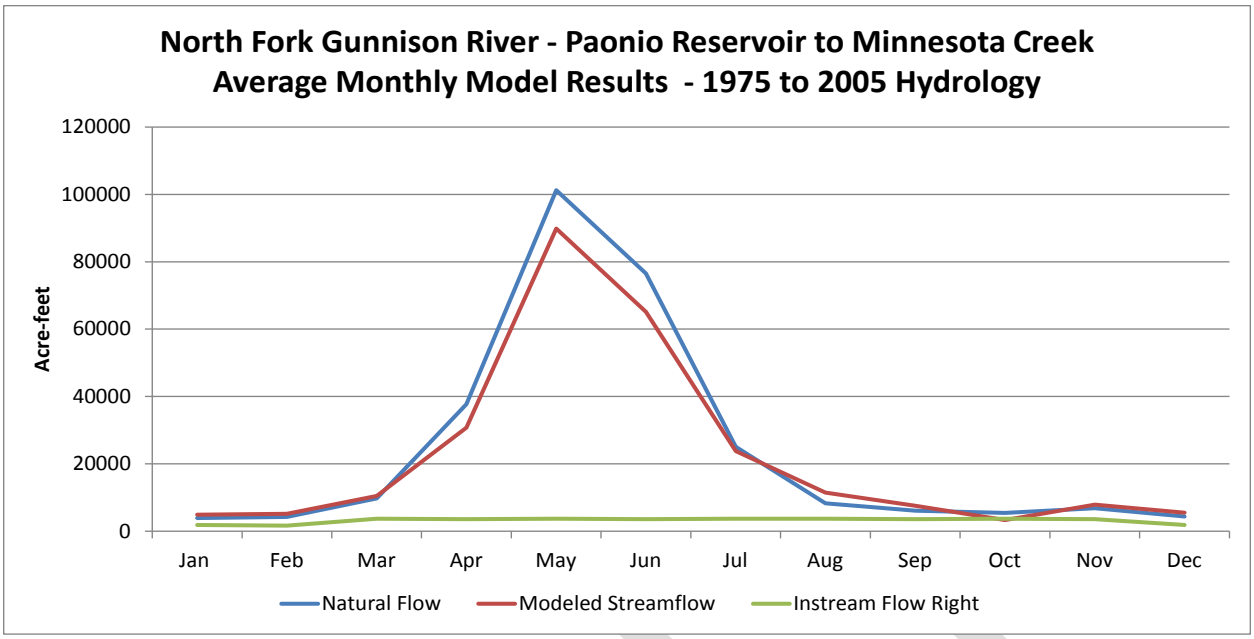
- The average natural flow is greater than the instream flow right in every month
- On average, there is enough monthly physical flow in the river to meet the instream flow right
- Natural flow was less than the instream flow right in July and August in 2002, and in August of 1977
- Senior irrigation diversions caused the physical flow to be less than the instream flow right in July and August in 2002

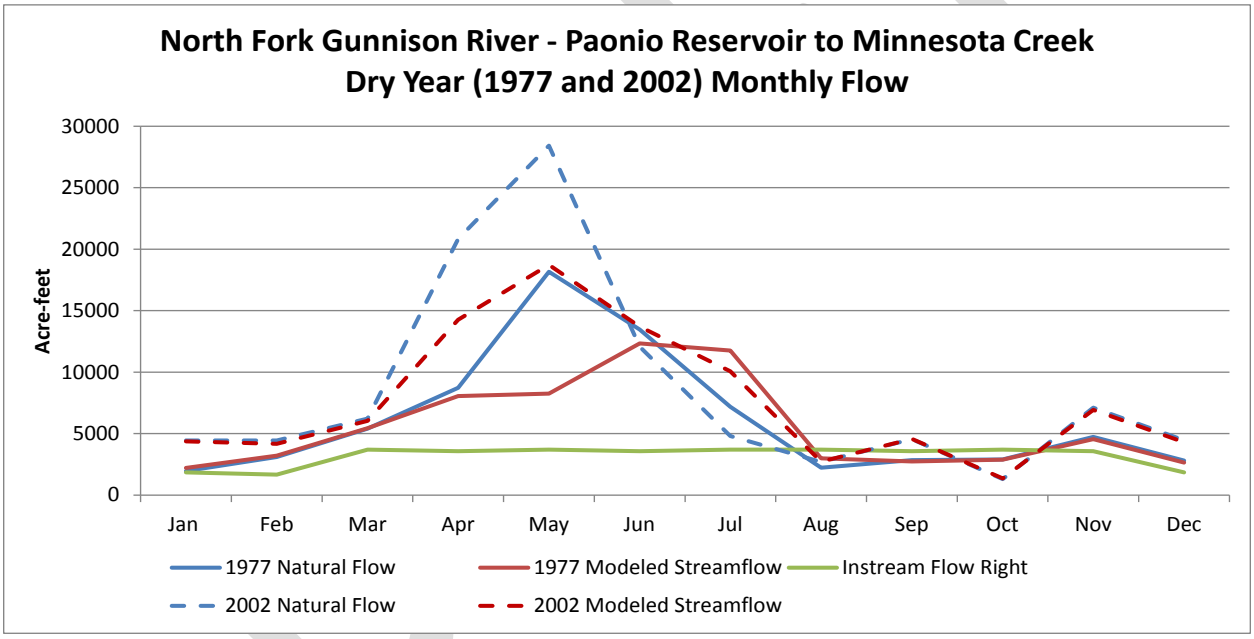




Cimarron River Instream Flow Observations

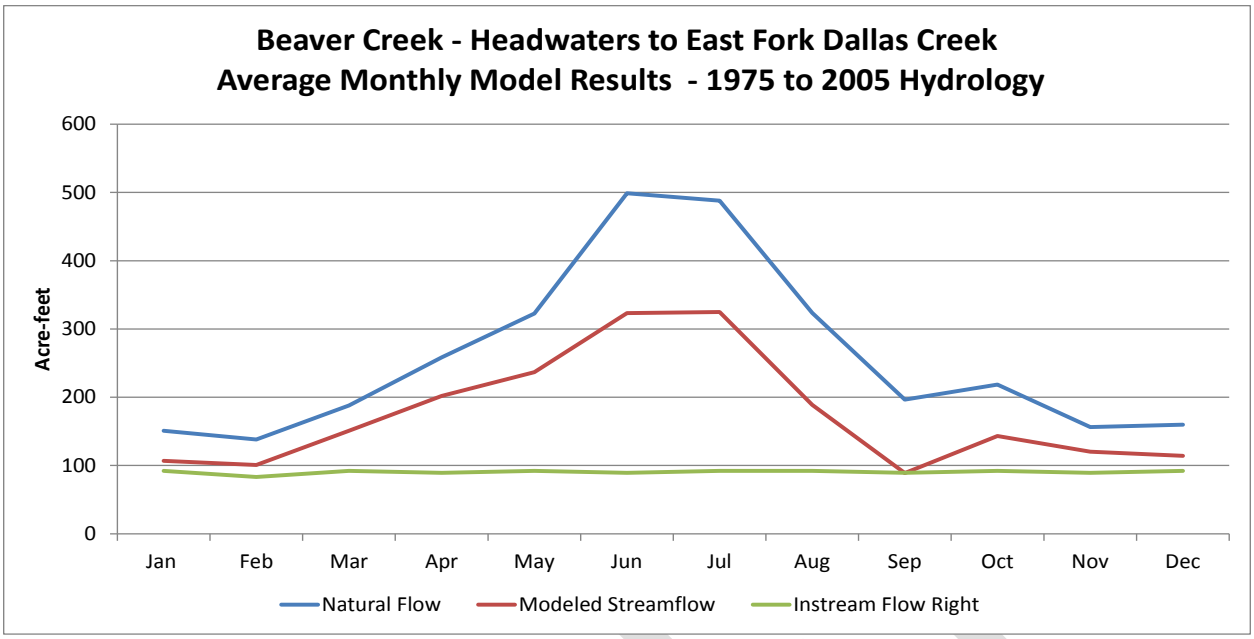
- The average natural flow is greater or equal to the instream flow right in every month
- On average, there is not enough physical flow in the river to meet the instream flow right in August through March
- In 1977, the natural flow was less than the instream flow request in August, September, and December; in 2002 the natural flow was less than the instream flow request in August
- There was physical flow to meet the instream flow right in 2002 only in the month of May; there was physical flow to meet the instream flow right in 1077 only in the months of May and October

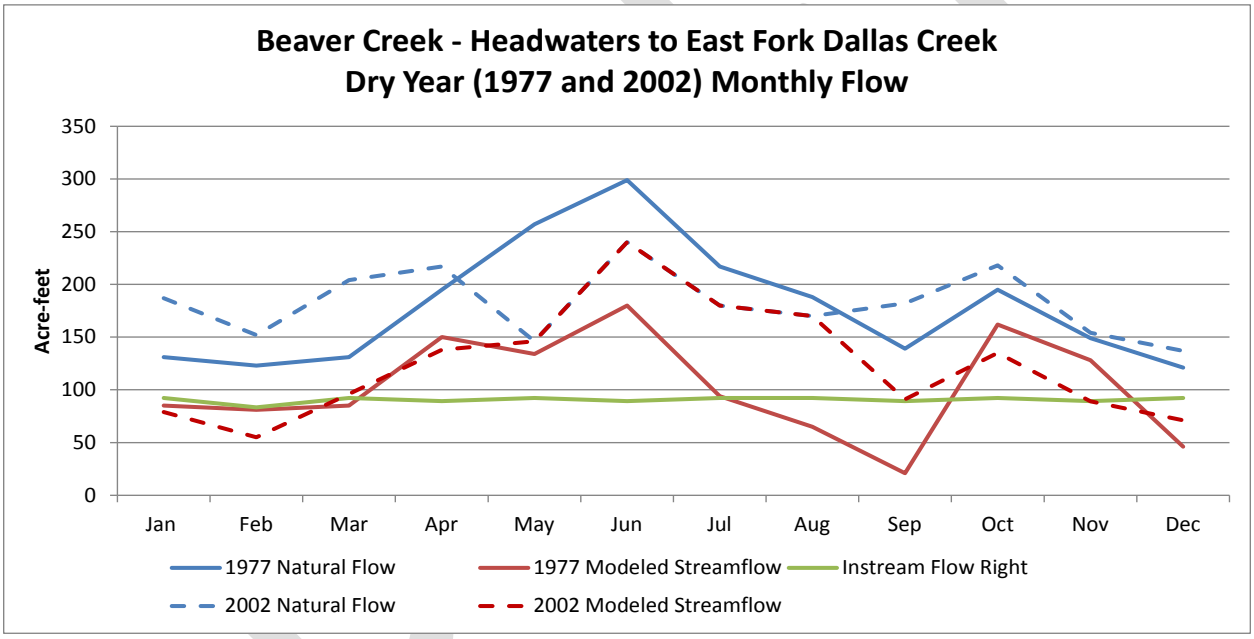




North Fork Gunnison River Instream Flow Observations

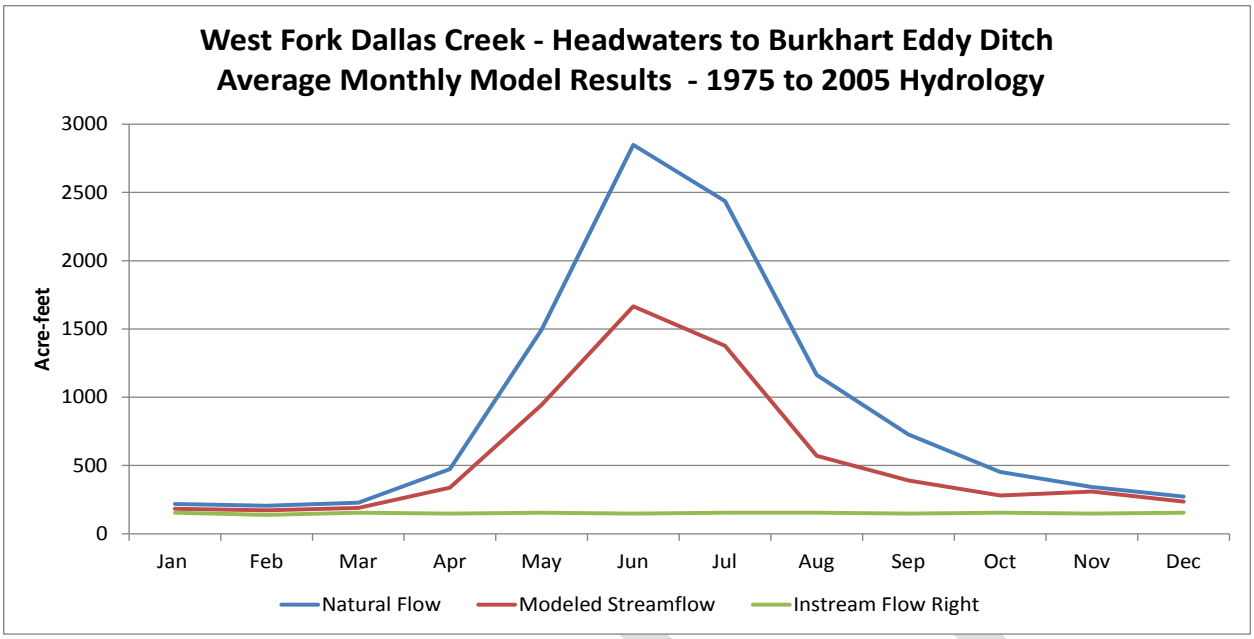
- The average natural flow is greater or equal to the instream flow right in every month
- On average, there is enough physical flow to meet the instream flow right except in October
- Natural flow was less than the instream flow right in the late irrigation season (August through October) in the dry years
- Lagged return flows from irrigation and Paonia Reservoir operations provide increased flow in June, July, and August compared to natural flow absent operations in the dry years

