Colorado Basin Roundtable

Colorado Basin Implementation Plan

Volume I

SGM

July 14, 2014

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Document Roadmap

The Colorado Basin Roundtable (CBRT) used a "grassroots" public education and outreach process and the Colorado Water Conservation Board's (CWCB) Basin Implementation Plan (BIP) Guidance document (CWCB, 2013) to establish the structure of the Colorado River BIP. Although most elements of the CWCB BIP Guidance document are addressed, they are incorporated throughout the BIP. Table 1 provides a "roadmap" to assist the reader in locating information suggested by the BIP Guidance.

Table 1. - Document Roadmap.

CWCB Guidance Section	CWCB Guidance Section Description	Colorado BIP Section(s)
1	Basin Goals and Measurable Outcomes	Section 3
2	Evaluate Consumptive and Nonconsumptive Needs	Section 3.8
2.1	Nonconsumptive Needs	Section 3.8
2.2	Consumptive Needs	Section 3.8
3	Evaluate Consumptive and Nonconsumptive Constraints and Opportunities	Section 3
3.1	Current Basin Water Operations and Hydrology	Section 3
3.2	Water Management and Water Administration	Section 1
3.3	Hydrologic Modeling (Optional)	Section 5
3.4	Shortages Analysis	Section 5
4	Projects and Methods	Section 3

CWCB Guidance Section	CWCB Guidance Section Description	Colorado BIP Section(s)
4.1	Education, Participation and Outreach	Section 2
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
4.5	M & I Projects and Methods	Section 3; Section 6
4.6	Agricultural Projects and Methods	Section 3; Section 6
4.7	Nonconsumptive Projects and Methods	Section 3; Section 6
4.8	Interbasin Projects and Methods	Section 4
5	Implementation Strategies for the Projects and Methods	Section 5
6	How the Plan meets the Roundtable Goals and Measurable Outcomes	Section 5

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Executive Summary

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

Colorado's General Assembly formed the Roundtable under the 2005 Colorado Water for the 21st Century Act, an effort to broaden discussions among the citizenry to find balanced water-supply solutions that also protect agriculture, the environment and river systems. The Colorado Basin Roundtable's primary interest area is the mainstem of the Colorado River and includes six counties from the headwaters to the Utah state line: Grand, Summit, Pitkin, Eagle, Garfield and Mesa.

The Colorado Basin Roundtable bases its BIP on nine years of taking testimony, holding internal discussions, creating a Vision Statement and the issuing of a White Paper. This body of work underpinned a facilitated effort to inform our constituents and garner public comment for the formation of this BIP. The final work was financed by a state Water Supply Reserve Account grant from the Colorado Water Conservation Board. The grant allowed the CBRT to contract with the consulting engineering firm SGM Inc. of Glenwood Springs.

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. However, it does find that the Basin's 63 water providers have identified projects to meet their future needs. It also identifies the necessity of restoring and protecting the flows and water quality of the Colorado River. This document also addresses the fact that other basins will be looking to the Colorado River system to help solve their water supply Gaps, to move additional Western Colorado water across the Continental Divide to the Front Range.

"Colorado's water plan must reflect its water values."

Gov. Hickenlooper | *Post Independent*
"Help Colorado's Water Plan" | 3.3.2014

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. The same concern extends to all of Western Colorado. The state has a ceiling for how much water it can deplete while still meeting its delivery obligations under the Colorado River Compact of 1922. If it fails to understand that ceiling, curtailment looms for post-1922 water rights, both for Western Colorado and Front Range users of transmountain water. While that prospect is not immediately at hand as this document is being prepared, the state of Colorado and six other Colorado River states are discussing a potential operational crisis stemming from low reservoir levels at Lakes Powell and Mead. 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. Potential mitigation actions include voluntary demand management (conservation and agricultural fallowing). This crisis foreshadows circumstances and actions that could occur under a Compact curtailment. It does not make sense to discuss a big TMD for Colorado while regional concerns point to the potential of cutting use. In all cases and at all times, it is essential that existing uses be protected.

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.

In Colorado, 15 major TMDs already exist to move water from Western Colorado to the Front Range and Eastern Colorado. In the Colorado Basin Roundtable interest area, 450,000 to 600,000 acre-feet (AF) of water annually leaves the Colorado River system to support municipalities and farming east of the Divide. This Basin is the state's major donor basin. Another 120,000 to 140,000 acre-feet of water could still be developed under existing agreements, prospective agreements and fully developing water rights associated with existing infrastructure.

It is imperative that Colorado's Water Plan goes directly to work on the best means of using the water already at hand through conservation, reuse and best practices for moving water from agriculture to municipalities. Over-development poses an unacceptable risk to existing water users and the environment. It threatens the local economy and the emblematic reasons why so many people travel from the Front Range to Western Colorado every weekend to their favorite vacations spots and second homes.

The seven-state Basin has already reached a point where its demand exceeds supply. The seven states in the Basin and the U.S. Bureau of Reclamation (BOR) collaborated in 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 exceeded supply, and the Gap will widen in the coming decades. If trends continue, a Compact curtailment between now and the year 2050 is likely unless corrective actions are taken.

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 that included more than 6 Town Halls, 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 connected with 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***.

Public Education and Outreach efforts provided the basis for the Colorado Basin Implementation Plan. The six themes that arose from the outreach portray the voices of the Colorado River Basin stakeholders, the agricultural community, municipalities, water providers, watershed groups, conservancy and conservation districts, government officials, students, and the public. The six themes are:

1. Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas
2. Sustain Agriculture
3. Secure Safe Drinking Water
4. Develop Local Water Conscious Land Use Strategies
5. Assure Dependable Basin Administration
6. Encourage a High Level of Basinwide Conservation

Water projects have been identified by Basin stakeholders to proactively address these themes to support future consumptive and nonconsumptive (environmental and recreational) water projects. However, the overarching solution to meeting all six themes is to ***not develop additional transmountain diversions from the Colorado River Basin*** for other basins.

Six Themes of the Colorado Basin Implementation Plan

The following six themes represent the primary messages gathered from the public outreach efforts. Each theme is supported by solutions, projects and methods specifically targeting how the consumptive, environmental and recreation and agricultural needs should be achieved.

Theme 1 - Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas

The economy, environment, agricultural production and drinking water treatment operations in the Colorado River Basin depend on healthy streams, rivers, lakes and riparian areas. Another large TMD would diminish streamflows while impacting water temperature, coldwater fish health and overall water quality – the latter a factor for municipal diverters such as Rifle and Clifton. Greater concentrations of salts threaten irrigated agriculture in the Grand Valley. Many headwater streams currently suffer from historical TMD diversions, a factor recognized in part through the environmental projects envisioned by the Colorado River Cooperative Agreement (CRCA) between Denver Water and 42 West Slope entities. Water needs for healthy riparian areas are even greater (Sanderson et. al., 2012). Current West Slope and Front Range water diverters are also invested in the success of the Upper Colorado Endangered Fish Recovery Program for four threatened species in the 15-Mile Reach in the Grand Valley. Another large diversion upstream of this section threatens that program's success.

The CBRT is calling for the development of a Stream Management Plan (SMP) in an effort to quantify and document these impacts using the Watershed Flow Evaluation Tool (WFET). The purpose of the SMP will be to 1) establish the environmental and recreational (nonconsumptive) flow needs; 2) assist with the identification of areas where the historical alteration of stream flow is most likely to have modified ecological resources from conditions that may have existed prior to the time that water was first diverted for irrigation, domestic use and other purposes; and 3) develop consistent and reliable standards for data collection and analysis. Additional TMDs will lead to further degradation and diminishment of West Slope stream and river ecosystems, which will not allow the Basin stakeholders to meet their goals.

In support of this effort, the CBRT notes that several efforts are in motion that could assist with this theme. Environmental concerns and the ability to address them are cited in the Upper Colorado River Wild and Scenic Stakeholders Alternative Management Plan, the Colorado River Cooperative Agreement and the Windy Gap Firm Project agreement. Each of which is still in the approval process.

Theme 2 - Sustain Agriculture

Agriculture in the Colorado River Basin is part of the region's economic backbone providing food, culture, de facto open space and wildlife habitat. Senior water rights held by Grand Valley irrigators (in addition to water rights held by the Shoshone Hydroelectric Plant in Glenwood Canyon) form base flows upon which Colorado citizens can enjoy recreational experiences, privately or through the recreational industry.

The agricultural economy currently uses about 584,000 acre-feet annually to irrigate 268,000 acres. However, there is an existing annual average shortfall of 100,000 acre-feet (CDM, 2011a). Both the SWSI 2010 and Colorado Basin Needs Assessment state that as irrigated acreage declines, as expected, so will the needs and demands for irrigation. This is unlikely. Projected increases in temperatures will result in higher evaporation, evapotranspiration by plants, and a longer growing season. A decreasing snowpack means a reduction in the West Slope's primary water supply "reservoir." Furthermore, population growth will create a greater demand for food production. All of this will require more consumptive water for agriculture, not less, even if irrigated acreage declines.

The CBRT recognizes the importance of agriculture to the environment, water quality, wildlife, open space, economy and jobs. Our BIP promotes multi-purpose water-supply solutions and projects to benefit agriculture, drinking water supplies, recreation and environmental needs for current and expanded demands. Our BIP supports the overarching goal to protect and sustain existing agricultural practices. Therefore, we have included projects and policies that provide incentives and protections necessary to support agriculture. Water Law should be improved to allow the agricultural community the flexibility to implement efficient irrigation without the loss of water rights.

An additional TMD that supports more blue grass lawns on the Front Range while decreasing Colorado Basin irrigated agricultural lands and associated food supply is poor planning and not sustainable.

Theme 3 - Secure Safe Drinking Water

A critical question that needs to be answered is "how can we secure our drinking water supplies to the year 2050 and beyond?" Water supply infrastructure and long-range planning have historically benefitted from an established institutional structure supported by water attorneys, water engineers, master plans, appointed and elected officials. This proactive local and regional institutional structure has resulted in legal and physical water supplies that meet future drinking water needs. There are, however, future challenges facing water providers including extended droughts, impacts from climate change, degraded forest health, competition from energy needs and unknown Compact curtailment administration.

This BIP recommends in-basin, at-large and regional projects that meet water supply needs up to the year 2050 and beyond. The Colorado Basin Roundtable recommends the establishment of high conservation and efficiency targets which will lessen the need for future drinking water supply infrastructure. Each of the seven regions has specific local projects and policies necessary to meet future drinking water needs. They include recommendations to pursue redundant physical water supplies, provide regional cooperation, plan for small reservoirs above physical intakes that provide multiple benefits for all water users, implement watershed protections, update master plans that account for future challenges and apply water efficient land use practices. Improvements to the permitting process to support new water supply projects are imperative in securing safe drinking water in the future.

Underlying the theme to secure safe drinking water is the need to maintain streamflows, as we know them. Streamflows diminished by another big transmountain diversion would be costly to water providers who divert directly from the river.

Theme 4 - Develop Local Water Conscious Land Use Strategies

The entire State of Colorado must connect land use planning with water supply availability, especially in light of projections that the population may double by 2050. Local governments have the authority and tools to ensure that new growth and development do not outstrip water supply by considering the timing, density, landscaping and location of development. Opportunities exist for closing Colorado's and the Colorado Basin's water supply Gaps between future supply and demand through land use planning and conservation while also restoring and maintaining healthy rivers and preserving agriculture.

The methods for achieving high conservation targets will vary across the Basin and be developed specific to each region. All local governments can improve land use development codes to achieve high conservation targets. Developers can also drive the matter, an example being the water conservation plans proposed by the principals of Sterling Ranch in Douglas County.

Land use planning and water supply planning must extend beyond local jurisdictions and include regional cooperation to recognize the carrying capacity of local water supplies. This BIP encourages regional cooperation among all water users and local governments to ensure that existing and future land use meets conservation targets, protects and restores stream health, preserves and sustains agriculture, and meets Compact obligations.

Theme 5 - Assure Dependable Basin Administration

The Shoshone Hydroelectric Plant and the Grand Valley irrigation rights are the linchpins for administration of the Colorado River mainstem. Both sets of senior water rights pull largely dependable flows down the river from the headwaters. The coordinated administration of these mainstem rights through releases from Green Mountain, Ruedi, Wolford Mountain and Williams Fork reservoirs provides benefits that accrue to the recreation industry, the environment and municipal water diverters along the way. These operations are crucial to the economies of the Basin. The CBRT recommends that actions be taken to protect the Shoshone Hydroelectric Plant for the benefit of the Colorado Basin and that 100 percent ownership of the Grand Valley irrigation water rights be retained by West Slope entities. The CBRT supports actions called out in the Colorado River Cooperative Agreement to explore the future ownership of the Shoshone plant. Protection of Grand Valley irrigation rights serves the same interest.

> *"It's a little bit like being in the middle of a rubber band and being stretched from both ends; we are being stretched by our water supplies to meet Front Range demands and our legal requirement to continue to allow water to go through to our downstream states and to Mexico."*
>
> Eric Kuhn | *Colorado River Water Conservation District*

Meeting the Dependable Basin Administration theme also relies upon maintaining Compact depletion limits as set forth in the Colorado River Compact. Nearly 70 percent of the Colorado River's native flow needs to pass the state line. All Colorado River users must be responsible for providing this water as required under the Compact. The CBRT recommends the adoption of a low-risk legal and hydrological assumption for Colorado's obligation under the Colorado River Compact in order to minimize the risk of curtailment on existing users of the Colorado River Basin.

Theme 6 - Encourage a High Level of Basinwide Conservation

Water providers must work with land use decision makers on a local level to craft and implement regulations that will significantly reduce water needs for future growth. A recent analysis authored by John Currier, Chief Engineer of the Colorado River District, (Currier, 2014b) concluded that if the per capita demand within the South Platte basin could be reduced from 178 gallons per capita per day (gpcd) to 129 gpcd the need for a TMD would be non-existent. Significant water savings (new supply) can be achieved through demand management. Water providers must do what they can to lower gpcd rates through infrastructure improvements and water pricing while working with decision makers to implement policies that lower demand through best practices for development. Again, Sterling Ranch in Douglas County is an example of how that might look. A number of water providers on the Front Range have made admirable strides in the area of conservation and efficiency. West Slope communities such as the Town of Winter Park, the City of Aspen, the Town of Snowmass Village, to name a few, are also leading the movement to limit growth based upon their existing water supplies and promoting best management practices that reduce the impervious footprint of new developments. In an effort to lead the state in conservation, the CBRT adopted a high level of conservation goal for future water use and locally controlled planning efforts.

The CBRT's solution to encouraging a high level of conservation includes improvements to Colorado Water Law that support the implementation of water efficiencies, conservation and reuse. This also includes solutions that promote agricultural conservation while maintaining a viable and productive agricultural economy.

The CBRT recommends adoption of high conservation targets for all future and existing land uses. Technical work by the CWCB indicates that a high conservation strategy statewide equates to 460,000 acre-feet of new water supply from active conservation practices. Western Resource Advocates projects a high conservation strategy would be worth 610,000 acre-feet, once passive savings are included. This order of magnitude compares favorably to the state's water supply Gap of 500,000 acre-feet and

illustrates the power of conservation and how it can put off the day when expensive, impactful transmountain water development is proposed.

The Metro Basin Roundtable published a White Paper that predicted metro area water providers could drive gallons per capita per day (gpcd) to 129. Currently the rate is 155 gpcd. This is a worthy goal that should be held up as an example for other regions of the state. The CBRT supports the Metro Roundtable in these efforts and is willing to assist with efforts to do better, a request made by the White Paper.

No More Water

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. The current level of water development, population growth and long term hydrology work against this notion. This is not the 1950s or even the 1960s. The overarching solution to meeting our future water challenges is to plan beyond 2050 and avoid future TMDs that could increase the likelihood of a Compact curtailment and triggering many environmental, agricultural and recreational impacts. This policy supports the six themes that emerged from CBRT work and constituent comment. Colorado Water Law does not allow the legal argument of "not one more drop." 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. Continued development from the mainstem of the Colorado River toward full Compact entitlement is not sustainable and will harm all of Colorado.

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 would 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 is the first water year that water deliveries from Lake Powell to Lake Mead are 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 transmountain diversions 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 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 uncertain factors 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 in planning for future water demands.

In summary, the CBRT does not promote the use of TMDs to meet future water demands without first considering reuse, conservation and first developing in-basin water supply projects.

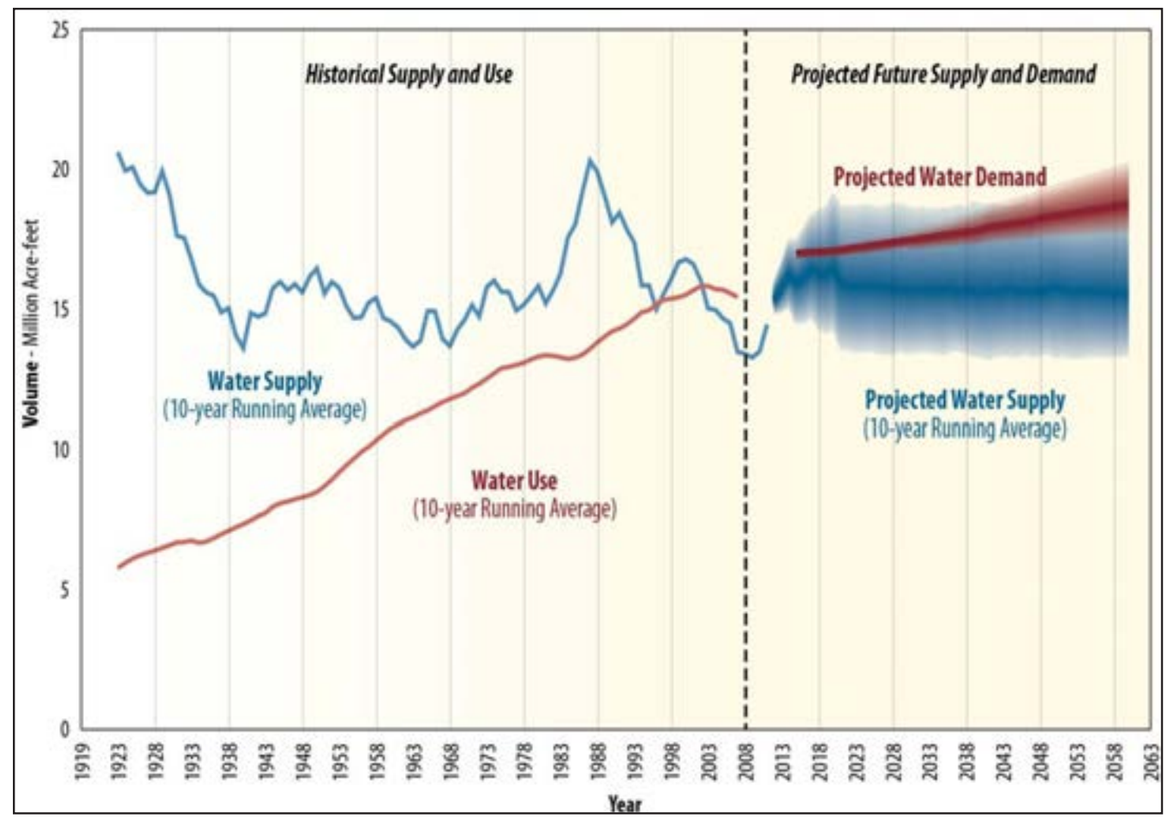

Figure 1. Historical and Future Projected Colorado River Basin Use and Demand. (BOR, 2012)

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Introduction

The state of Colorado is facing significant water supply challenges to meet future demands of a swelling population, active and important agricultural industry, and living rivers that require flowing water to restore and sustain aquatic ecosystems and recreational uses. With Colorado's water supply already fully allocated, state officials have directed the development of a statewide plan to identify future water needs and methods to meet those demands. In 2013, Governor Hickenlooper issued an Executive Order (EO) calling for the Colorado Water Conservation Board (CWCB) to work with the nine Basin Roundtable, the Interbasin Compact Committee (IBCC), and other stakeholders to develop the Colorado Water Plan (CWP). In response to the EO each of the nine roundtable (Figure 2) developed a basin-specific plan, or Basin Implementation Plan (BIP), that identifies how future municipal, industrial, agricultural, recreational and environmental (i.e., nonconsumptive) water needs will be met through existing or new projects, policies, and/or processes to the year 2050. According to the EO the Colorado Water Plan must incorporate:

- 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

One Voice

We are prepared to work together to solve the Basin's challenges, including opposing future transmountain diversions (TMD) particularly those that lack proper input from Western Slope entities. Our values reflect not only the Colorado Basin, but the values of Coloradans statewide.

Since the passage of Colorado House Bill 05-1177, Coloradans have been working together to address water needs at a statewide level through the IBCC and locally through the basin roundtable. This legislation established the framework for citizens and stakeholders to participate in statewide water decisions, creating a locally driven process where the decision-making power rests with those living in the state's river basins. It is through the 1177 legislation that the nine BIPs were developed.

The members of the Colorado Basin Roundtable (CBRT) have been meeting monthly since the passage of HB 05-1177, facilitating discussions about water management issues within and between basins and encouraging locally driven collaborative solutions to address water supply challenges (Figure 3).

Throughout the BIP preparation process the CBRT met twice a month, presented at over 45 community meetings reaching over 900 stakeholders, obtaining input and direction on the goals for the future of the Colorado River Basin. Additionally, the CBRT considered existing policies and reports for the BIP including, but not limited to water supply plans, comprehensive land use plans,

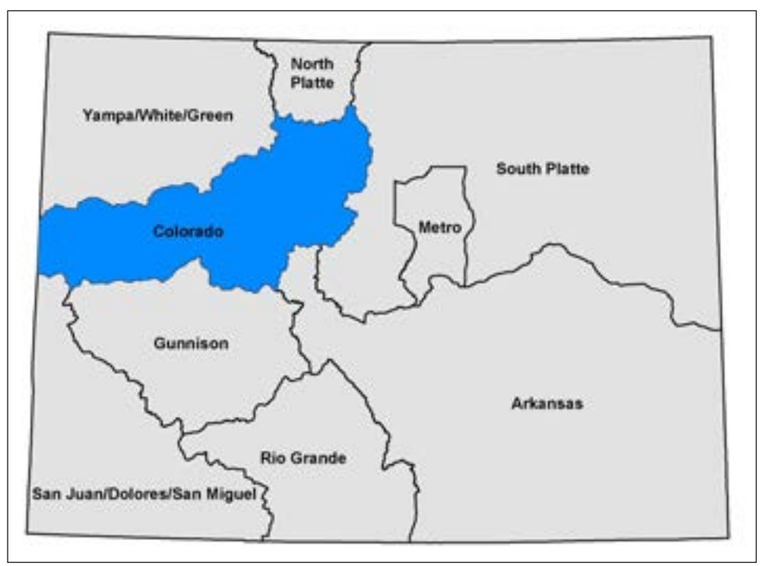

Figure 2. Boundaries of the Nine Basin Roundtable.

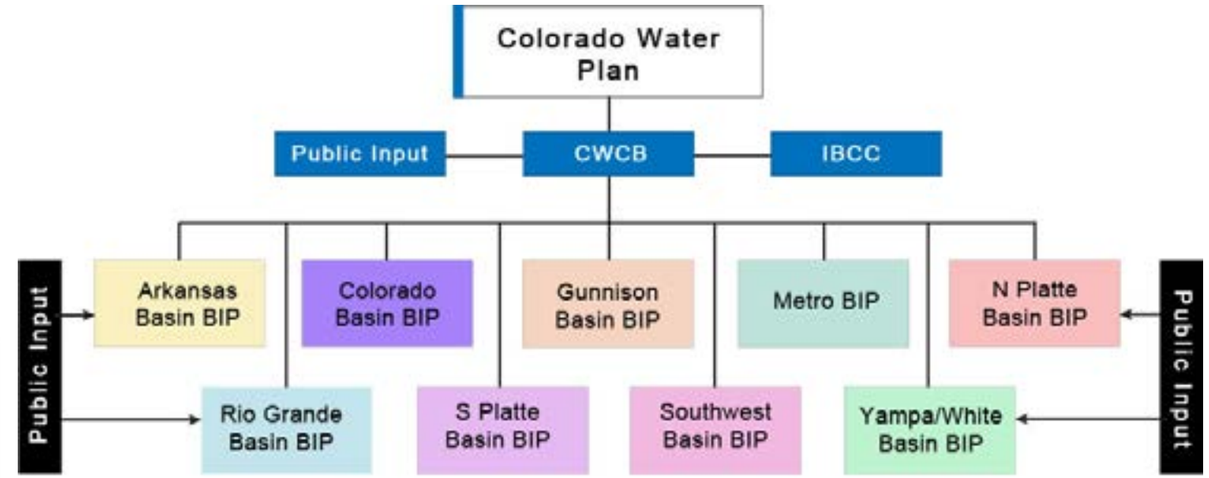

Figure 3. Organization of the Colorado Water Plan.

water quality plans (208 Plans), watershed plans, and related local government documents. However, the overall content of the BIP relied on a bottom-up public outreach process which resulted in a list of goals, actions, and projects developed by the CBRT stakeholders.

The robust and aggressive public outreach program, coupled with the knowledge of the Colorado Basin Roundtable members, the CBRT White Paper and the CBRT Vision resulted in the creation of six basinwide themes which reflect the most important needs of the Colorado River Basin. These themes also support the directive identified in the EO for Colorado's Water Plan issued by Governor Hickenlooper that "Colorado's water policy must reflect its water values". It should be noted that the level of importance varies greatly across the Basin; hence they are not listed in any order of priority. The six themes are:

1. Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas
2. Sustain Agriculture
3. Secure Safe Drinking Water
4. Develop Local Water Conscious Land Use Strategies
5. Assure Dependable Basin Administration
6. Encourage a High Level of Basinwide Conservation

A summary of the underlying importance of each theme is presented below. Additional detail regarding the development of these themes is provided in the Approach (Section 3).

Theme 1 - Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas –Tourism, recreation, and agriculture are economic drivers in the Colorado Basin and biologically healthy rivers are important for these industries to thrive. Agriculture, wildlife, and water providers also depend upon healthy rivers. We need to define the water quality and flow needs of our water

bodies, define which ones are at-risk for ecological degradation, rehabilitate those impacted and protect the ones that are healthy. Top projects supporting this theme include the development of a Basinwide Stream Management Plan (SMP) and a basinwide funding mechanism to pay for additional projects identified in the SMP.

Theme 2 - Sustain Agriculture – Upcoming generations overwhelmingly recognize the importance of local food sources to a sustainable future. The importance of sustaining the agricultural community is not only important to our Basin community, but to other communities around the world. A large percentage, greater than 50%, 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". In more than half of Colorado's counties, one in every ten jobs is tied to agriculture and the food industries. The agricultural economy within the Basin currently uses 584,000 acre-feet to irrigate 268,000 acres. However, there is an existing annual average shortfall of 100,000 acre-feet (CDM, 2011b).

The diversity of agriculture in our Basin is important to maintain. While beef cattle represent the largest share of production and most of the irrigated ground is used for raising feed for the cattle, there are also a large number of sheep and horses raised, in addition to a smaller number of other types of livestock. Irrigated crops also include feed and cereal grains and, especially in the lower basin, a large variety of fruits, vegetables, wine grapes and many specialty crops (Currier, 2014a).

Urban growth is reducing the amount of land currently available for agricultural production, a trend that shows no sign of declining in the future. The top projects and policies supporting this theme include ones that promote water supply solutions, including storage projects and incentives that target agriculture in order to provide the water needed to keep West Slope agriculture whole and thriving. Future land use modifications must avoid diminishment of existing West Slope agricultural activity and production. More importantly, improvements to water law may be necessary in order to sustain agriculture, retaining the Prior Appropriation system with the flexibility to implement efficient irrigation without injuring existing water rights.

Agriculture, which consumptively consumes 85% of water in Colorado, must recognize and share in the States critically important quest for more conservation and efficiency. Conservation and efficiency are key to Colorado's water future; however, understanding the impacts of irrigation and different forms of irrigation is part of understanding the future of the Colorado River. Flood irrigation, as an example, saturates the alluvium, allowing water to be slowly released from the ground back into the river, supporting higher late season flows and cooler water temperatures. Scientifically-based studies should be implemented to ensure that agricultural conservation and efficiency projects do not negatively impact these critical late season flows in the Colorado River. Flood irrigation practices are critical in certain regions of the Basin and have been greatly impacted by TMDs. It is the replacement of this water to the rivers that help maintain the health of the streams and riparian areas, as well as the aquatic life that lives beyond the banks of these areas the floodplain.

Theme 3 - Secure Safe Drinking Water – Clean and safe drinking water is fundamental to our way of life and has been taken for granted because of the excellent service delivered by our water providers. Extreme droughts, forest fires, climate change, groundwater impacts and many other scenarios could all impact the quality and quantity of the water available to the Colorado Basin water providers. The CBRT believes that it is imperative to secure the needs of the growing water demand by developing in-basin supplies and expanding raw water storage supplies. Building new reservoirs as the first and only solution to meeting future water demands has not been well received in the Basin. The reservoir planning and construction process is most often very 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. The CBRT therefore recommends that through regional cooperative efforts among federal, state and local agencies, small reservoirs be considered throughout the Basin. Regional cooperation, intergovernmental agreements (IGAs), and interconnection of water distribution grids can lead to more secure water supplies and efficient economies of scale.

Theme 4 - 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 5 - Assure Dependable Basin Administration – Protecting and maximizing the Shoshone Hydroelectric Plant, Grand Valley irrigators' water rights, and defending the 15-Mile Reach are vital to our instream flows (ISF) and critical waters for the Basin users. It is imperative that Basin and West Slope entities work together to ensure the Shoshone Hydroelectric Plant water rights are maintained in and by Basin interests in perpetuity to make sure downstream water deliveries are made. 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.

Theme 6 - Encourage a High Level of Basinwide Conservation – In order to meet the Basin and state goals, strong 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 in order to preserve our water needs. The stakeholders within the Basin will 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 all outdoor irrigation. Changes in water law and administration are also needed to reverse the mindset of "use it or lose it". Agriculture, as the major water user within the Basin, will need to share in the conservation efforts through the use of ditch lining programs, headgate improvements, conversion to more efficient irrigation practice and (planting) less water demanding crops. We will all need to rally around the need to accept these challenging changes to ensure these efforts are successful.

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
- Western Slope Principles
- Section 1 – About the Basin
- Section 2 – Public Outreach
- Section 3 – Basin Implementation Plan Approach
- Section 4 – Interbasin Reliance Report
- Section 5 – Next Steps
- Section 6 – Regional Breakdown

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.

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 (TMD) 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: Already, between 450,000 and 600,000 acre feet of Colorado River water 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, home to the state's most popular ski resorts as well as robust rafting, fishing, 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: overdevelopment 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 TMD 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

Western Slope Principles

There are at least three sets of principles, maybe more, carefully crafted by different entities in the Colorado Basin. The Western Slope Principles, created by the Northwest Colorado Council of Governments (NWCCOG) Water Quality/Quantity (QQ) Committee, was endorsed by various entities. The Colorado Roundtable incorporated these Principles into their White Paper. QQ maintains the most up-to-date list of endorsements, which includes approximately 30 local governments and water and sanitation districts in the headwaters region of Colorado. Seven counties endorsed these Principles, with representatives from three different river basins in the state (Gunnison, Routt, Park, Pitkin, Eagle, Summit, and Grand Counties). Another statement includes the Grand Valley Water Users' Principles (Exhibit B).

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 Colorado River Basin is a thriving and diverse economic and ecologic asset to the entire state. Analyses show that between anticipated developments, existing demands, climate forecasts and historical water analysis, cumulative impacts to healthy rivers and streams, there is no room for future water usage outside of the Basin. 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.

