

# South Platte Basin Implementation Plan

Metro Basin Roundtable

South Platte Basin Roundtable

April 17,  
**2015**



*West Sage*  
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# Acknowledgements

The South Platte Basin Implementation Plan (SP-BIP) could not have been developed over the past eighteen months without the involvement and guidance of many individuals, committees and organizations with deep commitments to comprehensive water management in the South Platte and Republican River Basins. HDR Engineering and the West Sage Team are very grateful for the generous support provided to us. First, thank you to the South Platte and Metro Roundtables for entrusting the important work of developing this plan to us. Second, we especially appreciate the direction of the two committees (Metro’s BIP Committee and the South Platte’s Rio Chato Committee) who were assigned by the Roundtables to do the “heavy lifting” during the development, writing and editing of the SP-BIP. The dedication and support of the people comprising this joint committee brought many important and diverse viewpoints to the SP-BIP. In particular, we thank those individuals who routinely took time each week to coordinate with our teams to shape the approach, technical information, and tone presented in the SP-BIP. We also owe significant thanks to the Environmental and Recreational Subcommittee, supporting West Sage in the development of the environmental and recreational portions of the SP-BIP. The balance and thoughtful advice of the subcommittee members brought important perspectives into the report and helped to provide a well-rounded document. Please see the membership lists for these groups below

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## Foreword

At the request of Governor John Hickenlooper, the State of Colorado has begun to develop “Colorado’s Water Plan”. As part of the plan, “Roundtables” across the state are developing Basin Implementation Plans (BIPs) which will be incorporated in Colorado’s Water Plan as appendices. Colorado’s Water Plan is intended to set a course for water planning on a statewide level in Colorado, utilizing a grassroots approach that incorporates local knowledge from each river basin. It is the hope of the South Platte and the Metro Basin Roundtables that the South Platte Basin Implementation Plan (SP-BIP) will serve as a first step towards decisive action to address Colorado’s water needs now and in the future.

The SP-BIP, as a piece of this larger project, has been developed in a collaborative effort by the South Platte and Metro Basin Roundtables (BRTs). As a Joint BRT, they engaged two consulting teams to develop the SP-BIP. HDR Engineering, supported by MWH Americas, Inc., was tasked by the BRTs with developing the portions of the SP-BIP related to consumptive water uses including municipal, industrial, and agricultural uses. The West Sage Water Consultants Team was tasked with developing the information related to environmental and recreational uses. The work of HDR Engineering and West Sage has been integrated in this document to form the SP-BIP. Key members of the consulting teams are listed on the following page.

Public input from all categories of water interests in Colorado is critical to formulate a balanced SP-BIP and a successful CWP. To engage the public in the development of the SP-BIP, the Metro and South Platte BRTs utilized multi-faceted communications and outreach tools to reach diverse stakeholders.

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## Table of Contents

S	Executive Summary .....	S-1
	S.1 Colorado’s Water Resources .....	S-1
	S.2 Basin Roundtables .....	S-2
	S.3 South Platte Basin Water Supply Challenges.....	S-3
	S.3.1 Limited Native Water Supply in the South Platte .....	S-4
	S.3.2 Successive Use, Conservation, and Reuse .....	S-4
	S.3.3 Groundwater and Aquifer Storage and Recovery .....	S-6
	S.3.4 Interstate Water Commitments .....	S-7
	S.3.5 Environmental Permitting Processes and Threatened and Endangered Species Recovery.....	S-7
	S.3.6 Environmental and Recreational Uses.....	S-8
	S.3.7 Water Quality Issues .....	S-8
	S.4 Solutions for the South Platte.....	S-9
	S.4.1 Making Choices.....	S-9
	S.4.2 Strategic Overview .....	S-10
	S.5 Implementation .....	S-11
	S.5.1 Maximize Implementation of IPPs .....	S-11
	S.5.2 Maintain leadership in conservation and reuse and implement additional measures to reduce water consumption rates .....	S-12
	S.5.3 Maximize use and effectiveness of native South Platte supplies .....	S-13
	S.5.4 Minimize traditional agricultural “buy and dry” and maximize use of Alternative Transfer Methods (ATMs) to extent practical and reliable .....	S-13
	S.5.5 Protect and enhance environmental and recreation attributes.....	S-14
	S.5.6 Simultaneously advance the consideration and preservation of new Colorado River supply options.....	S-14
	S.5.7 Promote Multi-Purpose Storage Projects that Enhance other South Platte Basin Solutions .....	S-15
	S.5.8 Manage the risk of increased demands and reduced supplies due to climate change .....	S-15
	S.5.9 Facilitate effective South Platte communications and outreach programs that complement the state’s overall program.....	S-15
	S.5.10 Research new technologies and strategies .....	S-16
	S.5.11 Advocate for improvements to federal and state permitting processes .....	S-16
	S.6 Summary .....	S-16

## List of Figures

Figure S-1. Colorado River Basins .....	S-2
Figure S-2. The South Platte Basin .....	S-3
Figure S-3. Remaining Gap by county (65% IPP Success Rate in the South Platte Basin and 88% IPP Success Rate in the Metro Basin) .....	S-12

# Acronyms

AF	Acre-feet
AFY	Acre-feet per year
ASR	Aquifer Storage and Recovery
ATMs	Alternative Transfer Methods
AWWA	American Water Works Association
BIP	Basin Implementation Plan
BMP	Best Management Practices
BRTs	Basin Roundtables
CAWS	Collaborative Approach to Water Supply Permit Evaluation
CBEF	Center for Business and Economic Forecasting
C-BT	Colorado Big Thompson
CCGA	Colorado Corn Growers Association
CDPHE	Colorado Department of Public Health and Environment
CDSS	Colorado Decision Support System
CDWR	Colorado Division of Water resources
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
CGWC	Colorado Ground Water Commission
Corps	United States Army Corps of Engineers
CRCA	Colorado River Cooperative Agreement
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Resource Program
CRSPA	Colorado River Storage Project Act
CRWAS	Colorado River Water Availability Study
CSA	Combined Service Area
CU	Consumptive Use
CU&L	Consumptive uses and Losses
CWA	Clean Water Act
CWCB	Colorado Water Conservation Board
CWP	Colorado Water Plan

