VOLUME 2 • JANUARY 2022

ARKANSAS

Basin Implementation Plan

ACKNOWLEDGEMENTS

The 2021 Arkansas Basin Implementation Plan Update (2021 BIP Update) could not have been developed without the involvement and guidance of many individuals, committees, and organizations with deep commitments to comprehensive water management in the Arkansas Basin. The consultant team is very grateful for the generous support provided to this process. Thank you to the Arkansas Basin Roundtable and its Executive Committee for providing direction, and especially to those individuals who routinely took time to coordinate with our team to shape the approach, technical information, and tone presented in this BIP Update.

The 2021 BIP Update builds upon a great deal of previous work developed by the State of Colorado and consultants working for entities within the Arkansas River Basin.

Arkansas Basin Roundtable – Executive Committee:

Mark Shea	**Arkansas Basin Roundtable Chair**
Mike Fink	Arkansas Basin Roundtable Secretary
Tim Canterbury	At-Large - Water Rights Owner
Jeris Danielson	Bent County Municipal
Carol Ekarius	Arkansas River Watershed Collaborative
Paul Fanning	Legislative Appointment
Greg Felt	CWCB Board Member
Bob Hamel	At-Large Recreation
Matt Heimerich	At-Large Agriculture
Sarah Mudge	Lake County
Abby Ortega	El Paso Municipal
Terry Scanga	Upper Arkansas Water Conservancy District
Amber Shanklin	At-Large Environmental
Sandy White	Huerfano County

Arkansas Basin Roundtable Members:

Spike Ausmus	Baca County
Bill Banks	Fountain Creek WGFCD
Jim Broderick	Southeastern Colorado Water Conservancy District
Tracy Pepper	Crowley Municipal
Seth Clayton	Pueblo Municipal
Mannie Colon	Fremont Municipal
Ron Cook	Prowers Municipal
Brett Dougherty	North La Junta Water Conservancy District
Shiloh Freed	Baca Municipal
Tom Grasmick	Prowers County
Gracy Goodwin	Saguache County
Terry Hart	Pueblo County
Bob Hartzman	At-large Industrial
Keith Hood	Custer County
Toby Johnson	Cheyenne County
Steve Kastner	Purgatoire River Water Conservancy District
Rick Kidd	Crowley County
Scott King	Huerfano County Water Conservancy District

Nick Koch	At-Large Representative
Dwayne McFall	Fremont County
Jay Moore	Chaffee Muni
Kevin Niles	At-Large - Water Rights Owner
Bud O'Hara	Pueblo Conservancy District
Rego Omergic	At-Large Local Domestic Water Provider
Gil Ramirez	Las Animas Municipal
Dan Richards	Kiowa County
Kent Ricken	At-Large - Water Rights Owner
Karen Salapich	At-Large Representative
Tom Seaba	Otero Muni
Bob Slagle	Upper South Platte Water Conservancy District
Greg Teter	Lake Municipal
Al Tucker	Huerfano Municipal
Tom Verquer	Las Animas County
Bob Ware	Elbert County
Amber Weber	Otero County
Mike Weber	Bent County
Dan Williams	Teller County

2021 BIP Update Consultant Team:

General Contractor Team

Brown and Caldwell

Wilson Water Group

CDM Smith

Element Water

Arkansas Basin Local Experts

LRE Water

Forsgren and Associates

TABLE OF CONTENTS

List of Abbreviations

AF	acre-feet
AFY	acre-feet per year
AGRA	Arkansas Groundwater and Reservoir Association
ASR	aquifer storage and recovery
ATM	Alternative Transfers Method
AVC	Arkansas Valley Conduit
BIP	Basin Implementation Plan
BMP	best management practices
BRT	Basin Roundtable
CF&I	Colorado Fuel and Iron Company
cfs	cubic feet per second
CNHP	Colorado Natural Heritage Program
CPW	Colorado Parks and Wildlife
CWCB	Colorado Water Conservation Board
CWP	Colorado Water Plan
DWR	Division of Water Resources
E&R	environment and recreation
FMIC	Fountain Mutual Irrigation Company
Fry-Ark	Fryingpan-Arkansas
FTE	full time employee
FVA	Fountain Valley Authority
gpm	gallons per minute
GWMD	Ground Water Management Districts
HB	House Bill
HI	Hydrologic Institute
HMIC	Holbrook Mutual Irrigation Co.
IBA	Important Bird and Biodiversity Areas
LAWMA	Lower Arkansas Water Management Association
M&I	municipal and industrial
NOAA	National Oceanic and Atmospheric Association
PBWW	Pueblo Board of Water Works
Reclamation	Bureau of Reclamation
RICD	recreational in-channel diversion
SDS	Southern Delivery System
SECWCD	Southeastern Colorado Water Conservancy District
SEO	State Engineers Office
SMS	Satellite Monitoring System
SWSI	Statewide Water Supply Initiative
TLCC	Twin Lakes Reservoir and Canal Company
UAWCD	Upper Arkansas Water Conservancy District
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VFMP	Voluntary Flow Management Program

EXECUTIVE SUMMARY

The Basin Implementation Plan (BIP) identifies the current and future needs for water in the basin, the vision for how the basin will meet its needs, and the strategies and projects that provide a pathway to success. This the first update to the initial Arkansas BIP, which was completed in 2015.

As the Arkansas Basin Roundtable (Roundtable) continues work through its second decade of existence, there is universal recognition that the water resource needs of the Arkansas River Basin are dynamic and ever-changing, in concert with the changing values of the basin's inhabitants. Future editions are anticipated as part of the cyclical update of the Colorado Water Plan and the Basin Implementation plans.

Organization of the 2021 BIP Update

THE ARKANSAS BASIN IMPLEMENTATION PLAN CONSISTS OF TWO VOLUMES:

VOLUME 1:	VOLUME 2:
summarizes the basin and its current/future water resources, focusing on basin goals and strategies to meet future water needs. Volume I is a snapshot in time of both basin needs and of the projects and strategies identified to meet those needs.	provides a more in-depth description of the basin, including an overview of basin water management, administration, and operations. It also provides more detail on the information in Volume 1, including additional specifics on technical analyses and project data.

Section 1 – Basin Overview and Goals

Section 1 of the BIP is titled Basin Goals and Measurable Outcomes. This chapter provides an overview of the Arkansas River Basin and articulates some common themes and fundamentals prior to presenting specific BIP goals. The themes recognize the critical importance of reservoir storage to all future solutions in juxtaposition with neighboring basins' hydrology, since the Arkansas operates as both an importing and exporting basin. The fundamentals describe the unique constraints of the Arkansas River Compact (aka the "Kansas-Colorado Compact") and the challenges inherent in the extremes of hydrologic conditions from year to year. The basin goals are organized by type of usage, with summary tables for each category of Storage, Municipal and Industrial, Agricultural, Environment and Recreation, and Watershed.

Section 2 – Water Management and Administration

The Water Management and Water Administration section was drafted by a former Colorado State Engineer and is an excellent summary for anyone looking to understand the Arkansas River Compact and the constraints on water administration that have followed the *Kansas v. Colorado* U.S. Supreme Court decision.

Section 3 – Basin Operations

This section describes the water supply systems of major water providers and users, and the infrastructure, programs, and operations that are central to the water supply picture for all basin users.

Section 4 – Constraints and Opportunities

Considering the unique challenges inherent to water supply planning in the Arkansas basin, potential constraints and opportunities are identified to help guide the Roundtable as it develops strategies for meeting basin goals.

Section 5 - References

Appendix A – Technical Memorandum on Evaluation of Needs

An evaluation of both current and future water needs in the Arkansas Basin was performed as part of the Technical Update to the Colorado Water Plan in 2019. As part of the BIP Update, both current and future demands were refined based on new data gathered from basin water users. The 2019 Technical Update applied projections of future water supply in the basin to the projected demands under five planning scenarios to estimate future shortages or gaps. This analysis was refined as part of the demand updates described in Section 2 and is summarized in this section on a basin-wide and sub-regional level.

In addition, during the BIP Update, the consultant team conducted a preliminary vulnerability assessment of both municipal and agricultural water supplies relied upon in the basin. This assessment will help guide strategies for implementing solutions to future water shortages.

Appendix B – Technical Memorandum on Updated Project Database

The Technical Memorandum contained in Appendix B describes the process for updating the basin Project Database that occurred as part of the BIP Update.

SECTION 1. BASIN OVERVIEW AND GOALS

The Arkansas River is a major tributary to the Mississippi River. It headwaters in the Rocky Mountains start at an elevation of 14,000 feet, with the river entering the Great Plains just past Pueblo, Colorado, before continuing eastward into Kansas, at an elevation of 3,340 feet. The Upper Arkansas River (from the headwaters through Big Horn Canyon) supports significant tourism and recreation. The Middle Arkansas River Valley—which includes the City of Pueblo and Pueblo County, along with the Fountain Creek Basin, the City of Colorado Springs, and El Paso County—comprises the largest urban area. In the Lower Valley below Pueblo, the Arkansas River supports significant agriculture, primarily fodder crops and row crops—pumpkins, squash, and melon fruits—for human consumption.

In the Huerfano and Purgatory River basins, there is a mix of agriculture, mining, and tourism. A large area of the Arkansas River Valley, i.e., the eastern portions and north and south of the valley floor, is sparsely populated. There are few if any surface water supplies. These regions depend on groundwater or designated groundwater to support the water supply needs of livestock, irrigation wells, towns, and industries.

The Arkansas River Basin is the largest basin in Colorado, covering more than 28,000 square miles across the southeast region of Colorado. Grasslands and forest dominate the basin; grassland covers approximately 67 percent of the basin, primarily covering the eastern portion, while forests cover the western region, which lies in the Rocky Mountains, stretching into Colorado's Front Range. In addition to agriculture, recreation, and natural landscapes, the Arkansas River Basin supports approximately 1 million people, including two large cities—Colorado Springs and Pueblo.

Limited water supplies in all areas of the basin, declining groundwater levels in the nontributary Denver Basin formations and the designated groundwater basins, extended droughts, land use planning, growing demand, and economic changes have resulted in competing interests. Rural water users are concerned over agricultural transfers and the impact water availability has on rural communities and agricultural productivity, along with declining groundwater levels and diminishing water quality. Concurrently, growth in the upper basin presents challenges to meeting municipal, industrial, and recreational demands. As a result of the current demand in the basin, there is little or no water available for new uses.

In addition to supporting its own demands, water from the Arkansas River flows through Kansas, Oklahoma, and Arkansas before its confluence with the Mississippi River. Along its course, it irrigates millions of acres of cropland and supports significant industry and shipping. 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; and the Hydrologic Institute, or "HI" model, which calculates and tracks compliance.

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 by using tributary groundwater, in violation of the Compact. 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 Improvement Rules, which require augmentation for any upgrades to irrigation water delivery systems, such as drip irrigation or sprinkler systems.

With its varied geology and water uses, the Arkansas Basin has significant water challenges for the future. Agriculture has faced encroachment by municipal demands, while environmental and recreational water demands have increased significantly in the late 20th and early 21st centuries. Given the many competing demands for water throughout Colorado, in 2005 the Colorado General Assembly created roundtables for each river basin in the state, with the passage of the Water for the 21st Century Act (House Bill [HB] 05-1177). Each basin roundtable consists of representatives of water users from throughout the basin, including multiple municipal water providers, agricultural members, specific environmental, recreational, and industrial representatives; and water conservancy districts. The roundtables were charged with ’proposing projects and methods to meet the needs of the basin.”

The basin roundtables have become a platform for stakeholders to be heard and for future needs to be assessed in a manner consistent with the water values and culture of the region. The April 2015 Arkansas Basin Implementation Plan (2015 BIP), an integral component of Colorado's first statewide water plan, is an initial culmination of a decade of effort by the Arkansas Basin Roundtable.

1.1 Basin Overview by Water Sectors

The Roundtable was purposefully organized by the Colorado General Assembly to reflect equal representation of the basin geography while providing specific voices for the sectors of water uses. Following is an overview of the main water sectors of interest within the Arkansas River Basin.

Municipal & Industrial

The Arkansas Basin, which includes Colorado Springs, Pueblo, and many smaller rural communities, was estimated to have a population of 1.01 million in 2015.[1] By 2050, the population is expected to increase by 45 percent to 61 percent, to 1.46 million to 1.63 million. By 2050, total municipal and industrial (M&I) demand throughout the Arkansas Basin is estimated to be between 309,000 acre-feet per year (AFY) and 346,000 AFY (see Appendix A).

Understanding regional needs and possible regional or local solutions highlights the imperative to disaggregate the municipal water supply gap. The revised demand and gap analysis from the Technical Update to the Colorado Water Plan (see Appendix A) estimated the municipal supply gap in the Arkansas Basin for 2050 to range from 57,300 acre-feet (AF) to 100,600 AF. Since much of the municipal supply gap is based in regions reliant on non-renewable groundwater, a more immediate understanding of local and regional supply gaps is warranted.

A deeper examination of the municipal supply gap reveals that the municipal gap falls into two categories:

Continued Dependence on Non-renewable Groundwater

Municipal dependence on non-renewable hard-rock aquifers and designated groundwater sources becomes a significant liability as these aquifers reach the end of their useful life and the economics of continued pumping increase exponentially. That time is here. Alternatively, the storage potential and non-evaporative nature of these same groundwater sources indicate these liabilities could become potential tools to better manage available water supplies.

Water purveyors in northern El Paso County and in the southeastern part of the Arkansas Basin are highly dependent on non-renewable groundwater sources that are approaching the end of useful life. The lack of cost-effective alternatives for renewable supplies has resulted in some Denver Basin purveyors pursuing the development of remote well fields; however, this may not be a sustainable solution.

Alluvial Groundwater

In a variety of localized settings there is a need for either replacement or augmentation of alluvial wells in the near term. In the Lower Arkansas Valley, water quality is the driver. While the Arkansas Valley Conduit could relieve the problem, federal funding may be challenging to secure. In the Upper Arkansas and the southwest portion of the basin, augmentation of existing uses and anticipation of growth are the focus.

Projects described in Appendix B are under development to address many of these needs. Many of the municipal water supply gap issues are highly localized; therefore, the Roundtable has supported efforts to disaggregate

[1] Technical Update to the Colorado Water Plan, 2019.

demand projections for the basin to identify localized needs (see Appendix A, along with the vulnerability assessment discussion in Volume I).

Industry

The top five industries by economic activity in the Arkansas Basin include:

- Federal government (military)
- Food service and drinking establishments
- Public education (state and local)
- State and local government (non-education)
- Real estate

These industries continue to attract urban population growth and drive municipal development; however, the biggest industrial users of water are the large industry and thermoelectric sub-sectors. Industrial water use is projected to remain fairly steady at 60,000 to 70,000 AFY.[1]

Agriculture

The basin supports a diverse agricultural economy, including crops and animal husbandry, which had total output of more than $1.5 billion in 2010; it was estimated[2] that irrigated crops accounted for more than $1 billion of economic activity. Agriculture accounts for diversions of more than 2 million AFY, primarily in the Lower Arkansas Basin where agriculture is concentrated. There are more than 428,000 acres of irrigated cropland in the basin, in which much of the land is unsuitable for dryland farming. Removing water from irrigated acres generally results in decrementing total cropland, as a switch to dryland farming is frequently inhibited by climactic conditions.[3] Without secure water for the future, many agricultural stakeholders fear the dry-up of irrigated land.

As farm practices become more efficient with the resulting potential to reduce stateline flow, additional augmentation or replacement water will be needed to meet the requirements of the Arkansas River Compact with Kansas. Currently, most of this augmentation water is leased from municipal suppliers who have converted historic farm water to fully consumable supplies, or reusable transbasin supplies. The availability of augmentation water for agriculture is expected to diminish as this municipal return flow is reused to meet future urban demands. Therefore, the Arkansas Basin Roundtable approached a future gap in agriculture considering the economic impact to the rural communities that agriculture supports.

To maintain the current level of agricultural economic productivity, many projects identified in Appendix B focus on developing rotational fallowing, conservation easements, and increased storage capacity to allow agricultural water to sustain agricultural productivity. A potential solution, that is currently being tested within the basin, is the use of alternative transfer methods (ATMs) to meet a portion of the municipal water supply gap while maintaining agricultural productivity.

Through a thoughtful and deliberative process, the Arkansas Basin Roundtable also agreed, by consensus, to include a policy statement about agriculture:

"The preservation of irrigated agriculture in the Arkansas Basin shall be given a high priority in the state water plan. It is too important to tourism, the preservation of food production, recreation, the environment, and the health and well-being of our citizens, as well as the economy of the State of Colorado, to be ignored."

---

[2] Jake Salcone and James Pritchett, *Value of Water Used in Agriculture for the Arkansas River Basin,* February 4, 2014.

[3] Estimates by Salcone and Pritchett (2013, Colorado State University) indicate that approximately one-third of irrigated cropland may be used in dryland farming.

Environment and Recreation

Opportunities for environmental and recreational activities and enjoyment are boundless in the Arkansas Basin, and non-consumptive water use is a major component of the basin's planning and distribution of water resources. Environmental and recreational demands on water are expected to increase with population growth. Managing Colorado's water supply is essential to meeting the Arkansas Basin's non-consumptive needs.

The Environment and Recreation (E&R) Subcommittee is one of the Arkansas Basin Roundtable's oldest and most active standing committees. Increasing the advocacy for environmental and recreational needs was an acknowledged goal of the Roundtable in its 2012 memorandum to the Colorado Water Conservation Board (CWCB). The E&R goals of the Roundtable fall into one of four categories:

- Protecting and improving species and habitat
- Maintaining, improving, and restoring wetlands
- Increasing the quality of recreational experiences
- Improving watershed health and water quality

By considering the E&R attributes of stream segments in the basin, the basin roundtable (BRT) has developed a qualitative evaluation of E&R uses and needs in the basin and seeks projects to help meet those needs.

