Colorado Basin Implementation Plan

Collaborating on Colorado's Water Plan

APRIL 17, 2015

FOREWORD BY THE CHAIR OF THE COLORADO BASIN ROUNDTABLE

"The Colorado Basin Roundtable's Basin Implementation Plan takes a firm position that when it comes to the Colorado River, another big transmountain diversion of water from our basin to the Front Range of Colorado would damage the regional recreation-based economy and heap further impacts on the environment and agriculture.

HERE'S WHY: Between 450,000 and 600,000 acre feet of Colorado River water already permanently leaves the basin annually through existing transmountain diversions. It's 100 percent gone, none of it coming back into the system through return flows. What's more, a number of the Roundtable's constituents have signed or are working on prospective agreements that could move up to another 140,000 acre feet through various projects. In other words, we already face a transmountain-sized project.

HERE'S THE WORRY: Existing streamflows are critical to sustaining the recreational economy in our basin, which is home to the state's most popular ski resorts as well as robust rafting, fishing, and hunting industries and other sought after outdoor experiences. Agriculture in the basin, especially in the Grand Valley area, remains a vital pursuit of statewide interest that depends on water supply. Further degraded streamflows threaten higher levels of pollutants.

HERE'S ANOTHER WORRY: If Colorado overdevelops the river system beyond Colorado River Compact of 1922 legal limits, curtailments loom for many water users, perhaps most significantly for current transmountain diverters. Colorado already knows this compact lesson from other in-state basins: over development of a river ultimately means undevelopment of agriculture to deal with the legal consequences.

For these and many more reasons spelled out in this document, we discourage the assertion that a transmountain diversion is in this state's best interest. Still the Colorado Constitution does not permit the legal argument of "not one more drop." So we make the case that Colorado should take immediate steps to best use the water it already has. Painful deliberations about per capita consumption, land use and landscaping lie ahead."

Jim Pokrandt,
Colorado River Water Conservation District
and Chair of the Colorado Basin Roundtable

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EXECUTIVE SUMMARY

Introduction

Colorado is facing significant water supply challenges to meet future demands. These challenges are driven by a growing population, agricultural needs, protecting and restoring river health, and a growing recreation economy. In response, Governor Hickenlooper issued an Executive Order (EO) in 2013 calling for the Colorado Water Conservation Board (CWCB) to work with the nine Basin Roundtables, the Inter Basin Compact Committee (IBCC), and other stakeholders to develop Colorado's first Water Plan. Each of the nine Basin Roundtables were charged with (Figure 2) developing a Basin Implementation Plan (BIP), identifying how future municipal, industrial, agricultural, recreational and environmental water needs will be met through existing or new projects, policies, and processes to the year 2050. The Governor's EO required that the Colorado Water Plan incorporate the following key water values:

- 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
- A strong environment that includes healthy watersheds, rivers and streams, and wildlife

Initial drafts of the Basin Implementation Plan were due in July of 2014 with final drafts due in April 2015. What follows is the outgrowth of countless Roundtable meetings, robust public outreach including 45 community meetings reaching over 900 stakeholders and countless hours of work by consultants, Roundtable members and the public.

Figure 2. Boundaries of the Nine Basin Roundtables

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Introduction [cont.]

The Colorado Basin Roundtable (CBRT) submits this Basin Implementation Plan (BIP) as its contribution to Colorado's Water Plan. In Governor John Hickenlooper's May 2013 Executive Order he called for the state to create a water plan that proposes water-supply solutions for Colorado's growing population, which according to the State Demographer could double to 10 million people by 2050. The Colorado Water Plan will be the culmination of more than nine years of work by nine basin Roundtable across the state, including the Colorado Basin Roundtable.

A primary objective of the BIP is to look inside the six counties for projects and processes that will define the mainstem Basin's water supply future and environmental needs. This BIP does that and it is a first-time aggregation of the many and varied ideas, projects, conditional water rights and environmental concerns that exist across the Basin. It does not favor one project over another but focuses on the needs of consumptive and non-consumptive uses within the Basin. While focusing on intrabasin needs by necessity it also addresses other basins looking to the Colorado River system to help solve their water supply Gaps, by moving additional Western Colorado water across the Continental Divide to the Front Range. Current and future proposed projects by out of basin users are referred to as Transmountain Diversions, or TMDs within this BIP.

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Document Map

Following guidance from the CWCB the Colorado BIP sought to streamline all plan components for easy reconciliation into the CWP. The remainder of this document is organized by the following sections:

Colorado Basin Vision

Executive Summary

Section 1 – About the Basin

Section 2 – Public Outreach – Basinwide Themes

Section 3 – Needs Analysis – Regional Information and Breakdown

Section 4 – Basinwide Projects – Regional Tiering

Section 5 – Interbasin Reliance Report

Section 6 – Next Steps

CWB Guidance Section	CWB Guidance Section Description	Colorado BIP Section(s)
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2.1	Nonconsumptive Needs	Section 3.8
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3.1	Current Basin Water Operations and Hydrology	Section 3
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4	Projects and Methods	Section 4

CWB Guidance Section	CWB Guidance Section Description	Colorado BIP Section(s)
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4.2	Watershed Health	Section 1.2
4.3	Conservation Projects and Methods	Section 3 Section 6
4.4	New Multi-Purpose, Cooperative and Regional Projects and Methods	Section 6
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5	Implementation Strategies for the Projects and Methods	Section 5
6	How the Plan meets the Roundtable Goals and Measurable Outcomes	Section 5

EXECUTIVE SUMMARY

Colorado Basin Vision

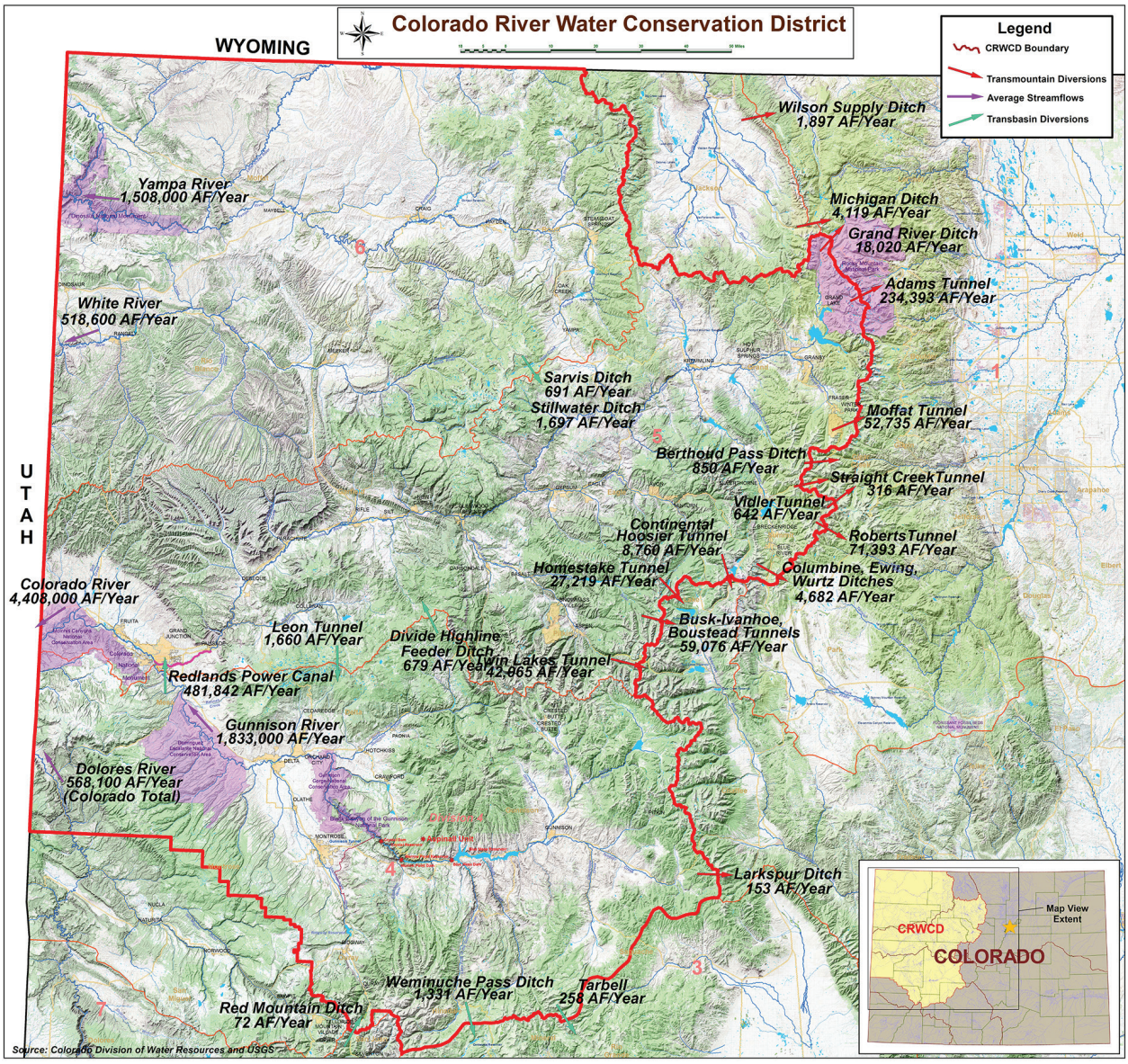
The Colorado River Basin Roundtable "envisions a Colorado River basin that is home to thriving communities benefiting from vibrant, healthy rivers and outstanding water quality that provides for all of the Colorado Basin's needs. We acknowledge the interdependence of the varied Basin water users. Protecting the water and river flows that will ensure the future for all of us is a high priority. We also recognize that the influence of historic drought patterns, the uncertainty of climate change, population growth, energy development and Compact compliance are interwoven within this vision. Much of this vision's success depends on how we collectively adapt to these forces" (CBRT, 2011).

The Vision (CBRT, 2011) and the Western Slope Principles (NWCCOG, 2014a) have been incorporated into the Colorado River Basin's White Paper (CBRT, 2014); a document developed and adopted by the Colorado Basin Roundtable members in an effort to articulate their perspective on how to approach the statewide water planning process. These documents (located in Exhibit B) serve as the foundation for this BIP, representing the collective values of the Basin's citizens and stakeholders, their stories and how they are standing their ground, negotiating their positions, and educating their constituents, including their children and grandchildren.

EXECUTIVE SUMMARY

Overview

This document's strongest finding is that another major transmountain diversion (TMD) of water from the Colorado mainstem to Eastern Colorado should be prevented as damaging to our recreational economy, environment and agriculture. Within Colorado, 15 major TMDs already move water from Western Colorado to the Front Range and Eastern Colorado. 450,000 to 600,000 acre-feet (AF) of water annually leaves the Colorado River system to support municipalities and farms east of the Divide. The Colorado Basin is the State's primary "donor" basin. Another 120,000 to 140,000 acre-feet of water could be developed using existing infrastructure.



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Overview [cont.]

The Colorado River also supports cities and agriculture far beyond Colorado's boarders. The seven states in the Basin and the U.S. Bureau of Reclamation (BOR) collaborated on the Colorado River Basin Water Supply and Demand Study that was released in December 2012. The study concluded that water use in the Basin has begun to exceed supply, and the Gap between demand and water available to meet that demand will widen in the coming decades. Unless current trends change a shortage or Compact curtailment between now and the year 2050 appears likely.

Lake Powell could fall below levels where it could generate electrical power. At Mead, low water levels threaten the ability to supply water to Las Vegas, southern California and the large agricultural demands downstream. Potential mitigation actions include voluntary demand management (conservation and agricultural fallowing). This crisis foreshadows circumstances and actions that could occur under a Compact curtailment.

This concern is highlighted by the lessons of overuse and Compact actions that exist today in the Arkansas, Rio Grande and Republican basins. The message: over-development of the river means un-development of agriculture. The CBRT does not want to see Western Colorado agriculture disappear because of poor — or purposeful — water planning. Our recreational and agricultural sectors are linked. The recreational economy "floats" on senior agricultural water rights moving from the headwaters to the Grand Valley.

POLICY FRAMEWORK

At the core of the Policy Framework for the BIP is the CBRT Whitepaper adopted by the Roundtable at its December 2013 meeting and attached as Exhibit B. In addition, thirty local governments and special districts in the headwaters, seven counties in three different basins (Gunnison, Routt, Park, Pitkin, Eagle, Summit, and Grand Counties) endorsed the Western Slope Principles authored by the Northwest Colorado Council of Governments (NWCCOG) Water Quality/Quantity (QQ) Committee. The Grand Valley Water Users' Principles (Exhibit B) also provides guidance and informs the BIP.

The Western Slope Principles emphasize the importance of ensuring that the Colorado Water Plan does not threaten the Western Slope's water-dependent economic cornerstones: agriculture, resource extraction, recreation and tourism (Holm, 2013). The CBRT White Paper focuses on the future vision of the Basin and the impacts that another TMD would have on the Basin. Similarly the Grand Valley Water Users' Principles reinforce that another TMD is not an acceptable solution to the Grand Valley.

All water activity in the Colorado Basin, and in the Western Slope as a whole, affects all of Colorado as well as all downstream users and agreements beyond the state line. The Colorado River Basin is a thriving and diverse economic and natural asset to the entire state. Analyses show that between anticipated development, existing and future basin demands, climate

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Overview [cont.]

forecasts and historical water analysis, cumulative impacts to healthy rivers and streams, there is no real water available for reliable future water supply outside of the Basin. This BIP attempts to balance the clear policy objectives of a diverse user group while recognizing the strategic importance of the Colorado River to the future development and sustainability of the entire State.

The CBRT 2013 White Paper provides a framework for addressing future demands by other basins on the Colorado Basin. This framework includes:

- West Slope gap requirements are filled first, with as much reliability as can be provided without the threat of compact curtailment.
- A well-defined quantification of current undeveloped conditional trans-mountain rights and IPPs must be made prior to considerations of any new projects.
- The Front Range must be unequivocally prove that the water available for such diversion truly exists in a reliable and long term, sustainable measure without adversely affecting the West Slope economy and environment.
- Serious and meaningful Basin of Origin protections must be incorporated.
- There will be no further degradation or diminishment of West Slope stream and river ecosystems or recreational opportunity.
- There will be neither diminishment of existing West Slope agricultural activity and production, nor unnecessary constraints on agricultural expansion.
- Local control, land use regulation and policy, must be adhered to.
- The Shoshone Power Plant water right and operations remain intact, with flows as recognized in Senate Document 80 recognized and maintained.

The core principle is that a TMD should be the last not the first tool out of the box to deal with water supply shortages statewide. This principle is equally applicable to any basin, including the Colorado Basin where the focus is on meeting the needs of the Basin from resources within the Basin.

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The Colorado Basin Implementation Plan — Influenced by a Grassroots Process

The Colorado Basin Roundtable initiated an extensive Public Education and Outreach program in December of 2013. This effort included numerous Town Hall meetings, 20 Roundtable and project leadership team discussions, 30 one-on-one interviews with water providers, 45 public outreach presentations to City and Town Councils and several college forums. From Grand County to Mesa County the public emphasized the importance of not overusing the Colorado River beyond its sustainable carrying capacity and stressed the need to restore and protect the essential flows and water quality of the Colorado River. These outreach efforts were attended by more than 900 citizens across the seven regions of the Colorado River Basin, offering them the unique opportunity to voice their concerns and offer solutions on how to meet future water demands within Colorado River Basin well beyond 2050.

The extensive public outreach process was unparalleled and resulted in a wealth of information regarding the needs, hopes and aspirations of the largest river basin in the State. The prior work of the CBRT over the last nine years also served to inform and guide the development of the BIP including most notably the CBRT White Paper and the CBRT Vision Statement. While diverse in both geographic locations and localized needs six themes emerged as the guiding principles for the Colorado Basin Implementation Plan. The six Themes are:

- Ecosystem Health - Protect and Restore Streams, Rivers, Lakes and Riparian Areas
- Agriculture – Sustain, Protect and Promote Agriculture
- Safe Drinking Water – Secure and Protect drinking water for today and tomorrow
- Conservation - Encourage a High Level of Basinwide Conservation across all uses
- Land Use – Develop Water Conscious Land Use Strategies
- Basin Administration - Ensure Reliable and Predictable Basin Administration

A summary of the underlying importance of each theme is presented below. Additional detail regarding the development of these themes is provided in the Section 2.

THEME 1 — ECOSYSTEM HEALTH

PROTECT AND RESTORE STREAMS, RIVERS, LAKES AND RIPARIAN AREAS

Biologically healthy rivers form the basis of a thriving Colorado Basin. Whether in support of tourism and recreation, agriculture, safe drinking water or meeting the River's Compact requirements healthy rivers with adequate flows are critical. This is not only reflected in stream flows but also in how those stream flows are managed. One of the identified projects discussed in more detail below is the development of a Basinwide Stream Management Plan.

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The Colorado Basin Implementation Plan — Influenced by a Grassroots Process [cont.]

THEME 2 — AGRICULTURE

SUSTAIN, PROTECT AND PROMOTE AGRICULTURE

Local food production has always been part of the Basin and has historically been an important component of the Basin's economy. Increasingly food production is not limited to local or even Statewide consumption. More than 50%, of the beef and much of the hay raised in the Basin is exported outside of the State and to other countries. Facing an annual average shortfall of 100,000 acre-feet agriculture within the Basin is the most pressured and vulnerable segment of our economy. Currently 584,000 acre-feet are used to irrigate 268,000 acres. However, there is an existing annual average shortfall of optimum cooperative usage of 100,000 acre-feet (CDM, 2011b).] Although cattle production remains the primary share of agricultural production in the Basin the lower Basin represents a surprising diversity including feed and cereal grains and a large variety of fruits, vegetables, wine grapes and many specialty crops (Currier, 2014a). Stream health, storage and protections against agricultural water transfers (while protecting private property rights) top the list of projects for this Theme.

THEME 3 — SAFE DRINKING WATER

SECURE AND PROTECT SAFE DRINKING WATER FOR TODAY AND TOMORROW

The Basin believes that it is imperative to secure the needs of the growing domestic water demands by developing in-basin supplies, expanding current raw water storage supplies and developing new small scale multi use storage. The reservoir planning and construction process is costly, time intensive, complex and often met with local opposition. Despite these challenges the Basin recognizes that smaller reservoirs (several thousand acre-feet) above physical intakes (not just augmentation) can provide multiple benefits for drinking water, agriculture, environmental and recreational interests. In contrast during the public outreach process it became clear that new large scale storage projects have little or no support in the Basin.

THEME 4 — ENCOURAGE A HIGH LEVEL OF BASINWIDE CONSERVATION

In order to meet the Basin and state goals, concerted conservation efforts have to be made. Although many stakeholders within the Basin have begun to embrace the importance of conservation, more conservation, efficiency and reuse efforts are needed. The stakeholders within the Basin continue to develop and implement municipal conservation plans that support stronger, and in some instances, more aggressive best management practices (BMPs) such as tiered water rates, leak detection programs, water conscious land use practices, and restrictions on outdoor irrigation. Agriculture, as the major water user within the Basin, has opportunities to participate in both conservation and efficiency such as ditch lining programs, headgate improvements, conversion to more efficient irrigation practice and exploring alternative cropping. All of these are currently being implemented to varying degrees throughout the Basin.

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The Colorado Basin Implementation Plan — Influenced by a Grassroots Process [cont.]

THEME 5 — LAND USE

DEVELOP LOCAL WATER CONSCIOUS LAND USE STRATEGIES

The connection between land use and water supply must be made. Land use authorities must be willing to take on water management as an issue when planning for the future. The stakeholders of the Colorado River Basin respect the State's effort to govern water planning for the benefit of all residents; however, there is a strong recognition of the vast diversity in the needs and desires of all regional management entities and the value of local control. Moving forward the planning horizon for land use and water supply should extend beyond 2050, working towards meeting our goal to protect and restore our environmental, agricultural and recreational settings through the use of high conservation and water efficiency practices. The State is also uncertain of the risks associated with a multi-year drought. It is critical that utilities, policy-makers, planners, officials and residents accept that we live in a high altitude arid region and be ready to change the way we use and allocate our water resources to appropriately live within the means of our climate.

THEME 6 — BASIN ADMINISTRATION

ASSURE DEPENDABLE BASIN ADMINISTRATION

Protecting the senior Shoshone Hydroelectric water right, Grand Valley irrigators' water rights (Cameo Call), and the 15-Mile Reach are vital to both our instream flows (ISF) and Basin water users. It is imperative that Basin and West Slope entities work together to ensure the Shoshone Hydroelectric water rights are maintained in and by Basin interests in perpetuity to make sure downstream water deliveries are made and protect headwater needs from excessive trans-mountain diversions. Further, Colorado is ill-prepared for a Lower Basin Compact call. The most immediate challenge is to avoid lowering the Lake Powell water levels below the "Power Pool" elevation, otherwise face large negative impacts to many federally funded programs the state of Colorado relies on within the Colorado River Basin. The means to protecting our valuable mainstem water rights, meeting our downstream obligations, including ISFs, will also require improvements to the state water court process from both a cost and timing perspective. Conservation and efficiency are key to Colorado's water future; however, understanding the impacts of irrigation and the different methods of irrigation in a watershed is critical to understanding the future of Colorado River and its flows. Flood irrigation saturates the alluvial in a watershed. This water is then slowly released from the ground back into the River, creating higher late season flows and cooler water temperatures. Proper studies should be done to ensure that conservation and efficiency methods do not cause a negative impact to late season flows of the River and Downstream users. Flood irrigation is critical in portions of the River that have been greatly impacted by TMDs. Flood irrigation is a replacement of natural high flows of the river, helping to maintain the health of riparian areas as well as aquatic life that lives beyond the banks of the River in the floodplain.

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Future Water Availability

The old paradigm that increasing demands on the Front Range can always be met with a new supply from the Colorado River system is no longer valid. However, current level of water development, population growth and long term hydrology work against this as a viable solution. The CBRT Whitepaper lays out a policy that addresses the misplaced reliance on TMD by focusing on in basin solutions first. This policy supports the six themes that emerged from CBRT work and constituent comment. From a policy perspective, the CBRT advocates that TMDs should be the last "tool" considered as a water supply solution, once the many and complex questions are addressed over hydrology, Compact curtailment rules, risk to existing water users, impacts to the environment and more - and once everything that can be done to conserve and reuse water has been undertaken.

This policy is supported by several documents, including the previously referenced Colorado River Basin Water Supply and Demand Study that concluded Colorado is overusing its Upper Colorado River Basin Compact of 1948 allocation of 51.75 percent of Upper Basin water and is estimated at about 58 percent. It is estimated that there will likely be an average shortfall of 3.2 million acre-feet in the entire seven-state region by 2060 (BOR, 2012).

Lake Powell is the "bank account" that allows Colorado and the Upper Basin to meet the 1922 Colorado River Compact obligations in lean snowmelt years and helps supply the electrical needs of 5.8 million people, including a significant number of people in Colorado. Revenue from hydroelectric generation is applied to several beneficial purposes in Colorado, including, but not limited to salinity control projects and the Endangered Fish Recovery Program. Long term drought that commenced in 1999 and a supply-demand imbalance in the Lower Basin (i.e. more uses than inflow), have caused Lake Powell and Lake Mead to approach critically low levels, below 50 percent of capacity. As a consequence 2014 was the first water year that water deliveries from Lake Powell to Lake Mead were reduced (8.23 million acre feet (MAF) to 7.48 million acre-feet) pursuant to the 2007 Interim Operating Guidelines (BOR, 2007). If long term drought continues and unless something is done in response to these conditions, Lake Powell's elevation could drop below the level at which the reservoir can generate hydroelectric power (minimum power pool) (McClow, 2014). All Colorado River users need to assess in-basin solutions that use high conservation measures, reuse, land use and best-practice agricultural transfer methods before considering projects that increase diversions from the Colorado River Basin.

Within the state of Colorado the Colorado River Basin is facing challenges related to water supply and water quality to support healthy ecosystems; promoting and sustaining strong agricultural and recreational economies; providing safe and reliable drinking water; and avoiding a looming Compact curtailment. One major factor contributing to these challenges is the 450,000 to 600,000 acre-feet of water currently being diverted to farms and cities of eastern Colorado through existing TMDs. The Colorado River Basin is the state's major "donor" basin of water and is at-risk for losing even more water to the Front Range, as much as 120,000 to

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Future Water Availability [cont.]

140,000 acre-feet, to support projects identified to meet future demands including:

- 50,000 to 70,000 acre-feet left for the full use of existing TMDs
- 50,000 acre-feet in new depletions through Moffat and Windy Gap
- Potential cooperative projects as contemplated by the Colorado River Cooperative Agreement (CRCA)
- 20,000 acre-feet contemplated with the Eagle River Memorandum of Understanding (MOU) to benefit Colorado Springs and Aurora

Additional uncertainties include climate change, agricultural shortages, energy development, dust on snow and the widespread impact of beetle kill on Upper Colorado River watersheds. Undefined environmental and recreational needs and existing identified projects add to the complexity of the Basin's challenges. On top of all this we have our own "gap" of water needs to fill. Given this it is difficult to see how the Colorado Basin or the West Slope at large can be expected to be a significant source of water for filling East Slope "gaps".

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About the Basin

The Colorado River Basin (Basin) encompasses approximately 9,830 square miles. It is among the largest watersheds in the state (Figure 4). The six counties within the Basin (Grand, Summit, Routt, Gunnison, Eagle, Pitkin, Garfield, and Mesa) have vastly different topography, climate conditions, land use characteristics, population growth, economic base and geology. All of these factors impact our water needs and the amount of water available in our streams, rivers, lakes and groundwater.

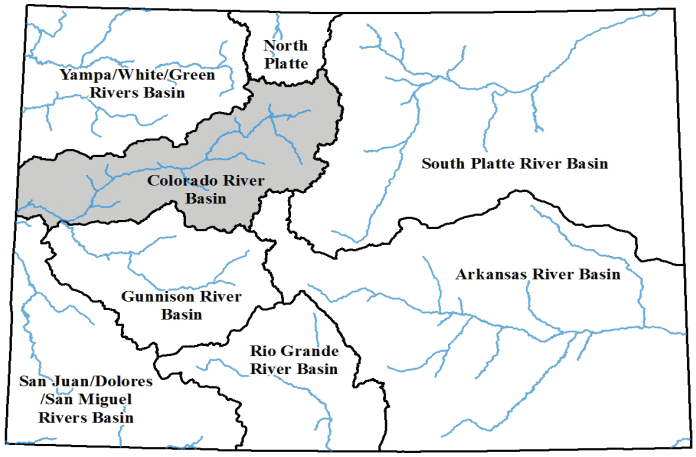

Figure 4. Colorado River Basin Boundaries

There is no certainty regarding the future climate of the Basin, except that normal climate variability, changes in average winter and summer temperatures, and increasing extremes due to climate change will continue to challenge the state in the 21st century. Due to the lack of certainty regarding future water availability it is difficult to plan for future growth and current needs based on hypothetically available water left to be developed within the Basin. As such the CBRT has taken the position that the reliance on a future TMD to meet the needs of other basins is not sound and should be undertaken only as a tool of last resort.

1.1 Background

BASIN WATER ADMINISTRATION AND DEVELOPMENT

In Colorado, the complexity of water law reflects the scarcity of the resource. Due to our semi-arid environment, managing water has become essential to water supply development both within the state and across the entire seven states region. Colorado employs a system of water administration known as the Doctrine of Prior Appropriation. Under this doctrine, the first user to put the water to beneficial use has a senior right to that water and that right must be satisfied before any rights junior to that can receive water.

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About the Basin [cont.]

Water development in the Basin first started for mining followed by agriculture. The most senior major agricultural water right in the Basin is the Grand Valley Canal, and was first established in 1882 with an original water right for 520.81 cfs. The Shoshone Hydroelectric Plant, located in Glenwood Canyon started operation in 1909 with a water right for 1250 cfs.

In 1922, the states relying on Colorado River water supply set up allocations that would govern the future of the Colorado River. The following years revealed that the river flow measurements on which the 1922 Colorado River Compact was based weren't correct:

- Hydrologic predictions were inaccurate
- Climate change was unknown in 1922

In 1937 the Colorado River Water Conservation District was formed by the Colorado General Assembly to give Western Colorado a voice in the matter of negotiating transmountain diversions (TMD) with Eastern Colorado entities Northern Colorado Water Conservation District and Colorado Water Conservation Board. This was a direct result of the difficult negotiations in the early 1930s over the Colorado-Big Thompson (C-BT) Project, the first big TMD. One result of that negotiation was Green Mountain Reservoir, a project to compensate West Slope water users and provide for growth.

In 1937 the Water Conservancy Act spelled out Basin of Origin mitigation for TMD projects created under the act. Cities were excluded from this requirement. But with Basin of Origin mitigation, the West Slope gained Green Mountain Reservoir from the C-BT and Ruedi Reservoir from the Fryingpan-Arkansas Project, which benefits Southeastern Colorado. Other top TMDs in the Basin include Denver Water's Moffat Tunnel Project and Blue River Project (Dillon Reservoir and Roberts Tunnel), Homestake Reservoir for Aurora and Colorado Springs and the Windy Gap Project for Northern Colorado entities. Other reservoirs include: Wolford Mountain Reservoir, a collaboration among the Colorado River District, Denver Water and Northern Water to benefit West Slope water use, and Denver Water's Williams Fork Reservoir, which replaces out of priority diversions to provide for West Slope water rights.

Water Administration is also impacted by the 15-Mile Reach Programmatic Biological Opinion for four species of Endangered fish in the Grand Valley area. Reservoir operators provide 10,825 acre-feet of water to enhance habitat flows in the 15-Mile Reach while cooperating on other measures with federal entities to enhance flows, propagate the species and create fish passages at dams.

A snapshot of some of the important water rights features and water rights within the Basin are depicted in Figure 5, found on the following page.

SECTION 1

About the Basin [cont.]

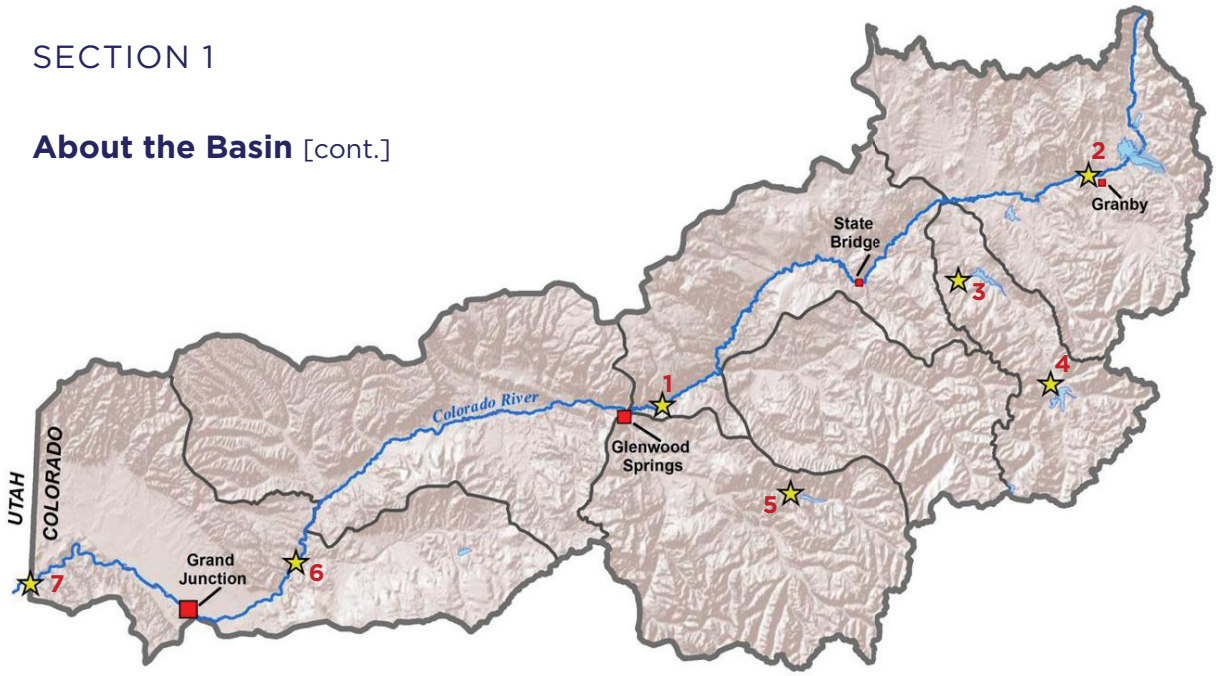

Figure 5. Important Features and Water Rights in the Colorado River Basin (Mainstem in Colorado)

1. **Shoshone Hydroelectric Plant**
   Located in Glenwood Canyon along the Colorado River the Shoshone Hydroelectric Plant is an essential water right for the Colorado River Basin. The plant holds very senior water rights and has the ability to call for water year-round whenever the Colorado River is flowing below 1,250 cfs. Placing a call mandates the upper Colorado River Basins allow the Colorado River to flow downstream maintaining important stream flows for a wide range of users. Xcel Energy owns the 16 Megawatt hydropower plant.

2. **Windy Gap Project**
   Windy Gap is an example of one of the complicated water projects in the Upper Colorado River Basin where Front Range interests and Colorado River Basin interests meet head on. The Windy Gap Project consists of a diversion dam on the Colorado River, a 445-acre-foot reservoir, a pumping plant, and a six-mile pipeline to Lake Granby. Windy Gap water is pumped and stored in Lake Granby before it is delivered to water users via the Colorado-Big Thompson Project's East Slope distribution system.

3. **Green Mountain Reservoir**
   Green Mountain Reservoir (GMR) represents a great compromise that made the Colorado-Big Thompson Project (C-BT) possible: it compensates (augments) the Colorado River Basin for water diverted to cities in Northern Colorado from Granby Reservoir, further upstream on the Colorado River. GMR was constructed in 1943 and was the first facility to be constructed as part of the C-BT. GMS also serves as an important augmentation source for Colorado River Basin Water users.

4. **Dillon Reservoir**
   Dillon Reservoir resides in the middle of Summit County along the Blue River and was built by Denver Water as a water source for their growing population. The Reservoir is capable of storing 254,036 acre-feet of water which can be transferred to Denver via the Harold D. Roberts Tunnel.

5. **Ruedi Reservoir**
   Ruedi Reservoir is located near Basalt, CO on the Fryingpan River. This Bureau of Reclamation project, part of the Fryingpan Arkansas Project, was built to augment east-slope diversions higher up on the Fryingpan River. Ruedi Reservoir also serves as a major augmentation water supply for Colorado River Basin water users.

6. **Grand Valley Irrigation Ditches**
   The Roller Dam on the Colorado River is the location of several large irrigation ditches. The water rights associated with these ditches are very senior on the Colorado River and generally are the primary calling rights during the irrigation season. While these water rights can divert the majority of the flow in the Colorado River they also ensure water is flowing down river from the Upper Colorado River Basin protecting stream flows through a majority of the Colorado River within Colorado.

7. **Colorado River Compact Call**
   In 1922, the seven states that touch the mainstream of the Colorado River or tributaries to the Colorado River signed the Colorado river Compact. This Compact divided the annual yield of the River between the states. Colorado has not been restricted in its water use by the Compact but as the annual average water yield of the Colorado River decreases and water demand from the 7 states increases, chances of Colorado being affected by a Compact call in the near future are more likely.

SECTION 1

About the Basin [cont.]

HYDROLOGY

Of the 16 million acre-feet/year (AFY) on average of renewable water generated within Colorado's high country, approximately 80 percent is on the West Slope while the remaining 20 percent is on the East Slope. The challenge of managing this valuable resource is that 80 percent of our state's population and a majority of the irrigated agricultural lands are located on the East Slope (CDM, 2010). The Reservoirs and TMDs discussed above provide the operational backbone to move the water from the West Slope to the East Slope.

DROUGHT AND CLIMATE CHANGE

Colorado has always been vulnerable to extreme weather and climate events as was evidenced in the droughts of 1930, 1954, 1977, 2002 and 2012. Many Colorado River Basin water providers and agricultural irrigators depended upon surface supply intakes that were severely impaired during the droughts of 1977, 2002 and 2012 due to low river and stream flows and irrigators lost production. Many Colorado River Basin utilities were forced to impose water restrictions.

The CWCB and Department of Natural Resources (DNR) address statewide drought planning through the Colorado Drought Mitigation and Response Plan (DMRP). In 2010, the DMRP went through a comprehensive revision and was again updated in 2013. The updated plan provides a blueprint for how the state will monitor, mitigate and respond to drought. The plan consists of four components: monitoring, assessment, mitigation, and response. Monitoring is ongoing and accomplished, at a minimum, by regular meetings of the Water Availability Task Force (WATF

The 2013 DMRP will also be used to incorporate drought planning into the Colorado Water Plan as it is developed over the next year (CWCB, 2014).

