
2. INITIAL DRAFT Overview of Each Basin

2.1. Introduction

NOTE: This draft section will be modified and supplemented upon receipt of the draft Basin Implementation Plans from the Basin Roundtables and additional work completed by the IBCC.

The state of Colorado provides a remarkably diverse and varied landscape for citizens and visitors: from the plains in the east, to the rugged peaks of the Continental Divide, and the mesas and vineyards of the western slope. With such a wide variety of terrain comes an equally distinctive array of opportunity. The Headwaters State is known worldwide as a vacation destination, a rich source of natural resources, an agricultural powerhouse, and a great place to call home.

In planning for the future of Colorado, and the water supply necessary to support the plethora of opportunities available, it is important to understand the distinct needs and issues facing these different areas of the state. Eight major river basins have literally and figuratively formed the state, and know very different histories and current challenges.

In this section of Colorado's Water Plan, the eight basins will be examined in the context of the larger river systems which they form. The landscape of each will be described, along with some historical context, and current issues facing that particular area. By understanding each basin's particular makeup: of agricultural production, recreational opportunities, increasing urbanization in municipal and metropolitan areas, and the factors which make that basin unique; a greater understanding of how to move forward can begin.

2.2. Arkansas Basin

The Arkansas River begins in the central mountains of the state near Leadville, at an elevation of more than 14,000 feet. It travels eastward through the southeastern part of Colorado toward the Kansas border, dropping over 10,000 feet to an elevation of 3,340 feet at the Colorado- Kansas state line. Several tributaries flow from the high southern mountains toward the mainstem of the Arkansas, and drainage from the higher plains to the north also contribute to the flows. The Arkansas River Basin is spatially the largest river basin in Colorado, covering slightly less than one-third of the state's land area (28,268 square miles or 27 percent of the state's total surface area).

Grassland and forest cover approximately 67 percent and 13 percent of the basin, respectively. Over 20 percent of the land is publicly owned. A large amount of the grassland is devoted to agriculture with one-third of agricultural lands benefiting from irrigation. Increasing urbanization

is occurring throughout portions of Arkansas River Basin. Over the last few years persistent drought has impacted the basin heavily.

The Arkansas River Compact of 1948 apportions the waters of the Arkansas River between Colorado and Kansas, while providing for the operation of John Martin Reservoir. The Compact is “not intended to impede or prevent future beneficial development... as well as the improved or prolonged functioning of existing works: Provided, that the waters of the Arkansas river... shall not be materially depleted in usable quantity or availability...” (Article IV, para. D.). The primary tool for administering the Arkansas River Compact is the 1980 Operating Principles, which provide for storage accounts in John Martin Reservoir and the release of water from those accounts for Colorado and Kansas water users.



Arkansas River

Colorado and Kansas have litigated claims concerning Arkansas River water since the early 20th century, which led to the negotiation of the Compact. In 1995, Colorado was found to have depleted stateline flows in violation of the Compact through the use of tributary groundwater. As a result, the Colorado State Engineer promulgated well administration rules to bring Colorado into compliance with the compact, and Colorado compensated Kansas for damage claims (approximately \$34 million). Recently, the State Engineer also promulgated irrigation efficiency rules, which require augmentation for any upgrades to water delivery systems, such as drip irrigation or sprinkler systems.

The Arkansas Basin will face several key concerns and challenges with respect to water management issues and needs over the next 40 years, identified as follows:

- Arkansas River Compact requirements, existing uses and water rights result in little to no water availability for new uses. All new uses, and many irrigation efficiency improvements, require augmentation.
- Growth in the headwaters region will present challenges in securing augmentation water for new demands.
- Concerns over agricultural transfers and its impact on rural economies are significant in the lower portion of the basin downstream of Pueblo Reservoir.
- Recreational in-channel diversions or water rights for recreation will have an impact on the development of augmentation plans for agricultural transfers. The Arkansas River has been called the “most rafted river in the world,” but those recreational flows could be threatened unless there is thoughtful collaboration on water resources.
- Concern over water quality and suitable drinking water exist in the lower basin.
- Possible federal listing of the Arkansas Darter fish as a threatened or endangered species could affect water management in the basin.

- The success of three major projects—the Southern Delivery System, the Preferred Storage Option Plan, and the Arkansas Valley Conduit—are key to meeting future water needs
- Replacement of existing municipal supplies, plus growth in urban areas will result in an increase in the demand for municipal water supplies.