CWRPDA	Colorado Water Resources and Power Development Authority
DBAS	Denver Basin Aquifer System
DCWRA	Douglas County Water Resource Authority
DNR	Colorado Department of Natural Resources
DPR	Direct Potable Reuse
ECCV	East Cherry Creek Valley
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentive Program
ERMOU	Eagle River Memorandum of Understanding
ESA	Endangered Species Act
FRICO	Farmers Reservoir & Irrigation Company
FSA	Farm Service Agency
G&MOs	Goals and Measureable Outcomes
GIS	Geographic Information System
gpcd	gallons per capita per day
GW	Groundwater
GWMD	Ground Water Management Districts
HB	House Bill
IBCC	Interbasin Compact Committee
IPP	Identified Projects and Processes
IPR	Indirect Potable Reuse
ISA	Interruptible Service Agreement
ISF	Instream flow
IWR	Irrigation Water Requirement
LEDPA	Least Environmentally Damaging Practicable Alternative
LIRF	Lawn Irrigation Return Flows
M&I	Municipal and Industrial
MO	Measurable Outcome
MOA	Memorandum of Agreement
MODFLOW	Modular Finite-difference groundwater flow computer program
W	
MPB	Mountain Pine Beetles
NAWQA	National Water Quality Assessment Program

NC	Nonconsumptive
NCNA	Nonconsumptive Needs Assessments
NEPA	National Environmental Policy Act
NGOs	Non-governmental organizations
NISP	Northern Integrated Supply Project
Northern Water	Northern Colorado Water Conservancy District
NPIC	North Poudre Irrigation Company
PACSM	Platte and Colorado Simulation Model
PEPO	Public Education, Participation, and Outreach
POR	Period of Record
PPCD	Pharmaceuticals and Personal Care Products
PRRIP	Platte River Recovery Implementation Program
RICD	Recreational in-channel Diversions
RO	Reverse Osmosis
ROD	Record of Decision
RRWCD	Republican River Water Conservation District
SB	Senate Bill
SDO	State Demographer's Office
SMWSA	South Metro Water Supply Authority
SP - BIP	South Platte Basin Implementation Program
SPDSS	South Platte Decision Support System
SRGAP	Southwest regional Gap Analysis Project
SSI	Self Supplied Industrial
SW	Surface Water
SWP	Surveyed Water Providers
SWSI	Statewide Water Supply Initiative
TDS	Total Dissolved Solids
TMD	Transmountain Diversion
USDA	United States Department of Agriculture
USGS	United States Geological Study
WEF	Water Environment Foundation
WERF	Water Environment Research Foundation
WISE	Water Infrastructure and Supply Efficiency



WQCD	Water Quality Control Division
WSL	Water Supply Limited
WSRA	Water Supply Reserve Account
WSSC	Water Supply Storage Company
ZLD	Zero Liquid Discharge

# Executive Summary





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# S Executive Summary

## S.1 Colorado's Water Resources

Over the last decade Colorado has faced substantial and increasingly complex water-related challenges. The sources of these challenges are as diverse as the state itself. They range from competing water needs including agriculture, oil and gas, tourism, environmental, recreational, industrial, and municipal uses, to differing regional outlooks about water management based on the state's geography and demographics. It was this coalescing of challenges facing Colorado that demanded stronger action. Taken together these and other issues presented a call for executive-level action to align competing interests and outlooks under a unified vision for the future of Colorado water planning. On May 14, 2013 Colorado's Governor, John Hickenlooper, responded to this situation by issuing an Executive Order directing the Colorado Water Conservation Board to commence work on Colorado's Water Plan (CWP). As specified in the Executive Order, the CWP must integrate the following:

- 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.

Colorado's Water Plan tackles many water challenges faced by the state including:

- Addressing the projected municipal and industrial water supply gap that previous state reports indicate may reach 500,000 acre feet per year by 2050
- Addressing the largest regional supply gap in the South Platte Basin – the most populous and agriculturally productive Basin in the state
- Addressing how drought conditions worsen this projected supply gap
- Reducing the state's trend toward "buy and dry" transfers of water rights from agriculture to municipal use as demand increases
- Incorporating environmental and recreational values so important to the economy and quality of life in each of the state's river basins
- Addressing long-standing interbasin and intrabasin challenges through cooperative dialogue and action, including the basin roundtables and IBCC
- Recognizing that water quantity and quality issues in the state are integrally linked
- Addressing interstate water obligations for the nine compacts and two equitable apportionment decrees applicable to Colorado

In developing the Plan, the Governor directed the Colorado Water Conservation Board to utilize the existing system of Basin Roundtables established by the *Colorado Water for the 21st Century Act* in 2005. The Basin Roundtables were created to encourage locally-driven, collaborative solutions to the increasingly complex and controversial water questions facing the state.

Additionally, the Governor directed that Colorado's Water Plan should work to align state water projects, studies, funding opportunities, and other efforts. The Governor further directed that the Plan should improve the state's role in facilitating and permitting water projects, utilize the knowledge and resource of relevant state agencies, as well as assemble working groups and ad-hoc panels to address specific issues that come to light in the process.

The first draft of Colorado's Water Plan was developed and submitted to the Governor in December 2014. The work of the Basin Roundtables and the Colorado Water Conservation Board continues to form the foundation of the Plan as it is finalized for submission to the Governor in December 2015.

## S.2 Basin Roundtables

As mentioned above, nine Basin Roundtables were established in 2005 to help manage and develop the state's water resources. This occurred in part as a response to the increasingly controversial and contentious water issues facing the state and in part to help proactively manage the changing water demands associated with the state's population.

The nine basin roundtables, as shown in Figure S-1, represent the major river basins of the state with one important exception: the South Platte Basin, which includes two roundtables, the Metro Roundtable and the South Platte Basin Roundtable. The factors affecting water in the South Platte River Basin, including the diversity of demographics and water uses for the urban portion of the basin versus the very different needs of agricultural users in other portions of the basin were deemed significant enough that the river basin was divided into two separate Basin Roundtables, one representing the Metro region of the South Platte and the other representing the remainder of the basin including the portion of the Republican River Basin in far Eastern Colorado. Given the integrated water needs of the two designated "basins," however, the South Platte Roundtable and Metro Roundtable decided to develop a single Basin Implementation Plan for the South Platte River Basin.