As such, state officials, when considering the future state of water in Colorado, encourage the state and all its basins to pursue creative solutions to a persistent problem. Colorado Basin Roundtable members and basin officials assert the following decision-making principles for inclusion in the Colorado Water Plan, which recognize Colorado Basin interests as they relate to the state as a whole:

- CWP solutions should originate first in the basin in which the problem exists and recognize local land use plans and regulations. Colorado is a non-traditional state, and its water solutions should be similarly creative and non-traditional. All cross-basin diversions should take into careful consideration the precarious balance of in-basin and in-state water, as well as out-of-state impacts, through the Colorado River Compact.
- All CWP solutions should protect and not threaten the economic, environmental and social well-being of the West Slope. Solutions must respect:
  - Water = West Slope economic drivers, especially tourism, recreation, sustainable ecosystem, agriculture and resource development
  - Importance of historical and existing diversions
  - Hydrologic limitations
  - Local input, buy-in and agreement
  - Compensatory storage to protect existing and future west slope water uses as well as the recreational and environmental needs of the basin of origin
  - Water quality
  - Restore and maintain healthy environmental wildlife habitats
- The CWP should identify a process and requirements for basins to exhaust available in-basin water supply before pursuing out-of-basin possibilities, including diversions or new supply projects. Those process would include but not be limited by:
  - Reuse to extinction of re-usable water supplies from existing transmountain diversions
  - Re-allocation
  - Sharing utilities and supply – and impacts of forthcoming shortages -- particularly in Front Range metropolitan areas
  - In-basin projects should be pursued to fully use in-basin supplies
  - Maintain and enhance existing infrastructure
  - Conservation and other efficiency mechanisms
  - Processes that support local input, buy-in, and respect for local land use and control
  - Consider existing demands and hydrologic limitations
  - Smart land use that recognizes limits on natural resources
- All CWP solutions should consider the State's Colorado River Compact responsibilities, and should adopt low-risk legal and hydrologic assumptions to protect the state, its users and the Upper Colorado River Basin as a whole from curtailment.
- The state should act as facilitator – not an advocate – in inter-basin conversations surrounding transmountain diversions, new storage and new supply projects where resolution is a challenge. All such solutions should result in a shared responsibility and shared benefits outcome.

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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, 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.

Citizens, water providers, and the state have adapted by conserving water, stabilizing forests, investigating new sources of supply, and carefully studying the likelihood and impacts of future droughts. There is no certainty regarding the future climate and weather conditions in Colorado, 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.

Today, more than half the states depending on river flows in an arid or semi-arid climate have developed state water plans to govern and guide water planning into the future, ensuring a sustainable supply for residents and anticipated residents of the state. Now, it's Colorado's turn.

1.1 Background

Basin Water Administration and Development

Colorado has developed the most comprehensive set of water laws out of any other state in the country. Due to our semi-arid environment and the 1922 Compact, managing water has become essential to water supply development both within the state and across the entire seven states region. For well over 100 years, Colorado has used a system of water distribution known as the Doctrine of Prior Appropriation. Under this doctrine, the first appropriator of water has a senior right to that water and that right must be satisfied before any rights junior to that right can receive water. This system is based on premise that all water in the state is owned by the state and entities need a decreed water right to appropriate the water and use it as decreed. Water rights are decreed for groundwater or surface water and can be for multiple uses including municipal, irrigation, snow making, industrial, recreation, wildlife, geothermal and many others. Water rights can be obtained as conditional or absolute rights and in general can be sold separate from the land they were originally connected to. Water rights can be changed by obtaining a decree for a change in use, amount, location, or time.

Conditional water rights are decreed water rights that have not been fully developed and require a due diligence process every six years, or as specified in the conditional decree, to prove that progress is being made to fully put the decreed water to beneficial use. Once the water right is put to beneficial use, as specified in the decree, the water right can be made absolute. Although absolute water rights are exempt from showing diligence they are reviewed every ten years for documented use and can be abandoned in whole or in part. It is because of this ten year abandonment review for the absolute water rights that the understanding of "use it or lose it" has become a common recommendation for all water users.

In 1922, the states relying on Colorado River water supply set up allocations that would govern the future of the vital lifeblood of Western United States. The following years revealed that the river flow measurements on which the 1922 Colorado River Compact was based weren't sustainable for a variety of reasons:

- Hydrologic predictions were inaccurate for the years to come
- Climate change has impacted water availability, particularly through variable precipitation across the region
- Population growth and economic needs unpredicted at the time have increased water demands
- Economic needs have also increased water demands

Water development in the Basin first started with agriculture along the rivers and in the valleys and as mining rights in the upper reaches of the Basin. The most senior major agricultural water right in the Basin is located at what is now called 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, was one of the first hydroelectric plants in Colorado when it started operation in 1909 with a water right for 1250 cfs.

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. 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 protect West Slope water users and provide for growth. Another law passed in 1937 was the Water Conservancy Act that 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 important reservoirs are 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 keep West Slope water rights whole.

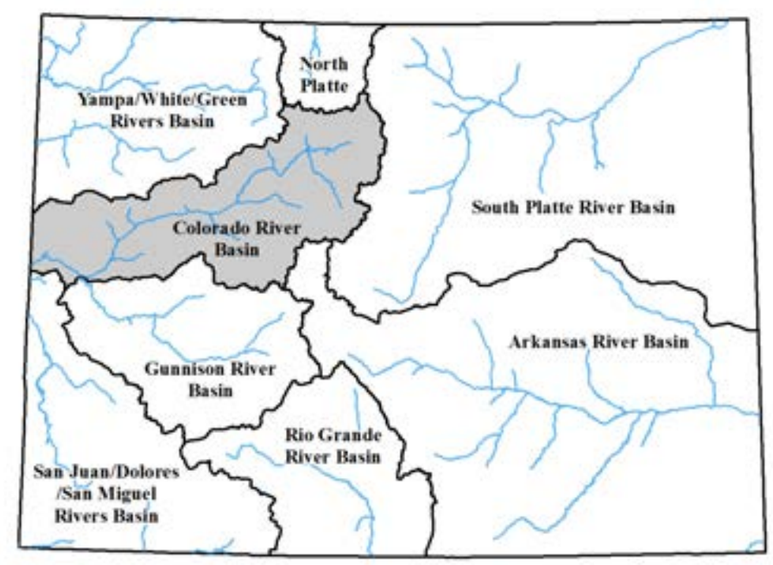

Figure 4. Colorado River Basin Boundaries.

Water Administration also takes into account the 15-Mile Reach Programmatic Biological Opinion for four species of threatened 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.

About the Basin (cont)

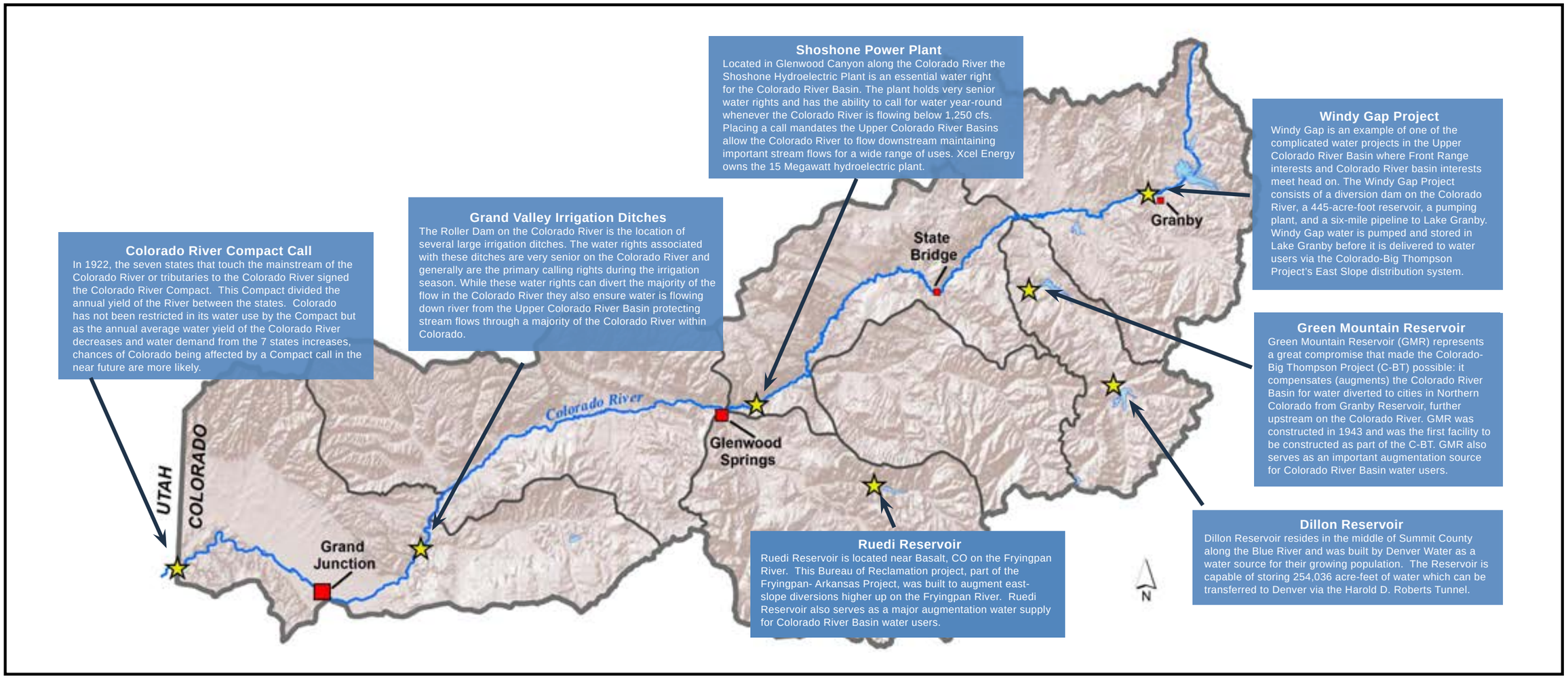

Figure 5. Important Features and Water Rights in the Colorado River Basin (Mainstem in Colorado).

About the Basin (cont)

Hydrology

Of the 16 million acre-feet/year (AFY) of average renewable water generated within Colorado's river systems, approximately 80 percent is on the West Slope while the remaining 20 percent is on the East Slope. The challenge with managing this valuable resource, however, 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).

Drought and Climate Change

Colorado has always been vulnerable to extreme weather and climate events. Severe winter droughts indicate the vulnerability of winter recreation to climate. More recently, in the midst of severe droughts in 1977, 2002 and again in 2012, many Colorado River Basin water providers and agricultural irrigators depended upon surface supply intakes and flows that were severely impaired due to low flows. As a result, many Colorado River Basin utilities were forced to impose water restrictions.

The most serious anticipated impacts of climate change include shifts in timing and intensity of streamflows and runoff, 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 overall water supply reliability, impacting municipalities, wildlife, ecosystems, forests, recreation, industries including power generation, snowmaking, energy extraction and production, and agriculture.

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).

Population

Colorado's population is expected to nearly double by 2050 under various economic growth scenarios, from approximately 5.1 million people to between 8.6 million (low growth; 71 percent) and 10 million people (high growth, 98 percent). 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). In addition, the Colorado Basin supports much of the state's critical recreation and agriculture.

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). Rangeland is the second most predominant land use in the Basin accounting for approximately 40% of the total area. Livestock grazing, recreation, hunting, 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 Watersheds and Forest Health

There are 14 active watershed and outreach groups in the Basin assessing and mitigating impaired water bodies and lands. These promote the health and conservation of their watersheds through research, education, and project identification and implementation. In many cases these groups have been key orchestrators in the development of watershed plans outlining specific needs, vulnerabilities and projects throughout their areas. 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; since then 14 of the 15 most destructive fires 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 (i.e., land use changes, etc.) that can influence our water quality. The CBRT recognizes the importance of protecting and maintaining healthy watersheds and forests and restoring ones that pose a challenge from a vegetation and surface fuels perspective. 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.

Wildfire Assessments and Watershed Plans provide strategies for water providers, land management agencies, private landowners, environmental and watershed groups, state and local governments, local fire authorities, and water users to jointly identify and prioritize the type and location of treatments necessary to mitigate the impacts that occur to hydrology in a post-fire environment (CWCB, Guidance, 2013). Wildfire Assessments identify locations of hazardous fuels and areas prone to post-fire flooding. Fuel treatments are designed to protect water infrastructure. Pre-fire mitigation strategies should identify site locations for sediment check structures, contour log felling, sediment catchment basins, constructed alluvial fans, and other treatments designed to dissipate flood energy. Monitoring of pre-fire treatments after a fire is critical to determine levels of success (CWCB BIP Guidance, 2013).

Watershed Plans document a strategy and a work plan for achieving water resource goals that provides assessment and management information for a geographically defined watershed. It includes the analyses, actions, participants, and resources related to development and implementation of the plan. The watershed planning process uses a series of cooperative, iterative steps to characterize existing conditions, identify and prioritize problems, define management objectives, develop and implement protection or remediation strategies as necessary (EPA, 2008). Together these documents can serve as a basis for improving and providing watershed and forest health protection.

About the Basin (cont)

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 can be neglected is the riparian area in the forest and the overall Basin. Deficient county and municipal building codes allow home owners and businesses to develop up to rivers' banks. The loss of a natural buffer to human activity and pollution degrades water quality. Stream and river depletions to fill reservoirs have meant a loss of peak spring flows which has resulted in decreasing 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, and thus help provide clean water and suitable habitat and nutrients for aquatic life.

1.3 Water Quality

Two federal regulations, 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 implement water quality standards, i.e., water quality standards are being exceeded and not protecting the beneficial uses. 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 approval. 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.

The Colorado Water Conservation Board (CWCB), in collaboration with CDPHE, represents the State of Colorado in the Colorado River Basin 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. The program reduces salinity, preventing salts from dissolving and mixing with the river's flow. Irrigation improvements and vegetation management reduce water available to transport salts vertically, laterally and on the soil surface. Point sources, such as saline 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 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.

We cannot afford to ignore what the Colorado River does for us!

- $14.6 billion in overnight leisure trips
- Colorado ranked the 5th most popular state to live in
- Agriculture accounted for $41 Billion of the State's economy in 2012
- Colorado is #1 in the nation for overnight ski visits
- Colorado is home to an estimated 12% of the national total of outdoor industry companies, accounting for more than 107,000 jobs and $10 billion annual economic output
- Recreation and tourism accounts for 8% of the total workforce

About the Basin (cont)

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

Tourism is the predominant basic-sector industry in the headwaters counties (Grand, Eagle, Summit, and Pitkin) containing visitor attractions of world-class status, including ski resorts, Gold Medal fishing, National Parks and Wild and Scenic eligible rivers. Each County ranks tourism as a top five economic development strategy where tourism comprises 48% of all jobs. In contrast, 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). These expenditures occurred not only at the resort communities but also in Front Range counties, since travel and equipment expenditures comprise an important component of the trip.

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 ecology and biology 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 because many attributes are intrinsic and qualitative. 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 Eastern Plains feedlots (NWCCOG, 2012). A large percentage, greater than 50%, 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).

Colorado Rive water is critical to our Basin's economy.

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. The Gap is, however, a generalized number that requires specificity as to locations and amounts before it can accurately inform state water policy.

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 and 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. To date not enough work has been done to quantify the environmental and recreational Gap and the agricultural shortages. 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.

Colorado's Prior Appropriation system of water use enabled the 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 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 forecasted growth to 4,740 AFY by 2050.

Transmountain Diversions (TMDs) in the Colorado River Basin provide between 400,000 AF and 600,000 AF annually for agriculture and municipal and industrial (M&I) demands of East Slope farms and cities. Some existing TMDs have occurred with agreements that have worked to the advantage of people on both sides of the mountains. Some have not. Even when agreements are in place, unforeseen problems can arise from different interpretations and the march of time.

The definition and use of the Gap for the 63 water providers of the Colorado Basin does not have the same relevance as it does to large Front Range utilities. Many utilities on the Front Range rely upon large upstream reservoirs. Colorado River Basin water providers and utilities, many of which are very 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 of augmentation reservoirs to meet in-basin calls, they do not have physical supply from reservoirs above intakes to protect them in drought periods.

About the Basin (cont)

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 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) has also diligently 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 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 real and the sense is that the methodology used to calculate these values, can be refined to 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.

SWSI assumed that 70 percent of the Gap will be met through buy and dry of additional irrigated acreage. This assumption can have potentially serious shortcoming 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.

A challenge facing the Colorado Basin in the future will be the location of the new growth and the 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.

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.

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Public Outreach

Substantial public outreach was conducted across the Basin during the BIP drafting process. Public outreach was a key goal of the CBRT from the beginning of the BIP allowing received input to drive the plan themes from the start. Input was collected from the public through in-person meetings and through survey links inserted into newspaper articles, the Colorado Basin Implementation Plan website (http://coloradobip.sgm-inc.com/), Facebook® page and Twitter® account. CBRT members and community organizations were key partners in publicizing the planning process and collecting input from a wide range of stakeholders. The input received provided the framework for the BIP process.

2.1 Summary of Outreach

Outreach activities conducted during the BIP 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.

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. In addition to meetings for the general public, technical outreach meetings with water providers across the Basin were conducted, work that 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

A series of newspaper articles describing the various elements of the BIP planning process, including an overview of the BIP, how to learn more and provide input; community water needs; agricultural perspectives; and environmental and recreational water needs. 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 newspaper coverage was generated in the form of advertisements for Town Hall meetings, local newspaper and television coverage and previews of the meetings. Aspen Journalism also covered the Roundtable meetings in collaboration with both the Aspen Daily News and the Aspen Times throughout the project.

Following is a list of some of the news stories that were either produced directly by the BIP team or written by others covering the results of the public meetings:

State of the Rivers will depict water needs, KREX TV Channel 5 5/14/14

Pitkin County meets to talk water in Colorado, Aspen Times, 4/4/14

Users stand firm on water question, GJ Daily Sentinel, 4/3/14

Mesa County residents can give opinion on water plan, GJ Daily Sentinel, 4/1/14

Roaring Fork residents can help create state water plan, Aspen Times, 5/31/14

Water Lines: Water planning, public outreach continue, GJ Free Press, 3/20/14

Guest Column: Western Slope agricultural producers weigh in on water plan, Rifle Citizen Telegram, 3/15/14

Western Slope still vulnerable to drought, Glenwood Springs Post-Independent, 3/14/14

Water Lines: What will the future of our rivers look like? GJ Free Press, 3/5/14

Water Lines: Western Slope agricultural producers weigh in on water planning, GJ Free Press, 2/27/14

Western Slope Vulnerable to Drought, Vail Daily, 2/25/14

Water Lines: Water planning for western communities, GJ Free Press, 2/20/14

Colorado River basin water planners gather local input, Sky Hi Daily News, 2/18/14

CO's Water supply expected to double by 2050, KREX Channel 5, 2/17/14

Water Lines: Help plan Colorado's Water Future, GJ Free Press, 2/13/14

Course focuses on Colorado Water Plan, Delta County Independent, 1/29/14

Be in the know when it comes to water, GJ Sentinel, 1/28/14

Water Lines: Learning about Colorado's Water Plan, GJ Free Press, 1/23/14

Water Group: Look Elsewhere for Water, Aspen Times, 12/2/13

Water Lines: How should we share the Colo. River? State's water plan needs your input, GJ Free Press, 11/26/13

Public Outreach (cont)

Internet/Social Media

A website (***http://coloradobip.sgm-inc.com***), a Facebook® page and Twitter® account to publicize public meetings, solicit input, and to further spread the reach of articles appearing in traditional news media was developed. The Colorado Basin Implementation Plan page has 324 "Likes" on Facebook® and 54 followers on Twitter®. In addition, outreach partners such as the Roaring Fork Conservancy (1,594 "Likes" on Facebook® and 117 Twitter® followers) and Water Center at Colorado Mesa University (183 "Likes" on Facebook® page and 349 Twitter® followers) frequently used their own social media accounts to publicize information about the planning process and input opportunities. Many of the planning team's articles and earned media articles were extensively circulated on social media by others as well. The best performer in that regard 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 Input Received/Integrated

Public input reflected significant concern about future water supplies and the health of the environment in the Colorado Basin. Residents also expressed significant worries 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 draft BIP. Input received on the potential for groundwater recharge to be used as a part of the Colorado Basin's storage strategy and specific sites where old reservoirs need to be rehabilitated or enlarged was also used to enhance the substance of the BIP.

Surveys were distributed that cataloged respondents interests and concerns related to water. This type of information was combined with geographical information regarding the respondent's county of residence and in some cases, other demographic information. An analysis of input received by geographic location and interest group is included later in this section, and the complete tabulation of survey results is included in Exhibit C.

Input was also received through formal letters from several organizations as well as some individuals. Themes in these letters mirrored many of the comments received from the general public. These letters are included in their entirety in Exhibit C.

Public Meetings

Participant's 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. Following is a summary of this input.

Formal notes were taken at all six Town Hall meetings held across the Basin (Exhibit C)**.** Participants voiced a desire to protect or enhance:

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

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

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

Public Outreach (cont)

Values Surveys

Surveys were distributed at public meetings and through web links attached to newspaper articles, email notices, and the BIP website throughout the BIP 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.

In response to the open-ended question, "What water issue(s) most concerns you?" most adults' responses fell into multiple categories (Figure 7). 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).

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.

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.

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.

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. 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.

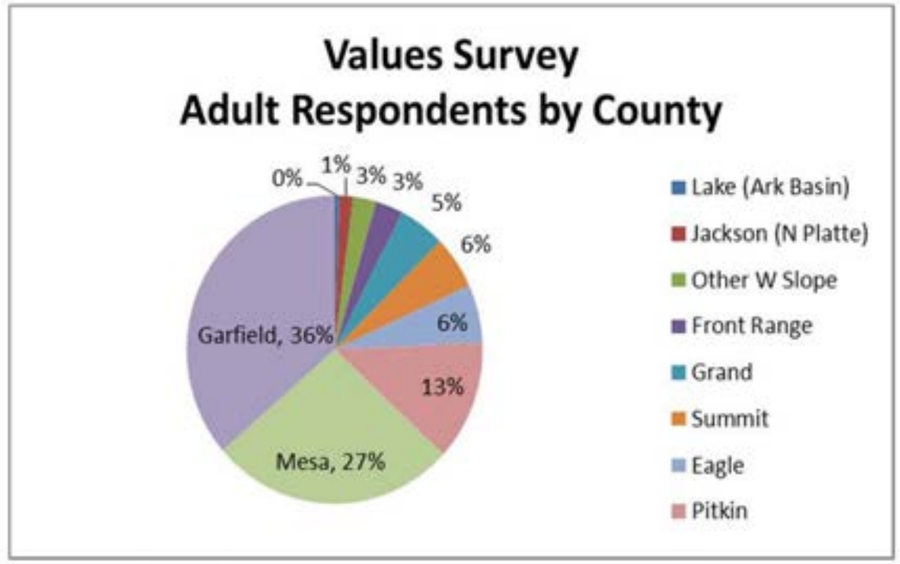

Figure 6. Values Survey Responses by County (by adults).

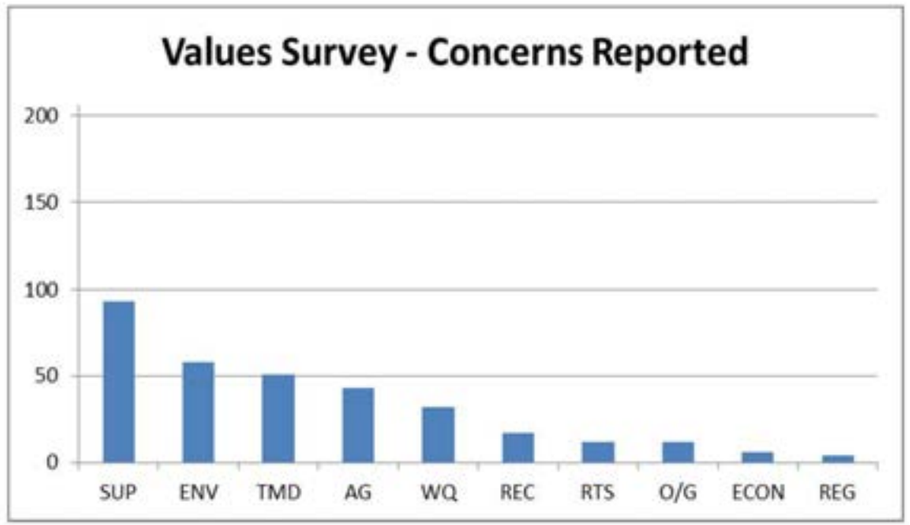

Figure 7. Values Survey Responses by Concern (by adults).

Public Outreach (cont)

- 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.

Formal Letters

The planning team also received input as formal letters. Key points from a few of these letters are summarized below.

- 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 Glen A. Miller, retired USGS Geologist: States that 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.
- 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.

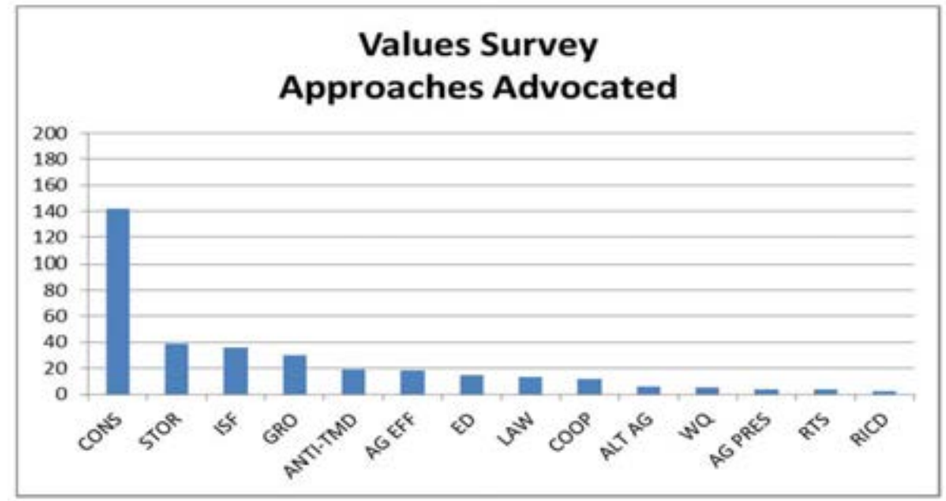

Figure 8. Values Survey Responses Approaches Advocated.

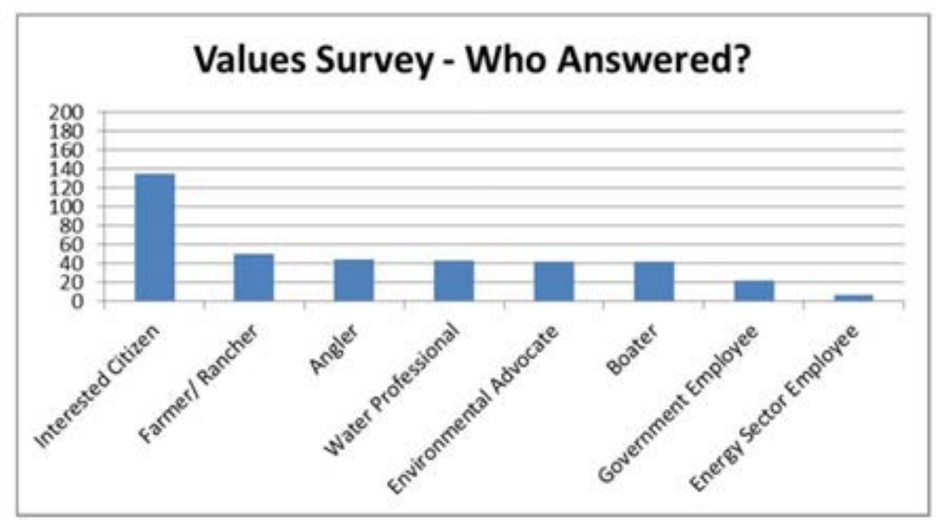

Figure 9. Values Survey Summary of Types of Respondents.

Public Outreach (cont)

2.3 Action Plan Beyond July 2014

The CBRT will continue education and outreach efforts on Colorado's Water Plan for the remainder of 2014 and throughout 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 encourage their input on how these needs should be met. Anticipated outreach and education activities for the remainder of 2014 and 2015 will include:

- Writing and distributing articles on the Colorado BIP when it is completed, and the draft of Colorado's Water Plan once it is released, with surveys attached to collect public input.
- The development of an updated slide show that CBRT members and community partners can show to community, local government, and school groups to explain the contents of the Colorado BIP and the draft of Colorado's Water Plan.
- The publication of op eds by respected regional leaders on the CWP.
- A continued social media presence to provide information and solicit input on the BIP and CWP.
- Enhanced 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 CBRT and 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 CBRT will strive to maintain a steady presence in both traditional and social media, as well as continue to ensure that CBRT members have the communication tools to inform their constituencies about the issues the Roundtable is addressing and collect public input on those issues.

Public Outreach (cont)

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

School/Class	What water issues most concern you?	What approach(es) do you favor to meeting future 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

Basin Implementation Plan Approach

This section presents the approach used by the Colorado Basin Roundtable (CBRT) to develop the Basin Implementation Plan (BIP) for the Colorado River Basin and served as the basis for developing the six themes. This approach was modeled after the BIP Guidance document provided by the Colorado Water Conservation Board (CWCB) to assist with the assimilation of all BIPs across the State into the Colorado Water Plan. The process implemented by the Colorado Basin followed the BIP Guidance for the most part, however varied slightly in order to incorporate a more traditional grassroots public process.

3.1 Process for Developing the Six Basinwide Themes

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. The CBRT heard from water users, policy makers and the public and reflects the voice of the Basin.

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) (i.e., consumptive), environmental and recreational (i.e., nonconsumptive), 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 ensure that meeting the Gap will require policies that go beyond projects and methods. The PLTs met semi-monthly (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 Town Hall meetings and presentations, one-on-one interviews, and surveys. The result: six basin themes supported by a condensed and more focused set of goals, measurable outcomes and projects and methods. These themes are the foundation for the Basin and the regional discussions highlighted in this plan.

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 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

5 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

6 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

Basin Implementation Plan Approach (cont)

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 goals. The goals should be interpreted as goals for the Basin which are recommended to be included in the state 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, 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 can be found in the Regional Breakdown Section 6 along with the top projects supported by the regions. In this version of the BIP implementation strategies were not included for the 300 projects in the regional section, as suggested by the BIP Guidance. One of the next steps identified for the CBRT (Section 5) addresses the need to document specific implementation strategies for the top projects and processes. Implementation strategies may already exist for some projects and in others they may need to be created. Additional research and collaboration is needed to document and created implementation strategies providing plans for funding, timeline, public education and public acceptance of the projects.

Definition of Terms

Goal – broad statements regarding the values of the basin stakeholders

Measurable Outcome – how this BIP will meet the goal in a quantifiable manner

Vulnerability – concerns expressed by stakeholders regarding future water needs

Need – specific action (research, policy, organization, etc.) or improvement needed to reduce and/or remove vulnerability and meet the goal and measurable outcome

Constraint – hurdle or concern foreseen in completing a goal (examples may include the timing and flows delivered for the Cameo and Shoshone calls; Lower Basin States Compact; current and future hydrology; reservoir operations; Colorado River Cooperative Agreement (CRCA); 10825; development of conditional water rights, water quality; population; drought, minimum instream flows, etc.)

Opportunity – opposite of a constraint and contributes to achieving a goal (examples may include conservation; public education; multi-beneficial projects; land use policy improvements; West Slope Water Bank, etc.)

Project and Method – opportunities such as a structural or non-structural project, policy or process identified to meet a goal

Implementation Strategies – implementation strategies include project sponsors, funding sources, and additional research needed to implement a project and method

The Colorado River Basin would like to make it clear the information contained herein is not set in stone. The BIP begins the process of developing projects that will help define the consumptive Gap, environmental and recreational needs and agricultural shortages beyond 2050. The BIP process is dynamic - the information will be continually updated.

Basin Implementation Plan Approach (cont)

Theme 1 - Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Areas

Rivers are the lifeblood of all basins, and the Colorado Basin in particular. Tourism, recreation and agriculture are economic drivers, and biologically healthy rivers are foundational for these industries to thrive. 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 within the recreation and tourism industries (NWCCOG, 2012). Protecting, maintaining and providing for the core water values of vibrant and sustainable cities, productive agriculture, safe drinking water, wildlife and robust recreation and tourism industries, in large part, depend on a strong environment that includes healthy watersheds, streams, rivers, lakes and riparian areas to support what we value most.

The environmental and recreational sector sometimes referred to collectively as nonconsumptive, emphasizes that they do not consume or remove water from the hydrologic system; they simply thrive from the presence of water.

The vulnerabilities that threaten the tourism and recreation sector 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

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. Additional TMDs from the Colorado Basin would interfere and negate the impact of these efforts. Specific examples of nonconsumptive restoration projects in headwater counties are contained in Exhibit F.

Tourism and recreation methods already identified for the Basin include, but are not limited to: (NWCCOG, 2012)

- Learning-By-Doing
- Grand County Stream Management Plan
- Wild & Scenic River Alternatives – Stakeholder Groups
- Eagle River MOU
- 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

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 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 was to continue to assess the systemic aquatic environmental needs of the Basin from an on-the-ground level 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 establish environmental and recreational flow needs and assist in the identification of 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. This work has been helpful at capturing a "30,000 foot level" picture of the Basin and what reaches are potentially or currently at risk due to changes in flow. 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.