2.3. Basins of the Colorado River System

The Colorado River system (including tributary basins) drains over one-third of the state's area. Originating in the north central mountains, the main stem of the Colorado River flows southwesterly and is met at Grand Junction by the Gunnison River before flowing west into Utah. The Yampa River and the White River move westward across the northwest quadrant of the State to the Utah border where they join the Green River, another tributary of the Colorado. The San Miguel River and the Dolores River begin near the southwestern corner and travel north along the western border and into Utah. The San Juan River and its tributaries collect the water in the southernmost regions west of the Continental Divide and carry it into New Mexico.

Less than 20 percent of the entire Colorado River Basin lies inside Colorado; however, about 75 percent of the water in the entire river basin originates in the State. In the State of Colorado, transbasin diversions account for about 5 percent of the total water supply, or about 500,000 acre-feet per year (AFY). Most of these transbasin diversions move water from west to east to supply water to the Front Range.

Allocations of water in the Colorado River Basin and its tributaries are subject to the following interstate compacts and international treaties:

Colorado River Compact of 1922 – Allocates 7.5 million acre-feet (AF) of consumptive use (CU) annually to both the Upper and Lower Colorado River Basins, with the basin dividing point located at Lee Ferry, Arizona. The compact requires the Upper Basin (Colorado, New Mexico, Utah, and Wyoming) not to deplete the average flow below 75 million AF to the Lower Basin (Arizona, California, and Nevada) during any consecutive 10-year period.

Rio Grande, Colorado, and Tijuana Treaty of 1945 between the United States and Mexico – Guarantees the delivery of 1.5 million AF of Colorado River water to Mexico each year, except in the event of extraordinary drought or serious accident to the irrigation system in the United States, in which case the United States may deliver less water to Mexico.

Upper Colorado River Basin Compact of 1948 – Allocates the Upper Basin's apportionment between the four Upper Basin states on a percentage basis. Colorado is entitled to 51.75 percent of the Upper Basin's apportionment. Additionally, the Colorado may not deplete the flow in the Yampa River below an aggregate of 5 million AF over any 10-year period.

Colorado's existing CU of Colorado River system water is estimated to be in the range 2,417,000 AF to 2,634,000 AF (CWCB 2009).

Mainstem Colorado River Basin

The Colorado River Basin in Colorado encompasses approximately 9,830 square miles. Elevations in the basin range from greater than 14,000 feet in the headwaters areas to about 4,300 feet at the Colorado-Utah state line. The basin's mountainous upper reaches gradually give way to a series of



Colorado River

canyons and gentler terrain, as the river flows along the Interstate 70 corridor towards Grand Junction and the Utah border.

The snowpack in the elevations above 9,000 feet is the important water source for human use, on both sides of the Continental Divide in Colorado, as well as compliance with legal obligations: as much as 70 percent of the river flows out of state.

A substantial portion of the basin is composed of federally owned land. Rangeland and forest are the predominant land uses in the Upper Colorado River Basin (about 85 percent). Forested land is present throughout many parts of the basin. Livestock grazing, recreation, timber harvest, and gas drilling are the leading uses of the federal lands. Active and inactive mines can be found within the basin. The Colorado River Basin will face several key challenges with respect to water management issues and supply needs over the next 40 years, some of which are as follows:

- Recreation and the environment are major drivers in the basin and are important for economic health and quality of life. There is some concern that many of these areas are vulnerable for various reasons, including competition with other water needs.
- Agriculture is important in the basin, especially in the lower basin (Grand Valley). However, agricultural lands continue to be urbanized as communities expand, which could impact twenty percent of irrigated lands in the basin.
- The success of the Upper Colorado River Endangered Fish Recovery Program is important. The Upper Colorado River Endangered Fish Recovery Program is designed to address the recovery needs of the Colorado River endangered fish while protecting existing water uses and allowing for the future use of Colorado River water in compliance with interstate compacts, treaties, and applicable federal and state law.
- There is concern over a potential compact shortage during severe and sustained drought and the potential impacts to in-basin supplies.

- The development of water rights associated with transbasin projects are a concern, and their effect on in-basin supplies must be considered.
- Water quality is a concern, particularly related to selenium and salinity issues.