Figure S-1. Colorado River Basins

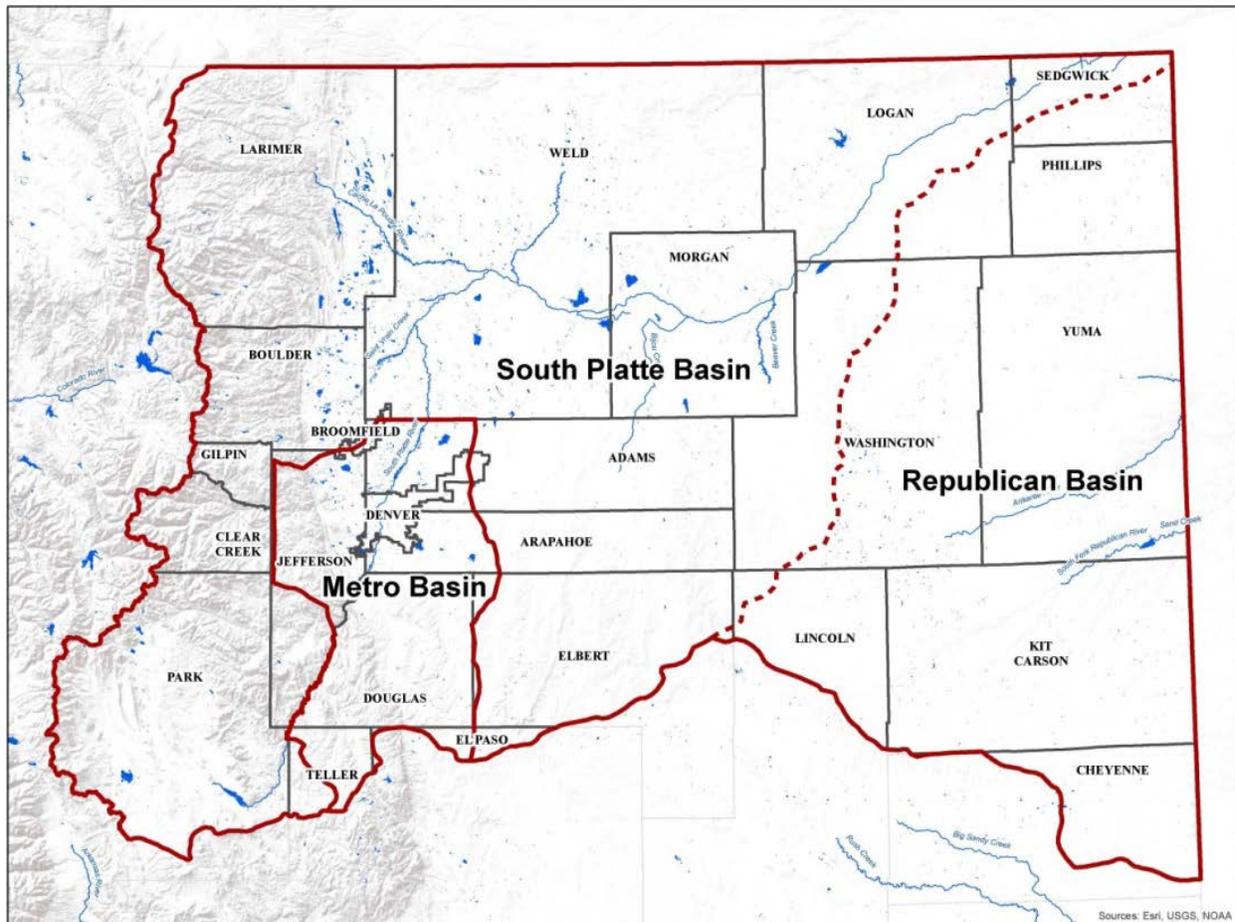


Figure S-2. The South Platte Basin

The South Platte Basin, as shown in Figure S-2, covers a large portion of Northern Colorado including 7 of the state’s top 10 agricultural counties as well as major urban centers and diverse environmental and recreational attributes.

### S.3 South Platte Basin Water Supply Challenges

The South Platte Basin supports a wide range of water needs including municipal, industrial, agricultural as well as important water-dependent ecological and recreational attributes. Coloradans and tourists regularly enjoy the recreational opportunities provided by the many environmental features of the basin. Based on state Demographers Office population projections, the South Platte and Metro Basins are projected to grow from approximately 3.5 million people in the year 2008 to about 6 million people by the year 2050. Population growth will significantly increase the basin’s future municipal and industrial water needs.

There are many water supply challenges and opportunities specific to the South Platte Basin which set the stage for analysis of water demand and implementation of satisfactory solutions. Familiarity with the South Platte’s water issues by regulatory agencies, elected officials, the business community, and the general public will bolster Colorado’s ability to maintain sustainable water supplies. This will help promote economic growth, public safety, and environmental diversity both within the South Platte

Basin and across the state. A good Colorado solution depends on a good South Platte solution.

Several water supply challenges specific to the South Platte Basin shape the ways that solutions for water availability in the basin are identified, analyzed and implemented. Below, these challenges are described in greater detail.

### S.3.1 Limited Native Water Supply in the South Platte

The basin, in a typical year, has little unappropriated water available for new uses. Unappropriated flows in the basin often come in sporadic high peaks during wetter years, making the economics of building a reservoir to capture these supplies questionable because of the large carryover storage requirements. In the lower portion of the basin, where unappropriated flows exist in some years, efforts are underway to develop and use the water through conditional rights and existing projects. Unfortunately, unappropriated flows often occur in such infrequent and high magnitude peaks that they can not be captured and converted to reliable yield. This means that any new population or new economic activity requires a transfer of water away from another use, or the importation of new Colorado River water supplies. In recent years, these transfers have predominantly been from agriculture to municipal use – a process known as “buy and dry” where agricultural water rights are willingly sold to municipalities to supplement their supply, resulting in the loss of irrigated agricultural lands. Although this method can help to address the projected water supply gap, there are negative economic and environmental impacts associated with “buy and dry”.

### S.3.2 Successive Use, Conservation, and Reuse

To address the basin’s water needs, water use efficiencies have been improved substantially along the South Platte, including successive use of water. The South Platte River is used and reused many times over to meet multiple needs. On average, South Platte Basin water is used seven times successively before it leaves the state at the Nebraska border. While this amount of successive use by downstream users is commendable, it can constrain the ability of water agencies to exchange water or to convey it back upstream, and can reduce the amount of water for downstream water users.