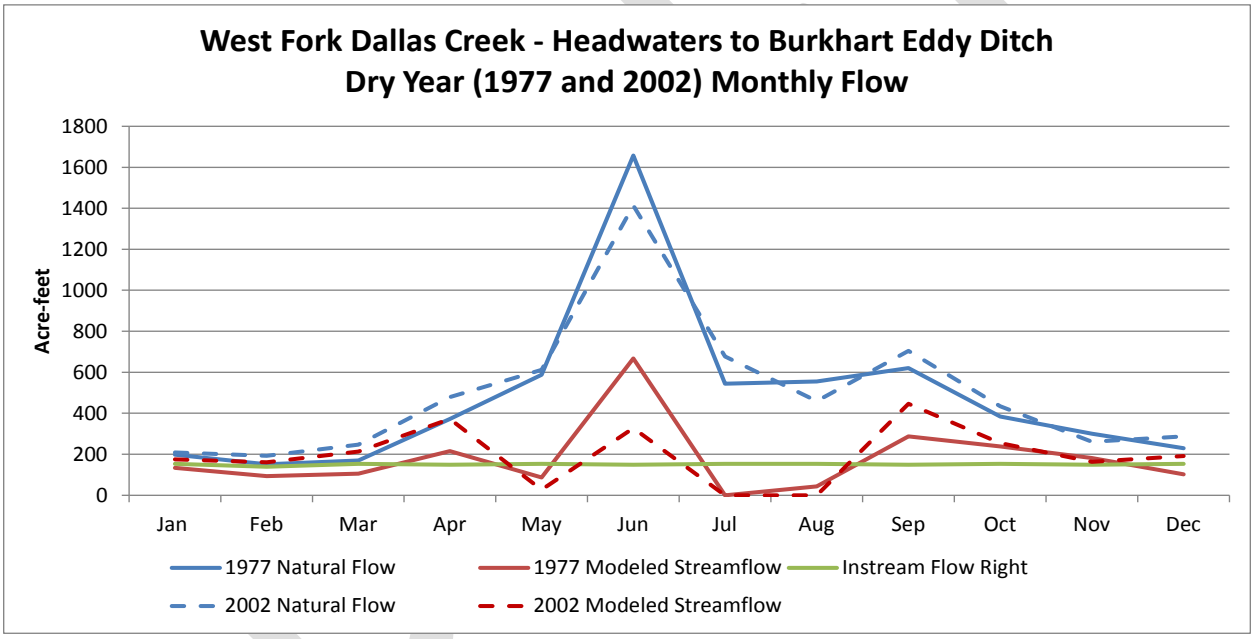




Beaver Creek Instream Flow Observations

- The average natural flow is greater or equal to 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 were higher than the instream flow right every month during the dry years of 1977 and 2002
- Senior irrigation diversions, primarily Ridgway Ditch, reduced river flows below the instream flow right in the late irrigation season (August and September) in 1977





West Fork Dallas Creek Instream Flow Observations

- The average natural flow is greater or equal to 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 was greater than or equal to the instream flow right in every month during the dry years of 1977 and 2002
- Senior irrigation diversions reduced river flows below the instream flow right in May, July and August during the irrigation season in the dry years of 1977 and 2002; physical flow was less than the instream flow right during the winter months in 1977

Appendix 12: Project Analyses – Paonia Case Study

Paonia Case Study Goals

1. Investigate opportunities for Projects that benefit Consumptive and Non-consumptive needs
2. Investigate benefits of increased agricultural efficiency specifically as it relates to reservoir use

Model Parameters:

1. Paonia Reservoir
    a. Account for Fire Mountain Canal = 12,650 AF
    b. Account for Ragged Mountain Exchange user = 2,000 AF
    c. Reservoir drawn down for Flood Control based on USBR Rule Curves
2. Fire Mountain Canal
    a. Baseline: Average Monthly Efficiency = 51%
    b. 70% Simulation: Average Monthly Efficiency = 70%
    c. Headgate "demands" calculated based on CIR/Average Efficiency
3. Ragged Mountain Exchange Users
    a. Baseline: Average Monthly Efficiency = 50%
    b. 70% Simulation: Average Monthly Efficiency = 70%
    c. Headgate "demands" calculated based on CIR/Average Efficiency

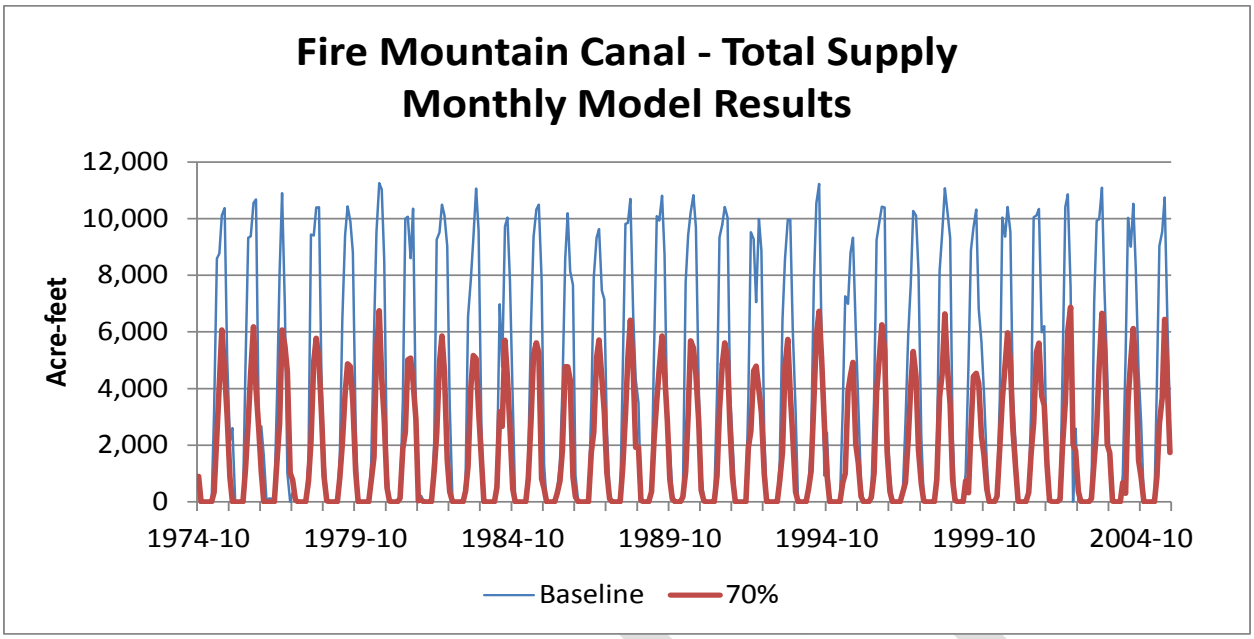
Ragged Mountain Exchange Users

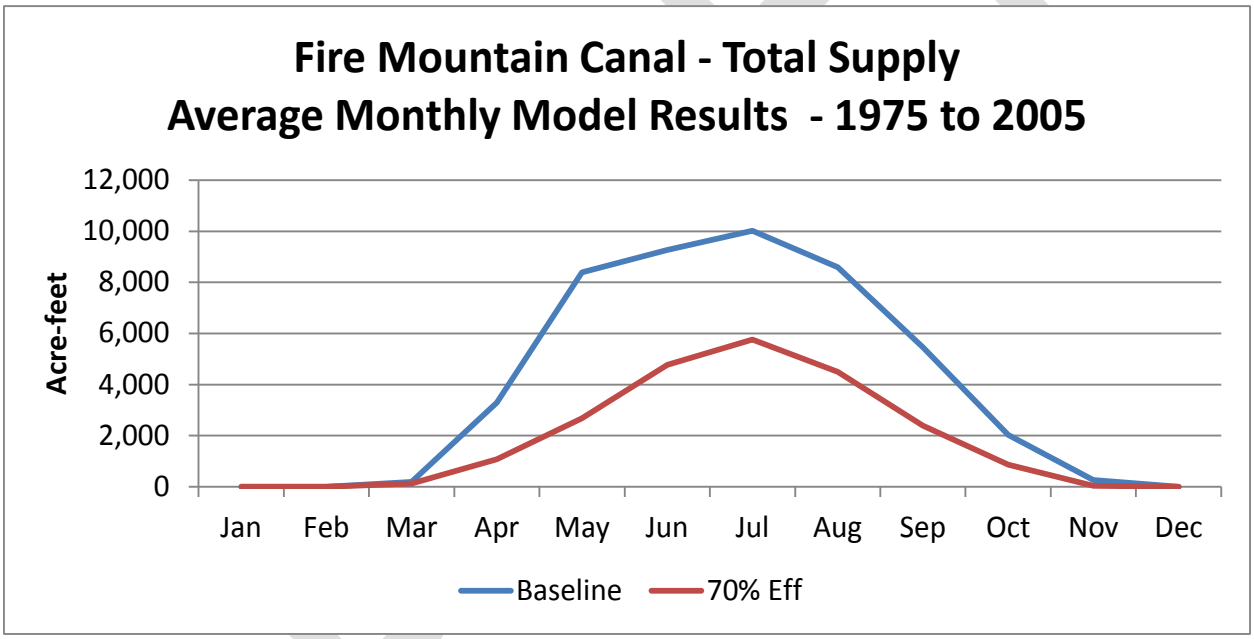
- Ragged Mountain Exchange Users do not increase CU with increased efficiency
- Limited by Reservoir Storage (2,000 AF account)
- Reduced headgate diversions = reduced return flows above Paonia Reservoir
- Inflow to Paonia Reservoir changes little with increased efficiency
    - Reduced Diversions = Reduced Return Flows (they offset each other)