Gunnison River Basin

The Gunnison River Basin stretches over 8,000 square miles of western Colorado, extending from the Continental Divide to the confluence of the Gunnison and Colorado Rivers near Grand Junction. The Gunnison River Basin is defined by the Elk Range to the north, the Sawatch Range to the east, the San Juan Mountains to the south, and the Uncompahgre Plateau to the southwest. Water traveling from the headwaters to Grand Junction experiences more than 9,500 feet of elevation change.

The Gunnison River Basin is largely forested. Forest area is distributed throughout the basin and covers approximately 52 percent of the total basin area. About 5.5 percent of the land in the basin is classified as planted/cultivated land and is primarily concentrated in the Uncompahgre River Valley between Montrose and Delta, with additional pockets near Gunnison and Hotchkiss.



Gunnison River

Several water management issues have been identified that will present challenges to Gunnison River Basin water users over the next 40 years, summarized as follows:

- Growth in the headwaters will require additional water management strategies.
- Addressing agricultural water shortages in the upper portion of the basin is an important goal of the community; lack of financial resources is an impediment.
- There is concern over possible future transbasin diversions and the effect this might have on the basin.
- The area between Ouray and Montrose is rapidly growing. Tourism is important in the headwaters areas, but agriculture is dominant in the Uncompahgre Valley. A rapid influx of retirees and growth in the Uncompahgre Valley may dramatically change the agricultural uses and other land uses in the area.

Yampa River, White River, and Green River Basins

The Yampa River, White River, and Green River Basins cover roughly 10,500 square miles in northwest Colorado and south-central Wyoming. The basin is defined, in part, by the Continental Divide on the east. The elevation in the basin ranges from 12,200 feet (Mount Zirkel) in the Park Range, to about 5,100 feet at the confluence of the Yampa and Green Rivers at Echo Park within

Dinosaur National Monument. The basin contains diverse landforms including steep mountain slopes, high plateaus, rolling hills, incised sandstone canyons, and broad alluvial valleys and floodplains.

Large portions of the basin are federally-owned lands. Livestock, grazing, and recreation are the predominant land uses. Near the towns of Craig, Hayden, Steamboat Springs, Yampa, and Meeker, much of the land is dedicated to agricultural use. The mountains are densely covered by forest. The valleys and plateaus are mostly covered by shrubland with some forested areas. The Steamboat Springs area, featuring a destination ski resort, is likely to experience continued and rapid population growth.



Yampa River

For the Yampa River, White River, and Green River Basins, key water management issues for the next 40 years include:

- The emerging development of gas and oil shale resources is impacting water needs both for direct production needs and the associated increase in municipal use.
- Agriculture, tourism, and recreation are vital components of this basin's economy. As the needs of communities and industry grow, competition between sectors could increase.
- Industrial uses, especially power production, are a major water use. Future energy development is less certain.
- While rapidly growing in some areas (Yampa River/Steamboat Springs area), the basin as a whole, is not developing as rapidly as other portions of the State. This has led to concern that the basin will not get a "fair share" of water use afforded to Colorado under the Colorado River Compact in the event of a compact call.
- Implementation of a successful Upper Colorado River Endangered Fish Recovery Program is vital to ensuring protection of existing and future water uses.
- Agricultural producers in the basin would like to increase the amount of irrigated land by 14,000 to 18,000 acres, but the lack of financial resources is an impediment

Dolores River, San Juan River, and San Miguel River Basins

The San Juan River, Dolores River, and San Miguel River Basins are located in the southwest corner of Colorado and cover an area of approximately 10,169 square miles. The Upper San Juan River and its tributaries flow through two Native American reservations—the Ute Mountain Ute Reservation and the Southern Ute Indian Reservation, in the southern portion of the basin. What is also known as the Southwest Basin is actually a series of nine sub-basins seven of which flow out of State before they join the San Juan River in New Mexico or the Colorado River in Utah. The water history of the

Southwest Basin has been shaped by the Colorado River Compact issues, the Colorado Ute Indian Water Rights Settlement and a number of U.S. Bureau of Reclamation storage projects.