Recreation and Tourism

Recreation and tourism account for more than $1 billion in income per year and contribute to a more robust economy. Residents and visitors benefit from the Arkansas Basin's many environmental and recreational water-based activities, including white-water rafting, flat-water recreation, fishing, and scenic tours. In three specific regions—Arkansas Headwaters Recreation Area, Pueblo Reservoir, and John Martin Reservoir—annual recreation economic activity is estimated at $349 million,[4] with more than 2.6 million visitors per year.[5] Reductions in water levels in rivers and reservoirs observationally correlate with reduced recreational visits and expenditures.

1.2 BIP Process Overview

Since its inception in 2005, the Roundtable has and continues to bring together committee members representing water stakeholders throughout the basin to discuss and plan for a sustainable water future. In May 2013, Governor Hickenlooper's Executive Order D2013-005 directed the CWCB to begin work on a statewide water plan. In 2015, the Arkansas BIP was developed by the Roundtable to meet the charge of the State of Colorado to develop a basin implementation plan. Colorado's Water Plan is an aggregation of the nine roundtable basin plans and builds on a decade of water planning initially known as the Statewide Water Supply Initiative (SWSI).

The 2015 BIP provided stakeholder input into the future of water with the goal of building on previous work mandated by HB 05-1177; that work was to propose projects or methods to meet the needs of the basin and use unappropriated waters where appropriate. However, as one of the earliest regions of Colorado to have been settled in the 19th century, the Arkansas River Basin has no unappropriated water.

This 2021 BIP Update builds on the 2015 BIP, along with updated analysis of basin demands and shortages described in the 2019 Technical Update to the Water Plan.

[4] Ibid. Includes direct, indirect, and induced effects.

[5] 2007-2011 averages by Colorado Department of Parks and Wildlife.

1.3 Basin Themes and Fundamentals

From its inception in 2005, the Roundtable dialogue has focused on several themes and fundamentals for water planning, which were first described in the 2009 Meeting the Needs Report, then again in the SWSI 2010 and Meeting the Needs 2012 updates and in the 2015 BIP.

- The 2009 Report focused on meeting the future M&I supply gap and recognized the dependence of the Arkansas River Basin on Colorado River imports.
- SWSI 2010 highlighted the importance of storage and the existence of "gaps" in all water use arenas—municipal, agriculture, recreation, and environment.
- The 2012 Update reaffirmed these themes and identified several initiatives to address water supply challenges.
- Through the experience gained during these planning processes, the 2015 BIP reiterated its basin themes and fundamentals and developed basin goals intended to guide future basin projects.

1.3.1 Basin Themes

The Roundtable identified three broad themes for basin water planning. They are that:

1. Increased water storage is critical to all solutions.
2. The Arkansas Basin, as an importing and exporting basin with significant inter-basin and interstate obligations, must meet its present and future water supply gaps by maximizing the use of native and imported water.
3. Stakeholders should take all actions required to maintain current water supplies and prevent future water supply gaps from increasing.

These basin themes reflect the values of the Arkansas Basin water users and provide broad principles for engagement across many stakeholders' areas of interest. They are also in accord with Section III, Declaration and Directives, of the Governor's May 2013 Executive Order, which states:

Colorado's water policy must reflect its water values. The Basin Roundtables have discussed and developed statewide and basin-specific water values, and the Colorado Water Plan must incorporate 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; and,*
- *A strong environment that includes healthy watersheds, rivers and streams, and wildlife.*

The Governor's Executive Order frames the dialogue in economic terms. Colorado's economic and environmental health is directly tied to its water resources, which support abundant recreation in addition to supporting vibrant ecosystems and habitats.

1.3.2 Basin Water Planning Fundamentals

To acknowledge all of the stakeholders, their goals, and their needs, the Arkansas Basin Roundtable developed the following basin fundamentals to guide the BIP process:

- Water supply gaps include all of the potential consumptive and non-consumptive use categories: environmental, agricultural, municipal and industrial, and recreational.
- The Arkansas River Compact of 1948 places unique constraints on water resource management within the Arkansas Basin.
- Regional extremes in hydrologic conditions require collaborative solutions from all stakeholders.

These basin fundamentals were agreed upon by the Roundtable to help ensure that all stakeholders are included in the planning process, that all gaps are addressed, and that constituents acknowledge potential constraints to finding a sustainable water future. Water is critical to the economy of the Arkansas Basin: it provides for significant municipal populations, industry, agriculture, recreation, and tourism.

1.4 Basin Goals

Identifying and articulating basin-wide goals is critical to developing projects to meet the future needs of the basin. The goals of the Arkansas Basin were originally developed for the 2015 BIP, and through a collaborative process have been revised in this 2021 BIP Update to reflect the Roundtable's renewed vision. The goals, detailed in the following subsections, fall under five major water sector categories:

- Storage
- M&I
- Agricultural
- Environment and recreation
- Watershed

By keeping in mind the goals for each of these major water sector categories, basin projects can be developed and implemented to meet the future needs of the Arkansas Basin.

Storage Goals

The Roundtable acknowledged that increasing available storage is critical to the future of the Arkansas Basin. Several projects have been proposed to expand storage, and they remain high priorities to the Arkansas Basin to meet consumptive and non-consumptive needs in the future.

Each of the storage goals has actions, including implementing specific projects, quantifying storage opportunities, and working with stakeholders to assess the feasibility of additional storage. Significant challenges exist to achieving the storage goals of the Arkansas Basin, including government permitting and regulations, competing stakeholder interests, and reluctance of storage site owners to take on further responsibility. While the challenges are significant, they are surmountable through coordinated efforts, projects, and Roundtable engagement.

The three basin storage goals and associated actions are:

ARKANSAS BASIN GOALS (order does not indicate priority)	
GOAL 1	**Continue to develop storage opportunities to support Basin needs** • Support new storage both within and outside the Arkansas Basin to help meet the Arkansas Basin water supply gap, mitigate water supply risks, optimize water resources, and provide multi-purpose benefits. • Work with the State Engineers Office of Dam Safety to identify storage facilities that can be renovated due to aging infrastructure, restored due to loss of storage from sedimentation or fill restrictions, or enhanced for additional storage. • Support funding, including grant contributions where appropriate, for storage restoration and expansion projects. • Investigate storage needs on a subregional basis and align with planned projects. • Protect the ability to store water imported from other basins into the Arkansas Basin. • Promote more flexible ways to store fully consumable water.
GOAL 2	**Develop alluvial and designated basin aquifer storage in gap areas within the Basin** • Quantify alluvial storage opportunities in the sub-regions of the Basin, Upper Ark, Huerfano/Purgatoire, Fountain Creek and Lower Ark, beginning with locations identified in Colorado Water Plan (CWP) Technical Update Storage memo. • Develop a feasibility study and action plan for aquifer storage that focus on the needs and opportunities in different sub-regions, differentiating between “holding” storage and “recharge” storage.
GOAL 3	**Promote multiple uses at existing and new storage facilities** • Support rehabilitation efforts with grant funds, especially if the project includes environmental and recreational attributes. • Engage Colorado Parks and Wildlife (CPW) and other stakeholders in project discussions. • Work with stakeholders in the basin to identify and encourage opportunities to create storage for multiple purposes and participants. • Support State of Colorado efforts to obtain a Colorado Multi-Purpose Account in John Martin Reservoir.

M&I Goals

The Arkansas Basin includes about 19 percent of the statewide population. Between the years 2015 and 2050, it is projected to grow from approximately 1.0 million to between 1.46 million and 1.63 million people in the low and high growth projections, respectively, which is an increase in population of 45 to 61 percent. The M&I supply could exceed 50,000 AF/year by 2050 (see Volume I). M&I water supplies of all types (groundwater, surface water, transbasin supplies) will all be stressed in the future if careful planning does not occur.

The four basin M&I goals and associated actions are:

GOAL 1: Meet the projected municipal supply gap in each subregion within the basin.

- Characterize current water supplies by subregion and future supply vulnerabilities.
- Support projects within and outside the basin that will help meet the Arkansas Basin M&I water supply gap, maintain existing supplies, better manage vulnerable supplies, and maximize use of water users' entitlements.
- Support reasonable efforts to prevent the exportation of Arkansas Basin water.

GOAL 2: Support regional efforts for finding cost-effective solutions to local water supply gaps.

- Provide the opportunity to build partnerships to support the ability of all Arkansas Basin communities, especially small rural communities, to pursue projects and address infrastructure challenges.
- Support projects that increase efficient use of current supplies and the ability to move water to where it is needed.

GOAL 3: Reduce groundwater dependence on unsustainable aquifers for municipal users.

- Promote tools to help manage groundwater resources.
- Characterize groundwater supply vulnerabilities in the future with respect to both quantity and quality.
- Develop strategies to address groundwater vulnerabilities, which includes identifying emergency supplies.

GOAL 4: Develop collaborative solutions between municipal, agricultural, and E&R users of water, particularly in drought conditions.

- Recognize relationship with agricultural goals and renew focus on broadening partnerships.
- Document lessons learned from existing Arkansas Basin ATM/water-sharing projects and provide recommendations on programmatic elements for water-sharing success.

Agricultural Goals

Agricultural economic activity is significant in the Arkansas Basin, contributing an estimated $1.5 billion annually to the economy. Agriculture has always been critical to the culture and economy of Colorado, and the agricultural goals of the Arkansas Basin reflect a desire to protect existing water supplies while making water available for all growing demands, particular urban growth demands, which have led to competing water interests within the basin.

Agricultural producers are the largest owners of water resources in the state. As new or growing users, particularly municipalities, require additional water resources, they often purchase it from agricultural users. The Arkansas BRT is concerned that additional transfer of water rights from irrigated agriculture to other uses that results in the permanent dry-up of irrigated land is undesirable and should be avoided if at all possible and further recommends mitigation efforts to protect local economies and land health if permanent transfers occur. This multi-base constituency is reflected in the goals outlined for agricultural water within the Arkansas Basin.

The five basin agricultural goals and associated actions are:

GOAL 1: Support projects within and outside the basin that will help meet the Arkansas Basin Agriculture water supply gap, maintain existing supplies, better manage vulnerable supplies, and maximize use of water users' entitlements.

GOAL 2: Sustain a productive agricultural economy in the basin that sustains viable rural, agricultural-based communities.

- Quantify economic potential/vulnerabilities under the CWP's five planning scenarios.
- Support efforts that maximize productivity while making the most efficient use of agricultural water supplies.

GOAL 3: Provide augmentation water as needed to support increased farm efficiencies.

- Support augmentation projects that are necessary to allow for increased efficiencies (e.g., transition to sprinklers, lining of canals and reservoirs, smaller storage at key locations).
- Help establish long-term sources of augmentation water and end reliance on municipal excesses and year-to-year leases.

GOAL 4: Support the development of viable ATM/water-sharing projects between agriculture and municipal interests to mitigate the impacts of drought, provide risk management for agriculture and municipal interests, and facilitate responsible and sustainable water-sharing arrangements.

- Convene a committee to research and discuss lessons learned from existing projects and make recommendations for future projects.
- Sustain recreational and environmental activities that depend on habitat and open space associated with farm and ranch land.
- Quantify the value agricultural lands provide as wildlife habitat and for recreation.
- Look at current multi-purpose projects and identify successful strategies that support both agriculture and E&R values.

Environment & Recreation Goals

In addition to assessing consumptive needs, the Roundtable has also assessed non-consumptive needs, specifically environment- and recreation-based demands. Environmental goals are to protect resident fish species and riparian habitats critical to supporting biodiversity and animal health. Environmental goals frequently align with recreational goals, which seek to maintain fishing opportunities and environmental health while improving opportunities for water recreation.

While it is challenging to ascribe an economic value to a healthy environment, tourism and recreation play significant roles in the Arkansas Basin economy. A Colorado State University study estimates that recreation contributes approximately $1 billion to the Arkansas Basin economy. Three specific water recreation areas—Arkansas Headwaters Recreation Area, Pueblo Reservoir, and John Martin Reservoir—contribute an estimated $349 million to the Arkansas Basin each year. Coloradans place significant cultural and economic value on their environment, and non-consumptive water plays a critical role in maintaining a "productive economy that supports … a robust skiing, recreation, and tourism industry."

The four basin E&R goals and associated actions are:

GOAL 1: Support projects and programs within and outside the basin that protect Arkansas Basin E&R water supply needs; collaborate with municipal and agricultural users to enhance E&R values.

- Support mitigation of risks to E&R values related to potential future reductions of imported water supplies.

GOAL 2: Maintain or improve native fish populations, restore habitat for fish species, and maintain or improve recreational fishing opportunities.

- Continue to support the preservation of native fish species.
- Continue to support the Voluntary Flow Management Program (VFMP) and refinement of the program for fisheries.
- Support and help maintain the Gold Medal status of the Arkansas River.
- Support collaborative stream management plans in high-priority watersheds.
- Support the maintenance of current access areas for fishing to protect riparian habitat and help identify opportunities for additional public access to fishing areas.

GOAL 3: Maintain, or improve boating opportunities, including rafting, kayaking, and other non-motorized and motorized boating.

- Continue to support and refine the VFMP for instream boating, including stream gaging and forecasting technology.
- Support the maintenance of current access areas for boating, including safety considerations.
- Help identify opportunities for additional public access to instream and flatwater boating areas.

GOAL 4: Maintain or improve aquatic, riparian, and avian habitat (including wetlands) that would support environmental features and recreational opportunities.

- For all Agricultural and M&I projects, consider E&R and look for opportunities that would deliver multiple benefits.
- Support the maintenance, improvement, and/or restoration of these habitats.
- Monitor the provision of water to the John Martin Reservoir wetlands.
- Support the maintenance, improvement and/or restoration of wetlands throughout the basin.

Watershed Health Goals

New goals this year were developed to capture the important linkage between sustainable water supplies and watershed health.

The two goals associated with watershed health are:

GOAL 1: Maintain, improve, or restore critical water supply watersheds that could affect Arkansas Basin water uses and environmental and recreational values.

- Identify "at-risk" watersheds with important environmental and recreational attributes and/or critical water supply values and promote proactive wildfire risk reduction through forest health protection and improvement activities in those watersheds.
- Promote watershed health and water quality as shared values to all Arkansas Basin water users.
- Support and collaborate with Arkansas River Watershed Collaborative to develop strategies and solutions.

GOAL 2: Improve water quality as it relates to the environment and/or recreation.

- Support efforts to reduce contaminants and address water quality issues in the Upper Arkansas River (mine tailings) and Lower Arkansas River (salts, selenium), as well as sedimentation from fire-impacted areas.

SECTION 2. WATER MANAGEMENT AND ADMINISTRATION

This section is an overview of the water administration in the Arkansas River Basin with the purpose of providing the Roundtable with a better understanding of how these policies impact water use in the basin.

Water administration in the basin can be grouped into the following topics:

- Arkansas River Compact Administration
- Surface Water Administration
- Groundwater Administration

This section is not intended to provide legal guidance or advice but to rather summarize the statutes, policies, and rules and regulations that impact water administration and use as it relates to water resource operations in the basin.

2.1 Arkansas River Compact

Background

The history of litigation between Kansas and Colorado with respect to the flows of the Arkansas River extends back to the early 1900s when Kansas sued Colorado in the case referred to as Kansas v. Colorado (1907). Kansas sought to have the U.S. Supreme Court apportion the waters of the Arkansas River. The Supreme Court ruled that Kansas did not show that there was any economic damage to Kansas but did state that "there will come a time when Kansas may justly say there is no longer an equitable division of benefits and may rightfully call for relief." This decision did provide important guidance to all states sharing a river basin by indicating there should be an equitable apportionment of the water supplies of that river.

In 1928 Colorado filed a complaint with the U.S. Supreme Court in a case referred to as Colorado v. Kansas (1943). This litigation was intended to settle a series of lawsuits filed by Kansas irrigators beginning in 1910 that attempted to adjudicate interstate priorities for waters of the Arkansas River. There were negotiations among the states with respect to a compact, but no success was reached. The Special Master assigned to the case submitted his report to the Supreme Court in May of 1943 with recommendations. The Supreme Court did not adopt the Special Master's recommendations and:

- Indicated Colorado should not be subject to future litigation from Kansas irrigators.
- Denied Kansas's demand for an apportionment of the water of the Arkansas River.
- Strongly advised the states to settle future disputes through negotiations of an interstate compact.

The states agreed to initiate compact negotiations in 1945 and appointed commissioners to represent each state. Congress in 1945 passed legislation granting both states the right to negotiate compacts, which could include operations of John Martin Reservoir, which was nearing completion. The reservoir was constructed by the United States Army Corps of Engineers (USACE), and construction began on the John Martin dam in August of 1940. After intensive negotiations, the compact was signed on December 14, 1948. It was approved by both state legislatures and the U.S. Congress in 1949.

Arkansas River Compact Features and Administration

The Arkansas River Compact does not have a quantifiable allocation of water to either state, unlike other compacts that Colorado has entered into. Examples include:

- A delivery obligation at the state line, such as in the Rio Grande Compact or the La Plata River Compact
- An allocation of consumptive use among the states, as in the Colorado River Compact and the Republican River Compact

- The operation of a common water rights administration system across the state line, such as the Costilla Creek Compact and the South Platte River Compact.

Instead, the Arkansas River Compact limited the future development (post compact) in Colorado and Kansas so as to not deplete the usable flow of the river above the state line to the detriment of pre-compact water rights in each state. The key provision is Article IV D., which states:

> *This compact is not intended to impede or prevent future beneficial development of the Arkansas River basin in Colorado and Kansas by federal or state agencies, by private enterprise, or by combinations thereof, which may involve construction of dams, reservoirs and other works for the purposes of water utilization and control 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 for use to the water users in Colorado and Kansas under this compact by such future development or construction.*

Thus, the Compact is basically protecting development existing as of 1948, including John Martin Reservoir, from any material depletion by post-compact activities or development. At times of high flow when all pre-compact water rights and John Martin Reservoir are satisfied, it may be possible to divert under an in-priority post-compact water right. This has only occurred five times since 1954.