The most serious anticipated impacts of climate change include shifts in timing and intensity of precipitation, streamflows, reductions in late-summer flows, decreases in runoff, increases in drought, and modest declines for Colorado's high-elevation snowpack (Avery, et.al., 2011). These effects will ripple into water supply reliability, impacting municipalities, wildlife, ecosystems, forests, recreation, industries including power generation, snowmaking, energy extraction/ production, and agriculture.

POPULATION

Colorado's population is expected to nearly double by 2050 from approximately 5.1 million people to between 8.6 million and 10 million people. On average, statewide population projections from 2008 forward indicate an increase of about 1.4 million people every 15 years. The fastest growth on a percentage basis is anticipated to take place on the West Slope with growth in some areas in the Basin increasing by 240 percent during the next 35 years (CDM, 2011b). This population growth will drive a significant demand for additional water to meet future municipal and industrial (M&I) demands and self-supplied industrial (SSI) water uses including snowmaking, energy extraction and production, and other industrial needs (CDM, 2011b).

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About the Basin [cont.]

FEDERAL LAND AND NATURAL RESOURCE MANAGEMENT

A substantial portion of the Basin is made up of Federally owned land. Of the almost 6 million acres in the Basin, almost half is owned by the United States Forest Service (USFS). Bureau of Land Management controlled rangeland is the second most predominant land use in the Basin accounting for approximately 40% of the total area. Livestock grazing, recreation, hunting, energy and timber harvest are the primary uses of the federal lands. Active and inactive mines can also be found throughout the Basin. A majority of the energy extraction activity occurs on Federal Lands throughout the Basin, specifically within the Piceance Basin of Garfield County.

1.2 Watershed and Forest Health

There are 14 active watershed groups in the Basin assessing impaired water bodies and lands. These organizations promote the health and conservation of their watersheds through research, education, and project identification and implementation. In many cases these groups have been key operators in the development of watershed plans outlining specific needs, vulnerabilities and projects. These groups are critical to the successful protection of Basin watersheds and forests as they are leading the efforts in protection, reclaiming and maintaining this vibrant and living resource.

Another collaborative effort that assesses the health and condition of our watersheds is being led by state and local fire and land management authorities. Fires and floods are becoming more and more destructive with drier climate conditions. Since the year 2000, 26 of Colorado's 30 largest wildfires have occurred and 14 of the 15 most destructive fires to human property have been recorded. It has been estimated that over 4 million acres of forests in Colorado and Wyoming are dying due to the ongoing mountain pine beetle (MPB) infestation. The visual impact of dying and dead forests is stark, but the invisible changes to the water cycle in vital watersheds such as the Colorado River Basin headwaters, may be a longer-lasting legacy of the MPB (Maxwell et. al, 2012).

With the loss of forests come risks to infrastructure, including, but not limited to water supply reservoirs, pipelines and pumping stations. Watersheds critical to supplying water to our communities should have a plan that provides specific actions needed to protect reservoirs, intakes, water transportation and distribution structures and other facilities from high-severity wildfires and other impacts that can influence our water quality. The CBRT recognizes the importance of protecting and maintaining healthy watersheds and forests and restoring ones that have been compromised by wildfires. The CBRT promotes planning and actions that will support sustainable ecosystems and protect critical water supplies, with good water quality and adequate water quantity during critical times of the year.

Due to the breadth of the Basin, planning will necessarily occur at the local level as a Basinwide Plan is geographically infeasible.

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Additional plans that evaluate and protect our forests include the Colorado Community Wildfire Protection Plans (CWPPs) and the Colorado Wildfire Risk Assessment Project (Colorado WRA 2012). CWPPs require counties to identify wildfire hazard areas in unincorporated areas perform a risk analysis and identify methods to reduce structural ignitability and an implementation plan. There are 18 CWPPs within the Basin. Further the Colorado State Forest Service established the Colorado WRA 2012 project to provide a consistent, comparable set of scientific results to be used as a foundation for wildfire mitigation and prevention planning in Colorado.

An important aspect of the watershed health that is most often neglected is the riparian areas and floodplains the forest and the overall Basin. Deficient county and municipal building codes allow home owners and businesses to develop up to a rivers' bank. The loss of a natural buffer to human activity degrades water quality. Stream and river diversions to fill reservoirs have meant a loss of peak spring flows resulting in decreased overbank flooding which is necessary to sustain riparian vegetation. Infringement on the riparian corridor and a loss of flows for riparian health, has added additional stress to overall river health. Half of the nutrients found in rivers come from riparian areas. In order to protect watershed health we must embark on additional assessments to quantitatively identify flow needs to sustain riparian health, (including the evaluation of benefits to the riparian health created from flood irrigation) and thus help provide clean water and suitable habitat and nutrients for aquatic life.

1.3 Water Quality

Salinity Control Program (CRBSCP). The CRBSCP is a cooperative effort of the seven Colorado River Basin states, the federal government and Basin water users to limit increases in river salinity. Irrigation improvements and vegetation management reduce water available to transport salts. Point sources, such as saline springs like Glenwood Hot Springs are also controlled. The program, a long term interstate and interagency public/private partnership effort, is carried out to reduce the amount of salts in the river and its associated impacts in the Basin. The combined efforts of the Program have resulted in the control of an estimated 772,627 tons of salt per year. This salt reduction results have decreased damages to about $88 million/year. Salinity Control Projects in the Colorado Basin include:

- Grand Valley Unit: Canal lining, piped laterals and on-farm irrigation improvements in the Grand Junction area, funded by U.S. Bureau of Reclamation (BOR) and Natural Resources Conservation Service (NRCS)
- Additional NRCS study areas: Silt, Whitewater and De Beque

In conjunction with the removal of salts from the Colorado River basin, selenium is also removed. Reductions in selenium concentrations in the lower Colorado River have resulted in attainment

SECTION 1

About the Basin [cont.]

of the chronic and acute selenium standards on the lower Colorado River from the Gunnison River to the Colorado-Utah state line. This portion of the river was first identified on the state's 303(d) List as impaired for selenium in 2004 and remains critical habitat for the endangered species, the Colorado pikeminnow and razorback sucker.

Two federal laws, the Clean Water Act (CWA) and the Safe Drinking Water Act (SDWA), were established to ensure the quality of Americans' drinking and surface waters. Under the SDWA, EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards (EPA, 2014). Under the CWA, the statute employs a variety of regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. The Colorado Department of Public Health and Environment (CDPHE) – Water Quality Control Commission (WQCC) and Water Quality Control Division (WQCD) are responsible for developing specific state water quality policies in a manner that implements the broader policies set forth by the Legislature in the Colorado Water Quality Control Act. The WQCC adopts water quality classifications and standards for surface and groundwaters of the state, as well as various regulations aimed at achieving compliance with those classifications and standards and the WQCD protects and restores water quality for public health and environment through the development and enforcement of permits.

Several regulations have been established to protect the beneficial uses (public water supplies, domestic, agricultural, industrial and recreational uses, and the protection and propagation of terrestrial and aquatic life), of Colorado's water bodies. Two specific surface water regulations identify narrative and numeric limits for waters within the Colorado Basin, Regulation No.33, covering the Upper Colorado River Basin and North Platte River Basins, and Regulation No. 37, covering the Lower Colorado River Basin. These regulations are revisited on a triennial basis by the WQCC to ensure site-specific standards protect identified beneficial uses. Another regulation, Regulation No. 93, establishes Colorado's List of Water-Quality-Limited Segments Requiring Total Maximum Daily Loads ("TMDLs") and Colorado's Monitoring and Evaluation List (M&E List). The list of Water-Quality-Limited Segments Requiring TMDLs fulfills requirements of section 303(d) of the federal Clean Water Act which requires that states submit to the EPA a list of those waters for which technology-based effluent limitations and other required controls are not stringent enough to achieve water quality standards,. The M&E List includes a list of those water bodies where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more factors, such as the representative nature of the data. Water bodies that are impaired, but it is unclear whether the cause of impairment is attributable to pollutants as opposed to pollution, are also placed on the M&E List. This M&E List is a state-only document that is not subject to EPA oversite. Both lists have been compiled and included as part of the nonconsumptive needs evaluation as part of this BIP and depicted on the figures within the Regional Breakdown section.

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About the Basin [cont.]

1.4 The Colorado River Basin's Economy — Relationship to Water

Tourism, Agriculture and Energy are all critical and integral components of the Basin Economy. Tourism is the predominant basic-sector industry in the headwaters counties (Grand, Eagle, Summit, and Pitkin) with world-class visitor attractions, including ski resorts, Gold Medal fishing, National Parks and Wild and Scenic eligible rivers. Each County ranks tourism as a top economic development strategy. Tourism comprises 48% of all jobs, in contrast, with the rest of the State, tourism comprises 8% of all jobs statewide. In 2010, 60% of all overnight skier visitors came from out-of-state. Most major ski resorts are in the six headwaters counties. Skiers spent an average of $931 per person during their average 4.6 day stay (Longswood International, 2011). In 2007, in the six headwaters counties (including Gunnison and Routt counties), anglers spent about $105.8 million on goods and services and generated a total economic impact of $180.68 million and 2,199 jobs (NWCCOG, 2012). This economy also benefits the Front Range counties, where travel and equipment expenditures comprise an important component.

Headwaters counties are highly dependent on and vulnerable to changes in environmental conditions that impact tourism (NWCCOG, 2012). Risks to environmental and recreational uses already exist. For example, the ecosystems of many headwater streams currently suffer from depletions by TMDs and local water uses. Further development of TMDs including the 120,000 AF to 140,000 AF, already identified in increased TMDs, will further impact the available recreational and environmental flows and carried through to the related industries in the Basin. Recreation, the economic mainstay for many counties in the Basin, requires virtually no consumptive water (NWCCOG, 2012).

The value of agriculture to the Basin is often understated. Agriculture is part of the historic culture; it is complementary to tourism and a vital source of return flows that sustain late season streamflows for fisheries. It produces cattle that support east slope feedlots (NWCCOG, 2012) and summer produce that fills our grocery stores. A large percentage, of the beef raised within our Basin is exported outside of the state and to other countries. Colorado's agricultural and food industries support about four percent of Colorado's jobs and many of Colorado's counties are "ag dependent" (CDM, 2011b).

Energy also represents an important though varied segment of the economy. Water needs of the energy industry are similarly varied and added in more detail in Section __.

1.5 The SWSI Gap

SWSI 2010 determined that all eight basins in Colorado face a "Gap" between water supply and demand. SWSI identified a large discrepancy between the anticipated supply and the projected need for water by the year 2050. The statewide Gap as determined is projected to be 500,000 AFY by the year 2050, with most of that being within the South Platte, Arkansas, and Metro basins. However, the Gap is a generalized number that lacks specificity to accurately inform state

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About the Basin [cont.]

water policy. Local needs and impacts must be analyzed and recognized to develop an accurate picture of Statewide needs.

The 2010 SWSI intended to grow the available information on water supply and demand as well as support regional water planning efforts across the state. Key elements of SWSI included:

- Analysis of the water demands to 2050, including consideration of the effect of passive conservation on those demands
- Analysis of environmental and recreational needs (for each basin)
- Analysis of the water availability/supply in the Colorado River basin
- Implementation elements associated with identified projects, water conservation, agricultural transfers, and development of new water supplies (the four legs of the stool)

The projected Colorado River Basin Gap ranges from 22,000 to 48,000 AFY, depending upon whether the low to high population projections were applied. This Gap is misleading as it does not account for the environmental and recreational needs and the agricultural shortages within the Basin, many of which exist as a result of the combined effects of the 400,000 to 600,000 AFY of water currently exported out of the headwater counties. Current water demands are being met through the administration and operation of augmentation reservoirs which augment water to the mainstem senior calls. A large percentage of these reservoirs are now fully allocated. The shortcoming of SWSI 2010 was not addressing recreational, environmental and agricultural needs in a meaningful manner. The lack of data on these issues for the Basin leads to a misconception as to the actual impacts of additional TMDs to the Basin.

Colorado's Prior Appropriation system of water use enabled the stable settlement and cultivation of Colorado's Western Slope. The ability to divert and put to beneficial use waters in Colorado's rivers and streams helped bring economic life to communities throughout western Colorado. As our communities have grown, so too has our need for more water. Despite the fact that there are significant water resources in the Colorado Basin, our needs have in many cases outpaced supply. Here's a brief look at the background to why these Gaps have surfaced over time.

MUNICIPAL AND INDUSTRIAL

The SWSI 2010 Municipal and Industrial (M&I) water demand forecast focused on a growing population. Additional industrial water demands were evaluated as Self Sustained Industry (SSI) which included the oil and gas industry and snowmaking industries water demands among others. SWSI 2010 stated that in 2008 the estimated direct water demands for energy development within the Basin were 2,300 AFY and proposed to be between 200 AFY and

SECTION 1

About the Basin [cont.]

10,700 AFY in 2050 due to the variability of the oil and gas industry. Snowmaking water demand in 2008 was estimated at 3,180 AFY with forecast growth to 4,740 AFY by 2050.
The definition and use of the Gap for the 63 water providers of the Colorado Basin water providers and utilities are small and dependent upon direct stream flows. More importantly, these water providers have not addressed the uncertainties brought about by extended drought, Compact calls and climate change into their long-range water plans (beyond 2050). Many lack redundancy of supplies and even though most of them have a legal supply from augmentation reservoirs to meet in-basin calls, they do not have physical supply from reservoirs above intakes that can protect them in drought periods.

Many Colorado water providers are growing into existing supplies or have senior water rights from local surface water supplies that are sufficient for future growth. Most of the planning for these supplies was premised on a firm dry year yield. Firm dry year yields were based upon historical statistical modeling. Relying upon historical hydrology will not guide us in the future based upon recent extended droughts and future climate change. Therefore this plan recommends that water providers need to update master plans to account for extreme droughts, a Compact call and climate change scenarios.

AGRICULTURE

The deficit in the agricultural water supply versus demand is referred to as the "shortage". SWSI 2010 estimated that the agricultural sector is approximately 100,000 AF short. That estimate was based on the number of acres in production, the water needed to produce a crop, and the water typically available to meet full season demand. This shortage will exist and potentially increase as more senior water rights, that were once "conditional", are developed in other parts of the Basin. This will continue to impact those with fewer senior rights who in the past have been vulnerable in dry and even normal years. For some farmers and ranchers in the Colorado Basin with more junior rights, their ability to divert water in the latter part of the season may be curtailed.

ENVIRONMENT AND RECREATION

The environmental and recreation (nonconsumptive) Gap has not been quantified. Initial efforts to quantify the nonconsumptive Gap have been made through the Watershed Flow Evaluation Tool (WFET), the Nonconsumptive Needs Assessment, and regional efforts such as the Grand County Stream Management Plan. In collaboration with the State of Colorado, the Basin (like the 8 others) identified the environmental attributes and the areas that are at-risk of hurting those attributes as a result of changes to river and stream flows through the use of the WFET. Further, American Whitewater completed an assessment of key whitewater boating opportunities in the Colorado Basin. They identified 28 reaches and the minimum, optimum and maximum flow levels for these reaches. As described in the WFET, many of these reaches are at-risk to being diminished by current or additional water development. American Whitewater's study also

SECTION 1

About the Basin [cont.]

identified the number of user days that have historically been available. This BIP establishes a goal to protect these recreational boating opportunities from future water development above these reaches that might detract from their recreational values. There are some recreational reaches, we should note, where seasonally high flows are prohibitive for recreational use. This information will assist the Basin in moving forward with a Basinwide Stream Management Plan to further quantify the Basin's environmental and recreational needs.

1.6 The Gap Shortfalls

There is disagreement across the state on whether the SWSI Gap is accurate and the sense is that the methodology used to calculate these values should include more site-specific data and information. For instance, a review of the data used by SWSI and that information collected throughout the BIP process shows that, in general, existing water providers in the Basin have identified projects, policies, and methods to meet future water demands. Many will grow into existing supplies; however, the impacts to recreational and environmental needs, agriculture, and instream flows are unclear and need to be further evaluated. This is in sharp contrast to other basins which are projecting the need to develop TMDs to meet the future (if not current) demand. See e.g. South Platte and Arkansas Basin BIPs.

SWSI assumed that 70 percent of the Gap will be met through buy and dry of additional irrigated acreage. This assumption has serious shortcomings by overstating the agricultural acreage that could be removed from irrigation (Currier, 2014b). SWSI 2010 did not use the historical consumptive use (HCU) from the urbanized lands to reduce the M&I Gap. If HCU from urbanized land is used to meet the Gap (and as a practical matter, it has been and will be) then the reported additional buy and dry acreage could be much smaller.
In the Colorado Basin, about half of the urbanization is expected to occur in the Grand Valley, followed by Garfield County. Realistically, there will be very little buy and dry as water providers will meet future demands through a combination of storage as well as HCU from urbanized land and junior water rights (Currier, 2014b). Buy and dry on a large scale is simply not necessary because alternative supplies are available.

The Next Steps section for the Basin Implementation Plan identify actions and projects that will better quantify the future consumptive, environmental, and agricultural water needs of our Basin.

SECTION 2

Basin Implementation Plan Approach, Public Outreach, and Basinwide Themes

This section presents the approach used by the Colorado Basin Roundtable (CBRT) to develop the Basin Implementation Plan (BIP) for the Colorado River Basin. The approach used was modeled on the BIP Guidance document provided by the Colorado Water Conservation Board (CWCB). In developing the information, ideas and solutions, the CBRT Team relied on a grassroots, bottom up, approach.

2.1 Summary of Outreach

Outreach during the BIP drafting process included Town Hall meetings, presentations to community groups, invitations to the public to attend Roundtable planning sessions, a series of newspaper articles, a website, Facebook® page and Twitter® page. Input was gathered through a variety of methods including in-person meetings, surveys, and the Colorado Basin Implementation Plan website (http://coloradobip.sgm-inc.com/), Facebook® page and Twitter® account.

PUBLIC MEETINGS

The Colorado BIP Team led by SGM, with assistance from CBRT members and the collaboration of community groups within the Basin, made presentations on the BIP planning process and collected input at 45 public meetings throughout the Basin, reaching over 900 people prior to the completion of the draft BIP in July 2014. Since the completion of the draft BIP and Colorado Water Plan, presentations have been made in at least an additional 12 meetings with a combined attendance of over 350 people. In addition to meetings for the general public, technical outreach meetings with water providers across the Basin were conducted, which was integral to developing the municipal and industrial needs assessments and project lists. A complete list of the public meetings is included in Exhibit C.

NEWS MEDIA

The Water Center at Colorado Mesa University, a member of the BIP team, coordinated the writing and publication of a series of newspaper articles describing the various elements of the BIP, including an overview of the BIP, community water needs, agricultural perspectives, and environmental and recreational water needs during the BIP drafting process. These articles appeared in the Grand Junction Free Press, Glenwood Springs Independent, Vail Daily, and Rifle Citizen Telegram newspapers. Survey links were included in most of these articles. Additional articles on the plan were published following the release of the draft BIP and the draft statewide water plan. Aspen Journalism also covered Roundtable meetings in collaboration with both the Aspen Daily News and the Aspen Times, and other local newspapers and TV stations did stories on the water plan and outreach events.

SECTION 2

Basin Implementation Plan [cont.]

INTERNET/SOCIAL MEDIA

The BIP website (http://coloradobip.sgm-inc.com), Facebook® page and Twitter® account were all utilized during the drafting process to publicize public meetings, solicit input, and to further disseminate articles appearing in traditional news media. Outreach partners such as the Roaring Fork Conservancy and Water Center at Colorado Mesa University also used their social media accounts and email lists to publicize information about the planning process and input opportunities. The star performer in the use of social media to disseminate information was the December 2, 2013 Aspen Times article reporting on a Basin Roundtable meeting titled "Water Group: Look Elsewhere for Water," which was shared on Facebook® 257 times and on Twitter® 57 times.

2.2 Public Input Results and Methodology

Three primary methods were used to collect data from the public: 1) open discussions at public meetings, 2) online surveys, and 3) comment letters and emails. It was from this data collection that the six major Themes of the Basin were developed.

Public input reflected significant concern about future water supplies and the health of the environment in the Colorado Basin. Residents also expressed concerns about transmountain diversions (TMDs) and a strong desire to protect irrigated agriculture in the Basin. Conservation was by far the most frequently advocated approach to meeting future water needs, followed by increased water storage. These messages were consistent with material already in the CBRT White Paper and contributed to the development of the BIP themes. Site specific ideas and technical information were also incorporated to enhance the substance of the BIP.

PUBLIC MEETINGS

Participants at all public meetings were invited to express their concerns, needs and proposed solutions to meet our future water demands in the Colorado River Basin. The following is a summary of this input. Formal notes from Town Hall meetings are included in Exhibit C.

Participants voiced a desire to protect or enhance:

- Water-based recreation
- Existing water rights
- Irrigated agriculture
- Stream health
- Water quality

SECTION 2

Public Outreach [cont.]

Participants voiced concerns about:

- The future of West Slope irrigated agriculture
- Stream health
- The impacts of a Colorado River Compact curtailment
- The impacts of additional transmountain diversions
- The impact of oil and gas development on water quality and supply
- The impact of population growth on water supply

Participants advocated the following approaches to meeting future water needs:

- Promoting household water conservation, especially with outdoor watering
- Raising water rates to encourage conservation
- Limiting or guiding growth to reduce water demands
- Understanding the energy-water nexus
- Front Range storing water on the Front Range
- 100% reuse of existing water supplies on the Front Range
- Protecting the Shoshone call
- Enhancing instream flow rights
- Promoting agricultural water conservation/ removing "use it or lose it" disincentives to conservation
- Payment for new projects by groups that need new water supplies – not whole state
- Pursuing new water supply sources such as desalination, untapped groundwater, and water imports from outside Colorado and the Colorado Basin
- More education

SECTION 2

Public Outreach [cont.]

SURVEYS

Three different surveys were circulated to encourage public input at different stages of the BIP development process. An open-ended "water values" survey was broadly distributed early on in the process; a more detailed "community water needs survey" was distributed upon completion of a preliminary analysis of municipal needs in the basin; and a "plan input survey" was broadly distributed after the draft BIP and Colorado Water Plan were released.

Water Values

Surveys on residents' values related to water were distributed at public meetings and through web links attached to newspaper articles, email notices, and the BIP website throughout the initial BIP drafting process. Over 500 surveys were received of which over 200 were from adults and 324 surveys from K-12 students. Complete results are included in Exhibit C. A summary analysis from the adult responses is presented in Figure 6 (student responses are summarized in a separate subsection). The overall representation by adult respondents was well-distributed between the Colorado River headwaters, middle, and lower basin counties.

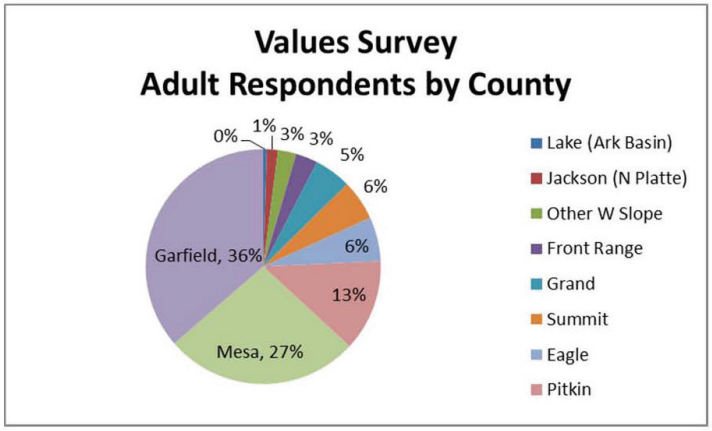

Figure 6. Values Survey Responses by County (by adults).

In response to the open-ended question, "What water issue(s) most concerns you?" most adults' responses fell into multiple categories (Figure 7) found on the following page. The categories were assigned during the data analysis process. General concerns about the adequacy of future water supplies (SUP) were by far the most commonly reported, followed by more specific concerns related to environmental health (ENV), transmountain diversions (TMD), and maintaining water for agriculture (AG). Other concerns reported related to water quality (WQ), the economy (ECON), recreation (REC), water rights (RTS), the impact of oil and gas development (O/G), and over-regulation (REG).

SECTION 2

Public Outreach [cont.]

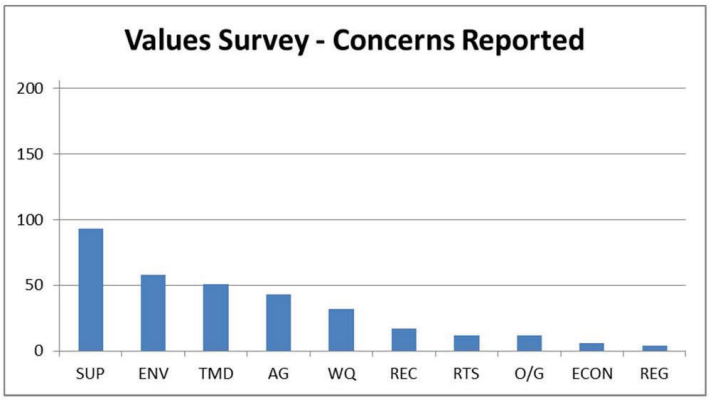

Figure 7. Values Survey Responses by County (by adults).

Most adults' responses to the open-ended question "What approach(es) do you favor to meeting future water needs?" fell into multiple categories (Figure 8). Categories were assigned during the data analysis process, not selected by the respondents. Conservation (CONS) was by far the most common approach recommended by adult respondents for meeting future water needs, followed by enhancing storage (STOR), protecting instream flows (ISF), and either controlling or limiting growth (GRO). Some respondents advocated against transmountain diversions (TMD), while others suggested additional education (ED), legal changes (LAW), cooperative approaches (COOP), and non-permanent agricultural transfers (ALT AG). Water quality (WQ), agricultural preservation (AG PRES), preservation of water rights (RTS) and recreational water rights were also mentioned by a smattering of respondents.

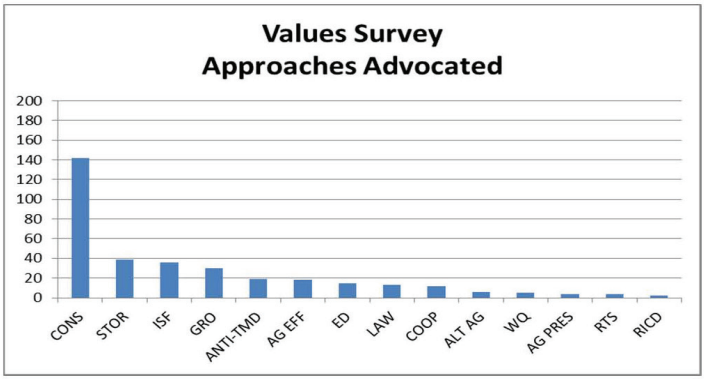

Figure 8. Values Survey Responses Approached Advocated.

SECTION 2

Public Outreach [cont.]

Respondents were asked "Which categories describe you?" and provided the options listed above. Most chose multiple categories, including "Interested Citizen" over half the time (Figure 9). Between 20-25% of respondents included each of the following categories: Farmer/ Rancher, Angler, Water Professional, Environmental Advocate, or Boater.

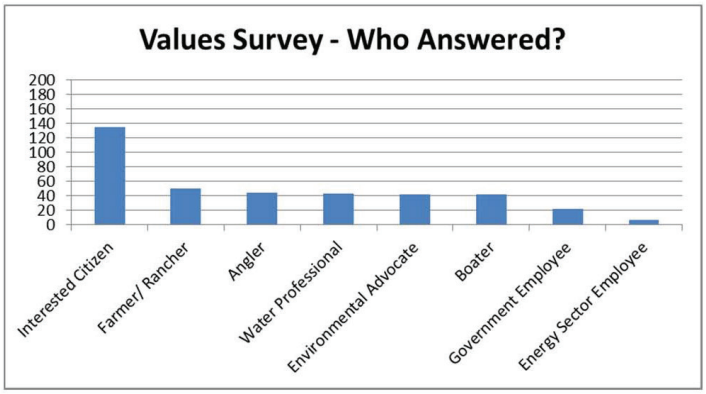

Figure 9. Values Survey Summary of Types of Respondents.

Three hundred twenty-four (324) K-12 student surveys were collected by the Roaring Fork Conservancy and provided to the Colorado Basin planning team. The results are summarized in Table 2; full surveys are attached in Exhibit C.

SECTION 2

Public Outreach [cont.]

School/Class	What water issues most concern you?	What approaches do you favor to meeting water needs?
Glenwood Elementary Grade 4a — summary of 36 surveys	water waste, water pollution, water diversions, population growth	conserving water at home, metering water, stop polluting, educating the public, re-using water, do not water yards/gardens during the day
Glenwood Elementary Grade 4b — summary of 23 surveys	water waste, water pollution, water diversions	conserving water at home, metering water, stop polluting, educating the public, re-using water
Carbondale Middle School Grade 6a — summary of 16 surveys	water waste, water pollution	conserving water at home, shorter showers, landscaping, stop polluting, wash clothes less often
Carbondale Middle School Grade 6b — summary of 30 surveys	water waste, water pollution	conserving water at home, shorter showers, landscaping, stop polluting, wash clothes less often
Carbondale Middle School Grade 6c — summary of 26 surveys	water waste, water pollution, chemicals in the water, water diversions	conserving water at home, stop polluting, educating the public, re-using water
Basalt Middle School Grade 6a — summary of 21 surveys	water waste, lack of water = lack of food, Arizona and Mexico need water	conserving water at home, shorter showers, landscaping, stop polluting, wash clothes less often
Basalt Middle School Grade 6b — summary of 44 surveys	water waste, lack of water = lack of food, Arizona and Mexico need water	conserving water at home, shorter showers, landscaping, stop polluting, wash clothes less often
Basalt Elementary Grade 4a — 34 surveys	waste, no need for snowmaking, dam safety, drought, not being able to fish or raft, the economy, water for hay and cows, population growth, water quality	conservation, storage, get more snow, not make so much snow
Basalt Elementary Grade 4b — 54 surveys	water for skiing, boating, parents jobs, and droughts	conserving water at home, shorter showers, landscaping
Roaring Fork High School 15 surveys	maintaining water for agriculture & recreation and the environment, worrying about running out, fracking	conservation, storage, instream flow protections, growth control, maintaining agriculture
Basalt Middle School 25 surveys	dry Colorado River delta, evaporation, waste, running out, the environment	conservation (household and agriculture), restore and protect habitat, allocate Colorado River fairly between states

Table 2. Summary of K-12 Student Roaring Fork Conservancy Survey Responses.

SECTION 2

Public Outreach [cont.]

Community Water Needs Survey

In addition to the "Values" survey, the Colorado Basin planning team circulated a survey on how to meet community water needs via a link in a newspaper article and e-newsletters following the completion of a preliminary analysis of municipal water needs. Twenty-six (26) people answered this survey, which asked people to indicate their level of support for different options to meet future water needs for their own communities, as well as Front Range cities. A complete analysis of the results is provided in Exhibit C. Notable results included:

- A moderate level of concern about their own community's water supply.
- 52% of respondents felt their water rates were about right; 39% thought they were too low.
- Promoting healthy streams, forest health, household conservation and regional cooperation to help meet future water needs were all "completely" supported by over 60% of respondents.
- Regulations to increase household conservation, denser development to decrease household water use, and building more reservoirs were less popular, but over half the respondents either "somewhat" or "completely" supported each of these options.
- 69% of respondents would be willing to pay higher rates to support the actions listed above that they supported.
- To meet Front Range water needs, respondents overwhelmingly supported incentives, regulations and denser development to reduce household water use, while moderately supporting temporary agricultural transfers and strongly opposing the "buy and dry" of agricultural water rights and additional transmountain diversions (large or small).
- Most respondents identified themselves as Interested Citizens, 42% as Water Professionals, and 10% as Environmental Advocates. Farmer/Ranchers, Boaters, Anglers and Government Employees were also represented, in smaller numbers. Respondents could choose multiple categories.

SECTION 2

Public Outreach [cont.]

Plan Input Surveys

Plan input surveys were distributed a public meetings held after the release of the draft BIP and Colorado Water Plan, as well as via links in newspaper articles and e-newsletters distributed by the Water Center at Colorado Mesa University, the Roaring Fork Conservancy, and the Eagle River Watershed Council. As of the end of March 2015, thirty-two (32) responses had been received to this survey, which asked participants to prioritize and indicate their level of support for key goals and themes of the Colorado Water Plan and the Colorado BIP, as well as approaches to meeting those goals. In summary:

- Respondents gave highest priority to Colorado Water Plan goals related to environmental health, followed by effective and efficient water infrastructure promoting smart land use. The ranked "supporting vibrant cities" lowest.
- Conservation was the most popular approach for meeting growing urban needs, ahead of both agricultural transfers and additional transmountain diversions.
- Over 74% of respondents supported all six themes in the Colorado BIP.
- Most respondents supporting funding, incentives, regulations and education to support the themes they supported, with education getting the strongest support and regulations the weakest.
- Comments expressed concern about water waste, transmountain diversions, over-use of water in the lower Colorado River Basin, growth, water quality and the importance of recreational and environmental flows.

Thirteen of the respondents were from Mesa County, Six from Garfield County, Five were from Eagle County, two were from Pitkin County, and three from counties outside of the Colorado River Basin. Approximately 80% of the respondents listed the environment as their primary interest in water.

We anticipate additional survey completions as additional outreach is conducted, and will use these to inform Roundtable actions as well as forward them to the Colorado Water Conservation Board for consideration as Colorado's Water Plan is completed.

LETTERS AND EMAILS

The planning team also received input through letters and emails from organizations and individuals, which were also provided to the Colorado Water Conservation Board for consideration in the development of the statewide water plan. Key points from these letters are summarized on the following page.

SECTION 2

Public Outreach [cont.]

- **From "Protect the Flows":** States that small snow-and river-dependent businesses support keeping rivers healthy and flowing, reducing per capita municipal water use by 35% by 2050, investment in agricultural irrigation infrastructure, and modernizing and maximizing existing storage systems.
- **From Trout Unlimited (Input Document #74 for the Colorado Water Plan, Colorado Basin Region):** States that environmental needs need to be quantified and detailed, not merely "identified" on maps (which is where the process stopped 4 years ago). Nonconsumptive needs are real in their own right and not just "enhancements" to be added to consumptive projects.
- **From Roaring Fork Conservancy (memo to Jim Pokrandt):** Emphasizes the need for restoration and preservation of environmental and recreational water uses to support the economic, cultural, and ecologic health of the West Slope.
- **From Pitkin County Board of County Commissioners (memo to Louis Meyer):** States the importance of river health, the importance of funding river health, the importance of developing incentives within the framework of existing law in order to leave water in the streams.
- **From the Colorado Oil and Gas Association (COGA):** States that the oil and gas requires reliable water supplies; is an ally to the agricultural industry and is a cornerstone of Colorado's economy.
- **From Kendall Bakich, Wildlife Biologist, Colorado Parks and Wildlife (Electronic Record of Senate Bill 115 Comments and CWCB Responses):** The Colorado Water Plan should support funding to understand and address nonconsumptive needs in the Colorado Basin.
- **From the Mesa County Board of County Commissioners:** Commissioners express strong support for the draft Colorado BIP and emphasize their opposition to additional transmountain diversions.
- **Individual:** The volume of useable groundwater on the Western Slope could exceed 100 million acre-feet and advocates increasing groundwater recharge to support stream base flow and reliability of water supplies.
- **Individual:** Demand management has to be cornerstone of balancing supply and demand.

SECTION 2

Public Outreach Plan [cont.]

2.3 Public Outreach Action Plan Beyond 2014

The CBRT will continue education and outreach efforts on Colorado's Water Plan for the remainder of 2015, as the statewide plan is finalized. Longer term, we will continue to use the partnerships and communication channels developed through the process of conducting outreach on the BIP to continue to educate the public on the activities of the Basin Roundtable and regional and statewide water needs, and to encourage their input on how these needs should be met. Anticipated outreach and education activities for the remainder of 2015 will include:

- Continuing to write and distribute newspaper articles on the Colorado Water Plan.
- Continuing to use social media to provide information and solicit input on the Colorado Water Plan.
- Enhancing coordination with watershed groups and other community organizations to inform a broader set of the public about the CWP and encourage input and participation.