To establish water rights in Colorado, an emphasis is placed on the way that water is used. A key premise in Colorado water law is the concept of “beneficial use”, and specific water uses must be identified in order to receive a decree. These decrees also indicate whether a water right is limited to a single use or can specify the degree of reuse available. The limits placed on reuse of a water right frequently constrain or prevent water from being reused.

Additionally, because the South Platte relies heavily on return flows, expanded reuse is often simply a reallocation of water from agriculture to municipal uses, thus reducing the water available for agriculture, as well as environmental, and recreational purposes. Though only a limited amount of water is fully reusable under Colorado law, South Platte and Metro water providers are implementing innovative ways to reuse these supplies and are incorporating these projects as key components to meeting their long term needs.

Water providers in the South Platte Basin continue to seek expansion of their existing conservation programs for several reasons. Though these agencies have already implemented significant water conservation measures that are known nationally for their rigor, they plan to pursue even more aggressive conservation levels in the future. Some factors that limit the amount of conservation which can be implemented include the type of industry seeking water savings. Several industries within the basin including livestock operations, food processing, beverage production, oil and gas extraction, as well as mineral development, have significant water requirements which cannot be reduced indefinitely. In addition, indoor conservation measures can reduce the amount of available water for agriculture and environmental and recreational purposes by diminishing return flows the basin relies on. And finally, the wide range of cultures, community settings, and backgrounds within the basin affect lot sizing and landscaping and consequently result in a widely varying per capita water usage that cannot be approached with a “one size fits all” conservation approach.

### S.3.3 Groundwater and Aquifer Storage and Recovery

Four types of groundwater are recognized in Colorado water administration: 1) tributary, 2) designated groundwater, 3) nontributary water outside of designated groundwater basins and 4) nontributary and not- nontributary Denver Basin bedrock water of the Dawson, Denver, Arapahoe, and Laramie - Fox Hills aquifers. Aquifer storage in the Denver Basin Aquifer System and conjunctive use of the alluvial aquifer and surface water present opportunities and challenges in addressing the future water needs of the South Platte River Basin.

The Denver Basin Aquifer System is an important, non-tributary, regional asset which is threatened by continuation or expansion of current withdrawal rates. The result is declining water levels and well productivity in large areas of the Aquifer. Conjunctive use of renewable supplies and the Denver Basin Aquifer System could provide promising opportunities for Metro municipalities to better manage water supplies through drought conditions and hydrologic variability. Additionally, new technologies for Aquifer Storage and Recovery (ASR) offer opportunities to use the Denver Basin Aquifer system for future water storage; however they require a reliable renewable resource to supply the recharge and provide strategies to meet EPA water quality requirements for injection water.

Alluvial aquifers (tributary groundwater) along the South Platte have been used historically by water users and continue to present opportunities for increased conjunctive use of surface and ground water supplies. However, numerous wells remain shut down or curtailed since 2006 due to a limited supply of affordable augmentation water in the central South Platte Basin to replace out-of-priority depletions from well pumping on other vested water rights.

In 2012, the Colorado Legislature passed HB-1278, entitled *Concerning the Authorization of a Study of The South Platte River Alluvial Aquifer*, directing the Colorado Water Institute (CWI) at Colorado State University to conduct a study of the South Platte alluvial aquifer. The HB1278 Study was completed in December 2013 and contained

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#### Types of Groundwater in Colorado Administration

**Tributary groundwater** is underground water that is hydraulically connected to a stream system that influences the rate and/or direction of flow on that stream system.

**Designated groundwater** (1) is within the geographic boundaries of a designated ground water basin as created by the Ground Water Commission (2) natural course would not be available to or required for the fulfillment of decreed surface water rights. (3) Is in an area that is not adjacent to a continuously flowing natural stream where ground water withdrawals have been the principal source of water for at least 15 years prior to the first hearing on designating that basin.

**Nontributary groundwater** is "ground water, located outside the boundaries of any designated ground water basin in existence on January 1, 1985, the withdrawal of which will not, within 100 years, deplete the flow of a natural stream, at a rate greater than one tenth of one percent of the annual rate of withdrawal".

**Nontributary and not nontributary of DBA** is ground water located within those portions of the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers that are outside the boundaries of any designated ground water basin in existence on January 1, 1985, the withdrawal of which will (not nontributary) and will not (nontributary), within one hundred years, deplete the flow a natural stream...at an annual rate of greater than one-tenth of one percent of the annual rate of withdrawal.

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several recommendations. The South Platte Basin Roundtable formed a “Technical Committee” to investigate these recommendations and develop specific direction to resolve issues where appropriate. The Technical Committee’s current focus is the development of a basin-wide groundwater monitoring network and the mitigation of localized high groundwater conditions in the La Salle/Gilcrest and Sterling areas.

### S.3.4 Interstate Water Commitments

South Platte River management is constrained by both interstate compacts and other programmatic and regulatory issues. The South Platte River Compact divides the waters of the South Platte River between Colorado and Nebraska, giving Colorado the right to fully use the water between Oct. 15 and April 1. During the irrigation season, Colorado must curtail water rights in Water District 64 that are junior to June 14<sup>th</sup>, 1897 if flows at the Colorado-Nebraska state line drop below 120 cubic feet per second. The State Engineer is authorized to administer the compact. In addition, compliance with federal programs for threatened and endangered species recovery also results in interstate water management commitments that are outlined below.

The Republican River Compact between Colorado, Nebraska and Kansas places severe constraints on Colorado residents living and working in this basin. The Republican River Basin is physically distinct from the South Platte Basin such that the Rocky Mountain snowmelt feeding the South Platte River does not benefit the Republican River Basin. Rather, the Ogallala Aquifer, which spans eight Great Plains states, supplies the basin’s agricultural economy. According to the 2012 USDA agricultural census, Yuma, Kit Carson, Phillips, and Washington counties are among the top ten agricultural producing counties in the state. In these areas, irrigation with Ogallala Aquifer water contributes to superior crop yields but a declining groundwater table raises concerns about how much longer or to what degree the basin will be able to benefit from this water source.