The compact provides for the storage of water in John Martin Reservoir beginning on November 1 and continuing to March 31 of the following year, referred to as conservation storage. The water can be released at the rate of up to 750 cubic feet per second (cfs) for Colorado users and up to 500 cfs for Kansas water users, which is a 60/40 division of the water stored. The compact allows either state to call for water from storage beginning April 1. If the content of John Martin Reservoir is less than 20,000 AF, the release rates are reduced to 600 cfs for Colorado water users and 400 cfs for Kansas water users.

Summer storage is also allowed in John Martin Reservoir provided Colorado is not administering water rights below John Martin Reservoir. Any summer-stored water is to be released on the same 60/40 ratio as for winter-stored water.

The compact is administered by a seven-member administration. It includes a non-voting federal representative appointed by the U.S. President that acts as chair, and three members each from Colorado and Kansas appointed by the Governor of each state. Each state has only one vote on any compact action; thus, approval of any action requires unanimous consent of the compact administration.

The states often would call for releases of winter-stored water shortly after April 1, and the reservoir was often drawn down early in the irrigation season. This "race" to use the water at the rate of releases set forth in the compact led to the compact administration amending the operations in 1980 by allocating the water stored in John Martin Reservoir based on volume, with Colorado receiving 60 percent and Kansas 40 percent. The water could be released when any state desired and could be carried over if desired. Colorado ditches are allocated a fixed percentage of the Colorado allocation and have separate accounts in the reservoir. The amendment of the operations was accomplished by the compact administration approving the "Resolution Concerning an Operating Plan for John Martin Reservoir" on April 24, 1980, and is referred to as the 1980 Operating Plan. The Division Engineer for Water Division 2 is required to give an accounting of the operations under the plan no later than December 1 of each year.

The compact administration also approved a resolution in 1976 that created a permanent pool of 10,000 AF to support fish and wildlife habitat and recreation in John Martin Reservoir. The pool is to be filled by Colorado water rights owned by CPW. The pool will be charged its pro rata share of evaporation from the reservoir. In 2019, both states agreed to allow Highland Canal water rights owned by the Lower Arkansas Valley Water Conservancy District (LAWMA) to be delivered to John Martin Reservoir as a permanent source of water to fill the permanent pool.

Post-compact Water Development

After the compact was signed, there was post-compact development related to the construction of large-capacity tributary wells along the Arkansas River as described in the Tributary Groundwater section below. At that time, especially during the drought of the 1950s, it was not recognized that the construction of these wells would impact the flow of the Arkansas River. The number of wells constructed increased until the 1965 Ground Water Management Act. The number of post-compact wells in operation along the Arkansas River was around 3,000. The pumping of these wells was subject to the 1973 use rules until the 1996 amended use rules were adopted.

The Fryingpan-Arkansas (Fry-Ark) Project, which included Pueblo Reservoir, became operational in 1975 with the completion of Pueblo Dam. The authorizing legislation, Public Law 87-590, states that the purposes of the project include supplying water for irrigation, municipal, domestic, and industrial uses; generating and transmitting hydroelectric power and energy; controlling floods; and other useful and beneficial purposes incidental thereto, including recreation and the conservation and development of fish and wildlife. The project was authorized to divert water imported from the Fryingpan and Roaring Fork River basins, tributary to the Colorado River, and store the transbasin imports in the enlarged Turquoise and Twin Lakes reservoirs and in the Pueblo Reservoir. As mitigation for the project's transbasin diversions, water is also stored at Ruedi Reservoir for use by West Slope water users. As described in the Winter Water Storage Section below, the Fry-Ark Project authorizing legislation included the Winter Water Storage Program, which involves the storage of pre-compact water rights in Pueblo Reservoir and other existing off-channel reservoirs.

Trinidad Reservoir was completed in 1977 and its primary purposes as set forth in the authorizing federal legislation were:

- Control of floods originating above the reservoir for the benefit of the City of Trinidad and downstream reaches.
- Optimum beneficial use of available water for irrigation and M&I use through:
  - Transfer of the storage decree in the Model Reservoir for 20,000 AF annually.
  - Storage of flood flows that would otherwise spill from John Martin Reservoir.
  - Storage of winter flows that were historically diverted for winter irrigation of project lands.
- Maintenance of a minimum pool for fishery and wildlife enhancement values.

Litigation with Kansas over Post-compact Development

In 1985, Kansas filed a request with the U.S. Supreme Court for permission to file a lawsuit against Colorado over compliance with the Arkansas River Compact and specifically the post-compact development described previously. Kansas alleged that the operation of post-compact wells, the Winter Water Storage Program, and the operation of Trinidad Reservoir had violated the compact. The Supreme Court granted Kansas's motion to file a complaint in March of 1986.

The trial was bifurcated into a liability phase and a remedy phase. The liability phase of the trial began on September 17, 1990, in front of Special Master Arthur Littleworth and concluded on December 16, 1992. Littleworth issued his report to the Supreme Court in July of 1994, in which he put forth findings that indicated:

- The increase of groundwater pumping in Colorado had caused serious depletions of usable Stateline flow in violation of Article IV-D of the compact.
- Kansas did not prove that the operation of the Winter Water Storage Program had caused material depletions of Stateline flow.
- The claim concerning Trinidad Reservoir should be dismissed.

Both states filed exceptions to the report and a hearing was held in front of the Supreme Court. The Supreme Court overruled the exceptions on May 15, 1995.

Subsequent hearings in front Littleworth resulted in a final determination that the depletions to usable Stateline flow from 1950 through 1996 were 428,005 AF. The economic damages to Kansas based on these depletions was also determined and found to be $34,615,146, which Colorado paid to Kansas on April 29, 2005.

As a result of Littleworth's first report in July of 1994, the State Engineer adopted amended groundwater use rules in 1996. The Special Master was impressed with Colorado's efforts to comply with the compact, and so stated in his second report to the Supreme Court in 1997. Based on the opinions of Colorado's experts, Littleworth also recommended that compact compliance be determined over a 10-year moving period to smooth out annual variations in the model's operation. The Supreme Court agreed with this recommendation; the first 10-year period was 1997 to 2006. The results of the model run for this period showed a credit to Colorado; each subsequent 10--year period has shown a credit and no depletions indicating that the amended use rules appear to be working as intended and that Colorado is in compliance with the Compact, except for a small shortfall (less than 100 acre-feet) that occurred for the 2011-2020 model update.

Compact Compliance

Colorado has been vigilant in efforts to comply with the Compact. The Irrigation Improvement Rules discussed in the section below exemplify one such effort that bans irrigation system improvements that cause an additional depletion to Stateline flows.

Storing water in post-compact reservoirs using post-compact water rights continues to be closely monitored by the Division 2 Engineer. New reservoirs can only store water from transbasin sources or from changed pre-compact water rights that allow the water from these water rights, including return flows from a previous use such as municipal sewage effluent, to be fully consumed. Water from nontributary groundwater sources can also be stored in a new reservoir or an existing post-compact reservoir.

2.2 Surface Water Administration

Surface water in the basin is administered separately but in conjunction with groundwater in accordance with Colorado water law and Compact administration. Colorado administers water rights according to the Doctrine of Prior Appropriation (first in time, first in right), which gives older senior water rights priority over newer junior water rights when water is not available to the senior water right.

Doctrine of Prior Appropriation

A water right in Colorado is a right to use, in accordance with its priority, a certain portion of the waters of the state by reason of appropriation. Appropriation is the application of a specified portion of the waters of the state to a beneficial use. A water right in Colorado arises by application of water to beneficial use and is confirmed by a Water Court decree, which determines the amount and priority of the water right for the purposes of administration by state water officials. The appropriation date (date of first use) of each water right generally establishes the "rank" or priority of the right, with the first right (the senior right) having priority over later rights (junior rights). An exception to this general principle is that a water right not adjudicated in the first possible adjudication will have a lower priority than any water right adjudicated in the prior adjudication, even if its appropriation date is older than any other water right in the prior adjudication. Therefore, the priority of a water right is based on the date of first use and the date of adjudication. Decrees for diversions for direct use are approved as a rate in cfs; decrees for storage rights are approved as a volume in AF. Water rights are administered by the State Engineer, division engineers, and water commissioners based on the priority of each water right in accordance with the decrees of the Colorado courts and applicable laws, including interstate compacts.

Streamflow Data

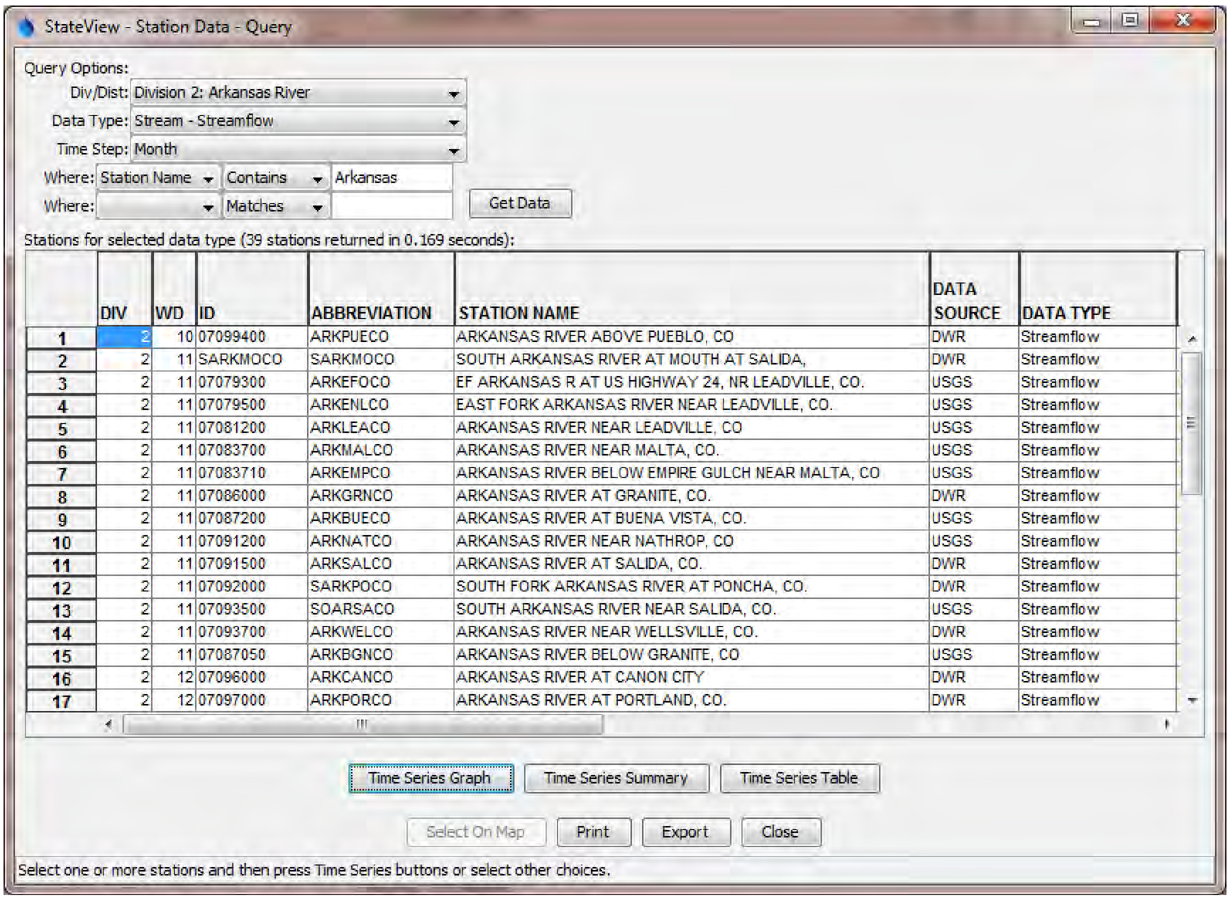
To administer surface water in Colorado and the Arkansas Basin, data on streamflow is required. The data helps inform administrative decisions regarding specific surface water diversions that are allowed to divert water according to their priority.

Colorado is the only state in the U.S. that operates its own hydrographic program. Under the program, the state uses its own stream gages needed for water rights administration. This eliminates the state's reliance on the U.S. Geological Survey's (USGS) stream gaging program for data. Additionally, the lower operating cost of the state's hydrographic program results in savings to the Division of Water Resources (DWR) and lower costs for water users.

HydroBase

DWR and CWCB maintain a central database of water resources data within the State of Colorado called HydroBase. HydroBase contains data on streamflow, diversions, storage, and water rights, as well as conditional and decreed water rights that can be queried using various parameters to identify water rights. HydroBase is maintained by the DWR, is publicly available on the state website, and updated annually after the irrigation season ends on October 31. Figure 1 shows a screenshot of a data query in HydroBase.

Figure 1 - Screenshot of HydroBase Streamflows (via StateView)



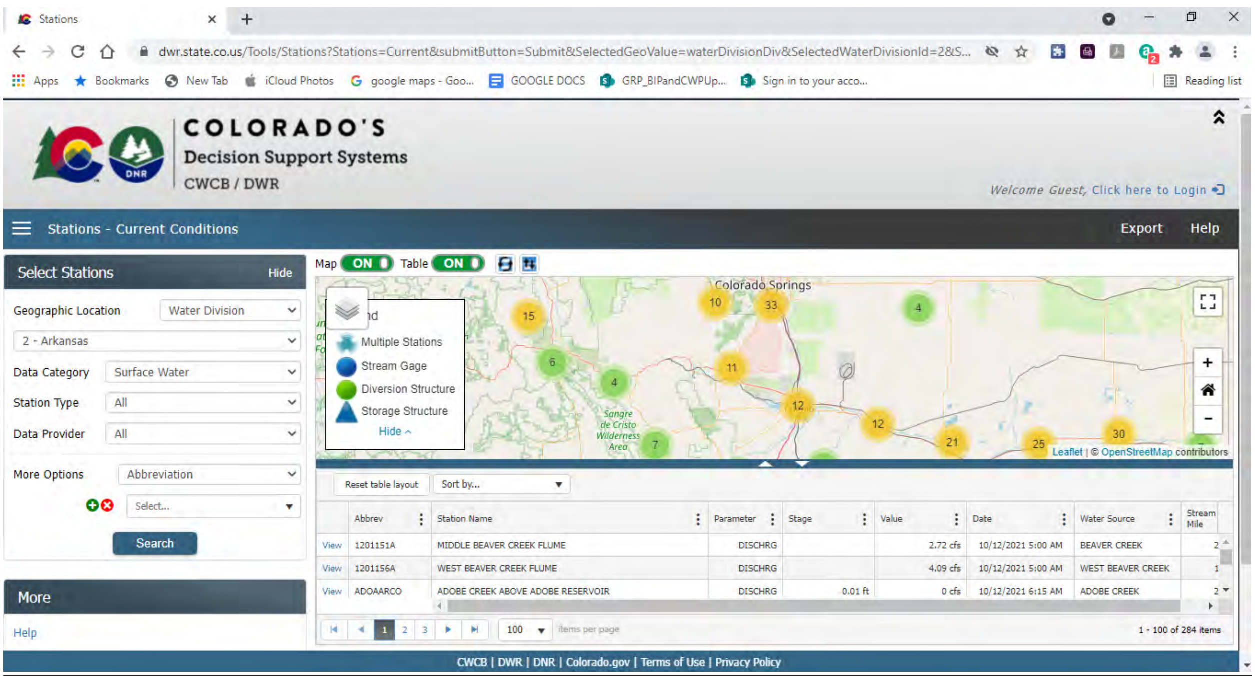
	DIV	WD	ID	ABBREVIATION	STATION NAME	DATA SOURCE	DATA TYPE
1	2	10	07099400	ARKPUECO	ARKANSAS RIVER ABOVE PUEBLO, CO	DWR	Streamflow
2	2	11	SARKMOCO	SARKMOCO	SOUTH ARKANSAS RIVER AT MOUTH AT SALIDA,	DWR	Streamflow
3	2	11	07079300	ARKEFOCO	EF ARKANSAS R AT US HIGHWAY 24, NR LEADVILLE, CO.	USGS	Streamflow
4	2	11	07079500	ARKENLCO	EAST FORK ARKANSAS RIVER NEAR LEADVILLE, CO.	USGS	Streamflow
5	2	11	07081200	ARKLEACO	ARKANSAS RIVER NEAR LEADVILLE, CO	USGS	Streamflow
6	2	11	07083700	ARKMALCO	ARKANSAS RIVER NEAR MALTA, CO.	USGS	Streamflow
7	2	11	07083710	ARKEMPCO	ARKANSAS RIVER BELOW EMPIRE GULCH NEAR MALTA, CO	USGS	Streamflow
8	2	11	07086000	ARKGRNCO	ARKANSAS RIVER AT GRANITE, CO.	DWR	Streamflow
9	2	11	07087200	ARKBUECO	ARKANSAS RIVER AT BUENA VISTA, CO.	USGS	Streamflow
10	2	11	07091200	ARKNATCO	ARKANSAS RIVER NEAR NATHROP, CO	USGS	Streamflow
11	2	11	07091500	ARKSALCO	ARKANSAS RIVER AT SALIDA, CO.	DWR	Streamflow
12	2	11	07092000	SARKPOCO	SOUTH FORK ARKANSAS RIVER AT PONCHA, CO.	DWR	Streamflow
13	2	11	07093500	SOARSACO	SOUTH ARKANSAS RIVER NEAR SALIDA, CO.	USGS	Streamflow
14	2	11	07093700	ARKWELCO	ARKANSAS RIVER NEAR WELLSVILLE, CO.	DWR	Streamflow
15	2	11	07087050	ARKBGNCO	ARKANSAS RIVER BELOW GRANITE, CO	USGS	Streamflow
16	2	12	07096000	ARKCANCO	ARKANSAS RIVER AT CANON CITY	DWR	Streamflow
17	2	12	07097000	ARKPORCO	ARKANSAS RIVER AT PORTLAND, CO.	DWR	Streamflow

Satellite Monitoring System

Effective surface water administration requires access to accurate, timely, and reliable data on streamflow. A satellite monitoring system (SMS), operated by DWR's Hydrography and Satellite Monitoring branch, provides near-real-time (i.e., most data is reported hourly) gaging station data on streamflow, reservoirs, and selected canal diversions at approximately 240 locations in the basin. This near real-time data can be retrieved via the DWR's Surface Water Conditions page (https://dwr.state.co.us/Tools/Stations) (see Figure 2). In addition to administrative functions, the SMS can be used to help manage operations along the state's river systems.