In addition to the three compacts governing water use across the broader Colorado River Basin, there are other compacts, settlements and species issues specific to the San Juan/Dolores/San Miguel region:



Dolores River

- La Plata River Compact of 1922 – Apportions the La Plata River between Colorado and New Mexico.
- Animas-La Plata Project Compact of 1969 – The right to store and divert water for use in New Mexico under this project shall be of equal priority to rights granted under Colorado court decrees for uses in Colorado from the project.
- The Colorado River Compact places pressure on uses of the San Juan River because New Mexico's primary source of supply for its Upper Colorado River Basin Compact apportionment is the San Juan River. A big factor that has created these pressures is the San Juan Chama Transbasin Diversion that pulls water out of the Rio Blanco, a tributary to the Upper San Juan River, and diverts it into the Chama River in New Mexico.
- The Colorado Ute Indian Water Rights Settlement Act of 1988 – Settles the reserved water right claims of the Southern Ute and Ute Mountain Tribes on all streams that cross the reservations of the two tribes, with respect to quantity, priority, and administration.
- The Dolores Project was integral to the Ute Mountain Ute portion of the Indian Water Rights Settlement. Construction of the Dolores Project was allowed to proceed in 1977, by order of the Secretary of Interior, because it provided potable water for the first time to the Ute Mountain Ute community of Towaoc and irrigation water for a highly productive 7,600 acre Tribal farm in exchange for subordinating senior Tribal water rights claims that could have dried up the Mancos River Valley.
- Tribal water allocations out of the Animas-La Plata Project component of the Settlement provided the Tribes with an M&I water source to supply and augment future depletions of the San Juan River system which are constrained by the San Juan Recovery Program for Endangered Native Fish. The ALP also provided the City of Durango and surrounding areas with a long term M&I supply.
- The Upper Colorado River Endangered Fish Recovery Program and the San Juan River Basin Recovery Implementation Program are designed to work cooperatively to address the recovery

needs of the Colorado River endangered fish while protecting existing water uses and allowing for the future use of Colorado River water in compliance with interstate compacts, treaties, and applicable federal and state law, i.e., "The Law of the Colorado River." The San Juan Recovery Program resulted in the elimination of the irrigation component of the Animas-La Plata Project. The elimination of the ALP irrigation component, combined with the 1992 La Plata compact created a persistent irrigation and M&I gap in the La Plata drainage.

- The Southwest Basin also includes numerous instream flow segments. Instream flows have served as a tool to balance valued agricultural uses with in-stream water to support recreational and environmental values, all of which combine to support the economic and aesthetic values that drive settlement and commerce in the Southwest Basin.
- The Southwest Basin is also characterized by extensive US Forest Service and BLM land ownership. Most Southwest Basin headwaters originate on Federal Land. These federal agencies have worked with the CWCB Instream Flow Program to secure substantial flow protection at high elevations throughout the Basin. As stream flow protections have increasingly focused on lower elevation streams, below stored water and communities, instream flow appropriations have become more complex and challenging.

Agriculture and ranching prevail in the lower elevations of La Plata, Montezuma, Dolores, San Miguel, and Montrose Counties as they have for many generations. Tourism and recreation have become more established in the region as the Animas, Piedra, Dolores, and San Miguel Rivers offer both fishing and rafting opportunities along with flat water recreation on the region's many reservoirs.

This multiple-basin area of the State is extremely diverse and is experiencing changing demographics:

- The Pagosa Springs-Bayfield-Durango corridor is rapidly growing, has areas of localized water shortages, and is transitioning from oil and gas, mining and agriculture to tourism/recreation, and a retirement/second home area.
- The Cortez and Dove Creek area remains strongly agricultural, supplemented by energy production, but is also seeing growth with retirees moving to the area.
- The San Miguel area is a mix of recreation and tourism along with a strong desire to maintain agriculture in the western part of the county.

Overall, water supply is available in the Southwest Basin as a result of numerous storage projects built primarily to supply irrigation water. Several of these storage projects have been able to allocate or carve out small amounts of M&I water to supply domestic growth. Resulting revenues from M&I sales are being re-invested in delivery system efficiencies that will yield the water necessary to meet future M&I needs without diminishing agricultural deliveries. The remaining

challenge is the development of sufficient infrastructure to get M&I water to where it is needed. There is also a need for new storage to meet long term supply needs in the Pagosa Springs area.

The Southwest Basin Roundtable takes very seriously the need to reconcile a strong commitment to the continuation of a vibrant agricultural sector with healthy streams to support environmental and recreational values. In keeping with this philosophy the Southwest Basin is organizing IPPs by sub-basin with one IPP list that addresses agricultural, municipal, industrial, environmental and recreational values and needs. This approach is intended to reveal opportunities for multi-benefit projects to address water supply gaps.