### S.3.5 Environmental Permitting Processes and Threatened and Endangered Species Recovery

Important species protection plans, namely the Platte River Recovery Implementation Plan (PRRIP), place restrictions on developing additional water supplies for the South Platte Basin. This three-state program protects the habitat of four endangered species that utilize the Platte River and riparian areas. The current program places specific constraints on approval of new water depletions and prevents certain types of new water storage facilities in the lower reaches of the South Platte River in Colorado.

In addition to the PRRIP, other regulatory and permitting issues significantly constrain water planning in the South Platte. A key constraint on the South Platte Basin is the ability to permit new reliable sources of future supply. Due to the unpredictable timeframes and requirements associated with federal (Clean Water Act, Endangered Species Act), state, and local permitting requirements, some water supply agencies have been pursuing permits for new water supply projects for ten years or longer without clear resolution. The resulting delays and the extended timelines for permitting water projects, cause a significant financial burden for Colorado residents and result in costly risks for water providers due to the uncertainty of being able to meet their customers’ future needs. Given the immense need for water in the basin, permitting processes for major water projects in the state must improve their turnaround times and the

predictability of the process, while maintaining the needed environmental protections and mitigations.

### S.3.6 Environmental and Recreational Uses

Preservation and enhancement of the environmental and recreational aspects of the South Platte River is important to Colorado's economy and quality of life. Water is needed to maintain aquatic, riparian and wetlands habitats that are essential for ecological diversity. In addition, flows in streams are essential to many recreational economies, including fishing, waterfowl hunting, skiing, flatwater and whitewater boating, and for general aesthetics near waterways, including greenways, trails and wildlife viewing. The important environmental and recreational values in the South Platte Basin must be considered when planning for Colorado's water future. Many of these attributes currently suffer due to current water diversions and infrastructure operations.

Maintaining or enhancing environmental and recreational attributes can be a constraint on potential future water development, however many opportunities exist to maintain these attributes while concurrently developing water supply projects. Multi-purpose projects or agreements for cooperative operation of existing projects to help benefit these important attributes should be considered when projects are planned to help meet water needs. Additional projects to address these needs should be considered including environmentally friendly diversion structures, restoration of habitat and stream channels, and environmental pools in reservoirs with release timing to benefit the environment.

### S.3.7 Water Quality Issues

A major challenge in the South Platte Basin relates to adequacy of the water quality for domestic and municipal water uses. These water users and water supply agencies recognized as early as the late 1800s that higher quality water was found in the mountain tributaries of the South Platte River where they exit the foothills. Since then delivery systems bringing high quality, reliable water from the South Platte River tributaries have been a staple of South Platte Basin water planning. Today, however, these higher quality water sources are approaching full development and municipal water suppliers are attempting to meet new supply demands with lower quality water sources often located within the lower portions of the basin. Major technological innovations are needed for delivery, treatment, and disposal of the waste streams from currently available complex water treatment systems, which results in significant cost to customers, impacts to the environment, and uncertain regulatory permitting processes. Relying exclusively on South Platte River supplies in the face of decreasing water quality will be a major challenge in the South Platte Basin.

## Summary of Challenges

Because of the diverse population and economic drivers in the basin, as well as a host of specific challenges on the water available for developing new supply, the South Platte Basin faces an enormous challenge in meeting its future water needs. As the Basin faces the greatest projected regional supply gap, it will need to continue to develop creative, multifaceted approaches to meet a growing demand. The challenges facing the South Platte are representative in many ways of the greater challenges facing Colorado as it looks to plan its water supply to 2050. Though the challenges loom, they are not insurmountable. The South Platte Basin Implementation Plan offers an integrated planning approach that will maximize the use of existing water supplies, develop new opportunities, and leverage technology and policy advancements that help to meet the Basin's diverse water supply needs while striving to maintain or enhance environmental and recreational values throughout the basin.

## S.4 Solutions for the South Platte

### S.4.1 Making Choices

Finding solutions for the range of issues constraining water planning in the South Platte Basin is as much about determining how to balance the competing demands of Colorado and the South Platte Basin as it is about seeking technological and political solutions. To produce a viable and sustainable model to meet the projected water supply gap requires tradeoffs within the basin and the state concerning how we want to balance the utilization of our natural resources to support diverse economic, cultural, and environmental interests across the state.

Today's current de facto answer to our growing water demands has been the use of agricultural transfers. These transfers offer a mechanism to provide much-needed water to municipal suppliers and the environment through instream flows; however this water comes at the expense of the agricultural sector, which has a long and rich history in Colorado. The dry up of agricultural land in order to support growing municipal demands means that farmers and ranchers who have cultivated land, helped support small communities across the state, and contributed to Colorado's rich cultural heritage are making choices to leave agriculture – and, in the process, affecting surrounding rural economies and our state's historical identity. A key element of the South Platte solution is establishing systems where farmers can decide for themselves how to manage their water rights, while maintaining their right to use or sell vested property rights in the form of water rights, and concurrently offering potential new transactional methods to help lessen the associated impacts on others.

The current solutions for increasing water demands can also have tradeoffs for environmental and recreational values throughout the basin. The South Platte's environmental and recreational attributes are important for the economy and resident's way of life, and these attributes should be proactively considered when planning for the basin's future water needs. Colorado's residents appreciate Colorado's natural resources and want to maintain scenic and ecological values throughout the state, including in the South Platte Basin.

## S.4.2 Strategic Overview

Although the two roundtables representing the South Platte Basin support the free market and rights of water owners to sell their property, the roundtables have explored options to counter the “buy and dry” trend. The three major guidelines the basin Roundtables have utilized in determining solutions to meeting the projected municipal and industrial water supply shortfall are:

1. Minimize adverse impacts to agricultural economies
2. Develop new multipurpose projects that either offset transfers from agricultural uses or provide additional water to reduce current agricultural shortages
3. Proactively identify and implement methods to protect and enhance environmental and recreational water uses

In the state’s recent water planning program, a common phrase for an integrative approach is known as the “Four Legs of the Stool.” This approach recognizes that successful water planning in Colorado needs to utilize four specific tools; Conservation and Reuse, Identified Projects and Processes (IPPs), Agricultural Transfers, and new Colorado River supplies along with a strong supporting component of storage. The South Platte Basin Implementation Plan employs this approach.