The primary utility of Colorado's SMS is for water rights administration. The availability of real-time data from a network of key gaging stations in each major river basin in Colorado provides an overview of the hydrologic conditions of each basin that was previously not available. By evaluating real-time data for upstream stations, downstream flow conditions can typically be predicted 24 to 48 hours in advance. This becomes an essential planning tool in the hands of division engineers and water commissioners. The "river call" can be adjusted more precisely to satisfy as many water rights as possible, even if just for short duration flow peaks caused by precipitation events. Access to real-time data makes it possible to adjust the river call to match dynamic hydrologic conditions. If additional water supplies are available in a basin, more junior rights can be satisfied. On the other hand, if water supplies decrease, then water use can be curtailed to protect senior rights.

Figure 2 - Screenshot of DWR's Surface Water Conditions



Water Rights Administration

The administration of water rights in Colorado is becoming increasingly more complex due to increased demands, implementation of augmentation plans, water exchanges, transbasin diversions, and minimum stream flow requirements. For example, the number of water rights in Colorado has increased from 102,028 in 1982 to more than 173,000 in 2007; this escalation continues to the present. Water rights transfers approved by the water courts are becoming increasingly complex. This is especially evident where agricultural water rights are transferred to municipal use.

There is considerable interest in monitoring transbasin diversions, both by West Slope water users and the eastern slope entities diverting the water. Transbasin diversions are administered differently than water originating in the basin. In general, this water may be claimed for reuse by the diverter until it is fully consumed. The SMS monitors 40 transbasin diversions.

Water exchanges between water users or between specific locations are becoming more frequent. These exchanges can provide for more effective use of available water resources in high-demand river basins but can be difficult to administer. The SMS has proven to be an integral component in monitoring and accounting of these exchanges.

Many municipalities and major irrigation companies have reservoir storage rights. Generally, these entities can call for release of stored water on demand. A division engineer must be able to delineate the natural flow from the storage release while in the stream, track the release, and ensure that the proper delivery is made. Transit losses are charged on the stored water released to the stream. The SMS has demonstrated to be effective in this area.

The utility of the SMS in administering interstate compacts is an especially important application. Data collected from more than 20 gage stations operated by both the Colorado DWR and the USGS are incorporated in the statewide monitoring network and used for the effective administration of interstate compacts.

The majority of the large, senior water rights in Colorado belong to irrigation companies. These rights often have first priority in diverting water (i.e. the "calling right") in the administration of a water district. The direct diversion rights exercised by irrigation companies can significantly affect the hydrology of the river, and dozens of major irrigation diversions are monitored by the SMS.

Instream flow water rights have been appropriated by the CWCB to provide minimum instream flows in critical stream reaches around the state. These instream flow water rights are junior water rights and cannot prevent a senior water right from reducing the flow below the minimum amount appropriated; however, these instream flow water rights can protect a stream reach from diversions by junior water rights or from a reach being impacted by a change in use of a senior water right. The availability of real-time data is essential in ensuring that these minimum stream flows are protected to the extent of the law.

Hydrologic Records Development

Specialized software programs provide for the processing of raw hydrologic data on a real-time basis. Conversions such as stage-discharge relationships and shift applications are performed on a real-time basis as the data transmissions are received. Mean daily values are computed automatically each day for the previous day. Data values that fall outside of user-defined normal or expected ranges are flagged. Flagged data values are excluded when computing mean daily values. Missing values can be added, and invalid data values corrected, by the respective hydrographer for that station using data editing functions.

Data can be retrieved and displayed in various formats, including the standardized USGS-Water Resources Division annual report format adopted by the Colorado DWR for publication purposes. An advantage of real-time hydrologic data collection is being able to monitor the station for ongoing valid data collection. If a sensor or recorder fails, the hydrographer is immediately alerted and can take corrective action before a significant amount of data is lost.

It is essential to understand that real-time records can be different from the final record for a given station. This can be the result of editing raw data values because of sensor calibration errors, sensor malfunctions, analog-to-digital conversion errors, or parity errors. The entering of more current rating tables and shifts can modify discharge conversions. Corrections to the data are sometimes necessary to compensate for hydrologic effects such as icing. Human error can also result in invalid data. The final record for those gaging stations operated by nonstate entities, such as the USGS-Water Resources Division, is the responsibility of that entity. Modifications to the real-time records for these stations are accepted by the State of Colorado.

The Hydrography and Satellite Monitoring Branch develops historic streamflow records in coordination with other state and federal entities and the water user community. At the conclusion of each water year, the State Engineers Office (SEO) compiles streamflow information and measurements conducted throughout the year for publication. Published streamflow records describe the mean daily discharge, the instantaneous maximum, lowest mean discharge, and monthly/annual volumetric totals for a specific location on a river or stream. These annual streamflow records are computed using two critical sources of information: streamflow measurements made throughout the water year to calibrate the stage-discharge relationship at a specific site, and the electronic record of stream stage collected by the satellite monitoring system. Using these data, a continuous record of streamflow for the water year is computed. Streamflow records undergo a rigorous data quality control/quality assurance program to ensure the product is accurate. The DWR hydrographic program computes and publishes more than 240 streamflow, reservoir, and canal diversion records annually in the basin. Published historical streamflow data are extremely valuable in support of water resources planning and management decision making, assessment of current conditions and comparisons with historical flow data, and hydrologic modeling.

Water Resources Accounting

Currently, the satellite-linked monitoring system, i.e., SMS, is being used to support accounting for the Colorado River Decision Support System, the Colorado-Big Thompson Project, the Dolores Project, and the Fry-Ark Project Winter Water Storage Program, among others around the state. The ability to input real-time data into these accounting programs allows for current and ongoing tabulations.

Dam Safety

Dam safety monitoring has developed in recent years into a major issue. Numerous onsite parameters are of interest to the State Engineer in assessing stability of a dam. At this time, the system monitors reservoir inflow, water surface elevation, and reservoir release or outflow at more than 50 reservoirs in Colorado. These data provide a basis for evaluating current operating conditions as compared to specific operating instructions. The installation and operation of additional sensor types could provide essential data on internal hydraulic pressure, vertical and horizontal movement, and seepage rates.

Exchanges

Water exchanges (exchanges) are an important component of surface water administration and water management. Exchanges allow a water user or provider to move water upstream to a point of diversion or reservoir. A water exchange is accomplished by diverting water at one point in a river basin and replacing that water with a like quantity released from a reservoir or from a source that can legally be used for this purpose, which could include transbasin diversions, transbasin diversion return flows, or fully consumable water from a change in use of senior irrigation water rights.

An exchange has a priority among other exchanges based on the date it was first implemented and can be adjudicated by Water Court to establish a priority for administration with other exchanges that may be occurring in a reach of the river. Exchanges cannot operate if injury to other water rights would occur. The Division Engineer and water commissioners must carefully administer exchanges to prevent injury.

An example of a simple exchange would be the operations under the Holbrook Canal located on the north side of the Arkansas River near Manzanola. The Holbrook Canal has two reservoirs—Dye and Holbrook—that are filled with water from the canal. Both reservoirs are located downgradient from the canal so water cannot be released to serve lands under the canal. The reservoir water is released to the Arkansas River to meet the demands of senior downstream water rights, and a like amount of water is diverted (exchanged) upstream at the Holbrook Canal headgate to irrigate lands under the canal. The Colorado Canal also has exchanged water from Lake Meredith to its headgate to allow the stored water to be used to serve the lands under the canal.

An example of a more complex exchange is where transbasin return flows from the Colorado Springs wastewater treatment plant to Fountain Creek to the confluence of the Arkansas River are exchanged upstream to Pueblo Reservoir. This water is not native water to the basin and can be legally reused so it becomes the source of water for the exchange by having this quantity of water flow downstream to meet a senior demand and a like amount of water stored in Pueblo Reservoir by exchange. Simple or complex, a division engineer and water commissioners must carefully administer the exchange to prevent injury to other water rights.

There are several exchanges of water from the Arkansas River below Pueblo Reservoir upstream to storage in Pueblo Reservoir or even higher upstream to Twin Lakes Reservoir, Turquoise Reservoir, Clear Creek Reservoir, or to the Otero Pump Station near Buena Vista. These exchanges are all decreed by the Water Court and are operated by Colorado Springs Utilities (SPRINGS UTILITIES), the Pueblo Board of Water Works (PBWW), Aurora Water, and other utilities to a smaller degree. Table 1 (adapted from Table 2, Arkansas Valley Conduit (AVC) FEIS, Appendix D.1) provides an example of the number and priorities of exchanges from the Arkansas River below Pueblo Reservoir to Pueblo Reservoir.

Table 1 - Major Arkansas River Exchange Priorities into Pueblo Reservoir

Priority	Beneficiary	Amount	Case	Priority Date
1	Southeastern Colorado Water Conservancy District (SECWCD)	(1)	B42135, 88CW143, 84CW56	2/10/1939
2	PBWW	27 cfs	83CW18, 84CW62, 84CW63, 84CW64, 84CW35, 84CW202, 84CW203, 84CW177, 84CW178	**6/5/1985**
3	Colorado Canal Company agricultural entities	100 cfs		
4	PBWW	50 cfs		
	Colorado Canal Companies	50 cfs		
5	Colorado Canal Companies	50 cfs		
6	Colorado Springs	77 cfs minus PBWW Exchange under #2 and #4		
7	City of Aurora	Applicable Maximum Rate of Flow Allowed by Decree in 83CW18		
8	Colorado Springs	100 cfs minus Colorado Springs Exchange under #6		
9	Colorado Canal Companies	1/2 of remaining exchange potential up to 756 cfs		
	Colorado Springs	1/2 of remaining exchange potential minus Rocky Ford I		
	City of Aurora	Up to 40 cfs of 1/2, but not to exceed 500 AF annually; thereafter 25% of 1/2 up to an additional 500 AF annually		
10	Colorado Springs	William Creek Reservoir		
11	Pueblo West	6.0 cfs (measured return flows)	85CW134A	12/31/1985
12	City of Aurora (Rocky Ford II)	Applicable maximum rate of flow allowed by decree in 99CW169)	99CW169	12/28/1999
13	City of Pueblo	(2)	01CW160	5/15/2000
	City of Fountain	60 cfs	01CW108, 01CW146	(4)
	SECWCD	50 cfs (3)	01CW151	(4)
	Pueblo West	100 cfs	01CW152	(4)
14	Aurora – Rocky Ford Highline	500 cfs	05CW105	(4)
15	SECWCD	Varies	06CW8	(4)
	Restoration of Yield Storage – Holbrook Reservoir	2,000 cfs	06CW120	(4)
16	Super Ditch	Varies	10CW4	(4)

Notes:

(1) Measured Municipal Fry-Ark return flows generated and re-purchased by the same entity.

(2) See discussion on Pueblo Flow Management Program in subsequent sections.

(3) Non-measured Municipal and Agricultural Fry-Ark return flows.

(4) Priority yet to be determined.

Reservoir Storage

Reservoir storage plays an important role in meeting Colorado's water supply needs. Colorado is a headwaters state, meaning that all the water supplies in Colorado come from precipitation (rain or snow). The timing of runoff plays a key role in water resources planning. To mitigate the runoff pattern to better match water supply needs, both within a year and over multi-year periods, many reservoirs have been constructed within the state by various entities and for a variety of purposes, including municipal water supply, power generation, recreation, and flood protection.

Pursuant to section 37-87-101, C.R.S., the right to store water for later use is recognized as a beneficial use of water under Colorado statutes. The structure must be operated in such a way as to not cause material injury to other water users. Water in Colorado at a time of demand can only be stored when there is a water right to store the water. Storage water rights are obtained in a process similar to direct flow rights and are assigned a priority so that they can be administered according to the prior appropriation system.

One-fill Rule

Water may either be stored under a water right under the priority system or, in some situations, contractually, e.g., a user may be able to store reusable water in a reservoir. The one-fill rule concerns the storage of water under the priority system. Under Colorado law, a water user may store water whenever the water is physically available, its water right is in-priority, and the decree for the water right has not been filled. Under Colorado Supreme Court decisions, a user is entitled to only one filling of a reservoir water right in any one year unless a user has a water right that provides for a refill and/or additional storage or free-river conditions exist (i.e., no downstream shortage of water to meet the demands of all users for their decreed water rights, including storage in John Martin Reservoir pursuant to the Arkansas River Compact).

Carryover

Generally, any water remaining in a reservoir at the end of the seasonal year is called "carryover water" and is credited to the next year's fill. This will limit the amount of new water to be put into storage during next year's seasonal year. For example, if a reservoir's decreed and physical capacity is 100,000 AF and at the end of seasonal year 1 it contains 60,000 AF, then the carryover would be 60,000 AF for the next year, seasonal year 2. In this situation, a division engineer or water commissioner would limit the amount the owner could divert and store in seasonal year 2 to 40,000 AF (60,000 AF (carry over) + 40,000 AF (diverted) = 100,000 AF (decreed capacity). The 40,000 AF limit would exist even if the owner released water from storage during seasonal year 2 and created additional capacity. In this situation, this additional capacity can only be refilled under free-river conditions since no other storage rights exist.

Decreed versus Physical Capacity

Given the large investment required for reservoir construction, a potential reservoir owner generally receives a decree for a conditional water right to store an amount of water prior to construction. Upon completion of the reservoir, the actual physical capacity of the reservoir may be different from the decreed capacity. This raises the question of whether the physical capacity or the decreed capacity controls the administration of the amount of water that can be stored. If the physical capacity is less than the decreed capacity, then the allowed amount of fill will be based on the physical capacity. For example, when a reservoir is physically full at 50,000 AF but has a decreed capacity of 60,000 AF, the reservoir has reached its one fill at 50,000 AF and cannot fill the additional 10,000 AF later in the season when space becomes available. The difference between the decreed capacity and the lower physical capacity is subject to abandonment (or if conditional,[6] to cancellation for failure to prove diligence)[7] unless the reservoir owner shows intent to make subsequent modifications to enlarge the reservoir to the originally decreed capacity. [8]

Conversely, when physical capacity is greater than decreed capacity, a fill is based on the decreed capacity. To use the additional capacity, the reservoir owner must adjudicate a new water right for the difference, use other foreign water legally available for storage in the reservoir, or hope to fill the difference under free-river conditions.

---

[6] A conditional water right is one in which the amount claimed in the decree has not been put to a beneficial use.

[7] Diligence is the process of showing progress toward putting the conditional water right to beneficial use. Evidence is presented to a water court on the progress made during the current diligence period.

[8] Decreed capacity is the specified storage capacity in a water court decree.

Storable Inflow

Storable inflow is the amount of water physically and legally available for storage in a reservoir under a particular water right. After the beginning of the seasonal year, all storable inflow must be accounted against the storage right in order to protect other water users, whether or not the reservoir owner actually stores the water. This assures junior water right users that they will be able to divert water in the amount and time that they could have if the senior storage right had filled with all water available to it under its storage priority. For example, if a reservoir operator with a decree to store 20,000 AF of water chooses to bypass 5,000 AF of water that they would otherwise have been able to store in-priority, the Division Engineer would consider the 5,000 AF of bypassed water as "storable inflow." Accordingly, the Division Engineer would credit the bypassed water toward the fill of the reservoir and would consider the storage right to be filled when the reservoir physically contains 15,000 AF of water stored under the storage right.

Refill Rights

Some reservoirs in the basin operate under decrees that provide for refill rights. A refill right typically has a later priority than the original storage right; however, if the reservoir owner applied for a refill right in the original application, the owner may have been given a right to store under the same priority of the original appropriation after the reservoir achieves its first fill and capacity becomes available. Available capacity for a refill right in a reservoir is created by evaporative and seepage losses in addition to actual storage releases.

Paper Fill, Including Bookover

A paper fill is an accounting mechanism whereby storable inflow is charged against a storage water right either because the reservoir owner elected not to physically divert or store water under that right or a junior upstream reservoir diverted the storable inflow out of priority. Some examples of paper fill are described below, followed by a discussion of some of the exceptions to the general rule. These are not meant to be exhaustive on this issue, but should provide an understanding of the most typical situations.

- A reservoir may have multiple rights. For example, it may have a senior storage right and a junior storage right for additional decreed uses. If water is stored under the junior right before the senior right is filled, then a paper fill for the amount stored and credited under the junior right will also be charged against the senior storage water right, to the extent that it remains unfilled. Once the senior right is filled (either physically or on paper), the junior right may continue to store under its own priority unless it is (or until it becomes) filled.
- A paper fill is charged against a water storage right when a reservoir cannot be filled to its decreed capacity because of a flood control limitation on storage (unless flood control is a decreed beneficial use) or because of a state engineer storage restriction on the dam.[9]
- A paper fill is charged if sedimentation has occurred that limits the reservoir's physical capacity.
- A paper fill is charged when actual storage in the reservoir includes foreign water that limits the capacity of the reservoir to fill under a senior priority. In this instance, the owner of the senior priority may transfer (i.e "bookover") the foreign water in the reservoir to the senior right at the rate that the senior right would have filled the space taken up by the foreign water.
- A paper fill is charged for any exchange on natural flow into the reservoir for foreign water. For example, assume an on-stream reservoir user exchanges 20 cfs of foreign water into the reservoir by releasing a substitute supply downstream at the same time the user is entitled to fill the reservoir in priority. In this example, the reservoir would be paper filled for the 20 cfs, or approximately 40 AF each day the exchange occurred.