The results of these activities will be shared with the CWCB as their planning efforts continue. Longer term outreach activities will build on the communication and partnership infrastructure developed through the outreach efforts related to the BIP in order to engage the public on the water challenges and opportunities in the Basin and statewide. The Roundtable will strive to maintain a steady presence in both traditional and social media, as well as continue to ensure that CBRT members and partner organizations have the communication tools to inform their constituencies about the issues the Roundtable is addressing and collect public input on those issues.

In addition to strengthening current outreach activities, the Roundtable will explore opportunities to connect with a broader segment of the population through new initiatives, including:

- Enhancing K-12 water education opportunities, both inside and beyond the classroom. Programs established by the Roaring Fork Conservancy and the Keystone Science School provide models for potential initiatives throughout the basin
- Enhancing water education opportunities in higher education. A new general education water course and student field seminar pioneered by Colorado Mesa University provide models to build on.

SECTION 2

Public Outreach Plan [cont.]

- Using film, radio, art and literature to engage people who don't have an intrinsic interest in water science and policy issues. Very popular presentations by photographer Peter McBride and author Kevin Fedarko, as well as the positive reception to a 30-minute documentary on the Grand Valley and its Rivers produced by the Water Center at Colorado Mesa University, demonstrate the potential of such efforts.

2.4 Process for Developing the Six Basinwide Themes

As detailed above, for over nine months, members of the CBRT and stakeholders of the Colorado Basin participated in multiple meetings and discussions, provided input, reviewed data, inventoried existing projects, policies and processes, participated in conferences, exchanged dialogue, and presented at several public outreach venues. During that same time the CBRT heard from water users, policy makers and the public.

The CBRT formed four Project Leadership Teams (PLTs) early on in the BIP development process. These PLT's were charged with identifying and documenting the municipal and industrial (M&I) and self-supplied industry (SSI) (the Consumptive PLT), environmental and recreational (the Nonconsumptive PLT), agricultural, and policy concerns and needs of the Basin. The agriculture PLT provided input on the Basin's agricultural goals and needs separate from the Consumptive PLT, recognizing the importance and unique nature of agriculture. The policy PLT was created to address issues in meeting the Gap that require policies beyond the projects and methods identified in the BIP. The PLTs twice a month for four months, documenting the goals and measurable outcomes; needs and vulnerabilities; constraints and opportunities as well as projects and methods as recommended by the BIP Guidance document. Exhibit D includes the initial compilation of this information as well as the comprehensive inventory of projects and methods. As the BIP evolved, the information developed by the PLTs was continually updated and reorganized to fit with the feedback collected from the Public Outreach. This process resulted in six basin themes supported by a condensed and more focused set of goals, measurable outcomes, projects and methods. These themes are the foundation for the Basin and the regional discussions highlighted in this plan.

SECTION 2

Basinwide Themes

1	Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas
A	Protect and rehabilitate healthy rivers, streams, lakes and riparian areas
B	Define water quality needs and at-risk water bodies
C	Preserve high quality recreational river and stream reaches with appropriate flows
D	Develop a basinwide funding system to meet basin environmental and recreational needs

2	Sustain Agriculture
A	Reduce agricultural water shortages
B	Minimize potential for transfer of agricultural water rights to municipal uses
C	Develop incentives to support agricultural production
D	Increase education among the agricultural community about Colorado River Basin water issues

3	Secure Safe Drinking
A	Secure growing water demand by developing in-basin supplies and expanding raw water storage supply
B	Raise awareness of current obstacles and efforts facing water providers
C	Protect drinking water supplies from natural impacts such as extended droughts, forest fires, climate change, etc
D	Ensure safe drinking water

4	Encourage a High Level of Basinwide Conservation
A	Improve Colorado Water Law to encourage efficiency, conservation and reuse
B	Pursue continued municipal and industrial conservation
C	Promote agricultural conservation that maintains agricultural production and viability

5	Develop Local Water Conscious Land Use Strategies
A	Develop land use policies requiring and promoting conservation
B	Support, preserve and promote local authorities management of stream health, development and conservation efforts
C	Expand regional cooperation efforts to improve efficiencies, provide water supply flexibility, and enhance environmental and recreational amenities
D	Extend water planning vision beyond 2050

6	Assure Dependable Basin Administration
A	Protect and defend maximum mainstem calls at Shoshone Hydroelectric Plant and senior Grand Valley irrigation diversions
B	Ensure sufficient Lake Powell water level for uninterrupted hydroelectric power production
C	Maintain Interstate Compact deliveries to Lake Powell
D	Improve water court process

The following six subsections focus on each of the six themes. A table outlining the goals, measurable outcomes, short and long term needs, and projects and methods for each theme are also included. In general, each theme is supported by three or four basinwide goals. Under each goal are measurable outcomes which define in a quantifiable way how the BIP will meet the goal. Short term and long term needs highlight the specific actions (research, policy, organization,

SECTION 2

Basinwide Themes [cont.]

etc.) or improvements needed to reduce and/or remove vulnerability and meet the goal and measurable outcome. Projects and methods highlight identified opportunities to address the needs and accomplish the goals. Projects and methods identify only a few examples of the many collected and supported by the CBRT stakeholders. A full list of the projects by region can be found in Section 4 and the next steps are identified in Section 6.

THEME 1

PROTECT AND RESTORE HEALTHY STREAMS, RIVERS, LAKES AND RIPARIAN AREAS

Healthy Rivers provide the foundation for tourism, recreation and agriculture in the Colorado Basin and Statewide. Colorado is home to 12% of the nation's outdoor industry companies which provide 107,000 jobs and $10 billion in economic output. Nine to ten percent of the total workforce in Colorado is employed by recreation and tourism industries (NWCCOG, 2012). The environmental and recreational sector sometimes referred to collectively as nonconsumptive use in this BIP, are unique in that they neither consume or divert water from the hydrologic system; but are dependent on it remaining in place. When you imagine outdoor recreation in Colorado it is most often images of non-consumptive uses that come to mind.

The vulnerabilities that threaten non-consumptive uses include, but are not limited to: (NWCCOG, 2012)

- Potential loss of "Gold Medal" fishing status and the related benefits of attracting anglers worldwide
- Adverse impacts on fish, specifically within the 15-Mile Reach that need adequate streamflow, water quality and temperature conditions
- Less reliable streamflows for kayaking and rafting (impact summer tourism)
- Reductions in irrigated lands and the associated delayed return flow to the streams
- Devaluation of real estate development that relies on healthy riparian corridors for scenic beauty and fishing
- Higher costs for water and sewer treatment facilities that are borne by local rate payers due to reduced streamflows
- The loss of pristine headwaters from TMDs which degrades water quality throughout the entire basin, but most acutely in the middle and lower basin

SECTION 2

Basinwide Themes

PROTECT AND RESTORE HEALTHY STREAMS [cont.]

Millions of dollars and significant time has been spent through public and private collaboration to repair and restore streams, rivers and riparian habitat and to create recreational opportunities. Specific examples of nonconsumptive restoration projects in headwater counties are contained in Exhibit F.

Methods for addressing and assessing non-consumptive needs already identified for the Basin include, but are not limited to: (NWCCOG, 2012)

- Grand County Stream Management Plan – Learning by Doing implementation.
- Wild & Scenic River Alternatives – Stakeholder Groups
- Eagle River Watershed Council
- Winter Park Master Plan – Zoning Density Constraint
- Roaring Fork Watershed Collaborative
- Blue River Restoration Project
- GMUG Pathfinder Project
- Grand Valley / Gunnison Selenium Task Force
- Local Voter-Authorized Tax Rate Increases for Watershed Improvements
- Aspen Water Conservation Initiative
- Wolford Mountain Reservoir Agreement
- Coordinated reservoir operations (upper Colorado River reservoirs releases)
- Upper Colorado Endangered Fish Recovery Program
- Summit County / Denver Water Agreement
- QQ Committee of the NWCCOG
- Upper Blue Reservoir/ CSU Substitution Agreement

SECTION 2

Basinwide Themes

PROTECT AND RESTORE HEALTHY STREAMS [cont.]

The four environmental and recreational goals identified to support this theme include:

- Protect and rehabilitate healthy rivers, streams, lakes and riparian areas
- Define water quality needs and at-risk water bodies
- Preserve high quality recreational river and stream reaches with appropriate flows
- Develop a basinwide funding system to meet basin environmental and recreational needs

Table 3 on the following pages presents these four goals as column headings. These goals are supported by measureable outcomes, short term needs, long term needs, and projects and methods.

The most important project identified by the environmental and recreational PLT and the Colorado Basin Roundtable members is to continue assessing the systemic riverine environmental needs of the Basin on-the-ground through the creation of a basinwide stream management plan (SMP). The purpose of a SMP is to provide the framework for maintaining healthy stream systems while also protecting local water uses and planning for future consumptive and nonconsumptive water needs. SMPs identify environmental and recreational flow needs and assist in identifying areas where historical alterations of stream flows most likely affected the ecological resource conditions. For example, Grand County developed a Stream Management Plan for 80 miles of river in the Upper Colorado Basin, completing the effort in 2010. Their SMP analyzes and provides recommendations for target flows, restoration opportunities, and monitoring recommendations. This SMP also formed the underpinnings of the CRCA negotiations for Grand County.

The Nonconsumptive Needs Assessment Focus Mapping efforts (CDM, 2010) identified environmental and recreational attributes throughout the Basin that may need a project or process to protect, restore or enhance its function. The Watershed Flow Evaluation Tool (WFET) identified 66 reaches in the Basin that are at risk due to reductions or changes to flow regimes. Results of this analysis provided suggestions on how best to address the risks to associated attributes. The WFET also identified flow needs for critical recreational reaches. While these initial studies and reports provide an insightful, big picture look at reaches of concern, they do not focus on how to best to evaluate, prioritize and implement projects and methods for improving the overall function of rivers and streams. The CBRT believes that the rest of the Basin would benefit from following the example of the Grand County SMP and other more site-specific watershed plans, such as those completed by the Roaring Fork Conservancy or the Eagle River Watershed Council.

SECTION 2

Basinwide Themes [cont.]

Goals	Protect and rehabilitate healthy rivers, streams, lakes and riparian areas	Define water quality needs and at-risk water bodies
Measurable Outcomes	• A map depicting high priority reaches that have insufficient or poorly timed flows (e.g., 15-Mile Reach, 303(d) impaired streams, instream flows, monitoring and evaluation reaches, ecological impacted, recreational significant, reaches with existing dams) • Map or list of reaches where habitat has deteriorated as a result of non-flow related changes and could be restored • Improve habitat conditions in all identified prioritized reaches in exchange for harm caused by existing or additional water development • Reduce the number of river miles where non-native invasive fish and invasive riparian species have degraded aquatic and riparian communities	Reduce number of stream reaches that the state has identified as impaired • Secure municipal, county, or State regulations that require water developments to analyze future impacts on flows to determine if depletions would trigger water quality problems • Implement coordinated monitoring program to measure a. flows and temperatures b. 3-native fish and cutthroat trout c. Macro invertebrates at critical locations • Implement water quality protection standards within development codes for local governments in the Colorado River Basin • Determine "tripping point" triggers for required fish population reviews under the Programmatic Biological Opinion for the environmentally sensitive fish of the 15-Mile Reach based on current planned transmountain diversions such as Windy Gap and Moffat firming projects.
Short Term Needs	• Develop a basinwide stream management plan using the Watershed Flow Evaluation Tool (WFET) that identifies rivers and streams at-risk and methods and projects to rehabilitate them to satisfactory conditions • Identify habitat restoration projects to benefit important recreational or natural values • Implement projects currently identified in Watershed studies to rehabilitate them to satisfactory conditions	• Identify water quality improvement projects including 303(d) listed segments • A map depicting high priority reaches that have insufficient or poorly timed flows (e.g., 15-Mile Reach, 303(d) impaired streams, instream flows, monitoring and evaluation reaches, ecological impacted, recreational significant, reaches with existing dams) • Identify municipal and county land use guidelines that permit current or future development within riparian/wetland areas
Long Term Needs	• Take the steps identified in the stream management plan to remove rivers from the impaired list, one by one, until all are removed • Support monitoring efforts that identify the scope, cause and potential management opportunities to address invasive species • Ensure that new water development activities do not further degrade stream and riparian health or become an impediment to restoration and recovery efforts	• Ensure that new water development activities do not diminish water quality and fall below standards • Develop model guidelines that could be adopted by land use authorities to protect riparian/wetland areas and function • Promote research to assess impacts of pharmaceuticals introduced to streams through wastewater discharge • Implement forest health initiatives to protect source water quality
Projects & Methods	• Develop a basinwide stream management plan to identify criteria for restoration projects and multi-use projects • Successfully recover fish in the 15-Mile Reach • Implement Colorado River Cooperative Agreement (CRCA) identified projects	• Develop a basinwide stream management plan to identify criteria for restoration projects and multi-use projects • Implement CRCA water quality projects • Secure 401 certification for specific places prior to a Record of Decision (ROD) by the Army Corp of Engineers, through a coordinated permitting process that includes all permitting agencies, including local government

Table 3. Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas

SECTION 2

Basinwide Themes [cont.]

Goals	Preserve high quality recreational river and stream reaches with appropriate flows	Develop a basinwide funding system to meet basin environmental and recreational needs
Measurable Outcomes	• Maintain number of boater days on 28 reaches identified as recreation priorities by American Whitewater in cooperation with the WFET work • Protect access and flows levels to 28 popular recreational reaches • Develop more Recreational In-Channel Diversions (RICDs) structures and water rights on community and basin supported reaches to protect recreational flows	• Establish a new funding agency or existing agency for the basin or in every county in the basin to fund environmental and recreational management • Leverage existing financial resources to further protect or restore all streams, rivers and lakes that host prioritized recreational or natural attributes (determine source and scope of funding) • Fund the acquisition of conservation easements that retain agricultural purposes and current uses of water
Short Term Needs	• Develop acceptance from watershed groups on 28 recreation reaches identified by American Whitewater in cooperation with the WFET work • Support existing RICD applications • Recreation and fishery interests continue to investigate how whitewater park development affects fisheries, and how best to mitigate impacts to the aquatic community	• Develop a basinwide stream management plan that identifies environmental and nonconsumptive needs and how best to meet those needs • Identify funding sources for restoration activities and water acquisitions • Utilize basinwide and sub-basin collaboratives already operating in the Basin to leverage and implement the work suggested in this table. Find focal point or institutional framework for facilitation of data sharing, outreach, research, and problem solving. (e.g., CMU Water Center)
Long Term Needs	• Support efforts to expand water based recreational uses of the Colorado River Basin	• Coordinate research, management and project efforts with federal, state, local government and non-profit organizations. • Evaluate future storage projects in-basin and the potential impacts to nonconsumptive values • Projects should identify real costs of municipal water including implementation of associated conservation efforts and river improvement projects
Projects & Methods	• Construct and obtain absolute water right for pending RICD	• Develop stream management plans basinwide to identify criteria for restoration projects and multi-use projects

Table 3. Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas

SECTION 2

Basinwide Themes [cont.]

THEME 2
SUSTAIN AGRICULTURE

Agriculture is extremely important to the Colorado Basin and the economy. Agriculture supports open space, provides wildlife habitat, contributes to late season flows in rivers and streams, maintains groundwater levels, and is part of the culture and heritage. Agritourism is a growing segment of the headwaters counties economies as ranchers and farmers look for additional ways to support their business activity. The Colorado Department of Agriculture defines agritourism as activities, events and services related to agriculture that take place on or off the farm or ranch, and that connects consumers with the heritage, natural resource or culinary experience they value. In 2006, an estimated 13.2 million visitors to Colorado engaged in some agritourism, spending about $1.26 billion (Thimany, et. al, 2007). In 2012, $41 billion of the State's economy benefited from agriculture. Throughout the state, agricultural land is at risk. In the headwaters counties, there has been market pressure to convert agricultural land to other land uses.

Agriculture uses the largest amount of water in the Basin. This lends a favorable eye for municipalities and industrial water users to purchase agricultural water rights. The agricultural community in the Basin believes that alternatives to buy and dry of agricultural lands generally have limited utility unless landowners receive help to address issues such as lost income, lost market share, and lack of expertise to farm new crops. Alternatives to buy and dry typically involve short term fallowing, switching to lower water use crops, or limiting irrigation. Alternatives to buy and dry are limited because producers do not want to lose their existing market share, they might not have the right equipment to farm a different way, they will lose income unless payments adequately cover all of their expenses, their land might not tolerate short term fallowing (grapes, orchards, and forages for example) and they might not have the expertise to farm different crops. Reducing the buy and dry trend would require that producers be given help to transition to different practices, be protected from financial losses, and that the support must be provided for the long term.

The problems with alternatives to buy and dry are not just limited to the Colorado River Basin — the issues are the same for the producers statewide. If the obstacles to buy and dry are to be addressed on a broad scale, it may be possible to continue profitable agricultural production with less water use and address future water demands without building new diversion projects from the Colorado Basin.

The difficulties associated with successfully implementing alternatives to permanently taking agricultural lands out of production reflect the overall trend in Colorado's agricultural sector. The fact is that the number of agricultural producers statewide continues to decline, which leads to a sell off of land and water previously used to grow food. The primary reason that land and water are being taken out of production and sold for other uses is the fact that farm economics cannot

SECTION 2

Basinwide Themes

SUSTAIN AGRICULTURE [cont.]

compete with the prices offered by buyers for the land and water. If this trend is to be reversed, the root causes of the decline in the number of producers needs to be thoroughly examined. Farm economics, limited options for young producers, centralized markets, transportation costs, access to consumers, and consumer willingness to pay are factors that have impacted the agricultural sector.

Although a full agricultural economic analysis is beyond the scope of this report – there are some exciting trends in the agricultural sector that may address at least a portion of the decline. The consumer demand for locally raised food products and the consumer demand for less processed foods provide new opportunity in the agricultural sector. Producers could more readily respond to this strong consumer demand if some of the obstacles were addressed. A partial list of the challenges facing the local foods movement include:

- Availability of affordable insurance for the non-traditional crops in the event of a failure
- Access to convenient markets where consumers can purchase the products year-round
- Technical assistance addressing regulatory requirements
- Availability of processing for meats and other products
- Transportation networks to support getting crops from either the farm to the consumer or the processing facility to the consumer
- Crop storage facilities
- Equipment availability to plant, irrigate, and harvest specialty crops (e.g., vegetables)
- Access to market (customers), improve connection of producer to customer (farm-to-plate)

Tapping into the demand for locally raised and processed foods for some, but not all regions of the Basin, could provide supplemental income for agricultural producers if the benefits are greater than the costs.

This theme emphasizes the importance of the agricultural sector to the Colorado River Basin based upon the needs evaluation. The CBRT's assumptions for the evaluation of the agricultural needs was based on: land dedicated to agricultural production is not expected to increase in the Basin; current shortages in supply already exist; and that existing agricultural producers intend

SECTION 2

Basinwide Themes

SUSTAIN AGRICULTURE [cont.]
to stay in business and will continue to divert and consume water for livestock and farming purposes. The four goals identified to support this theme are:

- Reduce agricultural water shortages
- Minimize potential for transfer of agricultural water rights to municipal uses
- Develop incentives to support agricultural production
- Increase education among the agricultural community about Colorado River Basin water issues

Table 4 includes the four goals as column headings. These goals are supported by measureable outcomes, short term needs, long term needs, and projects and methods.

SECTION 2

Basinwide Themes [cont.]

Goals	Reduce agricultural water shortages	Minimize potential for transfer of agricultural water rights to municipal uses
Measurable Outcomes	• Identify multi-purpose storage projects and methods that address the annual 100,000 acre feet agricultural shortage • Maintain existing irrigated agricultural acreage • Research local agricultural shortage values in the Colorado River Basin • Improve Colorado water law to encourage agricultural water efficiency practices without harming water right value • Establish lease programs for excess water from existing supply projects in the Municipal and Industrial (M&I) sector or multi-use projects	• Identify farm improvements to develop strong sustainable farm economics • Develop a set of quantifiable factors of agriculture pressures that can be measured and evaluated in the future to incentivize production and reduce trends towards transfers • Adopt local land use codes to conserve water and reduce pressures for agricultural water transfers • Promote conservation easements with the anticipated result that they will be more widely considered by the agricultural community
Short Term Needs	• Estimate increased agricultural shortages if temperatures increase • Suggest conservation improvements that reduce headgate demands and reduce shortage • Expand the storage capacity in existing reservoirs • Develop options for financing and constructing new multi-purpose projects	• Study and recommend alternatives to urbanization, growing water demands and other pressures that may reduce the current agricultural land area • Raise funds to purchase conservation easements to preserve agriculture, especially in prime farmlands locations • Research new supplies for M&I water use including reservoir enlargements • Support basin stakeholder ownership of agricultural water rights through private or government ownership
Long Term Needs	• Ensure agricultural decrees are tabulated properly, in proper priority to transmountain diversions • Construct new agricultural reservoirs with hydropower to help finance agricultural projects • Identify local water providers for pilot leasing program • Study high value, low water demand crops • Identify multi-use and collaborative projects that address agricultural water shortages	• Research farm improvements to develop strong sustainable farm economics • Identify opportunities to reduce agricultural consumptive use while continuing agricultural production • Improve Colorado water law to encourage agricultural conservation without harming water right value • Research how to tie basin agricultural water rights to basin lands to limit transbasin transfers or purchases - Protect private property rights
Projects & Methods	• Create leasing program with M&I users to lease back water for agricultural uses • See regional lists for local ditch and reservoir projects	• Expand Green Mountain historic users pool (HUP) to include Slot Group (1977-1985 water rights) • Revise local governments land use policies to protect agricultural land • Develop a risk analysis of new supply projects increase chances of a Compact Call

Table 4. Sustain Agriculture.

SECTION 2

Basinwide Themes [cont.]

Goals	Develop incentives to support agricultural production	Increase education among the agricultural community about Colorado River Basin water issues
Measurable Outcomes	• Reimburse agriculture for value added to the environment including, water quality, wildlife, and viewscapes • Track effectiveness of agricultural incentives in maintaining irrigated acres • Minimize regulatory disincentives such as overly stringent requirements for reservoir construction • Reduce taxes for true self-sustaining agriculture • Develop incentives that encourage continued agricultural production	• Increase participation of agricultural community in Colorado Basin Roundtable (CBRT) meetings • Establish regional water provider and ditch company cooperatives focused on improving regional relationships, water supply redundancy and operational flexibility, water quality, coordinated efforts for multi-beneficial projects and addressing environmental and recreational needs
Short Term Needs	• Reimburse agriculture for value added to the environment including water quality, wildlife, and viewscapes • Research and recommend revising existing taxes and other fiscal requirements for agriculture • Research regulatory disincentives for ATM transfers • Interview Colorado State University Extension staff about on-going and planned research on higher value and low water consumptive use crops	• Engage larger agricultural producer representatives in the Colorado River Basin through presentations, personal conversations/interviews and meetings • Publicize the use and importance of the Historical Users Pool (HUP) to the Basin • Educate Front Range about the importance of keeping West Slope water on the West Slope
Long Term Needs	• Identify the availability of funds to support agricultural water use research • Study available incentives and recommend new incentives that encourage agricultural entities to continue production	• Establish regional watershed cooperative groups represented by agriculture, municipal and industrial, environmental and recreational water users to understand and support local, regional and basin agricultural and riparian needs
Projects & Methods	• Study available incentives and recommend new incentives that encourage agricultural entities to continue production • Use toolbox of existing agricultural incentives (as identified by Colorado Agricultural Water Alliance and Colorado State University Colorado Water Institute) • Pass open space taxes to purchase agricultural land in the Basin	

Table 4. Sustain Agriculture.

SECTION 2

Basinwide Themes [cont.]

THEME 3
SECURE SAFE DRINKING WATER

Clean safe drinking water is essential. The public has taken safe drinking water for granted because of the excellent uninterrupted service provided by water providers. Most consumers hardly think of mentioning it on a list of priorities for the Basin. Input for the municipal needs was obtained from the SWSI 2010 Report Colorado Basin Needs Assessment (CDM, 2011a), input from interviews with the major water providers and collaborative efforts with representative and interested CBRT members and participants.

The population in the Colorado Basin is projected to increase from 307,000 in 2008 to a range from 661,000 to 832,000 by the year 2050. M&I water usage is also expected to nearly double, even with savings from passive conservation.

The 2010 SWSI Report (CDM, 2011b) predicted a Colorado Basin municipal and industrial Gap of 48,000 AF by the year 2050. This is the volume of new water that must be developed to meet the water demands between now and the year 2050 above the needs already met by proposed projects. Upon evaluation of this number, the CBRT has found this "Gap" an irrelevant statistic for our Basin. Unlike other basins in the state, the majority of the municipal and industrial water use in the Basin is diverted directly from streams and aquifers instead of planning by volumes from reservoir releases. Diversions and available supplies are based upon time and place from available streamflows. In most cases the impact on recreation and environmental needs has not been quantified. Thus, the Gap will not be quantified until completion of the basinwide Stream Management Plan (SMP).

The Gap was also determined using a simplified calculation based on gallons per capita per person ratio which has not incorporated the large variability of city populations throughout the year in the resort headwater communities that can swell to over 600% of the permanent population during peak seasons. To better understand the Gap, each large water provider within the Basin was contacted and interviewed to evaluate specific needs to meet the estimated 2050 municipal demands. Further discussion regarding the data collected from these interviews is included in the Evaluation of Consumptive, Environmental and Recreational, and Agricultural Needs section below.

The Colorado Basin has approximately 63 water providers in the basin. The majority of these water providers are small (< 5000 taps). The two largest water provides in the basin include the Ute Water Conservancy District in the Grand Valley Region and the Eagle River Water and Sanitation District in the Eagle River Region. Overall, most water providers throughout the Basin have surface water intakes and/or wells as their primary source of supply and very few rely upon physical water from larger upstream reservoirs. The majority of water providers do rely upon augmentation from Green Mountain Reservoir or Ruedi Reservoir to meet mainstem senior calls. All of the water providers interviewed (30) had master plans in place that identify the legal

SECTION 2

Basinwide Themes

SECURE SAFE DRINKING WATER [cont.]

and physical source of water and infrastructure needed to meet future demands. The future timeframe for these plans varied, however, averaged around a 20 year horizon. Water providers in the Basin, however, are vulnerable to extended droughts, a Lower Basin Compact call, future forest fires, and the uncertainties of climate change and unpredictable future land use. Several water providers are seeking upstream reservoirs as an additional source of physical and legal water supply despite the challenges associated with the cost, complexity and timeframe associated with the permitting and regulatory climate. In addition the presence of fens, regulated through Section 404 of the Clean Water Act (CWA), has become a significant obstacle to developing storage reservoirs.

Water providers are vulnerable to additional TMDs because of the impacts to physical and legal water supplies. Additional TMDs will also increase the risk of Compact curtailment. The majority of water providers are not prepared for the likelihood of Compact curtailment as many legal water rights and augmentation storage is junior to 1922, the date of the Compact. Water quality throughout the Basin will continue to be negatively impacted as firming projects increase diversions out of the Basin by diminishing high quality dilution flows.

Despite the excellent service from water providers, future threats must be taken into consideration in order for reliable service to continue. Recommendations are as follows:

- Water providers should continue to aggressively pursue multiple and redundant water supplies in order to maintain reliable water supplies during extended droughts.
- Water providers must recognize the change in permitting that has occurred and that has resulted in the lengthy and costly regulatory requirements for reservoirs. Rather than undertake this risk with no assurances of approval, water providers should consider other alternatives to upstream reservoirs in order to ensure a safe reliable supply. Other alternatives include redundant surface and groundwater supplies, increased conservation, water efficient land use practices, and regional cooperation that may result in interconnections with other systems.
- Water providers should establish high conservation goals in conjunction with the local land use authorities to which they provide water.
- All water providers should update their respective Water Master Plans to reflect a planning horizon beyond 2050. These master plans

SECTION 2

Basinwide Themes

SECURE SAFE DRINKING WATER [cont.]

should be updated to specifically reflect extended drought conditions, climate changes, protections against a Lower Basin Compact administration, and impacts to instream flows. These plans should be updated every three to five years.

- Water providers should aggressively pursue converting irrigation water rights in their portfolios that are senior to 1922 to municipal water rights in order to improve risk from Compact administration.
- Water providers should require that developers dedicate 100% of water necessary for the proposed development needs.
- Water court processes must be enhanced to improve the cost, timeframe and complexity to allow water providers to meet these future challenges.
- Water providers need to address aging infrastructure requiring costly and timely replacement.

The Basin water providers are planning and preparing for the future with great motivation and sound planning. Implementation of the listed projects will support the water providers in providing redundancy and expanding much needed storage for better drought protection.

The four goals identified to support this theme are:

- Secure growing water demand by developing in-basin supplies and expanding raw water storage supply
- Raise awareness of current obstacles and efforts facing water providers
- Protect drinking water supplies from natural impacts such as extended droughts, forest fires, climate change, etc.
- Ensure safe drinking water

Table 5 includes the four goals as column headings. These goals are supported by measureable outcomes, short term needs, long term needs, and finally projects and methods.

SECTION 2

Basinwide Themes [cont.]

Goals	Secure growing water demand by developing in-basin supplies and expanding raw water storage supply	Raise awareness of current obstacles and efforts facing water providers
Measurable Outcomes	• All basin water providers to meet current supply needs with redundancy, drought plans and viable project options to meet future water needs • Reduced average permitting time for reservoir project to under 10 years • Established regional water provider and ditch company cooperatives focused on improving regional relationships, water supply redundancy and flexibility, water quality, coordinated efforts for multi-beneficial projects and addressing environmental and recreational needs • Reduce demands by establishing water conservation goals and strategies	• Publish summary of state and basin water providers' true cost of water by analyzing operation and maintenance costs including sustainable infrastructure replacement programs • Development of national, state or local funding assistance programs to replace aging infrastructure • All basin water providers have sustainable infrastructure replacement funding programs
Short Term Needs	• Complete existing water provider projects to meet growing demands • Construct interconnects between regional water providers to provide redundancy in water supply • Improve inefficiencies in reservoir permitting process between federal agencies and promote revisions and best management practices (BMPs) to improve process timeline and cost • Research potential locations for hydropower generation facilities • Establish regional cooperatives to meet municipal, industrial, agricultural and environmental and recreational needs • Develop a set of project criteria that supports the development of multi-use water supply projects	• Study existing burden of aging infrastructure on basin water providers • Educate water providers on additional means of reducing demand to meet "high" conservation goal and reduce distribution costs • Publish summary of true cost of water by interviewing water providers • Secure funding for replacement of aging infrastructure through federal or state grants or loans, or through local taxing programs
Long Term Needs	• Develop a tool to estimate the cost of reservoir permitting, construction and operations • Develop a user friendly GIS database and map that facilitates understanding of water supply needs, diversion locations and environmental and recreational needs, including a reservoir site evaluation with sufficient legal and physical water supply analysis	• Ensure all water providers are charging for true cost of water including sustainable infrastructure replacement programs • Ensure all water providers are planning and funding for development of future projects to meet population growth expectations
Projects & Methods	• Installation of permanent drinking water systems interconnect among Fraser River valley water providers • Established regional water provider and ditch company cooperatives • See regional project lists for local water provider projects	• Pursue state funding assistance for water providers to improve infrastructure

Table 5. Secure Safe Drinking Water.

SECTION 2

Basinwide Themes [cont.]

Goals	Protect drinking water supplies from natural impacts such as extended droughts, forest fires, climate change, etc.	Ensure safe drinking water
Measurable Outcomes	• Every basin water provider has a reliable redundant water supply to meet 2050 demands • CBRT or CWCB to establish a biannual basin conference on natural disaster planning for water providers, government officials	• Source water protection regulations are enforced and revised when supported by proper research
Short Term Needs	• Complete and provide updates to Colorado River Water Availability Study (CRWAS) Phase II to better understand estimated affects of climate change, extended droughts, flooding, forest health and impacts on water supply and quality. • Construct interconnects between regional water providers to provide redundancy in water supply • Water providers to provide mitigation plans for potential natural disaster impacts to water supply and water quality and implement recommended mitigation methods	• Provide clean drinking water by all water providers 100% of the time • Implement natural disaster mitigation measures outlined in water provider, local government or state plans for drought, forest fire, flood, climate change or other unforeseeable potential source water quality impacts • All wells classified as groundwater under the direct influence (GWUDI) of surface water have proper treatment facilities • Maintain and increase flows in Colorado River below Glenwood Springs to provide sufficient dilution flows for high salinity issues and potential affect of emerging contaminants to protect water providers with mainstem intakes (applies to Fraser River as well)
Long Term Needs	• Continued research to best understand future climate changes to best manage water supply and water use • Update and modify water provider mitigation plans per most current data and BMPs • Implement identified mitigation plan projects to protect water supply and water quality • Educate water provider, municipal and county elected officials and planning officials on importance of potential natural changes to water supply and water quality	• Additional research on emerging contaminants and treatment technologies • Better understanding and/or national research of algal toxins produced in reservoirs • Broader enforcement of nutrient removal to include agriculture and lawn applications in an effort to control nitrogenous disinfection byproducts exacerbated by large population growth and lower stream flows
Projects & Methods	• Installation of permanent drinking water systems interconnects as listed in the regional project lists • CBRT or CWCB to establish a biannual basin conference focused on natural disaster planning BMPs for water providers, government officials and interested persons • See regional project lists for local mitigation plan projects	• Installation of permanent drinking water systems interconnects as listed in the regional project lists to provide redundancy • Implementation of source water protection plans mitigation projects • Pharmaceutical take-back program and education to keep over the counter drugs, prescriptions and personal care products out of sewer systems.

Table 5. Secure Safe Drinking Water.

SECTION 2

Basinwide Themes [cont.]

THEME 4

ENCOURAGE A HIGH LEVEL OF BASINWIDE CONSERVATION

The CBRT supports adoption of high water conservation and efficiency measures for all water users including water providers, agriculture (where conservation and efficiency measure have been studied and determined to be productive in meeting SWP and CBIP goals and protecting private property rights), and industrial users. Conservation and efficiency measures vary significantly throughout the Basin which is expected based upon the unique geographic, cultural, economic, and climatic setting of each region. In general, there is a broad recognition that water is a finite resource, and it is not to be wasted. Conservation will be a key element in meeting the vision for the State's future water needs and, therefore, the Basin, have to walk the talk.

The old "Soil" Conservation Districts, established by state law in the 1950s, now called the Natural Resource Conservation Districts, encouraged landowners to install soil and water conservation practices. The Basin has seven Conservation Districts promoting conservation work with private landowners. This work is the landowner's information and is generally not available to the public, however, it is estimated that over $100 million of private dollars has been spent on the installation of conservation practices over the last 60 years with in the Colorado Basin. In some instances these improvements had a 50% match with federal and or state programs, such as Environmental Quality Incentive Program (EQIP), and the many other matching dollars programs. These practices include, but are not limited to, pipelines, water control structures, gated pipes and sprinklers systems (Davidson, 2014).

Currently most water providers in the Basin already have aggressive conservation programs. Based upon information gathered during the outreach and interviews, many Basin water providers use less water today than they did 10 years ago. Examples of these programs include:

- Voluntary and/or mandatory water restrictions (depending upon drought or water supply conditions)
- Leak detection and correction programs
- Water loss tracking
- Integrating conservation into land use planning and regulation
- Increasing block rate structures (tiered rates) which encourage conservation
- Radio read meters which can detect leakage or red flag water usage
- Limitations on use of potable water for outside irrigation
- Adoption of Best Management Land Use Practices (BMPs) for outside irrigation

SECTION 2

Basinwide Themes

ENCOURAGE A HIGH LEVEL [cont.]

- Adoption of plans that require more xeriscaping, using plants that don't require irrigation, and reducing irrigation of remaining turf

Colorado Basin water providers realize they first must put their own house in order before encouraging other basins to use in-basin supplies first. Other examples of conservation practices that are in the Basin include:

- Communities are making the connection between water usage and impacts to the local rivers or streams below diversion points. Western Resources Advocates' (WRA) Rushing Rivers study identified those communities that would be receptive to adopting programs that would stress conservation BMPs and using the revenues saved through utility charges to make improvement to the local stream.
- Several communities have adopted land use comprehensive plans that have a maximum allowable population growth or number of taps limited by finite water supplies and/or based upon leaving adequate water in receiving streams for instream flows.
- The Town of Breckenridge is considering regulations that would cap outdoor use at three days a week.
- Several headwater water providers do not allow any outdoor irrigation for new development.
- A coalition of Roaring Fork Valley water providers is assembling plans for public outreach to elevate water efficiency by the adoption of a broad water efficiency strategy for the valley.
- The City of Aspen used the same amount of water last year as it did in 1966 despite having three times as many residents.
- The City of Grand Junction has offered incentives for use of xeriscaping.
- The Upper Eagle River District outdoor use since 2005 has been restricted to three days a week, before 10:00 AM and after 4:00 PM which in part has resulted in a 20% per capita reduction.
- The irrigation entities in the Grand Valley have implemented irrigation ditch conveyance efficiency measures.