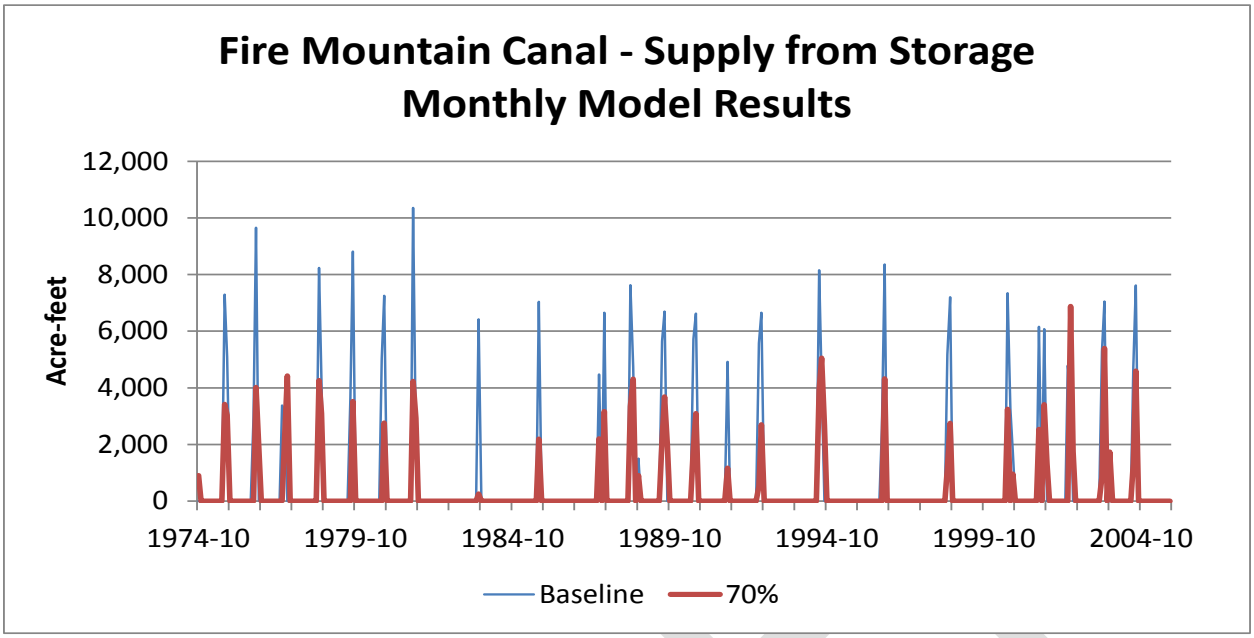
Fire Mountain Canal

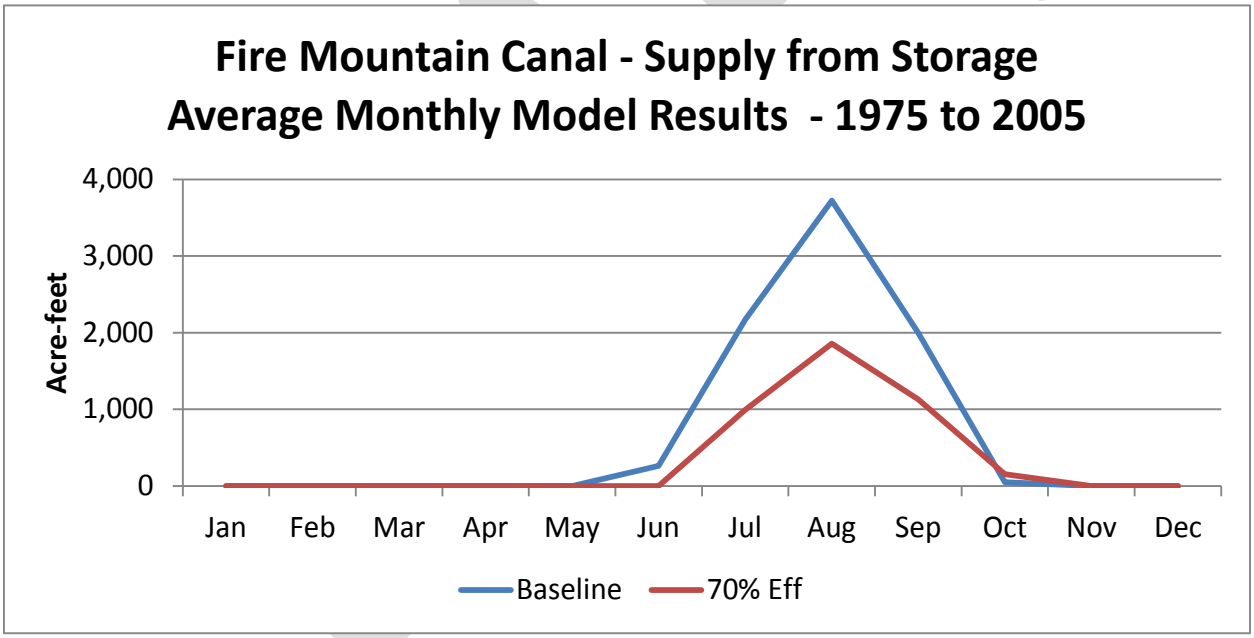
1. Reduced Headgate Demand due to more efficient delivery system = Reduced Direct Diversions
2. Reduced Headgate Demand due to more efficient delivery system = Reduced Reservoir Use
3. Minimal increase in Consumptive Use since generally receives full supply; however operational efficiencies would likely results time and cost savings
4. Reduced Direct Diversions = Increased Flow past Headgate
5. Reduced Reservoir Use = Increased EOM Content in Paonia Account (that is until releases are made for flood control)

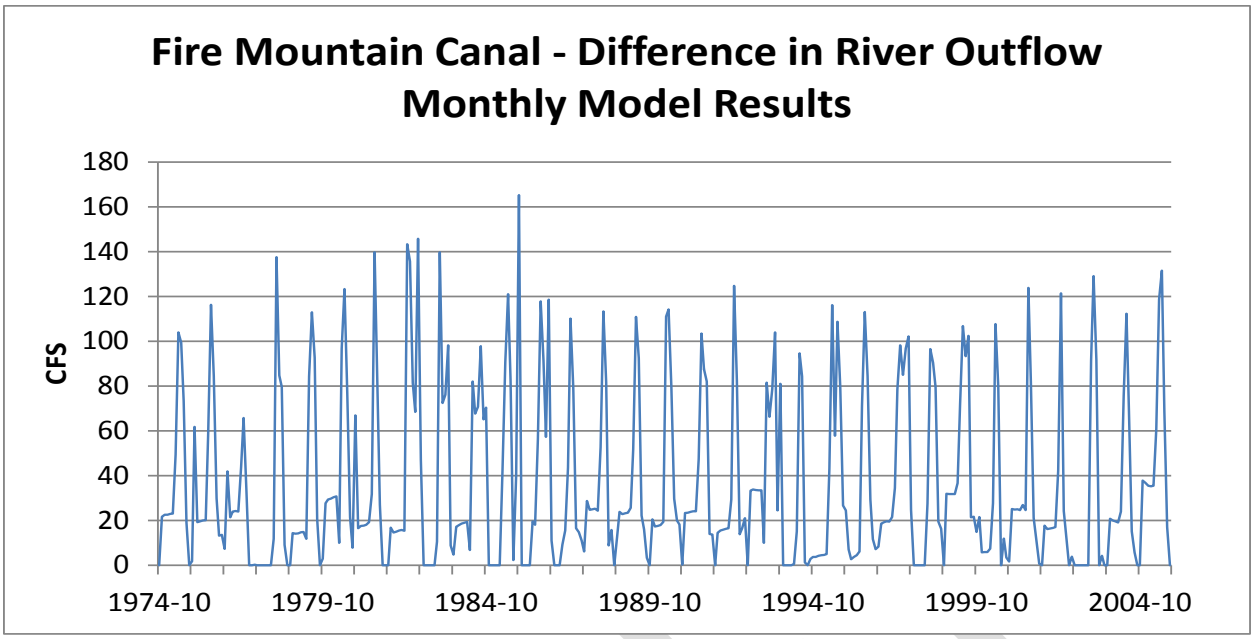
DRAFT

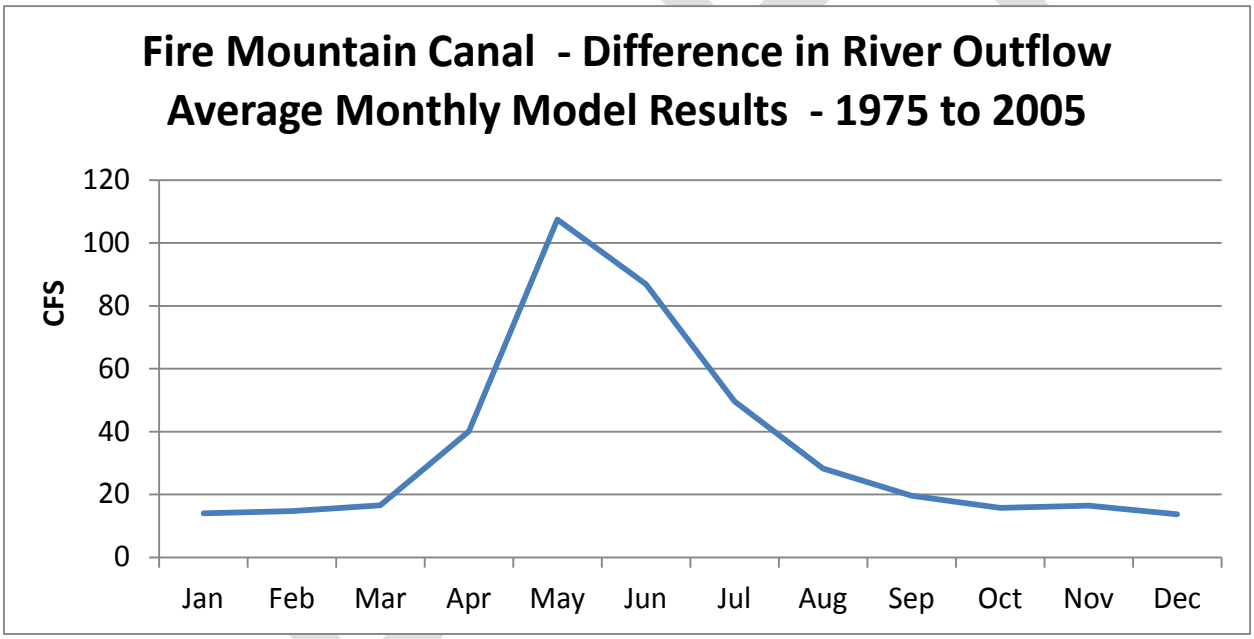

Fire Mountain Canal - Total Supply
Monthly Model Results
Acre-feet
12,000
10,000
8,000
6,000
4,000
2,000
0
1974-10
1979-10
1984-10
1989-10
1994-10
1999-10
2004-10
Baseline
70%

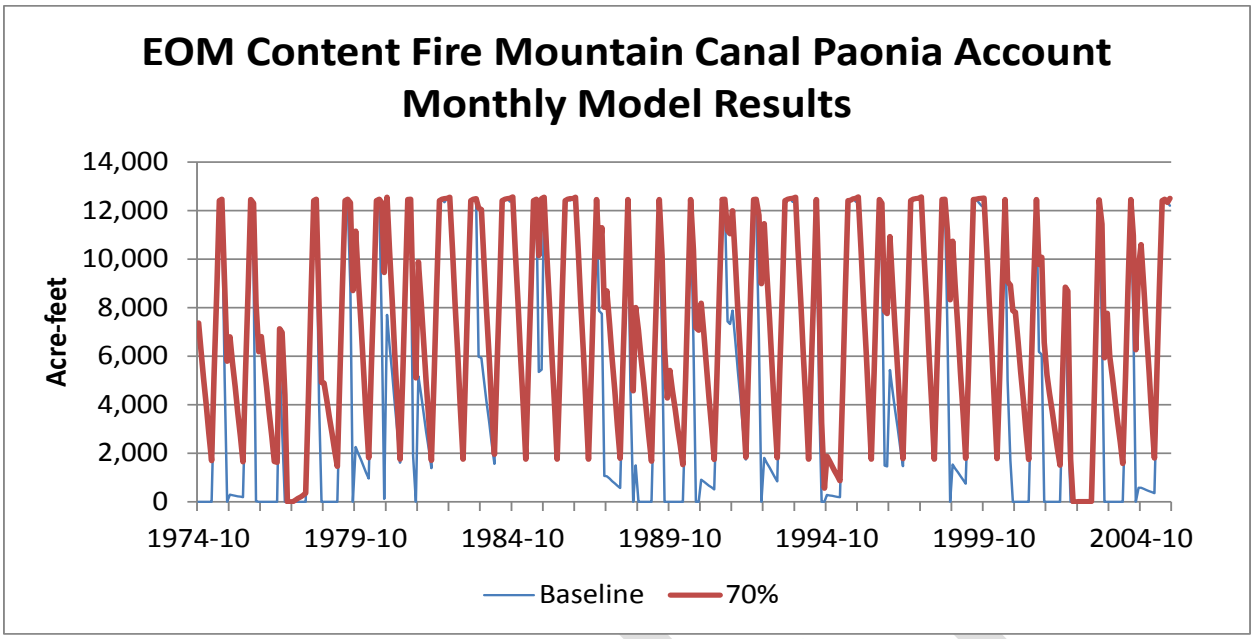

Fire Mountain Canal - Total Supply
Average Monthly Model Results - 1975 to 2005
Acre-feet
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Baseline
70% Eff