2.4. South Platte River, Republican River, and North Platte River Basins

South Platte River Basin

The South Platte River Basin is the most populous basin in the State. The South Platte Basin population is expected to double from approximately 3.5 million people to 6 million people by 2050. (approximately 85% of Colorado's population resides in the South Platte Basin), and the Front Range area of the South Platte Basin is Colorado's economic and social engine. The South Platte River Basin also has the greatest concentration of irrigated agricultural lands in Colorado.

The topographic characteristics of the South Platte River Basin are diverse. Its waters originate in the mountain streams along the Continental Divide in the northern portion of the Front Range. The river emerges from the mountains southwest of Denver and moves north through the Denver area where numerous tributaries such as Cherry Creek, Clear Creek, Coal Creek, Boulder Creek, St. Vrain Creek, Big Thompson River, and Cache La Poudre River join the South Platte; then northeast across the High Plains. The western portions of the basin and its montane and subalpine areas are mostly forested, while the High Plains region is mainly grassland and planted/cultivated land. Approximately one-third of the South Platte Basin land area is publicly owned, with the majority of these lands in the forested mountains. The South Platte River crosses the Colorado-Nebraska state line near Julesburg and merges with the North Platte River in southwestern Nebraska to form the Platte River.



South Platte River

The hydrology of the South Platte Basin is highly variable, with an approximate average annual native flow volume of 1.4 million acre-feet. Water supply in the South Platte Basin is supplemented by approximately 400,000 acre feet of trans-basin diversions from the Colorado River Basin and by approximately 100,000 acre feet from the Arkansas, North Platte and Laramie River Basins. In addition, over 30,000 acre feet are pumped from non-tributary groundwater aquifers to supplement supplies. However, surface water diversions in the South Platte Basin average approximately 4.0 million acre-feet annually, with an additional average annual 500,000 acre-feet of groundwater withdrawals. The amount of diversion in excess of native flow highlights the return

flow-dependent nature of the basin's hydrology, and the basin-wide efficient use and reuse of water supplies. On average, only 400,000 acre feet leave the Basin.

The South Platte River Compact of 1923 establishes a legal framework within which the water of the South Platte River is allocated to water users in both Colorado and Nebraska. Specifically, the compact requires the Colorado State Engineer to curtail diversions east of the Washington County line that are junior to June 14, 1897 when flow in the river is less than 120 cubic feet per second from April 1 through October 15.

The Platte River Recovery Implementation Program (PRRIP) and the Upper Colorado River Endangered Fish Recovery Program provide limited Endangered Species Act (ESA) coverage for Program participants. Participation in these programs protects existing uses and allows continued water development.

The South Platte Basin is Colorado's most economically diverse basin. Urban sector business and industries within the South Platte Basin provide for a majority of the state's overall economy. Agricultural production is the highest among basins across the State of Colorado. The Basin also supports a wide range of ecological systems and important water-dependent ecological and recreational attributes. Coloradoans and tourists regularly take advantage of the South Platte's recreational opportunities provided by the basin's many environmental features. Willing water transfers from the agricultural sector to the municipal/industrial (M&I) sector has proven reliable, though is viewed as unsustainable if the South Platte, and the State of Colorado, is to continue to have a high quality of life and diverse economy as the population continues to grow. The challenge of preserving the M&I, agricultural, and recreational economies, as well as preserving the basin's environmental features, makes water management in the South Platte Basin especially complex. These complexities include:

- Agriculture is the dominant water use in the Basin, accounting for 85% of total water diversions. Conversion of agricultural water to M&I uses ("Agricultural Transfers") will continue to be a significant option for meeting future M&I needs, especially in those areas where agricultural land will be urbanized. These Agricultural Transfers are likely to have negative impacts to rural communities, and to open spaces, wetlands and recreation that are tied to irrigated lands. Loss of irrigated agricultural lands will negatively impact the local economy and the State's economy, as well as the State's food security.
- Competition for additional M&I water supplies is significant, and in some cases, multiple M&I suppliers have identified the same water supplies as future water supplies. Competition increases the costs to M&I customers, and competition for the same water supplies could result in some M&I suppliers not having enough water in the future.
- A substantial amount of the basin's water supply originates in the Colorado River Basin. As such, compliance with the Colorado River Compact, and avoiding a compact curtailment, is critical to the South Platte Basin.