SECTION 2

Basinwide Themes

ENCOURAGE A HIGH LEVEL [cont.]

An important step in obtaining a high conservation level is education. Watershed organizations throughout the Basin have undertaken aggressive education programs to inform and remind residents where their water comes from.

West Slope grassroots efforts in part were the driving force behind SB-023 which passed both houses of the legislature this year but was ultimately vetoed by the Governor. This legislation proposed changes to Colorado Water Law that would have provided for incentives for Colorado Basin agricultural water users and irrigators to make their operations more efficient while also increasing instream flows, and protecting the full legal water rights. Basinwide implementation of greater conservation and water conscious land use practices to encourage conservation needs additional work. This may include legislative actions such as mandating daily maximums per user or requiring comprehensive plans to include high water conservation goals.

The Colorado Basin Roundtable strongly supports the conclusions of three different studies by John Currier (Currier, 2014b), Ken Ransford (Ransford, 2012) and Western Resource Advocates (WRA, 2014) that show new supply projects, transmountain diversions and buy and dry practices can be eliminated or deferred through adoption of water conservation measures that reduce per capita water use and reduce the amount of water consumptively used on blue grass lawns on the Front Range. The CBRT also encourages local government land use authority to strictly limit water demands from outside lawn irrigation statewide and recommends small incremental improvements in Colorado Water Law that can result in more efficient water use among all sectors of water users. These changes will allow water users more flexibility to install efficiency measures that can result in improvements to instream flows and promote stream health. These measures would be voluntary and should come with economic incentives.

Conservation measures are intertwined with those goals included in the Develop Local Water Conscious Land Use Strategies theme. Water conscious land use development is a critical component of any conservation strategy. However, it is important to reiterate that changes to the statutory framework for administering water rights in Colorado could have a beneficial effect for agricultural producers allowing them to transfer water rights or to implement conservation measures. An integral part of the Colorado Water Plan should include an innovative approach to addressing and encouraging agricultural efficiencies.

The three goals identified to support this theme are:

- Improve Colorado water law to encourage efficiency, conservation and reuse

SECTION 2

Basinwide Themes

ENCOURAGE A HIGH LEVEL [cont.]

- Pursue continued municipal and industrial conservation
- Promote agricultural conservation that maintains agricultural production and viability

Table 8 includes the three goals as column headings. These goals are supported by measureable outcomes, short term needs, long term needs, and finally projects and methods.
The following section describes the background information used to support the consumptive (municipal and industrial), agricultural, and environmental and recreational (nonconsumptive) needs that drove the development of the goals, measurable outcomes, short term and long term needs, and projects and methods discussed in the sections above.

SECTION 2

Basinwide Themes [cont.]

Goals	Improve Colorado water law to encourage efficiency, conservation and reuse	Pursue continued municipal and industrial conservation
Measurable Outcomes	• Revised Colorado Water Law through legislation to allow more flexibility among water providers and agricultural community to promote stream health through conservation, bypass flows, and flexibility in diversion location • Reduce time of average Division 5 water court process by adding staff including judges, referees and supporting staff	• Achieve and sustain a high level of conservation by all basin water providers and industrial users
Short Term Needs	• Research improvements to the water court process to decrease cost and average time between application submittal and signed decree • Developed potential Colorado Water Law revisions for environmental benefits from allowing more legal flexibility to municipal and agricultural water rights	• State recognition that Basin municipal return flows remain in the basin and contribute to instream flows, downstream water users and Compact deliveries • Publication of existing basin high level conservation efforts in-basin cities and industries • Develop alternative water use calculation to gallons per capita per day (GPCD) that more accurately describes resort communities water use
Long Term Needs	• Seek state funding to hire additional water court judges, referees and supporting staff	• Evaluate alternatives for municipal water right modifications without exposing water right portfolio to opposition, especially when conservation or environmental benefits are met
Projects & Methods	• Compare Colorado Water Law and procedure with other Western states to identify alternative practices to facilitate water transfers	• See regional project lists for local water provider conservation projects

Table 6. Encourage Basinwide Conservation.

SECTION 2

Basinwide Themes [cont.]

Goals	Promote agricultural conservation that maintains agricultural production and viability	
Measurable Outcomes	• Revised Colorado Water Law to allow agricultural conservation and improved efficiency measures without impacting water right value or risk of abandonment • Strive towards a high level of conservation and efficiency within the agricultural industry	
Short Term Needs	• Research the water efficiencies that can be gained through structural improvements and infrastructure improvements • Investigate non-productive water losses • Study potential for producing high value, low water demand crops • Research beneficial contributions from agricultural flood irrigation return flows to nearby springs, wells and contribution flows to streams and rivers in late summer, fall and winter	
Long Term Needs	• Identify "water saving" opportunities in the Colorado River Basin that have no injury to other water users, the proponents water rights and environmental values	
Projects & Methods	• See regional project lists for local agricultural conservation projects	

Table 8. Encourage Basinwide Conservation.

SECTION 2

Basinwide Themes [cont.]

THEME 5

DEVELOP LOCAL WATER CONSCIOUS LAND USE STRATEGIES

We cannot solve Colorado water issues without addressing the fundamental link between water and land use. Basin residents recognize that the limited water supply in Colorado and the ever-increasing water demands both in the Basin and throughout the State require the development of new policies linking land use and water. The Colorado Basin from the headwaters to the state line is very diverse. Land use policies, water conservation practices and economies are different and are best managed by local authorities who represent and understand the local needs and are directly accountable to the local population. Implementation of these policies will vary based on geographic region within the Basin. Local governments have the authority and tools to ensure that new growth and development do not out strip water supply. Colorado's Water Plan must support these local efforts (NWCCOG, 2014b).

Overall these policies should ultimately:

- Build a culture of conservation within the development community
- Encourage local authorities to implement conservation and growth strategies that protect and preserve efficient water resources not only for meeting consumptive needs but to address nonconsumptive needs as well
- Promote regional cooperation for water resource use within the Basin
- Plan for water demands that will continue to grow beyond the current 2050 planning horizon
- Achieve balanced economies which protect and encourage agriculture
- Adopt local and regional comprehensive plans which respect and recognize locally available limited water supplies

The CBRT recommends that these policies be adopted in Colorado's Water Plan, recognizing that current and future land use practices will have a significant impact on water use statewide. Dense growth should be directed within urban growth boundaries where water supply infrastructure and plans are in place. Land use planning across the Basin should recognize the shortage and limits of water supply and establish achievable and meaningful water conservation goals. Land use policies must both recognize and articulate preserving water for streams and rivers and maintaining agriculture as a trade-off for efficient outdoor landscapes and indoor use.

The goals contained in Table 7 were developed from repeated comments and suggestions heard from Town Hall meetings, Rotary presentations, city councils and at watershed collaborative discussions. The thoughts were assembled and presented with overwhelming support from the

SECTION 2

Basinwide Themes

DEVELOP LOCAL WATER [cont.]
CBRT. This is the voice of the Colorado Basin on what water conscious land development will look like in our Basin and a model for what it could look like Statewide.

The four goals identified to support this theme are:

- Develop land use policies requiring and promoting conservation
- Support, preserve and promote local authorities management of stream health, development and conservation efforts
- Expand regional cooperation efforts to improve efficiency, provide water supply flexibility, and enhance environmental and recreational amenities
- Extend water planning vision beyond the 2050 horizon

Table 7 includes the four goals as column headings. These goals are supported by measurable outcome short term needs, long term needs, and projects and methods.

SECTION 2

Basinwide Themes [cont.]

Goals	Develop land use policies requiring and promoting conservation	Support, preserve and promote local authorities management of stream health, development and conservation efforts
Measurable Outcomes	• Develop recommendations for city, county and state governing bodies promoting water awareness and efficiency in land use policy • Develop educational material or opportunities for municipal and county elected officials and planning officials on water supply issues and conservation options • Preserve agriculture and reduce the transfer of agriculture water to municipal use	• Development of intergovernmental agreements (IGA) to provide regional comments and input on water projects • Development by local jurisdictions of water conservation plans with identified goals
Short Term Needs	• Review existing land use regulations for water conscious development requirements • Evaluate potential growth in unincorporated areas and water supplies to those areas	• Educational outreach utilizing currently available materials to educate local jurisdictions on stream health, development and conservation opportunities • Maintain and strengthen local jurisdictions' review authority of water project development
Long Term Needs	• Provide financial support to local jurisdictions to implement water conscious development requirements • Draft recommended model basin and Statewide land use planning guidelines that focus on water conservation and water efficient land use development	• Rally state and basin support for water conservation goals • Provide financial support for local jurisdictions to develop and implement stream management plans
Projects & Methods	• Create Statewide grant opportunities for local jurisdictions to review land use regulations, conduct public outreach and implement regulations • Utilize current councils of government to develop model land use regulations • Encourage water conservation plans with identified goals for every county and city within the Basin	• Encourage local government in the area where project impacts occur to review water development projects by entities outside the Colorado River Basin

Table 7. Develop Local Water Conscious Land Use Strategies.

SECTION 2

Basinwide Themes [cont.]

Goals	Expand regional cooperation efforts to improve efficiency, provide water supply flexibility, and enhance environmental and recreational amenities	Extend water planning vision beyond the 2050 horizon
Measurable Outcomes	• Established regional water provider, ditch company and environmental & recreational advocate cooperatives focused on improving regional relationships, water supply redundancy and flexibility, water quality, coordinated efforts for multi-beneficial projects and addressing environmental and recreational needs • Increase permanent interconnects between water providers where feasible	• Provide regular updates to the state water plan every 10 or less years once plan is created • Require updates for water demands to include 50-75 years in the future
Short Term Needs	• Develop examples of regional cooperative structures as models for rest of basin • Provide financial support for planning and implementation for water providers needing redundant water supply in water tight watersheds, including shared supplies • Improve environmental and recreational attributes by coordinating time and place of diversions by water providers and agriculture users	• Develop a Basin and state vision for Colorado beyond 2050 and estimate water needs to meet vision • Develop timeframe for updates to Colorado Water Plan
Long Term Needs	• Expand scope of smaller water providers to proceed on needed water storage projects as multi-beneficial projects • Coordinated watershed efforts among major water users to improve water use efficiency	• Pursue state water planning discussion to address future population growth, climate change, natural disasters, economic growth and environmental health • Strongly evaluate state land use regulations to meet long term exponential state population growth (and water demand) with a limited water supply
Projects & Methods	• Establish regional water provider and ditch company cooperatives • Install permanent drinking water interconnections among Fraser River valley water providers	

Table 7. Develop Local Water Conscious Land Use Strategies.

SECTION 2

Basinwide Themes [cont.]

THEME 6
ASSURE DEPENDABLE BASIN ADMINISTRATION

Assuring dependable Basin administration provides stability and predictability for the Colorado Basin. The Basin identified two primary diversions; the Shoshone Hydroelectric Plant located above Glenwood Springs in the Glenwood Canyon and the senior Grand Valley irrigation diversions referred to as the "Cameo Call". Water users in the Colorado Basin identified maintaining these two diversions and their positions within the administration system of the river as critical to the future of the Basin. A third pivotal concern for the Basin is the 15-Mile Reach which protects Endangered fish in the Upper Colorado River. Every water user within the Colorado Basin feels the impacts of these three major uses and their senior calls which ensure that water remains in the Colorado River and gets delivered to the State line. This helps to meet critical environmental and recreational needs both on the Colorado River and its tributaries.

The short and long term needs of the Shoshone Hydroelectric Plant were partially addressed in the Colorado River Cooperative Agreement (CRCA) and the Shoshone Outage Protocol which was adopted by the large reservoir operators on the Western Slope. However, the long term viability of a 100+ year old power plant is always in question and so the exploration of more permanent long term solutions than the Shoshone Outage Protocol must be an integral component of the Colorado Water Plan. The Grand Valley water users divert to support the production of high value agricultural crops. The short and long term goals of maintaining and protecting the viability of agriculture on the Western Slope, help to ensure that the Cameo Call will continue to be a lynchpin for middle and lower river operations and administration.

Two pending projects, the Moffatt Firming Project and the Windy Gap Firming Project have the potential to divert an additional 18,000 AF and 40,000 AF, respectively to the Front Range. Additional major depletions from the Colorado River or its tributaries could trigger another Section 7 consultation under the Endangered Species Act. In 1999 the US Fish and Wildlife Service (FWS) issued a Programmatic Biological Opinion (PBO) recommending that 10,825 AF be delivered each year during the late summer and fall to protect four endangered fish in the 15-Mile Reach of the Colorado River, from the Grand Valley Irrigation Company Diversion Dam near Palisade downstream to the Gunnison River confluence in Grand Junction. This is known as the Recovery Program. The four species Listed under the Endangered Species Act are the Colorado pikeminnow, humpback chub, razorback sucker and bonytail. The US Fish and Wildlife Service (FWS) set a goal in the PBO for a population of 1,100 pikeminnow. The PBO stated that if this level is not reached by the earlier of 2015 or when 50,000 AF of new depletions are made from the Colorado River, this would be considered new information and require a new consultation under Section 7 of the Endangered Species Act. A Section 7 consultation requires the US Fish and Wildlife Service to undertake another scientific study to estimate the population of these fish to determine if their numbers are increasing, stable, or decreasing. If the Recovery Program fails, Federal Agencies are obligated to take measures to conserve the Endangered fish. Any additional depletion from the Colorado River is likely to trigger another Section 7 consultation.

SECTION 2

Basinwide Themes

ASSURE DEPENDABLE BASIN ADMINISTRATION [cont.]

The desire to increase conservation and maintain agriculture through creative programs comes regularly in conflict with the entrenched culture and current statutory framework for the administration of water rights. In particular there is such a high fear of losing some portion of a diverter's water rights that both municipalities and agricultural users are disincentivized from pursuing creative solutions. Water court proceedings have also become prohibitively expensive for many small users to participate in. Simple matters such as changing a point of diversion have become so expensive that for a small agricultural user the thousands of dollars involved render whatever gains might be made by the water user in efficiency or conservation economically impractical. Legislative solutions to improving upon the current statutory framework to allow for varied and creative approaches to water needs without penalizing water users needs to be addressed as part of the Colorado Water Plan.

Two goals identified by the Basin to support this theme included meeting the obligations of the Colorado River Compact and maintaining Lake Powell levels at a point at which power can be generated. The failure to maintain Lake Powell levels will have a significant impact on millions of people's lives and the economy of much of the western United States. Linking conservation, water conscious land use and limiting the potential for large new TMDs all contribute to maintaining Colorado River flows and Lake Powell levels. In addition, meeting the needs of agriculture and the protection of the Shoshone and Cameo Calls contribute to the short and long term goals of maintaining Lake Powell levels at power production levels.

The four goals identified to support this theme are:

- Protect and defend maximum mainstem calls at Shoshone Hydroelectric Plant and senior Grand Valley irrigation diversions
- Ensure sufficient Lake Powell water level for uninterrupted hydroelectric power production
- Maintain Interstate Compact deliveries to Lake Powell
- Improve water court process

Table 8 includes the four goals as column headings. These goals are supported by measureable outcomes, short term needs, long term needs, and finally projects and methods.

SECTION 2

Basinwide Themes [cont.]

Goals	Protect and defend maximum mainstem calls at Shoshone Hydroelectric Plant and senior Grand Valley irrigation diversions (Cameo Call)	Ensure sufficient Lake Powell water level for uninterrupted hydroelectric power production
Measurable Outcomes	• A Western Slope purchase of, or signed first right of refusal to purchase, the Shoshone Hydroelectric Plant • Protocols to maximize significant mainstem calls at Shoshone and Grand Valley • Retain 100% ownership of senior Grand Valley irrigation water rights by West Slope entities (private or government) • Improve time that ESA Recovery flows for 15-Mile Reach are met	• Upper Basin states plan to protect and maintain power producing water level in Lake Powell • Developed statewide plan to guarantee water deliveries to Lake Powell with allotted flows and volumes including a discussion on risk responsibilities • Protect Shoshone and Grand Valley irrigation calls
Short Term Needs	• Develop protocols with Xcel to protect and maximize Shoshone Hydroelectric Plant calls for the health of the Colorado River mainstem, recreation provided by the Shoshone flows, and needed water quality improvements provided through dilution by Shoshone flows.	• Secure uninterrupted hydroelectric power production which sustains basin: low electricity costs, funding for federal Programmatic Biological Opinion (PBO) programs and Upper Colorado River Endangered Fish Recovery Programs, funding for salinity and selenium reduction programs, and supports necessary storage to meet the Colorado River Compact deliveries • Increase the water level in Lake Powell to build drought protection for uninterrupted hydropower production
Long Term Needs	• West Slope control of the Shoshone Hydroelectric Plant to guarantee maximize call potential for entire basin benefit • Eliminate risks to reduced Grand Valley irrigation call to sustain needed environmental, recreational and water quality flows above Grand Valley irrigation diversions • Identify additional existing water rights important for the sustainability of the Colorado River Basin	• Define Colorado River Basin's responsibilities to maintain Lake Powell hydropower producing water level • Pursue interstate options to create real "new supply" projects • Develop triggers and responses based on Lake Powell water level to better manage water level • Work with Bureau of Reclamation to understand tools available to support Lake Powell water level
Projects & Methods	• Purchase of Xcel owned Shoshone Hydroelectric Plant or other permanent solution to maintain secure maximum Shoshone diversions	• Establish a Water Bank to meet West Slope required flows or volumes • Pursue interstate options to create real "new supply" projects (i.e. exchange of Pacific Ocean desalination water for Lower Basin Colorado River water, importation of water from outside the Colorado River Basin) • Develop criteria for new water rights detailing risk responsibility • Evaluate potential for Intentionally Created Surplus programs in the Upper Basin

Table 8. Assure Dependable Basin Administration.

SECTION 2

Basinwide Themes [cont.]

Goals	Maintain Interstate Compact deliveries to Lake Powell	Improve water court process
Measurable Outcomes	• Maintain 10-yr running average delivery of 8.25 million acre-feet to Lower Basin • Assume in any further water availability studies of the Colorado River that the Upper Basin is responsible for 50% of the Mexico Treaty obligation to deliver 1.5 million acre feet each year • Colorado to define and meet allotted Upper Basin delivery requirements	• Recommendations to improve the objector process • Recommendations to limit vulnerability of water rights when changing existing water rights in water court • Improvements to Colorado water law to encourage agricultural water efficiency practices without harming water right value
Short Term Needs	• Work with Upper Basin states to determine state specific responsibilities • Determine Colorado's consumptive use of the Colorado River	• Evaluate alternatives for municipal water right modifications without exposing water right portfolios to opposition • Convene a symposium to engage a statewide discussion on improving Colorado water law process
Long Term Needs	• Evaluate future needs for curtailment and payback to meet 10-yr running average deliveries to Lower Basin • Pursue interstate options to create real "new supply" projects	• Seek federal and state funding to retain additional water court judges, referees and supporting staff if the current system cannot be improved
Projects & Methods	• Establish the Water Bank to meet West Slope required flows or volumes • Pursue interstate options to create real "new supply projects (i.e. exchange of Pacific Ocean desalination water for Lower Basin Colorado River water users, importation of water from outside the Colorado River Basin) • Develop criteria for new water rights detailing risk responsibility • Evaluate potential for Intentionally Created Surplus programs in the Upper Basin	• Compare Colorado water law and procedure with other Western states to identify alternative practices to facilitate water transfers

Table 7. Assure Dependable Basin Administration.

SECTION 3

Needs Analysis — Regional Information and Breakdown

3.1 Evaluation of Consumptive, Agricultural, Environmental and Recreational Needs

The evaluation of needs for this BIP relied on existing studies including, but not limited to SWSI 2010 (CDM, 2011b) and the SWSI Colorado Basin Needs Assessment (CDM. 2011a). The BIP is built upon the information contained in these and other documents and by obtaining input from stakeholders throughout the Basin. A comprehensive list of projects, policies and processes was also developed and is provided in Section 4. The development of this list is an iterative process and will continue to be well into the future. Specific information relating to the evaluation of the consumptive, agricultural and environmental and recreational needs is provided below.

Evaluation of Consumptive Needs

Municipal and Industrial users form the principal needs for consumptive use. Energy development is the primary user within the industrial sector,. The CBRT relied on data and information contained in existing studies including the SWSI 2010 and the SWSI Colorado Basin Needs Assessment. This information was further expanded to include the data collected from the water provider interviews for the municipal sector. The Colorado/Yampa-White Roundtable' Energy Demand studies, input from the Colorado Oil and Gas Association (COGA) and the National Oil Shale Association (NOSA) were used to assess the future water demands associated with the oil and natural gas and oil shale industries. Exhibit E includes additional data and information related to the consumptive needs evaluation.

WATER PROVIDER DATA

The consumptive Project Leadership Team (PLT) focused on obtaining additional data to better quantify the water demands of local water providers than that provided in SWSI 2010. Interviews were conducted with 30 of the major water providers throughout the Basin. A questionnaire was developed and provided to each of the interviewed providers and other major water providers. The questionnaire requested data that characterized their existing and forecast supply, demands, conservation efforts and projects. Additional data was obtained from available engineering reports, comprehensive studies, and other similar published data. A qualitative analysis was performed through the questionnaire and interviews discussing topics such as: the three most significant needs of each provider; the concerns and preparations for environmental changes; and an understanding of the water providers input into the local land use planning and approval process. The analyses of needs were collected as Maximum Daily Demands and Average Daily Demands to more appropriately reflect the demands of each system as many of the water providers in the Basin are dependent on wells and direct streamflows, instead of large reservoirs. The data collected from the water providers within the Basin are included in Exhibit E and a Summary of Demands is provided in Table 9.

SECTION 3

Needs Analysis [cont.]

COLORADO BASIN MUNICIPAL WATER DEMAND SUMMARY BY COUNTY

County	Population 1			Annual Water Demand (AFY)			Estimated C.U. (AFY)		
	2015	2030	2050	2015	2030	2050	2015	2030	2050
Eagle	104,495	108,649	166,184	18,819	26,335	41,271	2,823	3,950	6,191
Garfield	58,961	87,300	131,692	19,453	21,200	28,848	2,918	3,180	4,327
Grand	21,661	33,267	42,809	2,945	4,271	5,403	442	641	811
Mesa	121,295	204,268	282,460	20,425	36,124	54,384	3,064	5,419	8,158
Pitkin	39,800	47,911	60,566	6,854	5,686	6,997	1,028	853	1,050
Routt	2,077	2,140	2,227	370	362	374	55	54	56
Summit	66,104	73,587	92,248	5,211	7,981	10,027	782	1,197	1,504
Total	414,393	557,122	778,186	74,077	101,959	147,305	11,112	15,294	22,096

Table 9.

Conservation is at the forefront of most water provider's goals and large efforts have been made to reduce the system demands. The SWSI conservation analysis used the gallons per capita per day water demand for each water provider. The PLT decided not to focus on this type of a conservation analysis as it does not account for the huge population fluctuations in the resort communities across the headwaters of the Basin. The Next Step this BIP identified is the need for a more in-depth analysis of this information and further investigation into the water providers not interviewed. A summation of water demands and consumptive uses of individual water users should also be conducted to support a full analysis of future Basin drinking water demand and depletions.

SELF-SUPPLIED INDUSTRY

SWSI 2010 addressed water demands associated with the self-supplied industry (SSI) and municipal provided large industries separate from the M&I sector.

The subsectors that were included in SWSI SSI assessment were

- Large industries, including mining, manufacturing, brewing, and food processing
- Water needed for snowmaking

SECTION 3

Needs Analysis [cont.]

- Thermoelectric power generation at coal- and natural gas-fired facilities
- Energy development, including the extraction and production of natural gas, coal, uranium, and oil shale.

Since SWSI 2010, additional research and information has been made available that better quantifies the water demands associated with the oil shale and oil and natural gas sectors. No additional data was collected as part of this BIP effort to refine the water demands presented in SWSI 2010 for the large industrial, snowmaking, and thermoelectric power sectors. Further assessment of these demands are needed and recommended for further evaluation in the Next Steps Section of this report.

ENERGY DEVELOPMENT

The abundance of natural resources in northwest Colorado is predictive of continued potential for energy resource development. Recent studies have indicated that the Green River Formation in western Colorado, of which a portion lies within the Colorado River Basin, may contain approximately 1.5 to 1.8 trillion barrels (bbl) of recoverable oil from shale (URS, 2008). As a result of the recent improvements in the extraction and production technologies and the continued potential for future development, there is a need to continually assess and update the water-related impacts of energy resource development in northwestern Colorado, specifically within the Colorado, Yampa, and White River Basins.

In 2008, the Energy Subcommittee of the Colorado and Yampa/White Green Basin Roundtable commissioned a study to evaluate the water demands associated with the oil shale, oil and natural gas, coal, and uranium industries (Phase I). In addition, Phase I provided estimates of water demands for the electrical generation needed to fuel energy production and the municipal water demands stemming from the increased population of workers. The results of Phase I study concluded that more than 400,000 AF of water annually were needed for the development of the studied energy industries (oil and natural gas, oil shale, uranium, coal), a very high estimate of which a majority was for oil shale development, requiring more than 200,000 AF for electrical generation to serve in-situ (in place) oil shale production.

Due to the concern regarding the Phase I water demands for the oil shale industry, the Energy Subcommittee commissioned a second study in 2011 (Phase II) that reexamined the oil shale water demands. The result was that the overall annual demand estimates were reduced to 120,000 AF (AMEC, 2012). However, changing industry conditions have led to a reassessment of Phase I and II water needs regarding their validity under current conditions. (Anticipated to be completed by June 30, 2014.) A summary of the information documented in the Update memorandum (Exhibit E) for the oil shale and oil and natural gas industries is provided below. Since coal and uranium energy production is not expected to vary considerably from current conditions, the Phase I estimates will be adopted in the Update. (Note that the Colorado River

SECTION 3

Needs Analysis [cont.]

Basin currently does not have any active coal and uranium mines.) The Update provides revised water demands where applicable based upon updated data and recommendations made for further research and refinement for oil shale, oil and natural gas.

ENERGY — OIL SHALE

In March 2014, the National Oil Shale Association (NOSA) updated their circa 2012 water use estimates for the future commercial oil shale industry. The new NOSA data indicate future oil production from oil shale projects have been reduced from 1.5 million to 500,000 barrels per day in light of a more pragmatic view of what the industry might look like in 50 years. These revised estimates result in a new estimate of 10,000 – 25,000 AF/year net water demands for oil shale as compared to the Phase II Report of 120,000 AF. This estimate does not include the water demands associated with the indirect uses of water associated with the oil shale industry.

ENERGY — OIL AND NATURAL GAS

The Phase I report (URS, 2008) estimated 3,000 to 5,500 AF/year for "low" to "high" production scenarios for natural gas (an estimated 2.2 AF/well demand). Due to recent developments in the drilling technology, from vertical to horizontal wells, and data and information from the Colorado Oil and Gas Conservation Commission (COGCC) and the CWCB, the gross direct water use factor may be more than double of the Phase I estimate, now around 5 AF/well.

Additional research is underway by AMEC and Canyon Water Resources to document the overall impact to the future water demands needed for the oil and gas well drilling and completion

activities. The U.S. Department of Energy (DOE) released on June 18, 2014, a new report that frames an integrated challenge and opportunity space around the water-energy nexus for DOE and its partners and lays the foundation for future efforts. These on-going efforts to refine the water demands needed to support our energy sector will be important in updating the consumptive water demands for the Basin.

The Next Step section identifies the need to incorporate this information into the consumptive needs evaluation.

Evaluation of Agricultural Needs

Agricultural water uses are considered part of the consumptive water use sector, because of the importance of agriculture, this BIP addressed the municipal and industrial consumptive water use needs separately, as documented above. The agricultural Project Leadership Team (PLT) focused on addressing existing agricultural water supply shortages but the members also identified management programs as tools that address agricultural needs. The agricultural uses addressed during the assessment included row crop farming, irrigated pasture and hay production, water used for vineyards, orchards, vegetables, and other specialty crop production. The CBRT's approach to evaluating the agricultural needs was based on the following

SECTION 3

Needs Analysis [cont.]

assumptions: land dedicated to agricultural production is not expected to increase in the Basin, current shortages in supply already exist, and existing agricultural producers intend to stay in business and will continue to divert and consume water for livestock and farming purposes. It was generally agreed during the evaluation discussion that the overarching goal is to protect and sustain the existing agricultural practices. Measures were discussed in that context. While evaluating the agricultural needs in the basin the participants noted that broad-scale management efforts such as the promotion of on-farm improvements by the Natural Resources Conservation Service, the Salinity Control Program, and the Endangered Fish Recovery Program elements should be included and evaluated because of their direct and indirect agricultural production benefits. Such programs were included in the evaluation because of their overall benefit to agricultural production. Interviews were also conducted in an effort to obtain input on other relevant studies currently in the works by the BOR, the Colorado River Water Conservation District (CRWCD), and other water users in the Basin.

Evaluation of Environmental and Recreational Needs

The evaluation of the environmental and recreational needs for the Draft CWP was based on the SWSI 2010 Nonconsumptive Needs Assessment (NCNA), which assumed that the existing needs did not need quantifying beyond the minimal instream flows. This document assisted in the identification of those river reaches that have been adversely affected as a result of changes in river flows. The efforts of the CBRT's environmental and recreational PLT resulted in a comprehensive list of projects to consider in meeting the environmental and recreational needs of the Basin.

The environmental and recreational PLT also identified two primary actions in moving forward beyond the BIP. Specific goals and measurable outcomes should determine what projects and methods are most important. A set of questions developed by the environmental and recreational PLT will assist in determination of the relative importance of individual projects and methods included on the comprehensive list. The environmental and recreational PLT expressed a need to continue to assess the systemic needs of the Basin from an on-the-ground perspective. A template for these needs assessment can be obtained from the "Catalog of Stream and Riparian Habitat Quality for the Roaring Fork River and Tributaries, Central Colorado", prepared for the Roaring Fork Stream Health Initiative and the recent Inventory and Assessment of the Colorado River in Eagle County, the Colorado River Inventory Assessment (CRIA) prepared for the Eagle River Watershed Council.

The Watershed Flow Evaluation Tool (WFET) report identified over 60 river reaches in the Basin that were at-risk of degrading one or more attributes including riparian, geomorphic processes, aquatic, recreation or water quality. While this report gives an insightful, big picture look at reaches of concern due to changes in flows, it is not focused on how to best address these vulnerabilities from a site specific perspective. Gaining this perspective is going to be

SECTION 3

Needs Analysis [cont.]

challenging work, but by using past studies including the work in the watershed flow evaluation tool and more site specific watershed plans like the one developed by the Roaring Fork Conservancy, Eagle River Watershed Council and by Grand County, Basin stakeholders will continue to plan and implement projects that will best address the environmental and recreational needs of the Basin. Exhibit F includes additional data and information relative to the environmental and recreational needs evaluation.

Table 10 depicts previous work done using the Watershed Flow Evaluation Tool. The tool identified 66 reaches at-risk of hurting one or more key environmental or recreational attributes throughout the Colorado Basin. The following excerpt from the WFET table is taken from the Upper Blue and Upper Colorado River basins. The full table is provided in Exhibit F. The following attributes and their corresponding flow needs were used to evaluate which reaches in the upper Colorado Basin are at-risk of hurting these attributes because of changes in flows:

- Geomorphic function
- Aquatic ecosystems
- Riparian/wetland ecosystems
- Water quality
- Recreational boating

While the public tends to focus on the health of the fishery, identified here as the aquatic environment it is important to use additional indicators to help us determine what makes a healthy river and able to continue to provide for human use and enjoyment. Despite the havoc and damage that can occur with seasonal flooding, natural geomorphic changes in the shape and depth of rivers is as important to aquatic and riparian health as periodic fires are to forest health. Nature is not static and when human development barricades a river's edge or water development decreases the frequency or magnitude of flooding events, river health suffers. Changes in flow and low flows in particular contribute to and exacerbate issues with water quality. Many of the smaller reaches in the upper Blue, Fraser, Eagle, or Roaring Fork rivers provide municipal water for thriving mountain towns. But the combination of transmountain diversions, historic mining practices, and burgeoning municipal development has paired water depletions with historic contamination. This is a significant problem for the ecosystem and people. Careful consideration to water quality should be given when evaluating projects that will further deplete these already degraded river and streams.

SECTION 3

Needs Analysis [cont.]

Recreation is another key attribute was used to identify at risk reaches. For most Coloradans, whitewater and flat water boating is about having fun. But for the Western Slope it is a key economic driver. Maintaining adequate flows in key river reaches that are enjoyed by hundreds of thousands of Colorado residents and visitors alike is critical to the Colorado Basin's recreational economy. It also assists ranchers, farmers and municipalities downstream by helping to ensure that adequate flows. The full report on the WFET work will be a helpful screen to ensure that our Basin continues to do the right work in the most important places. Table 9 highlights critical issues and puts forth possible solutions to these challenges.

Additional work has been done to add corresponding State instream flows to the 66 identified at-risk reaches. Future work needs to be done to determine what instream flows are met consistently and which are not. Most people assume that the State's broad network of instream flows designed to protect adequate flows for the environment are sufficient to keep water in the streams. While the State instream flow program has been an enormous asset to protecting flows and helping maintain river health, the junior dates of appropriation of many of the instream flows are too recent to provide sufficient. Additional water projects that take more water out of rivers and streams are often done with senior water rights that have yet to be developed. As a result, many instream flows are insufficient protection for the streams they are designed to help. The Colorado Basin has committed to using this BIP and other studies to create a stream management plan to assess how the Basin can further determine their recreational and environmental needs and which projects should be prioritized for implementation.

A challenge facing the Colorado Basin in the future will be the location of the new growth and impacts on water supplies. In the past thirty-five years much of the growth has occurred outside of municipal boundaries in unincorporated areas abetted by the proliferation of special districts. Because existing water providers have robust water supply plans, the growth over the next thirty-five years should be encouraged to be within urban growth boundaries or service areas. Growth outside of these boundaries will be very dependent upon building new augmentation reservoirs because current augmentation reservoirs are fully allocated or subscribed. Further growth outside of these boundaries and service areas will further displace agricultural land.

SECTION 3

Needs Analysis [cont.]

Sub-basin	Stream Name	Location	Geomorphic Functions	Aquatic Ecological Functions: trout, warm water	Riparian/Wetland Ecological Function	Water Quality	Recreational Boating	Resource Values at Risk	Issues
Blue River	Upper Blue River	Dillon Reservoir					X	Recreational boating (flatwater)	Ensure adequate lake levels for Frisco and Dillon Marinas July through Labor Day
Blue River	Snake River	Upstream of Dillon Reservoir		X		X		Recreational trout fishing	Aquatic life impacted by trace metals from abandoned mines and low flows in winter, channel maintenance (sediment)
Blue River	Blue River	Dillon Dam to Willow Creek (Silverthorne town limit)		X				Gold medal fishery	Protect flows for fish; flows for fish are related to operations at Dillon; water too cold to support bug life below dam
Blue River	Blue River	Willow Creek to Green Mountain Reservoir		X			X	Recreational boating (private and commercial) through July 4th, fishing, riparian habitat	Protect rec. flows for kayak/rafting June through July 4th, channel maintenance (sediment), fish/aquatic life needs; diminished flows require "resizing" channel i.e., physical habitat work
Blue River	Blue River	Green Mountain Reservoir to Colorado		X			X	Recreational boating (private and commercial) , fishing	Protect recreational flows in Green Mtn Canyon for fish and float boats, threatened by potential GMR pumpback, fish/aquatic life needs, channel maintenance (sediment)

Table 10. Example of Data from the Watershed Flow Evaluation Tool for the Upper Blue River

SECTION 3

Needs Analysis [cont.]