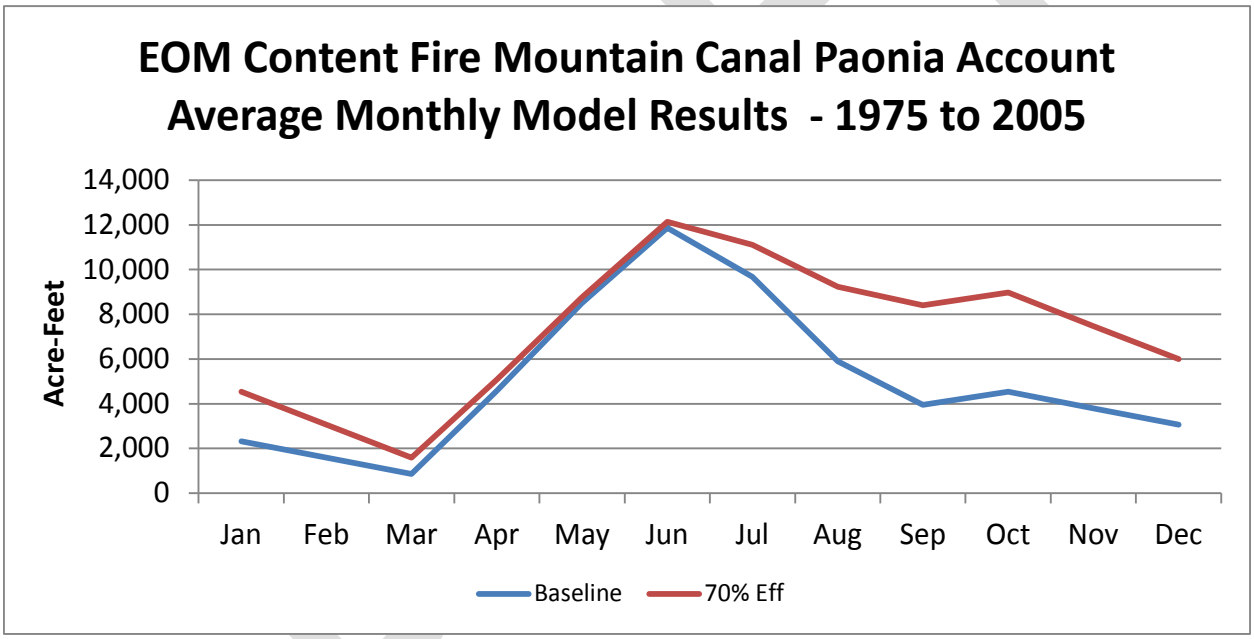

Fire Mountain Canal - Supply from Storage
Monthly Model Results
Acre-feet
12,000
10,000
8,000
6,000
4,000
2,000
0
1974-10
1979-10
1984-10
1989-10
1994-10
1999-10
2004-10
Baseline
70%


Fire Mountain Canal - Supply from Storage
Average Monthly Model Results - 1975 to 2005
Acre-feet
4,000
3,000
2,000
1,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Baseline
70% Eff


Fire Mountain Canal - Difference in River Outflow
Monthly Model Results
CFS
180
160
140
120
100
80
60
40
20
0
1974-10
1979-10
1984-10
1989-10
1994-10
1999-10
2004-10


Fire Mountain Canal - Difference in River Outflow
Average Monthly Model Results - 1975 to 2005
CFS
120
100
80
60
40
20
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec


EOM Content Fire Mountain Canal Paonia Account
Monthly Model Results
Acre-feet
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1974-10
1979-10
1984-10
1989-10
1994-10
1999-10
2004-10
Baseline
70%


EOM Content Fire Mountain Canal Paonia Account
Average Monthly Model Results - 1975 to 2005
Acre-Feet
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Baseline
70% Eff

Appendix 13: Project Analyses – Meridian Lake Enlargement

Approach

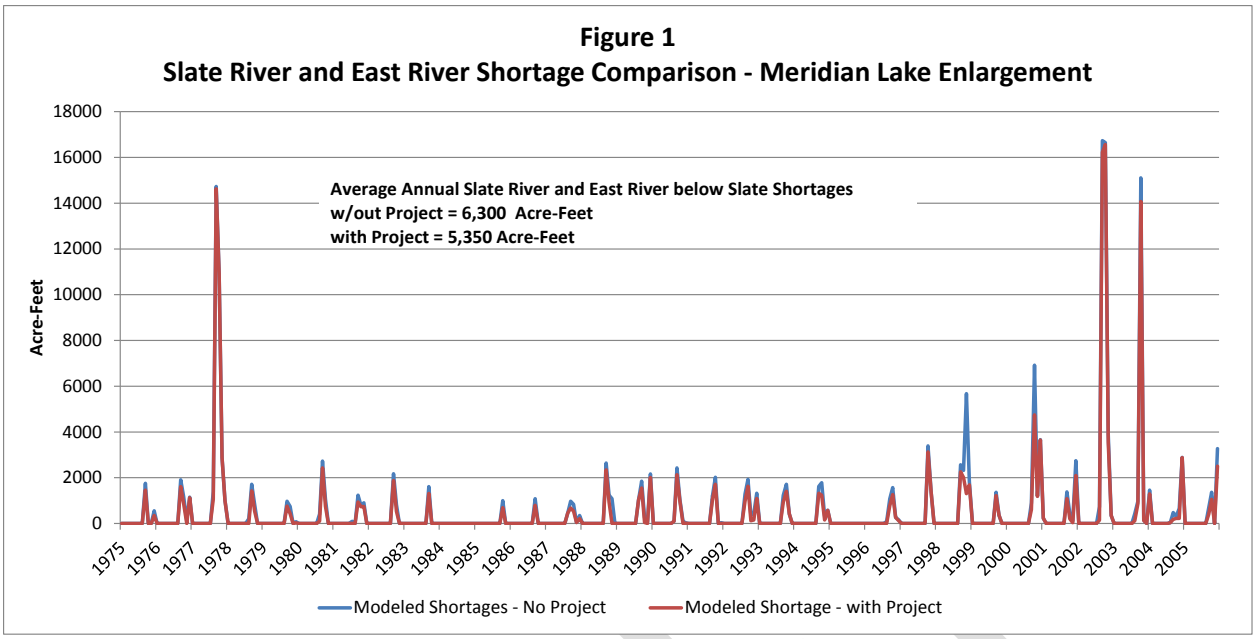
The following approach was taken to investigate the benefits of enlarging Meridian Lake from its current capacity of less than 500 AF to 1,381 AF. The project includes Meridian Lake off Washington Gulch, filled from a carrier ditch with a maximum 15 cfs capacity. The reservoir would provide late season supply to irrigation diversions on Slate River and East River downstream of the confluence; domestic and augmentation requirements; and provide storage for fish and wildlife. The analysis was performed using the existing Gunnison River basin StateMod model with the following revisions:

1) Included an enlarged Lake Meridian with total of 1,391 AF capacity on Washington Gulch (Node ID = 593663). The reservoir was given two accounts: 1,101 AF for irrigation, domestic and augmentation uses and 280 AF for fish and wildlife uses. The volumes are based on the four reservoir storage rights and their associated uses.
2) Included a new diversion on Washington Gulch upstream of the reservoir (Node ID = 593663_C). The new canal serves as a carrier ditch to convey water from Washington Gulch Creek to the reservoir. The canal capacity was set to 15 cfs.
3) Provided operating rules that direct StateMod to carry water from Washington Gulch to the reservoir using the reservoir's individual rights and associated priorities, limited to the 15 cfs capacity of the carrier structure. Note that no losses were assigned.
4) Provided operating rules that direct StateMod to deliver water from the Meridian Reservoir irrigation account to meet "shorted" irrigation demands on Slate Creek and downstream demand on East River.

Results

Review of the model results focused on reductions in shortages to irrigation structures on the Slate River and East River downstream of the confluence with Slate River. Figure 1 shows the time-series of Slate River and East River shortages with and without the Meridian Lake enlargement project based on 1975 through 2005 historical hydrology. Demands are defined as the amount of water irrigators need to divert from the river, based on current irrigation practices, to meet a full crop supply throughout the irrigation season. **As noted, the model estimates that irrigation demands are shorted on average by 6,300 AF percent without the project. Shortages are reduced to 5,350 AF with the project. The largest reduction in shortages occurs during moderately dry years.**

Figure 2 shows average monthly shortages with and without the project. As shown, Meridian Lake enlargement provides benefit in terms of shortage reductions throughout the irrigation season. **Average annual diversions increase on Slate River and East River by 950 acre-feet.**



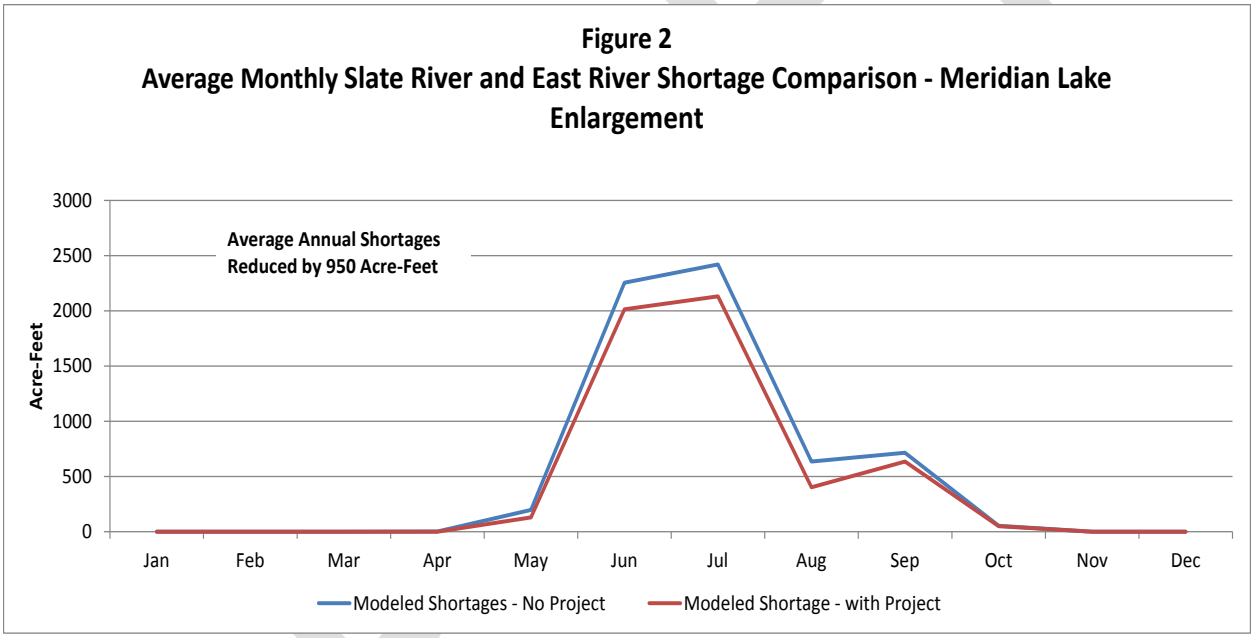
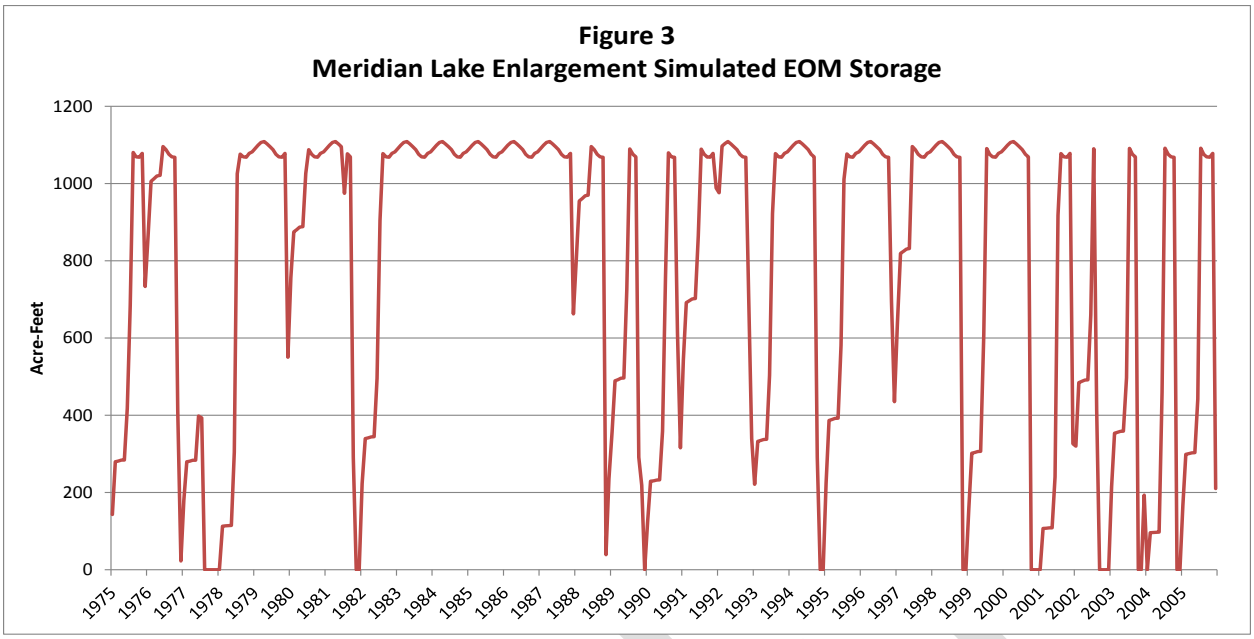
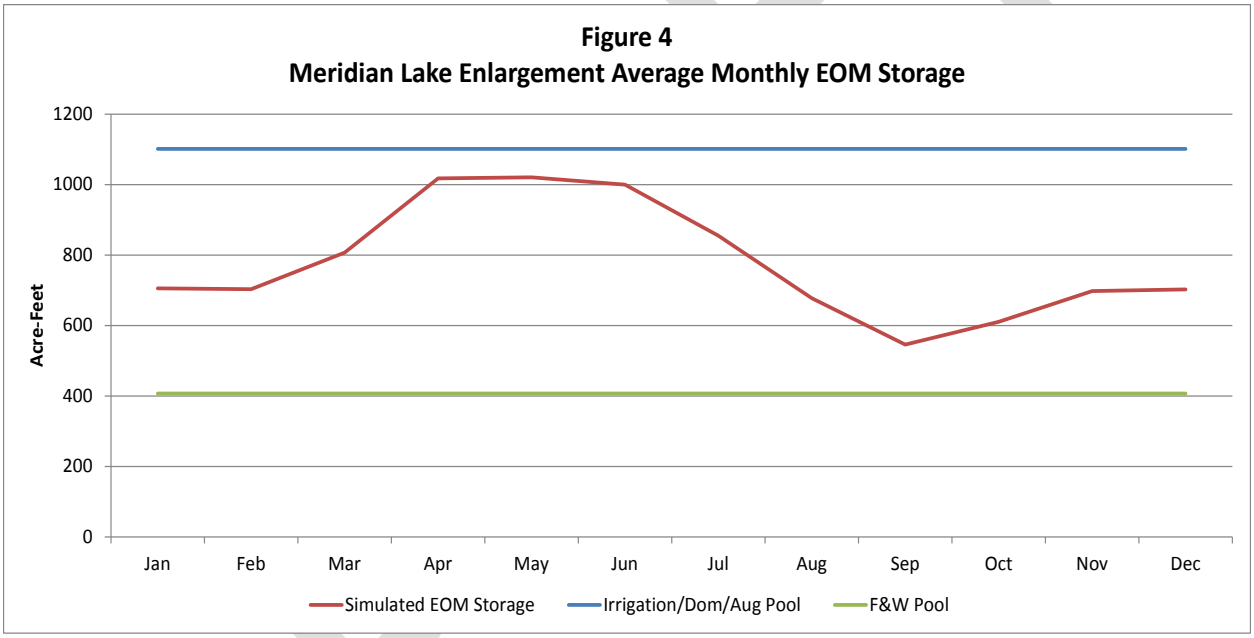