The South Platte Basin’s goal is to prepare for future water needs in a way that maximizes the state-wide beneficial use of our water resources while minimizing the impacts of additional water use on environmental and recreational resources, and even enhancing these resources when possible. An integrated and managed approach to meeting the supply gap will include implementing a large percentage of the basin’s IPPs, a term used to describe the existing strategies and water projects which have been planned but not yet fully implemented. Additionally, the plan calls for enhancing water use efficiencies (conservation and reuse), integrating multi-purpose projects comprised of storage, conveyance via pipelines and other methods, and the integration of existing water infrastructure systems where possible. The plan intends to incorporate environmental and recreational protections and enhancements, utilize some degree of agricultural transfers using alternative methods to traditional “buy and dry,” and simultaneously develop new unappropriated Colorado River supplies for the benefit and protection of all of Colorado, both now and in the future.

Ideally, projects within this strategy would be multi-purpose and address associated recreational and environmental benefits. New Colorado River supply would be developed in a manner that does not exacerbate compact obligations. Front Range storage would come from enlarging existing reservoirs; building off-river storage; and using underground storage to maintain aquifer levels, reduce evaporative losses and minimize riparian impacts. New Colorado River supplies and Front Range storage would be used to coordinate and manage highly variable yields expected from New Colorado River supplies. Additional Colorado River Basin supply would also augment existing municipal and industrial supply while providing environmental and recreational benefits. Front Range agricultural transfers coordinated with use of the Denver Basin Aquifer system would be used primarily for droughts and drought recovery. Alternative transfer methods including land and water conservation easements could be used to help maintain agricultural production and the local economic benefits of agriculture. Continued leadership in conservation and reuse will ensure that all of these resources are used

efficiently, allowing the basin to maximize the benefits and minimize costs of development.

The South Platte Basin’s vision is to develop solutions that balance the use of new Colorado River supplies with South Platte agricultural transfers, conservation and reuse, and environmental and recreational programs. Implementing these solutions in a coordinated way can help to reduce the size and effects of the Colorado River supply projects and equitably share project benefits between the east and west slopes. The South Platte Basin proposes the construction of projects that develop diverse sources of supply – from new Colorado River supplies and agricultural transfers – instead of risking Colorado’s future on a single source, from either new Colorado River supplies or agricultural transfers.

## S.5 Implementation



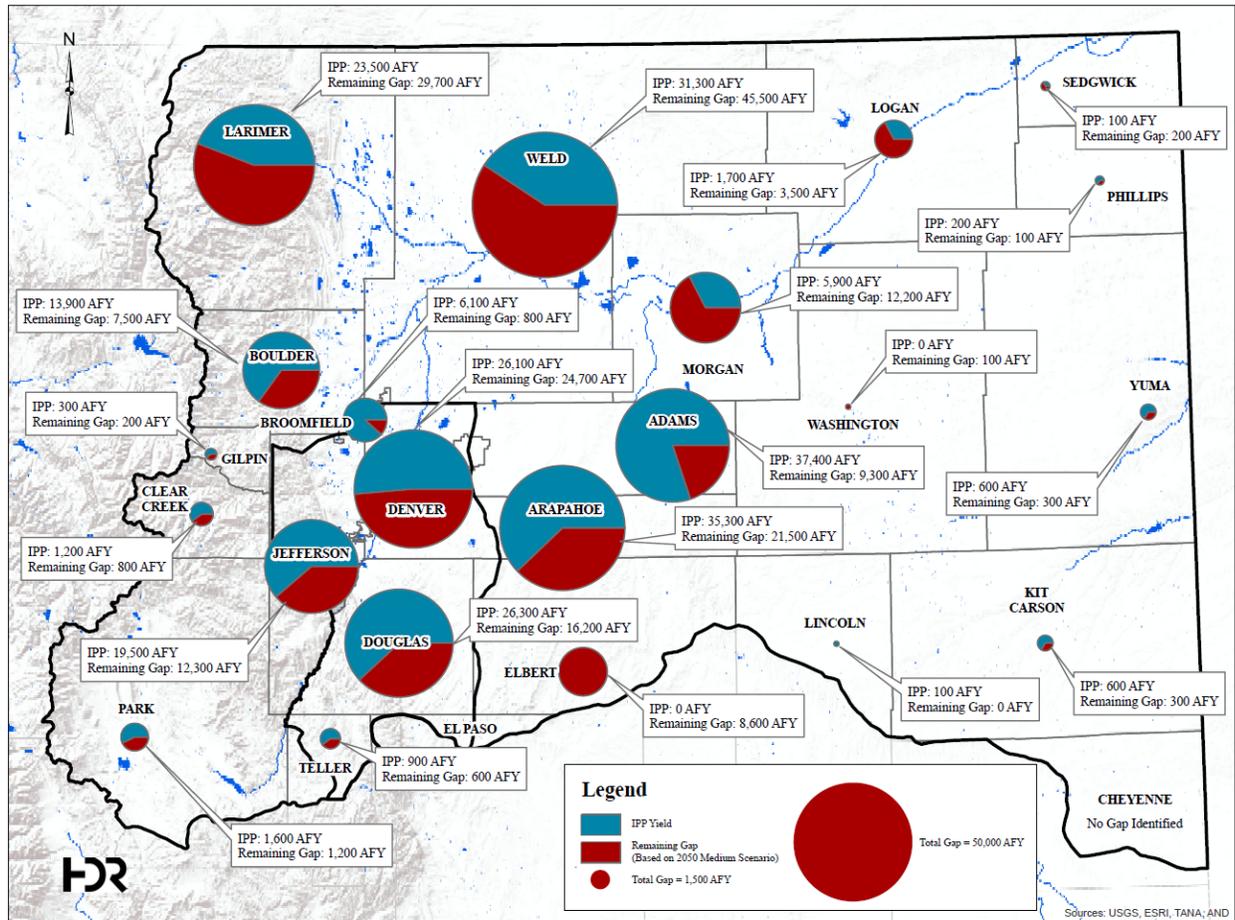
The graphic above represents the process used to write the South Platte Basin Implementation Plan. Arrows represent each stage of the development of the Plan sequentially. This process helped to drive the evolution of the report, and to establish the strategies and portfolios recommended in Sections 5 and 6.