Sub-basin	Stream Name	Location	Actions/ Solutions	Is risk flow related?	Can flow be realistically part of the solution?	Quantity of water needed	ISF	Case Number(s)
Blue River	Upper Blue River	Dillon Reservoir		No	Not Applicable	Not Applicable	N	
Blue River	Snake River	Upstream of Dillon Reservoir	Improve winter flows and upstream source control	No	For trout, if reach not protected, identify mechanisms to protect reach. Perhaps retime to address winter issues could be addressed.	Not Applicable	Y	5-86CW210
Blue River	Blue River	Dillon Dam to Willow Creek (Silverthorne town limit)	Reservoir operational consider-ations	No	For trout, if reach not protected, identify mechanisms to protect reach.	Not Applicable	Y	5-87CW293 5-87CW294
Blue River	Blue River	Willow Creek to Green Mountain Reservoir	Reservoir operational consider-ations	No	For trout and cottonwood, if reach not protected, identify mechanisms to protect reach.	Not Applicable	Y	5-87CW296 5-87CW297
Blue River	Blue River	Green Mountain Reservoir to Colorado		No	For trout and cottonwood, if reach not protected, identify mechanisms to protect reach.	Not Applicable	Y	5-87CW299

Table 10. Example of Data from the Watershed Flow Evaluation Tool for the Upper Blue River

SECTION 3

Needs Analysis [cont.]

Sub-basin	Stream Name	Location	Stream Name	Upper Terminus	Lower Terminus	Segment Length (miles)	Flow Amount (CFS)	Appropri-ation Date
Blue River	Upper Blue River	Dillon Reservoir						
Blue River	Snake River	Upstream of Dillon Reservoir	Snake River	confl NF Snake River at	confl Dillon Res in	4.4	6 (10/1 - 4/30)	3/14/1986
Blue River	Blue River	Dillon Dam to Willow Creek (Silverthorne town limit)	Blue River Blue River	outlet Dillon Reservoir in; confl Straight Creek in	confl Straight Creek in; confl Willow Creek in	0.4; 2	50 (1/1-12/31) 50 (10/1 -4/30)	10/2/1987 10/2/1987
Blue River	Blue River	Willow Creek to Green Mountain Reservoir	Blue River Blue River	confl Rock Creek in; confl Boulder Creek in	confl Boulder Creek in; confl Slate Creek in	1.6; 4.2	78 (10/1 - 10/31) 70 (11/1 - 2/29)	10/2/1987 10/2/1987
Blue River	Blue River	Green Mountain Reservoir to Colorado		outlet Green Mountain Res in Kremmling	confl Colorado River in	15.4	60 (5/1 - 7/15)	10/2/1987

Table 10. Example of Data from the Watershed Flow Evaluation Tool for the Upper Blue River

SECTION 3

Needs Analysis [cont.]

Sub-basin	Stream Name	Location	Geomorphic Functions	Aquatic Ecological Functions: trout, warm water	Riparian/Wetland Ecological Function	Water Quality	Recreational Boating	Resource Values at Risk	Issues
Upper Colorado	Colorado River	3-Lakes area; Shadow Mt to Granby		X		X		Riparian habitat	Fishing and recreational boating (flatwater) threatened by water quality. algae, aquatic weeds, sediment, clarity, fish/aquatic life needs; extremely irregular flow regime, 30 cfs to 1,000 cfs
Upper Colorado	Colorado River	Granby Reservoir to Windy Gap	X	X				Flows for fish and habitat, overwintering fish habitat, macroinvete-brates, fishing, riparian habitat	Adequate releases from Granby for fish and habitat, temperature, sediment transport, embeddedness, cottonwood regeneration, overwintering fish habitat, macroinverte-brate habitat; USFWS flow rec's ignored
Upper Colorado	Colorado River	Windy Gap Reservoir		X		X		Fishing	Ideal whirling disease conditions, sediment transport and deposition, fish/ aquatic life needs
Upper Colorado	Colorado River	Windy Gap Reservoir to Williams Fork	X	X				Gold Medal fishery with good access, riparian habitat, recreational boating (seasonal)	Whirling disease, temperature, water quality, algae, fish/ aquatic life needs, channel maintenance (sediment transport and deposition)
Upper Colorado	Colorado River	Williams Fork to Blue River	X	X		X		Fish, aesthetics	Temperature, sediment embeddedness, cottonwood revegetation related to upstream reservoir management, fish/ aquatic life needs; Williams Fork Reservoir operations challenges, minimal ramping

Table 10. Example of Data from the Watershed Flow Evaluation Tool for the Upper Colorado River

SECTION 3

Needs Analysis [cont.]

Sub-basin	Stream Name	Location	Actions/ Solutions	Is risk flow related?	Can flow be realistically part of the solution?	Quantity of water needed	ISF	Case Number(s)
Upper Colorado	Colorado River	3-Lakes area; Shadow Mt to Granby		No	For trout, if reach not protected, identify mechanisms to protect reach.	Not Applicable	N	
Upper Colorado	Colorado River	Granby Reservoir to Windy Gap		Yes	For trout - flows could be considered; for cottonwood, magnitude of flows likely preclude flow solution.	Trout - 6000 AF - August/ September annual average increase; Cottonwood - >100,000 AF - May to July increase 1 in 3 years (150% increase over current flows)	Y	5-90CW300
Upper Colorado	Colorado River	Windy Gap Reservoir	Windy Gap bypass, identify off-channel diversion (enhance-ment)	No	Not Applicable	Not Applicable	N	
Upper Colorado	Colorado River	Windy Gap Reservoir to Williams Fork	Windy Gap enhancement, $6 million at habitat improvement; RICD at Hot Sulphur Springs, proposed	Yes	For trout - flows could be considered; for cottonwood, magnitude of flows likely preclude flow solution.	Trout - 7000 AF - August/ September annual average increase; Cottonwood - >100,000 AF - May to July increase 1 in 3 years (150% increase over current flows)	Y	5-80CW447
Upper Colorado	Colorado River	Williams Fork to Blue River		Yes	For trout, if reach not protected identify mechanisms to protect reach. For cottonwood, magnitude of flows would likely preclude flow solution.	Cottonwood - >150,000 AF - May to July increase 1 in 3 years (~50% increase over current flows)	Y	5-80CW446

Table 10. Example of Data from the Watershed Flow Evaluation Tool for the Upper Colorado River

SECTION 3

Needs Analysis [cont.]

Sub-basin	Stream Name	Location	Stream Name	Upper Terminus	Lower Terminus	Segment Length (miles)	Flow Amount (CFS)	Appropri-ation Date
Upper Colorado	Colorado River	3-Lakes area; Shadow Mt to Granby	Colorado River					
Upper Colorado	Colorado River	Granby Reservoir to Windy Gap	Colorado River	outlet Granby Res in	confl Fraser River at	7.8	40 (5/1 - 8/31)	11/27/1990
Upper Colorado	Colorado River	Windy Gap Reservoir	Colorado River					
Upper Colorado	Colorado River	Windy Gap Reservoir to Williams Fork	Colorado River	hdgt Windy Gap Project div at	confl Williams Fork River in	14.7	90 (1/1 - 12/31)	7/8/1980
Upper Colorado	Colorado River	Williams Fork to Blue River	Colorado River	confl Williams Fork River in	confl Troublesome Creek in	8	135 (1/1 - 12/31)	7/8/1980

Table 10. Example of Data from the Watershed Flow Evaluation Tool for the Upper Colorado River

SECTION 3

Needs Analysis [cont.]

3.2 Regional Breakdown

Although united by the six themes, the priorities and challenges from the headwater counties of Grand, Eagle, Summit and Pitkin, to the Colorado-Utah State line, are diverse. The water demands to support the tourism, recreation, municipal, industrial and agricultural demands carry a different emphasis in each of these areas. The Basin was divided into seven regions to allow more focus on regional needs, vulnerabilities, methods and projects.

Each of the following regional sections begins with a brief description of the region followed by a series of three maps that depict the existing consumptive uses, environmental and recreational conditions, and top identified projects. This existing conditions information was used by the regional stakeholders to develop the most relevant Basinwide themes and associated vulnerabilities for that region which in turn helped identify methods and top projects in meeting future needs. This information is presented in the first table of each section. Focusing on specific goals, vulnerabilities, needs and top projects within each region is not intended to split the basin but instead draw the Basin together through better understanding of how the Basinwide themes are prioritized.

The regional boundaries were delineated based on the State Engineer Office's (SEO) water district boundaries. Several regions mimic the exact SEO district boundaries while some were a combination of several districts and in one instance; the Middle Colorado Region, was enlarged to include the Shoshone Hydroelectric Plant. The seven regions are as follows (Figure 10):

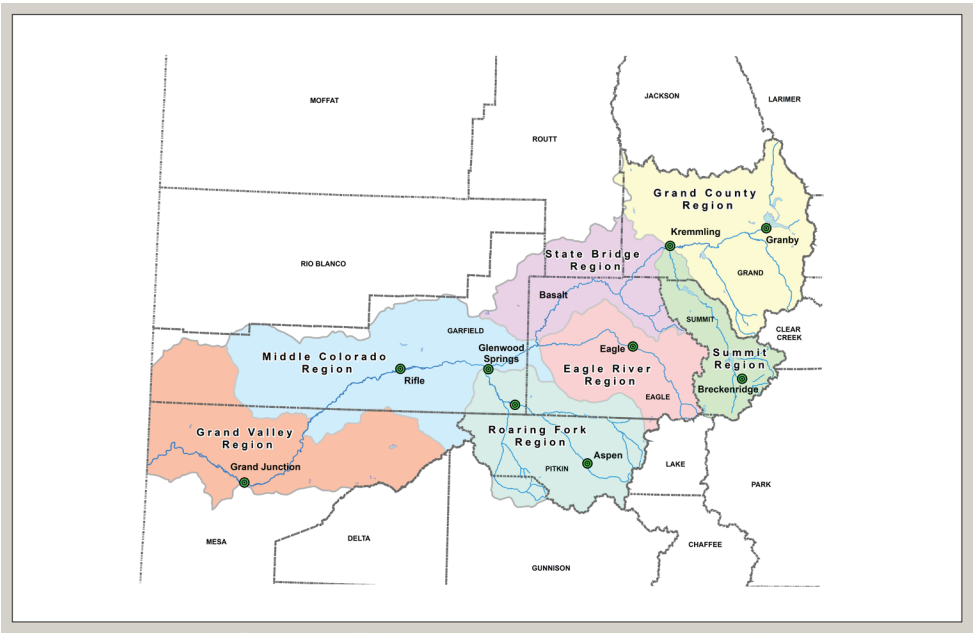

Figure 10. Colorado BIP Regions.

SECTION 3

Needs Analysis [cont.]

- Grand County
- Summit County
- State Bridge
- Eagle River
- Middle Colorado
- Roaring Fork
- Grand Valley

GRAND COUNTY REGION

The Grand County Region consists of the Fraser and the Upper Colorado River watersheds and follows the boundary of Grand County. This region is the most impacted region in the Colorado basin from TMDs. The major TMDs include:

- Northern Water Conservancy Districts Colorado Big Thompson Project (C-BT) which diverts water through the Alva B. Adams Tunnel at Grand Lake (BOR, 2014)
- Windy Gap Project (Northern Water, 2014) sponsored by Northern Water, diverts water through a pump back system to Lake Granby and is delivered to water users via the C-BT project
- Moffat Collection System which diverts water above Winter Park through the Moffat Tunnel (Denver Water, 2014) and the Williams Fork Basin sponsored by Denver Water
- Grand Ditch, a diversion project in the Never Summer Mountains, delivers water to the Cache La Poudre River via a 14.3 mile long ditch

The diversions out of Grand County amount to more than 300,000 AFY, more than three times the amount from any other region in the Colorado Basin. On average, more than 60% of the Fraser River is diverted out of the Basin above Tabernash (Ranch Creek Confluence).

Water providers in the upper Fraser River Valley are vulnerable to extended droughts, lack of redundancy, regulatory changes from Groundwater Under the Direct Influence (GWUDI) classifications, further firming from Denver's Moffat Collection Project and lack of upstream reservoir storage that can be used for physical water. Further, Grand County water providers experience large fluctuations in demand due to the tourist/recreational seasonal economy.

SECTION 3

Needs Analysis [cont.]

The protection and restoration of the Fraser and upper Colorado Rivers are critical needs for Grand County. Recent studies and reports including the Upper Colorado River Basin Study (UPCO) (Hydrosphere Resource Consultants, 2003) investigated water quantity and quality issues in Grand and Summit Counties. The Grand County Stream Management Plan (Tetra Tech, et. al., 2010) developed a framework for maintaining a healthy stream system in Grand County and has been used extensively to assist Grand County in recent negotiation for the Colorado River Cooperative Agreement (CRCA) and the Windy Gap Firming Projects. Copies of both these agreements can be found in Exhibit I. Many of the projects listed in the Grand County Region tables have come from these agreements.

Several projects listed include possible new small reservoirs above the physical diversion locations. Regulatory restrictions, high costs and variable geologic conditions have prevented proceeding with these conditional storage rights. This BIP recommends that State, Federal and Local regulatory jurisdictions work collaboratively to improve the permitting process. Collaboration among the water users in the Fraser Valley, Grand County, Middle Park Water Conservancy District, Denver Water, Winter Park Recreation Association, CWCB (minimum instream flow program) and others should occur in order to permit and build these small reservoirs to provide redundant water supplies.

Water providers in the upper Fraser Valley should consider interconnected water systems which would have multiple benefits to all users. The Grand Valley Water Council and the Eagle River Water and Sanitation District (ERWSD) are good examples that could be followed to guide these interconnections. The cooperation and interconnections would result in multiple supplies and redundancy that could protect water users from extended droughts, impacts from climate change and upstream spills in the Fraser River.

The Fraser Valley will incur growth over the next 35 years to 2050. Existing water providers and municipalities have land use planning and water master planning in place. If land use and growth occurs outside of these planned areas where plans do not exist, the development of physical and legal water supplies will be challenging and will further stress specific reaches of the Fraser River. A land use/water supply study should be undertaken to develop plans in the Fraser River that would result in better collaboration on reservoir planning and municipal water distribution system interconnections in the upper Fraser River. The lower Fraser River water providers should continue to work toward consolidation and interconnecting water systems.

Table 11 highlights the top specific themes and vulnerabilities, methods and projects for the Grand County Region. Figures 11 and 12 depict the consumptive uses, environmental and recreational conditions, and identified projects for this region.

SECTION 3

Needs Analysis [cont.]

Figure 11. Colorado River BIP Grand County Region Consumptive Uses

SECTION 3

Needs Analysis [cont.]

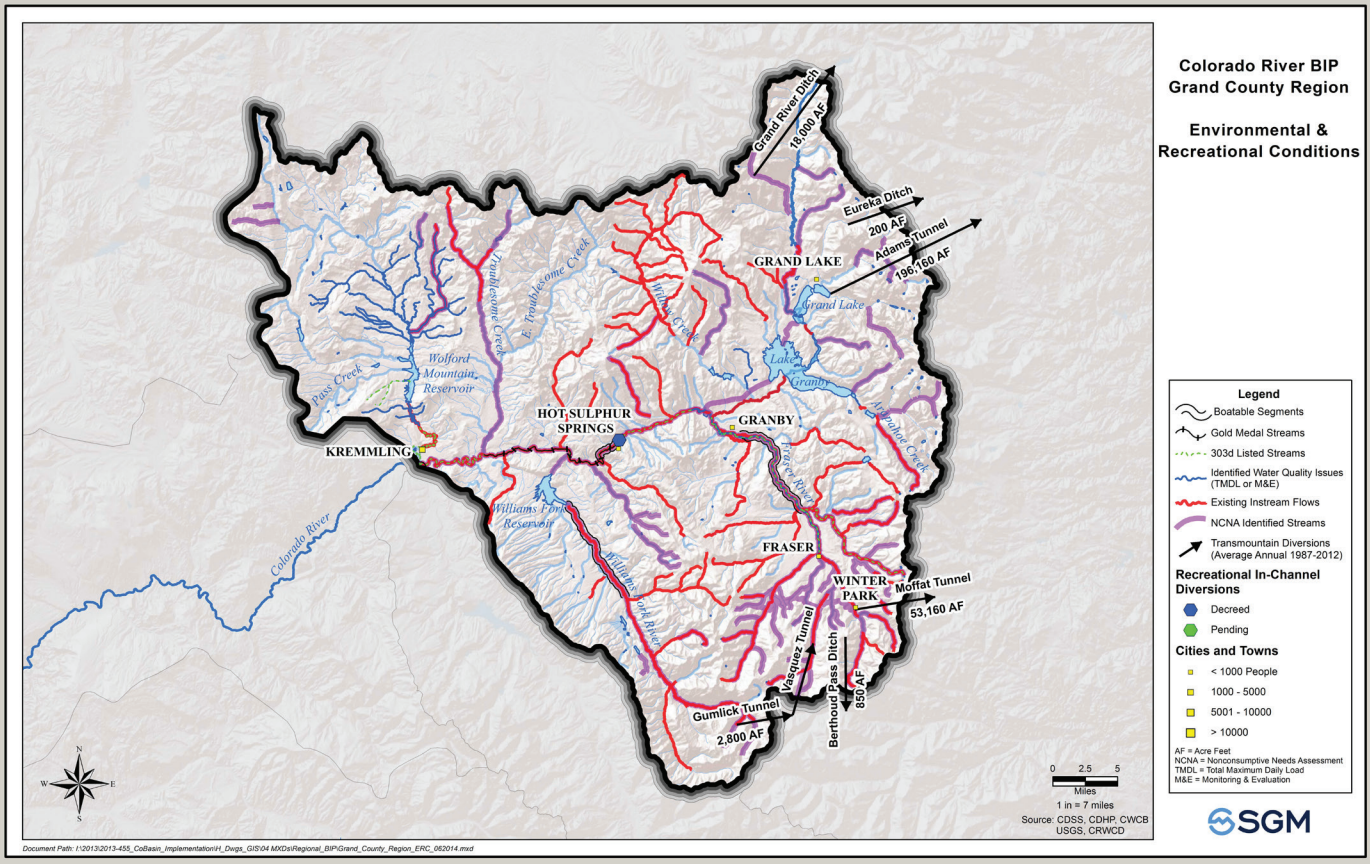

Figure 12. Colorado River BIP Grand County Region
Environmental and Recreational Conditions

Themes and Supporting Vulnerabilities	Methods	Identified Projects
Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas • Aquatic environmental habitat degradation • Unmet instream/nonconsumptive flows • Impacts to tourism and recreation economies1 • Impacts by existing and potential additional transmountain and in-basin diversions • Agreed proposed benefits vulnerable to Moffat & Windy Gap projects implementation • Collapsing ecosystems due to low flows, degrading water quality and non-optimal temperatures	• Preserve Water Conservancy Act • Grand County Stream Management Plan, CRCA, Grand Lake Clarity MOU, Windy Gap Firming Project IGA, and UPCO Study. • If firming projects proceed, all conditions of signed agreements must be completed • If firming projects do not proceed, identify projects for mitigation • Local government land use authority • Restore Upper Colorado River above the confluence with the Blue River • Tourism and recreation economy1 needs and funding opportunities • Review proposed benefits from mitigation actions of Moffat and Windy Gap projects • Learning By Doing to direct, coordinate and apply resources • Regional Section 208 Water Quality Management Plan	• CRCA identified projects • Windy Gap Firming Project IGA identified projects • UPCO Study identified projects • Grand County Stream Management Plan identified projects • Water provider conservation projects • Bypass of Windy Gap Reservoir • Upper Colorado River Irrigation and Restoration Project Phase 1 (KB Ditch to Blue River) and Phase 2 (TMDs on the Fraser and Colorado River to the confluence with the Blue River) • Grand Lake Clarity Umbrella Agreement Projects • Grand County RICDs • Wild and Scenic River Stakeholder Group Plan • Implement transmountain diversion bypass flow projects • Jones 1 Reservoir
Sustain Agriculture • Reduced agriculture irrigated acres • Purchase of agricultural water rights by East Slope entities • Impacts by existing and potential additional transmountain and in-basin diversions • Existing and potential shortages	• Use suggestions presented in the Agriculture Toolbox2,3,4 • Expand HUP to include Slot Group • Restore Irrigation Infrastructure and Irrigated Lands that have been damaged from TMDs above the confluence with the Blue River • Protect West Slope agricultural values • Studies identifying existing and potential shortages • Protect Green Mountain Operation Policy • Increase raw water storage • Coordinate exchange potential between users and CWCB	• Hay Park Conduit and Reservoir • Protect Slot Group • Big Lake Ditch Study • Upper Colorado River Irrigation and Restoration Assessment projects • Sunset Ridge Pond • Upper Colorado River Irrigation and Restoration Project Phase 1 (KB Ditch to Blue River) and Phase 2 (TMDs on the Fraser and Colorado River to the confluence with the Blue River)
Secure Safe Drinking Water • Source water degradation • Lack of redundancy in drinking water supplies • Extended drought • Forest Service bypass in Fraser Valley • GWUDI classification on drinking water wells • Important junior municipal water rights being called out by senior right	• Follow recommendations documented in local source watershed protection/forest health studies and plans • Water providers should work with neighboring entities to provide a redundant water supply • Maintain Forest Service bypass • Create redundancy for individual users/ storage • Coordinate exchange potential between users and CWCB • Protect Green Mountain Operation Policy • Protect Green Mountain Slot Group	• Granby/SCWWW Authority Permanent drinking water systems connection • Fraser/Winter Park drinking water systems connection • Winter Park Reservoir No. 2 Enlargement • Jones 1 Reservoir • Hay Park Conduit and Reservoir • Implement CRCA identified projects • Implement Windy Gap Firming IGA and Firming of Middle Park Windy Gap water • Ranch Creek Reservoir • Expand HUP to include Slot Group • Grand County W&S Reservoirs Nos. 1 & 2 • Fraser River Pumpbacks
Develop Local Water Conscious Land Use Strategies • Growth development impacting water supplies and nonconsumptive needs	• Limiting development to within urban boundaries • Promote water conscious growth development through improved land use policies	• Grand County Master Plan land use revisions • Winter Park changes to land use policy

Table 11. Grand County Region Themes and Supporting Vulnerabilities

SECTION 3

Needs Analysis [cont.]

SUMMIT COUNTY REGION

The Summit County Region aligns with the Summit County boundaries and includes the Blue River, Tenmile Creek, Snake River, Straight Creek and Swan River, to name a few of the main tributaries. The region is home to some of the largest and most visited ski resorts in Colorado including Keystone, Breckenridge, Copper Mountain, and Arapahoe Basin ski resorts. These resort communities are not only known for their winter activities but sport great boating and fishing opportunities in their rivers, streams and lakes during other times of the year. Summit County is also home to many productive ranches.

The Colorado State Demographer estimated Summit County population in 2012 at 28,160 people and forecasts population growth to 50,350 by 2040. SWSI concluded that Summit County 2008 water supply demands of approximately 8,000 AFY will grow to 16,800 AFY by the year 2050. According to the UPCO Study, "Approximately 25% of the future demands are in the upper Blue River area above Dillon Reservoir. The remaining future demands are primarily in the Silverthorne, Eagles Nest and Mesa Cortina areas. Keystone and East Dillon Water District will experience water supply shortages under future demands due primarily to lack of physical supply during fall and winter months" (Hydrosphere Resource Consultants, 2003). Other water providers in the county have adequate water supplies to support anticipated future growth and demands.

Summit County is a major donor basin, providing approximately 75,000 AFY through Dillon Reservoir, Straight Creek Tunnel, Vidler Tunnel and the Continental Hoosier Tunnel. Dillon Reservoir, owned by Denver Water, has a capacity of 254,000 AF, diverting the largest amount of water from the Blue River through the Roberts Tunnel to the South Platte River Basin. The Blue River between Dillon and Green Mountain is significantly impacted by TMDs and Dillon Reservoir. Portions of the region, including the upper Blue River, have been impacted by historical mining practices and resulting significant water quality challenges. The Snake River and Upper Blue Watershed Plans have been actively identifying and implementing projects to remediate these issues.

The Colorado Springs Utilities' Hoosier Pass Collection System and Vidler Tunnel impacts flows in the Blue River and Snake River. Streamflows in the Blue River below Dillon Reservoir under additional anticipated diversions through the Roberts Tunnel would be at or just above the decreed minimum stream flows of 50 cfs as identified by the CWCB instream flow program, and well below flows needed for recreation purposes during normal water years. In very dry years, flows below Dillon Reservoir have fallen below 50 cfs and may continue to decrease below the ISF target if inflows to Dillon Reservoir are less than 50 cfs and Denver Water reduces outflows in accordance with the 1966 right-of-way from the Department of Interior (subject to conditions of the CRCA).

SECTION 3

Needs Analysis [cont.]

Summit County government is proactive in water issues including assisting water providers, ski areas, and smaller water users in unincorporated areas of the County. The County offers water allotment contracts for legal water supplies and augmentation plans with water from Dillon Reservoir, Old Dillon Reservoir, Clinton Reservoir and Green Mountain. Ruedi Reservoir serves as a source of replacement water for Green Mountain Reservoir, when needed. The County is actively pursuing plans that will stress comprehensive land use and development codes, promoting smart land use, water efficiency and conservation, density, open space, and Best Management Practices.

Although the County has taken a lead in countywide legal augmentation water, the infrastructure to support drinking water treatment, conveyance, and storage of this water is not as organized. The Town of Breckenridge, however, has been proactive in long range planning to provide potable water from current town boundaries to Dillon Reservoir. There is an identified need to develop additional storage that can provide more physical water above water users' points-of-use to protect against drought, climate change and uncertainty in the future. Further regional collaboration of all water users in the County and including Denver and Colorado Springs could result in additional storage projects and better instream flow management.

The needs of the Summit County Region primarily are focused on protecting, maintaining and restoring healthy rivers and streams. The County, individual town plans, CRCA and the UPCO Study identified projects to meet these needs and are further identified in the following tables. Summit County is very interested in participating in the development of a basinwide stream management plan (SMP) necessary to identify criteria for restoration projects and multi-use projects.

Table 12 highlights the top specific themes and vulnerabilities, methods and projects for the Summit County Region. Figures 14 and 15 depict the consumptive uses, environmental and recreational conditions, and identified projects for this region.

SECTION 3

Needs Analysis [cont.]

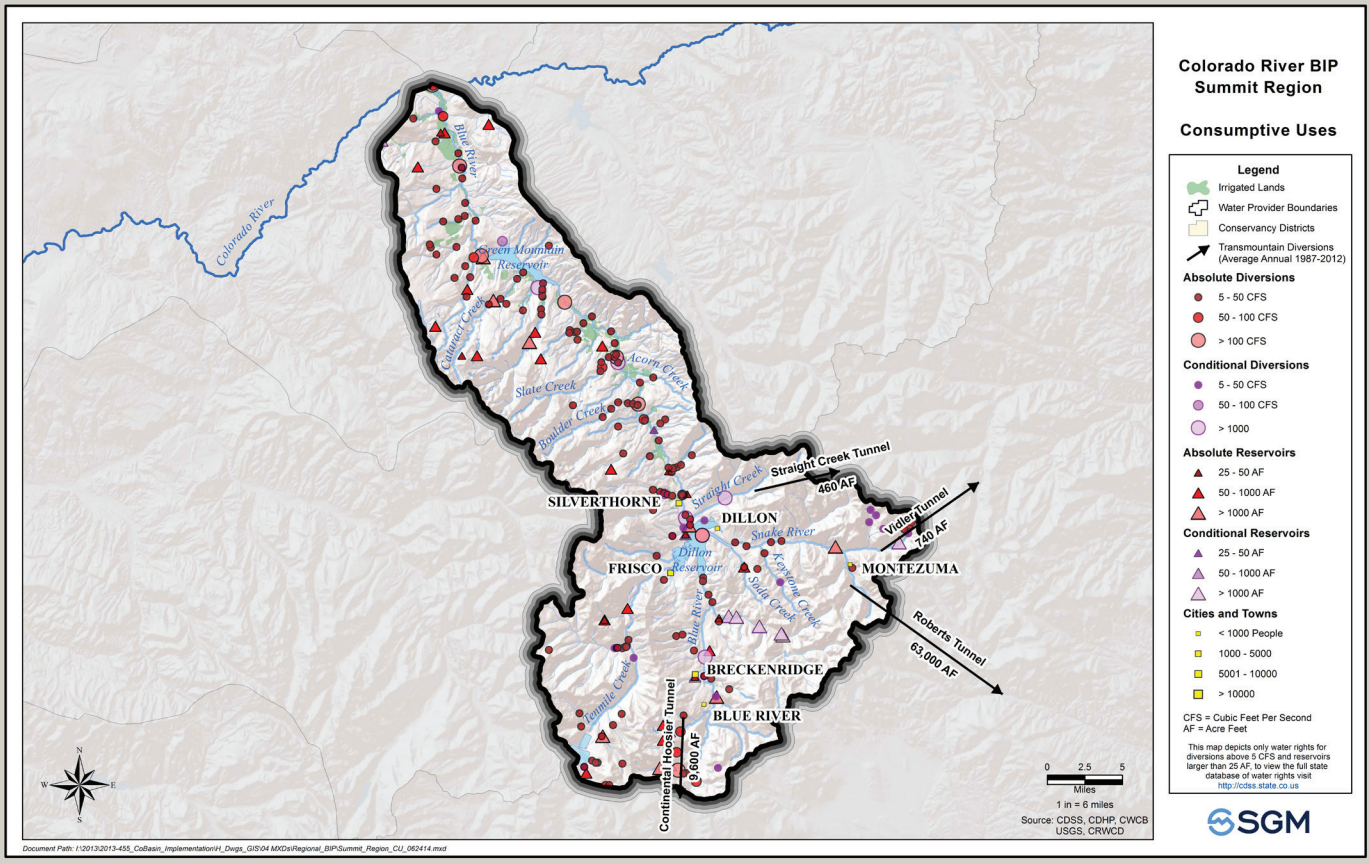

Figure 14. Colorado River BIP Summit Region
Consumptive Uses

SECTION 3

Needs Analysis [cont.]

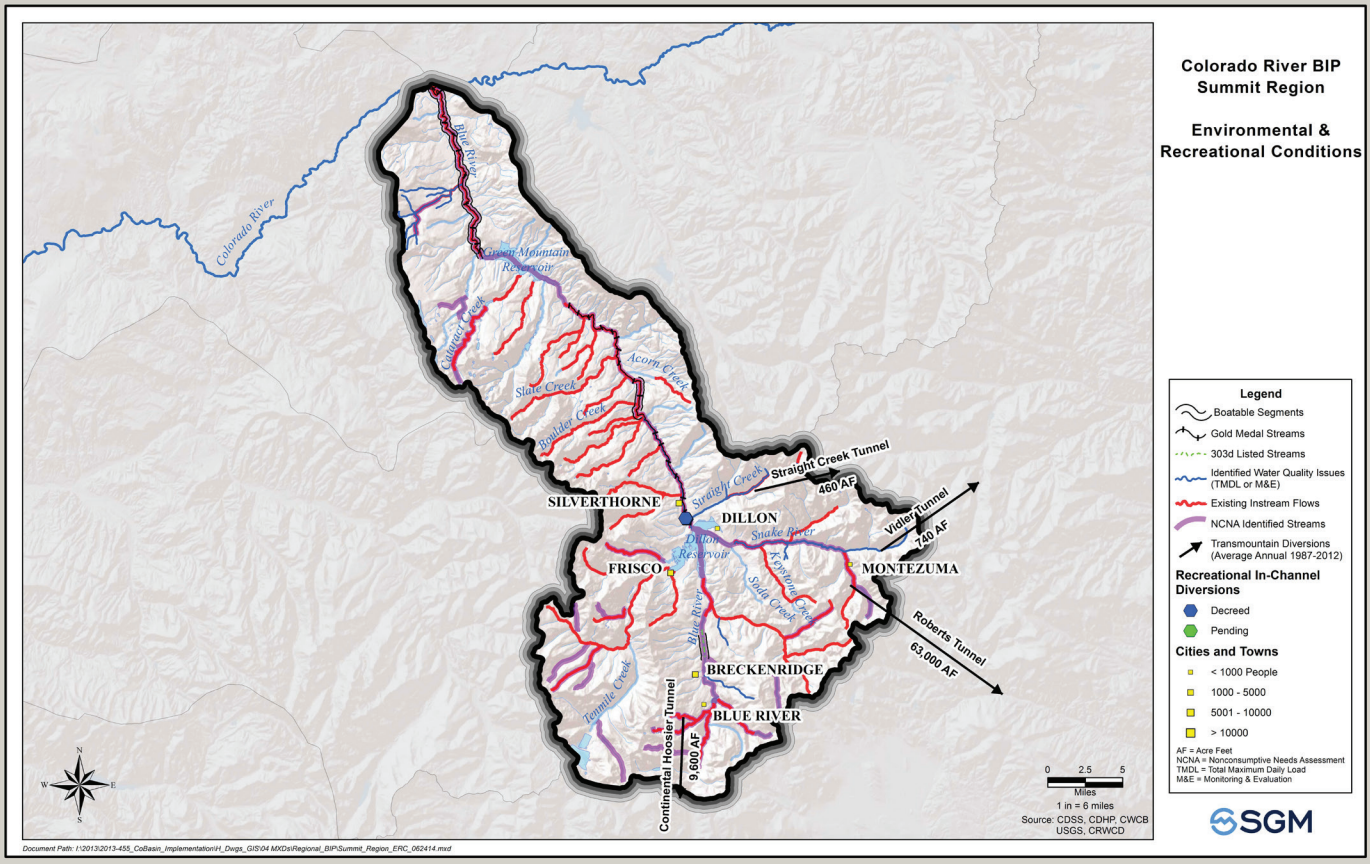

Figure 15. Colorado River BIP Summit Region
Environmental and Recreational Conditions

Themes and Supporting Vulnerabilities	Methods	Identified Projects
Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas • Aquatic environmental habitat degradation • Unmet instream/nonconsumptive flows • Impacts to tourism and recreation economies1 • Impacts by existing and potential additional transmountain and in-basin diversions • Lack of detailed understanding of habitat and ecological needs • Adequate mitigation of implemented SWSI Identified Projects and Processes (IPPs) • Reduced dilution flows in rivers and streams (specific impact from wastewater treatment plant discharges) • Extended drought	• Utilize local government land use authority to protect stream health • Restore streams, rivers and lakes affected by transmountain diversions (in-basin and out-of-basin diversions and consumptive uses) • Implement agricultural efficiency measures and apply savings to instream flows • Remediate mine drainage and mining impacts to water quality and stream health • Snake River and Upper Blue Watershed Plans • Watershed Flow Evaluation Tool (WFET) identifies ecological water shortages at watershed scale • Tourism and recreation methods1 • Study habitat and ecological needs and develop flow/habitat management plans • Evaluate potential for improvements to coordinated reservoir operations • Tourism and recreation economy1 needs and funding opportunities • Accelerate Open Space protection mechanisms and water quality improvement projects • Regional Section 208 Water Quality Management Plan	• Dillon and Frisco Marina improvement projects • Tenmile Creek Restoration Phase II • Swan River Restoration Project • Creation of low flow habitat below Dillon Dam • Lower Blue River habitat restoration • Staged release structure from Dillon Reservoir for temperature for fish • Development of whitewater park below Dillon Dam • Implement 2013 Snake River/Blue River Watershed Plans prioritized list of mine remediation projects • Summit County stream management plan documenting and prioritizing stream conditions and rehabilitation • New Town of Breckenridge water treatment plant • Upper Blue Reservoir/Colorado Springs Utilities (CSU) Substitution Agreement • Peru Creek Reservoir • Pooled release of CRCA/Clinton Reservoir water • Maintain bypass flows below CSU and DWD diversions • CRCA identified projects • UPCO identified projects
Sustain Agriculture • Buy and dry • Impacts by existing and potential additional transmountain and in-basin diversions • Purchase of agricultural water rights by East Slope entities • Unauthorized well depletions	• Use suggestions presented in the Agriculture Toolbox2,3,4 • Expand HUP to include Slot Group • Restore Irrigation Infrastructure and Irrigated Lands that have been damaged from TMDs above the confluence with the Blue River • Protect West Slope agricultural values • Studies identifying existing and potential shortages • Protect Green Mountain Operation Policy • Increase raw water storage • Coordinate exchange potential between users and CWCB	• CRCA identified projects, including water supply provisions • UPCO Study identified projects
Secure Safe Drinking Water • Source watershed degradation • Lack of redundancy in drinking water supplies • I-70 threats such as frequent hazardous materials transportation and harmful materials from road maintenance	• Water providers need to implement redundancy in water supply • Establish agreements to begin connecting neighboring water systems, providing redundancy • Implement Colorado Department of Transportation (CDOT) Sediment Control Action Plan (SCAP) for Straight Creek • Develop new water supply projects to meet identified Gaps (UPCO) • Denver Water/USFS watershed management agreement • Summit County Wildfire Protection Plan	• Joint Sewer Authority WWTP improvements • Frisco Sanitation District outfall project • Old Dillon Reservoir for Town of Dillon - Clinton Gulch Reservoir 1st Enlargement • Goose Pasture Tarn/Blue River watershed protection • Winterization of Upper Blue Reservoir • Upper Blue Pumpback/McCain Storage • Interconnect Mesa Cortina and Hamilton Creek water suppliers with other providers
Develop Local Water Conscious Land Use Strategies • Growth development impacting water supplies and environmental needs	• Limiting development to within urban boundaries • Improve water conscious land use policies • Assess master plans and codes for improvements in smart growth land use policies • Review local governments land use policies for water quality and environmental protection standards	• Town of Breckenridge outside irrigation minimization plan • Wetland bank located in Summit County • Town of Breckenridge Water Conservation Plan

Table 12. Summit County Region Themes and Supporting Vulnerabilities

SECTION 3

Needs Analysis [cont.]