Basin Implementation Plan Approach (cont)

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

Goals	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
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 - Identify reaches where additional flows can restore degraded rivers	- 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.	- 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 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	- 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	- 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	- Support efforts to expand water based recreational uses of the Colorado River Basin - Ensure and require RICD designs maintain or enhance aquatic environment	- 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	- 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	- Construct and obtain absolute water right for pending RICD applications	- Develop stream management plans basinwide to identify criteria for restoration projects and multi-use projects

Basin Implementation Plan Approach (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 and generally holds the most senior water rights lending 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 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 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.

Basin Implementation Plan Approach (cont)

Table 4. Sustain Agriculture.

Goals	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
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	- 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	- 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	- 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	- 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	- 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	- 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	- 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	

Basin Implementation Plan Approach (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 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 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.

Basin Implementation Plan Approach (cont)

Table 5. Secure Safe Drinking Water.

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	Protect drinking water supplies from natural impacts such as extended droughts, forest fires, climate change, etc.	Ensure safe drinking water
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	- 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 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	- 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	- 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	- 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 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	- 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.

Basin Implementation Plan Approach (cont)

Theme 4 - 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 6 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 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 6 includes the four goals as column headings. These goals are supported by measurable outcome short term needs, long term needs, and projects and methods.

Basin Implementation Plan Approach (cont)

Table 6. Develop Local Water Conscious Land Use Strategies.

Goals	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
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	- 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	- 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	- 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	-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	- 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	-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	- Establish regional water provider and ditch company cooperatives - Install permanent drinking water interconnections among Fraser River valley water providers	

Basin Implementation Plan Approach (cont)

Theme 5 - Assure Dependable Basin Administration

Assuring dependable Basin administration provides stability and predictability for both individuals and large scale diverters. The Basin identified two primary diversions within the Colorado Basin; the Shoshone Hydroelectric Plant located above Glenwood Springs in the Glenwood Canyon and the senior Grand Valley irrigation diversions located up river from Grand Junction (often 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 native 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 should be an integral component of the Colorado Water Plan. The Grand Valley water users divert to support the production of high value agricultural crops within the Grand Valley. The short and long term goals of maintaining and protecting the viability of agriculture on the Western Slope, and in particular the Grand Valley, 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 30,000 AF, respectively to the Front Range. A big concern for the Basin is that any additional major 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 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, 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 depletion from the Colorado River is likely to trigger another Section 7 consultation.

The desire to increase conservation and maintain agriculture through creative programs comes regularly in conflict with the entrenched culture, attitudes and current statutory framework for the administration of water rights. In particular there is such a high risk 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 7 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.

Basin Implementation Plan Approach (cont)

Table 7. Assure Dependable Basin Administration.

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	Maintain Interstate Compact deliveries to Lake Powell	Improve water court process
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	- 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	- 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	- 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	- 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	- 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	- 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	- 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

Basin Implementation Plan Approach (cont)

Theme 6 - 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, agricultural communities 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 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
- 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.
- In Vail and 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.

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.

Basin Implementation Plan Approach (cont)

The three goals identified to support this theme are:

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

Table 8. Encourage Basinwide Conservation.

Goals	Improve Colorado water law to encourage efficiency, conservation and reuse	Pursue continued municipal and industrial conservation	Promote agricultural conservation that maintains agricultural production and viability
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	- 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 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	- 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	- 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	- 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	- 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	- See regional project lists for local agricultural conservation projects

Basin Implementation Plan Approach (cont)

3.2 Evaluation of Consumptive, Agricultural and Environmental and Recreational Needs

The BIP Guidance advised the Roundtable to conduct an inventory and provide a summary of the existing water planning information relevant to the development of the consumptive, agricultural and 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 built upon the information contained in these and other documents by obtaining input from stakeholders throughout the Basin. A comprehensive list of projects, policies and processes was also developed (included in the Regional Breakdown Section 6) and served the basis for the top projects and methods. The development of this list was an iterative process and will continue to be well into the future.

The information contained in this BIP builds upon this information and reflects the knowledge brought forth by the CBRT and basin stakeholders. Specific information relating to the evaluation of the consumptive, agricultural and environmental and recreational needs is provided below.

Evaluation of Consumptive Needs

The consumptive needs evaluation included a cursory review of the municipal and industrial sectors in the Basin. The CBRT relied on data and information contained in existing studies such as the SWSI 2010 and the SWSI Colorado Basin Needs Assessment and further expanded the evaluation 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

There was a general distrust regarding the water provider data published in SWSI 2010. Hence, the consumptive PLT focused on obtaining additional data to better quantify the water demands of local water providers. 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 forecasted supply, demands, conservation efforts and projects. Additional data was obtained from available engineering reports, comprehensive studies, and other similar published data. The analysis 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.

Conservation is at the forefront of most water provider's goals and large efforts have been made to reduce the system demands. 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 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 input received for each provider was gathered and assimilated into the findings reported in this BIP. The data collected from the water providers within the Basin are included in Exhibit E. The Next Steps 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
- 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 indicates there is 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 criticism regarding the Phase I water demands for the oil shale industry, the Energy Subcommittee commissioned a

Basin Implementation Plan Approach (cont)

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).

Since completion of the Phase II study in January 2012, various circumstances have taken place with the energy industry that warranted revising the water demand estimates once again, specifically for oil and natural gas and oil shale. First, the oil shale industry has significantly revised their planning with respect to the commercial industry's production levels and estimates for water use factors (i.e. barrel of water per barrel of oil). Second, only three companies, AMSO, Exxon/Mobile, and NSHI, (compared to five at the time of the previous studies) are active on research, development and demonstration (RDD) leases in Colorado (AMEC, 2014).

Under the direction of the Energy Subcommittee, an assessment of Phase I and II water needs regarding their validity under current conditions is underway (anticipated to be completed by June 30, 2014) by AMEC Environment and Infrastructure and Canyon Water Resources, LLC, as part of the Energy Water Needs Assessment Update (Update). 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 Basin currently does not have any coal and uranium mines.) The Update provides revised water demands where applicable based upon available data and recommendations made for further research and refinement for oil shale and 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 an industry might look like in 50 years. This equates to estimated direct water demands on the order of one-third or less of the "high end" 120,000 AF per year demand estimate documented in the Phase II Report (AMEC, 2014). These revised estimates result in a new estimate of 10,000 – 25,000 AF/year net water demands for oil shale. Note this estimate does not include the water demands associated with the indirect uses of water.

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

Although agricultural water uses are considered part of the consumptive water use sector, this BIP addressed the municipal and industrial consumptive water use needs separately, as documented above. The agricultural 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 assumptions: 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 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 and the 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 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. First, the specific goals and measurable outcomes will 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. Second, 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 this 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. Another is 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 basinwide perspective. Gaining this perspective is going to be 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 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.

Basin Implementation Plan Approach (cont)

Table 9 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 ecology
- Riparian/wetland
- Water quality
- Recreational boating

While the public tends to focus on the health of the fishery, identified here as the aquatic ecology, it is important to use additional indicators to help us determine what makes a river healthy and able to continue to provide for human use and enjoyment. Despite the havoc and damage that occurs 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 often 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 and this is problematic for the ecosystem and people. Careful consideration to water quality should be given when evaluating projects that will further deplete these already vulnerable river and streams.

Recreation is another key attribute that was used to help identify reaches that are at-risk. For much of Colorado's population, whitewater and flat water boating is about having fun. But for the Western Slope it is one of our key economic drivers. 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 and assists ranchers, farmers and municipalities downstream by helping to ensure that adequate flows continue west to meet other needs. 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. Many citizens 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 protection from recent or future water development. 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, some instream flows are insufficient protections for the attributes they are designed to help. As mentioned in previous sections, 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.

Basin Implementation Plan Approach (cont)

Table 9. Example of Data from the Watershed Flow Evaluation Tool for the Upper Blue and Upper Colorado Rivers.

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	Actions/ Solutions	Is Risk flow related?	Can flow be realistically part of the solution?	Quantity of Water needed	ISF	Case Number(s)	Stream Name	Upper Terminus	Lower Terminus	Segment Length (miles)	Flow Amount (CFS)	Appropriation Date
Blue River	Upper Blue River	Dillon Reservoir					X	Recreational boating (flatwater)	Ensure adequate lake levels for Frisco and Dillon Marinas July through Labor Day		No	Not Applicable	Not Applicable	N							
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)	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	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)		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	Reservoir operational considerations	No	For trout, if reach not protected, identify mechanisms to protect reach.	Not Applicable	Y	5-87CW293; 5-87CW294	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		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	Reservoir operational considerations	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	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

Basin Implementation Plan Approach (cont)

Table 9. Example of Data from the Watershed Flow Evaluation Tool for the Upper Blue and Upper Colorado Rivers. (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	Actions/ Solutions	Is Risk flow related?	Can flow be realistically part of the solution?	Quantity of Water needed	ISF	Case Number(s)	Stream Name	Upper Terminus	Lower Terminus	Segment Length (miles)	Flow Amount (CFS)	Appropriation Date
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)		No	For trout and cottonwood, if reach not protected, identify mechanisms to protect reach.	Not Applicable	Y	5-87CW299		outlet Green Mountain Res in Kremmling	confl Colorado River in	15.4	60 (5/1 - 7/15)	10/2/1987
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		No	For trout, if reach not protected, identify mechanisms to protect reach.	Not Applicable	N		Colorado River					
Upper Colorado	Colorado River	Granby Reservoir to Windy Gap	X	X				Flows for fish and habitat, overwintering fish habitat, macroinvetebrates, fishing, riparian habitat	Adequate releases from Granby for fish and habitat, temperature, sediment transport, embeddedness, cottonwood regeneration, overwintering fish habitat, macroinvertebrate habitat; USFWS flow rec's ignored		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	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		X		X		Fishing	Ideal whirling disease conditions, sediment transport and deposition, fish/ aquatic life needs	Windy Gap bypass, identify off-channel diversion (enhancement)	No	Not Applicable	Not Applicable	N		Colorado River					

Basin Implementation Plan Approach (cont)

Table 9. Example of Data from the Watershed Flow Evaluation Tool for the Upper Blue and Upper Colorado Rivers. (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	Actions/ Solutions	Is Risk flow related?	Can flow be realistically part of the solution?	Quantity of Water needed	ISF	Case Number(s)	Stream Name	Upper Terminus	Lower Terminus	Segment Length (miles)	Flow Amount (CFS)	Appropriation Date
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)	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	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	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		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	Colorado River	confl Williams Fork River in	confl Troublesome Creek in	8	135 (1/1 - 12/31)	7/8/1980

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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. Before any additional TMDs are considered, the Basin has realized the need for restoring and repairing our headwater streams already impacted by TMDs. Local Basin governments have completed the planning and construction of many environmental and recreational projects to restore watersheds and other water bodies 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. The investment could be endangered with additional development of a new supply 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 also benefits 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 and environmental and recreational needs is highly uncertain. Much more work is needed to fully quantify and understand these needs and the uncertainties 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 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.
- 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.
- 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

Interbasin Reliance Report (cont)

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 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.

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.

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 lowering per capita water demand, decreasing outside watering of non-indigenous 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 must have a number one priority of protecting and improving the health of our rivers and streams. 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. This BIP was drafted in less than six months and 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 is charting a path that will allow the effective coordination and implementation of these projects and methods across the geographically diverse regions. Cooperation is essential regionally and beyond the Basin border for success. The Colorado Basin has numerous resources and organizations that will facilitate execution of the next steps that will lead to meeting the identified goals for each of the six themes.

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

- *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* of 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 updated every five years by the Colorado Basin Roundtable. The public should continue to be engaged, especially those making long term water use decisions such as politicians, land use planners, water providers, environmental awareness groups and the agricultural community. This process must be iterative. Long term outreach activities should build on the communication and partnerships developed through the BIP's established outreach efforts to continue to engage the public on the water challenges and opportunities in the Basin and statewide (See Section 2.3 Action Plan Beyond July 2014).The CBRT should strive to maintain a steady presence in both traditional and social media and ensure their members have the communication tools to inform their constituencies about the issues the Roundtable is addressing and collect public input.

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).

In general, the next steps over the next nine months will:

- Refine the consumptive water supplies and water demands (Gap) using recent water provider data
- Quantify the environmental and recreational flow and other parameters needed to support healthy ecosystems
- Define the unique regional agricultural needs for sustaining the economy
- Form project leadership teams (PLTs) that will focus on developing implementation strategies for supporting the identified top projects – emphasizing the use of multi-purpose objectives
- Establish the structure for funding the implementation of future projects and methods
- Coordinate with the other West Slope Roundtable to discuss how to collaborate and move forward with one common voice on proposed legislation before it goes to the State House

More specifically, the CBRT PLTs will address the following next steps which support the six themes.

Develop a basinwide Stream Management Plan

A basinwide stream management plan (SMP) is the top priority for the Basin. The goal of this project would be to develop quantitative flow values, temperatures and other parameters essential for maintaining healthy ecosystems. From this effort projects could be identified, funded and completed across the Basin, between watersheds and across county lines to make lasting impacts to our streams, riparian areas and overall ecosystem. A project champion needs to be determined as well as funding sources and identified metrics to use, measure and record in the SMP.

Ensure the protection and maintenance of our agriculture

Agriculture in the Basin is a resilient industry however; its biggest threat may be closing in quickly. The threat of buy and dry is closing in on the agricultural community. The individual decision to sell water rights and farms needs to be preserved but as a community this practice is devastating the industry. The Basin agriculture community needs to evaluate what their industry needs to survive this threat and what the Basin can do to support them. Consensus is needed on which programs should be initiated or tried to support this industry whether they are incentives, improvements to Colorado water law, or even develop a stronger "buy local" demand.

Plan and account for future municipal and industrial water demands

Over the next 9 months the data collected from the 63 water providers in the Basin will be aggregated and analyzed. The analysis of the water provider data will evaluate current water use and can help guide water providers and managers meet future basin water needs. Further research needs to be conducted that will evlauate the reservoir permitting process and provide recommendations on improvements. Additional research and analysis is needed on the impacts on the Middle Colorado and Grand Valley Regions of a 500,000 barrel per day commercial oil shale industry. A full review of the completed Phase III energy report should be included in the BIP along with additional study of the indirect water needs of a potentially growing oil shale industry. Additional research is needed to evaluate the impacts to the calling structure of the Basin if the oil shale industry develops into their significant water right holdings within the Basin. These impacts should be quantified in the BIP. In addition the BIP should address the impacts from the development of additional 140,000 AFY of TMDs already planned.

Further information from ski areas and industrial water users should be collected and analyzed for trend analysis and future water demand estimates.

Next Steps (cont)

Create a connection of land use and water demand

The CBRT should sponsor educational opportunities to engage land use officials on the importance of water conscious land use. These discussions should take place in each of the seven regions to discuss regionally acceptable best management practices (BMP), examples or models of water conscious communities and potential incentives for implementation of BMPs. The outcomes from each region should be compiled to develop basinwide and/or county guidelines for BMPs.

Examine the potentially acceptable conditions of a future supply project out of the Colorado Basin

The Colorado Basin Roundtable has not fully reviewed the Interbasin Compact Committee "Conceptual Agreement". The Roundtable was presented a copy of the CWCB memo from Jacob Bornstein at the July 7th Roundtable meeting. Over the next 9 months the Roundtable should take a formal action on this agreement and provide direction to our IBCC representatives.

Pursue dependable long term Shoshone Hydroelectric Plant calls

Roundtable project leadership teams should be created to develop a strategy to protect the Shoshone Hydroelectric Plant call. Xcel Energy agreed to have representatives participate in our Roundtable discussions and this should be pursued by the CBRT to take place by April. The Roundtable should follow up and be involved with the ongoing discussions occurring among the seven states about ongoing concerns of Lake Powell and Mead water levels and future compact administration and demand reduction strategies. Further the Roundtable should be engaged in the process to create a West Slope water bank.

Implement high conservation standards

The CBRT supported a high conservation target. The specifics and metrics to quantify those targets have not been discussed. Over the next nine months the Roundtable should provide more specific targets for high conservation.

Implementation of these next steps is essential to continuing the progress of the BIP findings. Each of these identified next steps has been identified as a goal under one or multiple themes described in the BIP as well as are supported in the text of the CBRT White Paper. It is with the consistency of the public input, the CBRT members and previously published findings, that these next steps should be pursued and documented in the final BIP and revisions to follow.

Next Steps (cont)

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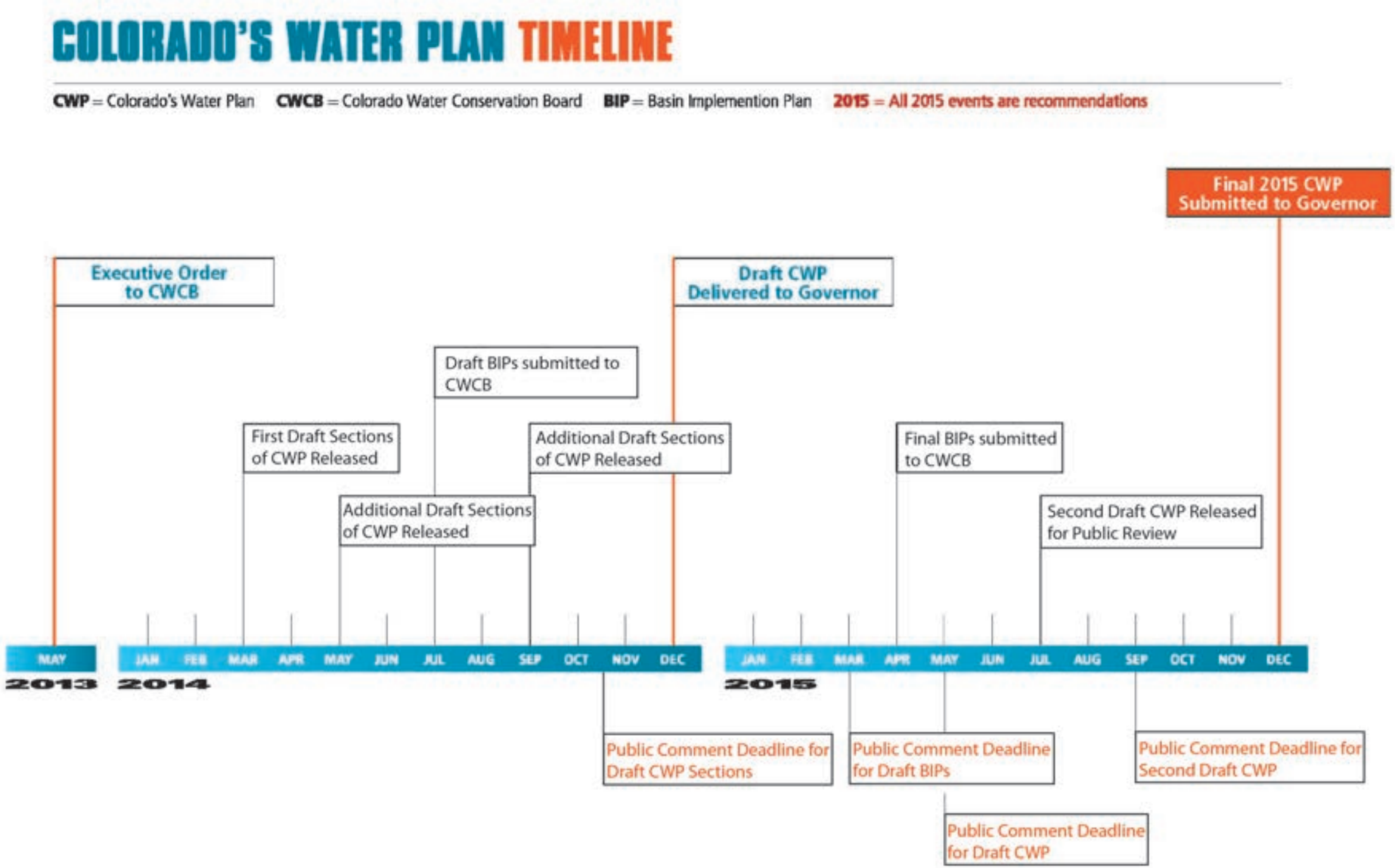

Regional Breakdown

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 as well and are unique to the settings across the Basin. The Basin was divided into seven regions to allow more specific discussion into regionally significant 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. The second table provides a comprehensive list of projects brought forth during the CBRT meetings, PLTs and public outreach forums. 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):

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

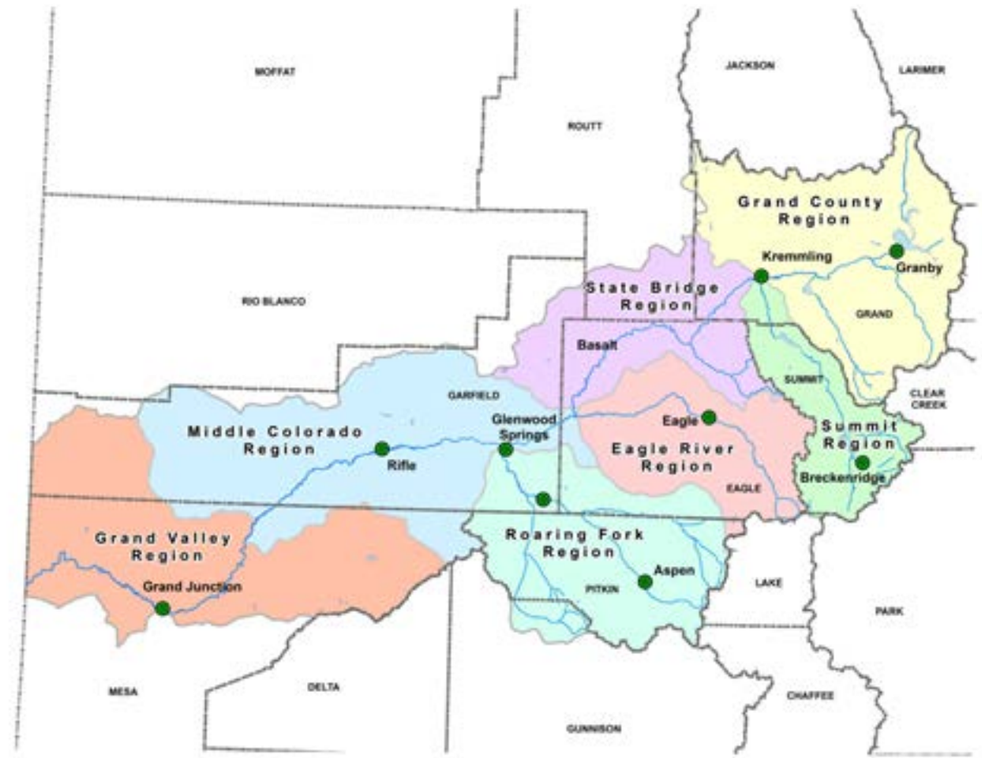

Figure 10. Colorado BIP Regions.

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

Regional Breakdown (cont)

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 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. Only those projects needed to meet the future shortages and Gaps in the future will be developed. The tables are broad reaching and will continually revised as the CBRT and Basin stakeholders evaluate, construct, and develop new projects.

Regional Maps

Three maps were developed for each region which identify the consumptive uses, environmental and recreational conditions, and location of identified top projects. 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.

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.
- **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.

Identified Projects Map

- **Identified Projects** - Derived from location based projects listed in the Themes and Vulnerabilities Table within each region. See description of regional tables for development of how these projects were identified.

Regional Breakdown (cont)

Section 6.1 - 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 Winter Park.

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.

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 10 highlights the top specific themes and vulnerabilities, methods and projects for the Grand County Region. Table 11 includes a full list of projects in all phases from conceptual to just before construction in the Grand County Region. Figures 11-13 depict the consumptive uses, environmental and recreational conditions, and identified projects for this region.

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Figure 11.

Colorado River BIP Grand County Region

Consumptive Uses

Legend

- Irrigated Lands
- Water Provider Boundaries
- Conservancy Districts
- Transmountain Diversions (Average Annual 1987-2012)

Absolute Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Conditional Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Absolute Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Conditional Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

CFS = Cubic Feet Per Second
AF = Acre Feet

This map depicts only water rights for diversions above 5 CFS and reservoirs larger than 25 AF, to view the full state database of water rights visit http://cdss.state.co.us

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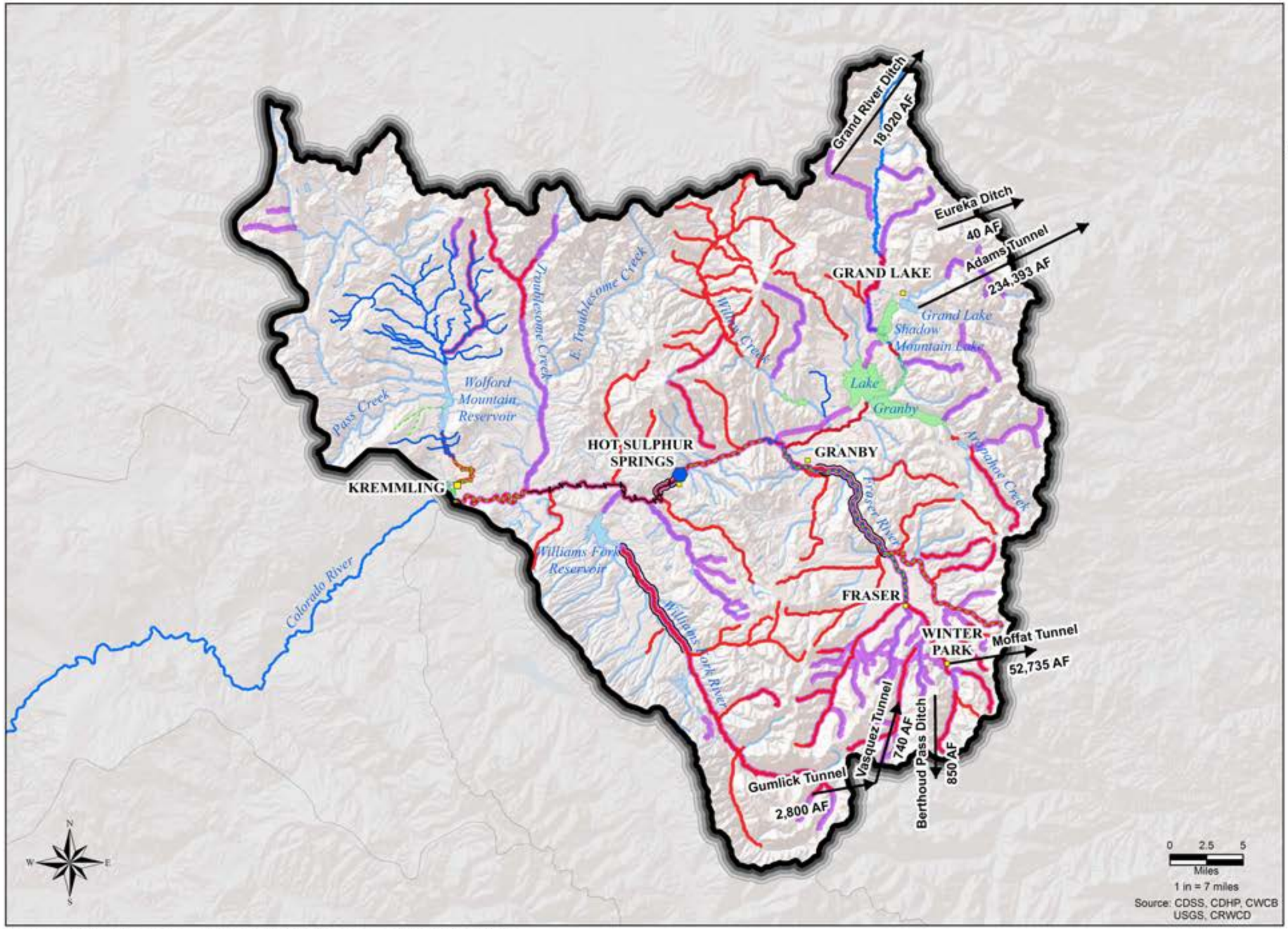

Figure 12.

Colorado River BIP
Grand County Region

Environmental & Recreational Conditions

Legend

- Boatable Segments
- Gold Medal Streams
- 303d Listed Streams
- Identified Water Quality Issues (TMDL or M&E)
- Existing Instream Flows
- NCNA Identified Streams
- Transmountain Diversions (Average Annual 1987-2012)
- 303d Listed Reservoirs

Recreational In-Channel Diversions

- Decreed
- Pending

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

AF = Acre Feet
NCNA = Nonconsumptive Needs Assessment
TMDL = Total Maximum Daily Load
M&E = Monitoring & Evaluation

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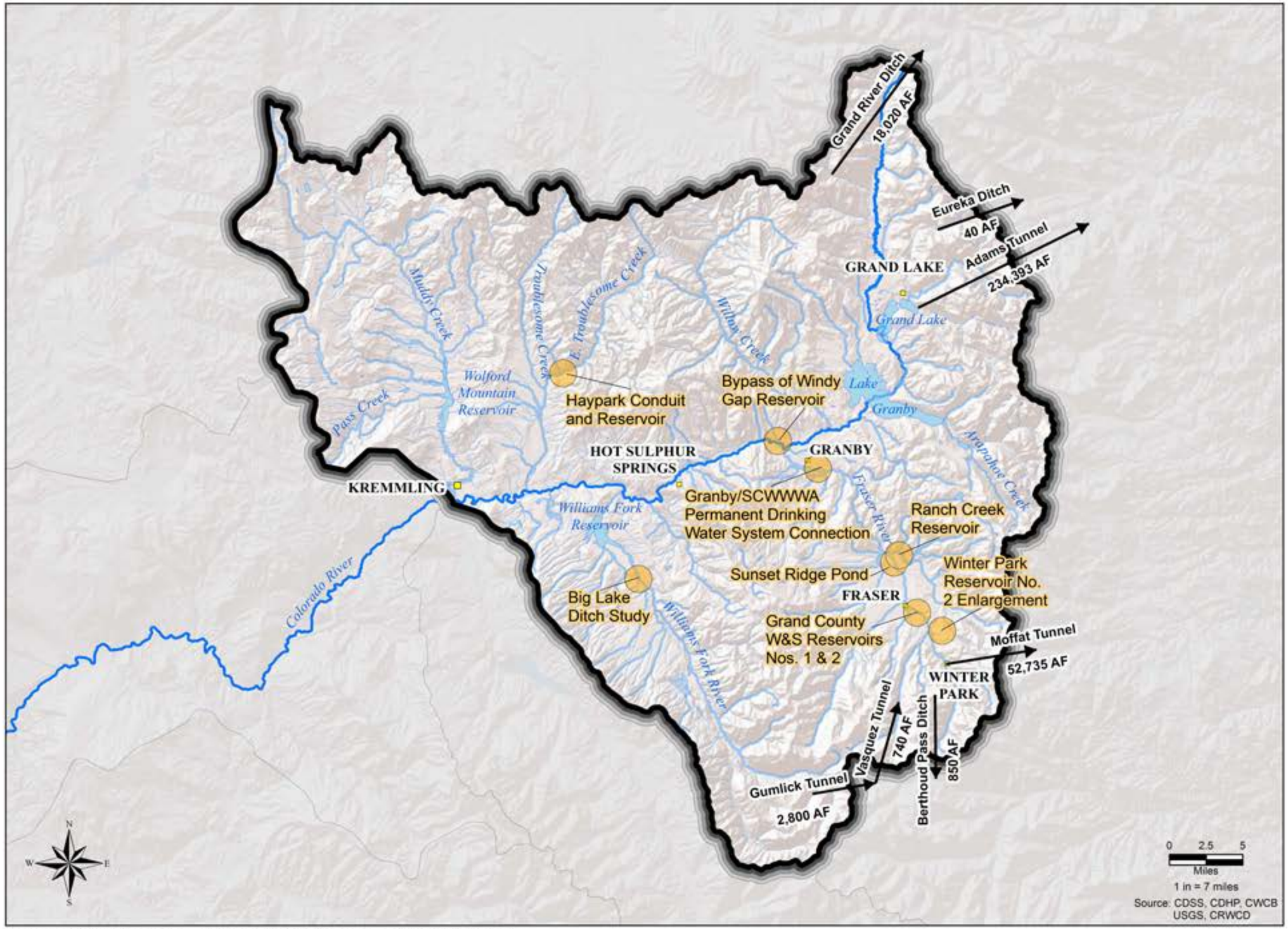

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Figure 13.