- Preserving options for development of additional supplies from the Colorado River Basin is critical to effectively planning for future water supplies. If additional Colorado River supplies are not available for future use, the “default” will include additional Agricultural Transfers, greatly increasing the negative impacts of Agricultural Transfers, as identified above.
- The lack of new major water storage in recent decades (aside from the recent construction of Reuter-Hess Reservoir) has led to reliance on nonrenewable groundwater in Douglas and Arapahoe Counties. Strong economic and population growth in these counties coupled with the lack of surface water supplies, led the need to develop renewable surface water supplies and additional water storage for the South Metro area.
- Completion of planned storage projects, including Glade Reservoir, Halligan and Seaman Reservoir Enlargements, Gross Reservoir Enlargement, and the Chatfield Reallocation Project, is critical to meeting future water supply needs. These projects will supply much-needed water to project participants, and failure to complete these projects will result in water shortages, additional Agricultural Transfers, or additional water diversions from the Colorado River Basin.
- Conjunctive use of surface water and alluvial groundwater, and use of alluvial aquifers for storage, offer opportunities to expand sustainable water use. Aquifer storage is generally considered to have lesser environmental impacts, and water stored in alluvial aquifers is not subject to evaporation losses. Aquifer storage poses control and administrative issues that will need to be addressed to ensure that other water rights are not injured.
- Water quality will continue to be a challenge as more water is diverted for use, and point and non-point sources discharge to the Basin’s waters. Salt content of soil and water in the South Platte River valley, and sedimentation/erosion in parts of the basin, are likely to continue to increase over time, which will negatively impact the ability to use the water for agricultural and M&I purposes. Technological solutions are expensive and non-sustainable because of high energy demands and issues associated with disposal of concentrated treatment residuals.
- The South Platte Basin is leading the State with regard to M&I water use efficiency. Efficient use of the basin’s resources, through water reuse and conservation, is a critical component of meeting future water needs. Increased M&I water use efficiency will reduce water availability for agriculture, ecological resources, and other uses, as M&I return flows diminish.
- The urban environment is an important component of quality of life for many South Platte Basin residents. Judgments about the value of the urban environment, including the need to provide water for irrigated landscape, make discussions about water supply development needs all the more difficult.
- The environmental and recreational features within the basin including amenities such as mountain streams and rivers (fishing, rafting, etc.), city green ways, flatwater reservoirs,

wetlands and open space, are extremely important to Colorado's tourism economy and resident's quality of life.

Republican River Basin

The Republican River Basin in Colorado is located on the Northeastern High Plains. The headwaters of the North Fork and South Fork of the Republican River, and the Arikaree River, originate in the Northeastern High Plains of Colorado near Wray, Cope and Seibert, respectively. The Republican River is formed by the confluence of the North Fork of the Republican River and the Arikaree River just north of Haigler Nebraska, with the South Fork of the Republican joining just southeast of Benkelman, Nebraska. Other major drainages within the Republican River Basin include Frenchman Creek, Beaver Creek and Red Willow Creek. The Republican River Basin in Colorado encompasses approximately 7,760 square miles, which represents thirty-one percent of the total Republican River Basin located in Colorado, Nebraska and Kansas.



Republican River

The topographic characteristics of the Republican River Basin are similar to the High Plains region of the South Platte River Basin, consisting mainly of grassland and planted/ cultivated land. The Republican River Basin in Colorado is underlain by the High Plains or Ogallala aquifer, which is one of the largest water bodies in the United States, and extends from South Dakota to Texas.

The Republican River Compact of 1942 (Compact) apportions the waters of the Republican River Basin between Colorado, Nebraska and Kansas. The Compact defined the Republican Basin for purposes of the Compact as "all the area in Colorado, Kansas, and Nebraska, which is naturally drained by the Republican River, and its tributaries, to its junction with the Smoky Hill River in Kansas". It also states that beneficial consumptive use is the basis and principle upon which the allocations made in the Compact are predicated.