9 According to the 2012 State Engineers Dam Safety Report, there are 20 dams in the basin with restrictions.

Evaporation

Reservoirs are categorized based on their location from a natural stream as either on-channel or off-channel. When a reservoir is constructed on a natural stream bed (on-channel), it causes an increase in losses to the stream system due to the increase in the stream's free-water surface area. When an on-channel reservoir is in-priority and filling, the operator does not have to pay back the stream for this increased loss. However, when the reservoir is not filling in-priority, the operator is required to release stored water to offset the amount of this increased loss to ensure that the total natural flow is passed through the reservoir as if the reservoir did not exist. Usually, the release for this loss is accomplished by lowering the reservoir stage to correspond to the calculated net depletion amount. If daily administration is not practical because of the limited size of a reservoir surface, releases for this loss are often aggregated and made on a monthly rather than daily basis. If more than one water right is in a reservoir or the reservoir contains foreign water, the reservoir owner may specify which type(s) of water to release to account for evaporation.

When predicting the amount of future evaporation to be replaced for an on-channel reservoir, the average gross evaporation (free-water surface) is usually calculated based on average evaporation atlases in the National Oceanic and Atmospheric Association (NOAA) Technical Report NWS 33 and the maximum surface area of the reservoir (unless otherwise decreed). The total gross evaporation estimate from NOAA shall be distributed to all months. The monthly distributions for elevations are shown in Table 2.

Table 2 - Monthly Distribution of Gross Evaporation.

Month	Gross Evaporation as Percent (below 6500 feet)	Gross Evaporation as Percent (above 6500 feet)
Jan	3.0%	1.0%
Feb	3.5%	3.0%
Mar	5.5%	6.0%
Apr	9.0%	9.0%
May	12.0%	12.5%
Jun	14.5%	15.5%
Jul	15.0%	16.0%
Aug	13.5%	13.0%
Sep	10.0%	11.0%
Oct	7.0%	7.5%
Nov	4.0%	4.0%
Dec	3.0%	1.5%

For some reservoirs, a division engineer may require that the owner install a weather station with an evaporation pan to obtain more accurate estimates of evaporation. The reservoir evaporation may be reduced by the amount of effective precipitation occurring on that day. The effective precipitation is the precipitation that would not have contributed to streamflow had the reservoir not been constructed. This reduction of gross evaporation reduces the amount of water released to compensate for the evaporation from the on-channel reservoir.

Seepage

As soon as water stored in a reservoir or in the process of being delivered by a ditch seeps through the bottom or sides of the structure, it is considered waters of the state subject to the prior appropriation doctrine. This applies to water that cannot be "re-used" as well as fully consumable water that is no longer under the dominion and control of the user. A reservoir owner may not recapture seepage water from a reservoir as part of the original storage right unless specifically allowed by decree and may not recapture fully consumable water without dominion and control accounting approved by a division engineer. An appropriator of seepage water cannot require or demand that the seepage continue, as the reservoir or ditch owner is generally allowed to make improvements that may eliminate or reduce the seepage.

Winter Water Storage Program

The Winter Water Storage Program became a reality when the Pueblo Reservoir was completed in 1975. The program had been in the conceptual stage since the 1930s when the Fry-Ark Project was envisioned.

Agricultural users have some of the most senior rights on the river. In winter, they were able to continue diverting water to their fields as long as there was water in the river available to their water rights in priority. The concept was that although crops needed little or no irrigation during winter, water could be stored in the soil underlying irrigated fields. This soil moisture content was important for spring planting and winter wheat. This concept was in place from the 1880s to 1976 when Pueblo Reservoir became available for storing inflows to the reservoir outside the irrigation season. Winter irrigation also prevented junior off-channel reservoirs from diverting in the winter by placing a call on the river.

The concept of the Winter Water Storage Program is that there now is an on-channel reservoir to store water to be released later in the growing season, which allows for better water management by the farming and ranching communities in the Lower Arkansas Valley. The need for a process to fairly divert and divide the amount of water stored under the Winter Water Storage Program was negotiated among water users and resulted in a 1987 decree (84CW179) officially recognizing the Winter Water Storage Program. The decree was granted on November 10, 1990. The Winter Water Storage Program is administered by the DWR Division 2 Office.

The Winter Water Storage Program operates from midnight on November 15 of each year to midnight on March 14 the following spring. Currently, the Division Engineer requires 100 cfs to be passed through Pueblo Reservoir and down the river above the City of Pueblo when possible. Pursuant to the decree, the river call is artificially set at March 1, 1910, which allows non-participants to divert water during the program period (November 15 – March 14), provided they hold water rights senior to that date and will not injure any other water users having senior priorities. There are also some further constraints and modifications in additional agreements and stipulations.

Storage is maintained at Pueblo Reservoir via an agreement with Reclamation. Additional, off-channel storage is allowed in reservoirs as agreed upon, including diversion to storage agreed upon by water users above Pueblo Reservoir. This is also identified in the accounting as described in the section below. Overall, water is stored and released as prescribed by the decree entered in 84CW179.

The flow of the Arkansas River, including the Winter Water Storage Program, is subject to the Arkansas River Compact of 1948. The USACE built John Martin Reservoir on the Arkansas River beginning in 1943 with completion in October 1948 for conservation and flood control purposes. The States of Colorado and Kansas agreed to a federally authorized compact regarding flows on the Arkansas River in 1948. The Winter Water Storage Program allows storage of some water in John Martin Reservoir, and the Compact Administration has approved resolutions permitting use of John Martin for this purpose. The Winter Water Storage Program is operated in compliance with these resolutions and the compact. The winter water allocation for the Winter Water Storage Program is shown in Tables 3 through 7. These tables were taken from the DWR synopsis of the Winter Water Storage Program.

Table 3 - Winter Water Storage Program First 100,000 AF

Direct Flow Participant	Percent of the First 28.8% Stored	Percent of the Overall First 100,000 AF
Bessemer	21.50%	6.19%
Highline	28.87%	8.31%
Oxford	6.96%	2.00%
Catlin	31.72%	9.14%
LA Consolidated	9.57%	2.76%
Riverside	0.46%	0.13%
West Pueblo	0.92%	0.26%
Total	100.00%	28.80%

From midnight on Nov 15 to midnight on Mar 14 direct flow participants receive 28.8% of the first 100,000 AF stored

Table 4 - Winter Water Storage Program First 100,000 AF

Off-channel Storage Participant	Percent of the First 71.2% Stored	Percent of the Overall First 100,000 AF
Colorado Canal System	15.01%	10.69%
Holbrook	11.97%	8.52%
Fort Lyon	19.42%	13.83%
Amity	19.42%	13.83%
Total	100.00%	71.20%

Off-channel storage participants receive 71.2% of the first 100,000 AF stored

Table 5 - Winter Water Storage Program Next 3,106 AF

Amity	2750 AF
Holbrook	356 AF

Next 3,106 AF stored

Table 6 - Winter Water Storage Program Water over 103,106 AF (Direct Flow)

Direct Flow Participant	Percent of the First 25% Stored Over 103,106 AF	Percent of the Overall Water Over 103,106 AF
Bessemer	21.50%	5.38%
Highline	28.87%	7.22%
Oxford	6.96%	1.74%
Catlin	31.72%	7.93%
LA Consolidated	9.57%	2.39%
Riverside	0.46%	0.12%
West Pueblo	0.92%	0.23%
Total	100.00%	25.00%

Any Storage over 103,106 AF direct flow participants receive 25.0% of any water over 103,106 AF

Table 7 - Winter Water Storage Program Water over 103,106 AF (Off-Channel)

Off-channel Storage Participant	Percent of the First 75% Stored Over 103,106 AF	Percent of the Overall Water Over 103,106 AF
Colorado Canal System	17.07%	12.80%
Holbrook	14.05%	10.54%
Fort Lyon	50.88%	38.16%
Amity	18.00%	13.50%
Total	100.00%	75.00%

Off-channel storage participants receive 75.0% of any water over 103,106 AF

Irrigation Improvement Rules

On September 30, 2009, the State Engineer filed the Compact Rules Governing Improvements to Surface Water Irrigation Systems in Basin ("Irrigation Improvement Rules" or "Rules") in the Division 2 Water Court. The Irrigation Improvement Rules are designed to allow improvements to the efficiency of irrigation systems in the basin while ensuring compliance with the Arkansas River Compact, § 37-69-101, C.R.S. (2009). The rules became effective on January 1, 2011. The Rules apply to sprinkler and drip systems installed on or after October 1, 1999.

The State Engineer determined that the improvements to surface water irrigation systems, such as sprinklers and drip systems that replace flood and furrow irrigation or canal-linings that reduce seepage, have the potential to materially deplete the usable waters of the Arkansas River in violation of the Compact and specifically Article IV-D. The Rules provide a process, referred to as a Compact Compliance Plan, for water users who have or will improve their irrigation systems causing a depletion to the Arkansas River. The Compliance Plan allows these water users to maintain historical seepage and return flows using other water sources. The Compact Compliance Plan must be approved annually by the Division Engineer.

2.3 Groundwater Administration

Groundwater is a key component of water supplies in Colorado and the Arkansas Basin. Groundwater is used for municipal, agricultural, industrial, and other uses. Groundwater in Colorado is presumed to be tributary unless shown to be otherwise. Groundwater that is nontributary is water from aquifers that have minimal or no connection with surface waters, as described below.

Colorado's prior appropriation system regulates tributary groundwater. Groundwater other than tributary is defined by Colorado statutes for three additional categories— designated, nontributary, and Denver Basin groundwater.

Groundwater administration in the basin can be grouped into the following topics:

- Tributary Groundwater
- Nontributary Groundwater
- Denver Basin Groundwater
- Designated Groundwater Basins

Tributary Groundwater

Tributary groundwater is groundwater hydraulically connected to a surface stream or alluvium that cannot be appropriated without a well permit from the State Engineer who must find that water is available for appropriation without causing injury to other water rights. If there will be injury to other water rights, the applicant must obtain from the Water Court the approval of a plan for augmentation to replace out-of-priority depletions that result from the pumping of a well. Since the Arkansas River is over-appropriated, no tributary well permits can be issued for nonexempt uses without a plan for augmentation. Exempt uses include household-use-only wells in a single-family dwelling, or domestic wells on parcels of land greater than 35 acres. Both types of wells must have pumps with a capacity of 15 gallons per minutes (gpm) or less.

Tributary well development began in the early 1900s and the number of irrigation wells increased dramatically during the drought of the early 1950s with the introduction of turbine pump technology, along with the availability of electrical power from Rural Electric Associations. The number of large-capacity wells increased until the 1965 Ground Water Management Act was approved by the legislature. This legislation focused primarily on the authority of the Colorado Ground Water Commission but did have a provision in Section 37-90-137 CRS that addressed permits to construct wells outside of designated groundwater basins. This section required that the State Engineer issue a well permit before construction of a well and that there be a finding that the use of the well would not materially injure vested water rights. The State Engineer began restricting the issuance of well permits in over-appropriated basins, including the Arkansas Basin.

In 1969 the legislature approved the Water Right and Determination Act (1969 Act) that dealt with all water rights, including tributary groundwater. The 1969 Act came about in part from the complaints by senior surface water rights in both the Arkansas and South Platte River basins that tributary irrigation wells were reducing stream flow and that the water supply in the streams was declining. The legislature in 1968 authorized two studies by engineering firms to evaluate the impact of the rapid development of wells. Both studies found that there was a correlation with declining stream flow and well development. The 1969 Act required all tributary large-capacity wells to file for adjudication by July 1, 1972 in order to preserve their priority date, with the new division water courts created by the act. The 1969 Act further required the State Engineer to administer the wells once adjudicated in the priority system. Furthermore, the State Engineer could promulgate rules to assist in the administration of tributary wells.

In 1973, the State Engineer promulgated rules for the basin governing the use of tributary wells. These rules limited pumping to 3 days per week; Monday, Tuesday, and Wednesday. The 3 out of 7 operational period could be modified for different days of pumping if approved by the Division Engineer so long as the pumping was restricted to

3 days. The rules were not opposed by the water users, nor were they supported by increased staffing or effectively enforced.

In 1974, the State Engineer attempted to amend the rules to provide for curtailing wells 5 days per week in 1974, 6 days in 1975, and completely in 1976. These rules were challenged, and a trial was held in the Division 2 Water Court. The outcome was that the court decided that the new rules should not be implemented because there had not been sufficient time to evaluate the effectiveness of the 1973 rules. The decision was appealed by the State Engineer to the Supreme Court, which sustained the Water Court disapproval (Kuiper v. Atchison, Topeka, and Santa Fe, June, 1978). The 1973 rules remained in effect until they were amended in 1996 as discussed below.

1994 Measurement Rules and Regulations

As a result of the litigation with Kansas over the Arkansas River Compact that began in 1985 (Kansas v. Colorado, No. 105 original) when the U. S. Supreme Court granted Kansas the right to sue Colorado over the administration of the compact, Colorado had to begin a more stringent administration of tributary wells in the basin. There was a need to have accurate well pumping records so that depletions by the tributary wells could be computed using computer models.

In March 1994, the Colorado SEO adopted "Rules Governing the Measurement of Tributary Ground Water Diversions Located in the Arkansas River Basin" (Office of the State Engineer, 1994); these initial rules were amended in February 1996 (Office of the State Engineer, 1996) and again in November 2005 (Office of the State Engineer, 2005). The amended rules require users of wells that divert tributary groundwater to annually report the water pumped monthly by each well.

The 1994 measurement rules require all tributary wells (except exempt wells) to be measured by a totalizing flow meter or the power conversion coefficient method, or be reported as inactive (not being used). Exempt wells are wells that are exempt from water rights administration and are not administered under the priority system. In most cases, exempt well permits limit the pumping rates to less than 15 gpm (Guide to Colorado Well Permits, Water Rights and Water Administration; DWR September 2012). Examples of exempt wells include household-use only, pre-1972 domestic and livestock wells, monitoring and observation wells, and fire-protection wells.

Annual reporting of the monthly water amounts pumped for the period November 1 to October 31 from wells within the basin meeting the criteria must be reported to the Division Engineer no later than January 31 of the following year.

Totalizing flow meters are required to be re-verified in the field to be in accurate working condition under the supervision of a state certified well tester every 4 years. The power conversion coefficient must be re-verified every 2 years. The legislature supported the implementation of these rules by authorizing 4.5 full time employees (FTE) to enforce the rules.

1996 Ground Water Use Rules and Regulations

In 1996, the original 1973 rules were amended, and are referred to as the 1996 Ground Water Use Rules. These rules apply to all wells except:

- Exempt wells permitted under 37-92-602 C.R.S.
- Wells located within a designated groundwater basin
- Decreed or permitted nontributary wells
- Exposure of groundwater in gravel mining operations
- Wells withdrawing from the Denver Basin, Dakota, or Cheyenne aquifers

These rules were opposed, and a trial was held in 1996 in the Division 2 Water Court. The outcome was that Judge Anderson upheld the rules that were then promulgated and effective in 1996. The legislature also supported the rulemaking by authorizing 9.5 FTEs to enforce the rules.

All wells subject to the rules are required to replace depletions to senior water rights and to Stateline flow. The rules have standard wellhead depletion factors based on the irrigation method so that the stream depletion can be computed using a computer model jointly developed by both states, which is referred to as the HI Model.

The rules require monthly reporting of well pumping so that the depletions associated with the previous month's pumping, as well as the pumping for the prior 240 months, can be computed and replaced in the current month. There are few if any river basins anywhere in the world that have tributary groundwater administered on such a near-real-time basis. When combined with the real time administration of surface water using the SMS, the basin may be the only one of this size so administered anywhere.

The rules in Rule 14 of the Arkansas Use Rules allow the State Engineer to approve annual replacement plans for well users that do not have permanent water rights that can be included in a plan for augmentation approved by the Water Court. The three main well augmentation associations in the basin—Colorado Water Protective & Development Association (CWPDA), Arkansas Ground Water Users Association (AGUA), and LAWMA—all operate to some extent with leased or purchased water for replacing well depletions and therefore have a need to use the replacement plan rather than Water Court-approved augmentation plans. In 2013, the State Engineer approved 12 replacement plans under Rule 14. In 2014, 11 replacement plans were approved.

Augmentation Plans

An augmentation plan is a court-approved plan designed to protect senior water rights, while allowing junior water rights to divert water out-of-priority and avoid State Engineer curtailment orders. Augmentation plans, which are a key part of managing Colorado's water resources, were created in the 1969 Act by the General Assembly.

Augmentation plans allow for out-of-priority diversions by replacing water that junior water right users consume (stream depletions). The replacement water must meet the needs of senior water rights holders at the time, place, quantity, and suitable quality they would expect absent the out-of-priority diversions. For example, a junior water user could pump a tributary groundwater well, even when a river call exists on the stream, by providing augmentation or replacement water to the calling water right. The depletions impacting the stream at a time of call, even if from pumping effects in prior years, must be replaced and this often requires complex accounting of pumping, consumptive use of the pumped water, and the computation of the amount and time of stream depletions.

Augmentation water can come from a variety of legally available sources and is provided in a variety of means. An augmentation plan identifies structures, diversions, beneficial uses, timing, and amount of depletions to be replaced. It also identifies how and when the replacement water will be supplied and how the augmentation plan will be operated. Some augmentation plans use stored water to replace diversions. Others use senior water rights whose use is changed to include augmentation. This has been done in the Lower Arkansas River basin below John Martin Reservoir by LAWMA.