Figure 3 shows the simulated monthly reservoir contents. As shown, **the irrigation account is fully used during dry and average years**. **In wet years, for example the mid-1980s, there would be water available in the reservoir for other uses**. Figure 4 shows the average monthly pattern of reservoir content. As shown, the reservoir begins filling in the fall after the irrigation season, then is able to complete the fill in most years during April and May.





Because the reservoir was able to fill most years, further analysis was performed to determine if a larger reservoir could meet additional shortages. Based on the estimated natural flow in Washington Gulch, it does not appear that additional flow is available most years to store in an increased enlargement.

An operating rule directing StateMod to release water from the fish and wildlife account was not included; however the instream flow on Slate River benefited from releases for downstream irrigation. Shortages to the Slate River instream flow right decreased in July, August and September; however they increased during the storage months.

Appendix 14: Project Analyses – Cunningham Lake Rehabilitation

Approach

The following approach was taken to investigate the benefits of rehabilitating the existing Cunningham Lake Reservoir structure. The 80 acre-feet reservoir is not currently used irrigation due to structural limitations. The project includes an off-channel reservoir (Cunningham Lake Reservoir) filled from Little Mill Creek Ditch. The reservoir would provide late season supply to irrigation diversions below the reservoir outlet on Mill Creek that provide habitat for Sage Grouse. The analysis was performed using the existing Gunnison River Basin StateMod model with the following revisions:

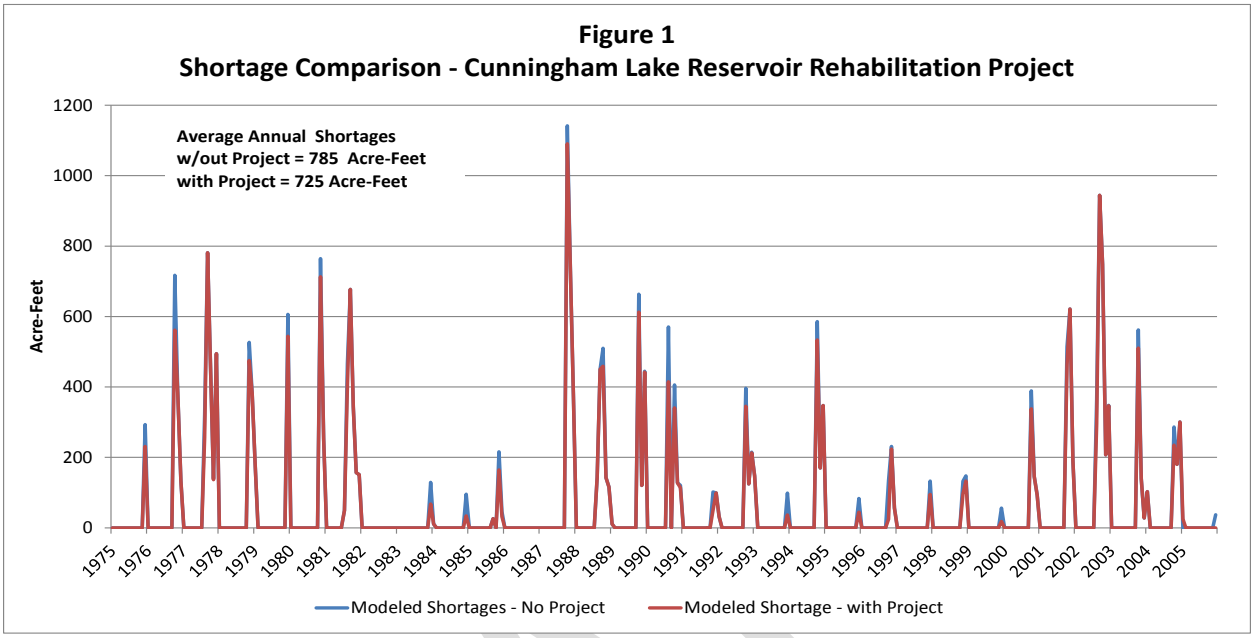
5) Included the 80 AF "off-channel" reservoir (Node ID = 593660) off Mill Creek. The reservoir was given one irrigation account.
6) Included Little Mill Creek Ditch (Node ID = 590982). The new canal serves as a carrier ditch to convey water from Mill Creek to the reservoir using the existing 5.75 cfs water right with the 1924 adjudication date. The canal capacity was set to 5.75 cfs.
7) Provided operating rules that direct StateMod to carry water from Mill Creek to store in Cunningham Lake Reservoir. Note that no losses were assigned; i.e. it was assumed the canal would be lined.
8) Provided operating rules that direct StateMod to deliver water from Cunningham Lake Reservoir to meet late season "shorted" irrigation demands under two ditches on Mill Creek (McGlashan South Side and McGlashan North Side ditches) and two ditches on Ohio Creek (Hinkle Irrigation and Hinkle Hamilton ditches) that provide habitat for Sage Grouse.

Results

Review of the model results focused on reductions in shortages to irrigation structures served by the Cunningham Lake Reservoir. Figure 1 shows the time-series of shortages for the two McGlashan ditches with and without the Cunningham Lake Reservoir Rehabilitation project based on 1975 through 2005 historical hydrology. Demands are defined as the amount of water irrigators need to divert from the river, based on current irrigation practices, to meet a full crop supply throughout the irrigation season. **As noted, the model estimates that irrigation demands are shorted on average by 785 AF without the project. Shortages are reduced to 725 AF with the project. The largest reduction in shortages occurs during average and dry years.**

Figure 2 shows average monthly shortages with and without the project. As shown, Cunningham Lake Reservoir provides benefit in terms of shortage reductions during the late

irrigation season months (July, August and September). **Average annual diversions under the four ditches increase by 60 acre-feet.**



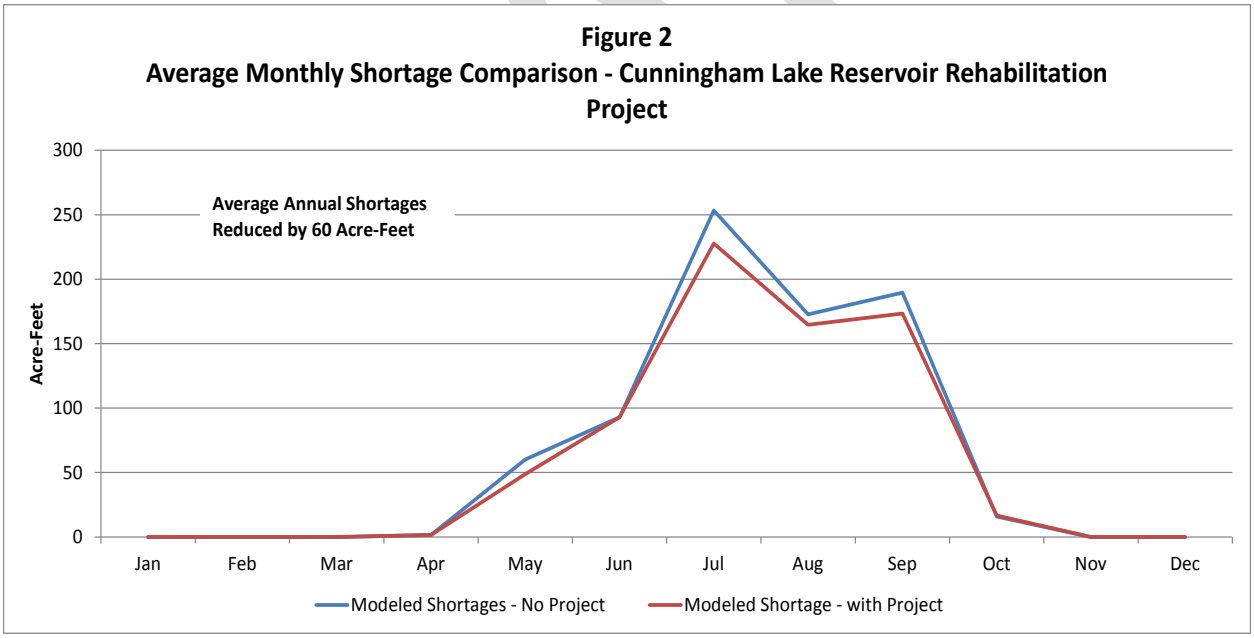


Figure 3 shows the simulated monthly reservoir contents. As shown, **the irrigation account is fully used during most years**. **Only in extremely wet years, for example in 1986, there would be water available in the reservoir for other uses**. Figure 4 shows the average monthly pattern of reservoir content. As shown, the reservoir begins filling in the fall after the irrigation season, then is able to complete the fill in most years during March and April.