Implementation of the multipurpose solutions described in the South Platte Basin Plan will be where ideas meet reality. To meet the supply gap and achieve the goals and outcomes identified by both the Governor of Colorado and the Basin Roundtables, the South Platte Basin Implementation Plan has recognized eleven areas of focus, whose successful completion will be integral to meeting the basin’s supply gap and ensuring that Colorado’s future water needs are met. Current projections anticipate that, in 2050, water demands will exceed water supplies for municipal and industrial uses as well as for irrigated agriculture. This water supply gap, under a medium demand scenario with current hydrologic conditions, anticipates that by 2050 there will be a municipal and industrial water supply gap of 428,000 acre-feet and irrigated agriculture water supply gap of 422,000 acre-feet.

### S.5.1 Maximize Implementation of IPPs

Successfully implemented IPPs, both in-basin and transbasin, will be critical to meeting the projected supply gap. The extent of which IPPs are successful will relate directly to the magnitude of the M&I gap. Successful IPPs will decrease the M&I gap while unsuccessful IPPs will widen the gap even further, resulting in larger quantities of water being transferred from agricultural uses or new Colorado River supplies. Figure S-3 shows the IPP yield per county (with a 65 percent IPP success rate for the South Platte Basin and an 88 percent IPP success rate for the Metro Basin) as well as the remaining gap in each county after IPPs are implemented.

**Recommendations: Facilitate the implementation of IPPs both within and outside of the basin. Continue to support efforts to develop a basin-wide groundwater monitoring network, and to mitigate localized high groundwater.**



**Figure S-3. Remaining Gap by county (65% IPP Success Rate in the South Platte Basin and 88% IPP Success Rate in the Metro Basin)**

### S.5.2 Maintain leadership in conservation and reuse and implement additional measures to reduce water consumption rates

Already, the basin has reduced water use by approximately 20 percent since 2000 and currently achieves one of the lowest per capita water uses in the state. Even so, both Roundtables anticipate implementation of additional conservation programs tailored to diverse types of water supply systems and conditions existing in the South Platte River Basin. The interplay between conservation programs and municipal and industrial water reuse will continue to be examined.

Currently there are a limited number of sources that can legally be reused in Colorado, but water providers are attempting to reuse every drop to which they are entitled. Water that isn't reused locally is reused within the basin through successive use. Reuse will continue to push the economic, technical, and legal limits in order to maximize South Platte supplies.

**Recommendations: Better coordinate water and land use planning to improve water use efficiency. Implement rate design improvements to require more efficient plumbing fixtures, appliances, and landscaping. Implement additional reuse where practicable.**

### S.5.3 Maximize use and effectiveness of native South Platte supplies

To more effectively utilize native South Platte supplies, the Roundtables suggest the development of multipurpose water storage and conveyance infrastructure, as well as new methods to more effectively utilize tributary and nontributary groundwater. Another critical aspect of utilizing existing supplies will be the exploration of integration of existing South Platte Water Supply Systems on a willing agency basis.

**Recommendations: Develop new, in-basin, multipurpose water storage and conveyance mechanisms, explore further integration of South Platte water supply systems to enhance yield and reliability, and develop methods to more effectively use groundwater. Encourage surface water and groundwater availability/hydrologic modeling to provide more detailed and reliable estimates of water availability.**

### S.5.4 Minimize traditional agricultural “buy and dry” and maximize use of Alternative Transfer Methods (ATMs) to extent practical and reliable

Many water providers count planned agricultural transfers towards their Identified Projects and Processes. These transfers are in the planning stages and will proceed, barring delays in water right transactions, permitting of conveyance infrastructure or other unexpected circumstances. Ensuring that such projects proceed to the extent possible is an important piece of meeting the South Platte supply gap.

Additionally, it is recognized that Colorado’s water right transfer process is heavily weighted towards dry-up of irrigated land in order to transfer its historical consumptive use (CU). The solutions described in the South Platte Basin Plan are not aimed at further complicating or restricting this process, but rather developing other alternatives. One alternative method to bolster water supply options is the use of alternative agricultural water transfer methods (ATMs). ATMs are meant to “minimize the impact on the local economy, provide other funding sources to the agricultural user, and optimize both the agricultural and nonagricultural benefits of the remaining lands”. (SWSI 2010) Some of these alternative transfer methods include rotational fallowing, interruptible supply agreements (ISAs), water banks, purchase and leasebacks, deficit irrigation, and changing crop types. Through the implementation of ATMs, the agricultural producer can view their water rights as a “crop” and cities may view the producer’s fields as “reservoirs” holding water supplies for times of shortage. Much is still to be evaluated about the feasibility of ATMs, but pilot projects in the basin are looking to find solutions to overcome the associated legal, technical, institutional, and financial issues associated with ATMs.

**Recommendations: Continue to study water sharing practices and adjust the water court process to encourage water sharing practices while protecting the vested rights of water rights holders. Continue to support measures to maintain**

***the economy and agricultural production of the Republican River Basin and long-term compliance with the Interstate Water Compact. Finally, continue compliance with the South Platte Compact and the PRRIP.***

### S.5.5 Protect and enhance environmental and recreation attributes

There are important environmental and recreational attributes within the South Platte Basin that must be proactively considered when addressing water supply needs. Some environmental and recreational attributes in the basin are impaired by the current strategies used to meet water demands, and in these areas habitat and streamflows must be enhanced or maintained to support these attributes. The efforts being undertaken to meet the supply gap may potentially impact these attributes by affecting flows in streams, plant and animal habitat, as well as water quality. Reduced stream flow in focus areas has the potential to expand those areas requiring protection. Additional storage in the basin has the potential to impact streamflows and to disturb wildlife habitat. Opportunities to align environmental and recreational uses with the projects needed to meet the supply gap do exist, however. If cooperative operational agreements can be put into place, there is potential to align environmental and recreational interests with the overarching goals of water suppliers. The strategies discussed regarding additional Colorado River supplies are intended to distribute benefits and impacts on environmental and recreational attributes to both the West and East slopes. Watershed management programs should also continue and be expanded to focus on additional high priority areas. Focused attention is needed to address threats associated with extensive tree mortality in the basin, increased fire hazards and water quality degradation associated with major recent floods.