Substitute Water Supply Plans

The State Engineer is allowed to approve substitute water supply plans under certain circumstances while an augmentation plan application is pending in Water Court. A notice of a request to approve the substitute water supply plan needs to be provided to all interested parties so they can provide comments to the SEO.

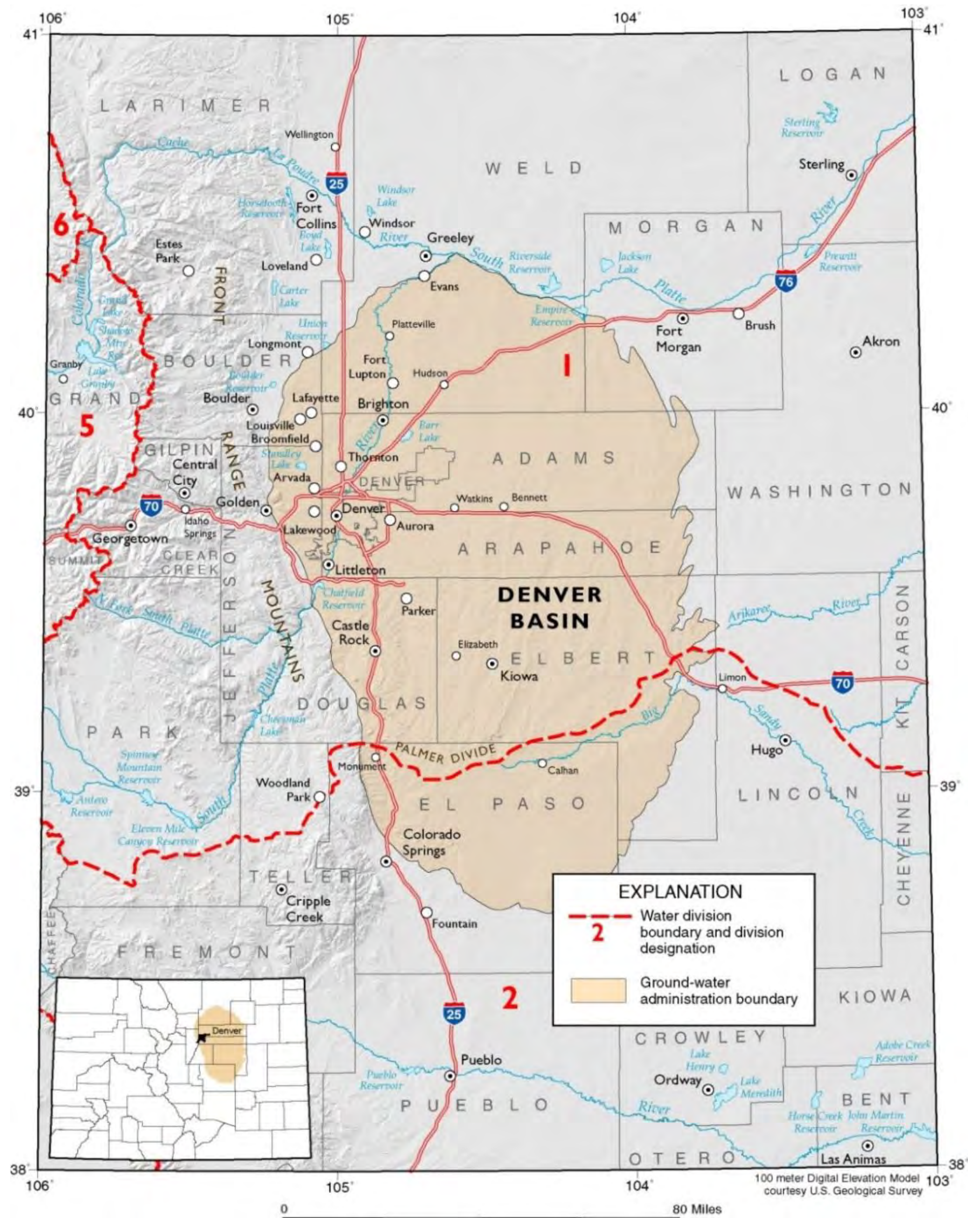
Substitute water supply plans allow temporary out-of-priority diversions if sufficient replacement water can be provided to senior water rights to offset depletions. Substitute water supply plans are approved by the State Engineer for a defined period. Substitute water supply plans differ from augmentation plans, which are long term and must be approved by the water courts. In the Arkansas River basin, approximately 50 to 100 substitute water supply plans are approved per year.

After review, the State Engineer will define the term and conditions of the plan to ensure that the operation of the plan will replace all the out-of-priority depletions in time, location, and amount to prevent injury to other water rights.

Nontributary *Groundwater including the Denver Basin*

The northern portion of the Arkansas Basin overlies the southern portion of the Denver Basin aquifers in northern El Paso and southern Elbert counties (see Figure 12 below). Some water providers in this area rely on the Denver Basin aquifers for their water supplies. These aquifers contain both non-tributary and not non-tributary groundwater. Withdrawing groundwater from the Denver Basin must comply with the Denver Basin Rules as discussed below

. Figure 12 - Denver Basin Extent (Source: CGS – Water Atlas image download)



In 1985, complex legislation commonly known as Senate Bill 5 was enacted to address the allocation and use of the Denver Basin aquifers, as well as other nontributary groundwater aquifers statewide. The rules for the groundwater withdrawal from the Denver Basin aquifers are commonly referred to as the "Denver Basin Rules."

By enacting this legislation, the General Assembly established a policy that made it acceptable to mine the Denver Basin aquifers by withdrawing more water than was being recharged by precipitation. These statutes clarified that nontributary groundwater is groundwater "the withdrawal of which will not, within 100 years of continuous withdrawal, deplete the flow of a natural stream... at an annual rate greater than 1/10th of one percent of the annual rate of withdrawal." This definition applies to all nontributary aquifers, including the Denver Basin. For parts of the Denver Basin not within a designated groundwater basin, the Water Court has the jurisdiction to enter decrees for the use of groundwater. Groundwater withdrawals from the Denver Basin and all nontributary- aquifers are limited so as to provide for a 100year aquifer life, which allows the annual pumping of 1/100th of the available water in the aquifer by the overlying land owner, municipality, or service district.

The Denver Basin Rules implement the provisions of Section 37-90-137 CRS pertaining to the Denver Basin. The rules include maps of the four aquifers in the basin—Laramie–Fox Hills, Arapahoe, Denver, and Dawson—and depict the areas that are nontributary. In these areas, well permits can be granted by the State Engineer without the need for an augmentation plan. The nontributary water can be reused but 2 percent of the water pumped must be replaced in the stream by the user.

For portions of the Denver Basin aquifers that are not nontributary and more than 1 mile from the point of contact of the aquifer with a stream or its alluvium, the statutes require that a water-court-approved plan for augmentation be in place to replace 4 percent of the amount of water annually withdrawn before the well permit is approved.

For portions of the Denver Basin aquifers within 1 mile of the contact of the aquifer with a stream or its alluvium, the augmentation plan must replace actual depletions.

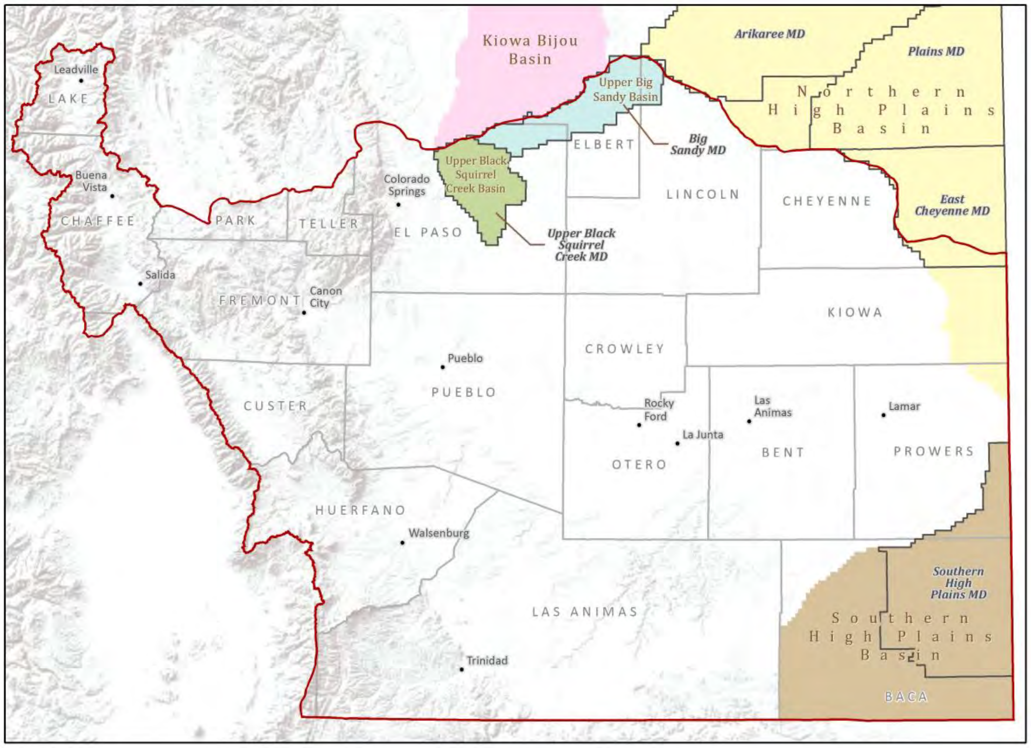
The Dakota formation underlies some areas of the basin and, depending on the conditions, some of the Dakota formation contains groundwater that meets the definition of nontributary groundwater. The remainder of the formation would contain tributary groundwater, and new appropriations would not be approved without a water-court-approved plan for augmentation.

Designated Groundwater Basins

There are four designated groundwater basins in the Arkansas Basin (see **Figure 3)**. They are:

- Upper Big Sandy
- Upper Black Squirrel Creek
- Southern High Plains
- Northern High Plans (small portion)

Figure 3 - Designated Basins



Administration of the designated groundwater basins is under the jurisdiction of the Colorado Ground Water Commission and is not administered by the State Engineer. The State Engineer provides technical and staff support to the Ground Water Commission. The General Assembly has granted the Ground Water Commission authority under Title 37, Article 90 of the Colorado Revised Statutes (Ground Water Management Act) to grant water rights and issue large-capacity well permits. Small-capacity wells are administered by the State Engineer. Small capacity wells are intended for domestic use, livestock, and small commercial operations. These wells are limited to a maximum pumping rate of 15 gpm and no more than 1 acre of lawn and garden irrigation (Guide to Colorado Well Permits, Water Rights and Water Administration, Sept 2012).

Designated groundwater is groundwater that in its natural course would not be available to and required for the fulfillment of decreed surface rights, or groundwater in areas not adjacent to a continuously flowing natural steam wherein groundwater withdrawals have constituted the principal water usage for at least 15 years. It is applicable to the groundwater underlying the eight "designated basin" areas created by the Colorado Groundwater Commission, located on Colorado's eastern plains.

Thirteen ground water management districts (GWMD) have been created pursuant to local elections and state statutes. The GWMDs are authorized to adopt additional rules and regulations to assist in administration and management of groundwater within their district.

The GWMD rules for GWMDs in the basin can be found on the Colorado DWR website:

- Upper Big Sandy - https://drive.google.com/file/d/1aH--fp732s8cxaCJBbqY2gw1kORh7MKG/view
- Upper Black Squirrel Creek - https://drive.google.com/file/d/1ek8QeHj22Y6IEIb9pBjle9ebGnx6G6_l/view
- Southern High Plains - https://drive.google.com/file/d/17jwp53YM9bXEwwXvWczQ4jOJynFl7d7-/view
- Northern High Plains - https://drive.google.com/file/d/1nsMMokWIQo1aXHFkp6SJZNu3OdLmdINw/view

These rules and regulations approved by the specific GWMDs address items such as the removal of groundwater from the district, well spacing, annual appropriations, land to be irrigated, and compliance.

*Produced N*ontributary *Groundwater from Oil and Gas Operations*

The Colorado DWR has promulgated rules for produced non-tributary groundwater from oil and gas operations. These rules were made final in the "Produced Nontributary Ground Water Rules (2 CCR 402-17). The purpose of these rules is to assist the State Engineer with the administration of dewatering of geologic formations by withdrawing nontributary groundwater to facilitate mining of oil and natural gas.

Groundwater in Colorado is legally presumed to be "tributary or hydrologically connected to the surface water system requiring administration within the prior appropriation system in conjunction with surface rights, unless it is demonstrated to be nontributary groundwater in accordance with the law. As part of these rules, Rule 17.7.D. identifies geographically delineated areas under which groundwater in specified formations is nontributary for the limited purpose of the rule. These maps are available on the DWR website (water.state.co.us).

A petition for a Determination of Nontributary Groundwater can be submitted if the area and formation has not been previously determined to be nontributary. The petition must demonstrate via a numerical groundwater model or alternate methodology that the groundwater being produced is nontributary.

These rules do not apply to any aquifer or portion thereof that contains designated groundwater and is located within the boundaries of a designated groundwater basin.

In addition, tributary-produced groundwater from oil and gas operations are required to have a well permit and operate in accordance with a plan for augmentation or substitute water supply plan that replaces depletions to affected streams.

2.3.1 Summary and Challenges

Water rights administration is complex, but particularly so in the Arkansas Basin, where the interstate compact with the State of Kansas and subsequent lawsuits have put additional requirements on both water users and the DWR. The level of scrutiny for changes in any attribute of a historic water right, including timing, replacement of return flows, and place of use, make water rights administration particularly difficult, and represent a challenge to meeting the needs of the basin for both consumptive and non-consumptive uses.

SECTION 3. BASIN OPERATIONS

This section describes the water supply systems of major water providers and users, and the related infrastructure, programs, and operations that are central to the water supply picture for all basin users. Specific information on water demand and supply is presented in the updated needs analysis described in Appendix A: *Arkansas Basin Current and 2050 Planning Scenario Water Supply and Gap Revised Results*.

3.1 Identification of Major Users

A list of major users, infrastructure, and programs that are significant diverters in the Arkansas Basin was compiled and used as a framework for the information on current basin operations presented in this section. This list was based on knowledge of the Basin and several sources, including Arkansas River straightline diagrams, SWSI reports, the 1985 USGS basin operations report (USGS 1985), and data provided by the DWR Division 2 office. Selection criteria included not only overall water use amounts, but impacts and interplay with other basin users, including potential future projects or changes. It is not intended to be an exhaustive list of all water users in the basin.

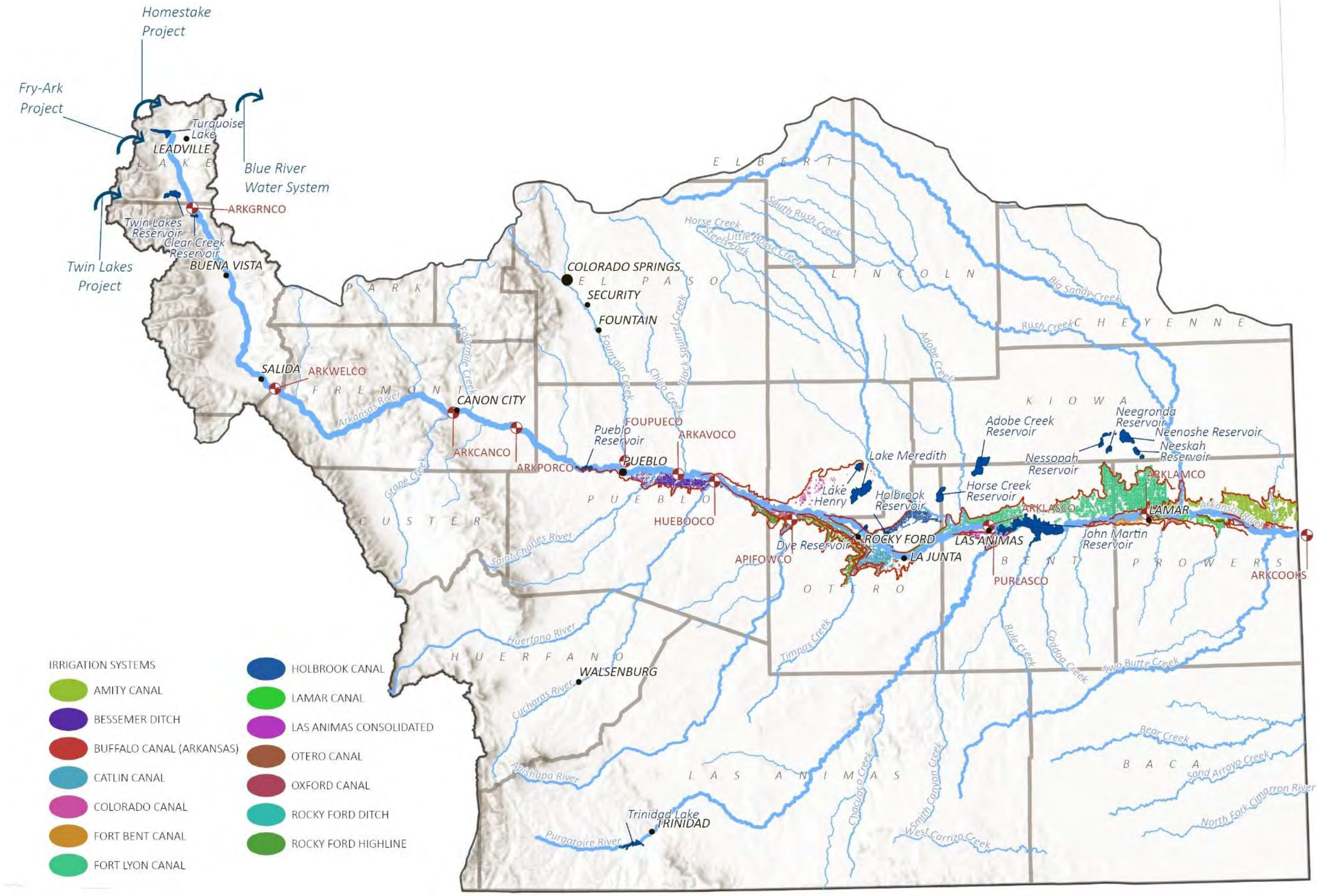
The major users described in this report are as listed below and shown in Figure 4. Figure 4 also shows key gage locations, consistent with the CWCB Hydrology Streamflow Analysis Tool memo and as shown in Table 8. There are numerous stream gages in the basin that could have been included but some did not have adequate period of record or had significant data gaps. The selected gages provide good-quality date and period of record, and are at what are viewed as key locations to represent overall basin hydrology.