Figure 3
Cunningham Lake Reservoir Simulated EOM Storage

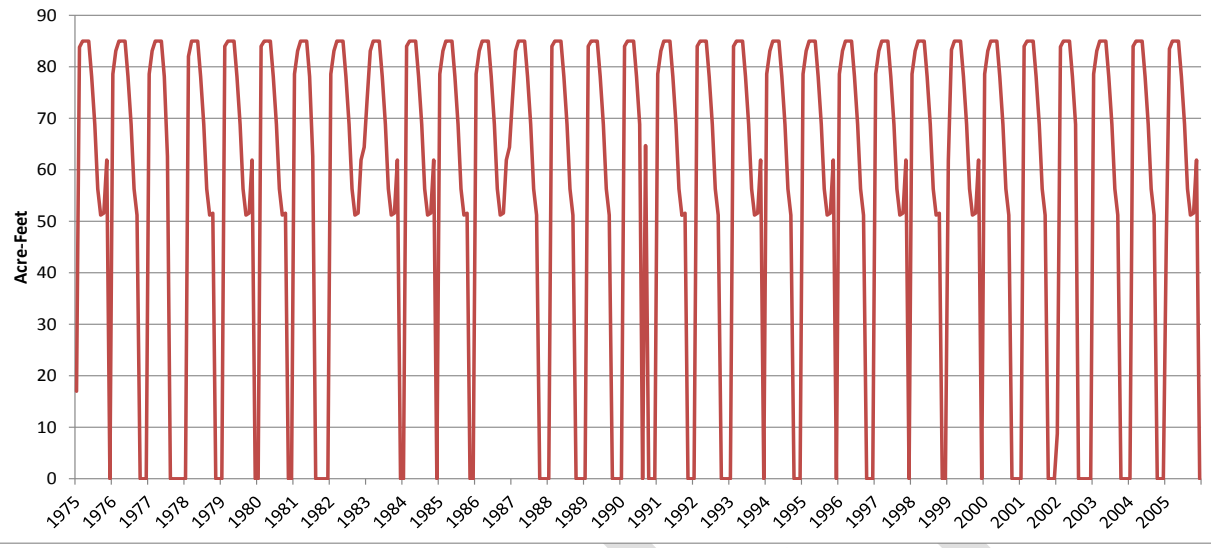
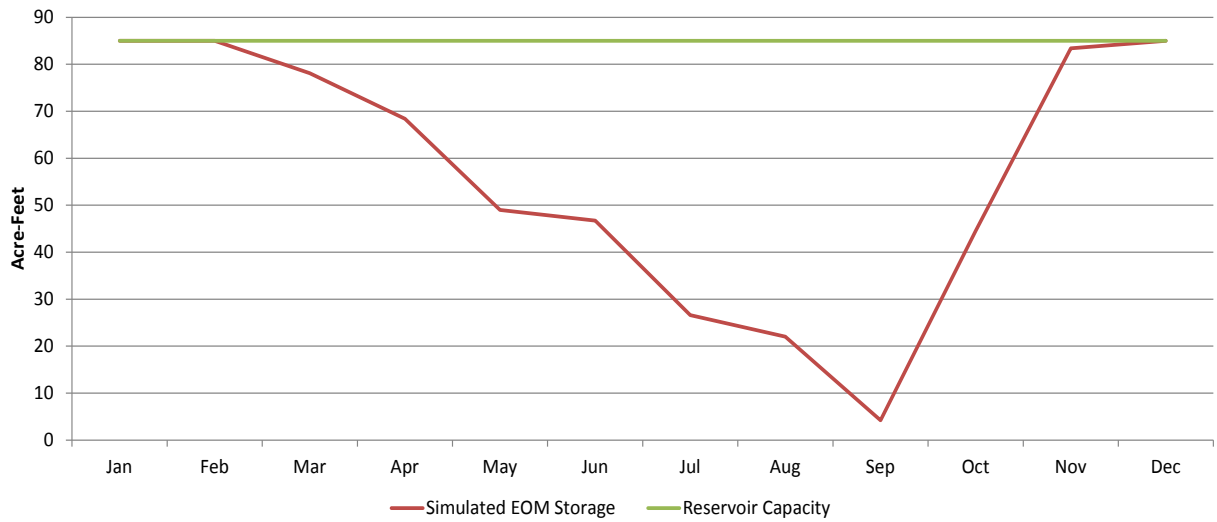


Figure 4
Cunningham Lake Reservoir Average Monthly EOM Storage



Because this project would rehabilitate and existing reservoir, further analysis was not performed to determine if a larger reservoir could meet additional shortages.

Appendix 15: Project Analyses – Upper Long Branch Reservoir

Approach

The following approach was taken to investigate the benefits of the Long Branch Reservoir project. The project includes Upper Long Branch Reservoir on the Long Branch tributary to Tomichi Creek. The reservoir would be filled from available snowmelt on the tributary and would provide supplemental water to irrigation diversions on Long Branch and Tomichi Creek primarily downstream of the confluence. The analysis was performed using the existing Gunnison River basin StateMod model with the following revisions:

9) Included Upper Long Branch Reservoir with total of 1,500 AF capacity on Long Branch (Node ID = LB_Res). The reservoir was modeled with a single irrigation account.
10) Provided a 1,500 AF storage right with a priority just senior to the Aspinall Unit storage and power right; the storage right is the most junior right on Tomichi Creek.
11) Provided operating rules that direct StateMod to deliver water from the Upper Long Branch Reservoir to meet "shorted" irrigation demands on Long Branch, and both upstream and downstream of the Long Branch tributary on Tomichi Creek.

Results

Review of the model results focused on reductions in shortages to irrigation structures on the Long Branch and Tomichi Creek.

Figure 1 shows the time-series of Long Branch and Tomichi Creek shortages with and without the Upper Long Branch Reservoir project based on 1975 through 2005 historical hydrology. Demands are defined as the amount of water irrigators need to divert from the river, based on current irrigation practices, to meet a full crop supply throughout the irrigation season. **As noted, the model estimates that irrigation demands are shorted on average by 16,900 AF without the project. Shortages are reduced to 15,000 AF with the project. The largest reduction in shortages occurs during moderately dry years.**

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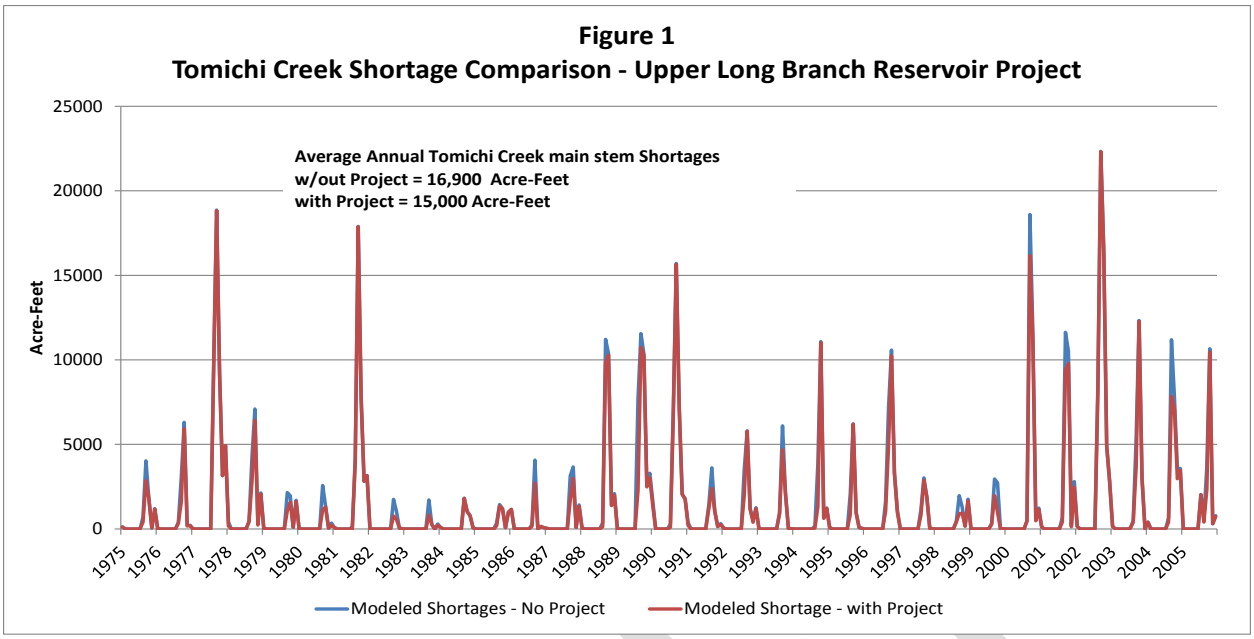


Figure 2 shows average monthly shortages with and without the project. As shown, Upper Long Branch Reservoir provides benefit in terms of shortage reductions only during the early irrigation season (May and June). In every year, the reservoir is empty by the end of July. **Average annual diversions increase on Long Branch and Tomichi Creek by 1,900 acre-feet.**

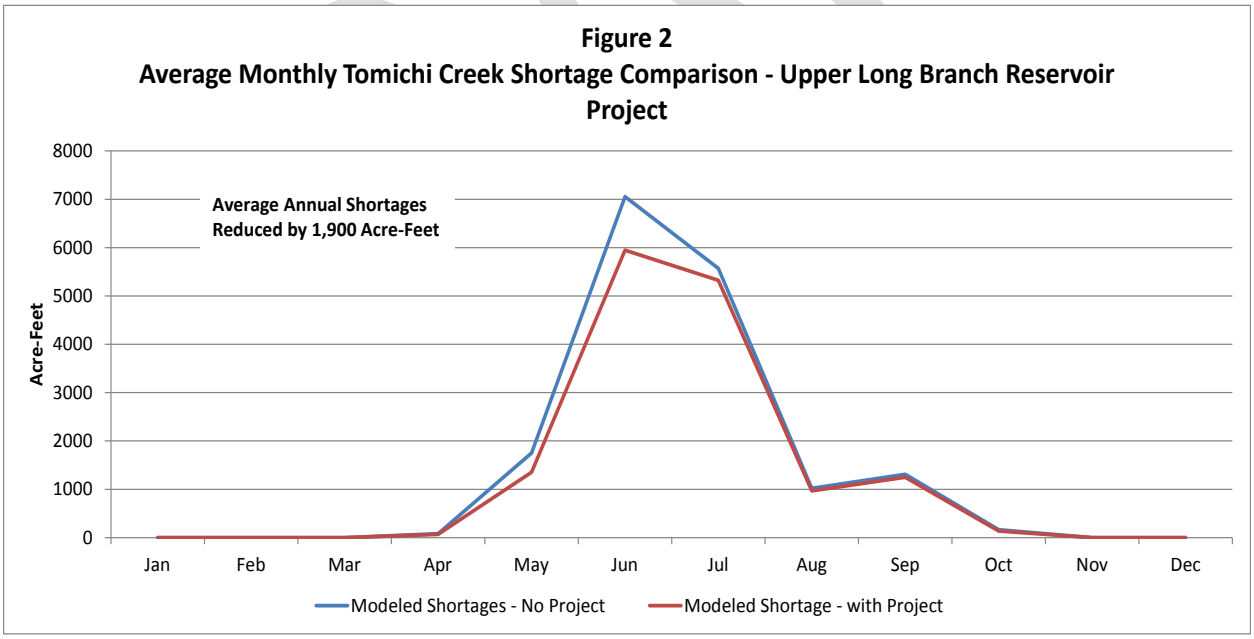


Figure 3 shows the simulated monthly reservoir contents. As shown, **the reservoir is fully used every year during the simulation**.

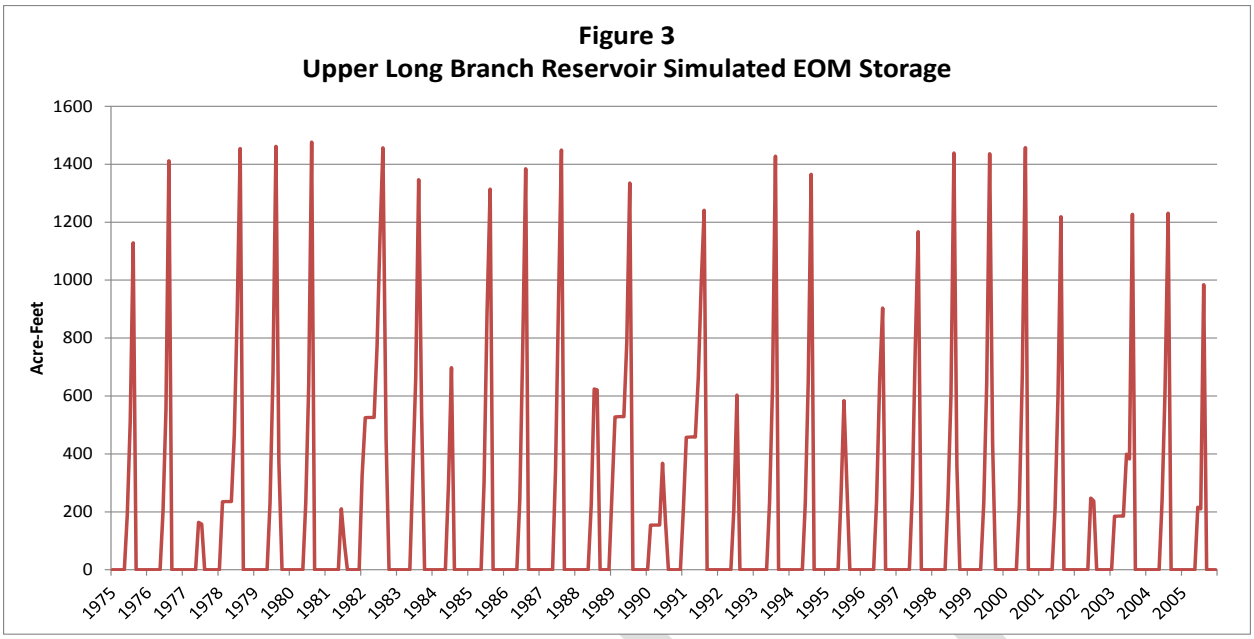
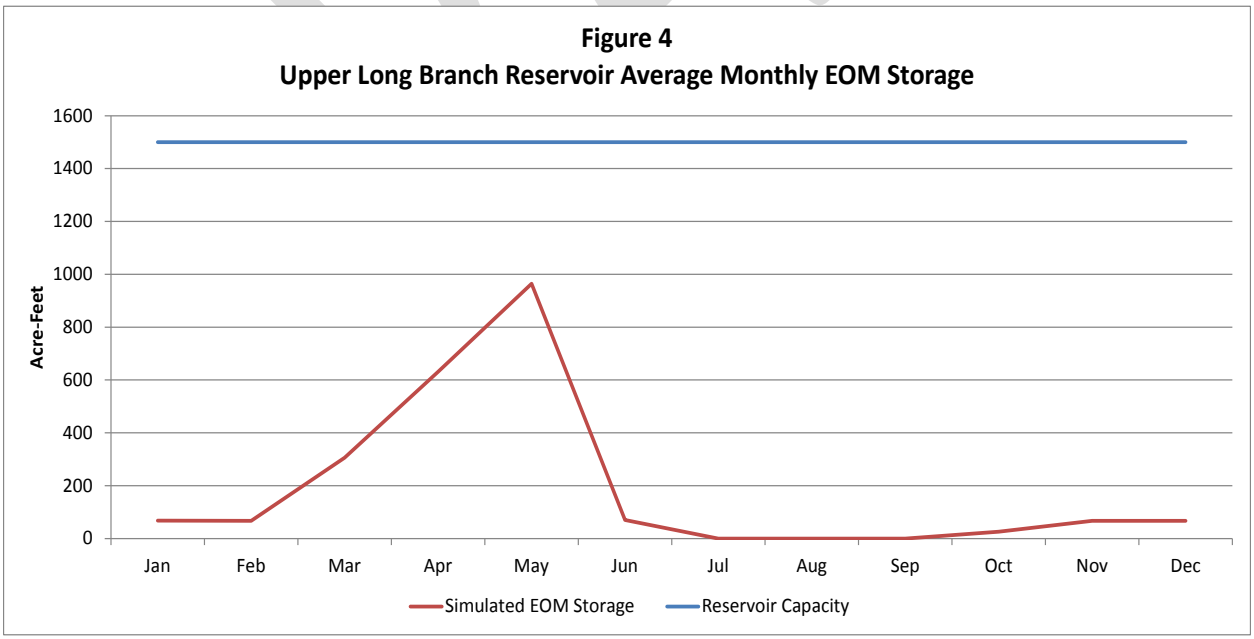