STATE BRIDGE REGION

The State Bridge Region consists of the Colorado River from below Kremmling at the top of Gore Canyon to Dotsero at the confluence with the Eagle River and includes Rock Creek, Piney River and Deep Creek. The Colorado River throughout this region has significant whitewater recreational amenities including Gore Canyon. This region is defined by the lack of significant municipal or industrial water uses. Water use in this region is mainly limited to ranching and irrigation along the tributaries and mainstem of the Colorado River. Included in the region is the largest average annual TMD imported to the Colorado River Basin for irrigation use into Rock Creek drainage called the Stillwater Ditch which conveys approximately 1,700 AFY.

Because of the large open spaces and low population present in the State Bridge Region, there are numerous areas being studied for identification as holding Outstandingly Remarkable Values (ORV) as part of the BLM and White River National Forest (WRNF) Wild & Scenic suitability assessment. The upper Colorado River and Deep Creek areas within this region are currently being studied for consideration for inclusion into the Wild and Scenic Rivers Act. Eligibility and suitability studies are currently finished. Deep Creek segments have been recommended as 'Suitable' as of February 2014 and are currently in public comment/objector phase prior to final Record of Decision (ROD) by WRNF and BLM. Colorado River segments were found Suitable, but an official Suitability recommendation will be delayed pending acceptance of the Wild & Scenic Stakeholder Group's Alternative Management Plan as the Preferred Alternative for the BLM's 2014 updated Resource Management Plan. The Alternative Management Plan seeks to protect ORVs, but defers an official Suitability recommendation which might restrict the flexibility of water management options by upstream and downstream stakeholders (Hoblitzell and Loff, 2014).

The largest identified threats to this region are the ongoing TMDs and associated reservoir operation schedules upstream in Summit and Grand Counties. The TMDs reduce needed flushing flows along the mainstem of the Colorado and dilution flows throughout the year which help keep the water temperature low to maintain existing ecosystems. The proposed Wolcott Reservoir, if built, could have a dramatic impact on this region. Wolcott Reservoir would be filled in part through water pumped from the Colorado River in the State Bridge Region.

The Colorado River Restoration & Conservation Project (CRRCP) is focused on identifying and implementing restoration and conservation projects on the Upper Colorado River reach in Eagle County. As part of the effort, the Eagle River Watershed Council (ERWC) has embarked on a "Colorado River Inventory and Assessment" (CRIA) to close the gap on the lack of research for this reach. Currently in final review, the CRIA provides important information on the primary natural and human drivers of the river ecosystem's current state, and its potential future direction. The CRIA includes baseline information on aquatic and terrestrial communities in the mainstem Colorado River and select perennial tributaries, as well as reviewing threats and

SECTION 3

Needs Analysis [cont.]

opportunities arising from river management upstream and downstream of the State Bridge Region. Sections of the report with special relevance to the Colorado BIP include preliminary quantification of nonconsumptive needs for habitat maintenance in the State Bridge Region via hydrologic alteration and flushing flows analyses.

Table 13 highlights the top specific themes and vulnerabilities, methods and projects for the State Bridge Region. Figures 17-18 depict the consumptive uses, environmental and recreational conditions, and identified projects for this region.

SECTION 3

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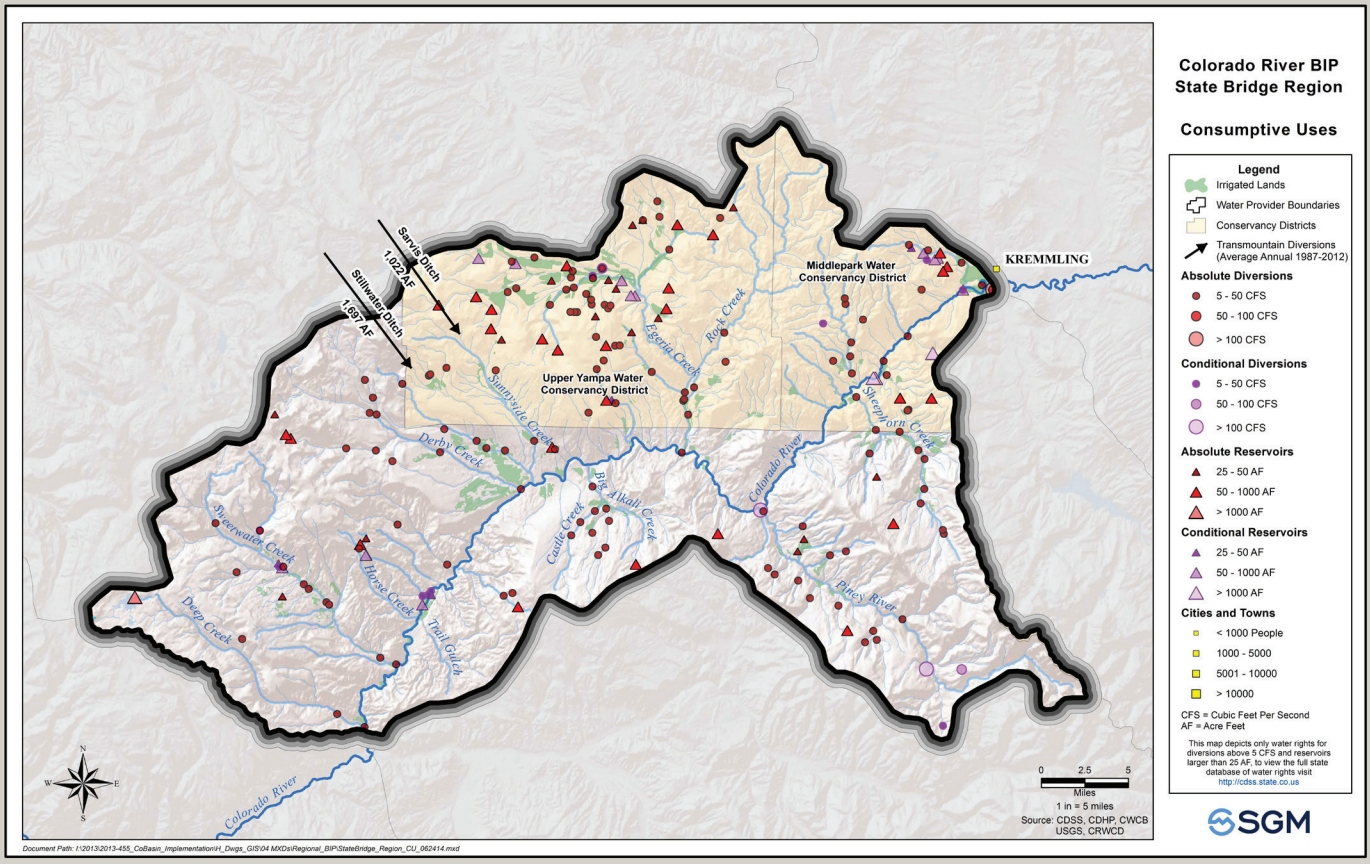

Figure 17. Colorado River BIP State Bridge Region Consumptive Uses

SECTION 3

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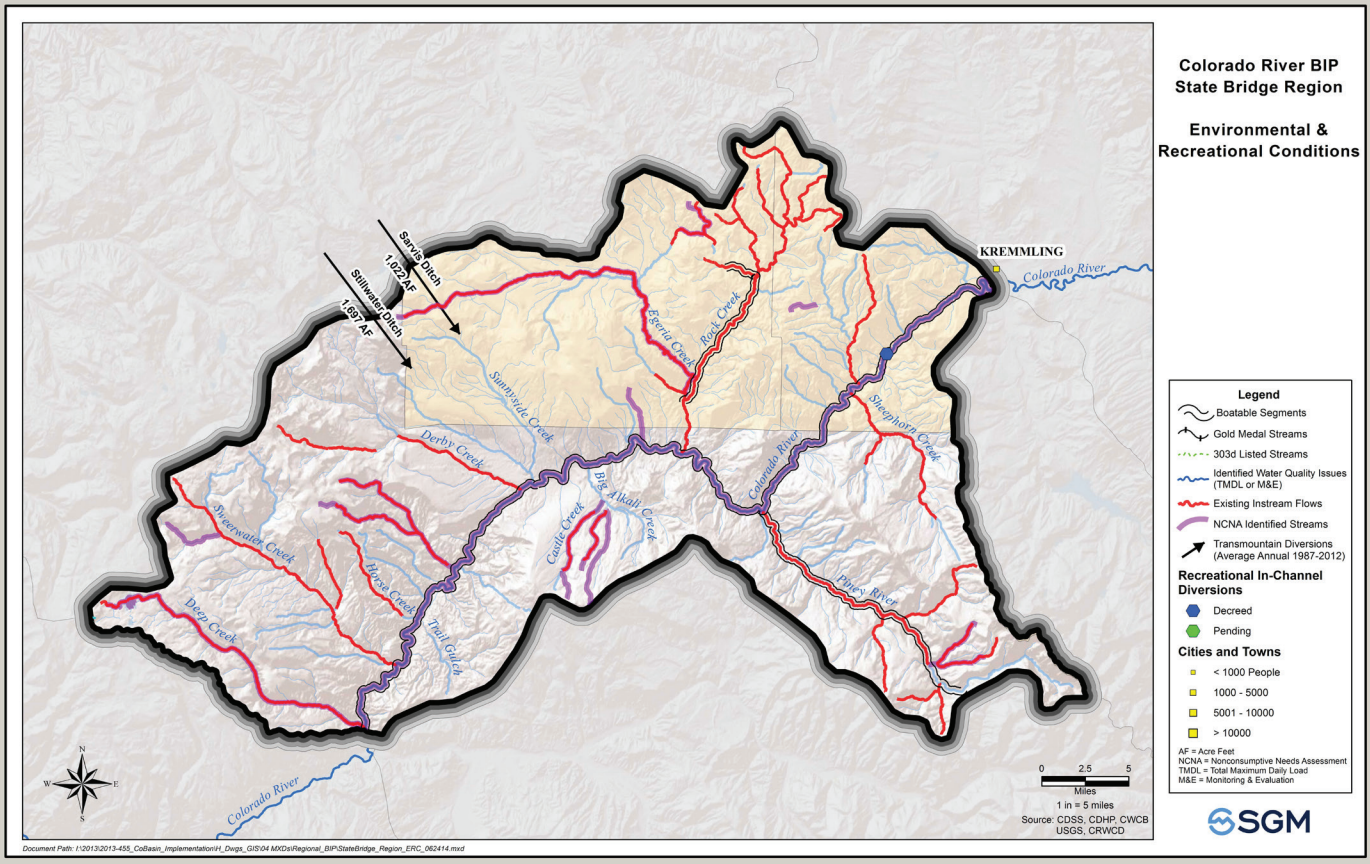

Figure 18. Colorado River BIP State Bridge Region
Environmental and Recreational Conditions

Themes and Supporting Vulnerabilities	Methods	Identified Projects
Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas • Aquatic environmental habitat degradation • Unmet instream/nonconsumptive flows • Embeddedness of sediment from decreased peak flows on the Colorado River • Continued riparian degradation within the hayfield to river bank buffer • Impacts by existing and potential additional transmountain and in-basin diversions (Wolcott Reservoir and Green Mountain Pumpback, Moffat Tunnel Firming, Windy Gap Firming)	• Colorado River Restoration and Conservation Project (CRRCP) and Colorado River Inventory and Assessment (CRIA) • Reinstate peak flushing flows • Coordinate with conservation districts to identify projects • Support CWCB instream flow applications in Colorado River • Document importance of Blue River flow temperature improvements to Colorado River • Identify tourism and recreation economy1 needs and funding opportunities • Eagle River Watershed Plan • Regional Section 208 Water Quality Management Plan	• Gore Canyon RICD development • Colorado River Wild & Scenic Alternative process • Deep Creek Wild & Scenic classification • Coordinated flushing flow releases from upstream reservoirs • Colorado River Inventory and Assessment identified projects
Sustain Agriculture • Reduced agriculture irrigated acres	• Use suggestions presented in the Agriculture Toolbox 2,3,4	

Table 13. State Bridge Region Themes and Supporting Vulnerabilities

SECTION 3

Needs Analysis [cont.]

EAGLE RIVER REGION

The Eagle River Region is located in Eagle County and encompasses the Eagle River watershed which includes the Eagle River, Gore Creek, Homestake Creek, Brush Creek and Gypsum Creek, (to name a few of the main tributaries). Like many headwater regions, residents and communities in this region place a high priority on the economic, recreational, and natural values associated with the its streams and rivers. Healthy, functioning streams best support these common values. Continuing the work to support and promote the environmental and recreational needs will best maintain healthy, functioning streams (ERWC, 2014). The economy of this region, , is very much dependent upon tourism and recreation industries. Eagle County is home to the Vail, Beaver Creek and Arrowhead Ski Areas. Healthy environments within the watershed are vital for maintaining this recreation based economy. Development focus has shifted from the upper valley resorts to lower valley towns. Eight hundred homes in the proposed Haymeadow area of Eagle, 700,000 square feet of retail and 550 homes in the proposed Eagle River Station, and almost 600 new residential units at Village of Wolcott offer challenges for water providers in managing water resources and providing for healthy stream communities (ERWC, 2014).

The proposed Wolcott Reservoir, a contested project among Basin regions, could allow Existing TMDs to increase diversions out of Grand and Summit Counties by providing augmentation releases to satisfy the Shoshone and Cameo calls. Eagle River Water and Sanitation District (ERWSD) and Upper Eagle River Water Authority (UERWA) are in favor of the reservoir but implementation plans by Denver Water for the reservoir has yet to be seen and opposition by other Colorado regions needs to be overcome.

The Columbine, Ewing & Wurtz Ditches and the Homestake Tunnel divert water out of the Eagle River watershed to the Arkansas River Basin. The ERWSD has and continues to collaborate with water providers on the Front Range as participants in the Eagle River Memorandum of Understanding (ERMOU) and the CRCA agreements. The objective of the ERMOU was to develop a joint use water project that meets the water requirements of the participants, minimizes the environmental impact, is technically feasible, and cost effective. The ERMOU was first established in 1998 to develop 30,000 AF of storage in the upper Eagle River that would be shared; 20,000 AF for Colorado Springs and Aurora, 10,000 AF for the Vail Consortium which includes ERWSD, URWA and the Vail Associates.

ERWSD is the second largest water provider in the Colorado Basin and in Western Colorado. The ERWSD operates the Upper Eagle Regional Water Authority through contract and has since the Authority was created in 1984. The service area extends from east Vail to Wolcott and includes Vail, Minturn, Eagle-Vail, Avon, Arrowhead, Beaver Creek, Edwards, Cordillera, and many other outlying developed areas. The ERWSD and UERWA serve approximately 60,000 people during the peak season and have the most complex water system in Colorado consisting of: 3 water plants, 17 wells, 73 pressure zones, and 270 miles of water mains with over 3,000 feet of eleva-

SECTION 3

Needs Analysis [cont.]

tion change. The ERWSD uses the Eagle River, Gore Creek, and their aquifers as direct supplies supported by minimal storage in Black Lakes, Eagle Park Reservoir and Homestake Reservoir. The ERWSD is a good example of the positive benefits of consolidation of multiple water systems into one regional system. The consolidated management of the ERWSD has allowed for cooperation and strong coalitions with municipalities and the ski industry through Vail Resorts and Eagle County. This cooperation has resulted in a well-managed efficient umbrella agency that could serve as a model for many other competing water systems throughout the Colorado Basin that not only supplies drinking water but provides environmental flows.

Several municipal governments including the Town of Vail, Town of Avon, and Town of Eagle continue to initiate proactive programs to address the existing water quality impairment issues, allocating significant financial resources and personnel time on research, stormwater improvements, land planning, and community outreach. Eagle County government supports progressive land use codes and continues to invest heavily in recreational access and stream-related amenities that support the recreation-based economy. In Gypsum's planning documents, the Town's goals include continuously providing adequate high quality water for service to its citizens for potable and business needs. Other Town goals include ensuring that minimum instream flows are met, and local river habitat is protected and improved. As part of all development approvals, the Town requires new developments to dedicate water to the Town to cover new uses (Kropf, 2014). The Town of Eagle's water planning efforts are an excellent example of collaboration and long range planning. With the construction of the Lower Basin Water Treatment Plant, the Town of Eagle will have redundant supply and treatment from three different sources, Upper Brush Creek, Lower Brush Creek and the Eagle River. The Town of Eagle has strategically planned water management in Brush Creek by cooperating with new developments and agricultural communities.

Examples of other efforts to support the environmental and recreational needs within this region include the Gore Creek Water Quality Improvement Plan, the Camp Hale-Eagle River Headwaters Collaborative Restoration Implementation Plan and the NWCCOG 208 WQ Management Plans. Additionally the Eagle River Watershed Plan outlines several needs and projects that will restore and maintain healthy rivers, streams and ecosystems in the Eagle River Region. The Eagle River Watershed Plan, updated in 2013, provides consensus-based, stakeholder developed guidance for the entire Eagle River Basin. The purpose of this plan is to ensure water related values are protected and enhanced not only in the face of out-of-basin pressures, but especially in relation to in-basin growth (ERWC, 2014). Overall, the water providers and community within the Eagle River Region support storage on the Eagle River for Eagle River users and purposes, more likely on a smaller scale. Local control for land use planning and water use is an important water management tool for most municipalities and water providers.

Projects identified in the CRCA, the Eagle River MOU and the Eagle River Watershed Plan are included in the following tables. Table 14 highlights the top specific themes and vulnerabilities, methods and projects for the Eagle River Region. Figures 20 and 21 depict the consumptive uses, environmental and recreational conditions.

SECTION 3

Needs Analysis [cont.]

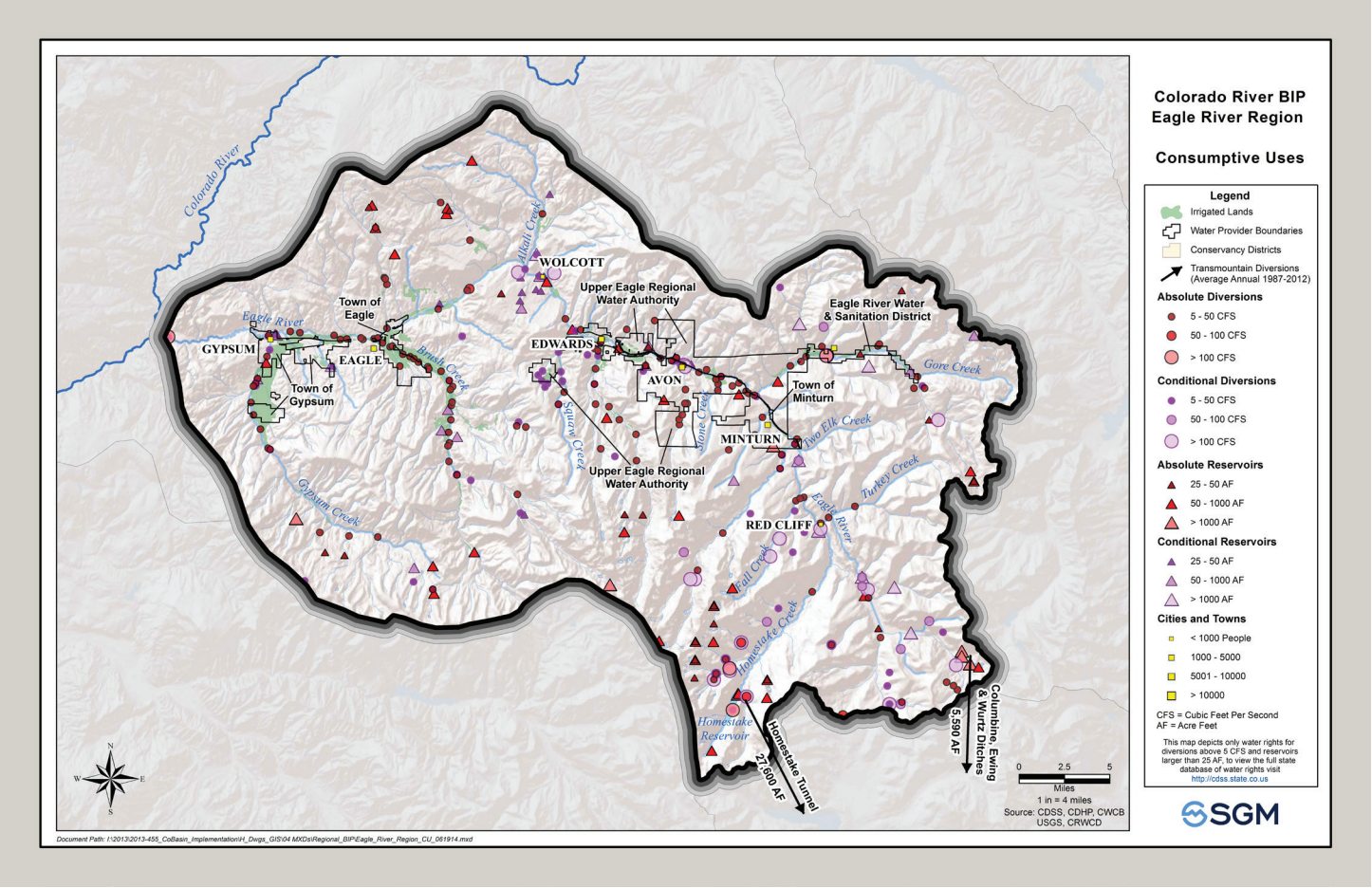

Figure 20. Colorado River BIP Eagle River Region Consumptive Uses

SECTION 3

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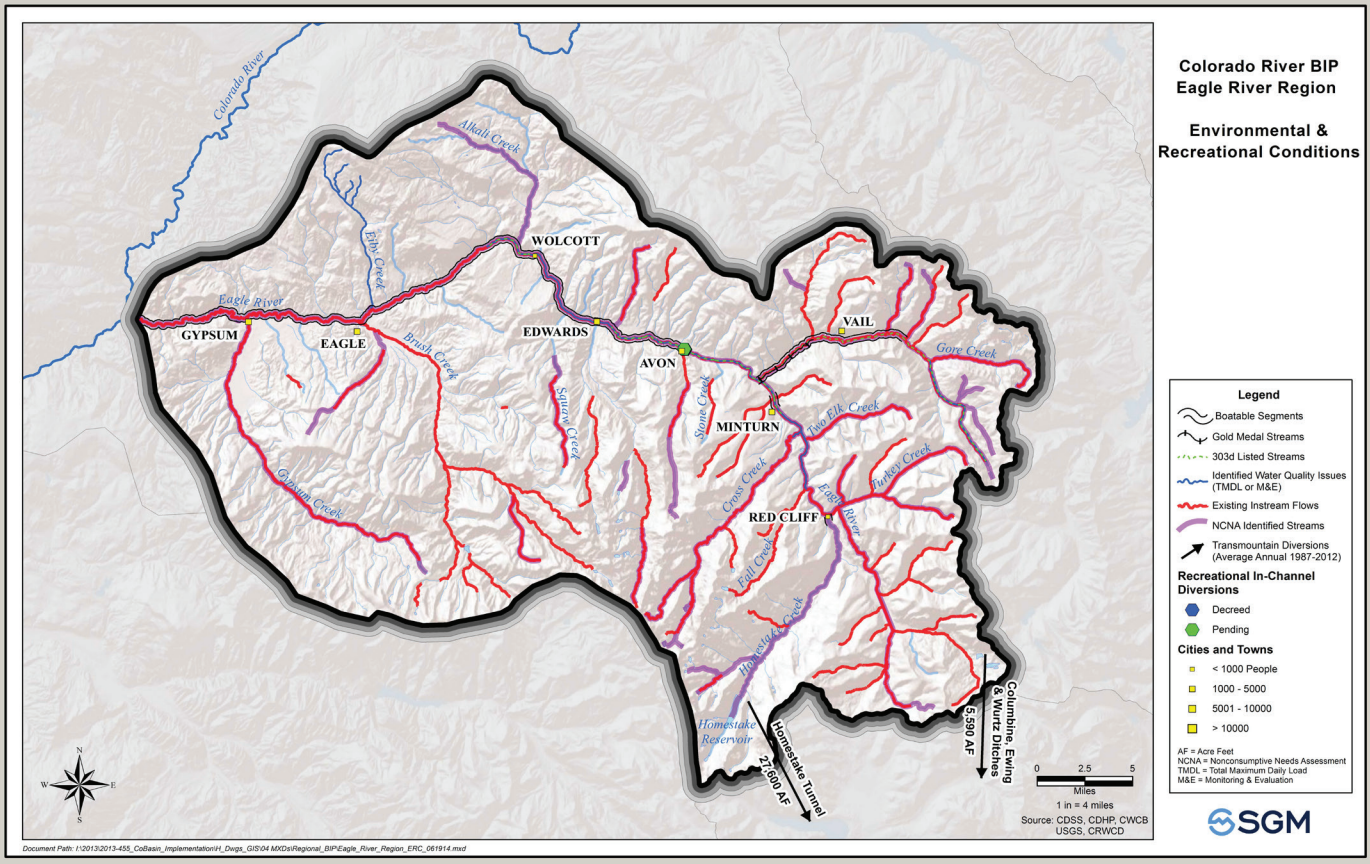

Figure 21. Colorado River BIP Eagle River Region
Environmental and Recreational Conditions

Themes and Supporting Vulnerabilities	Methods	Identified Projects
Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas • Aquatic environmental habitat degradation • Unmet instream/nonconsumptive flows • Impacts to tourism and recreation economies1 • Impacts by existing and potential additional transmountain and in-basin diversions	• Eagle River MOU • CRCA • Utilize local government land use authority to protect stream health • Evaluate and uphold instream flow levels • 2013 Eagle River Watershed Plan • Tourism and recreation economy1 needs and funding opportunities • Regional Section 208 Water Quality Management Plan	• Eagle River MOU listed projects • Gore Creek Water Quality Improvement Plan • Abrams Creek Cutthroat Trout Improvements • CRCA identified projects • Water provider conservation projects • Eagle Mine Reclamation • Camp Hale Restoration • Re-evaluating existing ISFs • Quantifying recreational needs in lower -valley communities • Thorough examination of all new major diversions and storage projects for impacts to water quality and quantity
Sustain Agriculture • Reduced agriculture irrigated acres	• Use suggestions presented in the Agriculture Toolbox2,3,4 • Continued use and policies to protect senior water rights in a Prior Appropriation system, particularly those rights senior to 1922 Colorado River Compact • Town planning documents support continued agricultural land use	• Gypsum's L.E.D.E. Reservoir
Secure Safe Drinking Water • Source watershed degradation • Extended drought	• Coordinate with conservation districts and Upper Colorado to identify source watershed protection projects • Eagle River MOU • Implement ERW&SD Fire preparedness plan • Implement Community Wildfire Protection Plan	• Eagle River MOU listed projects • Eagle Park Reservoir Enlargement • Red Cliff Project (Iron Mountain) • Eagle Mine Reclamation
Develop Local Water Conscious Land Use Strategies • Growth development impacting water supplies and environmental needs	• Eagle River MOU • Limiting development to within urban boundaries • Promote water conscious growth development through improved land use policies	• Review Eagle County land use policies • Ensure new development appropriately incorporates water-related values • Water provider conservation projects • Implement new technologies and BMPs to mitigate urban runoff on new developments
Encourage a High Level of Basinwide Conservation • Municipal and agricultural waste due to state laws promoting "use it or lose it"	• Evaluate state water policy and law for opportunities to implement effective conservation • Recognize the discrepancies and contradictions between the current water rights system and conservation/ nonconsumptive goals • Work locally to reduce calls on Gypsum Creek that dry the creek • Town code adoption of drought stages for reduced water use • Town code land use provisions includes limits on irrigation on a per lot basis • Agreements exist between Gypsum and the Colorado River Water Conservation District to uphold instream flows • Metering and increasing rate structure for higher water use encourages conservation	• Water provider conservation projects

Table 14. Eagle River Region Themes and Supporting Vulnerabilities

SECTION 3

Needs Analysis [cont.]

MIDDLE COLORADO REGION

The Middle Colorado Region includes the mainstem Colorado River from the Eagle/Garfield County line at the head of Glenwood Canyon to the confluence of Roan Creek at the Town of De Beque. Some of the smaller tributaries include No Name, Grizzly Creek, Canyon Creek, Divide Creek, Rifle Creek, Garfield Creek, Mamm Creek, Parachute Creek, and Roan Creek. Several communities are located along the Colorado River and include Glenwood Springs, New Castle, Silt, Rifle, Parachute, Battlement Mesa, and De Beque.

Of the seven regions within the Colorado Basin, the Middle Colorado supports the second highest number of irrigated acres at over 52,000. A significant portion of this acreage is irrigated with water from the smaller tributaries. This region is supported by the Silt Water Conservancy District, Bluestone Water Conservancy District and the West Divide Water Conservancy District. This area is also served by the Bureau of Reclamation Silt Project (BOR, 2014) which is located near the towns of Rifle and Silt.

The Middle Colorado Region is also characterized by the ongoing natural gas drilling and potentially marketable oil shale formations. It contains more natural gas wells than any region in the state outside of Weld County. In the past, this region was also subject to significant conditional water rights filed by energy concerns for a future oil shale industry. One of the largest oil shale reserves in the world is located within the Middle Colorado Region. For many years, oil companies have tried to extract the oil from this hard rock but have yet to find a cost-effective method. Several research and development operations are ongoing in the region and surrounding areas to find the key to unlocking this valuable resource. If development of oil shale becomes a viable industry, water use will increase.

The Middle Colorado Region has just recently emerged as an identifiable reach of the Colorado River through the efforts of the Middle Colorado Watershed Council (MCWC) (MCWC, 2014). The MCWC is in the process of creating a watershed plan that will identify opportunities and plans for protecting and enhancing the health of the watershed.

As part of this planning effort, the MCWC is currently assessing existing water quality issues. The Colorado River through this reach is a direct source of drinking water for the Town of New Castle (redundant supply with Elk Creek), Town of Silt, City of Rifle, Parachute, Battlement Mesa and De Beque. This reach is impacted by all Colorado River Basin headwater TMDs which take high quality clean water, leaving less water and lower flows to help dilute the poorer quality water downstream. Concentrations of salinity, selenium, hardness, total dissolved solids, iron and manganese are examples of potential water quality concerns through this reach. Additional concerns include emerging contaminants and endocrine disruptors; however, limited water quality data has been collected to understand the trends. The City of Rifle, in particular, has experienced the significant impacts of water quality concerns and is currently in the process of building a new surface water drinking water plant using Colorado River water. The expense of this new plant has significantly increased water rates for the citizens of the City of Rifle.

SECTION 3

Needs Analysis [cont.]

The Endangered Species Act designation of critical habitat for three of the T&E listed fish species extends upstream on the Colorado River mainstem from the 15-Mile Reach in Mesa County to the main Rifle I-70 Bridge. This designation has resulted in more stringent discharge permit standards for wastewater treatment discharges. This same reach of river is also home to three native fish species of concern: the roundtail chub, bluehead sucker, and flannelmouth sucker. Management actions are needed to ensure that populations of these species do not decline to the point requiring a T&E listing.

One of the region's most important needs is to protect water quality and riparian habitat along the Colorado River. Plans matching future land use with restoration needs for the numerous abandoned and existing gravel pits should be developed to provide comprehensive standards focusing on restoration of riparian habitat; this is an element that will be addressed through watershed planning efforts. Finally, this region may experience uncertainty with regards to water supply because of the potential oil shale industry development and the significant amount of conditional water rights which, if developed, may impact the priority of other water rights in the Colorado Basin.

Table 15 highlights the top specific themes and vulnerabilities, methods and projects for the Middle Colorado Region. Figures 23-24 depict the consumptive uses, environmental and recreational conditions.

SECTION 3

Needs Analysis [cont.]

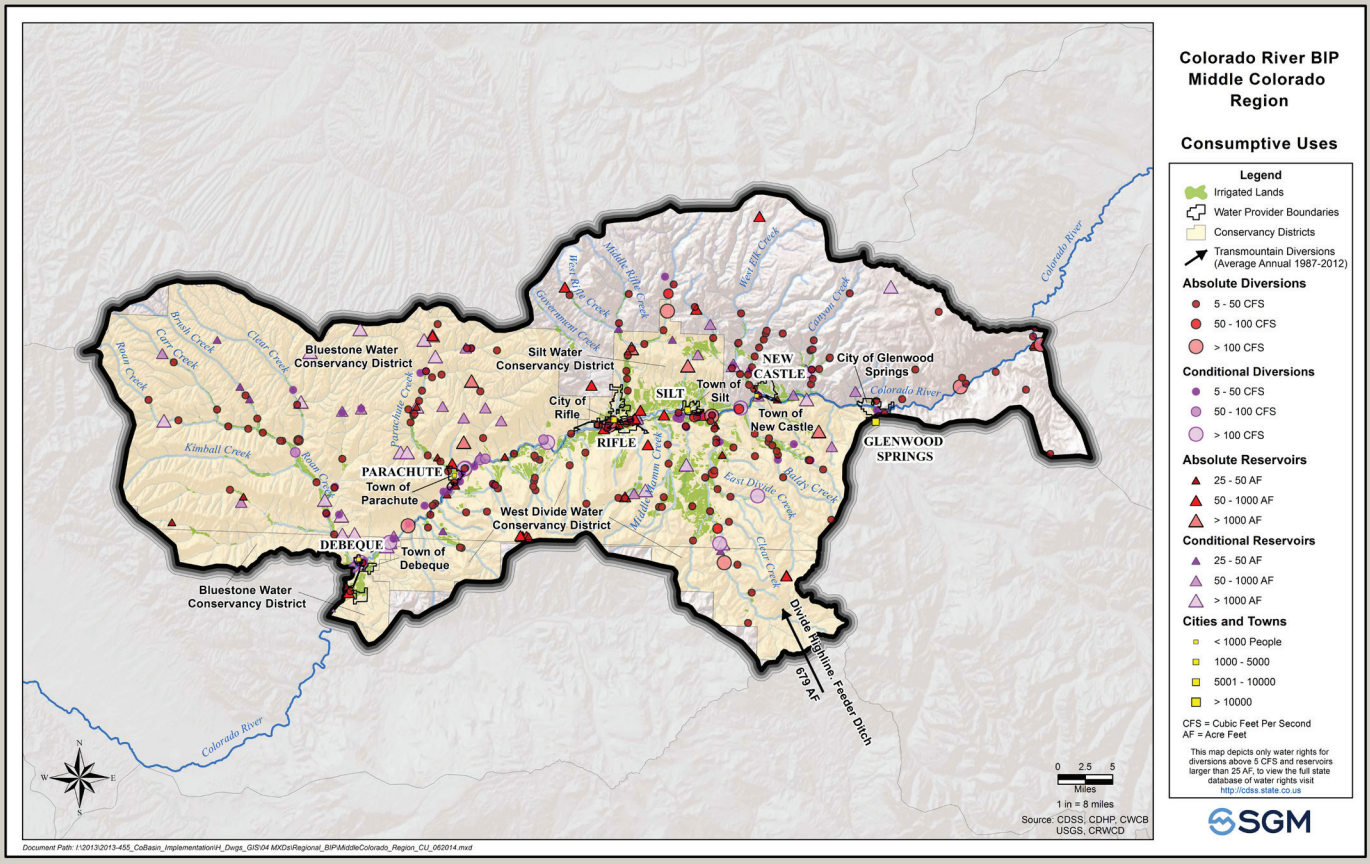

Figure 23. Colorado River BIP Middle Colorado Region Consumptive Uses

SECTION 3

Needs Analysis [cont.]