Colorado River BIP Grand County Region

Identified Projects

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 10. Grand County Region Themes and Supporting Vulnerabilities.

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 economies[1] - 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 economy[1] 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 Toolbox[2,3,4] - 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 rights	- 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

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects.

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Denver to identify conditional water rights that might be needed by Denver and to abandon those conditional water rights not needed.		Denver Water, Grand County	CRCA				
Amount of money Denver required to pay under CRCA is subject to escalation beginning in the 4th anniversary of Effective Date of agreement based on CPI for Denver-Boulder-Greeley.		Denver Water, Grand County	CRCA				
Denver Water will not divert any project water through the Moffat Project for storage in Gross Reservoir until such time as water committed by Denver pursuant to CRCA is legally available for use by Grand County.		Denver Water, Grand County	CRCA				
Denver Water will deliver or make water available for various uses within Grand County. Denver will not be responsible for costs of new infrastructure required for delivery or make water available.		Denver Water, Grand County	CRCA				
$2M to address water quality through Learning By Doing (If mitigation imposed by federal permits require this - funds will be diverted from this amount)		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project through LBD.
$1M for aquatic habitat - if mitigation requires by permit requires this - funds will be diverted from this amount applied through Learning By Doing.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project applied through LBD
No water in Boulder environmental pool to be filled with West Slope water.		Denver Water, Grand County	CRCA				
Cooperative effort for Aquatic Environment - IGA establishing Learning By Doing (LBD). Will jointly request that the Corps of Engineers (COE) acknowledge LBD in Record of Decision (ROD) for Moffat Project.		Denver Water, Grand County	CRCA				
Additional $1 Million for purpose of improving aquatic habitat through Learning By Doing.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project through LBD.
$2M future environmental enhancements - place in interest bearing account within 2 years of Moffat Project becoming operational applied through Learning By Doing.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project through LBD.
Funds for Windy Gap pumping opportunities - with year Moffat becomes operational - place $500,000 into an interest bearing account controlled by Grand County. Two years after fund established - second $500,000 placed in account. Fund to be used by Grand County for sole purpose of paying 50% annual costs for pumping Windy Gap Water for environment. If fund reaches $2M - any funds over $2M be used by cooperative effort.		Denver Water, Grand County	CRCA				
Bypass on Fraser River system - each year when Moffat becomes operational - 1,000 AF of water from Fraser Collection System for environmental and incidental recreational benefit applied through Learning By Doing.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project.
Denver will undertake voluntary pilot projects using the 1,000 AF for environmental purposes.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project through LBD.
Annual Releases from Williams Fork - each calendar year beginning with the year the Moffat Project becomes operational, if a portion of the Fraser 1,000 AF is made available during a call on the river or Shoshone Outage Protocol is operational, Denver will make available for release a like amount of water from Williams Fork, up to 1,000 AF. This will be in addition to any water Denver has contractual obligations to deliver.		Denver Water, Grand County	CRCA				If stored - releases through LBD
All or part of the 1,000 AF may be carried over in Williams Fork by Grand County into subsequent years, subject to space available, up to 2,500 AF. Denver Water will notify Grand County if Williams Fork is predicted to spill.		Denver Water, Grand County	CRCA				Through LBD

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Limits on reducing Forest service Bypass Flows - Denver will not reduce bypass flows in Fraser system unless they institute in-house only water use after Moffat becomes operational.		Denver Water, Grand County	CRCA				
Will institute joint study on how to maintain historic agricultural uses of Big Lake Ditch so as to maximize environmental benefits while preserving the yield Denver counted on when purchasing these rights.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project.
Denver and Grand County will fund a study to determine how to best enhance stream flows with Denver's rights in Rich Ditch and Hammond Ditch #1. Any enhancements would be in addition to the 1,000 AF.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project through LBD.
Denver Water will pay $1.95 M to offset water supply projects in Fraser Valley upon execution of agreement.		Denver Water, Grand County	CRCA				
Within 6 months or resolution of Blue River Decree issues, whichever comes first - $2 M for water supply projects in Fraser Valley.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project.
Provide Clinton bypass water under 1992 agreement on year-round basis provided Grand County Water Users provide replacement water.		Denver Water, Grand County	CRCA				
Make 20% temporary contracts permanent after snowmaking return flow recapture plan implemented. (20% of water purchased for conveyance through Denver System to east slope will be made available for in-basin uses).		Denver Water, Grand County	CRCA				
Denver may allow, on case-by-case basis, water treatment plants in Fraser Valley use of their system as temporary source of supply if back up supply and necessary infrastructure supplied.		Denver Water, Grand County	CRCA				
Denver will explore, on a case-by-case basis, use of its system to benefit Grand County.		Denver Water, Grand County	CRCA				Through LBD and GC Mutual Ditch Co.
Denver will not undertake future water development projects or appropriations or acquisitions of water rights in Grand County without prior approval of BOCC and River District.		Denver Water, Grand County	CRCA				
Make 375 AF additional water - 100 AF to Winter Park Recreational for snowmaking; remaining 275 AF allocated @ 68.75 AF to other Grand County water users.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project.
Grand County Mutual Ditch and Reservoir Company has right to trade shares (owned in Meadow Creek Reservoir) for like amount of water in Denver's system, carried through the system and delivered to Fraser River Basin. Ditch Company to be responsible for any additional infrastructure or operational costs.		Denver Water, Grand County	CRCA				
Denver will not oppose any changes of Grand County Mutual Ditch Company rights in the future.		Denver Water, Grand County	CRCA				
Denver and Grand County will study Denver Water lands in Grand County to determine value for wildlife habitat and public fishing access without impacting operational needs. Denver will decide which lands should be set aside and what mechanism should be used.		Denver Water, Grand County	CRCA				Enhancement not available until issuance and acceptance of permit for Moffat Project.
Without impact to operations, Denver agrees to not oppose CWCB instream flow filings on segments of Colorado River below confluence of Blue River where no instream flows exist.		Denver Water, Grand County	CRCA				

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
No opposition to Grand County RICD. (2,300 cfs junior right on Colorado River below Big Gore Canyon).		Denver Water, Grand County	CRCA			May be constructed in fall of 2014	Consult with CPW; avoid impacts to macroinvetebrates and fish passage
West Slope will not object to Denver's operation and decree of exchange from Dillon Reservoir to Williams Fork and to existing points of diversion for Fraser River and Williams Fork diversion projects. These exchanges will not be implemented if Division Engineer advises that curtailment of exchanges is required to satisfy all senior instream flows existing in 2009.		Denver Water, Grand County	CRCA				
Support all future renewals of MOU for substitutions from Wolford Mountain for Denver/CRWCD. Substitution is for 1,000 AF annual.		Denver Water, Grand County	CRCA				
Denver Water waives right to participate in second enlargement of Wolford Mountain Reservoir.		Denver Water, Grand County	CRCA				
Replacement water to Denver in the amount of 2,590 AF in any one substitution. Under Clinton and Summit Agreement - West Slope provides 1,249 AF substitution from Wolford Mountain Reservoir.		Denver Water, Grand County	CRCA				
Green Mountain Administration - Develop and support protocol on administration of Green Mountain with Federal government as it applies to Blue River Decree.		Denver Water, Grand County	CRCA				
Shoshone Outage Protocol - If flow at Dotsero drops below 1,250 cfs when Shoshone Plant is not operating due to outage, etc., March 25 through November 10, Denver, CRWCD and Middle Park will operate their systems as if Senior Call was in place and release water accordingly. Best efforts will be used to include Federal government Green Mountain Reservoir in this protocol. In winter months if Shoshone is off-line, and flows at Dotsero are at or below 900 cfs, Denver and CRWCD will operate their systems as if a Senior Call at Shoshone were on subject to capacity.		Denver Water, Grand County	CRCA				
Denver Water can call for relaxation of Shoshone during extremely dry times. This agreement expires 2032. West Slope will not oppose renewal if agreement same as 2007. Relaxation period can be expanded for severe drought. (10% savings to West Slope).		Denver Water, Grand County	CRCA				
Evaluate pilot project to determine feasibility of implementing partial Shoshone Call relaxation in non-critical winter months and dedicating water to environmental and recreation purposes (10% savings ?? - timing of release critical).		Denver Water, Grand County	CRCA				
Goal to make Shoshone Outage Protocol permanent.		Denver Water, Grand County	CRCA				
West Slope desires to acquire Shoshone Assets.		Denver Water, Grand County	CRCA				
Learning by Doing (LBD) - made permit condition.		Denver Water, Grand County	See Comments				Data Source: Moffat Collection System, Mitigation and Enhancement Coordination Plan - Proposed as a 404 Permit Condition on Denver Water's proposed Moffat Project
Windy Gap bypass channel could help to reduce water temperatures and Whirling disease.		Northern Colorado Water Conservancy District, Colorado Parks and Wildlife, Grand County	UPCO Study			Under Study	under study - some funding available

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Temperature - monitor temperature at Fraser below Crooked Creek; Ranch Creek below Denver diversion; Ranch Creek near Fraser; Colorado downstream Windy Gap. Denver would bypass 250 AF July 15 to August 31 at a rate of 4 cfs based on maximum daily and maximum weekly average. LBD will determine which of Denver's facilities will bypass said water.		Denver Water	See Comments				Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
If none of the measures to address temperature through LBD are successful, after 20 years, Denver will provide $1M to LBD for design and construction of projects to affect temperature in Fraser River Basin. Denver, on as available basis, will provide water for flushing flows as described in Grand County Stream Management Plan and through LBD. Flows will be provided for 72 consecutive hours in 40% of the years (16 out of 40) and 3 out of every 10.		Denver Water	See Comments				Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
Construct, maintain and coordinate efforts to remove sediment from Fraser Sediment Basin.		Denver Water, Grand County	See Comments			Ongoing	Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
If after 20 years of project operation, flushing flows provided by Denver and determined by LBD and verified by CDPHE have de minimus effect, Denver will contribute $1M to LBD for exclusive purpose of designing and constructing projects to improve channel stability and sediment transport.		Denver Water	See Comments				Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
Denver will provide $72,000 to CPW to construct barrier and restore Cutthroat Trout habitat in Grand County.		Denver Water	See Comments				Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
Denver will place $750,000 in escrow for stream habitat restoration projects to compensate for reduced flows and potential decrease in aquatic habitat in Fraser and upper Williams Fork Basins.		Denver Water	See Comments				Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
Voluntary Monitoring Program - define stressors to environment before project becomes operational regardless of causation (no blame placed). - Define stream conditions in Grand County. Denver will participate in voluntary operational experiments for important stream reaches. - LBD will rely on stream management plan. - Monitor water temperature. - Expand existing network of water temperature data loggers. - Monitor air temperature. - Data from loggers will determine where and how many real-time temperature monitoring stations LBD should deploy through the basin. - Monitor for channel stability and sediment transport data and analyze to develop prescriptions for specific stream reaches. - Monitor for Benthic Macroinvertebrate. - Monitor for Riparian Areas and Wetlands - Using information above to help ameliorate temperature issues in Fraser River Basin and Colorado River through LBD. - LBD to begin addressing channel stability using data above.		Denver Water	See Comments				All through Learning By Doing Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
LBD, including Denver Water, have committed to develop an annual operations plan to maximize the stream environmental benefits. Explore opportunities for coordinated operations of diversion structures and reservoir releases among all water users in Grand County.		Northern, Denver Water	See Comments				Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
Denver Water and Northern will supply $6M to CPW for habitat improvement in approximately 17 miles of Colorado River from Windy Gap to Kemp-Breeze State Wildlife area.		Denver Water, Northern	See Comments				Enhancement not available until issuance and acceptance of permit for Moffat Project Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Denver will provide $1M to Wild and Scenic River management Program on the Colorado River.		Denver Water	See Comments				Enhancement not available until issuance and acceptance of permit for Moffat Project Data Source: Moffat Project Mitigation and Enhancement Coordination Plan - Proposed Regulatory Obligations
1.25% of Denver Water West Slope surcharge to Grand County for forest restoration projects and aquatic improvements related to forest health. These funds could begin as early as 2015 (per attachment "D" of CRCA).		Denver Water, Grand County	Colorado River Cooperative Agreement				
10% of Denver Water West Slope surcharge to West Slope for projects that protect or enhance water (Grand County eligible to apply for these funds).			Colorado River Cooperative Agreement				
Denver will participate in LBD efforts to obtain grant funding once LBD is actively functioning.			Colorado River Cooperative Agreement				
Middle Park Water Conservancy apportionment: can, within one (1) year decide to remain under 1980 and 1985 agreement for provision of water. Annual Water supply, if under WGFP receive annually 2,300 AF; Variable Water up to concurrent 1,500 AF; 700 AF of carryover not subject to spill. 3,500 AF of storage space in Granby Reservoir.		Northern Water	Windy Gap Firming Project IGA				
Grand County Water apportionment: Transfer any of Middle Park water as of August 1 and October 15 or becomes carry over water. 3,500 AF of storage space in Granby Reservoir subject to spill.		Northern Water	Windy Gap Firming Project IGA				Through Learning By Doing
Concurrent pumping - when WGFP has diverted and stored 15,000 AF Grand County can elect to receive 3.8% up to 1,500 AF and can be carried over subject to space allocated. If project stops pumping but Grand County wishes to continue, it may request project to keep pumping up to the 1,500 AF maximum.		Northern Water	Windy Gap Firming Project IGA				
If Windy Gap in priority and Grand County wishes to keep pumping after project stops, it can pay for the additional pumping at average charge for electricity up to storage allowed (which can be combined with Middle Park for total of 7,000 AF). Denver Water has provided $1M to offset pumping costs.		Northern Water	Windy Gap Firming Project IGA				
Grand County can carry over all water in storage in its account, subject to spill criteria and "shrink".		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will operate its system in manner that does not diminish ability of CRWCD to capture natural flow of Muddy Creek up to maximum of 65,998 AF.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will place deed restriction on sale of any parcel that requires subsequent development approval by Grand County and such property will be developed under Grand County Rural Land Use Plan.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will make arrangements with Northern Water to provide public access to that portion of Willow Creek as long as Northern owns lands adjacent to Willow Creek and such access to be managed by CPW or other entity acceptable to Northern.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will abandon Jasper Reservoir Conditional water rights.		Northern Water	Windy Gap Firming Project IGA				

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Recording and telemetry devices for flow measuring approved by State Engineer will be acquired, installed, operated, maintained and replaced by and at expense of WGFP Enterprise if able to obtain permanent access agreements.		Northern Water	Windy Gap Firming Project IGA				
Will cooperate in good faith toward development of plan to avoid and address potential curtailment under 1922 Compact.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict, without prior consent of Grand County and CRWCD, will not acquire any existing water rights in Grand County, construct additional water supply facilities in Grand County, appropriate new water rights in Grand County, or appropriate new water rights in Division 5 that will result in depletions in Grand County.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will support the entry of a decree for a CWCB instream flow on the Colorado River mainstem from confluence of Blue and Colorado Rivers.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will not oppose entry of decree for Grand County RICD.		Northern Water	Windy Gap Firming Project IGA				
WGFP will operate in conformance with Shoshone Outage Protocol based on limits stated in IGA.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will participate in LBD.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will not oppose or interfere with CRCA.		Northern Water	Windy Gap Firming Project IGA				
Subdistrict will pay $50,000 to Endowment Fund for Upper Colorado River Wild and Scenic.		Northern Water	Windy Gap Firming Project IGA				
Without written consent of Grand County and CRWCD, Subdistrict will not divert water at Granby Reservoir under the priority of the Windy Gap Decrees or during free river conditions.		Northern Water	Windy Gap Firming Project IGA				
Provide CPW $250,000 to study methods to bypass flows, sediment, and fish around and through Windy Gap Reservoir. (Also entered into Funding Agreement to provide $2M to implement plan if approved).		Northern Water	Windy Gap Firming Project IGA				
Work to implement Green Mountain Administration Protocol.		Northern Water	Windy Gap Firming Project IGA				
Grand Lake Clarity Agreement - improve water clarity and quality in Grand Lake.		Northern Water	Windy Gap Firming Project IGA				
Winter Park Reservoir No. 2 Enlargement (GCW&S #1)		Grand County W&S No 1	WP Interview			Status pending	
Winter Park Water and Sanitation Pumpback to protect instream flows		Winter Park Water & San District	NC Needs Assmt				Mike Wageck was contact

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Evaluate the possibility of a channel bypass around Windy Gap Reservoir or other structural solution - Upper Colorado River mainstem (Between Blue River and Fraser River confluences)		Northern Water, Colorado Parks and Wildlife	Windy Gap Firming Project 1041 Permit			Study in Progress	Study in Progress - some funding available
Streamside restoration on Ranch Creek (lower reach) - Narrow low flows, increase shading, create pools to lower temp, support fishing and lower temp on Fraser River.			NC Needs Assmt				
303(d) listing from Hammond Ditch, Ranch Creek, St. Louis Creek, Fraser River			NC Needs Assmt				
Water rights purchase on Williams Fork River			NC Needs Assmt				
Cottonwood Reservoir restoration			Restricted Reservoirs	71 AF			Reservoir is restricted due to "Spillway back cutting, inoperable outlet". All 71 AF is under restriction. Restriction placed on 07/01/2013.
Matheson Reservoir restoration			Restricted Reservoirs				Reservoir is restricted due to unknown reasons. A note in the State Engineers files says, "Full storage in spring. Drain to gage height 30 by 9/1." Restriction placed on 10/30/2002
Little King Ranch Reservoir restoration			Restricted Reservoirs	900 AF	190 AF		(Recreation augmentation?) Reservoir is restricted due to "Sinkhole and excessive seepage" and is limited to a gage height reading of 25 feet. 900 AF of the full 1,090 AF is under restriction. Restriction placed on 02/08/2010.
Milk Creek Reservoir restoration			Restricted Reservoirs	56 AF			Reservoir is restricted due to "Excessive leakage" and is limited to "15.0 crest (August 1 through May 1)". 56 AF of the full 88 AF is under restriction. Restriction was placed on 05/10/1991.
Wolford Mountain Reservoir hydropower and enlargement - · 75 cfs pump station from Colorado River to existing reservoir · Optional 6,400 AF reservoir enlargement with 4 foot spillway raise · 160 ft pumping lift · Pump station enhances yield of existing reservoir as well as potential enlargement			10,825 Study	6,500 AF			· Not needed for 10,825 Study but an option for future alternate needs · Pump station diversions may adversely affect flow of upper Colorado River (below Kremmling) in springtime · Timely to construct and permit
Use of Windy Gap to recover bypass flows via CB-T: System with East Slope interconnection to Denver's north end service area.			UPCO Study				Fraser River above Fraser. Bureau of Reclamation approval would be required
Additional in-basin storage reservoir(s) in conjunction with pumpback to store runoff. Use pumpback and Denver's collection system to move water back up to mainstem or tributaries during low flow periods.			UPCO Study				Fraser River above Fraser.
Reduce CWCB instream flow blw Vasquez Creek from 11 cfs to 5 cfs for Sept 15-30 so that the instream flow time frame is consistent with the stream reach above Vasquez Creek.			UPCO Study				There is an issue of native supply during this timeframe on the Fraser River during this time.
Dry-year water supply, such as non-tributary groundwater, to maintain higher flows in the Fraser River.			UPCO Study				Fraser River above Fraser.

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Wastewater treatment consolidation with pumpback (Fraser River below Fraser)			UPCO Study			Pumpback is pending	Consolidation done. Pumpback is pending.
Fall and winter flow below Lake Granby could be supplemented through reservoir releases that could be recovered at Windy Gap (with installation of low-volume pumping capability).			UPCO Study				Colorado River above Fraser River
Use William Fork Reservoir for replacement releases during low flow periods instead of Green Mountain and/or Wolford Reservoirs. (Colorado River below Fraser River and above Kremmling).			UPCO Study				
Winter Park land use policy review		Winter Park Water & San District	Winter Park				
Reservoir releases for endangered fishes could enhance late summer/fall (below Kremmling). Could help extend the optimum flow (1,100 cfs) for rafting and kayaking between May and July.			UPCO Study				
Upper Colorado Wild & Scenic Alternative Management Plan Stakeholder Group - Partnership developing management alternative to Wild and Scenic designation		Upper Colorado Stakeholder Group	NC Needs Assmt				Group has developed an "Upper Colorado Stakeholder Group Management Plan" to serve as an alternative to W&S suitability determination by BLM. (See Appendix U of the Kremmling Field Office Final Resource Management Plan).
Synchronized use of multiple facilities			10,825 Study				
Ranch Creek Valley & others in the study (Vasquez, Louis Creek, Elk Creek, Ranch Valley)		River District	CBRT				
GCILC - Vail Ditch			CBRT				
Winter Park changes to land use policy (build out vs. water availability)		Town of Winter Park	CBRT				
Ten Mile Creek Reservoir			CBRT				
Hay Park Conduit and Reservoir		Middle Park Water	CBRT	75 cfs 28,000 AF			Multi- use reservoir
Sylvan Reservoir enlargement		Privately Owned	CBRT				
Strawberry Ranch Reservoir		Privately Owned	CBRT				
Deberad Reservoir (Silver Creek)			CBRT				
Sheep Mountain/Gaylord Reservoir		YMCA	CBRT				
Elk Creek Reservoir			Grand County				
Grand County W&S Reservoirs Nos. 1 & 2		Grand County W&SD	Grand County			Status pending	
Weloiman Creek Reservoir			CBRT				
Jim Creek Reservoir			CBRT				
Meadow Pumpers located on the Colorado River near Kremmling and Meadows Act water rights. Evaluate tabulation, ensure proper seniority on Colorado River.			CBRT				

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Colorado River Irrigation and Restoration Project - Phase 1.							
Colorado River Restoration Project - Phase 2. Improve flows and aquatic environment Fraser River basin to confluence of Blue River on Colorado River. (Possible project for funds from Grand County 1.25% and West Slope 10%) through LBD. 1. Pool and river habitat improvements for winter flows (Between Blue River and Fraser River confluences) 2. Bar construction to narrow low flow- Upper Colorado River mainstem (Between Blue River and Fraser River confluences)		Denver Water	CBRT				
Grand County Master Plan - land use revisions		Grand County	CBRT				
Kirtz Ditch			CBRT				Conditional Right >100cfs
Lost Creek Reservoir			CBRT				Conditional Reservoir > 100 AF
Sylvan Reservoir			CBRT				Conditional Reservoir
Cornerstone Reservoir			CBRT				Conditional Reservoir
Welk Creek Reservoir			CBRT				Conditional Reservoir
Lower Vasquez Reservoir			CBRT				Conditional Reservoir
Upper Vasquez Reservoir			CBRT				Conditional Reservoir
Idlewild Camp Grounds Reservoir			CBRT				Conditional Reservoir
Wolverine Reservoir			CBRT				Conditional Reservoir
St. Louis Reservoir			CBRT				Conditional Reservoir
Ranch Creek Reservoir			CBRT				
Upper Colorado River Endangered Fish Recovery Program - Denver Water will comply with the 2013 Biological Opinion, which requires Denver Water to pay a fee to support the Upper Colorado River Endangered Fish Recovery Program		Denver Water, Grand County, Trout Unlimited	See Comments				Data Source: Moffat Collection System Project - Conceptual Mitigation Plan
TBD - Windy Gap Firming Project (30,000 AFY)		Northern Water	Windy Gap Firming IGA	30,000 AF		See Comments	Progress: FEIS complete; 1041 Permit issued by Grand County; Carriage Contract negotiations underway, 404 Permit application pending
Windy Gap 1041 Permit		Grand County	Windy Gap 1041 Permit			Issued	
Draft Report Stream Management Plan, Phase 3, Grand County (2010). Lists conditions of streams, target flows, monitoring programs, and water quality measurements. Also provides a ranked listing of highest priority stream segments.		Grand County	GC Stream Mgt Plan				
Town of Kremmling new intake facility on Colorado River below Sheep Creek to help meet higher demands	Town of Kremmling, Grand River Ranch HOA	CWCB loan mostly	UPCO Study	2 cfs	5 cfs	In use	

Regional Breakdown (cont)

Section 6.1 - Grand County Region

Table 11. Grand County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Jones 1 Reservoir (Sheep Creek)	Town of Kremmling	Town of Kremmling	CBRT			See Comments	Conditional Reservoir < 50 AF Progress: Diligence filed. Dam design is being reviewed by State Engineers Office
Jones 2 Reservoir 2nd refill	Town of Kremmling	Town of Kremmling	Town of Kremmling			Diligence filed	
Upper Colorado River Irrigation and Restoration Project (KB Ditch to Blue River)	Grand County	Grand County	Grand County				
Granby - SCWWW Authority drinking water system permanent interconnect		Granby, SCWWW	CBRT				
Fraser-Winter Park Clean Water System Connection			CBRT				
Town of Kremmling Wolford Mountain Contracts	Town of Kremmling	Town of Kremmling	Town of Kremmling				
Expand Green Mountain Reservoir Historic Users Pool (HUP) to include Slot Group		Grand County	Grand County				
Protect Slot Group		Grand County	Grand County				
Sunset Ridge Pond		Grand County	Grand County				

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Regional Breakdown (cont)

Section 6.2 - 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, 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.

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 275,000 AF, diverting the largest amount of water from the Blue River through the Roberts Tunnel to the South Platte River Basin. The Lower Blue River 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 water quality challenges. The Snake River and Upper Blue Watershed Plans have been actively identifying and implementing projects to remediate these issues.

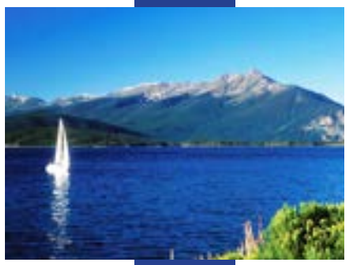
The Colorado Springs Utilities' Hoosier Pass Collection System and Vidler Tunnel impacts flows in the Blue River and Snake River. Streamflows in the Blue River below Dillon Reservoir under additional anticipated diversions through the Roberts Tunnel would be at or just above the minimum stream flows 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).

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. Table 13 includes a full list of projects in all phases from conceptual to just before construction in the Summit County Region. Figures 14- 16 depict the consumptive uses, environmental and recreational conditions, and identified projects for this region.



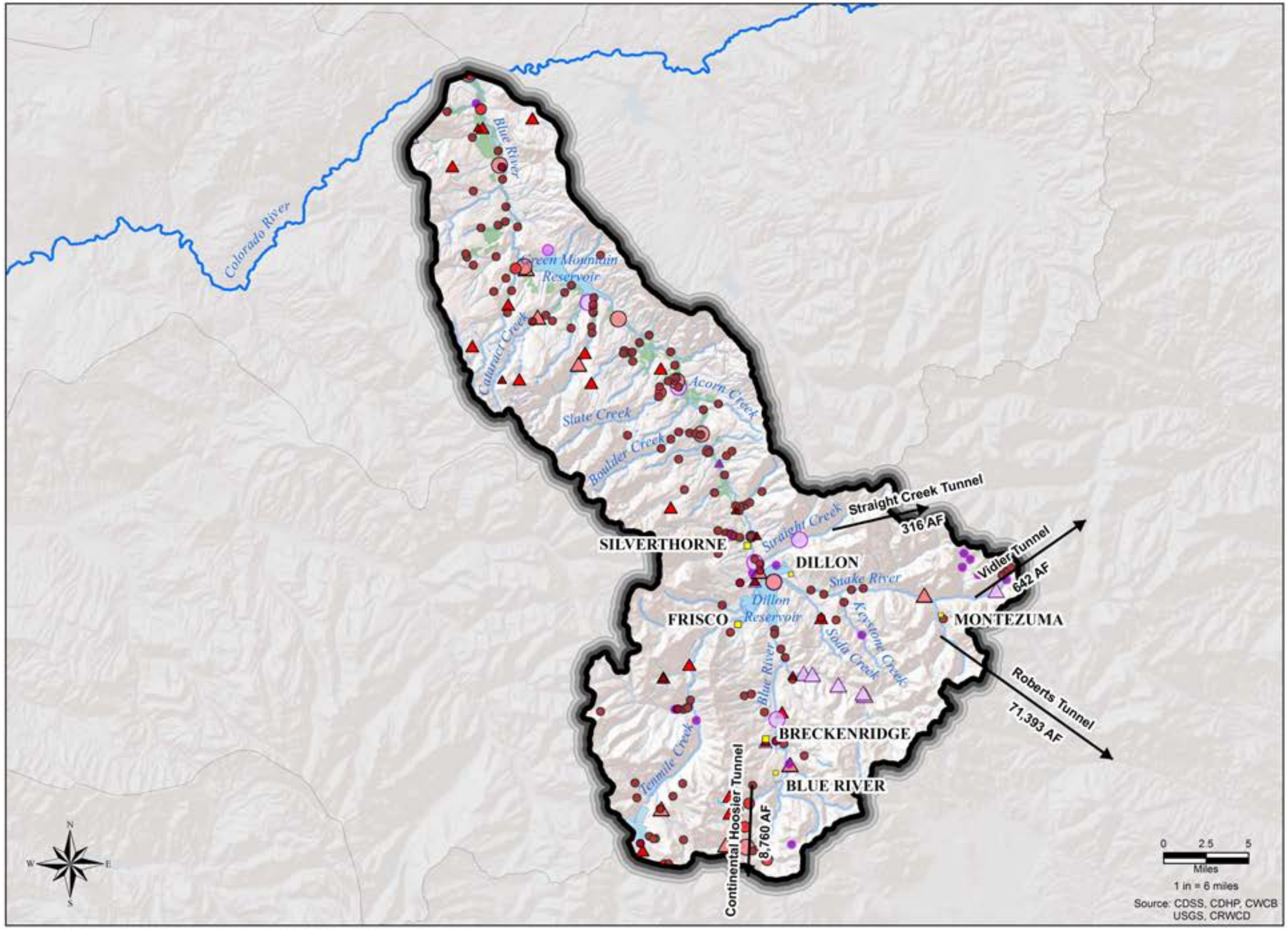


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Figure 14.

Colorado River BIP Summit Region

Consumptive Uses

Legend

- Irrigated Lands
- Water Provider Boundaries
- Conservancy Districts
- Transmountain Diversions (Average Annual 1987-2012)

Absolute Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Conditional Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Absolute Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Conditional Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

CFS = Cubic Feet Per Second
AF = Acre Feet

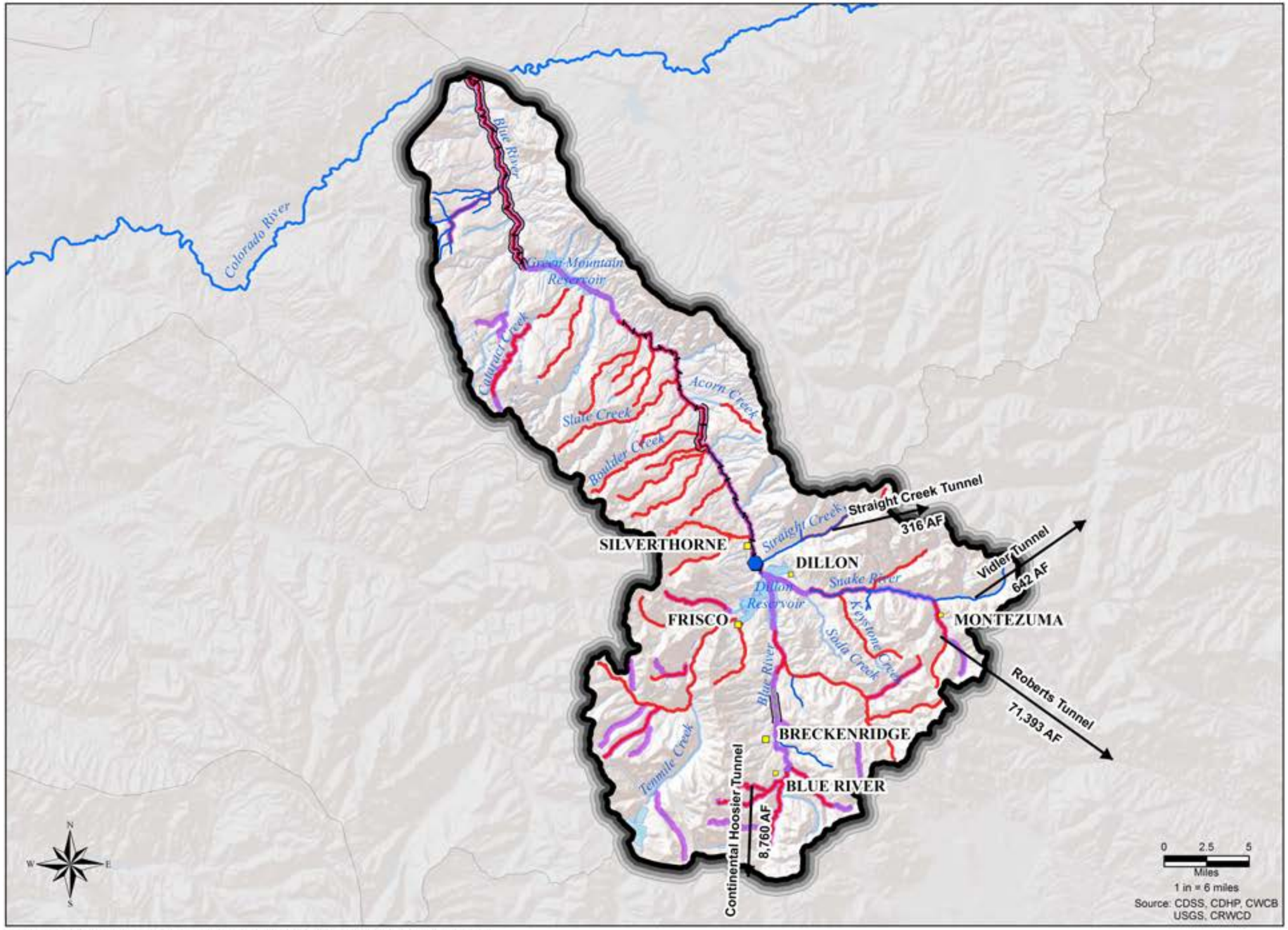
This map depicts only water rights for diversions above 5 CFS and reservoirs larger than 25 AF, to view the full state database of water rights visit http://cdss.state.co.us

SGM

Figure 15.