Figure 4 shows the average monthly pattern of reservoir content. As shown, there is water available to store some water in the fall, but the reservoir primarily fills from March through May. **The reservoir is only able to fill to its 1,500 AF capacity about 10 years out of the 30 year simulation period.** There is physical and legally available water to store up to 1,200 AF 20 years out of the 30 year simulation period. The average content shown in Figure 4 is influenced by the **8 years when the reservoir cannot even fill to 50 percent capacity.**



Because the reservoir was unable to fill most years, further analysis was performed to determine if a smaller reservoir could provide the same yield to reduce shortages. A 1,200 AF

reservoir provided less supply to reduce shortages; 1,600 AF per year compared to 1,900 AF per year.

Note that although the model was directed to provide supply to any ditch experiencing shortages upstream or downstream on Tomichi Creek, most water was delivered by exchange to upstream ditches. These ditches are called out earlier by downstream senior ditches; therefore there is both demand and exchange potential during May and June. By July when the downstream senior ditches also begin experience shortages, the reservoir is empty and cannot provide benefits.

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Appendix 16: Project Analyses – Farris Creek Project

Approach

The following approach was taken to investigate the benefits of developing the Farris Creek Reservoir Project. The project includes 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 and Farris Creek. The analysis was performed using the existing Gunnison River basin StateMod model with the following revisions:

12) Added a "combined" reservoir with a single 3,000 AF account located on Farris Creek (Node ID = 593602). This is a reasonable approach because there does not appear to be significant inflow between the two reservoir sites.
13) Provided a 3,000 AF storage right with a priority just senior to the Aspinall Unit storage and power right; the storage right is the most junior right on Slate River and its tributaries.
14) Provided operating rules that direct StateMod to deliver water from Farris Creek Reservoir(s) to meet "shorted" irrigation demands on Slate River both upstream and downstream of the reservoir location.

Results

Review of the model results focused on reductions in shortages to irrigation structures on the main stem of East River both above and below the Farris Creek tributary.

Figure 1 shows the time-series of main stem Slate Creek shortages to demands with and without the Farris Creek Reservoir project based on 1975 through 2005 historical hydrology. Demands are defined as the amount of water irrigators need to divert from the river, based on current irrigation practices, to meet a full crop supply throughout the irrigation season. **As noted, the model estimates that irrigation demands are shorted on average by 8,500 AF without the project. Shortages are reduced to 6,800 AF with the project. The largest reduction in shortages occurs during average and dry years.**

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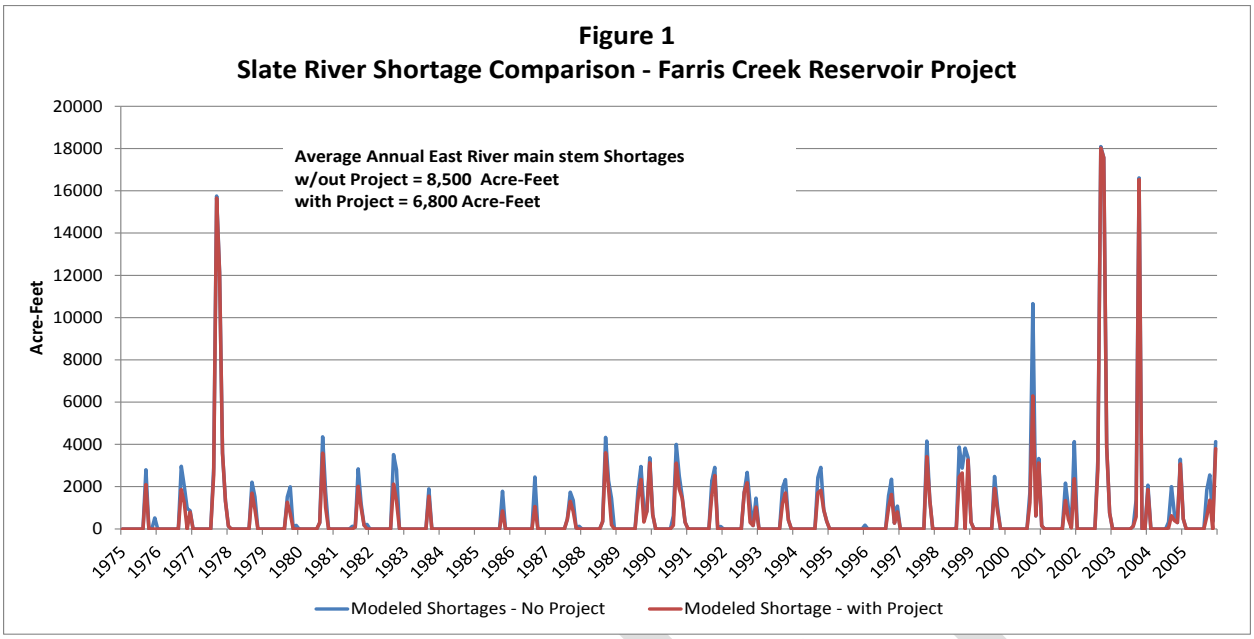


Figure 2 shows average monthly shortages with and without the project. As shown, Farris Creek Reservoir(s) provides benefit in terms of shortage reductions primarily during June and July, with some benefits during the later irrigation season months (August and September). **Average annual diversions increase on the main stem of East River by 1,700 acre-feet.**

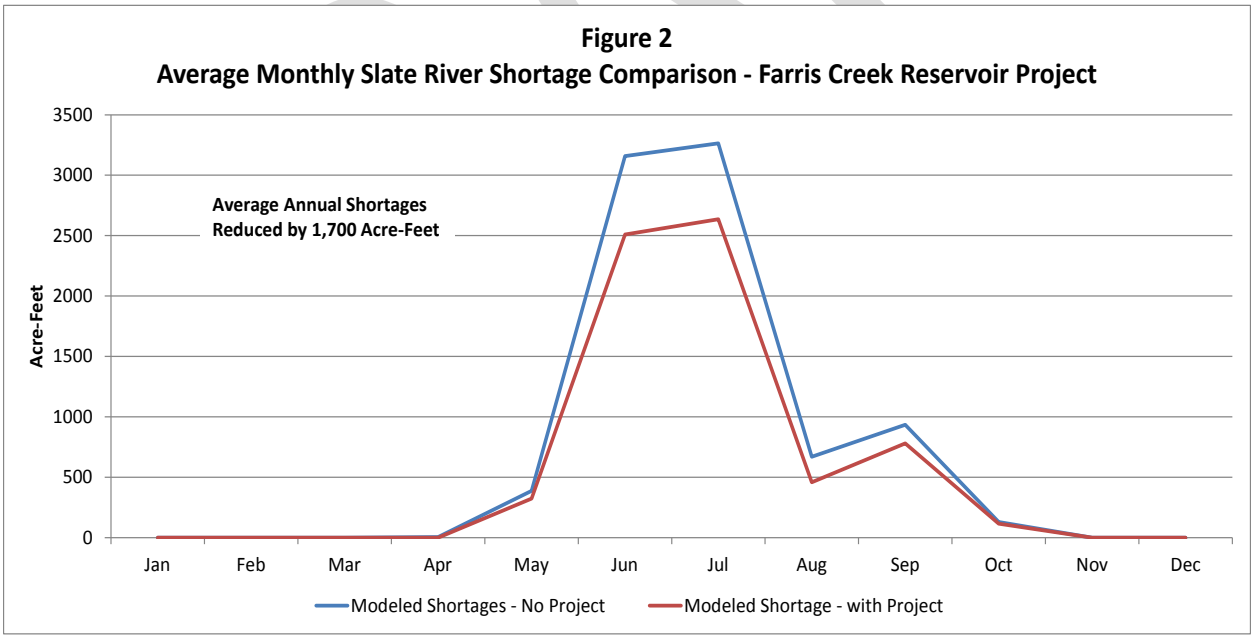


Figure 3 shows the simulated monthly reservoir contents. As shown, **the reservoir is fully used during dry and average years**. **In wet years, for example the mid-1980s, there would be water available in the reservoir for other uses**.

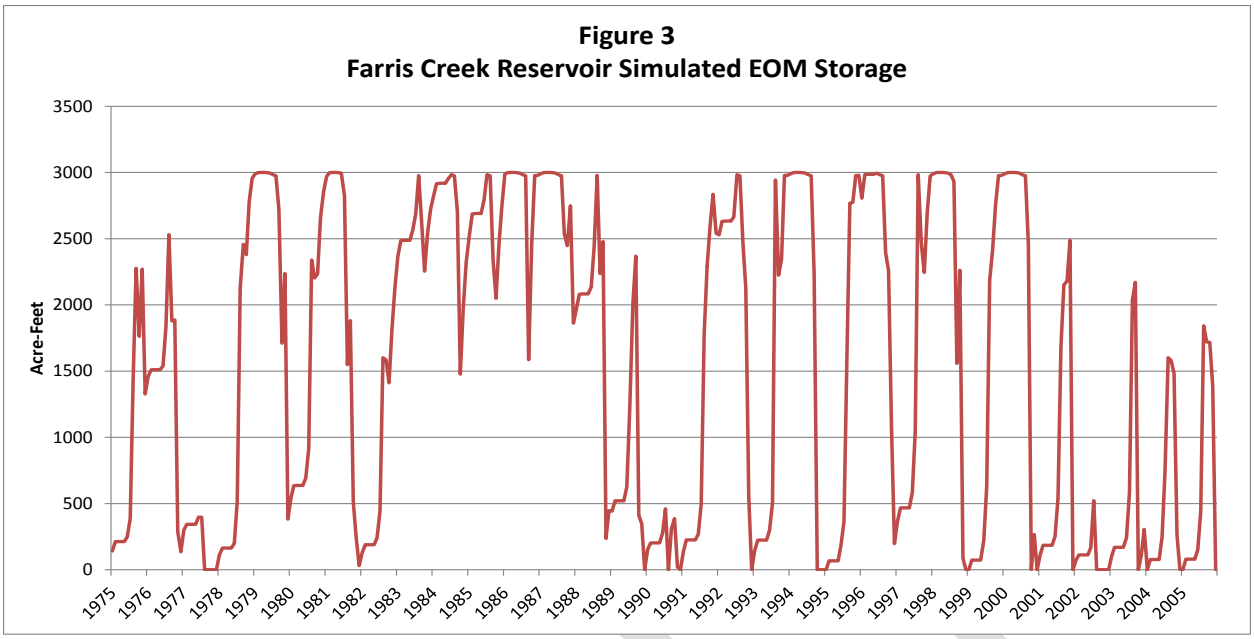
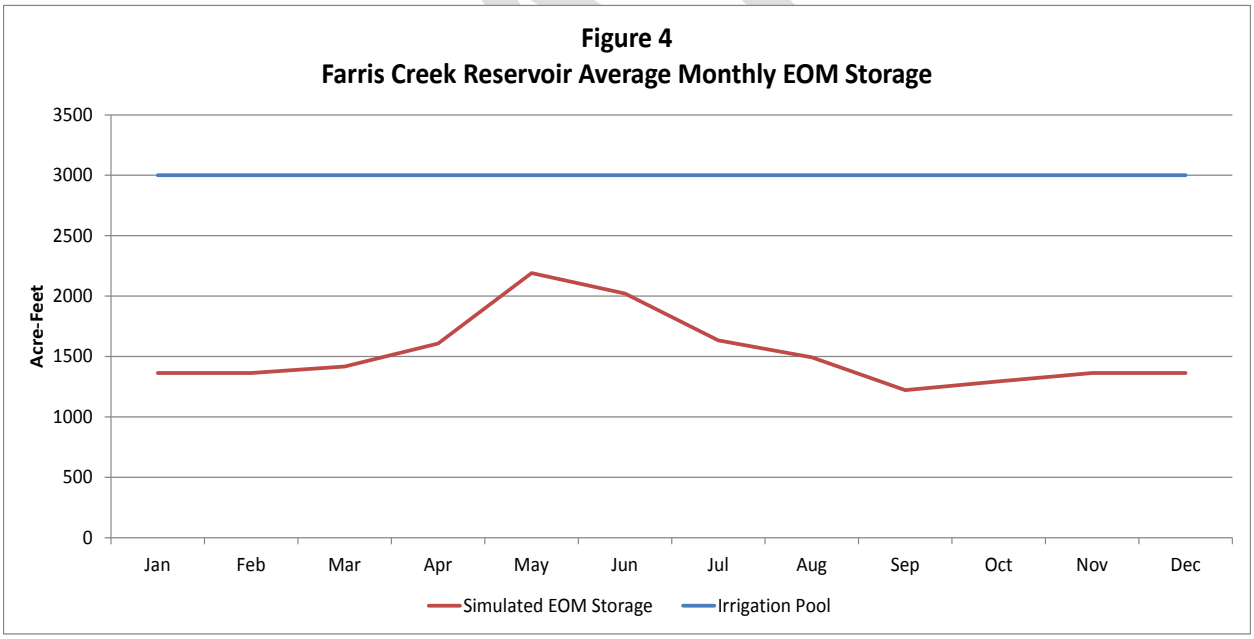