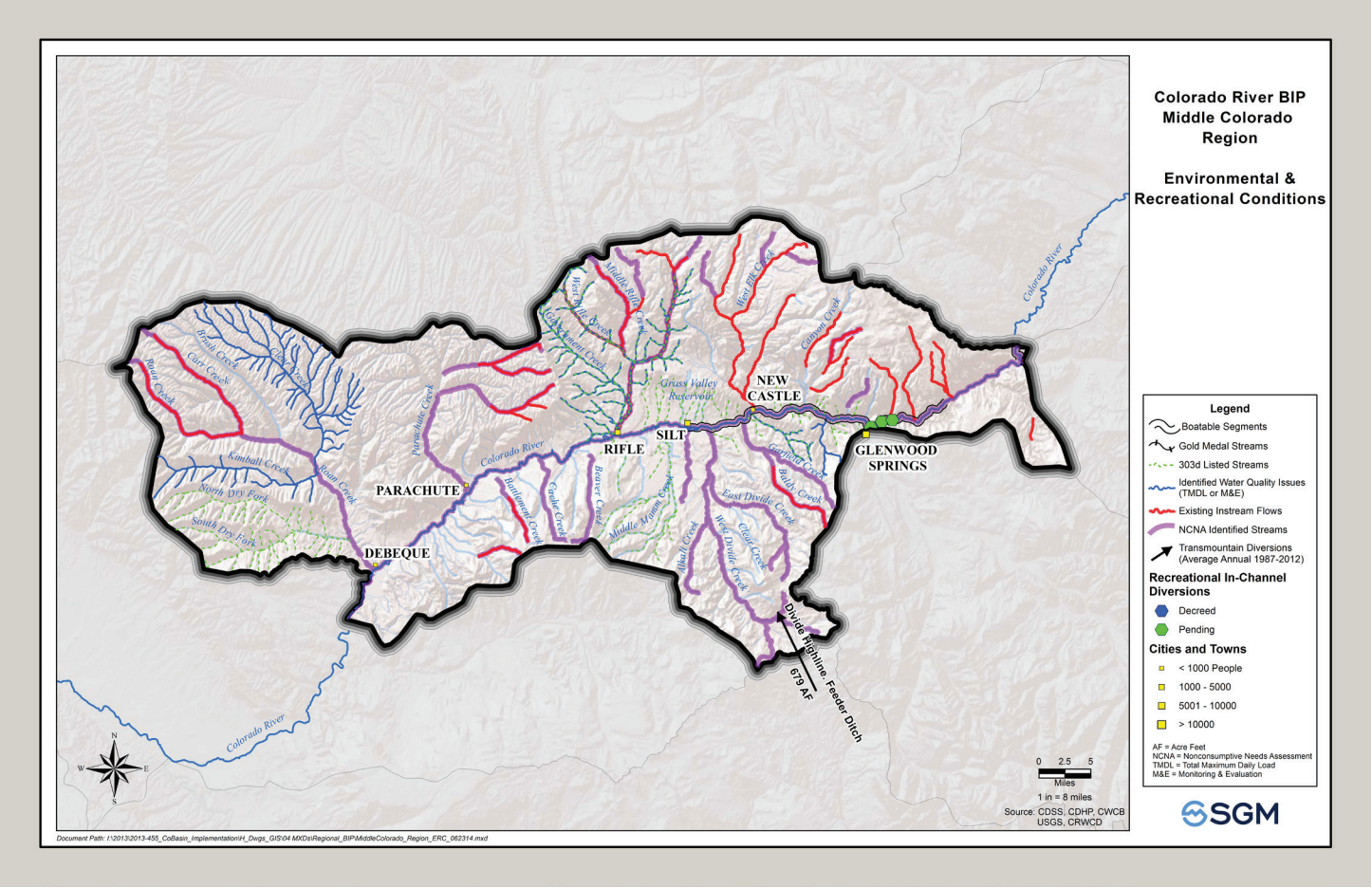

Figure 24. Colorado River BIP Middle Colorado Region
Environmental and Recreational Conditions

Themes and Supporting Vulnerabilities	Methods	Identified Projects
Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas • Aquatic environmental habitat degradation • Unmet instream/nonconsumptive flows • Impacts to tourism and recreation economies1 • Impacts by existing and potential additional transmountain and in-basin diversions • Salinity issues • Increase in energy extraction activities	• Recreation flows through Glenwood Canyon • Address tributary water quality and quantity issues • Middle Colorado Watershed Council • Tourism and recreation economy1 needs and funding opportunities	• City of Glenwood Springs RICD application • Develop a watershed management assessment and watershed plan • Battlement Reservoir #3 • Water provider conservation projects
Sustain Agriculture • Reduced agriculture irrigated acres • Existing and potential shortages	• Use suggestions presented in the Agriculture2,3,4 • Build reservoirs in tributaries to provide needed late season agricultural water • Enhance conservation easement incentives	• Kendig Reservoir and 1st Enlargement • Baldy Reservoir Enlargement • Implementation of Farm Bill Incentives through the NRCS • Horsethief Canal Improvements • Dry Hollow Reservoir and feeder canal • West Divide Canal - West Mamm Creek Reservoir
Secure Safe Drinking Water • Lack of redundancy in drinking water supplies • Increase in energy extraction activities	• Every water provider should have redundant water supplies. Implementing intakes off of tributaries as well as the mainstem of the Colorado or groundwater supplies • Implement groundwater monitoring program in areas of concern • Coordinate with the Middle Colorado Watershed Council and stakeholders to develop water master planning/regional treatment efforts	CRCA identified project to upgrade diversion structures for water treatment plants in Garfield County • Kendig Reservoir and 1st Enlargement • Baldy Reservoir Enlargement • West Mamm Creek Reservoir • Middle Colorado Watershed Assessment/ Plan projects to be identified
Develop Local Water Conscious Land Use Strategies • Growth development impacting water supplies and environmental needs • Increase in energy extraction activities	Smart population growth by: • Limiting development to within urban boundaries • Promote water conscious growth development through improved land use policies	• Kendig Reservoir and 1st Enlargement • Baldy Reservoir Enlargement • West Mamm Creek Reservoir • County Land Use Policy Review • Water provider conservation projects
Assure Dependable Basin Administration • Decreased flows in Colorado River from reduced calls at Shoshone Hydroelectric Plant and senior Grand Valley irrigation diversions ("Cameo Call")	• Pursue acquisition or right of first refusal to purchase Xcel owned Shoshone Hydroelectric Plant • Maintain maximum Grand Valley irrigation calls	• Purchase of Xcel owned Shoshone Hydroelectric Plant or other permanent solution to maintain maximum Shoshone flows

Table 15. Middle Colorado Region Themes and Supporting Vulnerabilities

SECTION 3

Needs Analysis [cont.]

ROARING FORK REGION

The Roaring Fork Region, a main headwaters region, consists of the Roaring Fork River and many sizable tributaries including: Maroon Creek, Castle Creek, Hunter Creek, Woody Creek, Fryingpan River, Crystal River, Cattle Creek and Fourmile Creek. The Roaring Fork Region consists of nine major water providers, three Water Conservancy Districts and four counties. Additionally, the region is characterized by strong watershed organizations including the Roaring Fork Conservancy and Pitkin County Healthy Rivers and Streams Board. The Ruedi Water and Power Authority is a quasi-governmental agency made up of representatives from the five municipalities in the watershed, plus representatives from Pitkin and Eagle Counties. The region is very dependent upon tourism and recreation economies with a vibrant winter and summer recreation industry. There are five ski resorts contributing to the strong winter tourism in the region including Aspen, Highlands, Buttermilk, Snowmass and Sunlight Ski Resorts. These resort communities attract summer visitors as well through local Gold Medal fisheries, whitewater rafting, mountain biking, hiking, cultural attractions and overall scenic mountain settings.

Water is currently diverted out of the Basin to Front Range communities including Colorado Springs, Aurora and Pueblo through the Fryingpan-Arkansas Project and Twin Lakes Projects, amounting to an average annual yield of approximately 100,000 AFY. On average, 37% of the upper Roaring Fork Watershed (42,000 AFY) and 41% of the upper Fryingpan Watershed (59,000 AFY) is currently diverted annually to the Front Range. These are the 5th and 3rd largest transmountain diversions, respectively, in the state.

Water providers in the upper reaches of the Basin are dependent upon direct flow stream intakes and are susceptible to extended drought periods. Because the watersheds above these intakes are primarily located on U.S. Forest Service lands (USFS) the process for permitting a new reservoir will be rigorous. Due diligence to thoroughly investigate every option along with a detailed environmental mitigation plan, will be a necessary part of any permitting process. These water providers should also seek redundancy through other means including: enlargement of existing reservoirs, interconnects between regional water providers, development of well supplies and reliance upon multiple stream water supplies.

A recent issue in the Roaring Fork Region that may impact water development in the future is the complete allocation of Ruedi Reservoir augmentation water. Ruedi has been the source of augmentation and physical water for not only the Roaring Fork Region but the entire Colorado Basin. Ruedi Reservoir became 100% allocated in 2013 when the Bureau of Reclamation sold the remaining unallocated volume in the reservoir. Several entities including the Basalt Water Conservancy District, the Colorado River Water Conservation District and Garfield County have large water holdings in Ruedi that can continue to provide augmentation water for future growth in the Roaring Fork Region. Further study is needed to determine if the water under contract with these entities is sufficient for future needs in the region to the year 2050 or beyond. Many Roar-

SECTION 3

Needs Analysis [cont.]

ing Fork water providers have relatively junior water rights that are augmented by Ruedi Reservoir. Roaring Fork water providers that have post Compact water rights (junior to 1922) should aggressively convert agricultural rights senior to 1922 to points of potable water supply diversions. These pre-1922 water rights will provide protection against a future Compact call. This will require change cases in water court.

The primary need of the Roaring Fork Region is to protect, maintain and restore healthy rivers and streams. Almost 140 of 185 miles of streams surveyed in the Roaring Fork Region have moderately modified to severely degraded riparian habitat. There are three critical reaches of mainstreams that have been targeted for restoration 1) the Roaring Fork River below the Salvation Ditch through the City of Aspen; 2) the Roaring Fork River upstream from the confluence of the Fryingpan River; and 3) the Crystal River upstream from Carbondale. These three main reaches do not include all the smaller tributaries in the upper Fryingpan and the upper Roaring Fork that have been dewatered due to TMDs. Active efforts are underway to restore these reaches with innovative methods including, but not limited to, coordinated efforts among irrigators to maintain stream flows, improvements to irrigation ditch infrastructure efficiency and legislation similar to Senate Bill 14-023 (not enacted) promoting voluntary transfer of water efficiency savings to instream flows.

Some of the top priority projects in the region are conservation focused. A Regional Water Conservation Plan for the Roaring Fork watershed is currently underway and is exploring water conservation measures on a regional basis. The Roaring Fork Watershed Plan (Roaring Fork Conservancy, 2012) has outlined additional actions and projects to protect and restore the watershed and riparian habitats. Additionally, consideration is being given to studying the viability of small reservoirs located along some of the small tributaries such as Fourmile Creek and Cattle Creek which have been subject of diminished late season flows from irrigation diversions, and out of basin diversions. These reservoirs could provide multiple benefits including instream environmental flows during times when the tributaries dry up. Finally, the region should collaborate more with unified constituencies in a cooperative effort to develop multipurpose projects. Regional efforts among water providers, irrigators, conservation organizations and recreational enthusiast are pivotal to the implementation of any future project.

Table 16 highlights the top specific themes and vulnerabilities, methods and projects for the Roaring Fork Region. Figures 26-27 depict the consumptive use, environmental and recreational conditions.

SECTION 3

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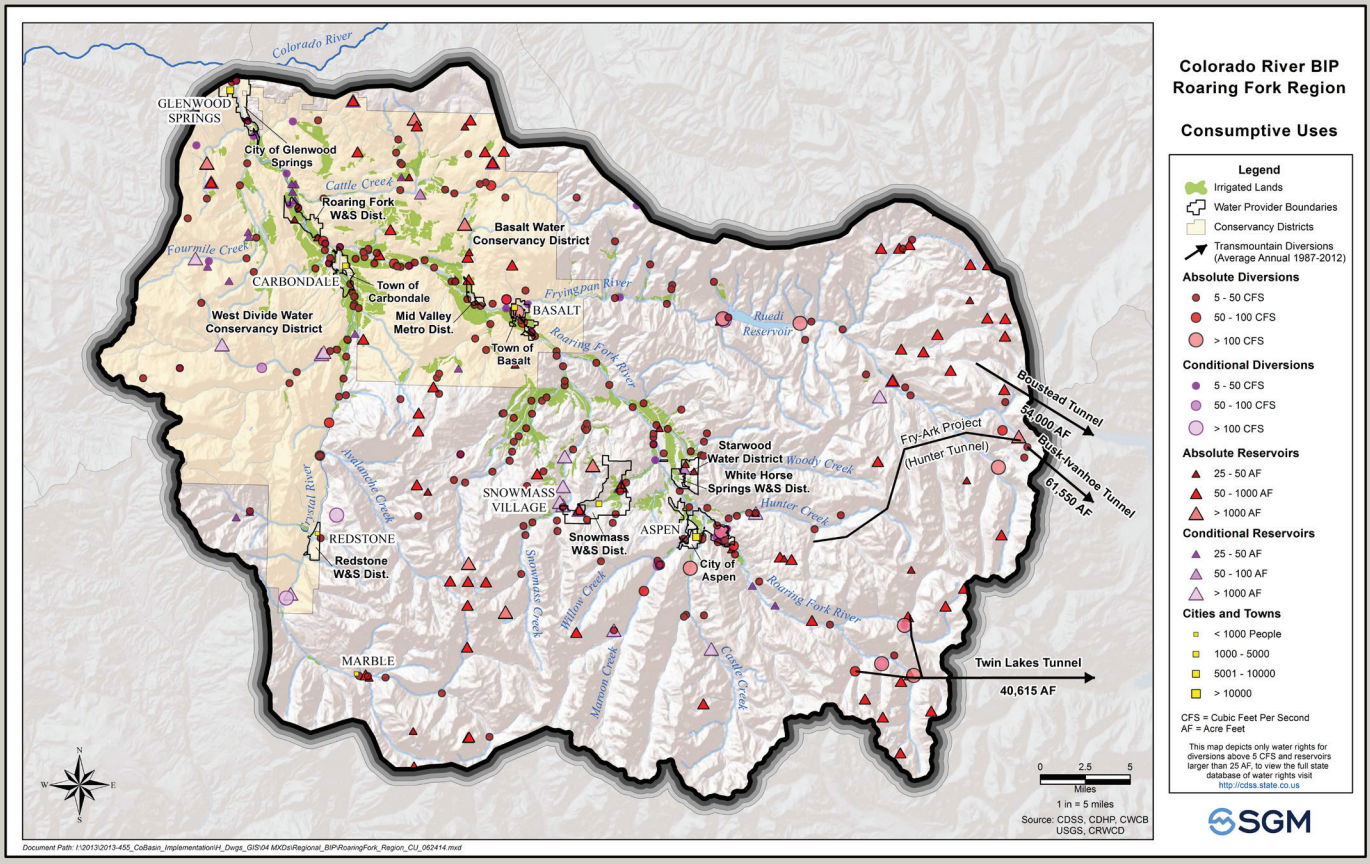

Figure 26. Colorado River BIP Roaring Fork Region Consumptive Uses

SECTION 3

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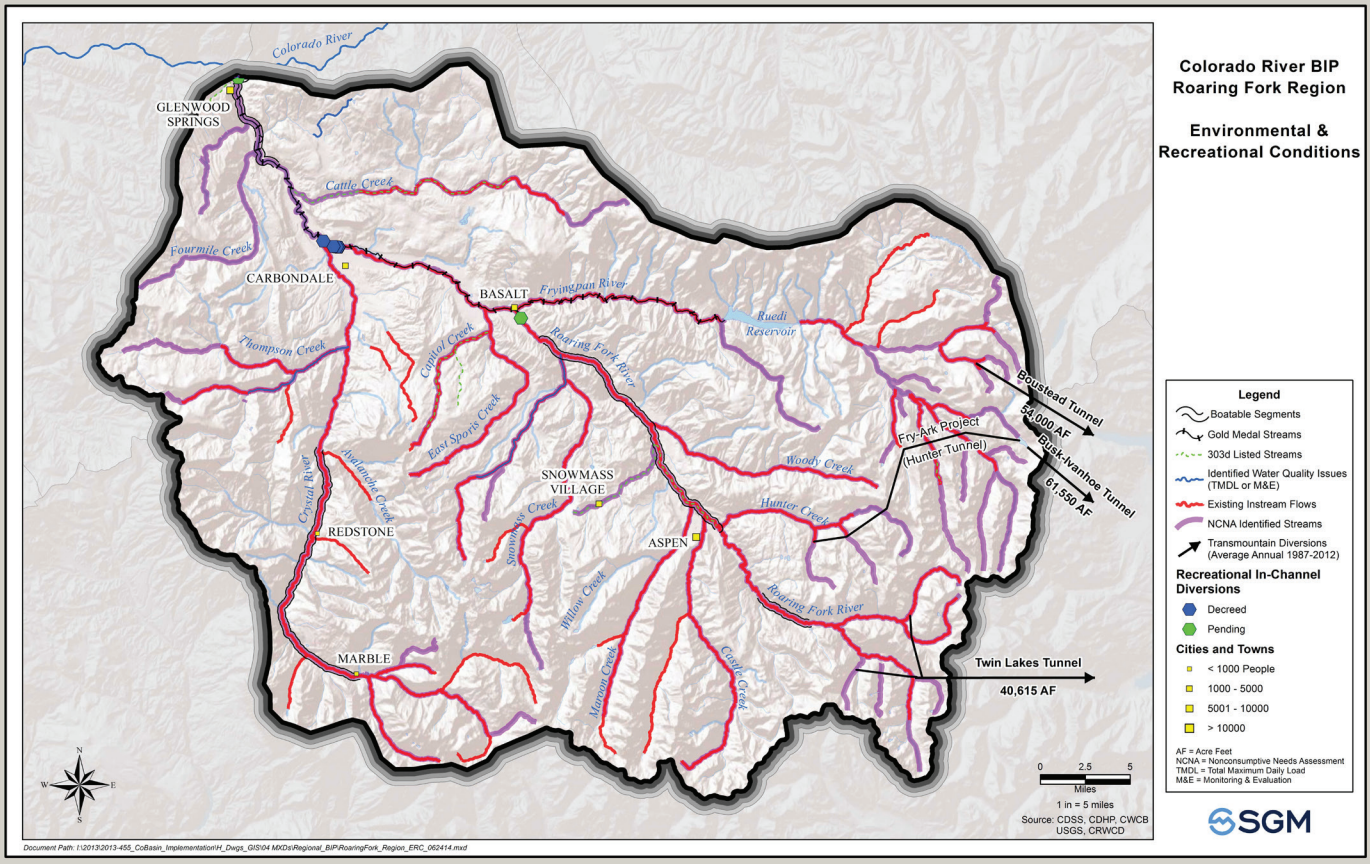

Figure 27. Colorado River BIP Roaring Fork Region
Environmental and Recreational Conditions

Themes and Supporting Vulnerabilities	Methods	Identified Projects
Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas • Aquatic environmental habitat degradation • Unmet instream/nonconsumptive flows • Impacts to tourism and recreation economies1 • Annual dry river segment or "holes" (Lower Crystal River, Roaring Fork River above Fryingpan R. and Roaring Fork River below Salvation Ditch) • Water quality degradation in tributaries • Impacts by existing and potential additional transmountain and in-basin diversions (Fry-Ark Project, Twin Lakes Project) • Water quality impacts from energy development • Unidentified funding system to support basin environmental and recreational needs	• Roaring Fork Watershed Plan • Mitigate streams that have been impaired by transmountain diversions (in-basin and out-of-basin consumptive uses) • Monitor and evaluate water quality impacts from energy development • Regional stormwater management plans • Improved instream flows through better utilization of beneficial use of ditch water • Roaring Fork Water Efficiency Plan recommendations • Utilize local government land use authority to protect stream health • Tourism and recreation economy1 needs and funding opportunities • Evaluate state water policy and law for opportunities to assure adequate nonconsumptive instream flows • Review existing basin and state stream and watershed plans for better regional management and funding ideas. (Grand County Stream Management Plan, Pitkin County Healthy Rivers and Streams program, Roaring Fork Water Efficiency Plan, and the Endangered Fish Recovery) • New water rights should demonstrate how it complies with goals and themes of the BIP • Regional Section 208 Water Quality Management Plan	• Northstar Restoration Project • Cattle Creek Restoration Project • Town of Basalt Restoration Project • Pitkin County and Carbondale RICDs • Pitkin County and City of Aspen ditch conversions to instream flow filing • Identify additional short term leases of agricultural and municipal water rights for instream use • Crystal River irrigators coordinated efforts to maintain instream flows • Aspen Reclaimed Water Project • Water provider conservation projects • Develop broadly-applicable metrics for measuring adequate streamflow and mitigation measures (physical and political) • Small reservoirs to improve instream flow in tributaries (Sopris Creek, Cattle Creek Snowmass Creek) • Develop municipal stormwater programs • Conduct an economic analysis that assesses the primary, secondary, and tertiary costs of a river
Secure Safe Drinking Water • Lack of redundancy in drinking water supplies • Sufficient supply storage during low flow periods • GWUDI designation on water provider alluvial wells	• City of Aspen to investigate the possibility of developing redundant water supplies in the event the Castle and Maroon Creek sources are temporarily unavailable • Address extended drought protections • Address vulnerability towards source watershed protection/forest health • Investigate the development of storage reservoirs on both Maroon and Castle Creeks if no better alternative is discovered	• Ziegler Reservoir 2nd enlargement • Aspen Deep Well System • Continue due diligence for the preservation of the 1972 storage rights on Maroon and Castle Creeks by giving true consideration to all other potential options
Develop Local Water Conscious Land Use Strategies • Source water degradation • Growth development impacting water supplies and environmental needs	• Address Missouri Heights lowering groundwater levels • Water providers should work with neighboring entities to provide and plan for growth between boundaries • Promote water conscious growth development through improved land use policies	• County Land Use Policy Review • Missouri Heights Reservoir enlargement • Avalanche Canal and Siphon Project • Fourmile Canal & Siphon Project • Martin Reservoirs enlargement • Water provider conservation projects
Encourage a High Level of Basinwide Conservation • Municipal and agricultural waste due to state laws promoting "use it or lose it"	• Evaluate state water policy and law for opportunities to implement effective conservation • Recognize the discrepancies and contradictions between the current water rights system and conservation/ nonconsumptive goals • Suggest incremental changes to both existing laws and water rights administration	• Water provider conservation projects • Pitkin County and City of Aspen ditch conversions to instream flow filing • Identify additional short term leases of agricultural and municipal water rights for instream use

Table 16. Roaring Fork Region Themes and Supporting Vulnerabilities

SECTION 3

Needs Analysis [cont.]

GRAND VALLEY REGION

The Grand Valley Region follows the mainstem of the Colorado River stretching from De Beque Canyon to the Colorado-Utah state line. The two main tributaries are the Gunnison River (in the Gunnison Basin) and Plateau Creek. Due to the favorable growing conditions and the supply of the Colorado River (previously the Grand River) the valley was one of the first areas in the Basin to develop and consequently, it has some of the most senior water rights. These senior water rights historically place a call on the river requiring water to be delivered to the region; this call is sometimes referred to as the "Cameo Call". Maintaining this call and requiring delivery of the large flow of water to the lower Basin is a top priority. The irrigation entities that comprise the Cameo Call are the Grand Valley Irrigation Company, Palisade Irrigation District, Orchard Mesa Irrigation District (OMID), Mesa County Irrigation District and Grand Valley Water Users Association.

Grand Valley domestic water providers have made strong efforts to coordinate their services by establishing over 31 interconnects among, at least, four separate systems. This regional cooperation has even expanded to include the local irrigation entities to better coordinate water needs and manage the water resources in the Valley. This type of regional cooperation should be a model for not only the Basin but the entire state.

Ute Water Conservancy District (Ute Water) is the largest domestic water provider in the Colorado Basin with approximately 80,000 customers (Ute Water, 2014). Despite strong conservation gains lowering the average water use to less than 80 gallons per person per day, Ute Water anticipates a water Gap of approximately 9,000 AFY by the year 2045. To meet this Gap, Ute Water is currently pursuing permits to enlarge Hunter and Monument Reservoirs, both of which are located in the Plateau Creek watershed along the north side of the Grand Mesa. After 10 years and more than $1.5 million dollars spent by Ute Water the permit application continues to be under review by the U.S. Environmental Protection Agency.

Grand Valley Region is known throughout the state for its robust agriculture production that produces vegetables, fruits and grains on over 70,000 acres (Spahr, et. al., 2000). The most famous products from the Grand Valley are the prized Palisade peaches and numerous vineyards and associated wineries. The region is home to the City of Grand Junction and the surrounding communities which combined make it the largest population center in Colorado's West Slope. Although the region is located in the lowest elevations of the Basin it is still home to the Powderhorn Ski Resort located on the north side of the Grand Mesa.

The most significant needs heard from the Grand Valley can be summarized by the need to protect, maintain and, if possible, increase flows in the Colorado River, not only to benefit the streams but to assure Colorado River Compact compliance and power production at Lake Powell. The Grand Valley desires to make best use of the Shoshone and Cameo calls, improve water

SECTION 3

Needs Analysis [cont.]

quality in the streams and particularly in the mainstem of the Colorado River, and improves the permitting process to allow for more efficient approval of water storage projects. Attached in Exhibit B are copies of the Grand Valley's Principles for the CWP and a statement from the Grand Valley Water Council that characterizes the perspectives of the Grand Valley water providers. A further concern for the Grand Valley is the continuation and success of the recovery of the endangered fish in the lower Colorado River. Water quality improvements are also a need due to high salinity and selenium concentrations which result from applying water to Grand Valley soils. Substantial investments have been made to line ditches and improve irrigation practices to reduce salt and selenium loading in the river. High salt levels cause problems for downstream agriculture, while high selenium levels negatively impact waterfowl and endangered fish. The Grand Valley is also a supporter of interstate activities to create real "new supply" such as desalination projects in the Lower Basin and importation of water from remote watersheds.

Table 17 highlights the top specific themes and vulnerabilities, methods and projects for the Grand Valley Region. Figures 29-30 depict the consumptive uses, environmental and recreational conditions.

SECTION 3

Needs Analysis [cont.]

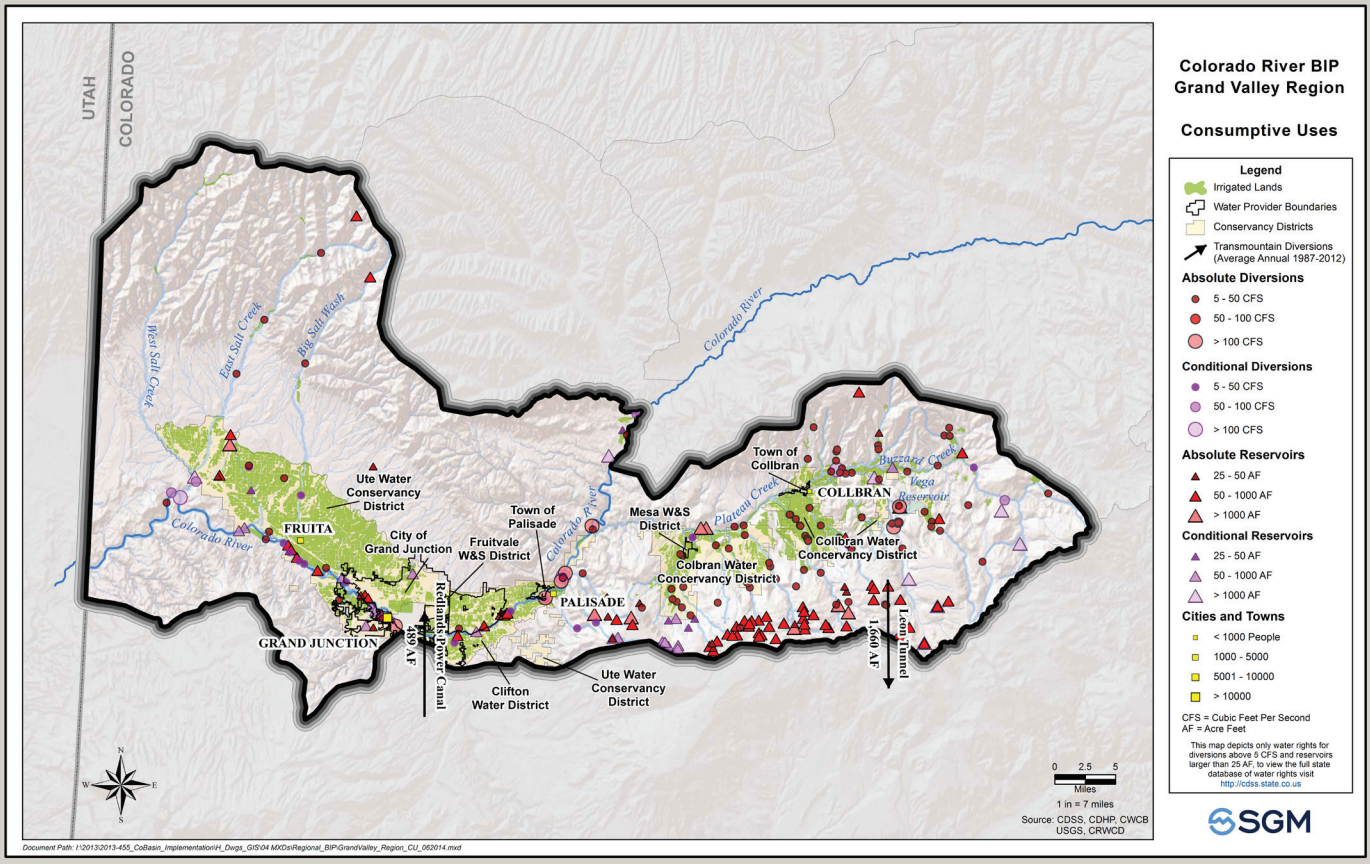

Figure 29. Colorado River BIP Grand Valley Region Consumptive Uses

SECTION 3

Needs Analysis [cont.]

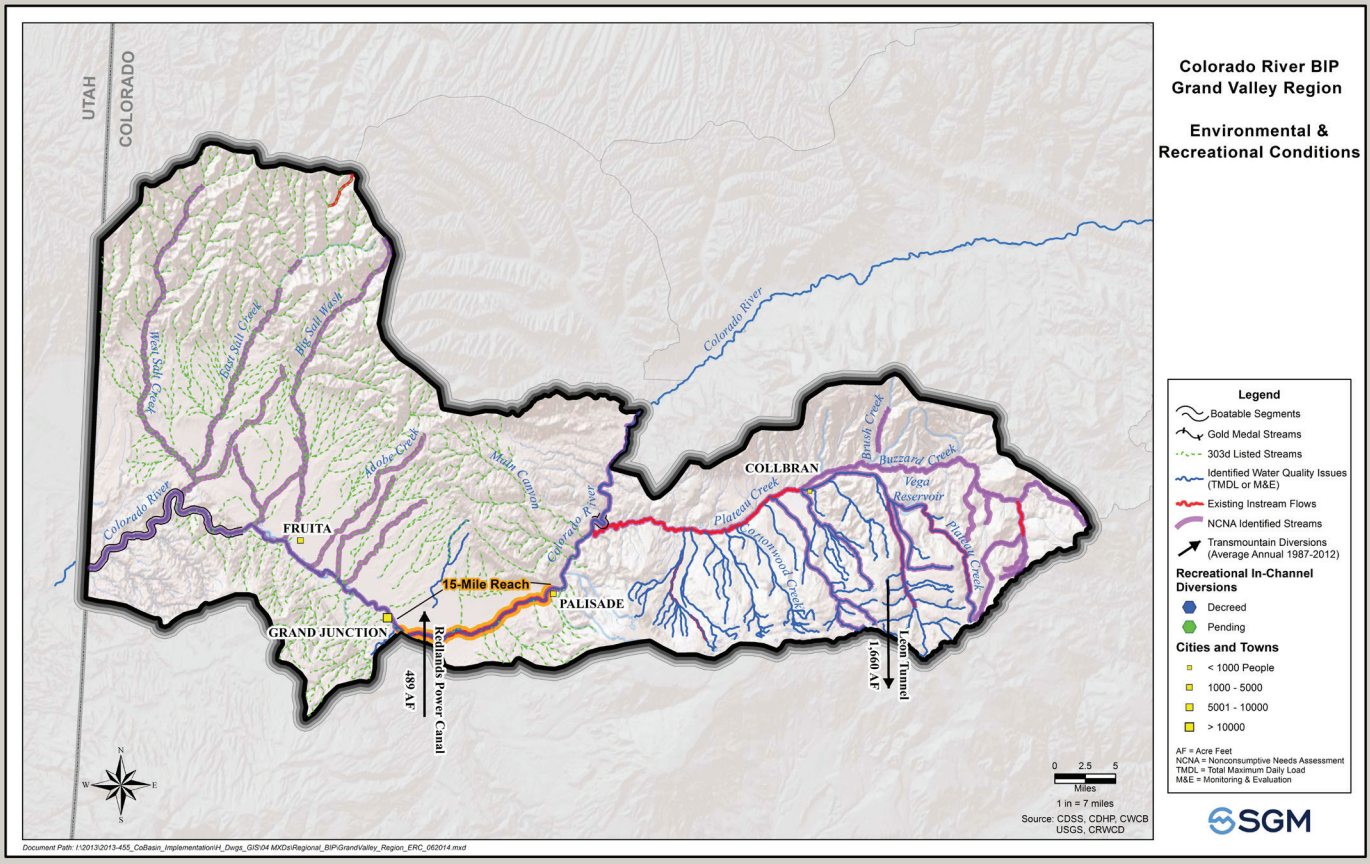

Figure 21. Colorado River BIP Eagle River Regions Environmental and Recreational Conditions

Themes and Supporting Vulnerabilities	Methods	Identified Projects
Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas • Aquatic environmental habitat degradation • 15-Mile Reach • Salinity and selenium issues • Collapsing ecosystems due to low flows, degrading water quality and non-optimal temperatures • Impacts by existing and potential additional transmountain and in-basin diversions	• Evaluate use of supplies from upstream reservoirs for power production at the Grand Valley Power Plant, 15-Mile Reach flows and instream flows • Prohibit any new transmountain diversions to protect dilution flows in the mainstem of the Colorado River • Stormwater management plans • Identify Bureau of Reclamation funding for salinity/selenium remediation projects	• Develop model to better represent timing of reservoir releases and stream management of the 15-Mile Reach • Comprehensive Grand Valley Canal lining project • Water provider conservation projects • OMID Improvements
Sustain Agriculture • Purchase of agricultural water rights by east slope entities • Late season shortage in Plateau Creek	• Utilize toolbox of agricultural incentives • Build reservoirs in Plateau Creek tributaries to provide needed late season agricultural water • Maintain and improve infrastructure to ensure continued use of irrigation rights	• Grand Valley Diversion Dam (Roller Dam) Improvements • Comprehensive Grand Valley Canal lining project • Collbran Conservation District main canal improvements and siphon replacement • Bull Creek #5 Reservoir • OMID improvements
Secure Safe Drinking Water • Extended drought • Colorado River Compact curtailment • Source watershed degradation	• Research reservoir permitting constraints and inefficiencies with federal entities • Raw water Storage projects • Identify ways to use excess Green Mountain Reservoir HUP water to protect and firm up municipal water rights • Evaluate weather modification projects (e.g. cloud seeding) to enhance local water supplies	• Hunter/Monument Reservoir • Big Park Reservoir • Willow Creek Reservoir • Owens Creek • Buzzard Creek Reservoir
Assure Dependable Basin Administration • Decreased flows in Colorado River from reduced calls at Shoshone Hydroelectric Plant and senior Grand Valley irrigation diversions ("Cameo Call")	• Use to full extent senior irrigation water rights • Evaluate potential for creation of Intentionally Created Storage (ICS) programs in Colorado and/or Upper Basin States • Prohibit any new transmountain diversions to protect water supplies in the mainstem of the Colorado River • Evaluate potential for a Water Bank (should avoid unregulated buy and dry by post-Compact water users, should maintain full Grand Valley irrigation call during fallowing and deficit irrigation in Grand Valley) • Evaluate methods for West Slope acquisition of Shoshone Hydroelectric Plant or other permanent solution to maintain Shoshone flows	• Maintain and improve infrastructure to ensure continued use of irrigation rights • Grand Valley Diversion Dam (Roller Dam) Improvements • Comprehensive Grand Valley canal lining projects • Collbran Conservation District main canal improvements and siphon replacement • Bull Creek #5 Reservoir • OMID improvements • Pursue acquisition or purchase of Xcel-owned Shoshone Hydroelectric Plant or other permanent solution to maintain Shoshone flows

Table 17. Grand Valley Region Themes and Supporting Vulnerabilities

SECTION 3

Needs Analysis [cont.]