Colorado River BIP Summit Region

Environmental & Recreational Conditions



Legend

- Boatable Segments
- Gold Medal Streams
- 303d Listed Streams
- Identified Water Quality Issues (TMDL or M&E)
- Existing Instream Flows
- NCNA Identified Streams
- Transmountain Diversions (Average Annual 1987-2012)

Recreational In-Channel Diversions

- Decreed
- Pending

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

AF = Acre Feet
NCNA = Nonconsumptive Needs Assessment
TMDL = Total Maximum Daily Load
M&E = Monitoring & Evaluation

SGM

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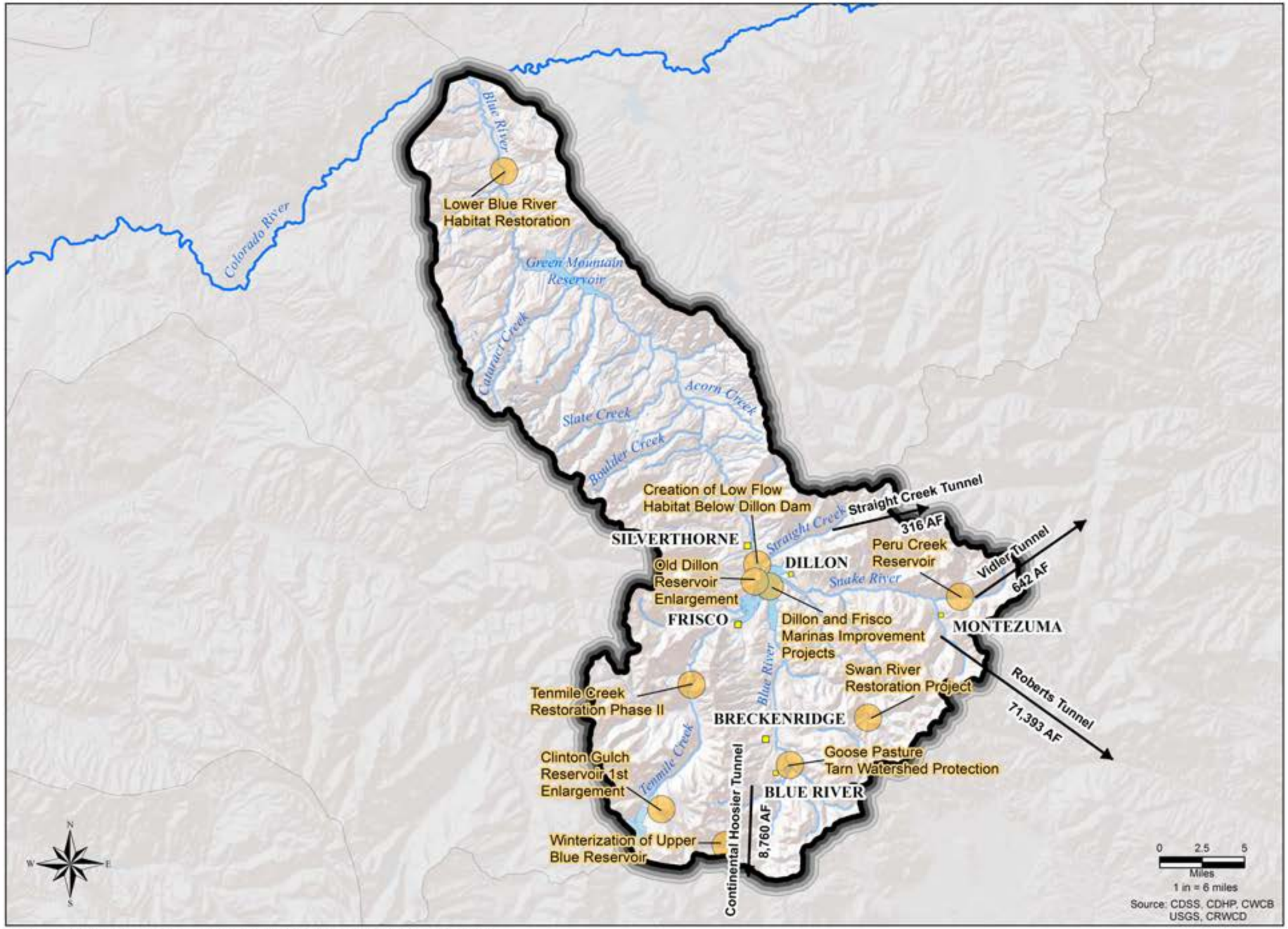

Figure 16.

Colorado River BIP Summit Region

Identified Projects

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Regional Breakdown (cont)

Section 6.2 - Summit County Region

Table 12. Summit County Region Themes and Supporting Vulnerabilities.

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 economies[1] - 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 methods[1] - Study habitat and ecological needs and develop flow/habitat management plans - Evaluate potential for improvements to coordinated reservoir operations - Tourism and recreation economy[1] 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 Toolbox[2,3,4] - Develop new water supplies to meet identified Gaps - Strict administration and augmentation of well depletions - Maintain acreage (for private farming or ownership by local entities) - Summit County augmentation plan	- 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

Regional Breakdown (cont)

Section 6.2 - Summit County Region

Table 13. Summit County Region Comprehensive List of Projects.

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, FS)	Progress	Comments (Opportunities and/or Constraints)
$1 million paid to Summit County by Denver Water for a Wastewater Treatment Plant Fund to offset the impacts of lower Dillon Reservoir levels or reduced outflows from Dillon Dam on permitted wastewater dischargers in Summit County	all municipalities	Denver Water/ Summit County	CRCA				
$1 million paid to Summit County by Denver Water for an Environmental Enhancement Fund to be used as 50% matching funds for environmental enhancement projects in Summit County	all municipalities	Denver Water/ Summit County	CRCA				
$9 million paid to Summit County by Denver Water that will be distributed in five equal shares to the following entities to offset the costs of the projects listed in Attachment G of the CRCA: Town of Dillon, Town of Silverthorne, Town of Frisco/Frisco Sanitation Dist., Town of Breckenridge, Summit County/ other water districts. (Specific Projects are outlined below)	all municipalities	Denver Water/ Summit County	CRCA				Specific projects are outlined below
Dillon Reservoir Additional 250 AF Storage (no replacement water) - Upon Resolution of Blue River Decree Issues, Denver Water will provide an additional 250 AF of water per year from Dillon Reservoir with a yield as reliable as the yield available to Denver Water at Dillon Reservoir. This water will be allocated as follows Silverthorne-60 AF, Summit County-56 AF, Snake River Water District-45 AF, Dillon-45 AF, Copper Mt. Metro District-29 AF, Dillon Valley Metro District-15 AF	all municipalities	Denver Water/ Summit County	CRCA	250 AF			
Dillon Reservoir Additional 1,493 AF Storage (replacement water) - Upon resolution of Blue River Decree issues, Denver Water will provide to the entities listed below 1493 AF per year from Dillon Reservoir with a yield as reliable as the yield available to Denver water at Dillon Reservoir. This water shall be made available directly in Dillon Reservoir each year or, at the option of an individual recipient, at Clinton Gulch Reservoir.	all municipalities	Denver Water/ Summit County	CRCA	1493 AF			
Dillon Bypass Flows - Denver Water's release of water from Dillon Reservoir is subject to the terms of its 1966 right-of-way from the Department of Interior for Dillon Reservoir. Upon resolution of Blue River Decree issues, Denver Water agrees: (1) to waive its right to reduce releases under section 2 (C) of the 1966 right-of-way; and (2) to add the following new limitation upon its ability to reduce releases in addition to the conditions described in the right of way: Denver Water will not reduce releases below those required by section 2 (A) of the right of way unless an emergency declaration banning residential lawn watering during the irrigation season is in force within its Service Area.	all municipalities	Denver Water/ Summit County	CRCA				
Design and construct kayak park for RICD (Blue River blw Dillon Reservoir; part of 1493 AF replacement water)		Town of Silverthorne	NC Needs Assmt				CPW is concerned for macroinvetebrates and fish passage at RICD projects. (less of a concern at base of Dillon Dam); consult with CPW. Silverthorne RICD has highly variable diurnal flows.
Montezuma Shaft utilization (snowmaking purposes at Keystone from Denver Water) - Denver water is willing to consider, on a case-by-case basis, use of the Montezuma Shaft by the Snake River Water Dist., East Dillon Water Dist and Summit County Government on a space available basis when the Roberts Tunnel is operating.		Keystone Resort	CRCA/ UPCO				Benefits snowmaking/Self-Supplied Industrial
Dillon Reservoir Levels - Denver Water agrees to use its best efforts to maintain the water level of Dillon Reservoir for recreational and aesthetic purposes at or above 9012 feet in elevation from June 18 to Labor Day of each year.		Denver Water/ Summit County	CRCA				

Regional Breakdown (cont)

Section 6.2 - Summit County Region

Table 13. Summit County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, FS)	Progress	Comments (Opportunities and/or Constraints)
Future Dillon Water Agreement (1985 Summit Agreement) - Denver Water has allowed the Town of Frisco to use its Future Dillon Water under the 1985 Summit Agreement as a source of augmentation supply for snowmaking at its winter sports area pursuant to the Future Dillon Water Agreement. Denver Water and Frisco agree to participate in a joint study on the amount and timing of snowmaking return flows from the winter sports are and to cooperate in maximizing the amount of snowmaking return flows in any Water Court proceeding.	snowmaking and municipalities	Denver Water/ Town of Frisco	CRCA				
Additional Exchanges - Denver Water will allow additional exchanges through Dillon Reservoir for the benefit of Summit County users, so long as Denver Water's firm yield is kept whole.	all municipalities	Denver Water/ Summit County	CRCA				
Temporary Storage in Dillon Reservoir - At its sole discretion, Denver Water will allow Summit County entities to temporarily store additional water in Dillon Reservoir on a space available basis.	all municipalities	Denver Water/ Summit County	CRCA				
Silverthorne's Dillon Storage Water - Upon resolution of Blue River Decree issues, Denver Water and Summit County will amend the 1985 Summit Agreement to eliminate the current restrictions on the use of the 300 acre feet of Dillon Storage Water made available to the Town of Silverthorne. A form of the revisions to the 1985 Summit Agreement to accomplish this result is Attachment H. The Silverthorne RICD will not be used to prevent or otherwise limit the exchange or substitution of any replacement or exchange water into Dillon Reservoir under this Agreement, the 1985 Summit Agreement or the 1992 Clinton Agreement.	all municipalities	Denver Water/ Summit County	CRCA				CPW is concerned for macroinvertebrates and fish passage (less of a concern at base of Dillon Dam)
Clinton Reservoir 1st Enlargement and Refill (06CW252) -raise spillway crest for snowmaking and municipal benefit.	snowmaking and municipalities		CRCA	500 AF	4,460 AF		Was recently surveyed; found additional storage was available; Benefits snowmaking/Self-Supplied Industrial
Clinton Reservoir Dead Storage Pool - Upon execution of this Agreement, Denver Water and the Clinton Ditch & Reservoir Company will enter into the Interim Agreement regarding the Clinton Reservoir dead storage pool		Denver Water/ Clinton Ditch & Reservoir Company	CRCA				
Clinton Reservoir Spillway Enlargement Water - Upon Resolution of Blue River Decree Issues, Denver Water and the Clinton Ditch & Reservoir Company will modify their existing 1992 Clinton Agreement to add the spillway enlargement water (up to a maximum of 500 acre feet). Water from the total reservoir capacity, including the dead storage pool and spillway enlargement, will be allocated to existing shareholders of the Clinton Ditch & Reservoir Company on a pro rata basis as either 4th year supply, or one-third of that amount will be so allocated as an increase in the "Reservoir Yield" of Clinton Reservoir, as that term is defined in the 1992 Clinton Agreement.		Denver Water/ Clinton Ditch & Reservoir Company	CRCA				
Purchase of Tenmile Creek water rights from Climax or use of water from the Clinton Reservoir dead pool. To help with frequent small shortages and large shortages on the Blue River and/or Snake River and to maintain instream flows.			SWSI 2010/ UPCO Study				
Town of Breckenridge outside irrigation minimization plan (well mitigation)		Town of Breckenridge	WP Interview				
New Water Treatment Plant in Town of Breckenridge to help instream flows		Town of Breckenridge	WP Interview				

Regional Breakdown (cont)

Section 6.2 - Summit County Region

Table 13. Summit County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, FS)	Progress	Comments (Opportunities and/or Constraints)
Tenmile Creek Restoration Project Phase II - Stream restoration on Tenmile Creek near Copper Mountain - Restore hydrologic characteristics of stream. Channelizing flow and creating better aquatic habitat.		Blue River Watershed, Forest Service, Copper, Climax	Blue River Watershed	1200 ft	1600 ft	On-going (hoping to complete by 2015)	Listed in NCNA Jim Shaw of the Blue River Watershed is a contact for project. Project has completed 1200 feet of restoration and has another 1200 feet planned. Currently working on funding. Hoping to complete by 2015.
Tudor Jones reclamation for trout habitat (a private proponent for the Blue River)			NC Needs Assmt			On-going	
Green Mountain Reservoir controlled flow fluctuations			NC Needs Assmt				
Aquatic habitat study and restoration project on Blue River above Dillon - Need to develop restoration plan. Reach is currently devoid of all aquatic life.		Town of Breckenridge	NC Needs Assmt				Peggy Bailey at Tetra Tech was contacted
Blue River Watershed Group - Swan River channel restoration design near the confluence of the south and north fork. Improving channel flow and aquatic habitat for cutthroat trout to create a 17-mile contiguous habitat. Improve access to river reach.		Blue River Watershed, Forest Service, TU	Blue River Watershed			On-going (hoping to complete by 2015)	A collective project by Blue River Watershed, Trout Unlimited, Forest Service, Private Land Owners, Summit County Open Space and Town of Breckenridge. Project has design and is working on funding. Jim Shaw of the Blue River Watershed was contacted.
Enlargement of McCullough Gulch Reservoir - Possible joint project with Colorado Springs to expand some of their storage on Hoosier Pass.			SWSI 2010/ UPCO Study			Conceptual	
Cleanup measures in French Gulch mine drainage			SWSI 2010/ UPCO Study			On-going	
Non-potable water reuse on Summit County golf courses (From $9 Million fund specified in CRCA)			SWSI 2010/ UPCO Study				(From $9 Million fund specified in CRCA)
Eagle Park Reservoir to help maintain CWCB instream flows in Tenmile Creek and Blue River.			SWSI 2010/ UPCO Study				
Construction of reservoir in Peru Creek drainage (From $9 Million fund specified in CRCA)		Summit County	SWSI 2010/ UPCO Study			Decree issued in 10CW43	
Mine site remediation (multiple efforts within French Gulch; Peru Creek; St. John's Creek) (From $9 Million fund specified in CRCA)			SWSI 2010/ UPCO Study				(From $9 Million fund specified in CRCA)
Straight Creek Watershed Protection (CDOT impact mitigation for the Town of Dillon water supply)			WP Interview			2025	(From $9 Million fund specified in CRCA)
Movable floating marina for Frisco/ Dredging or excavation/New boat ramps (From $9 Million fund specified in CRCA)			SWSI 2010/ UPCO Study			Have ACOE Permit	(From $9 Million fund specified in CRCA)
Study potential decrease in TMD diversions if Denver/Northern reuse water.			UPCO Study				May reduce TMDs and help meet nonconsumptive needs in the Colorado River Basin.
Installation of ultra-violet disinfection system at the Frisco Wastewater plant (From $9 Million fund specified in CRCA)			WP Interview				(From $9 Million fund specified in CRCA)
Joint Sewer Authority WWTP improvements to mitigate impacts (Silverthorne-Dillon Joint Sewer Authority) (From $1 Million fund specified in CRCA)			WP Interview				$1,000,000 from Denver Water

Regional Breakdown (cont)

Section 6.2 - Summit County Region

Table 13. Summit County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, FS)	Progress	Comments (Opportunities and/or Constraints)
Blue River Erosion Protection		Town of Silverthorne	Summit County			2025	
Staged Dillon Reservoir release structure			WP Interview			2025	(From $9 Million fund specified in CRCA) - selective level outlet works
Operational changes to provide ramping releases from reservoirs to simulate natural hydrology for the benefit of the fisheries and releasing less water during spring run off for longer periods of time to stretch the rafting and kayaking season.			SWSI 2010/ UPCO Study				CRCA has stipulations for flat-water benefit
Creation of a low flow channel below the Dillon Dam and fish habitat improvements		Town of Silverthorne, Trout Unlimited	SWSI 2010/ UPCO Study				2003 Report - "Blue River Restoration Project" is underway but needs financial assistance.
Increase dry year conservation measures in Metro area and Summit County			SWSI 2010/ UPCO Study				CRCA addressed some conservation measures
Upper Blue Pumpback/McCain storage (Town of Breckenridge water treatment has some pump back) (From $9 Million fund specified in CRCA)		Town of Breckenridge	WP Interview			2014	(From $9 Million fund specified in CRCA)
Goose Pasture Tarn/Blue River watershed protection (Town of Breckenridge; wildfire protection and tree cutting)		Town of Breckenridge	WP Interview			2020	
Lower Blue River habitat improvements/wetlands mitigation (From $9 Million fund specified in CRCA)			WP Interview			2020	(From $9 Million fund specified in CRCA)
Improvements to Snake River WWTP for mine waste and discharge cleanup (From $9 Million fund specified in CRCA)			WP Interview			2020	(From $9 Million fund specified in CRCA)
Drilling deeper wells (Buffalo Mountain Metropolitan District) (From $9 Million fund specified in CRCA)			WP Interview			2020	(From $9 Million fund specified in CRCA)
Direct intake from Dillon Reservoir (East Dillon Water District) (From $9 Million fund specified in CRCA)			WP Interview			2020	(From $9 Million fund specified in CRCA)
Treatment options necessary to utilize surface water (East Dillon Water Dist.) (From $9 Million fund specified in CRCA)			WP Interview			2020	(From $9 Million fund specified in CRCA)
Connect Hamilton Creek System to Silverthorne System via Angler Mtn Ranch (Hamilton) (From $9 Million fund specified in CRCA)			WP Interview			2015	(From $9 Million fund specified in CRCA)
Buffalo Mountain Metro Dist or Silverthorne water system to Mesa Cortina W&S (From $9 Million fund specified in CRCA)			WP Interview			2015	(From $9 Million fund specified in CRCA)
Develop boat chutes on Blue River			SWSI 2010/ UPCO Study				CPW is concern for macroinvertebrates and fish passage in RICD projects and recommends project sponsors consult with CPW.

Regional Breakdown (cont)

Section 6.2 - Summit County Region

Table 13. Summit County Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, FS)	Progress	Comments (Opportunities and/or Constraints)
McCain Reservoir (Town of Breckenridge)		Town of Breckenridge	WP Interview	2,500 AF		Proposed	
Swan Reservoir (Town of Breckenridge)		Town of Breckenridge/ Summit County	WP Interview	2-30,000 AF			
Spruce Creek Reservoir			WP Interview				
Noxious weed treatment (programs to manage high water consuming plants along river banks)			CBRT				
Wetland bank (proposed near the confluence of the Blue and Colorado Rivers).		Private	CBRT				Summit County does not support this project. Would like the wetland bank(s) closer to the area(s) of need/impact. Wetland Banking is 'mitigation' (at best); should not be perceived to have environmental or recreational benefits.
Forest Health/Watershed Improvements		Summit County	CBRT				From Lane Wyatt
Blue River Watershed Management Plan		Summit County	CBRT				
Snake River Watershed Plan		Summit County	Blue River Watershed				"dirty dozen" mine reclamation projects. Per Summit Daily article, June 21, 2013 article, "A hard-truth tour of Summit County mines highlights sources of pollution", about half have been completed.
Pennsylvania Mine Project -In 2013 DRMS conducted extensive underground mine rehabilitation work to allow equipment access for the next phase of bulkhead feasibility planning. The work completed in 2013 includes additional stabilization and support of mixed-face ground at the portal-rock interface, cleanout of sludge and debris with treatment of the outflows during construction, and ground support work in the cross cut and vein intersection areas. This work completed in 2013 will further planning for potentially installing underground bulkhead seals in the summer of 2014.	Environmental, WQ	DRMS, Blue River Watershed Group, TU, USEPA, USFS	DRMS			Investigation / Bulkhead Design Underway	Total Project Budget: $100,000 EPA/CDPHE (Drilling'10), approx. $1.0 million combined EPA and USFS funds. (bulkhead investigation, design and construction, joint repository investigation and construction). DRMS In-kind technical assistance, some set tax contributions as yet to be determined.
Winterization of Upper Blue Reservoir from Summit County Projects List "Attachment G" dated 4/25/2012.		Town of Breckenridge, Breckenridge Ski Area	Summit County	150 AF			
Frisco Sanitation District Outfall Project		Town Of Frisco	Summit County				Controlling sediment and erosion control
Town of Breckenridge Water Conservation Plan		Town of Breckenridge	Town of Breckenridge				
Old Dillon Reservoir for Town of Dillon	Town of Dillon	Town of Dillon	CBRT			Underway	
Pipeline/Siphon into the Town of Dillon through Dillon Reservoir or alternative facilities for access to Salt Lick Gulch flow rights and storage capacity in Old Dillon Reservoir	Municipal	Town of Dillon	CBRT				
Dillon Marina improvements - shoreline stabilization and wharf structure	Recreational	Town of Dillon	CBRT				
Frisco Sanitation District - Upgrade WWTP to meet standards to discharge to Miners Creek or relocate effluent outfall to discharge into Dillon Reservoir at a location that satisfies discharge permit conditions	Environmental, WQ	Frisco Sanitation Dist.	CBRT				

Regional Breakdown (cont)

Section 6.3 - State Bridge Region

The State Bridge Region consists of the Colorado River from below Kremmling 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 January 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 fish habitat and the existing ecosystems. The proposed Wolcott Reservoir, if built, will 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 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 14 highlights the top specific themes and vulnerabilities, methods and projects for the State Bridge Region. Table 15 includes a full list of projects in all phases from conceptual to just before construction in the State Bridge Region. Figures 17-19 depict the consumptive uses, environmental and recreational conditions, and identified projects for this region.

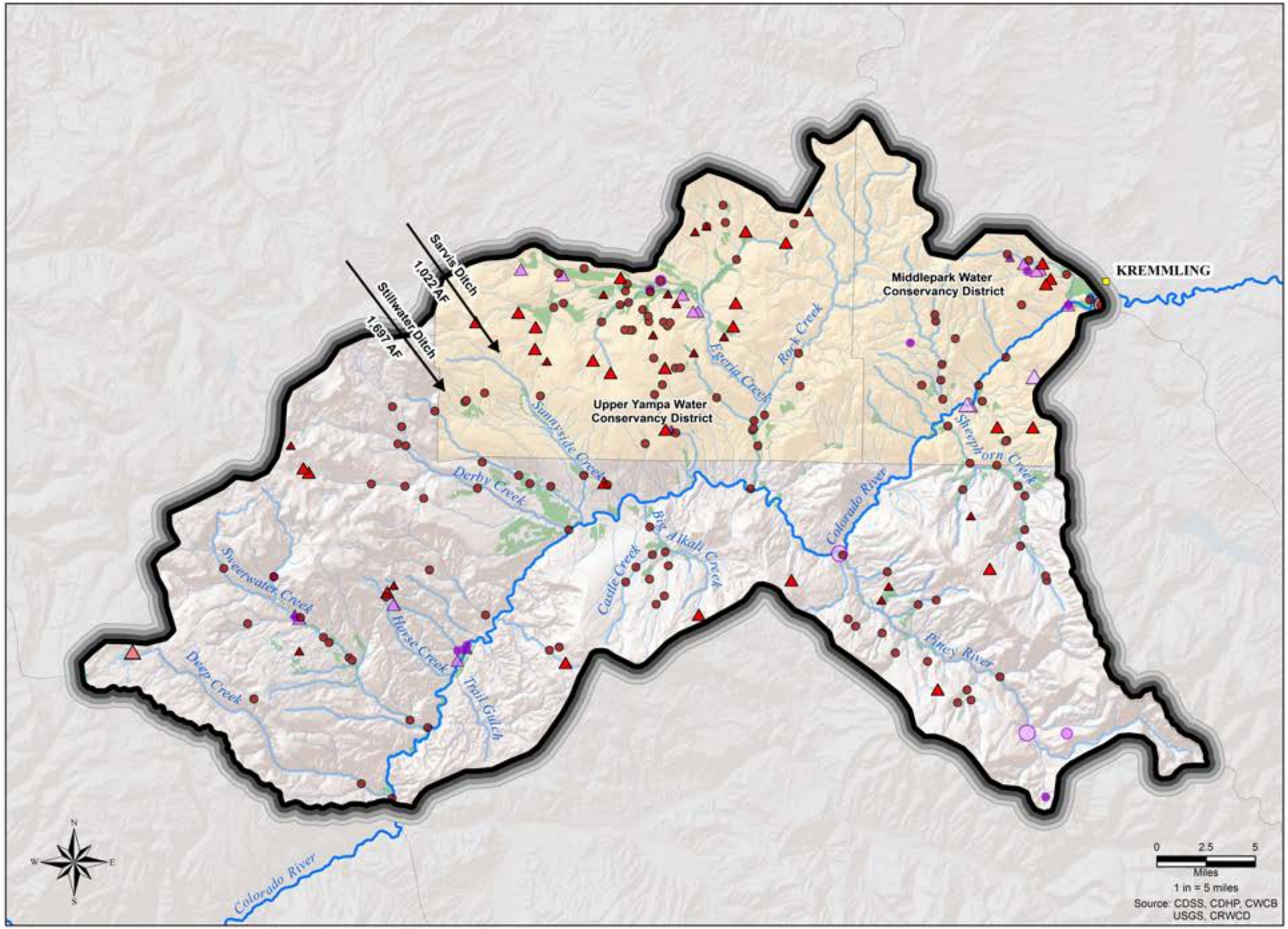

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Figure 17.

Colorado River BIP State Bridge Region

Consumptive Uses

Legend

- Irrigated Lands
- Water Provider Boundaries
- Conservancy Districts
- Transmountain Diversions (Average Annual 1987-2012)

Absolute Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Conditional Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Absolute Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Conditional Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

CFS = Cubic Feet Per Second
AF = Acre Feet

This map depicts only water rights for diversions above 5 CFS and reservoirs larger than 25 AF, to view the full state database of water rights visit http://cdss.state.co.us

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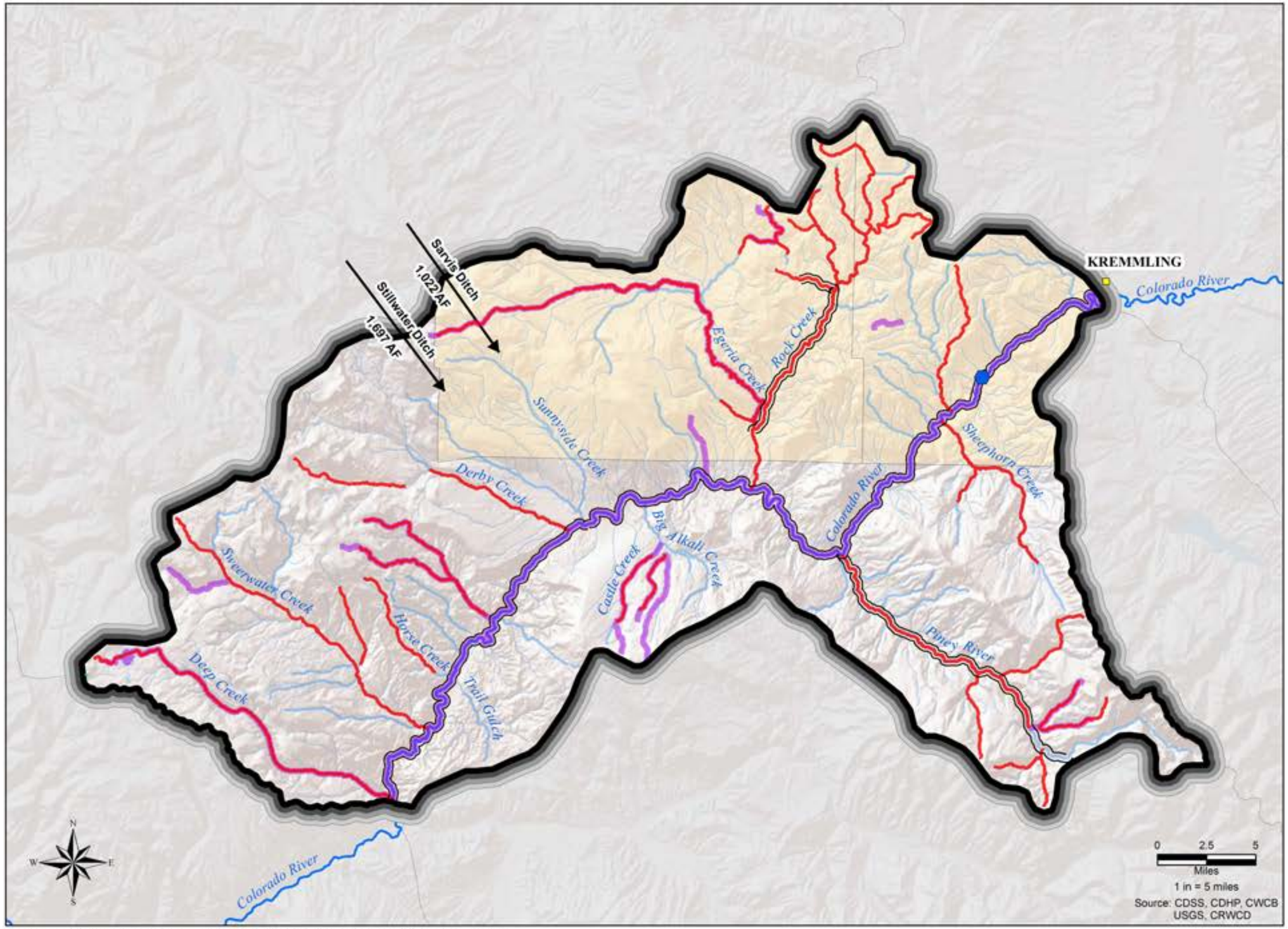

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Figure 18.