Table 8 - Major Gages in the Arkansas Basin

Gage Name	USGS Gage ID	DWR Gage ID
Arkansas River at Cañon City	07096000	ARKCANCO
Arkansas River at Las Animas	07124000	ARKLASCO
Arkansas River at Lamar	07133000	ARKLAMCO
Arkansas River near Coolidge, KS	07137500	ARKCOOKS
Arkansas River at Granite	07086000	ARKGRNCO
Arkansas River near Wellsville	07093700	ARKWELCO
Arkansas River near Avondale	07109500	ARKAVOCO
Arkansas River at Portland	07097000	ARKPORCO
Fountain Creek at Pueblo	07106500	FOUPUECO
Huerfano River near Boone	07116500	HEUBOOCO
Apishapa River near Fowler	07119500	APIFOWCO
Purgatoire River near Las Animas	07128500	PURLASCO

Cities and Municipalities	• Leadville • Buena Vista • Salida • Cañon City • Pueblo • Rocky Ford • La Junta • Las Animas • Lamar	• Colorado Springs • Walsenburg • Trinidad • Fountain • Security • Widefield • Aurora
Irrigation Systems	• Bessemer Ditch • Rocky Ford Highline Canal • Colorado Canal • Oxford Farmers Ditch • Otero Canal • Catlin Canal • Holbrook Canal • Rocky Ford Ditch • Fort Lyon Canal and Fort Lyon Storage Canal	• Las Animas Consolidated Ditch • Keesee Ditch • Amity Canal and Kicking Bird Canal for Great Plains Reservoirs Storage • Fort Bent Canal • Lamar Canal • X-Y Irrigating Canal • Buffalo Cana
Reservoirs	• Twin Lakes Reservoir • Turquoise Reservoir • Clear Creek Reservoir • Pueblo Reservoir • John Martin Reservoir • Trinidad Reservoir • Colorado Canal Reservoirs – Lake Meredith – Lake Henry	• Holbrook Canal Reservoirs – Holbrook Reservoir – Dye Reservoir • Fort Lyon Canal Reservoirs – Horse Creek Reservoir – Adobe Creek Reservoir • Great Plains Reservoirs serving the Amity Canal
Transmountain Systems	• Fry-Ark Project • Twin Lakes Project	• Homestake Project • Blue River Project
Industrial Water Users	• EVRAZ (formerly Colorado Fuel and Iron Company [CF&I])	• Comanche Power Plant
Groundwater Augmentation Associations	• AGRA	• LAWMA
Exchanges	• To Turquoise Reservoir • To Twin Lakes Reservoir • To Clear Creek Reservoir	• To Pueblo Reservoir • Holbrook Canal exchanges • Colorado Canal exchanges
Other Programs	• Voluntary Flow Management Program for Upper Arkansas River • Flow Management Program for Arkansas River below Pueblo Reservoir	• Winter Water Storage Program at Pueblo Reservoir

Figure 4. Arkansas Basin Overview



3.2 Basin Operations Summary

This section describes each of the major users identified above.

3.2.1 Cities and Municipalities

Municipal systems tend to be some of the most complicated water supply systems, combining water from several sources and locations. In the Arkansas Basin, groundwater augmentation requirements add an additional level of complexity to this system. Some descriptions of municipal systems include information from various reports; however, most rely primarily or wholly on interviews with personnel at each individual entity. Information provided in those interviews has generally not been verified by a second source.

Leadville

The City of Leadville is supplied by the Parkville Water District. The district uses a combination of groundwater and surface water supplies. The primary surface water source is a water right in Evans Creek, east of Leadville. The Evans Creek water right is original to Parkville and is very senior, dating back to 1860, and is for just over 10 cfs. It is primarily used as direct use, but Parkville does have about 300 AF of storage in three reservoirs.

For groundwater supplies, Parkville owns three well fields. One is on the Arkansas River and the other two are east of Leadville. The Arkansas River well field has augmentation requirements due to a change in the point of diversion. Pumping from this well field is augmented with a combination of a 1.5-cfs water right transferred from the Stevens & Leiter Ditch and a portion of the Iowa Gulch rights owned by Parkville.

The Iowa Gulch water right is for 11.4 cfs of direct use and dates to 1860. The portion of the right not currently used for augmentation is not currently active but could be used in the future to meet additional future water needs.

Buena Vista

Currently, Buena Vista is supplied completely by groundwater supplies. They own a 1,000-gpm surface water treatment plant, but it is currently not in regular use, although it can be placed into service as an emergency supply. Groundwater comes from an infiltration gallery and a municipal well. There is an additional small (0.1 cfs) well used to supply the rodeo grounds when in use. The infiltration gallery is the primary source of supply, is nontributary, and does not require augmentation. The well is currently used in the summer only to supplement the infiltration gallery supplies during peak demand, so overall augmentation needs are small. The municipal well has been operated under a substitute water supply plan, wherein Buena Vista can use rights the town owns on Cottonwood Creek for augmentation, as well as Fry-Ark water when the town's rights are not in priority. However, they have a more recent agreement with the Upper Arkansas Water Conservancy District (UAWCD) to provide augmentation water for the city. The town has also permitted a new well for park irrigation with raw water.

Salida

The City of Salida is supplied by a combination of surface water and groundwater. Surface water rights include several Arkansas River Ditch rights (i.e., Herrington Ditch, the Tennessee Ditch, and the Champ Ditch) converted from agricultural to municipal use. They also have two junior groundwater rights. The groundwater rights are augmented with excess surface water rights.

Salida has 295 AF of storage in North Fork Reservoir in addition to an "if-and-when" leased space account in Pueblo Reservoir. From April through October, Salida stores excess water credits in Pueblo Reservoir. From November through March, they make releases from storage to meet groundwater lagged depletion augmentation requirements and meet historical agricultural return flows from their converted ditch rights.

Cañon City

The City of Cañon City is supplied entirely by direct flow surface water rights from the Arkansas River. The direct flow water rights include:

- An 1864 right original to Cañon City Water Works
- Shares of the Cañon City Hydraulic & Irrigating Ditch Company
- A portion of the Frank Mayol Ditch right

Although Cañon City does not have any of its own surface water storage, it does have an allocation of Fry-Ark water in Pueblo Reservoir through participation in SECWCD. This water is released from Pueblo Reservoir and is diverted by exchange from the Arkansas River at the town's point of diversion.

Pueblo

The PBWW supplies drinking water to the City of Pueblo from surface water sources, including a combination of native and transbasin water supplies. Native supplies include original Pueblo municipal rights dating to 1874, as well as converted agricultural water from the Hobson, West Pueblo, Booth Orchard, and Bessemer ditches. Transbasin supplies include the Busk-Ivanhoe system (shared equally with Aurora), the first 2,500 AFY from the Homestake Project, a 10 percent share of Fry-Ark water, Ewing Ditch, and Wurtz Ditch. The City owns about 23 percent of The Twin Lakes Reservoir and Canal Company (TLCC), which includes native water, transbasin water from the Independence Pass Transmountain Diversion System, and storage rights in Twin Lakes Reservoir.

PBWW can store water in Clear Creek Reservoir (owned by PBWW), Pueblo Reservoir, Twin Lakes Reservoir, and Turquoise Reservoir (owned by the U.S. Bureau of Reclamation [Reclamation]).

PBWW reuses return flows from transmountain sources by exchange. Generally, flows are exchanged from the wastewater treatment plant into Pueblo Reservoir, but they can also be exchanged to other storage and intake locations in PBWW's system. They also exchange Ewing, and Wurtz ditches' transmountain inflows into Turquoise, Twin Lakes, and Clear Creek reservoirs for storage.

PBWW's primary surface water intake is a pipeline from Pueblo Reservoir completed in 2002. They can also divert water at the old North Side and South Side river intakes. It also owns Comanche Pump Station, which supplies PBWW water to the Comanche Generating Station owned by Xcel Energy. In addition, the Blacks Hills Energy power plant is entirely municipally supplied by PBWW.

Several of the projects in which PBWW participates are described elsewhere in this report, including the Fry-Ark, Twin Lakes, and Homestake projects; the VFMP, and the Flow Management Program for Arkansas River below Pueblo Reservoir.

Rocky Ford

The City of Rocky Ford is supplied by a combination of surface water and groundwater rights. In addition to three wells, it owns shares in the Rocky Ford and Catlin Canal ditch companies. Water is diverted through the original ditch headgates and then conveyed from the ditch to Rocky Ford. The city uses a combination of the Rocky Ford Ditch and Catlin Canal water and Fry-Ark water released from Pueblo Reservoir to meet groundwater augmentation requirements and match historical agricultural return flows from the converted agricultural water.

In dry years in the past, Rocky Ford has leased additional water from the Fry-Ark Project, the City of Aurora, or other entities in the basin.

La Junta

The City of La Junta is entirely supplied by 11 alluvial groundwater wells. Augmentation sources include Fry-Ark Project water purchased through SECWCD.

Florence

Florence is supplied completely with surface water rights. They have rights on Adobe, Minnow, and Newlin creeks, as well as on the Arkansas mainstem. The Arkansas mainstem water comes from Union Ditch (which gets its water via the Minnequa Canal). All surface water rights are sent to one of its four reservoirs–South Reservoir 1 and 2 and North Reservoir 1 and 2–which total about 580 AF of surface water storage. In the summer irrigation season, about 1 million gallons per day is released directly from Union Ditch to a local golf course irrigated with raw water. They also have a small allocation of Fry-Ark Project water.

Florence also supplies water to several other communities. East Florence does not have its own water supply at this time, and purchases water from Florence. The water provided to East Florence is included in the water rights described above. Florence also pumps water to three other communities–Coal Creek, Williamsburg, and Rockvale. These communities are using infrastructure owned by Florence to convey their own water rights; their water supplies are not included in Florence's rights described above.

Las Animas

The City of Las Animas is 100 percent reliant on groundwater supplies. It meets augmentation obligations by buying return flows through SECWCD and by participation in CWPDA.

Lamar

The City of Lamar is 100 percent reliant on groundwater supplies. The majority of its wells are in the Clay Creek alluvium, with some in the Dakota and Cheyenne Creek alluviums. The City recharges the Clay Creek alluvium using converted agricultural ditch water from a portion of the Fort Bent ditch and shares of the Lamar Canal. This water is brought to the Clay Creek Recharge Area for recharge. The City also participates in LAWMA for additional augmentation of groundwater depletions.

Colorado Springs

Colorado Springs Utilities relies primarily on surface water, drawing from a number of different sources, including original, local water rights; transbasin projects (including several shared regional projects); and water rights converted from agricultural to municipal use. Water is collected from these various sources and conveyed to five potable water treatment plants.

Colorado Springs Utilities also has a non-potable water system used for irrigating municipal parks and residential lawns. The system uses raw supplies from several of the sources outlined below, and includes a reuse system that treats wastewater effluent.

The following is a summary of Colorado Springs Utilities' regional and transbasin water supply systems.

- South Slope of Pikes Peak
  - This system collects water from the south slope of Pike's Peak. Water is collected and stored in the South Slope system and transported into the Arkansas Basin via the St. John's Tunnel, where it is stored in Morraine Reservoir (1,323 AF) and Big Tooth Reservoir (277 AF) before being sent to the Mesa Water Treatment Plant for treatment and distribution.
- North Slope of Pikes Peak
  - Colorado Springs Utilities operates three reservoirs on the north slope of Pike's Peak: Crystal Reservoir (3,523 AF), North Catamount Reservoir (12,030 AF), and South Catamount Reservoir (2,604 AF). Water can be treated at the Ute Pass Treatment Plant, the Mesa Water Treatment Plant, or can be transferred to the Northfield system (see below) for treatment at the Pine Valley Treatment Plant. Blue River water is also stored and conveyed in this system, as described below.
- Northfield Water System
  - The Northfield water system includes Nichols Reservoir (586 AF), Northfield Reservoir (276 AF), and Rampart Reservoir (40,871). Water from several other Colorado Springs Utilities water supply systems

makes up a substantial portion of supplies stored in the Northfield water system, including water from the Blue River Project, North Slope of Pikes Peak system, Homestake Project, Twin Lakes Project, Fry-Ark Project, Colorado Canal, and exchange water via the Otero pump station. Water is treated at the Pine Valley Treatment Plant or the McCullogh Treatment Plant.

- Blue River Water System
  - Water is collected in the Blue River Basin on the West Slope and transferred to Montgomery Reservoir (5,699 AF) via the Hoosier Tunnel. From there the water is conveyed to the North Slope water system via the Blue River pipeline. The water can also be sent to the Northfield water system via the Twin Rocks pump station.
- Homestake Project
  - The Homestake Project is a joint effort with Aurora, with each party sharing equal costs and receiving half the water. Water from the Eagle River Basin on the West Slope is stored in Turquoise and Twin Lakes reservoirs. The Colorado Springs Utilities share is ultimately conveyed to the North Slope and Northfield systems via the Otero and Twin Rock pump stations. These supplies can flow down the Arkansas River mainstem to Pueblo Reservoir to be taken through the Fountain Valley Authority (FVA) pipeline.
- Twin Lakes Project
  - Colorado Springs Utilities is a major shareholder in TLCC. The TLCC supply comes primarily from a Colorado River Basin collection system via the Twin Lakes Tunnel, also known as the Independence Pass Tunnel. Imported water is stored in Twin Lakes Reservoir. From there, the Colorado Springs Utilities supply is conveyed to the Northfield and North Slope watershed systems with the Otero pump station. Water supplies can also flow down the Arkansas River mainstem to Pueblo Reservoir to be taken through the FVA pipeline, or delivered through the Southern Delivery System.
- Fry-Ark Project
  - The Fry-Ark Project brings water from the Colorado River Basin into Turquoise, Twin Lakes, and Pueblo reservoirs in the Arkansas Basin. Colorado Springs Utilities supply is generally taken from Pueblo Reservoir via the FVA pipeline to the Fountain Valley water treatment facility. Supplies can also be taken from Twin Lakes via the Otero pump station.
- Colorado Canal
  - Colorado Springs Utilities owns controlling shares in the Colorado Canal Company, the Lake Meredith Reservoir Company, and the Lake Henry Reservoir Company. The Colorado Canal is an agricultural ditch company that historically diverted water from the mainstem of the Arkansas upstream of Boone, Colorado. The Colorado Canal supplies Lake Meredith and Lake Henry. Water rights associated with these companies are exchanged to Pueblo Reservoir and conveyed to Colorado Springs via the FVA pipeline and treatment plant, or exchanged to Twin Lakes or Turquoise Reservoir and conveyed to Colorado Springs via the Otero pump station. Exchanges can be made by release from Lake Meredith (Lake Henry released to Lake Meredith).

Colorado Springs Utilities also has a number of local water supplies systems, as summarized below.

- Rosemont Water System
  - This system diverts from Gould and East Beaver creeks. It is primarily used for non-potable irrigation use but can be stored in the South Suburban and Gold Camp reservoirs and treated at the Mesa Water Treatment Plant.
- South Suburban Water System

- The South Suburban water system collects water from North Cheyenne Creek water. The water is stored in South Suburban or Gold Camp reservoirs and treated at the Mesa Water Treatment Plant.
- Fountain Creek
  - Water is conveyed from the 33rd Street pump station and intake to the Mesa Water Treatment Plant. The water includes Fountain Creek and Sutherland Creek rights.
- Pikeview Reservoir
  - Monument Creek water is diverted into Pikeview Reservoir. This system is used primarily for non-potable uses, but water can also be sent to the Mesa Water Treatment Plant for treatment and distribution.

Colorado Springs Utilities also makes significant use of return flows from its transbasin supplies. These return flows are discharged to Fountain Creek and exchanged up to other storage locations in the Arkansas Basin. Some transbasin return flows are also treated and used as a supply to Colorado Springs Utilities' non-potable system.

In addition to accounts in Pueblo, Turquoise, and Twin Lakes reservoirs, Colorado Springs Utilities has a number of smaller reservoirs within its own collection systems, as indicated in each system's description above. In addition, Colorado Springs Utilities has storage in Turquoise Reservoir purchased from CF&I (now EVRAZ), and uses storage in the excess capacity storage program in Pueblo Reservoir.

Colorado Springs Water Sharing Program was started in 2013 to develop additional water supplies in the Lower Arkansas Valley for the city while also helping agriculture realize more stable water supplies. The Program has since implemented several projects that have included purchasing additional water storage and new water supply for a well augmentation company, helping young farmers purchase a farm and install center pivot irrigation, and participation in a CWCB Pilot Project with the Super Ditch Company. It is based on the concept that all uses of water are important and that solutions involving agriculture must be mutually beneficial.

Walsenburg

Walsenburg is supplied entirely by surface water. The city diverts water from the Cucharas River and Wahatoya Creek. This water can be stored in Wahatoya Lake, Daigre Lake, and Walsenburg Reservoir before treatment and distribution. Total storage in these three water bodies is about 850 AF. As a secondary supply, the City also owns storage rights in Lake Miriam and Lake Oehm (also known has Horseshoe Lake and Martin Lake, respectively). These lakes are supplied from the Cucharas River by a separate ditch.