***Recommendations: Fill existing data gaps regarding protection of environmental and recreational attributes in order to better understand the adequacy of existing and future protections. This should be done for all South Platte focus Areas where opportunities arise for new projects. Additionally, provide sustainable and reliable funding for data recording and reporting equipment to assist with environmental and recreational projects.***

### S.5.6 Simultaneously advance the consideration and preservation of new Colorado River Basin supply options

The Metro and South Platte Roundtables encourage strong consideration and preservation of the ability to use Colorado's entitlement under the Colorado River Compact as we pursue other strategies to meet our water demands. Investigating, preserving, and developing Colorado's entitlement to Colorado River supplies is beneficial to the state's economic, social, political and environmental future. This may involve large state-level water projects, or small level projects, each with comprehensive West Slope water supply and environmental and recreational components. The Roundtables support the Conceptual Framework developed by the IBCC (and as outlined in Colorado's Water Plan) as the means whereby new Colorado River Basin supply options could be investigated and potentially developed.

***Recommendations: Promote additional conceptualization analysis of shared development of additional Colorado River Basin supplies. Consider potential criteria for "State Water Projects" including benefits and challenges.***

### S.5.7 Promote Multi-Purpose Storage Projects that Enhance other South Platte Basin Solutions

Stream flows vary widely in the South Platte Basin, both year-to-year and seasonally. Storing water when it is abundant for use in times of shortage is a vital weather management strategy for a basin with diverse water needs. Storage has historically been important for managing water in the South Platte, and today's water managers understand that storage in the South Platte Basin is a vital means to provide water security for the vast agricultural, municipal and industrial, recreational and environmental needs of the basin. Further, additional storage is essential to implement the six previously described elements of the Basin Implementation Plan.

**Recommendations: The Metro and South Platte Basin Roundtables strongly advocate for the development of additional surface and groundwater storage, further research of aquifer storage and recovery (ASR), and investigation into additional off-channel storage and reservoir sites in the basin. Additionally, they encourage the consideration of alternatives to "State Water Projects" such as regional collaboration on and financing of water projects.**

### S.5.8 Manage the risk of increased demands and reduced supplies due to climate change

The effects of climate change on water resource availability are very difficult to assess and the exact ways it will impact Colorado are unknown. Many South Platte water providers consider it irresponsible not to consider the potential for climate change in making water supply and demand projections.

**Recommendations: The South Platte and Metro Roundtables recommend continued analysis of the potential for back-up supply, such as for east slope interruptible supply agreements. They also encourage additional research to disaggregate the basin's M&I supply gap to gather more specific data on the quantity, time, and geography of the gaps within each county.**

### S.5.9 Facilitate effective South Platte communications and outreach programs that complement the state's overall program

A critical component in advancing the South Platte Basin Implementation Plan and Colorado's Water Plan will be a strategic focus on communication and education with stakeholders including water users, political leaders, and leaders of major businesses and industries throughout the state. Improving public understanding about the goals, needs, and plans of the state and the South Platte Basin will help to improve public acceptance of the need for innovative water rate structures, energetic conservation measures, and more integrated land use and water supply planning.

**Recommendations: Design and implement an intensive education, participation and outreach program designed to generate a lasting baseline of public awareness and support.**

### S.5.10 Research new technologies and strategies

Water quality is an ongoing issue for the South Platte Basin. A major concern is the ability to manage and treat lower quality water effectively, and then dispose of the waste products (brine) in a cost effective and environmentally sound way. One important component of the South Platte Basin Implementation Plan will be for the state to take a proactive role in investigating technologies capable of treating low quality water sources and disposing of waste products.

**Recommendations: Continue research and development of new strategies to address both the technical and regulatory constraints associated with treating low quality water and disposing of waste including direct potable reuse (DPR) and indirect potable reuse (IPR), developing an appropriate regulatory framework for these technologies, and promoting and monitoring research on relevant technologies to advance these objectives.**

### S.5.11 Advocate for improvements to federal and state permitting processes

Cities throughout the South Platte Basin struggle with the time and cost to obtain permits for incremental expansions to their water systems, despite the environmental mitigation and enhancements offered by the projects. To meet near and long term supply gaps while still maintaining regulatory compliance and environmental protections will require improvements to the permitting processes for supply projects. This begins with approvals for planned supply projects including IPPs to meet the nearer term supply gaps as well as other supply projects expected over medium and long range timeframes. It is recognized that not all of the projects currently engaged in federal permitting or planned in the near future may obtain permit approvals with conditions acceptable to the project sponsors. Regardless of permit success rates, an important component of the South Platte Basin Implementation Plan is development of specific and actionable steps to improve the federal and state permitting processes for major water projects both in terms of efficiency and the predictability of the process while still providing the needed environmental protections and mitigations.

**Recommendations: Identify methods to improve the approval process by increasing efficiencies in agency coordination, making changes to applicable statutes and regulations, and supporting the formation of a task force to study and implement ways to improve the permitting process for water supply projects.**

## S.6 Summary

The South Platte Basin faces a cadre of unique challenges in planning for its future water needs. It hosts some of the largest population centers in the state as well as several of the leading economic sectors. As such, the South Platte Basin faces the largest projected regional water shortfall for municipal, industrial and agricultural uses in the future. It also has wide-ranging environmental and recreational attributes important to the basin, the state, and the country. From Rocky Mountain National Park and the most heavily visited state parks, to the important endangered species recovery goals of the Platte River Recovery Implementation Program, the protection of non-consumptive water

needs and enhancement of water-based ecosystems must also be fully considered in planning our future.

The South Platte Basin Implementation Plan offers a strategy to combat our water supply shortfalls by utilizing diverse, integrated supply solutions to chart a course that meets the projected water needs of the South Platte Basin as it continues to develop. This plan acknowledges the unique challenges, opportunities, and tradeoffs in the South Platte Basin, and then leverages these challenges into eleven specific implementation strategies to address them. Because the solutions developed in the Plan are multifaceted, approaching the basin's water challenges with an arsenal of tools to help improve supply, they may help to achieve the goal of bridging the projected supply gap while evenly distributing the impacts of the state's water development across its many regions and diverse economic interests.

When executed with the support of the state, political leaders, business leaders, and the public, the implementation strategies outlined in the Plan have the potential to achieve the ambitious goal of supplying water to the South Platte Basin, and by extension help supply the water needs and sustain the economy of the state of Colorado through 2050.