Colorado River BIP State Bridge Region

Environmental & Recreational Conditions

Legend

- Boatable Segments
- Gold Medal Streams
- 303d Listed Streams
- Identified Water Quality Issues (TMDL or M&E)
- Existing Instream Flows
- NCNA Identified Streams
- Transmountain Diversions (Average Annual 1987-2012)

Recreational In-Channel Diversions

- Decreed
- Pending

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

AF = Acre Feet
NCNA = Nonconsumptive Needs Assessment
TMDL = Total Maximum Daily Load
M&E = Monitoring & Evaluation

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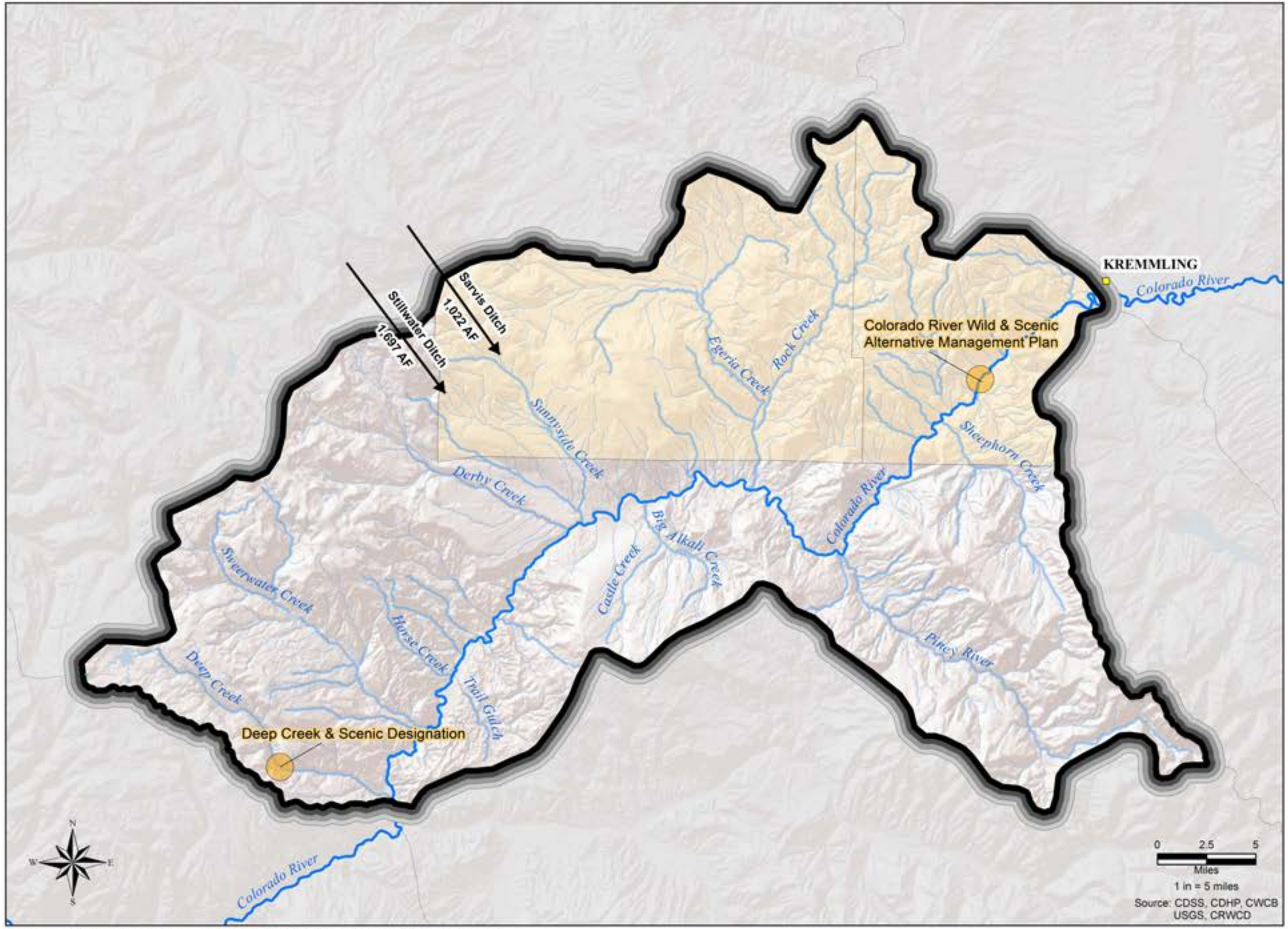

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Figure 19.

Colorado River BIP State Bridge Region

Identified Projects

Regional Breakdown (cont)

Section 6.3 - State Bridge Region

Table 14. State Bridge Region Themes and Supporting Vulnerabilities.

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 economy[1] 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]	

Regional Breakdown (cont)

Section 6.3 - State Bridge Region

Table 15. State Bridge Region Comprehensive List of Projects.

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Environmental and Recreational Pilot Project			CRCA				See '*Upper Colorado Wild and Scenic Stakeholder Group Management Plan*'
Holden Reservoir restoration		Flattops Water Company	Restricted Reservoirs	25 AF			Reservoir is restricted due to "Seepage above service spillway on downstream slope". All 25 AF of storage is restricted. Put under restriction on 08/26/2006. Holden Reservoir is part of a transbasin irrigation system from Division 6 to Division 5.
Kelly Reservoir restoration		Flattops Water Company	Restricted Reservoirs	84 AF	19 AF		Reservoir is restricted due to "Increase in seepage ". 84 AF of the full 113 AF is currently lost in the restriction. Put under restriction on 08/26/2006.
Wild and Scenic Alternative Management Plan - Colorado River		BLM	BLM			Deferred	Upper Colorado Wild and Scenic Management Plan on Federally owned reaches of the Colorado River between Kremmling and Dotsero. Kremmling and Colorado River Valley field offices of BLM recommend adopting the W&S SG Alternative Management Plan into the BLM's updated Resource Management Plan for the region. This option retains W&S *eligibility* for the reach, but defers a *suitability* recommendation to Congress, instead proposing to utilize the W&S SG's Alternative Mgmnt Plan to appropriately manage the river to "balance permanent protection of the segment's outstandingly remarkable values (ORVs), certainty for the stakeholders, water project yield, and flexibility for water users. The Group's management plan uses long term protection measures and voluntary cooperative measures of the Stakeholder Group to protect all the ORVs in the segments, while focusing on recreational fishing and recreational floatboating" (From Introduction to W&S SG Alt. Mgmnt. Plan, 2014, and BLM KFO PRMP 2014)
Wild and Scenic Designation - Deep Creek		USFS	BLM			In Progress	Segments 1, 2a, 2b, and 3 of Deep Creek were determined suitable for Scenic and Recreational designations. WRNF published a Draft ROD in early 2014. The recommendation will proceed for Congressional approval, pending public comment and objections phase. Contact: Kay Hopkins at 970-846-9040 or email at kchopkins@fs.fed.us.
Coordinated flushing flows releases from upstream reservoirs			CBRT				Quantification of channel maintenance/flushing flows is currently under study as part of the ERWC's CRIA, and the W&S Stakeholder Group's *Channel Maintenance Work Group* (Rob Buirgy, Project Manager 720-441-7510). Once best estimates are determined, opportunities for coordinated reservoir operations or alternative flow management scenarios could be further explored.
Wolcott Reservoir - 105,000 AF reservoir on Alkali Creek · 150 cfs pump station from Colorado and Eagle Rivers		Denver Water, ERWSD, CRWCD	10,825 Study/ CRCA	105,000 AF		In Progress	- Grand Valley water providers are concerned that reservoir releases will degrade water quality of lower Colorado River - This project will reduce flows from Blue River (below Green Mountain Res) all the way down stream to Dotsero on the Colorado River, thru Wild & Scenic reaches
Gore Canyon Whitewater Park		Grand/Eagle County	10,825 Study/ CRCA	860-1500 cfs (RICD)		In Progress	RICD decree issued by Div 5 in January by CWCB, tied to CRCA agreements. $1.2 M cost to be funded in part by Grand County, Eagle County, and CWCB.
Tributary fishery restoration		Grand/Eagle County	CBRT				Stream habitat projects on various perennial tribs in the State Bridge Region including Piney River, Deep Creek, and Red Dirt Creek in order to protect and enhance sport fisheries and native species of concern. Conservation Populations of cutthroat exist on several of these tributaries.
Colorado River Inventory and Assessment			CBRT			In Progress	
2013 Eagle River Watershed Plan identified strategies and actions		Eagle County, Eagle River Watershed Council	CBRT			In Progress	

Regional Breakdown (cont)

Section 6.4 - 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 and 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, as the home of the Vail, Beaver Creek and Arrowhead Ski areas, is very much dependent upon the health of the environment as are other tourism and recreation industries. While rapid urbanization in upper valley resort communities has slowed, development focus has shifted in earnest 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 Wolcott Reservoir, a contested project among Basin regions, will allow Denver to increase diversions out of Dillon Reservoir 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.

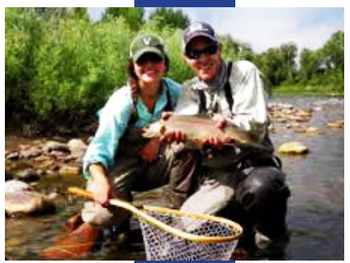
The Columbine, Ewing & Wurtz Ditches and the Homestake Tunnel divert water out of the Eagle River watershed to the Arkansas River Basin. The ERWSD has and continues to collaborate with water providers on the Front Range as participants in the Eagle River Memorandum of Understanding (MOU) and the CRCA agreements. The objective of the MOU 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 elevation 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 approval, 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 is included in the following tables. Table 16 highlights the top specific themes and vulnerabilities, methods and projects for the Eagle River Region. Table 17 includes a full list of projects in all phases from conceptual to just before construction in the Eagle River Region. Figures 20-22 depict the consumptive uses, environmental and recreational conditions and the top projects identified for this region.



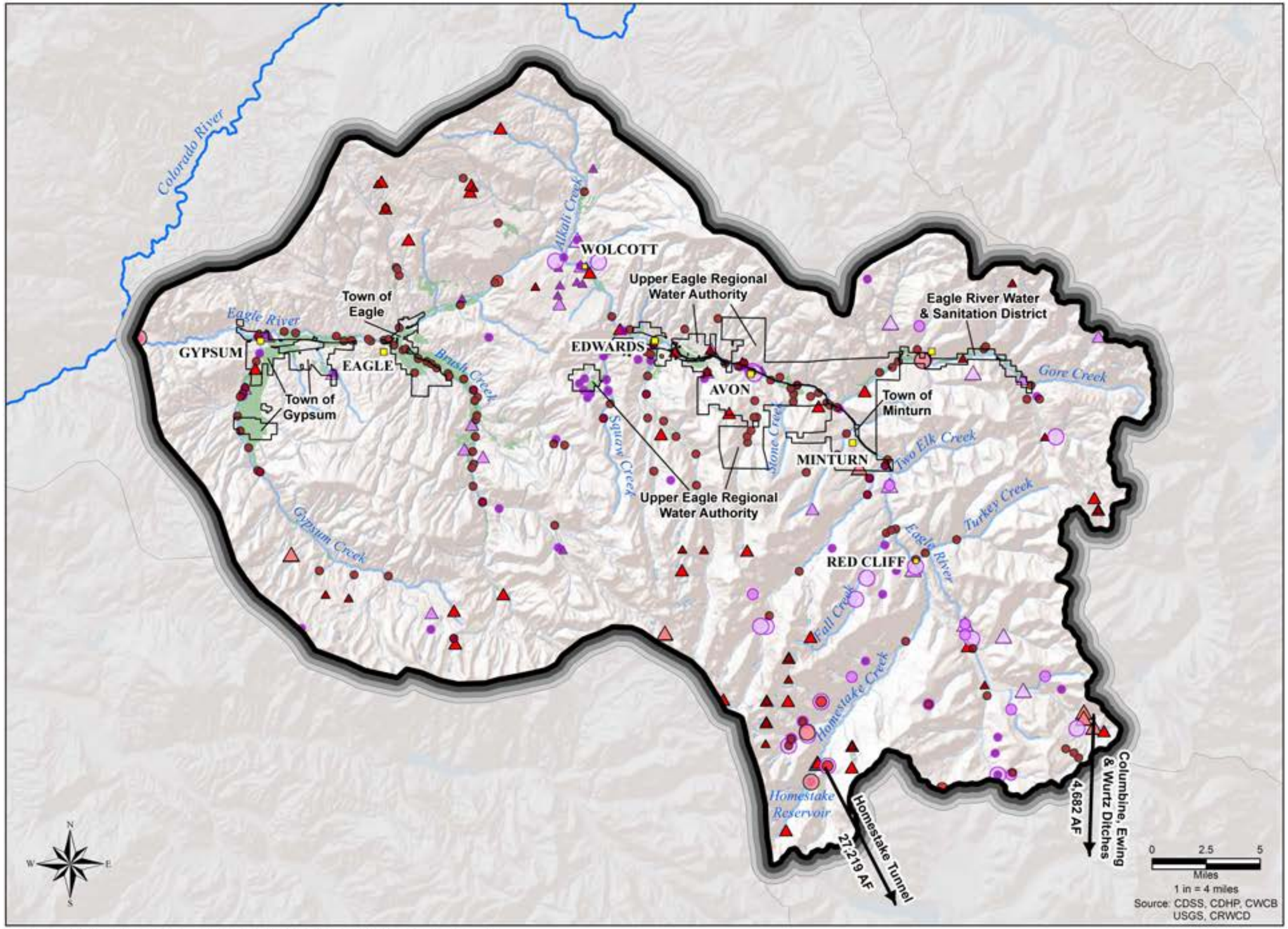


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Figure 20.

Colorado River BIP
Eagle River Region

Consumptive Uses

Legend

- Irrigated Lands
- Water Provider Boundaries
- Conservancy Districts
- Transmountain Diversions (Average Annual 1987-2012)

Absolute Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Conditional Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Absolute Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Conditional Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

CFS = Cubic Feet Per Second
AF = Acre Feet

This map depicts only water rights for diversions above 5 CFS and reservoirs larger than 25 AF, to view the full state database of water rights visit http://cdss.state.co.us

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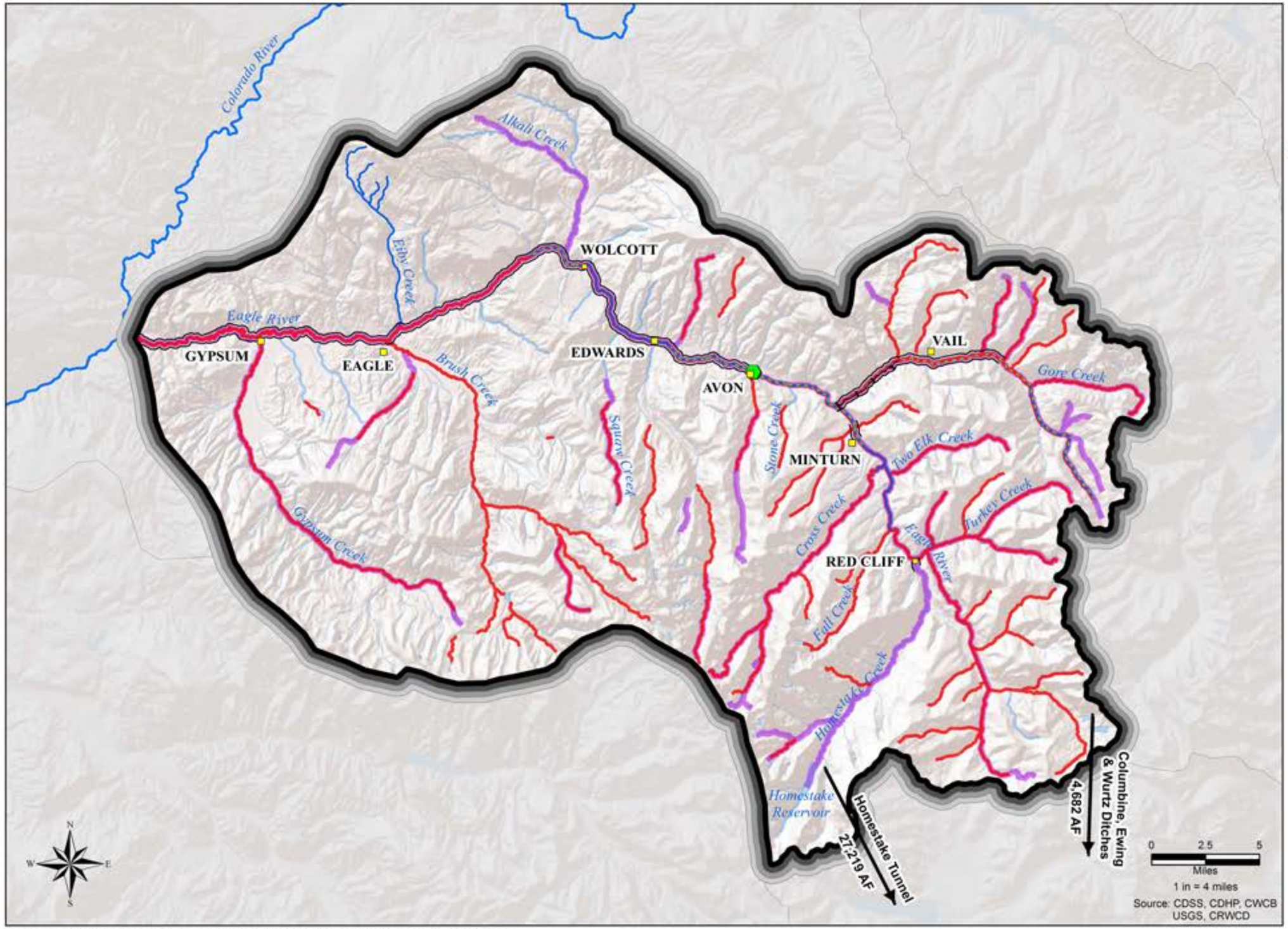

Figure 21.

Colorado River BIP
Eagle River Region

Environmental & Recreational Conditions

Legend

- Boatable Segments
- Gold Medal Streams
- 303d Listed Streams
- Identified Water Quality Issues (TMDL or M&E)
- Existing Instream Flows
- NCNA Identified Streams
- Transmountain Diversions (Average Annual 1987-2012)

Recreational In-Channel Diversions

- Decreed
- Pending

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

AF = Acre Feet
NCNA = Nonconsumptive Needs Assessment
TMDL = Total Maximum Daily Load
M&E = Monitoring & Evaluation

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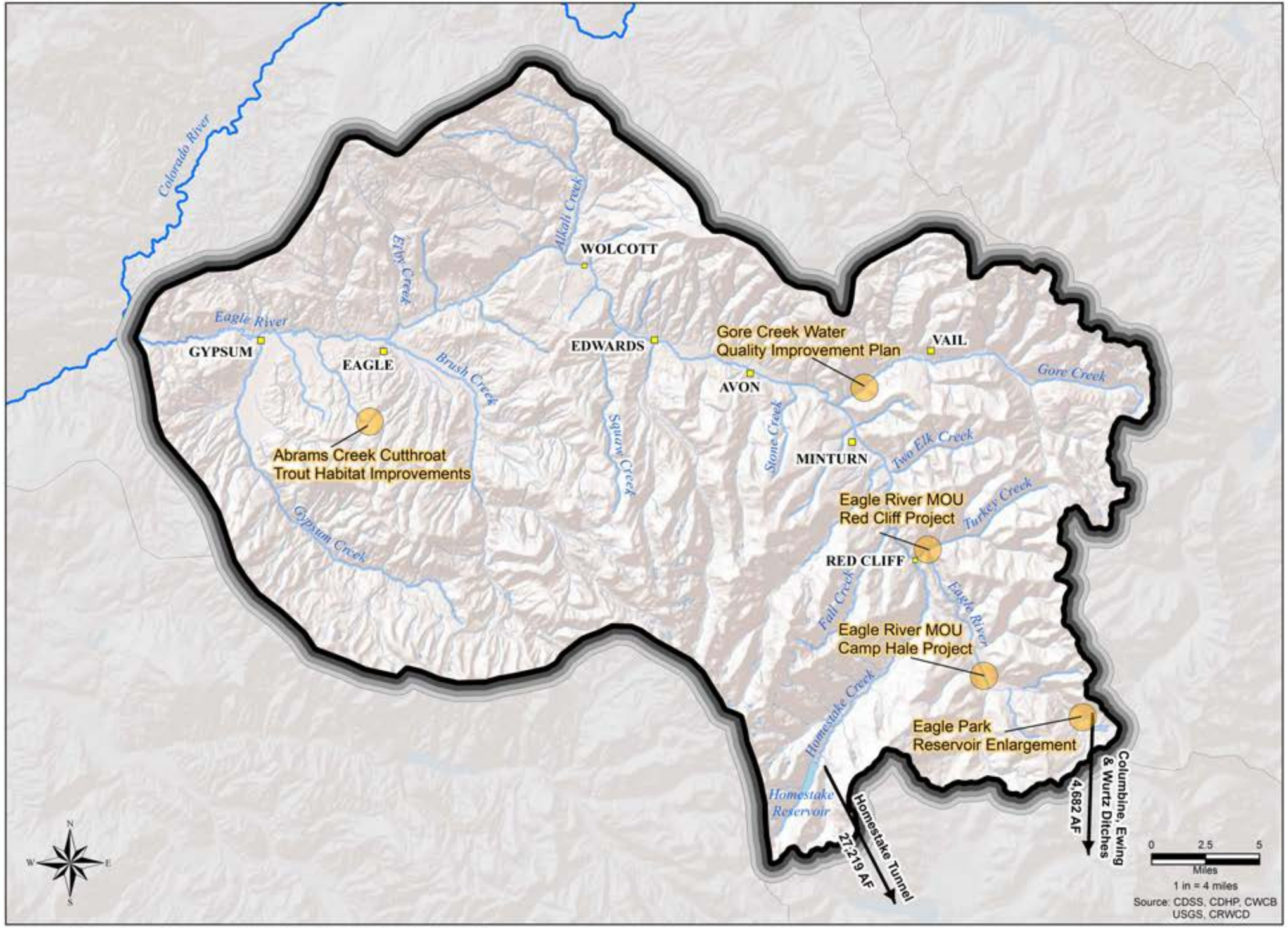

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Figure 22.

Colorado River BIP
Eagle River Region

Identified Projects

Regional Breakdown (cont)

Section 6.4 - Eagle River Region

Table 16. Eagle River Region Themes and Supporting Vulnerabilities.

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 economies[1] - 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 economy[1] 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 Toolbox[2,3,4] - 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

Regional Breakdown (cont)

Section 6.4 - Eagle River Region

Table 17. Eagle River Region Comprehensive List of Projects.

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS, other)	Existing (AF, CFS, other)	Progress	Comments (Opportunities and/or Constraints)
ERMOU Project The ERMOU Joint Use Water Project (ERMOU Project) derives from the 1998 Eagle River MOU among East and West Slope water users for development of a joint use water project in the Eagle River basin that minimizes environmental impact, is cost effective, technically feasible, can be permitted by local, state and federal authorities, and provides 20,000 acre feet per year (AFY) average annual yield for East Slope use, 10,000 AFY firm dry year yield for West Slope use, and 3,000 AF of reservoir capacity for Climax Molybdenum Co. The ERMOU Project is proposed as a cooperative alternative to construction of the Homestake II Project in the Holy Cross Wilderness. The ERMOU Project will utilize conditional water rights held by the ERMOU Parties and a yet-to-be determined combination of gravity diversion, storage, pumping, and/or groundwater infrastructure to develop the contemplated project yield. ERMOU Parties include: 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	ERMOU Parties	ERMOU Parties	ERMOU Parties	20,000 AFY average annual yield for Cities, 10,000 AFY firm dry year yield for the Reservoir Co., 3,000 AF storage space for Climax	2500 AF	Ongoing	Progress on the ERMOU Project has been continuous since 1998, with development and use of the Eagle Park Reservoir as a phase component of the Project, investigation of specific project configurations described in the ERMOU, investigation of alternative project configurations, and acquisition and adjudication of water rights to be used for the ERMOU Project. Currently, the Project Sponsors are continuing investigations to evaluate the "Whitney Creek" alternative, consisting of a surface diversion from the Eagle River in the area of Camp Hale with a dual purpose storage reservoir / pumping forebay on Homestake Creek to store West Slope yield, and regulate and feed East Slope yield up to Homestake Reservoir. The Project Sponsors hope to conduct field reservoir siting studies for this possible project component during the summer of 2014. They will continue to examine additional project variations and components that will be needed to develop the full yield contemplated for the ERMOU Project.
Red Cliff Project (Iron Mountain)		CRWCD	ERMOU Project	60,000 AF			
Fryingpan Project			ERMOU Project				
Eagle Park Reservoir Enlargement	Municipal, environmental		ERWSD, URWA	5,000 AF		Decreed	This is already decreed, has few if any environmental issues, and is likely to be up to 5,000± AF.
SWSI summer base flow project on Eagle River - Problem identified, no solutions identified	nonconsumptive	CPW	NC Needs Assmt				This project is specifically intended to address changes to late-summer and fall return flows due to changes in land use within the Eagle River corridor (primarily ag conversion). Multiple projects identified within this matrix MAY provide this relief if proper coordination and operations integrated into project.
Abrams Creek cutthroat trout habitat improvements - Project involves working with private entity to improve flow conditions below headgate to protect and expand native cutthroat trout population.	nonconsumptive	CPW	NC Needs Assmt				Details of project yet to be determined. Concepts include ditch efficiencies and habitat improvements; discussions ongoing.
Wolcott Reservoir - 105,000 AF reservoir on Alkali Creek · Tributary to Eagle River near Wolcott, Colorado · Located primarily on private land owned by Denver Water · 150 cfs pump station from Colorado and Eagle Rivers · 370 ft pumping lift · Firm yield of about 47,000 AF · Multi-purpose project with many staging opportunities		Denver Water, ERWSD, CRWCD	10,825 Study/ CRCA	105,000 AF			- Multi-purpose aspect of this alternative raises substantial East Slope / West Slope issues (i.e. Green Mountain Pumpback) - The large size and the multi-purpose aspect of this alternative will prolong implementation time - Grand Valley water providers are concerned that reservoir releases will degrade water quality of lower Colorado River - Summit County will not support this - it was not included in CRCA purposefully. (Green Mountain Pumpback causes water quality, land disturbance impacts that are not acceptable to Summit County or Silverthorne.) - Huge power consumption. - This project will reduce flows from Blue River (below Green Mountain Res) all the way down stream to Dotsero on the Colorado River, thru Wild & Scenic reaches - Negative water quality impacts on Eagle River, below diversion point, reducing peak flows right above Milk Creek confluence which is highest sediment impact on the Eagle River.

Regional Breakdown (cont)

Section 6.4 - Eagle River Region

Table 17. Eagle River Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS, other)	Existing (AF, CFS, other)	Progress	Comments (Opportunities and/or Constraints)
Wolcott Reservoir Agreement - Any development and use of Wolcott Reservoir shall be in compliance with the terms of the settlement agreement between Denver Water and the Eagle River Water & Sanitation District and Upper Eagle Regional Water Authority and the subsequent decrees in Water Division No. 5 Case Nos. 02CW125 and 07CW126.		Denver Water, ERWSD, UERWA	CRCA				
Wolcott Reservoir. The Colorado River Water Conservation District conveyed 600 AF of its water right in the Wolcott Reservoir to Gypsum for its use. Gypsum has decreed alternate points of diversion for this right, and continued to keep up diligence on this conditional water right.		Town of Gypsum	Town of Gypsum				
Denver Water Eagle River Acquisitions - Denver Water will not seek any new appropriation of water in the Eagle River basin or pursue or participate in any acquisition of water rights or any project that would result in any new depletion from the Eagle River basin without the prior approval of the Eagle County Commissioners, the Colorado River District, the Eagle Park Reservoir Company, the Eagle River Water & Sanitation District, and the Upper Eagle Regional Water Authority. In addition, the Abstention Provisions applied in Article I of this Agreement provide that any entity receiving water from Denver Water under any Future Contract or any contract for Reusable Return Flows will not seek any new appropriation of water, or pursue or participate in any project.		Denver Water, ERWSD, UERWA	CRCA				
Mackinnaw Lake, Burns	consumptive		CBRT	500 AF			
Gore Creek, Water Quality Improvement Plan	nonconsumptive	ERWSD, Vail Ski, Eagle Cnty, CRWCD	CBRT				
Milk Creek, sediment mitigation	nonconsumptive		CBRT				Would be exacerbated by Wolcott Reservoir diversions from the Eagle River.
Highway 24 Diversion: The Highway 24 diversion project is located in Eagle County near the historic town of Gilman approximately two (2) miles northwest of Redcliff, Colorado. The mines, situated on the west flank of Battle Mountain, were developed in the late nineteenth century during the Colorado Silver Boom and were mined intermittently through the 1930's with operations at the Eagle Mine continuing until 1984. In early 2013, the DRMS was contacted by the Colorado Department of Public Health and Environment to investigate elevated metals loading they were seeing in the Eagle River during runoff conditions. Funding for this investigation was provided by the Freeport McMoRan/DRMS Cooperative Agreement under the "Red Cliff Dumps" project. The Highway 24 Diversion Project is a continuation of that initial investigation effort.	nonconsumptive	DRMS	DRMS				
Eagle Mine Reclamation	nonconsumptive	USFS, CDPHE	ERWC				
Climax Mine Reclamation	nonconsumptive		ERWSD				
Camp Hale Restoration	nonconsumptive	USFS, CDPHE	ERWC				
Ensuring new development and land use changes appropriately maintain water-related values such as riparian function, nonconsumptive flows, and physical stream integrity	nonconsumptive	ERWC	ERWC				
Re-evaluating existing ISFs with enhanced methodologies and inventorying new stream segments that currently lack needed protections	nonconsumptive	ERWC	ERWC				

Regional Breakdown (cont)

Section 6.4 - Eagle River Region

Table 17. Eagle River Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS, other)	Existing (AF, CFS, other)	Progress	Comments (Opportunities and/or Constraints)
Quantifying recreational needs more clearly, and potentially pursuing additional RICDs as lower-valley towns revisit engineered stream recreation features	nonconsumptive	ERWC	ERWC				
Implementing state-of the-art technologies and BMPs to mitigate urban runoff on new developments, and perhaps eventually retrofitting the valley's existing developments	nonconsumptive	ERWC	ERWC				
Thorough examination of all major diversion and storage projects for the effects they will have on existing water quality and quantity	nonconsumptive	ERWC	ERWC				
L.E.D.E. Reservoir. Gypsum owns the water rights.	municipal, domestic, consumptive, nonconsumptive, recreational, fire protection and other decreed uses.	Town of Gypsum	Town of Gypsum	1947 AF	947 AF		The total volume of decreed capacity is up to 1,947 AF; the Town is constructing the reservoir to 947 AF in 2014.
Eye Lake Reservoir. This is a conditional water right, located on Red Creek, a tributary to Gypsum Creek.		Town of Gypsum	Town of Gypsum				The total project's decreed volume is for 600 AF, conditional.
Smaller storage dedications are expected to occur with other development in the Town boundaries.		Town of Gypsum	Town of Gypsum				

Regional Breakdown (cont)

Section 6.5 - 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 other region in the state other than 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 transmountain diversions. 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.

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 18 highlights the top specific themes and vulnerabilities, methods and projects for the Middle Colorado Region. Table 19 includes a full list of projects in all phases from conceptual to just before construction in the Middle Colorado Region. Figures 23-25 depict the consumptive uses, environmental and recreational conditions, and identified projects for this region.