The Compact quantified the average virgin water supply (defined as the water supply that is "undepleted by the activities of man") originating in the Republican River Basin upstream of the Nebraska-Kansas state line as 478,900 acre-feet per year. Based on this quantification, the Compact makes allocations for beneficial consumptive use in each State. Colorado was allocated 54,100 acre-feet, which was further allocated as follows: North Fork of the Republican River drainage basin – 10,000 acre-feet; Arikaree River drainage basin – 15,400 acre-feet; South Fork of the Republican River drainage basin – 25,400 acre-feet; Beaver Creek drainage basin – 3,300 acre-feet. In addition, Colorado is allocated the entire water supply of the Frenchman Creek and Red Willow Creek drainage basins in Colorado.

In 2004 the Republican River Water Conservation District (RRWCD) was established for the purpose of cooperating with and assisting the State of Colorado with Compact compliance. The RRWCD recently completed the construction of the Republican River Compliance Pipeline to assist in compact compliance.

Administration of surface water in the Republican River Basin is separate from ground water administration. The Water Courts have judicial authority regarding surface water rights, whereas the Colorado Ground Water Commission (CGWC) has regulatory and an adjudicatory authority regarding the management and control of Designated Ground Water. The CGWC is responsible for adjudicating groundwater rights and issuing large capacity well permits. Much of the ground water located within the basin has been authorized as being in a Designated Ground Water Basin. The CGWC has established eight designated basins and 13 Ground Water Management Districts (GWMDs) within such basins. Ground Water Management Districts are local districts that have additional administrative authority. Much of the Republican River Basin lies within the Northern High Plains Ground Water Management District.

The Republican River Basin will face several key issues and challenges with respect to water management issues over the next 40 years, identified as follows:

- Republican River Compact compliance.
- Depletions to the Ogallala Aquifer continue to reduce the amount of readily available water supplies for the agricultural economy in the Basin; in some cases presenting a feasibility issue of providing adequate water supplies for crop irrigation or in some cases no water supply.
- Continued detailed coordination and communication between multiple water rights and administrative authorities (CGWC, DWR, GWMD, Water Court, etc.).

North Platte River Basin

The North Platte River Basin, also known as North Park, is a high altitude valley covering about 2,000 square miles in north central Colorado, adjacent to Wyoming. The basin includes all of Jackson County and the small portion of Larimer County that contains the Larimie River Watershed.



North Platte River

Both the North Platte and Laramie Rivers flow north into Wyoming, and are subject to use limitations stemming from Supreme Court decrees. Water use in the basin is dominated by irrigated pasture grass related to ranching operations, with over 400 irrigation ditches diverting from the mainstem, and the numerous tributary streams throughout the basin. Total irrigated acreage in the basin, based on 2001 estimates, is approximately 116,000 acres. A portion of North Platte water is exported to the

Front Range via the Michigan Ditch and Cameron Pass Ditch, which combined divert approximately 4,500 acre-feet per year out of the basin. The basin also contains a major wildlife refuge along with numerous public lands and the recreational opportunities they allow.

The U.S. Supreme Court decisions which govern interstate water use in the basin include:

- **Nebraska v. Wyoming, 325 U.S. 589 (1945)** – Equitably apportions water in the North Platte River between Colorado, Nebraska, and Wyoming. Limits total irrigation in Jackson County to 145,000 acres and 17,000 acre-feet of annual irrigation season reservoir storage, Limits exports from the basin within Colorado to 60,000 acre-feet over 10 years.
- **Wyoming v. Colorado, 353 U.S. 953 (1957)** – Establishes the rights of Colorado and Wyoming to water in the Laramie River Basin. Limits Colorado's total diversions and exports from the Laramie River to 39,750 acre-feet per year, divided among specific water facilities.

Water use in the basin is also governed by the Three State Agreement of the Platte River Recovery (PRRIP) Implementation Program related to Endangered Species recovery efforts on the Platte River in Central Nebraska. The agreement employs a “one-bucket concept” for the North Platte Basin of Colorado that currently limits water use in the basin to depletions associated with the irrigation of up to 134,467 acres, while allowing for flexibility in the type water use.