Figure 4 shows the average monthly pattern of reservoir content. As shown, the reservoir generally fills in April and May.



The reservoir was unable to fill in about half of the analyses years. There may be opportunity to further fill using a feeder ditch from Brush Creek; however the decree does not list either of these tributaries as an additional source.

Appendix 17: Project Analyses – Gunnison River Flow below Redlands Canal

Approach:

1) Use daily measured streamflow for the Gunnison River below Redlands Canal gage. Note that the measurements have been verified for the period 2004 through 2012 and are available from the DWR website under gage ID GUNREDCO. For the period 1995 through 2003, the measurements are still considered provisional (i.e. have not been verified). These data are available on the DWR website as Administration Flow.
2) The daily flow was compared to the FSEIS baseflow requirements (Figure 1) and the number of days per year (1995 through 2005) in which the flow was less than required was tabulated (Figure 2). In addition, the percent of days on average for each month over the 1995 through 2012 period when the flow was less than baseflow requirements were calculated (Figure 3).
    a. Base flow requirements below Redlands Diversion Dam are generally 300 cfs each month
    b. In Moderately Dry years (2000, 2001, 2003, 2004, 2007 and 2010), bypass flows can be reduced in months except June, July, and August.
    c. In Dry years, (2002, 2012) bypass flows can be reduced in months except June and July.
3) When baseflow requirements were not met based on historical streamflow measurements, the releases from storage to meet the flows were estimated (Figure 4).

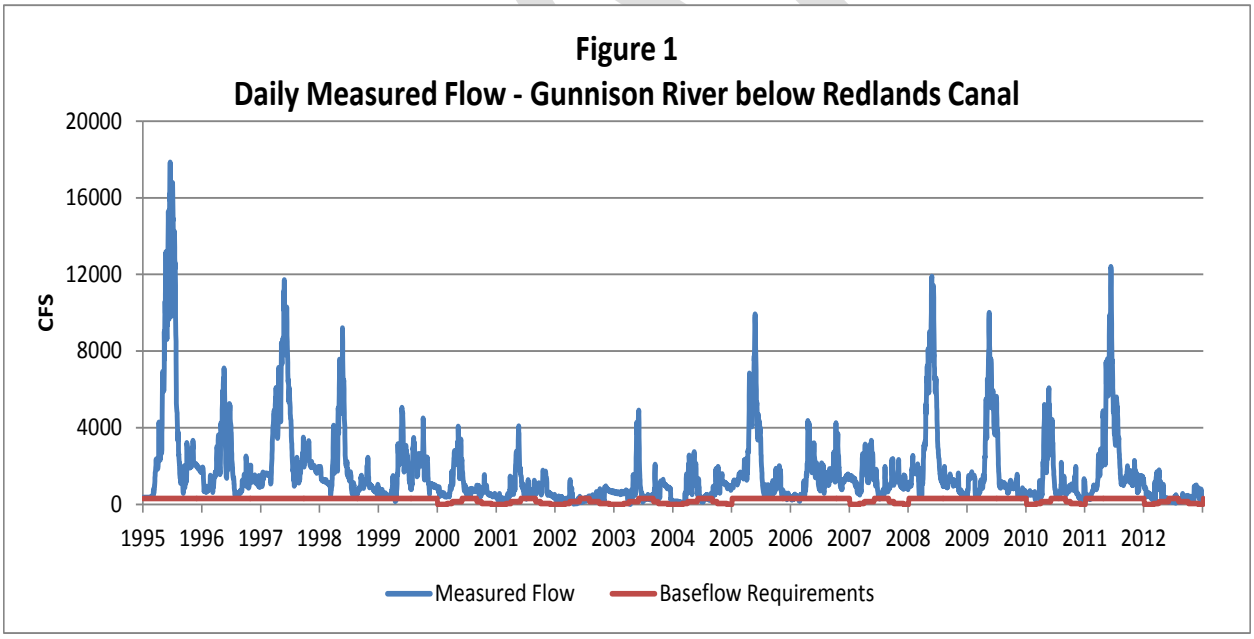


Figure 2
Number of Days per Year that Measured Streamflow at Gunnison River below Redlands Canal was less than Baseflow Requirements

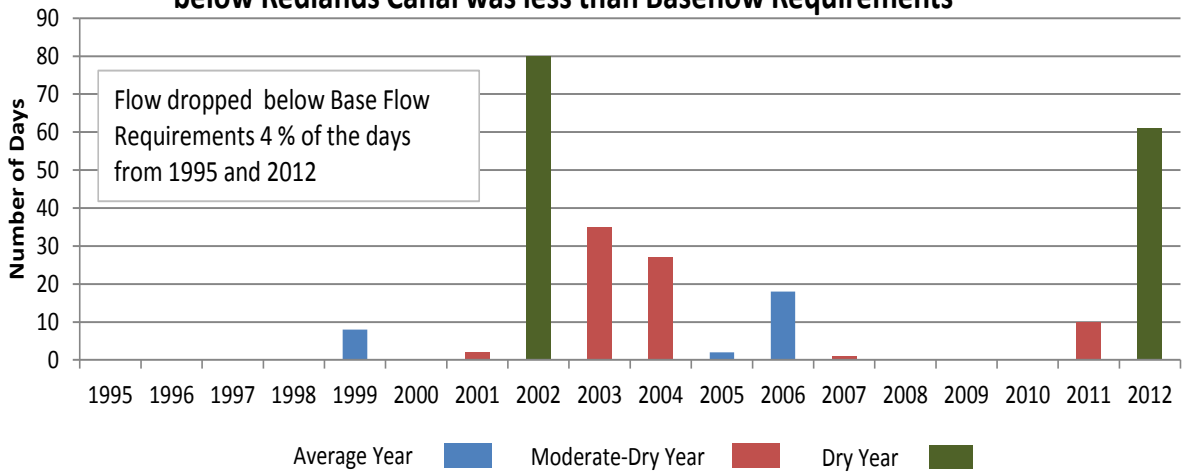
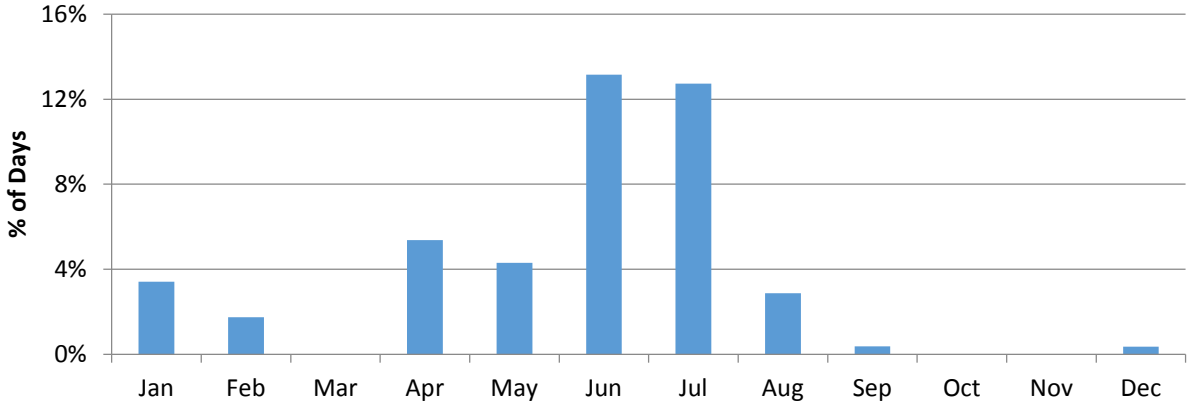


Figure 3
Average Percent of Days per Month that Measured Streamflow at Gunnison River below Redlands Canal was less than Baseflow Requirements (1995 to 2012)



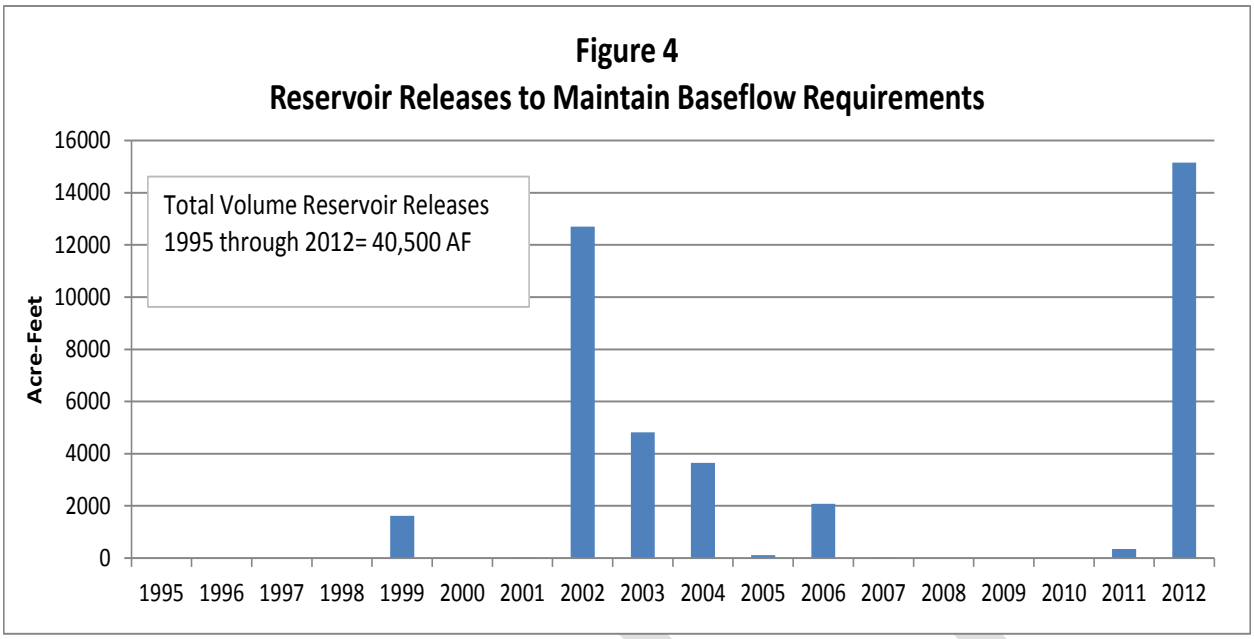


Figure 4
Reservoir Releases to Maintain Baseflow Requirements
Total Volume Reservoir Releases
1995 through 2012= 40,500 AF
Acre-Feet
16000
14000
12000
10000
8000
6000
4000
2000
0
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012

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