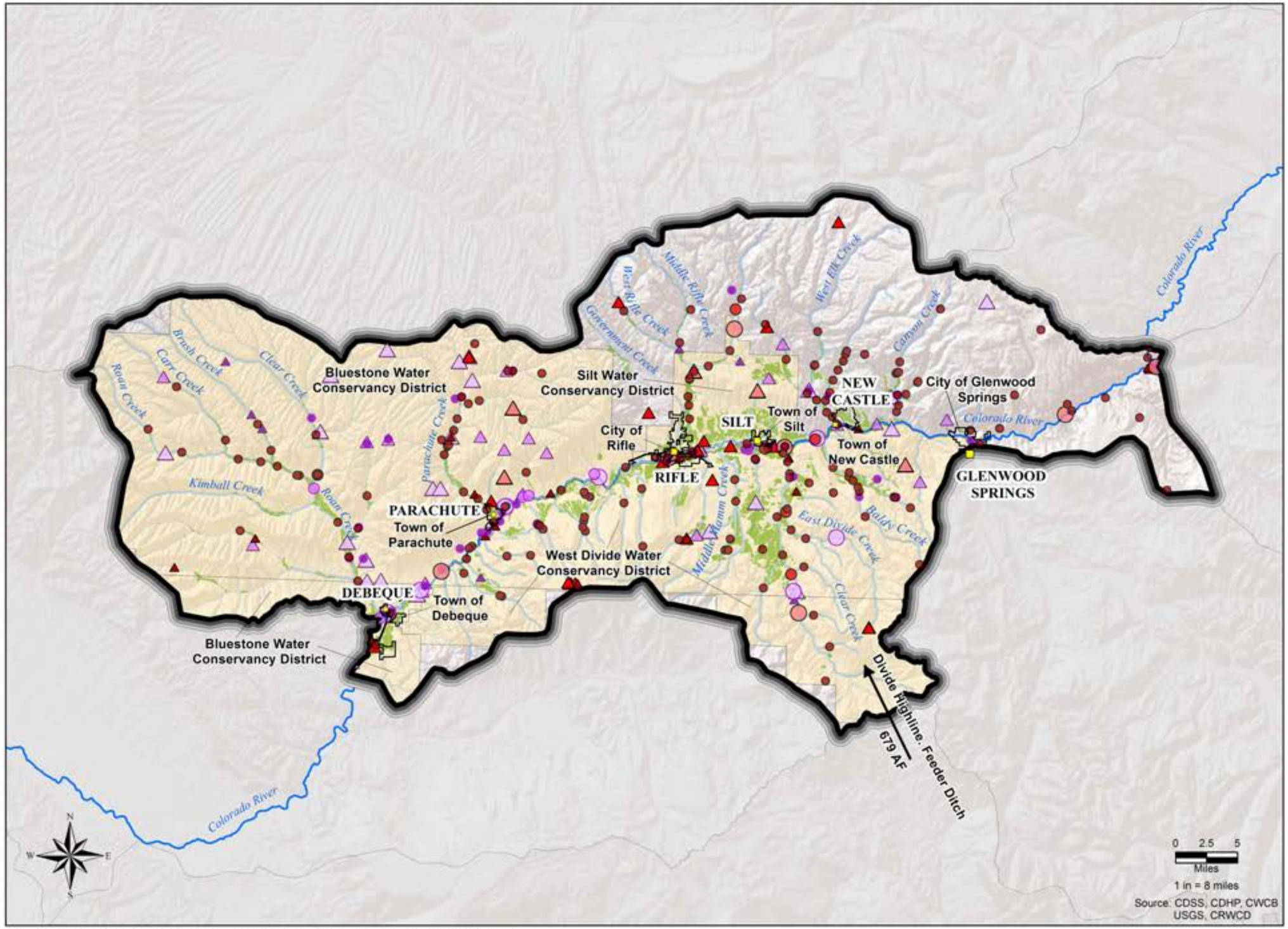

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Figure 23.

Colorado River BIP Middle Colorado Region

Consumptive Uses

Legend

- Irrigated Lands
- Water Provider Boundaries
- Conservancy Districts
- Transmountain Diversions (Average Annual 1987-2012)

Absolute Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Conditional Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Absolute Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Conditional Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

CFS = Cubic Feet Per Second
AF = Acre Feet

This map depicts only water rights for diversions above 5 CFS and reservoirs larger than 25 AF, to view the full state database of water rights visit http://cdss.state.co.us

SGM

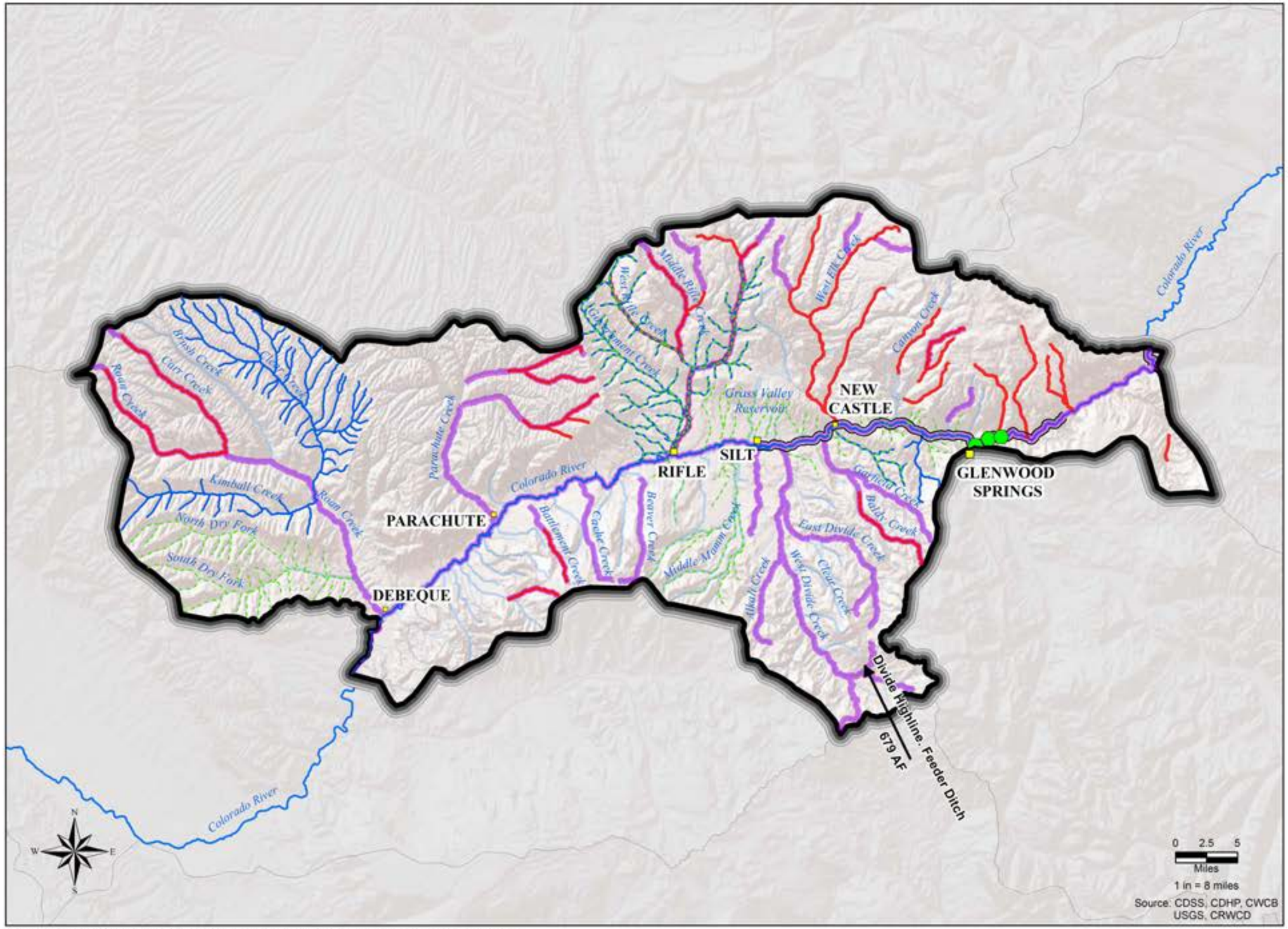

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Figure 24.

Colorado River BIP Middle Colorado Region

Environmental & Recreational Conditions

Legend

- Boatable Segments
- Gold Medal Streams
- 303d Listed Streams
- Identified Water Quality Issues (TMDL or M&E)
- Existing Instream Flows
- NCNA Identified Streams
- Transmountain Diversions (Average Annual 1987-2012)

Recreational In-Channel Diversions

- Decreed
- Pending

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

AF = Acre Feet
NCNA = Nonconsumptive Needs Assessment
TMDL = Total Maximum Daily Load
M&E = Monitoring & Evaluation

SGM

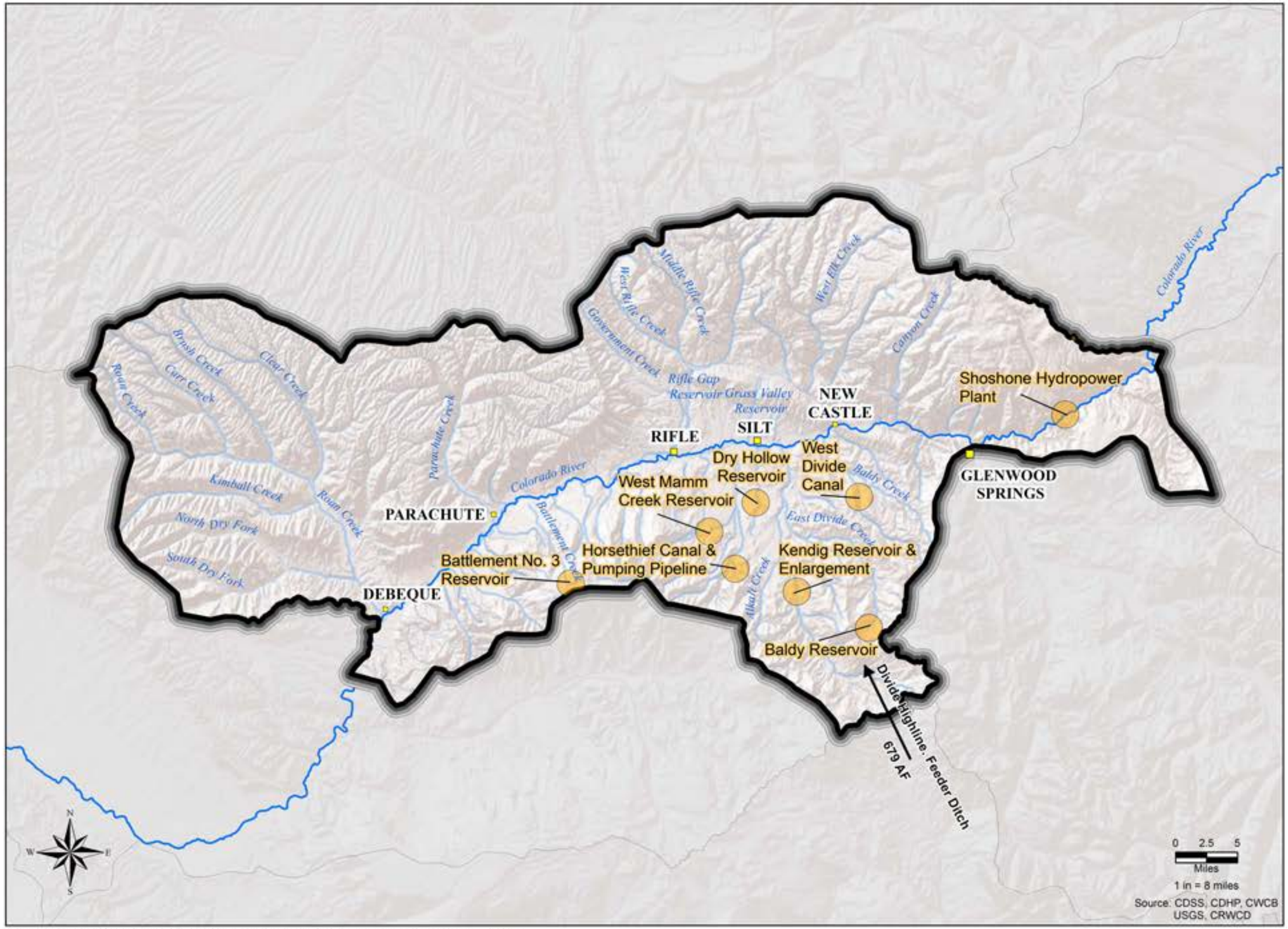

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Figure 25.

Colorado River BIP Middle Colorado Region

Identified Projects

Regional Breakdown (cont)

Section 6.5 - Middle Colorado Region

Table 18. Middle Colorado Region Themes and Vulnerabilities.

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 economies[1] - 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 economy[1] 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 Agriculture[2,3,4] - 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

Regional Breakdown (cont)

Section 6.5 - Middle Colorado Region

Table 19. Middle Colorado Region Comprehensive List of Projects.

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
SWSI Aquatic Wildlife Management Plan on mainstem of Colorado River between Rifle Creek and Gunnison River		CPW	NC Needs Assmt			Plan in draft - 2004	Mainstem fishery management plan (CPW) includes priorities and actions for sport fishery (off channel, screened, disconnected from river) and conservation species: ESA listed species (CPW/DNR as Recovery Program partner) and non-listed conservation species (flannelmouth and bluehead sucker; roundtail chub, aka '3 Species')
Within two years after the Effective Date of this Agreement, Denver Water shall place $500,000 in an interest-bearing account to offset additional operation and maintenance costs or the costs of upgrading diversion structures of water treatment plants in Garfield County, pursuant to the provisions of Article VI.E.3.		Denver Water, Garfield County	CRCA				
Within one year of issuance of an acceptable permit for the Moffat Project, Denver Water agrees to place $1 million in a fund for flow-related projects to protect Wild & Scenic Outstandingly Remarkable Values, and to propose this contribution as an element of the Mitigation Plan described in Article III.E.1.a.		Denver Water, Garfield County	CRCA				
R-4 Rodreick Reservoir restoration			Restricted Reservoirs	10 AF	21 AF		Illegally constructed and no spillway. Normally a 31 AF reservoir but is on restriction to a maximum of 21 AF. Lost storage is 10 AF. Put on restriction on 05/26/2009.
Rieger Pond restoration			Restricted Reservoirs	7 AF	3 AF		Illegally constructed and no spillway. Normally a 10 AF reservoir but is on restriction to a maximum of 3 AF. Lost storage is 7 AF. Put on restriction on 05/26/2009.
Protection of the Grand Valley irrigation water rights and calls			CBRT				When operating - how to fulfill irrigation calls
Grizzly Reservoir located in headwaters of Grizzly Creek		City of Glenwood Springs	CBRT	3,000 AF			Existing Conditional Reservoir
Main Elk Reservoir - 1963 conditional water right for 34,922 AF located on Main Elk Creek		ExxonMobil	CBRT	34,922 AF			Resurrect? Opportunity for public/private partnership?
Colorado River low flow salinity issues - Maintaining or augmenting low flows in Middle Colorado to mitigate for salinity issues (impacts municipal drinking water investment) during Nov to April period – issue tied to Cameo call. Return river base flows to natural conditions.			CBRT				
Existing storage structures study - Inventory existing structures and develop plans for maintenance and evaluate potential for increased storage capacity			CBRT				
Enhance conservation easements - Suggested by Aspen Valley Land Trust – seek more detail	nonconsumptive	Aspen Valley Land Trust	CBRT				
On-Farm Treatment for Conservation Practices Study- Evaluate cost/benefits/impacts of implementing agriculture efficiency improvements (i.e., ditch lining, use of polymers/surfactants, etc.). Evaluate at a subbasin or conservancy district level to capture localized variables. Identify and pursue cost sharing arrangements to implement.			CBRT				Ensure that conservation easements include recognition of benefits of water applied to land and encumber or provide flex-use arrangement (DO NOT SEVER WATER FROM LAND)
Enhance conservation easement incentives to prevent agricultural water from being sold for diversion or other uses.			CBRT				Easements on agricultural lands require that the water cannot be abandoned or sold. There are provisions for short term leases for instream flows. 12% of irrigated land in Roaring Fork basin already conserved.
Education/Information/Outreach - Regarding water use, conservation, connection to West Slope where food is produced, recreation is alive, tourism dollars generated			CBRT				

Regional Breakdown (cont)

Section 6.5 - Middle Colorado Region

Table 19. Middle Colorado Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Battlement Reservoir #3 Dam reconstruction (recreation & environment flows). 408 AF absolute water right.		TU and Grand Valley Anglers	NC Needs Assmt	408			Project ongoing; objective to improve habitat/ connectivity for cutthroat trout. CPW participated with Grand Valley Anglers and USFS to detail work that needs doing . USFS holds storage rights; potential benefits to downstream irrigators if upstream yield firmed with infrastructure improvements.
City of Glenwood Springs RICD on Colorado River above confluence with Roaring Fork River.		City of Glenwood Springs	City of Glenwood Springs			Water court application filed	Opportunity: Recognized benefits to recreation and instream flows Constraints: proponents encouraged to work with CPW to minimize impacts to macroinvetebrates and fishery passage through structures
Shoshone Outage Protocol - The Signatories agree that a Shoshone Outage could adversely affect water users and recreation interests on the Colorado River. Accordingly, the Signatories agree to implement the operational procedures described in this section during a Shoshone Outage (the "Shoshone Outage Protocol") to mitigate such potential adverse effects. The Signatories also agree to cooperate to achieve permanent management of the flows of the Colorado River as described in Article VI.C, whether or not the Shoshone Power Plant remains operational.		CRWCD	CRCA				
West Slope Acquisition of Shoshone Assets 1. West Slope water users believe that one means to ensure the permanent maintenance of the Shoshone Call is the acquisition and operation of the Shoshone Power Plant and Shoshone Water Rights (the "Shoshone Assets") by a West Slope governmental entity that is mutually acceptable to the West Slope Signatories ("West Slope Governmental Entity"). 2. Within twenty-four (24) months after the effective date of this Agreement ("Investigation Period"), any of the West Slope Signatories may agree among themselves and at their own cost, to undertake and complete an investigation of the viability of purchasing the Shoshone Assets and operating the Shoshone Power Plant (the "Initial Investigation").		CRWCD	CRCA				
Relaxation of Shoshone Call - Existing Call Relaxation Agreement. Denver Water and Xcel are parties to the 2007 Shoshone Agreement. The 2007 Shoshone Agreement currently is set to expire on December 31, 2032.		CRWCD	CRCA				
Shoshone Operations (CPW concerns about sediment flushes) - CPW has met with Xcel and Shoshone operators to relay to them concerns about both sediment flushes below the Shoshone diversion, and ways to mitigate uncertainty created by turbine maintenance		CPW	NC Needs Assmt				CPW has met with Xcel and Shoshone operators to discuss ways to mitigate sediment flushing from check structure (mainly timing) to minimize fishery/ macroinvertebrate impacts; ongoing and positive dialogue
Dry Hollow Feeder Canal	Agric, Dom, Ind, Rec & All Uses	WDWCD	WDWCD	250 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Dry Hollow Reservoir	Agric, Dom, Ind, Rec, Power & Other	WDWCD	WDWCD	45,000 AF		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Horsethief Canal - W. Divide Creek & Canal & Kendig Reservoir	Irrig., Dom., Stock, Munic., Ind. & Power	WDWCD	WDWCD	550 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Horsethief Canal - East Mamm Creek	Irrig., Dom., Stock, Munic., Ind. & Power	WDWCD	WDWCD	50 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Horsethief Canal - Beaver Creek	Irrig., Dom., Stock, Munic., Ind. & Power	WDWCD	WDWCD	50 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed

Regional Breakdown (cont)

Section 6.5 - Middle Colorado Region

Table 19. Middle Colorado Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Horsethief Canal - Cache Creek	Irrig., Dom., Stock, Munic., Ind. & Power	WDWCD	WDWCD	50 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Horsethief Canal - Battlement Creek	Irrig., Dom., Stock, Munic., Ind. & Power	WDWCD	WDWCD	50 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Kendig Reservoir 1st Enlargement	Agric, Dom, Munic, Irrig, Ind & Stock	WDWCD	WDWCD	2,610 AF		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Kendig Reservoir	Power, Dom, Munic, Irrig, Ind & Stock	WDWCD	CBRT	15,450 AF		Feasibility Studies Completed. Diligence approved in 2013.	Conceptual, Conditional Water Rights, Feasibility Studies Completed
West Divide Canal - Garfield Creek & Tunnel	Irrig., Dom., Stock, Munic., Ind. & Power	WDWCD	WDWCD	50 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
West Divide Canal - Baldy Creek	Irrig., Dom., Stock, Munic., Ind. & Power	WDWCD	WDWCD	50 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
West Divide Canal - East Divide Creek	Irrig., Dom., Stock, Munic., Ind. & Power	WDWCD	WDWCD	200 cfs		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
West Mamm Creek Reservoir	Power, Dom., Munic., Irrig., Ind. & Stock	WDWCD	WDWCD	6,500 AF		Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Middle Colorado Watershed Assessment/Plan		Middle Colorado Watershed Council	Middle Colorado Watershed Council			In development.	Watershed Assessment underway. Watershed Plan draft initiated.
Baldy Reservoir (East Divide Creek)	Irrig., Evap., Dead Storage, Dom., Stock, Fire Protection, Com., Rec., Pisc., Wildlife	WDWCD	WDWCD	46 AF	54 AF	Feasibility Studies Completed	Enlargement for Alsbury Reservoir
Desalination project at natural springs near Glenwood Springs	Water Quality		CBRT				
Grass Valley Canal Improvements		Silt Water Conservancy District, MCWC	MCWC			Conceptual design completed	(BOR. May 2014)
Replace Grass Valley Canal Siphon #2		Silt Water Conservancy District, MCWC	MCWC			Conceptual design completed	(BOR. May 2014)
Replace Grass Valley Canal Siphon #3 Drain		Silt Water Conservancy District, MCWC	MCWC			Conceptual design completed	(BOR. May 2014)
Davie Ditch Pipe Installation		Silt Water Conservancy District, MCWC	MCWC			Conceptual design completed	(BOR. May 2014)

Regional Breakdown (cont)

Section 6.5 - Middle Colorado Region

Table 19. Middle Colorado Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Silt Pump Canal Pipe Installation		Silt Water Conservancy District, MCWC	MCWC			Conceptual design completed	(BOR. May 2014)
Inspect Silt Pump Canal Siphons and Rehabilitate Drains		Silt Water Conservancy District, MCWC	MCWC			Conceptual design completed	(BOR. May 2014)
Dry Elk Valley Lateral Lining		Silt Water Conservancy District, MCWC	MCWC			Conceptual design completed	(BOR. May 2014)
East and West Laterals' Seepage Reduction		Silt Water Conservancy District, MCWC	MCWC			Conceptual design completed	(BOR. May 2014)

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Regional Breakdown (cont)

Section 6.6 - 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.

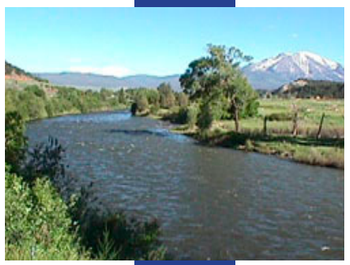
Water providers in the upper reaches of the Basin are dependent upon direct flow stream intakes and are susceptible to extended drought periods. Because the watersheds above these intakes are primarily located on U.S. Forest Service lands (USFS) the process for permitting a new reservoir will be rigorous. 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 Roaring 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 dried up 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 promoting voluntary transfer of water efficiency savings to instream flows. SB 14-023 was introduced by Senator Gail Schwartz who lives in, and represents, the Roaring Fork Valley.

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 20 highlights the top specific themes and vulnerabilities, methods and projects for the Roaring Fork Region. Table 21 includes a full list of projects in all phases from conceptual to just before construction in the Roaring Fork Region. Figures 26-28 depict the consumptive use, environmental and recreational conditions, and identified projects for this region.



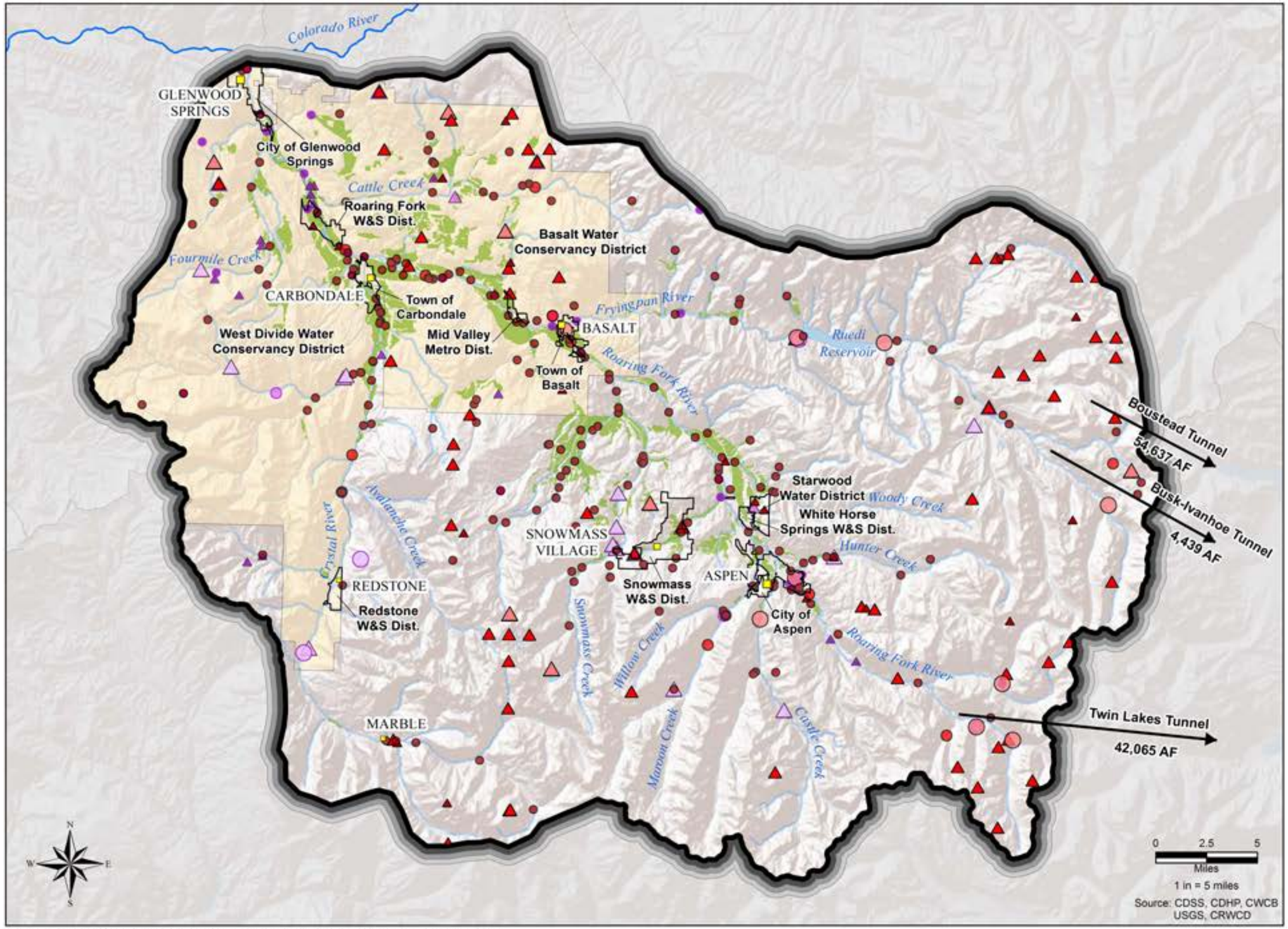


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Figure 26.

Colorado River BIP Roaring Fork Region

Consumptive Uses

Legend

- Irrigated Lands
- Water Provider Boundaries
- Conservancy Districts
- Transmountain Diversions (Average Annual 1987-2012)

Absolute Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Conditional Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Absolute Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Conditional Reservoirs

- 25 - 50 AF
- 50 - 100 AF
- > 1000 AF

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

CFS = Cubic Feet Per Second
AF = Acre Feet

This map depicts only water rights for diversions above 5 CFS and reservoirs larger than 25 AF, to view the full state database of water rights visit http://cdss.state.co.us

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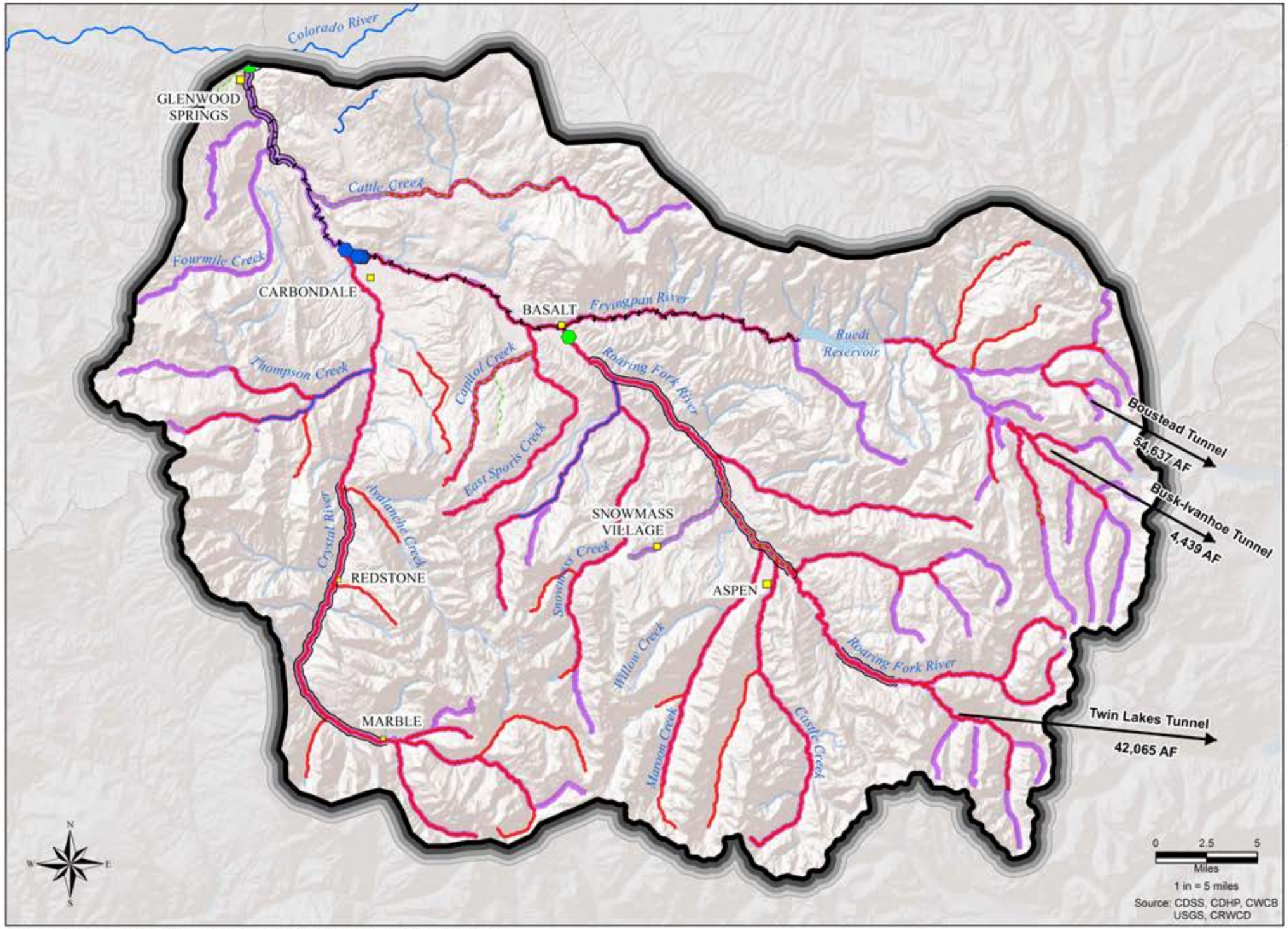

Figure 27.