The North Platte River Basin will face several key issues and challenges with respect to water management over the next 40 years, identified as follows:

- Maintaining compliance with the equitable apportionment decrees on the North Platte and Laramie Rivers that quantify the amount of available water and lands that can be irrigated.
- Increasing economic development and diversification through strategic water use and development.
- Continuing to restore, maintain, and modernize critical water infrastructure to preserve current uses and increase efficiencies.
- Gaining knowledge of the basin's consumptive uses and high-altitude crop coefficients.
- Understanding and using the North Platte Decision Support System to quantify historical consumptive use, agricultural shortages, water availability and water storage opportunities.
- Quantification and strategic development of available unappropriated waters within the basin.
- Successfully resolving endangered species issues on the Platte River in Central Nebraska through the PRRIP in a manner that does not put pressure on water users to reduce existing uses.
- Maintaining healthy rivers through the strategic implementation of projects that meet prioritized nonconsumptive needs.
- Promoting water rights protection and management through improved streamflow gaging data.
- Enhancing forest health and management efforts for wildfire protection and beetle kill impacts.

2.5. Rio Grande Basin

The Colorado portion of the Rio Grande drainage basin is located in south central Colorado and encompasses less than 10 percent of the State's land area (approximately 7,700 square miles). The San Juan Mountains in the west, the Sangre de Cristo Range in the north and east, the Culebra Range in the southeast, and the Colorado-New Mexico Stateline in the south define the boundaries of the Rio Grande Basin within Colorado. Between the San Juan Mountains and the Sangre de Cristo Mountains lies the San Luis Valley, a principal feature of the Rio Grande Basin, with an average elevation of 7,500 feet, and precipitation of less than 8 inches per year.



Rio Grande River

Basinwide, land is evenly divided between public and private ownership. However, the majority of the land in the San Luis Valley is privately owned. The primary use of more than 600,000 acres of irrigated land is agricultural operation in the central portion of the basin, which constitutes the second largest shipper of fresh potatoes in the United States. Areas in the valley which are not irrigated are mostly classified as shrubland (24 percent) and grassland (31 percent). The San Juan and the Sangre de Cristo mountain ranges are largely forested. The northern one-third of the basin is considered to be a "closed basin" and does not contribute any surface flows to the Rio Grande.

Interstate compacts and international treaties affecting water use in the Rio Grande Basin include the Rio Grande, Colorado, and Tijuana Treaty of 1945 between the U.S. and Mexico, the Rio Grande Compact of 1938, and the Amended Costilla Creek Compact of 1963. In particular, the Rio Grande Compact establishes Colorado's obligations to ensure deliveries of water at the New Mexico Stateline and New Mexico's obligation to assure deliveries of water at the Elephant Butte Reservoir, with some allowance for credit and debit accounts. The obligations are calculated based on the amount of flow at indexed stations, which then by schedule in the compact determines the amount of flow that must be delivered to the downstream states during that year. The Rio Grande Compact established the Rio Grande Compact Commission to administer the terms of the agreement. The Commission consists of one representative from each state and a non-voting federal representative.

The Rio Grande Basin will face several key issues and challenges with respect to water management issues and needs over the next 40 years, identified as follows:

- The Rio Grande Compact and the effects of sustained drought make the objective of sustainability difficult.
- Agricultural groundwater use is currently at unsustainable levels.

- Economic impacts of reducing irrigation use of groundwater supplies will be difficult, but working on community-based solutions offers the best hope of minimizing the impacts.
- Residential growth, primarily in the form of second and vacation homes, especially in the South Fork area, is creating a need for augmentation of water supplies.
- Groundwater is a key component of water use in the Basin for both M&I and agriculture and groundwater management provides a challenge.

2.6. Conclusion

We are connected statewide. West Slope ranchers finish their cattle on the East Slope, have them slaughtered and distributed there. The East Slope buys and eats West Slope peaches and wine. The West Slope has amazing recreational opportunities, and Front Range families support West Slope economies by being the largest user of these recreational opportunities and owning many of the second homes. At the same time, there are transmountain diversions that bring Colorado River water to East Slope communities. The Front Range is where the majority of the economic activity takes place, and therefore where the most of taxes are collected. This in turn, is distributed throughout the state, including rural communities.

As demonstrated in this brief overview, each basin features its own remarkable opportunities, as well as distinct challenges that make planning for Colorado's water future difficult. Solutions will impact not only one basin, but basins throughout Colorado. Though each area has unique issues and concerns, our water future is connected statewide. Every basin needs to grapple with drought, interstate compacts and agreements, growing populations, important environmental and recreational values, and sustaining agriculture. Because of so many shared interests, we need to continue working together to solve our water supply gaps so that the Colorado we value can continue to flourish.