REGIONAL TABLES

As previously described in the BIP Approach Section, the CBRT formed four Project Leadership Teams (PLTs) at the beginning of the BIP process to detail needs based on water uses in the municipal and industrial (M&I), environmental and recreational, agricultural, and policy sectors . These PLTs were responsible for developing the goals and measurable outcomes; needs and vulnerabilities; constraints and opportunities; and projects and methods requested by the CWCB. Exhibit D includes the initial compilation of this information. As the BIP evolved, the results of the PLTs were merged with the feedback collected from the public outreach efforts and further refined by representatives from each region. The results of this process are documented in the following two tables. These tables are envisioned to be a dataset for the CBRT to use as they continue to identify water needs and projects throughout the Basin.

The Themes and Vulnerabilities Tables highlight each region's priority themes and supporting vulnerabilities, the methods used to address the vulnerabilities, and finally projects that address the vulnerabilities. The first column identifies the top themes from the six basinwide themes. The shading in this table corresponds to each theme as defined in the Approach Section. These themes are supported by several vulnerabilities or observed threats listed directly below each theme. The second column lists methods which may include resources, existing plans and/or signed agreements, funding, and/or coordination partners that can be used to support the identified projects. The last column includes top projects that the regional stakeholders identified to mitigate and/or remove vulnerabilities. The identified projects listed in the first table are not all-inclusive list and represent top candidate projects for that region as identified by the CBRT in the Project, Policies and Processes Tables.

The Projects, Policies and Processes Tables located in Exhibit __ are comprehensive lists of identified projects for each region. The table lists projects in all phases from conceptual to just before construction, including multiple options for similar objectives. Many of the listed projects are either within the permitting phase, fundraising and/or waiting for agreements to be completed prior to starting. The CBRT realizes that it is unrealistic for all of the projects listed to be developed. The tables are broad reaching and will continually revised as the CBRT and Basin stakeholders evaluate, construct, and develop new projects. As described in Section 4 the CBRT along with regional stakeholders identified what they believe are the current priority projects for each region.

REGIONAL MAPS

Two maps were developed for each region which identify consumptive uses, environmental and recreational conditions. These maps provide an overview of the existing Basin characteristics identifying spatial relations to specific identified reaches, projects and towns. A summary of the data layers and/or process in the instance of the projects and processes maps, are provided below. Section 4 provides a more detailed analysis of projects by region.

SECTION 3

Needs Analysis [cont.]

Consumptive Uses Map

Irrigated lands — This dataset was based upon the 1993 Division 5 Irrigated Lands dataset from the Colorado Decision Support System (CDSS)

Water provider service area boundaries — This dataset was provided by Leonard Rice

Conservancy district boundaries — This dataset was provided by Leonard Rice

Absolute and conditional diversions/reservoirs — This dataset was obtained from the Colorado Decision Support System (CDSS)

Transmountain diversions (TMDs) — This dataset was obtained from the Colorado River Water Conservation District

Environmental and Recreational Conditions Map

Boatable segments — These segments were identified by American Whitewater as those waters that have 'acceptable' or 'optimal' flows for a specific subset of river segments that are important to the paddling community. These segments were identified as part of the Bureau of Reclamation's Colorado River Basin Study (BOR, 2012) which, in part, aimed to develop a 'boatable days' metric, one that defined the range of flows that provide the recreational opportunities, too low, optimal, and too high (American Whitewater, 2014). The river segment descriptions used to create the dataset were provided by American Whitewater, found in Exhibit F.

Gold Medal waters — These fishing areas have been designated by the Colorado Wildlife Commission as waters which are able to produce 60 pounds of trout per acre, and at least twelve (12) 14" or larger trout per acre (ColoradoFishing.net, 2014). This dataset was provided by the Colorado Water Conservation Board (CWCB).

303(d) Listed segments — Section 303(d) of the federal Clean Water Act requires that states submit to the U.S. Environmental Protection Agency a list of those waters for which technology-based effluent limitations and other required controls are not stringent enough to implement water quality standards. The Colorado Water Quality Control Commission's (WQCC) Regulation No. 93 lists Colorado's Section 303(d) Impaired Waters. This dataset was provided by the Colorado Department of Public Health and Environment Water Quality Control Division (CDPHE-WQCD).

Other Identified Water Quality Issues [with a developed Total Maximum Daily Load (TMDL) or on the Monitoring and Evaluation (M&E) list] — These segments represent one of two datasets; a segment on the M&E List; or a segment with a developed TMDL. Regulation No. 93 also includes Monitoring and Evaluation (M&E) water bodies where there is reason to suspect water quality problems, but where uncertainty exists regarding one or more factors, such as the representative nature of the data. Those segments where Clean Water Section 303(d) impairments have already been determined have developed TMDLs. These datasets were provided by the CDPHE-WQCD.

SECTION 3

Needs Analysis [cont.]

Instream flow segments — These are streams that have established water rights dedicated to the preservation and improvement of the natural environment to a reasonable degree. These segments have established minimum flows between specific points either on a stream or levels in natural lakes. These rights are administered within the State's water right priority system to preserve or improve the natural environment to a reasonable degree (CWCB, 2014). A list of the instream flow segments can be found in Exhibit F. This dataset was provided by the CWCB.

Nonconsumptive Needs Assessment (NCNA) segments — The NCNA assessment was implemented as part of the 2010 Statewide Water Supply Initiative (SWSI) efforts and identified streams with "environmental and recreational features at risk." The important environmental and recreational features selected were water quality, geomorphic function, aquatic ecological function, riparian/wetland ecological function, and recreational boating. Segments with features at risk were those that had important environmental and/or recreational features that were in some way threatened. A list of the environmental and recreational datasets used to identify these segments can be found in Exhibit F. This dataset was provided by the CWCB and the Colorado Decision Support System (CDSS).

Recreational In-Channel Diversions (RICD) — These identify locations where either RICDs have been decreed or are pending water court approval. RICDs essentially limit water rights to the minimum stream flow necessary for a reasonable recreational experience in and on the water (CWCB, 2014). This dataset was provided by the CWCB.

SECTION 4

Basinwide Projects — Regional Top Projects

Led by SGM, CBRT members and basinwide and regional stakeholders met on a regular basis from the fall of 2014 through April of 2015 undertaking an intensive and extensive review of the numerous projects and process that were identified in the first draft of the BIP. The comprehensive list of all identified projects is contained in Exhibit J. The outgrowth of that process is summarized in the following Table which identifies top projects both basinwide and regionally. Each project in the Table has a more detailed project information sheet contained in Exhibit K.

Each region determined the criteria by which it chose the regions top projects which are summarized below.

GRAND COUNTY

- Meet BIP Themes

SUMMIT COUNTY

- Substantially done by 2025 AND
- Sponsoring entity could use Water Supply Reserve Account (WSRA) funds to accomplish the project.

STATE BRIDGE REGION

- Meet BIP Themes
- Support the Stream Management Plan
- Not yet funded or permitted

EAGLE REGION

- Meet BIP Themes
- Support the Stream Management Plan
- Not yet funded or permitted

SECTION 4

Basinwide Projects [cont.]

MIDDLE COLORADO

- Address agricultural, drinking water and environmental needs – consistent with the overall focus of the BIP.
- Support agriculture. Building in additional agricultural water supply was important in our region which is considered water-short.
- All four projects address this goal directly or indirectly through either increased storage capacity or improved efficiencies.

ROARING FORK REGION

- Support the objectives of the Roaring Fork Watershed Plan
- Provide adequate instream flows to:
- Promote healthy streams
- Support the recreational economy
- Recharge aquifers
- Mitigate/protect water quality
- Sustain agriculture
- Secure Safe Drinking Water

GRAND VALLEY

- Projects are well into the permitting process
- Urgency - time sensitive, and there is a need for storage to increase Ute Water's firm yield.
- Sustain agriculture in the Plateau Valley

In developing the list the CBRT recognizes that the Top Projects list is ever changing based on needs and opportunities. Some of these projects may never happen for a variety of reasons and others not currently on the Top Projects list may happen.

SECTION 4

Basinwide Projects [cont.]

Table 18. Colorado Basin Implementation Plan Top Projects — April 2, 2015

BASINWIDE

Protect	Funding Needs	Project Sponsor(s)	Meets Six Themes					
			1	2	3	4	5	6
Protect Existing and Future West Slope Uses	TBD	Colorado Basin Roundtable, West Slope entities, Colorado River District, The Nature Conservancy	X	X	X	X	X	X
Colorado River Cooperative Agreement (CRCA)	As outlined in CRCA. Additional funding, TBD likely required for full implementation of all potential aspects of CRCA	17 West Slope signatories to CRCA and Denver Water	X	X	X		X	X
Grand Valley Roller Dam Rehabilitation	TBD	Grand Valley Water Users Association, Orchard Mesa, Palisade and Mesa County Irrigation Districts, Colorado Basin Roundtable	X	X	X	X	X	X
Colorado Basin Stream Management Plan	$20-30 M (mostly supports through compensatory wetland mitigation payments)	Conservancy Dist., Watershed Groups, Local Governments, Environmental Groups, CPW,CWCB, CBRT, USFS, BLM	X	X	X	X	X	X
Protect the Shoshone Hydroelectric Plant Cell	TBD	CRCA Signatories, Xcel Energy, other diverters, Reclamation and the State of Colorado	X	X	X	X	X	

SIX THEMES KEY:

1 **Protect/Restore Healthy Streams**
2 **Sustain Agriculture**
3 **Secure Safe Drinking Water**
4 **Water Conscious Land Use**
5 **Assure Dependable Basin Administration**
6 **High Basinwide Conservation**

SECTION 4

Basinwide Projects [cont.]

Table 18. Colorado Basin Implementation Plan Top Projects — April 2, 2015

EAGLE RIVER REGION

Protect	Funding Needs	Project Sponsor(s)	Meets Six Themes					
			1	2	3	4	5	6
Camp Hale – Eagle River Headwaters Restoration Project	$20-30 M (mostly supports through compensatory wetland mitigation payments)	National Forest Foundation, White River National Forest	X		X		X	
Eagle River Watershed Water Quality Plan & Implementation	$10 M	TBD	X	X	X	X		
Eagle River Memorandum of Understanding (MOU) Project	Multi-million dollar effort anticipated but order of magnitude TBD	The Cities of Aurora and Colorado Springs; Eagle Park Reservoir Company (consisting of the Colorado River Water Conservation District, Eagle River Water & Sanitation District, Upper Eagle Regional Water Authority and Vail Associates, Inc.); and Climax Molybdenum Company.	X					

SIX THEMES KEY:

1 **Protect/Restore Healthy Streams**
2 **Sustain Agriculture**
3 **Secure Safe Drinking Water**
4 **Water Conscious Land Use**
5 **Assure Dependable Basin Administration**
6 **High Basinwide Conservation**

SECTION 4

Basinwide Projects [cont.]

Table 18. Colorado Basin Implementation Plan Top Projects — April 2, 2015

GRAND COUNTY REGION

Protect	Funding Needs	Project Sponsor(s)	Meets Six Themes					
			1	2	3	4	5	6
Upper Colorado River Irrigation and Restoration Assessment and Implementation	$5-$16 M	ILVK, LBD(?), Grand County Colorado Basin RT	X	X	X	X	X	X
Construct Windy Gap Reservoir Bypass Alternative #3	$9.6 M	Grand County, NCWCD, MSNCWCD, UCRA, TU, CPW	X	X	X	X	X	X
Update and Implement Grand County Stream Management Plan	$1 M	LBD(?), Grand County Grand County Water Users	X	X	X	X	X	X
Grand County Water and Sanitation Reservoir #1	$1.5 M	Grand County Water & Sanitation #1, other Fraser Valley entities, Middle Park, Grand County	X	X	X	X	X	X

SIX THEMES KEY:

1 **Protect/Restore Healthy Streams**
2 **Sustain Agriculture**
3 **Secure Safe Drinking Water**
4 **Water Conscious Land Use**
5 **Assure Dependable Basin Administration**
6 **High Basinwide Conservation**

SECTION 4

Basinwide Projects [cont.]

Table 18. Colorado Basin Implementation Plan Top Projects — April 2, 2015

GRAND VALLEY

Protect	Funding Needs	Project Sponsor(s)	Meets Six Themes					
			1	2	3	4	5	6
Collbran Conservation District Main Canal Improvements and Siphon Replacement	Multi-millions	Collbran Conservancy District (CCD)	X	X	X	X		X
Hunter Reservoir Enlargement Project	The Ute Water Conservancy District will address as we get closer to construction (anticipated $5 - $7 M)	Ute Water Conservancy District	X	X	X	X		X
Monument Reservoir Enlargement Project	The Ute Water Conservancy District will address as we get closer to construction (anticipated ~$20 M)	Ute Water Conservancy District	X	X	X	X		X

SIX THEMES KEY:

1 **Protect/Restore Healthy Streams**
2 **Sustain Agriculture**
3 **Secure Safe Drinking Water**
4 **Water Conscious Land Use**
5 **Assure Dependable Basin Administration**
6 **High Basinwide Conservation**

SECTION 4

Basinwide Projects [cont.]

Table 18. Colorado Basin Implementation Plan Top Projects — April 2, 2015

MIDDLE COLORADO REGION

Protect	Funding Needs	Project Sponsor(s)	Meets Six Themes					
			1	2	3	4	5	6
Selenium Source Investigations and Implementation of Control Measures in the Middle Colorado Watershed	Phase I – $0.5 M Phase II - $1.5 M Phase III - $20 M Project funding to be derived from a number of sources, including federal ag-based cost share programs	Middle Colorado Watershed Council	X	X				X
Irrigation Asset Inventory Program	$300,000	Conservation Districts	X	X	X			X
Silt Mesa Feasibility Study to Assess the Value of a Rural Regional Water Authority	TBD	Silt Water Conservancy District, Bureau of Reclamation, Bureau of Land Management, West Divide Water Conservancy District, Colorado River Water Conservation District, Town of Silt, Town of Rifle, Colorado Parks and Wildlife, Garfield County, Bookcliff Conservation District	X	X	X			
Kendig Reservoir and Kendig Reservoir 1ST Enlargement	TBD	West Divide Water Conservancy District /Colorado River Water Conservation District	X	X	X			

SIX THEMES KEY:

1 **Protect/Restore Healthy Streams**
2 **Sustain Agriculture**
3 **Secure Safe Drinking Water**
4 **Water Conscious Land Use**
5 **Assure Dependable Basin Administration**
6 **High Basinwide Conservation**

SECTION 4

Basinwide Projects [cont.]

Table 18. Colorado Basin Implementation Plan Top Projects — April 2, 2015

ROARING FORK

Protect	Funding Needs	Project Sponsor(s)	Meets Six Themes					
			1	2	3	4	5	6
Roaring Fork Watershed Plan	Multi-million dollars will be needed and determined on a project-by-project basis	Roaring Fork Watershed Conservancy, Town of Basalt, City of Aspen, Eagle County, Pitkin County, Town of Snowmass Village, Town of Carbondale, City of Glenwood Springs	X					
Implement the City of Aspen Municipal Water Efficiency Plan	TBD	City of Aspen	X	X	X	X	X	X
Irrigation Asset Inventory Program	TBD	Roaring Fork Watershed Conservancy, Town of Carbondale, Ruedi Water and Power Authority	X	X				

SIX THEMES KEY:

1 **Protect/Restore Healthy Streams**
2 **Sustain Agriculture**
3 **Secure Safe Drinking Water**
4 **Water Conscious Land Use**
5 **Assure Dependable Basin Administration**
6 **High Basinwide Conservation**

SECTION 4

Basinwide Projects [cont.]

Table 18. Colorado Basin Implementation Plan Top Projects — April 2, 2015

STATE BRIDGE

Protect	Funding Needs	Project Sponsor(s)	Meets Six Themes					
			1	2	3	4	5	6
Irrigation Asset Inventory Program	$100,000	Eagle County Conservation District, Eagle County Road and Bridge Dept.	X	X	X			X
Deep Creek Wild & Scenic	TBD	BLM/USFSERWC/AR	X	X	X		X	
Colorado River Wild & Scenic Alternative Process								

SIX THEMES KEY:

1 **Protect/Restore Healthy Streams**
2 **Sustain Agriculture**
3 **Secure Safe Drinking Water**
4 **Water Conscious Land Use**
5 **Assure Dependable Basin Administration**
6 **High Basinwide Conservation**

SECTION 4

Basinwide Projects [cont.]

Table 18. Colorado Basin Implementation Plan Top Projects — April 2, 2015

SUMMIT COUNTY

Protect	Funding Needs	Project Sponsor(s)	Meets Six Themes					
			1	2	3	4	5	6
Swan River Stream Restoration	•Phase 1 - $2M (received $975,000 from Statewide and Colorado Basin Roundtable Water Supply Reserve Account) •Future Phases $300,000 annually	Summit County Board of County Commissioners	X				X	
Snake/Blue River Watershed Plan Project – Implement Clean Up of Abandoned Mines	TBD		X		X			
Constructed Wetlands in a Storm Water Detention Pond	TBD	Blue River Watershed Group, and Town of Silverthorne	X					
McCain Blue River Reclamation	TBD	Town of Breckenridge	X		X	X		X
Town of Dillon Alternate Water Supply – Old Dillon Reservoir Enlargement/ Pipeline	Partial funding from CRCA (900,000). Total project cost $3 -$5 M depending on alternatives.	Town of Dillon			X			X
Dillon Reservoir Staged Release System Feasibility Study	TBD	Town of Silverthorne	X					

SIX THEMES KEY:

1 **Protect/Restore Healthy Streams**
2 **Sustain Agriculture**
3 **Secure Safe Drinking Water**
4 **Water Conscious Land Use**
5 **Assure Dependable Basin Administration**
6 **High Basinwide Conservation**

SECTION 5

Interbasin Reliance Report

This section discusses the interaction and cooperative opportunities between the state Roundtable basins. For a Colorado Water Plan to work, all basins need to coordinate their efforts, priorities and needs to develop a plan that can be supported and shared by all. Below are several key points identified by the Colorado Basin for other basins statewide to consider.

CWP SHOULD ASSUME THAT NO ADDITIONAL WATER IS AVAILABLE FOR OTHER BASINS

One of the themes that came from the 2014 Roundtable Summit was cooperation and balance within and between basins. The Colorado Basin is the State's major "donor" basin of water, providing water to farms and cities of Eastern Colorado. The Colorado basin currently contributes approximately 400,000 to 600,000 AFY through transmountain diversions. It is currently estimated that up to an additional 140,000 AFY will be diverted in the future as Front Range diverters firm yields. These additional TMD yields will be developed from the following projects: the Moffat Collection System Project, Windy Gap Firming, Eagle River MOU, future Dillon Reservoir Diversions, firming in the Upper Roaring Fork and Fryingpan Rivers, and Colorado Springs Utilities expanded diversions from the upper Blue River. (See the figures in the Regional Breakdown Section for maps depicting the locations of the TMDs.)

The Colorado Basin has played more of a role in solving Colorado's water shortage than any other basin in the State. These TMDs have had dramatic impacts on the health of our ecosystems, the headwater counties of the Colorado Basin and in the middle and lower reaches of the river in Colorado. The Basin has realized the need for restoring and repairing our headwater streams already impacted by TMDs Before any additional TMDs are considered,. Local Basin entities have completed the planning and construction of many environmental and recreational projects to restore watersheds, streams and rivers at considerable investment of time and money. A small sampling of these projects (30 projects by NWCCOG) is shown in Exhibit F. Fifty-seven projects in Grand County alone are associated with restoring and protecting environmental and recreational needs from impacts from TMDs. The scale and expense of these projects are immense. These investments could be endangered with additional development of a new TMD project for the Front Range. One of the six themes of the BIP identified the need to develop projects, methods, policies, protections and repairs needed to protect stream health and restore our degraded rivers to a healthy condition. The Basin will continue to cooperate to the extent of firming projects identified above and to address mitigation of the impacts from existing and new TMDs. The Basin will simultaneously work towards retaining healthy watersheds which benefit the Colorado economy and water supply sources for other basins.

In addition to the impacted streams in the headwaters and the Colorado River, the Basin feels that the long term availability of sufficient water supplies needed to meet in-basin consumptive agriculture, mining, industrial and environmental and recreational needs is highly uncertain. Much more work is needed to fully quantify and understand these needs and the uncertainties

SECTION 5

Interbasin Reliance Report [cont.]

associated with climate change and the cyclical variability of wet and dry conditions. Given the needs and uncertainties detailed below, the most prudent planning approach for the CWP is to assume that there is no more reliable water to develop for export from the Colorado Basin:

- Basin agriculture currently has 100,000 AFY shortage of water (CDM, 2011b). SWSI projects that an additional 80,000 acres of West Slope agriculture will be lost to development within the Colorado Basin.
- The CBRT has funded studies and projects to assist ranchers in the Kremmling area along the upper mainstem of the Colorado River where their intakes have been left high and dry due to loss of hydraulic grade of the Colorado River.
- As much as 70% of the existing streams are listed as impaired based upon SWSI and the Nonconsumptive Needs Assessment prepared by the Colorado Basin Roundtable (CDM 2011a; CDM 2011b).
- Recent studies show that continued development from the Colorado River towards full Compact entitlement is simply unsustainable. The Bureau of Reclamation "Colorado River Basin Water Supply and Demand Study" (BOR, 2012) concluded that between the seven states using the Colorado River "the long term projected imbalance in future supply and demand is about 3.2 MAF by 2060". Any additional TMDs from the Colorado River Basin will increase that imbalance and hasten the time when a curtailment occurs which will have catastrophic impacts to the West Slope and East Slope. A Lower Basin Compact Call will curtail projects such as the C-BT Project, Dillon Reservoir, Fry-Ark Project, Moffat Tunnel Collection System, Homestake Project, Twin Lakes, Wolford, Dallas Creek, Delores, and Central Utah Project, San Juan Chama, etc. They could not legally divert a drop of water (Kuhn, 2007).
- Climate change is expected to further cause shortages across the southwestern US through declining water supply and increased water demand from warmer temperatures. The "Waages Group" calculated that the result could be as much as a 12% decrease in dry year water supply and a concurrent 6% increase in water use" (Woodhouse, 2007). Climate change will further cause shortages to the existing imbalance between supply and demand for the 35 million people that rely upon the Colorado River and among the seven states that border the Colorado River.

SECTION 5

Interbasin Reliance Report [cont.]

- The CWCB's study, "2008 Colorado Climate Change: A synthesis to Support Water Resource Management and Adaptation" (University of Colorado Boulder, 2008), concluded that future Colorado weather patterns are expected to change towards warmer average temperatures, shifting precipitation patterns and earlier runoffs. In Colorado, temperatures increased by approximately 2°F between 1977 and 2006. Current climate models projections forecast that Colorado will warm by 2.5°F by 2025 and 4°F by 2050. Summers are likely to warm more than winters. Warmer temperatures will affect evaporation rates in our rivers, streams and reservoirs, perhaps making less water available for beneficial use. The projected seasonal shift in precipitation may result in more mid-winter precipitation throughout the state and, in some areas, a decrease in late spring and summer precipitation. Lower elevation snowpack (below 8,200 feet) is likely to decline, with modest declines projected for high elevation snowpack (above 8,200 feet). The timing of runoff is projected to shift earlier in the spring, which may reduce late summer stream flows. These changes will probably occur regardless of changes in precipitation.

- The middle and lower Colorado River within Colorado already experiences water quality problems due to the reduction in flows from TMDs. The lack of higher quality dilution from headwater flows has caused downstream increases in concentration of salinity, selenium, nutrients, hardness, total dissolved solids (TDS), emerging contaminants and endocrine disruptors. These water quality problems have caused a dramatic increase in expense to water and wastewater facilities in the middle and lower Colorado River region.

- The lower Colorado River watershed has four warm water fish species that have been listed as endangered/threatened under the federal Endangered Species Act. The Colorado Basin and East Slope water providers have worked to permanently supply 10,825 AFY to assist with the recovery. The conditions leading to the listing of these species have been caused in part to diversions out of the Colorado River and TMDs. Additional diversions out of the basin above this critical 15-Mile Reach would jeopardize the success rate of the recovery program.

SECTION 5

Interbasin Reliance Report [cont.]

- Colorado is close to exceeding its Compact Entitlement. Based upon the BOR's hydrologic determination the State is entitled to 3,208,500 AFY, while the 1931-1964 hydrology estimate concludes the State's entitlement is closer to 2,432,000 AFY. Colorado is currently consuming in the range of 2.4 to 2.65 million AFY (Fleming, 2008).

- If the 18,000 AF Moffatt Firming and 30,000 AF Windy Gap Firming projects are completed, any additional depletions from the Colorado River or its tributaries upstream of Grand Junction could trigger another Section 7 consultation under the Endangered Species Act. In 1999, the US Fish and Wildlife Service (FWS) issued a Programmatic Biological Opinion (PBO) recommending that 10,825 AF be delivered each year during the late summer and fall in order to protect four endangered fish in the 15-Mile Reach on the Colorado River from the Grand Valley Irrigation Company Diversion Dam near Palisade downstream to the Gunnison River confluence in Grand Junction. This is known as the Recovery Program, and the four species at-risk of going extinct are the Colorado pikeminnow, humpback chub, razorback sucker and bonytail. The US Fish and Wildlife Service set a goal in the PBO for a population of 1,100 pikeminnow. The FWS's best scientific judgment is that if this level is not reached by the earlier of 2015 or when 50,000 AF of new depletions are made from the Colorado River, this would be considered new information and a "consultation under Section 7" of the Endangered Species Act would be reinitiated. A Section 7 consultation requires the US Fish and Wildlife Service to undertake another scientific study to estimate the population of these fish, and to determine if their numbers are increasing, stable, or decreasing. If the Recovery Program fails (because the pikeminnow are not reaching a population of 1,100), Federal Agencies are still obligated to take measures to conserve the endangered fishes. Therefore, any additional depletions from the Colorado River are likely to trigger another Section 7 consultation.

- The current hydrology, sustained drought, and administrative actions have reduced levels in Lake Powell and Lake Mead to historic lows levels. As of May of 2014, Lake Powell water levels had dropped to 39% of full pool to elevation 3,700. The level dropped to 3,571 feet on April 12, 2014 which is close to the water level elevation of 3,490 feet required to produce power. If power production is curtailed from Lake Powell the impacts will be felt across the Southwest US

SECTION 5

Interbasin Reliance Report [cont.]

and especially in Colorado. Colorado and other seven basin states purchase electricity produced from Lake Powell. In return, the federal government uses the funds from that electricity to maintain facilities and run programs in western Colorado including the Endangered Fish Recovery Program, salinity reduction programs, fish recovery programs in the Gunnison Basin. Urgent efforts are underway to prevent levels from dropping close to the elevation below which hydroelectric generating capacity is curtailed. Additional diversions out of the basin would further exacerbate the levels of Lake Powell.

- Any new TMD would be prohibitively expensive as a result of the permitting process, especially compared with the wide range of alternative actions that should be taken to fill the Gap. Colorado citizens have consistently shown a strong aversion to fund large and expensive initiatives.

- The Colorado Basin also has its own "Gap" to fill. It will be difficult to fill our gap while also being expected to help fill three other Basin "gaps".

RESOLVE ADMINISTRATION OF LOWER BASIN COMPACT CALL

The Colorado Basin recommends that the issues related to Compact Compliance/ Curtailment Implementation begin immediately between the four Upper Basin States, the four west slope basins/roundtable, and within Division 5 of the State of Colorado. A memo attached in Exhibit G from the First Assistant Attorney General outlines the complexity of curtailment issues. It will take years to resolve these issues and it is imperative to outline with reasonable certainty the impact to Colorado Water users and managers so that proper proactive water planning can occur before reactive planning and crisis management has to be implemented.

WATER SUPPLY SHOULD BE MET FROM WITHIN EACH BASIN

The Colorado Basin recommends that water planning strategies in each basin rely upon the water available in that basin. Solutions to supply water for growth and development in one part of the state should not over-ride land use plans and regulations adopted by local governments in the part of the state from which water will be taken. Due to the facts and uncertainties described above, new TMDs are likely to conflict with local control (e.g., 1041 statutes) and may not be sustainable and reliable long term sources of supply for other basins. The CWP should identify a process and requirement for each basin to fully use available water supply within its own basin before planning diversions from another area of the state.

SECTION 5

Interbasin Reliance Report [cont.]

FUTURE DIVERSIONS WILL NOT SAVE EAST SLOPE AGRICULTURE

Previous CWCB planning studies have referenced a portfolio tool which indicates that a new large state funded West Slope water supply project will prevent the loss of agricultural land in the Arkansas and South Platte Basins. That premise is flawed. A future diversion out of the Colorado Basin will hasten a Compact call which will curtail agricultural uses in both the West Slope and East Slope. South Platte officials have been on record as stating that a new diversion will not protect South Platte agricultural land from buy and dry practices. The exponential law of growth will only increase the demand on East Slope agricultural buy and dry practices.

WATER CONSCIOUS LAND USE

The BIP recommends the adoption of water conscious use policies across the state. These policies would be specific to each region; however, all would recognize the importance of ensuring that future and existing land use must consider impacts on water supplies on a local, regional, statewide and interstate basis. Several Colorado Basin municipalities have limited growth and new taps based upon a limited water supply and water providers and land use authorities are working together to require efficient use of water in new developments. Where is the same rational land use planning occurring in other parts of the State with even more limited supplies? The consequences of a doubling of population will have devastating consequences to the viability of agriculture, locally sourced foods, rivers, streams, tourism and recreation and all of the reasons we live in Colorado if land use planning strategies do not effectively address efficient use of water. Water conservation and land use best management practices (BMP) have to be implemented across the state. Incentive programs should be instituted to encourage implementation of BMPs. See Exhibit H for a list of BMPs.

IMPLEMENTING WATER CONSERVATION PRACTICES CAN LOWER THE STATE GAP

The CWP should recognize that seriously lowering per capita water demand, decreasing outside watering of non-native plant species and water conscious practices will lower the statewide Gap and significantly reduce the need for future new water supply projects. These practices can occur today with very little expense. Three different studies also came to the same conclusion Currier, 2014b; Ransford, 2012; Western Resource Advocates, 2011.

PROTECT ENVIRONMENTAL AND RECREATIONAL NEEDS

The BIP recommends that all basins statewide should make protecting and improving the health of our rivers and streams at top priority. Historically, Colorado water planning, water law and institutional structure have revolved around consumptive diversions. The culture of our State must change to emphasis protection of and rehabilitation of healthy rivers and streams.

NEXT STEPS

The development of this Basin Implementation Plan for the Colorado River Basin establishes a framework which will allow the Colorado Basin Roundtable and stakeholders to move forward with the planning and implementation of projects to meet their vision up to 2050 and beyond. Initial drafting of this BIP occurred in less than six months. The process resulted in the development of broad policy statements, specific themes, goals, measurable outcomes, short term and long term needs, and projects and methods for each of the Basin's seven regions. The challenge moving forward the effective coordination and implementation of identified projects and methods across the geographically diverse regions. Continued cooperation is across the Basin is critical for successful implementation of the BIP. Equally critical is cooperation and coordination Statewide.

The Colorado Basin Roundtable understands that successful implementation of the next steps and actions will require more than policy discussions, including:

- Focusing on the important projects and methods - pinpointing what must be done or everything else becomes unimportant
- Acting on the lead measures - 20% of all activity generates 80% of results
- Reporting metrics - keep a compelling scoreboard to motivate, incentivize and encourage successful implementation
- Creating a culture of accountability - accountability that is repetitive, positive and self-regulating

Regardless of how the Colorado Water Conservation Board and State move forward with projects, policies and processes, this BIP will guide future projects and methods for the Basin. The information contained within this BIP should be regularly reviewed and updated by the CBRT. Continued public engagement, especially those making long term water use decisions including politicians, land use planners, water providers, environmental awareness groups and the agricultural community is also necessary. Long term outreach activities will continue to build on the communication and partnerships developed through the BIP's outreach efforts. The CBRT will strive to maintain a steady presence in both traditional and social media to ensure their members have the communication tools to both inform and listen to their constituencies about the issues the CBRT is addressing.

The CBRT and BIP process developed a list of targeted solutions to support the six themes that will guide the next steps for meeting our future water demands. Over the next nine months the CWCB and nine basin roundtable will conduct public outreach on these BIPs. The final BIPs will incorporate and address this input and be submitted to the CWCB in April 2015 (See the CWCB Colorado's Water Plan Timeline at the end of this section).

NEXT STEPS [cont.]

The work of the CBRT is ongoing and will continue to focus on the six identified themes for the Basin. Each of these requires further refinement and work to fully realize the vision of the Basin.

The Colorado River Basin Roundtable "envisions a Colorado River basin that is home to thriving communities benefiting from vibrant, healthy rivers and outstanding water quality that provides for all of the Colorado Basin's needs. We acknowledge the interdependence of the varied Basin water users. Protecting the water and river flows that will ensure the future for all of us is a high priority. We also recognize that the influence of historic drought patterns, the uncertainty of climate change, population growth, energy development and Compact compliance are interwoven within this vision. Much of this vision's success depends on how we collectively adapt to these forces" (CBRT, 2011).

ACRONYMS

AF	Acre-Feet
AFY	Acre-Feet/Per Year
ATM	Alternative Transfer Methods
Basin	Colorado River Basin in Colorado
BIP	Colorado Basin Implementation Plan
BLM	Bureau of Land Management
BMP	Best Management Practice
BOR	U.S. Bureau of Reclamation
C-BT	Colorado Big Thompson Project
CBRT	Colorado Basin Roundtable
CRWCD	Colorado River Water Conservation District
CDM	CDM Smith
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CFS	Cubic Feet per Second
COGA	Colorado Oil and Gas Association
CPW	Colorado Division of Parks and Wildlife
CRCA	Colorado River Cooperative Agreement
CWA	Clean Water Act
CWCB	Colorado Water Conservation Board
CWP	Colorado Water Plan
DARCA	Ditch and Reservoir Company Alliance
DNR	Department of Natural Resources
DWR	Division of Water Resources
EO	Executive Order
ERWC	Eagle River Watershed Council
ERWSD	Eagle River Water and Sanitation District
ESA	Endangered Species Act
Fry-Ark	Fryingpan-Arkansas Project
Gap	SWSI 2010 M&I Gap
gpcd	Gallons per Capita per Day
GWUDI	Groundwater Under the Direct Influence
GVIC	Grand Valley Irrigation Company
HB	House Bill
IBCC	Interbasin Compact Committee
IGA	Intergovernmental Agreement
ILVK	Irrigators of Lands in the Vicinity of Kremmling
IPPs	Identified Projects and Processes
ISF	Instream Flow
LBD	Learning by Doing
MAF	Million Acre-Feet
MCWC	Middle Colorado Watershed Council
M&I	Municipal and Industrial
mg/L	Milligrams per Liter
MOU	Eagle River Memorandum of Understanding

ACRONYMS [cont.]

NCNA	Nonconsumptive Needs Assessment
NEPA	National Environmental Policy Act
NOSA	National Oil Shale Association
NRCS	Natural Resource Conservation Service
Northern	Northern Colorado Water Conservancy District
OMID	Orchard Mesa Irrigation District
ORV	Outstanding Remarkable Values
PLT	Project Leadership Team
RFC	Roaring Fork Conservancy
RICD	Recreational In-Channel Diversion
RFWC	Roaring Fork Watershed Collaborative
SB	Senate Bill
SCAP	Sediment Control Action Plan
SCWWW	Silver Creek Water and Wastewater Authority
SSI	Self-Supplied Industrial
SEO	State Engineer's Office
State line	Colorado/Utah state line in Mesa County
SMP	Stream Management Plan
SWSI	Statewide Water Supply Initiative
TDS	Total Dissolved Solids
TMD	Transmountain Diversion
TNC	The Nature Conservancy
UERWA	Upper Eagle Regional Water Authority
UPCO	Upper Colorado River Study
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
Ute Water	Ute Water Conservancy District
WGFP	Windy Gap Firming Project
WQCC	Water Quality Control Commission
WQCD	Water Quality Control Division
WFET	Watershed Flow Evaluation Tool
WRA	Western Resource Advocates
WSR	Wild and Scenic River
WSRA	Water Supply Reserve Account

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