Colorado River BIP Roaring Fork Region

Environmental & Recreational Conditions

Legend

- Boatable Segments
- Gold Medal Streams
- 303d Listed Streams
- Identified Water Quality Issues (TMDL or M&E)
- Existing Instream Flows
- NCNA Identified Streams
- Transmountain Diversions (Average Annual 1987-2012)

Recreational In-Channel Diversions

- Decreed
- Pending

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

AF = Acre Feet
NCNA = Nonconsumptive Needs Assessment
TMDL = Total Maximum Daily Load
M&E = Monitoring & Evaluation

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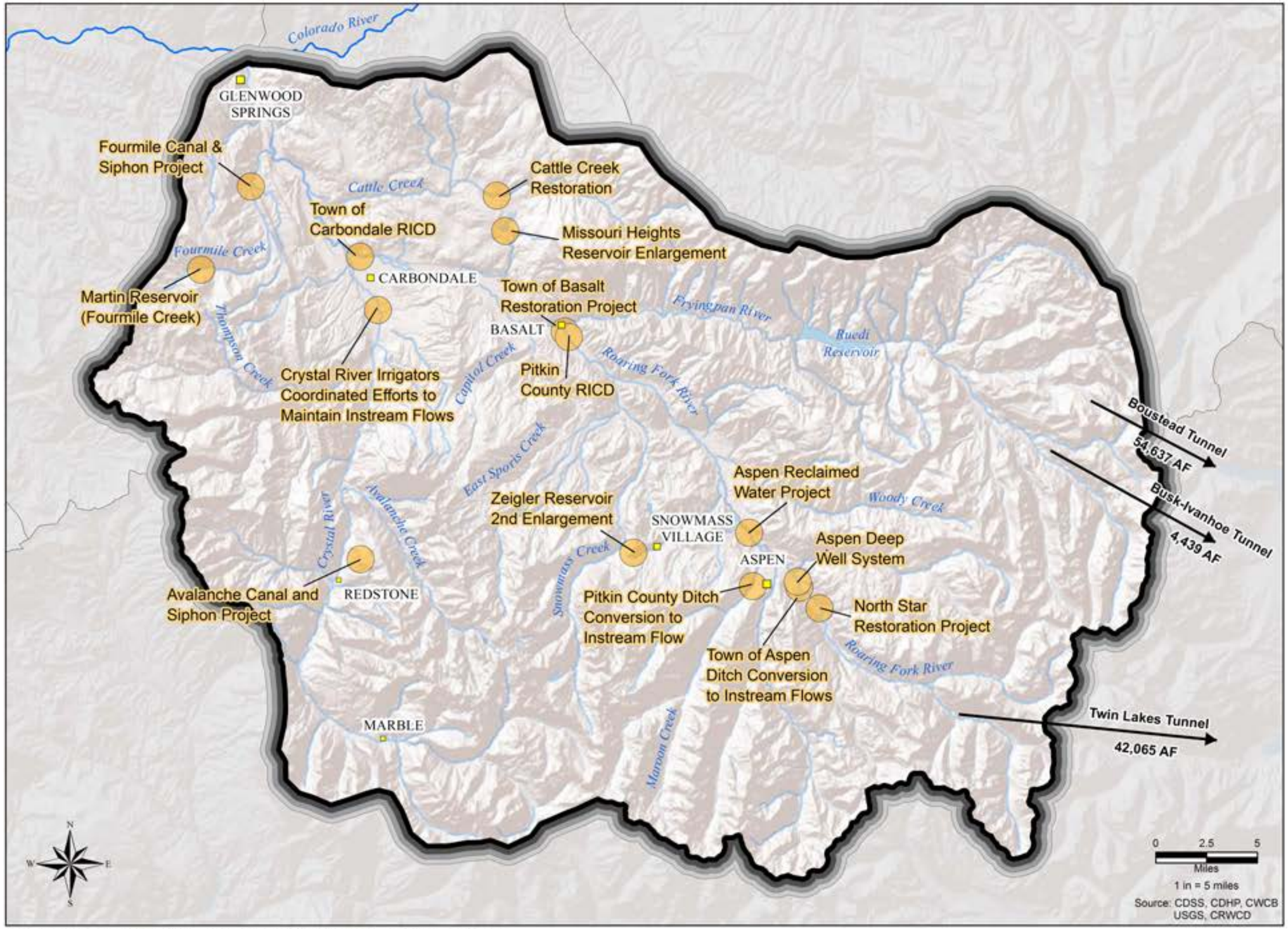

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Figure 28.

Colorado River BIP Roaring Fork Region

Identified Projects

Regional Breakdown (cont)

Section 6.6 - Roaring Fork Region

Table 20. Roaring Fork Region Themes and Supporting Vulnerabilities.

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 economies[1] - 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 economy[1] 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 - 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

Regional Breakdown (cont)

Section 6.6 - Roaring Fork Region

Table 21. Roaring Fork Region Comprehensive List of Projects.

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Cost	Progress	Comments (Opportunities and/or Constraints)
Snowmass Water and Sanitation District Roaring Fork Valley Pumpback-alternative water supply from Roaring Fork River. Conceptual idea for long range (Post 2050) planning.		Snowmass Water & San Dist.	Snowmass Water & Sanitation District				Conceptual idea	Would help Snowmass Creek minimum flow
Snowmass W&SD Conservation of an additional 7-8%		Snowmass Water & San Dist.	Snowmass Water & Sanitation District	7-8%				
Snowmass W&SD agreement with Snowmass Capitol Creek Caucus to maintain minimum instream flows in Snowmass Creek.		Snowmass Water & San Dist.	Snowmass Water & Sanitation District				Completed/ Ongoing	
City of Aspen water conservation (tiered rates, capped EQRs)		City of Aspen	WP Interview					
Aspen Reclaimed Water Project - Pump water from wastewater facility finished water to golf courses		City of Aspen	SWSI 2010	1,680 AF			Ongoing	Infrastructure is in place except for a pump. Need legal permissions to reuse water.
Maroon Creek Reservoir. City of Aspen conditional water right		City of Aspen	City of Aspen	10,000 AF			Conceptual	Diligence case required in 2015
Castle Creek Reservoir. City of Aspen conditional water right		City of Aspen	City of Aspen	9,000 AF			Conceptual	Diligence case required in 2015
Leonard Thomas Reservoir enlargement - reservoir is located at the water treatment plant. Reservoir currently holds 14 AF. Enlargement is needed to help equalize flows in the delivery and demand of raw water for treatment.		City of Aspen	City of Aspen	10 AF	14 AF		Beginning stages of design/ permitting	
Enlarge Grizzly Reservoir. Conceptual idea to enlarge the existing reservoir to allow for Roaring Fork Valley environmental and municipal storage above Aspen.			City of Aspen					
Enlarge Lost Man Reservoir. Conceptual idea to enlarge the existing reservoir to allow for Roaring Fork Valley environmental and municipal storage above Aspen.			City of Aspen					
Wheeler Ditch conservation to improve environmental flows. City has made preliminary progress on agreement to bypass conserved ditch water when the minimum instream flow in the Roaring Fork River (6 cfs) is not met. Currently in the trial period with CWCB.		City of Aspen	City of Aspen				Trial run completed	
City of Aspen Roaring Fork Ditches - improvements to ditch system to use for irrigation of city parks and green spaces(rather than the potable water they currently use) and use as an alternate source for potable water		City of Aspen	City of Aspen		35-40 cfs			
Aspen Deep Well System -Test a not so successful geothermal well to evaluate the deep aquifer (~1500 feet deep) for use as a backup potable water source, in case both Castle and Maroon Creeks are contaminated beyond treatment (i.e. wildfire)		City of Aspen	City of Aspen				Ongoing	Performing a pump test to determine quantity and quality of water

Regional Breakdown (cont)

Section 6.6 - Roaring Fork Region

Table 21. Roaring Fork Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Cost	Progress	Comments (Opportunities and/or Constraints)
Roaring Fork River Pump back to below Salvation Ditch. City of Aspen or Pitkin County project to pump back Roaring Fork water to increase flows through town. Conceptual idea.		City of Aspen/ Pitkin County	City of Aspen				Conceptual idea	
Pitkin County Instream Flow (ISF) filings with CWCB for 2-3 cfs. Ongoing project to transfer Stapleton Brothers Ditch to instream flows. Agreement reached and in trial period, can only use credits when minimum instream flow is not met.		Pitkin County	NC Needs Assmt	2-3 cfs		$0.3 M	Ongoing	Becky Long was contacted (becky@cecenviro.org)
Enlargement of Ziegler Reservoir. Phase 2 addition of 105 AF. Conceptual plan.		Snowmass Water & San Dist.	Snowmass Water & Sanitation District	105 AF	252 AF			
Sam's Knob Reservoir. Located in Brush Creek basin and has a diversion out of Snowmass Creek. Could be built to maintain minimum stream flows.		Snowmass Water & San Dist.	Snowmass Water & Sanitation District	565 AF				Conditional Reservoir
Enlargement of Missouri Heights Reservoir for domestic (Mid Valley Metro District) or increased agricultural uses. Conceptual idea.			City of Aspen				Conceptual idea	
Crystal River irrigators coordinated effort to maintain instream flows.	instream flows	Roaring Fork Conservancy	NC Needs Assmt				ongoing	
Coal Creek water quality study to improve erosion control and suspended solids levels.	water quality	Roaring Fork Conservancy	NC Needs Assmt				ongoing	
Ralston No. 1 Reservoir restoration - Owned by Merle Laurence			Restricted Reservoirs	59 AF				Reservoir restriction is due to "Poor condition of outlet conduit " and is limited to zero storage. All 59 AF is under restriction. Restriction was placed on 11/17/2009.
Christenson Reservoir restoration			Restricted Reservoirs	11 AF				Reservoir restriction is due to "Sloughing of downstream slope " and is limited to zero storage. All 11 AF of the full 13 AF is restricted. Restriction placed on 11/13/2008
Valana K Reservoir No. 1 restoration			Restricted Reservoirs	19 AF				Reservoir restriction is due to "Unapproved spillway and poor condition " and is limited to zero storage. All 19 AF is restricted. Restriction placed on 11/13/2008
Polaris Reservoir restoration. Built on volcanic rock and has geologic problems.			Restricted Reservoirs	774 AF				Built on volcanic rock and has geologic problems. Reservoir restriction is due to "Inadequate spillway and free board, basin seep, poor foundation and is limited to 16.5 feet below dam crest. All 774 AF is restricted. Restriction placed on 11/01/2007

Regional Breakdown (cont)

Section 6.6 - Roaring Fork Region

Table 21. Roaring Fork Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Cost	Progress	Comments (Opportunities and/or Constraints)
Yank Creek Reservoir (81CW0346, CA5884) - - 3,000 AF +/- reservoir on Yank Creek, tributary to Crystal River and Roaring Fork River - 160 ft earthen embankment - Yield approximately 1,500 AF per year - Located on private land in-holding within National Forest - Cooperative project with West Divide Water Conservancy District 8695 AF was abandoned in 2012. 17,303 AF remain conditional per CDSS			10,825 Study	3,000 AF		$8M	Conceptual, Conditional Water Right	10825 Study findings: - Multi-purpose reservoir - Late summer releases would enhance flow of lower Crystal River which is substantially impaired by irrigation diversions - No substantial environmental issues have been identified to date - Minor water supply opportunities within Crystal River watershed - Recommended for further study
Ruedi Reservoir - Three alternate Ruedi Reservoir delivery facilities to keep 10825 Water "out of Fryingpan River" and reduce sport fishing issues: 1) Gravity pipeline from Ruedi Reservoir to Roaring Fork River at Basalt 2) Tunnel and Pipeline from Ruedi Reservoir to Salvation Ditch on Roaring Fork River (500 ft pumping head, 12 mile conduit) 3) Tunnel and Pump station from Ruedi Reservoir to Twin Lakes Project (3,100 ft pumping head, 18-mile conduit) Cost: Unknown			10,825 Study				Conceptual	Option (2) may still be a viable option to increase Roaring Fork Flows below Salvation Ditch 10825 Study Results: - Cost prohibitive - Difficult to permit and construct - Sport fishing conflicts can likely be avoided with appropriate reservoir management criteria - Not Recommended for further study
Create legal authority to use efficiencies for nonconsumptive uses			CBRT				Conceptual	
Project to identify stream reaches that flow below instream flows and could benefit from more efficient ditch operations			CBRT				Conceptual	
Lining Salvation Ditch and/or improved agricultural efficiencies from Salvation Ditch irrigated lands			CBRT				Conceptual	Would only help if conserved water was left in the Roaring Fork River at the Salvation Ditch headgate
Pitkin County RICD on Roaring Fork River up stream of Basalt		Pitkin County	CBRT				Ongoing	Consultation with CPW is recommended to minimize impacts to aquatic invertebrates and fish passage
Town of Carbondale RICD on Roaring Fork River at Highway 133 bridge, above confluence with Crystal River		Town of Carbondale	CBRT				Ongoing	Consultation with CPW is recommended to minimize impacts to aquatic invertebrates and fish passage
Capitol Creek Ditch efficiency improvement project			CBRT				Conceptual	
Eliminate conditional transmountain diversion water rights from the upper Roaring Fork River and Fryingpan River			CBRT				Conceptual	

Regional Breakdown (cont)

Section 6.6 - Roaring Fork Region

Table 21. Roaring Fork Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Cost	Progress	Comments (Opportunities and/or Constraints)
Roaring Fork Water Efficiency Plan - A study and conservation plan of the Roaring Fork municipalities.			Ruedi Water and Power Authority				Underway	
Restoration at Northstar		Roaring Fork Conservancy	Roaring Fork Conservancy					Listed as Urgent Actions in the Watershed Plan
Restoration in the Town of Basalt		Roaring Fork Conservancy	Roaring Fork Conservancy				Underway	Listed as Urgent Actions in the Watershed Plan
Restoration at Cattle Creek		Roaring Fork Conservancy	Roaring Fork Conservancy					Listed as Urgent Actions in the Watershed Plan
Wild and Scenic Designation - Crystal River			Pitkin County					
Avalanche Canal and Siphon	Power, Dom., Munic., Irrig., Ind. & Stock	WDWCD	WDWCD	30 cfs	9.161 cfs		Feasibility Studies Completed	9.161 cfs is absolute for Dom, Muni, Irrig, Ind and Stock, Conceptual, Conditional water rights, feasibility study completed
Fourmile Canal & Siphon (from Three Mile Creek Diversion)	Power, Dom, Munic, Irrig, Ind & Stock	WDWCD	WDWCD	50 cfs			Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Fourmile Canal & Siphon (from Fourmile Creek Diversion)	Power, Dom, Munic, Irrig, Ind & Stock	WDWCD	WDWCD	50 cfs			Feasibility Studies Completed	Conceptual, Conditional Water Rights, Feasibility Studies Completed
Martin Reservoir (Fourmile Creek)	Irrig., Dom., and other Beneficial Uses	WDWCD	WDWCD	263.67 AF	39.43 AF		Feasibility Studies Completed	Three off-channel structures have been developed in the amount of 39.43 AF
Better management of Ruedi Reservoir and snowpack to fill the reservoir each year			CBRT					Suggested by Steve Child
Improve outflow from Ruedi Reservoir hydroelectric plant. Plant gets water logged now, which probably limits the amount of water that can be released from Ruedi. If we could increase the outflow speed then more water could safely be stored in the reservoir.			CBRT					Suggested by Steve Child
Ruedi Reservoir ANS Inspection Program	All Ruedi Reservoir Users	RWAPA	Ruedi Water and Power Authority				5th year in operation	Maintains Ruedi and private infrastructure, recreational viability of reservoir for fishing and boating
Study possible reservoir sites on Roaring Fork River (Possibly Taggert Lakes or an enlargement of Grizzly or Lost Man Reservoirs.)			CBRT					Suggested by Steve Child
County Land Use Policy Review			CBRT					
Hughes Reservoir Rehabilitation	Municipal, Irrig.		Garfield County					

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Regional Breakdown (cont)

Section 6.7 - 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 maximize the Shoshone and Cameo calls, improve water 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 22 highlights the top specific themes and vulnerabilities, methods and projects for the Grand Valley Region. Table 23 includes a full list of projects in all phases from conceptual to just before construction in the Grand Valley Region. Figures 29-31 depict the consumptive uses, environmental and recreational conditions, and identified projects for this region.

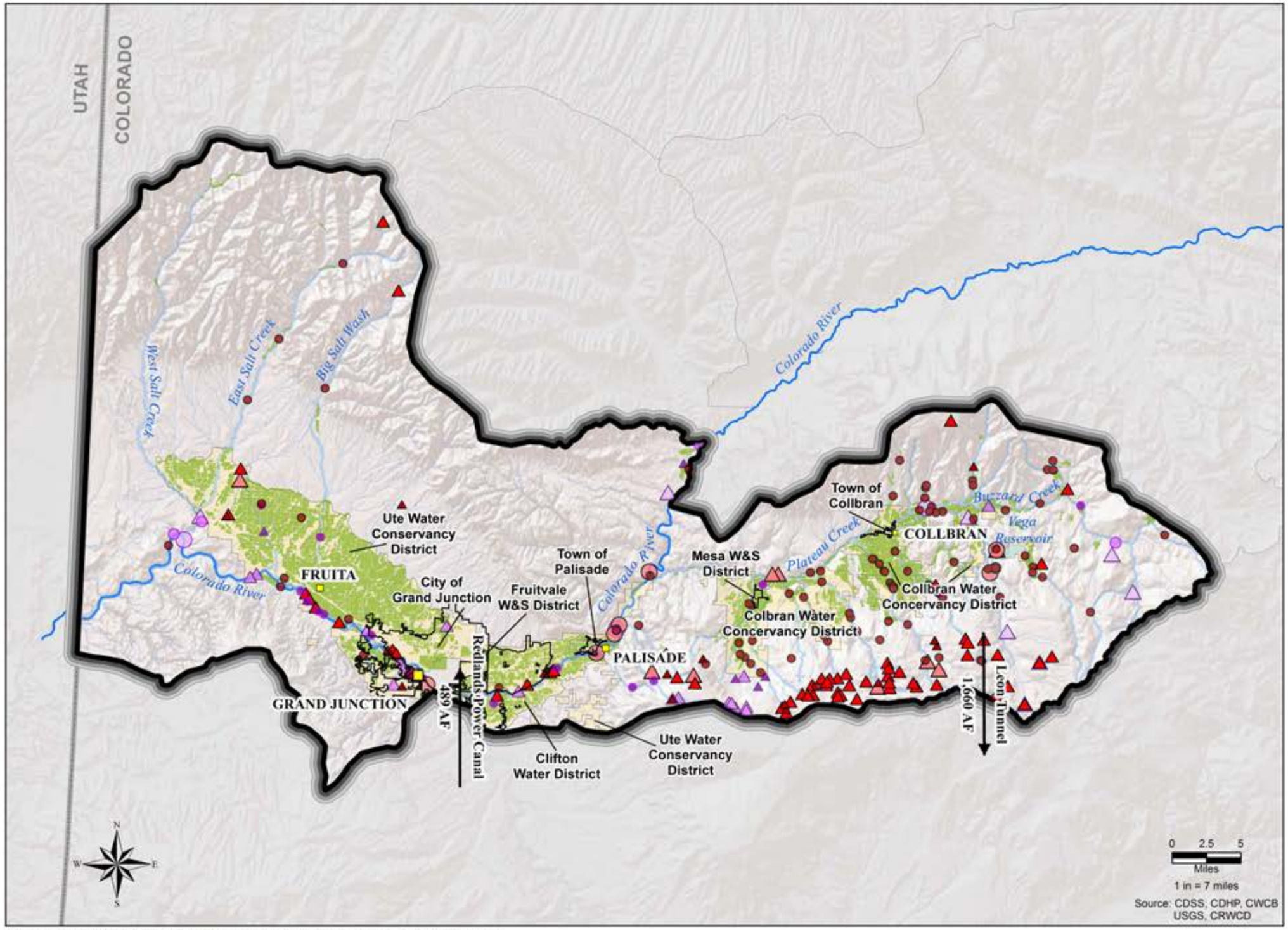

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Figure 29.

Colorado River BIP Grand Valley Region

Consumptive Uses

Legend

- Irrigated Lands
- Water Provider Boundaries
- Conservancy Districts
- Transmountain Diversions (Average Annual 1987-2012)

Absolute Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Conditional Diversions

- 5 - 50 CFS
- 50 - 100 CFS
- > 100 CFS

Absolute Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Conditional Reservoirs

- 25 - 50 AF
- 50 - 1000 AF
- > 1000 AF

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

CFS = Cubic Feet Per Second
AF = Acre Feet

This map depicts only water rights for diversions above 5 CFS and reservoirs larger than 25 AF, to view the full state database of water rights visit http://cdss.state.co.us

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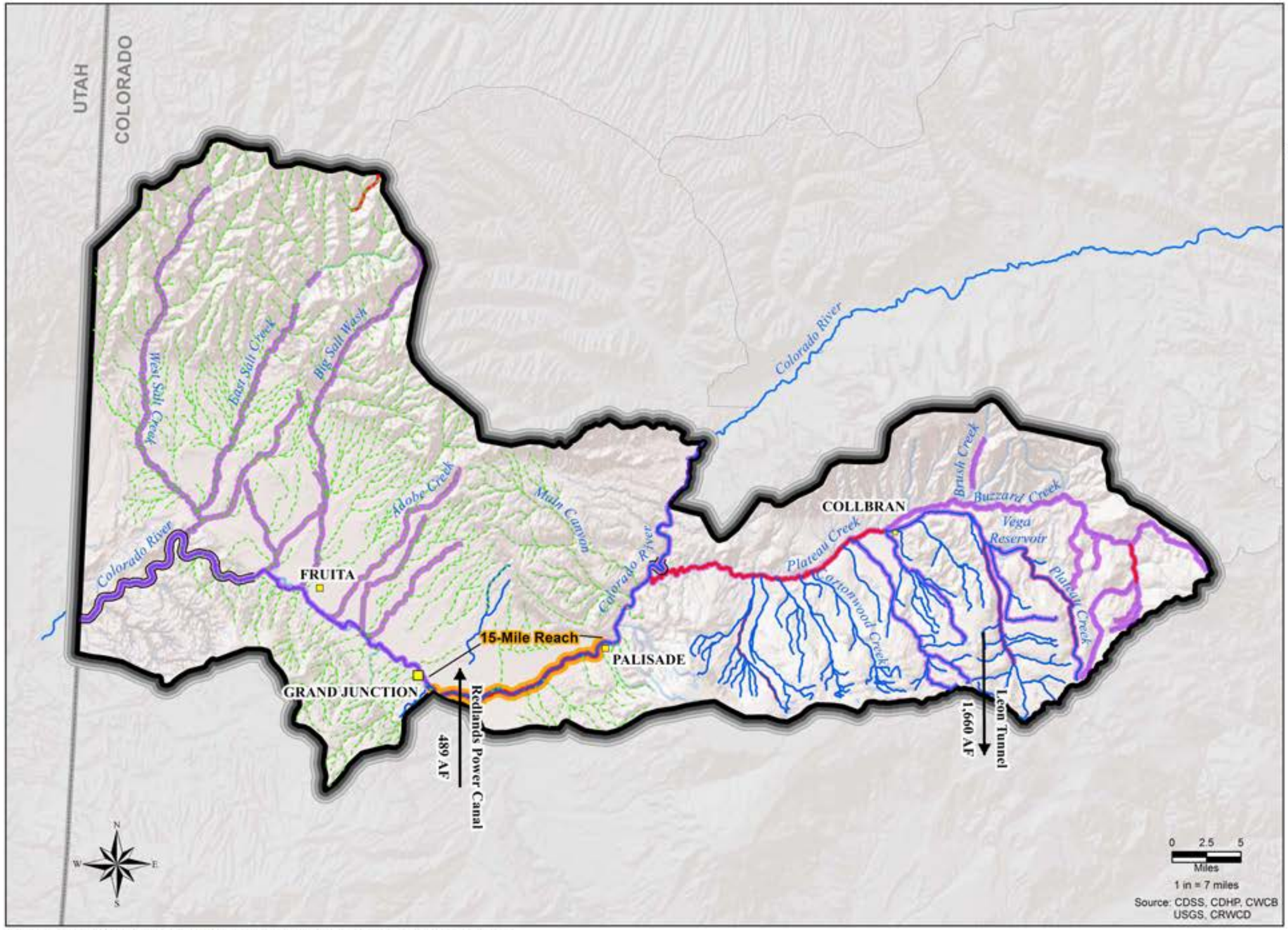

Figure 30.

Colorado River BIP
Grand Valley Region

Environmental & Recreational Conditions

Legend

- Boatable Segments
- Gold Medal Streams
- 303d Listed Streams
- Identified Water Quality Issues (TMDL or M&E)
- Existing Instream Flows
- NCNA Identified Streams
- Transmountain Diversions (Average Annual 1987-2012)

Recreational In-Channel Diversions

- Decreed
- Pending

Cities and Towns

- < 1000 People
- 1000 - 5000
- 5001 - 10000
- > 10000

AF = Acre Feet
NCNA = Nonconsumptive Needs Assessment
TMDL = Total Maximum Daily Load
M&E = Monitoring & Evaluation

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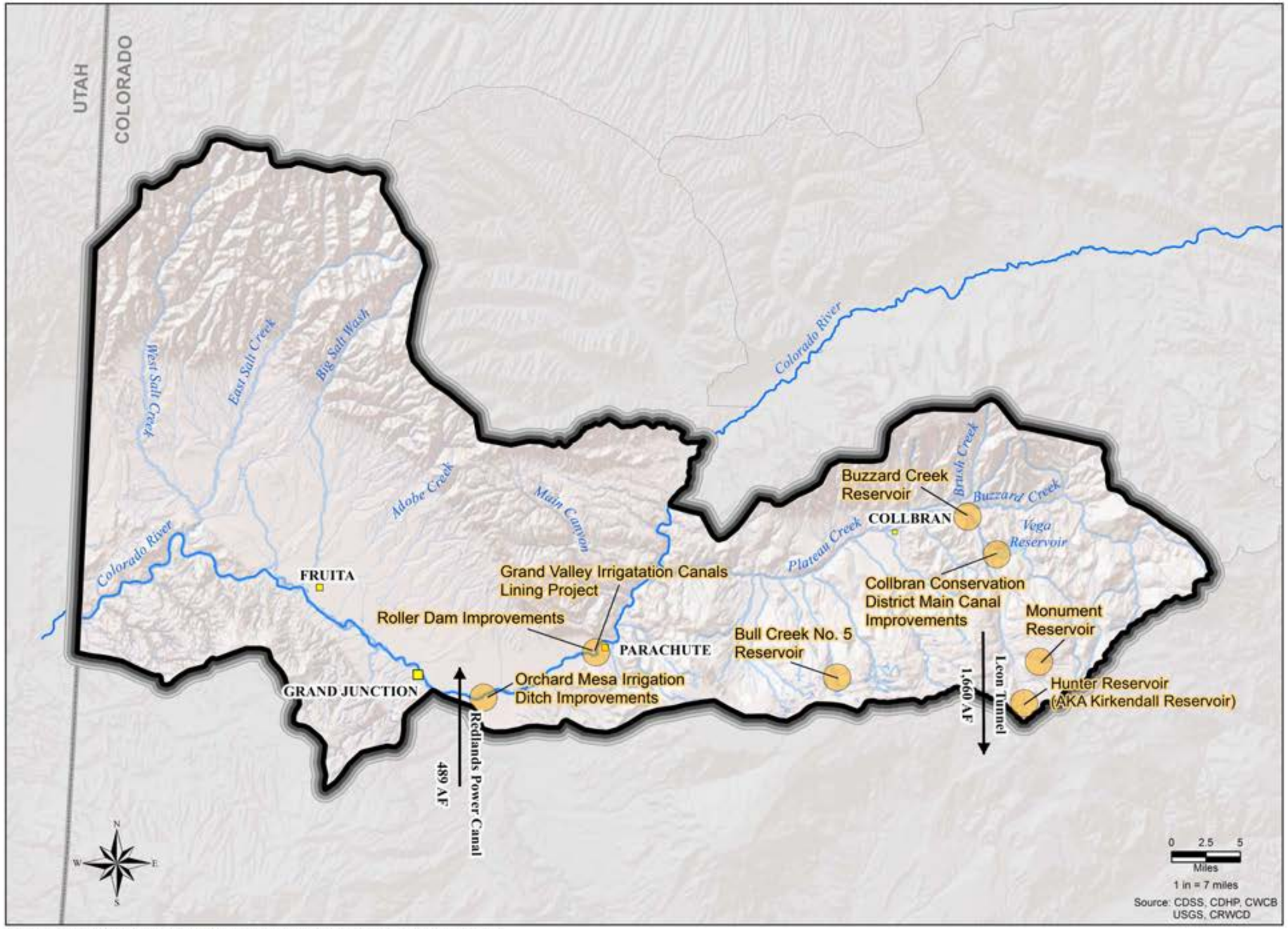

Figure 31.

Colorado River BIP Grand Valley Region

Identified Projects

Regional Breakdown (cont)

Section 6.7 - Grand Valley Region

Table 22. Grand Valley Region Themes and Supporting Vulnerabilities.

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

Regional Breakdown (cont)

Section 6.7 - Grand Valley Region

Table 23. Grand Valley Region Comprehensive List of Projects.

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Denver Water shall pay $1.5 million into the "Grand Valley Fund" to be designated by and controlled by the Grand Valley Signatories to this Agreement (the "Grand Valley Entities"). The following provisions shall apply to the Grand Valley Fund: 1. The Grand Valley Fund and any accruals to the Grand Valley Fund shall be used for water supply, water quality and/or water infrastructure projects in or benefiting the Grand Valley. Subject to such limitation, the projects for which the money in the Grand Valley Fund will be used shall be determined in the sole discretion of the Grand Valley Entities. 2. Denver Water shall pay the $1.5 million into the Grand Valley Fund pursuant to the following schedule: a. $1 million shall be paid within 2 years after resolution of Blue River Decree issues. b. $500,000 shall be paid within 2 years after the Effective Date of this Agreement.	Multiple	Grand Valley Signatories to CRCA	CRCA			Money not yet allocated	Multi-use; very little agricultural benefit
Bull Creek #5 Reservoir restoration	Agriculture		Restricted Reservoirs			Needs to be brought into compliance	Needs to be brought into compliance/agriculture benefit
Kendall Reservoir restoration - located on the west side of Leon Creek, owned by Scott Weiser			Restricted Reservoirs	76 AF			Reservoir is restricted due to "Wave erosion, dam instability & blocked spill". All potential 76 AF is under restriction as dam can't hold water. Put on restriction on 08/27/2007
Hawxhurst Reservoir restoration. Reservoir owner, Laramie Energy II. Due to USFS Roadless area designation access to dam for repairs hasn't been granted.	Agric/Wildlife Mitigation		Restricted Reservoirs	207 AF		Off-line	Reservoir is restricted due to "Hole in outlet conduit and sinkholes". All potential 207 AF is under restriction as dam can't hold water. Put on restriction on 08/21/2006. Water is decreed for irrigation and will be used to irrigate the Hawxhurst Ranch below the dam. As wildlife mitigation for drilling on the ranch, the reservoir flows will be released in the fall to keep water in Hawxhurst Creek for a cutthroat fishery.
Hunter Reservoir enlargement (Kirkendahl Reservoir) - 1,340 AF enlargement (from current storage of 100 AF)	Domestic	Ute Water	SWSI 2010/Ute Water	1,340 AF	100 AF	Ongoing	Domestic Use
Monument Reservoir enlargement (4682 AF for domestic; lease to agriculture in the short term)	Domestic/Agric	Ute Water	Ute Water	4,682 AF		Ongoing (completed prior to Hunter Reservoir)	Domestic/Agric. Short term
OMID Improvements - Efficiency improvements to Orchard Mesa Irrigation District (OMID) system - Improvements will return diversions to the head of the 15-Mile Reach during portions of the irrigation season - "Saved" water accrues to Historic Users Pool of Green Mountain Reservoir, and may be available for other West Slope use - Average yield of about 17,000 AF per year	Agriculture		10,825 Study	17,000 AF		Underway	Modernized irrigation system will benefit OMID water users Minimal environmental issues Timely to construct and permit Institutional and legal issues may exist

Regional Breakdown (cont)

Section 6.7 - Grand Valley Region

Table 23. Grand Valley Region Comprehensive List of Projects. (cont)

Projects, Policies and Process	Beneficiary	Project Sponsor	Data Sources	Proposed (AF, CFS)	Existing (AF, CFS)	Progress	Comments (Opportunities and/or Constraints)
Buzzard Creek Reservoir - · 16,800 AF reservoir on Buzzard Creek near Collbran, Colorado - Perennial tributary to Plateau Creek - Cooperative project between CRWCD and Ute Water Conservancy District - 140' earthen embankment - Located on private land - Average yield slightly greater than 10,825 AF - Dry year yield less than 2,000 AF	Domestic	CRWCD/ Ute Water	10,825 Study	16,800 AF		Not an option for 10,825 but potential for CRWCD or Ute Water	Conditional water right/domestic use??? 10,825 Study Findings: - In dry years, must be combined with other alternatives to fully supply 10825 water - Multi-purpose reservoir - Environmental issues do not appear to be significant - Would require many miles of pipelines to be relocated that cross the reservoir site. - Potential for seepage through glacial tills at dam axis should be investigated - No benefit to upstream areas (Grand County) - Recommended for further study
Mesa County Land Use Policy - promoting new development on unirrigated/agricultural lands (e.g., Whitewater)	Agriculture	Mesa County	Steve Aquafresca, Mesa County Town Hall Meeting			Ongoing	
Big Park Reservoir (5,650 AF out of Leon Creek for domestic first, maybe some agriculture)		Ute Water	CBRT	5,650 AF			
Willow Creek Reservoir	Domestic/Agric	Ute Water	CBRT	19,448 AF			
Owens Creek Reservoir	Domestic/Agric	Ute Water	CBRT				
Grand Valley Diversion Dam (Roller Dam) improvements			CBRT			Ongoing	
Comprehensive Grand Valley canal lining (including Highline, GVIC and OMID canals)			CBRT			Ongoing	
Collbran Conservation District main canal improvements and siphon replacement			CBRT			Ongoing	
Develop model to better represent timing of reservoir releases and stream management of the 15-Mile Reach			CBRT				

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Acronyms

AF	Acre-Feet
AFY	Acre-Feet/PerYear
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
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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