Trinidad

Trinidad is supplied entirely by surface water. The City's primary supply is water from The North Fork of the Purgatoire River, which can be stored in the 4,315-AF North Lake, along with a small amount of water from Coal Creek. As a secondary supply, water can be stored in Monument Lake from the North Fork of the Purgatoire River as well as the tributaries Brown Creek, Whiskey Creek, and Cherry Creek.

Fountain

About 70 percent of Fountain's water supply is Fry-Ark Project water through membership in the FVA, with the remaining 30 percent coming from nine alluvial wells. Fry-Ark return flows are the primary source of augmentation water, with additional augmentation supplies coming from ownership in two agricultural ditches: Chilicott Ditch and the Fountain Mutual Irrigation Company (FMIC).

Security

Security is supplied by a mix of surface water and groundwater. In addition to 24 wells providing groundwater supply, Security is a member of the FVA. Augmentation for groundwater use is a combination of Fry-Ark return flows and shares from the FMIC, Chilcotte and Locke agricultural ditches in the Fountain Basin. Share ownership in FMIC also includes storage space in Big Johnson Reservoir. In addition to space in Pueblo Reservoir allotted to Security as a Fry-Ark Project participant, Security may participate in SECWCD's excess capacity storage program in Pueblo Reservoir once a master contract for storage is completed with the Bureau of Reclamation.

Widefield

Widefield is supplied by a mix of surface water and groundwater. Over half of Widefield's supply comes from alluvial wells in the Widefield aquifer, with the remainder coming from Fry-Ark Project supplies through membership in the FVA.

Aurora

Although the City of Aurora is not located within the Arkansas Basin, Aurora has several water supply sources within the basin. Aurora has 50 percent ownership in the Homestake Project (although the first 2,500 AFY of Aurora's supply goes to PBWW by agreement), a 50 percent share in the Busk-Ivanhoe system, 50 percent share of the Columbine Ditch, and 5 percent ownership in TLCC. It also owns shares in the Colorado Canal and the Rocky Ford Ditch. Aurora's water is delivered to the South Platte Basin via the Otero pump station, which delivers Aurora's water from Twin Lakes Reservoir to Spinney Mountain Reservoir.

Aurora's Homestake Project water is delivered to the basin for storage in Turquoise Reservoir and can be released to Twin Lakes Reservoir for delivery to the Otero pump station intake. The Busk-Ivanhoe system delivers water from Ivanhoe Creek in the Colorado Basin, through the Busk-Ivanhoe tunnel, and ultimately into Turquoise Reservoir. The Colorado Canal water can be taken through the Colorado Canal headgate and stored in Lake Henry and Lake Meredith, then released to the river for exchange up to Pueblo Reservoir when exchange potential is available. The Rocky Ford Ditch system does not include storage, and water rights are exchanged directly into Pueblo Reservoir. From Pueblo Reservoir, Aurora can exchange the water higher up in the basin for ultimate diversion at Otero pump station.

Fountain Valley Authority

The FVA is a joint entity of Colorado Springs, Fountain, Security, Widefield, and Stratmoor Hills. It was established to manage shared infrastructure, including a pipeline and a water treatment plant, to convey Fry-Ark Project water supplies from Pueblo Reservoir to participating municipalities. The FVA has 78,000 AF of storage in Pueblo Reservoir and a pipeline with a capacity of 30.6 cfs. The Fountain Valley Conduit is a feature of the Fry-Ark Project built to deliver water for M&I use that is managed by the FVA. The conduit begins at Pueblo Dam and passes through five pumping plants traveling about 45 miles north to deliver approximately 20,000 AFY to FVA participants.

3.2.2 Industrial Users

There are two major industrial water users in the Arkansas Basin, as summarized below.

Xcel Energy – Comanche Generating Station

The Comanche generating station is a coal-fired steam-electric generation facility near the City of Pueblo, owned and operated by Xcel Energy. Electricity is produced using coal boilers to produce superheated steam, which is run through a turbine. The steam is then cooled (using either air or water in cooling towers) and the water is recirculated through the plant to be heated into steam again. The primary water use of the facility is water for the cooling system, with small amounts used to fill the boilers or treated onsite for potable uses.

The facility relies on surface water supplies. Xcel Energy owns more than 750 shares of TLCC and provides a share of Independence Pass Tunnel imports that can be stored in Twin Lakes Reservoir. It also has a long-term contract with PBWW for use of surface water rights owned by PBWW. Water from either source is conveyed to the generating station via a pipeline from the Comanche pump station below Pueblo Reservoir. The pump station is owned and operated by PBWW.

A third power generation unit went into service in 2009, which added significant electrical generation capacity. The unit's hybrid cooling system uses air cooling when possible and supplements with water cooling as needed.

About 83 percent of the water is consumptive use, with return flows sent to the St. Charles River.

EVRAZ Pueblo (CF&I)

EVRAZ Pueblo, formerly known as CF&I or the Colorado Fuel and Iron Company, is a steel mill located in the City of Pueblo along Salt Creek. Historically, CF&I held direct flow rights on the Arkansas mainstem as well as the St. Charles River, and additional water rights from Lake Fork, Tennessee Fork, and East Fork in the upper basin that could be stored in Turquoise Reservoir (the latter two by exchange).

CF&I was the original owner of Turquoise Reservoir, originally known as Sugarloaf Lake. When Reclamation purchased the lake for expansion of the Fry-Ark Project (at which point the lake was renamed), CF&I retained ownership of 17,416 AF of storage and the option to lease an additional 10,000 AF from Reclamation. In addition to storage in Turquoise, CF&I held three smaller reservoirs in the Salt Creek Basin: Reservoir No. 2 and Reservoir No. 3, as well as Lake Minnequa (Reservoir No. 1), used only as a standby supply.

About 85 percent of the surface water supplies to the plant were supplied from the mainstem of the Arkansas River via the Minnequa Canal, with the remainder delivered from the St. Charles River through the St. Charles Flood Ditch.

CF&I fully consumed about 20 percent of its water supplies, with the remainder treated and returned to Salt Creek.

3.2.3 Irrigation Ditches

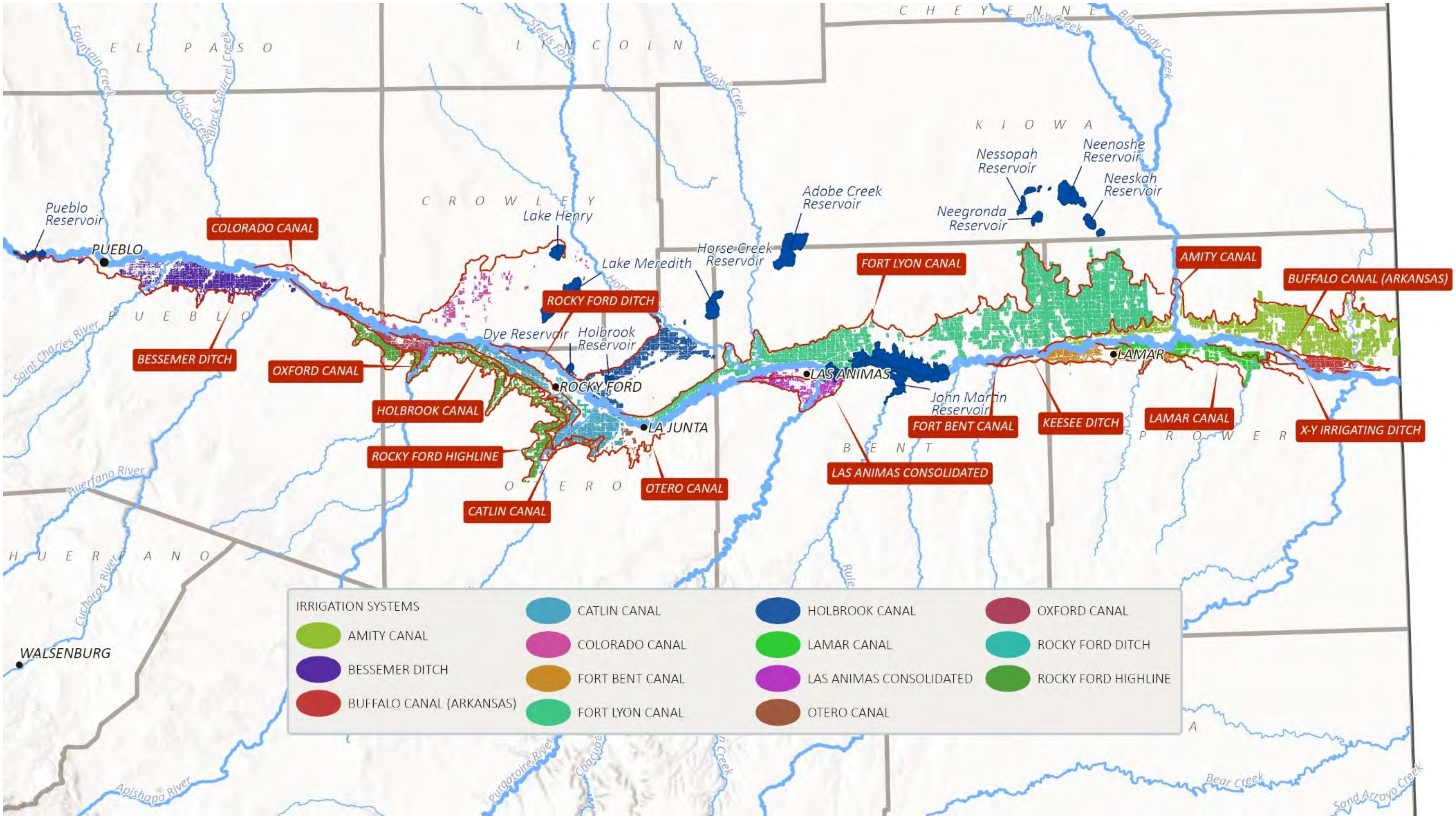
All the major agricultural ditch systems in the Arkansas Basin discussed in this report have historically diverted water from the mainstem of the Arkansas River below Pueblo Reservoir. Several have transbasin supplies in addition to native rights. Many systems now have significant ownership by municipal entities that have converted the water rights for municipal use and now use them either as surface water supplies or to augment groundwater supplies. In addition to the surface water supplied by these ditches, there is significant groundwater use for irrigation, along with storage facilities. The following is a brief description of each of the major agricultural ditches. The canals and irrigated acreage are shown on Figure 5.

- **Bessemer Ditch** has an outlet in the Pueblo Dam and irrigates acreage southeast of the City of Pueblo and supplies water to the St. Charles Mesa Water District for municipal use through shares that have been changed to municipal use. PBWW has purchased a significant number of shares of the Bessemer Ditch and is leasing the water back to irrigators until it is needed to meet future municipal demands.
- **Rocky Ford Highline** diverts near the confluence with the Huerfano River.
- **Colorado Canal** diverts from the river above the confluence with the Huerfano River. Major surface water storage includes Lake Henry and Lake Meredith. A significant portion of the shares of Colorado Canal and shares of Lake Henry and Lake Meredith (which are separate) have been converted to municipal use.
- **Oxford Farmer's Ditch** diverts below the confluence with the Huerfano River.
- **Otero Canal** diverts above the Apishapa River.
- **Catlin Canal** diverts from just below the Apishapa River confluence.
- **Holbrook Canal** diverts near Manzanola. Major storage includes Holbrook Reservoir and Dye Reservoir.
- **Rocky Ford Ditch** diverts below Manzanola but above the City of Rocky Ford.
- **Fort Lyon Storage Canal and Fort Lyon Canal**
- The Fort Lyon Storage Canal headgate is near the Holbrook Canal headgate and supplies Horse Creek Reservoir (also known as Timber Lake) and Adobe Creek Reservoir (also known as Blue Lake). No land is irrigated directly from the Fort Lyon Storage Canal. The two reservoirs release to the Fort Lyon Canal for irrigation. The Fort Lyon Canal has a separate headgate downstream, near La Junta.
- **Las Animas Consolidated Ditch** diverts about 8 miles upstream of the City of Las Animas. The system includes the Highland Ditch and the Las Animas Consolidated Extension. The Las Animas Consolidated Canal becomes

the Las Animas Consolidated Canal Extension on the east side of the Purgatoire River. The Highland Ditch, with the headgate located on the Purgatoire River above the City of Las Animas, delivers water into the Las Animas Consolidated Ditch. LAWMA purchased a majority of the shares of the Highland Ditch in the 1990s and changed the use to augmentation in its augmentation plan. The irrigated land was dried up as part of the plan. The downstream portion of this ditch is known as the Las Animas Consolidated Extension. This ditch was purchased by Xcel Energy's predecessor, Public Service Company of Colorado, in the 1980s and the use changed to include industrial uses. It was intended to supply a proposed thermoelectric power plant near Las Animas that was never constructed. The water is leased back to farmers for irrigation use.

- **Keesee Ditch** shares a diversion dam with the Fort Bent Canal, about 4.5 miles downstream of the John Martin dam. This ditch was purchased by LAWMA for groundwater augmentation use.
- **Amity Canal** diverts from the Arkansas mainstem about 8 miles below the John Martin Dam. In addition to the mainstem headgate, the Amity Canal can divert from Big Sandy, Big Bend, Gould's, and May Valley creeks. Major storage includes the four Great Plains reservoirs—Nee Gronda (Big Water), Nee Skah (Queens), Nee So Pah (Black Water), and Ne Noshe (Standing Water). The Amity Canal Company also has an agreement to store some Great Plains water in John Martin Reservoir. About one-half of the shares in the Amity Canal were purchased by Tri-States Power for a proposed thermoelectric plant near Holly. The use has been changed but the plant has not been constructed, and the water is being leased back to the farmers.
- **Kicking Bird Canal** receives water from the Fort Lyon Canal for delivery to the Great Plains Reservoir system. Water from the Great Plains reservoirs is delivered to the Amity Canal via the Comanche Canal. No acreage is irrigated directly from this canal. This canal has low or zero flows in many years. Water rights priorities are such that water can only be diverted into the Great Plains reservoirs during wet years, and as much as possible is typically stored in John Martin Reservoir instead.
- **Fort Bent Canal** diverts about 4.5 miles below the John Martin Dam.
- **Lamar Canal** diverts just above the City of Lamar. Discharge from the City of Lamar's power plant cooling well water is sent directly to the Lamar Canal and accounted for under the canal's decree, along with direct diversions from the headgate.
- **X-Y Irrigating Canal** diverts about 11 miles below the City of Lamar. Diverted water has been purchased by LAWMA for well depletion augmentation.
- **Buffalo Canal** diverts near Holly. In addition to the mainstem headgate, the canal can divert water from Buffalo and Simpson creeks and from House, Deadman, and Puntney draws.

Figure 5. Lower Arkansas Basin Ditch Systems and Irrigated Areas



3.2.4 Reservoirs

This section describes the storage and operations of major reservoirs within the Arkansas Basin.

Turquoise Reservoir

Turquoise Reservoir (also known as Sugarloaf Lake) is created by Sugarloaf Dam across Lake Fork Creek west of Leadville. It is the highest elevation storage reservoir in the basin. Sugarloaf Lake was originally constructed and owned by CF&I (now EVRAZ). Reclamation purchased and expanded Sugarloaf Dam and Reservoir as a feature of the Fry-Ark Project and subsequently changed the name to Turquoise Reservoir. Turquoise Reservoir receives water from several transbasin projects, including the Fry-Ark Project via Boustead Tunnel; the Homestake Project via Homestake Tunnel; the Busk-Ivanhoe Project via the Carlton Tunnel; and inflows from the Columbine, Wurtz, and Ewing ditches. Water exits Turquoise Reservoir through the Mount Elbert Conduit or by discharge through the outlet works to Lake Fork Creek, and ultimately the Arkansas River. Total storage in Turquoise Reservoir is 129,398 AF, of which 120,478 AF is active conservation storage. With the exception of Fry-Ark Project inflows, Colorado Springs Utilities, Aurora, and PBWW are the major water rights holders of transbasin and native water inflows into Turquoise Reservoir, and these entities contract with Reclamation for storage in Turquoise Reservoir. All three entities also use occasional exchanges of agricultural return flows and fully consumable transmountain return flows from Pueblo Reservoir to Twin Lakes and/or Turquoise reservoirs. Busk-Ivanhoe water rights owned by PBWW may also be conveyed through Fry-Ark Project facilities, including the Nast and Boustead tunnel system if and when excess capacity is available. Reclamation may store Fry-Ark Project or any other water in unused space if and when vacant space is available.

Twin Lakes Reservoir and Mount Elbert forebay

Twin Lakes Reservoir is created by Twin Lakes Dam across Lake Creek in the upper Arkansas Basin. It has a total storage of about 140,855 AF, of which approximately 67,917 AF is active conservation storage. Twin Lakes Reservoir was originally constructed and owned by TLCC and used to store water from the Independence Pass Transmountain Diversion System (Independence Pass Tunnel) and a small amount of native water rights along Lake Creek. The reservoir was purchased and expanded by Reclamation as a feature of the Fry-Ark Project, which resulted in an additional 13,500 AF of Fry-Ark Project storage capacity. The reservoir outflows discharge to Lake Creek and ultimately the Arkansas River. TLCC maintained the storage rights to 54,452 AF in Twin Lakes Reservoir. Reclamation may store Fry-Ark Project or any other water in unused space if and when vacant space is available. TLCC water use has been converted from agricultural to M&I use, with shareholders allotted a percentage of the transbasin and native water rights yields as well as a portion of the storage space at Twin Lakes Reservoir. Major shareholders in TLCC include PBWW, Colorado Springs Utilities, Aurora, and Xcel Energy (for use at the Comanche Generating Station). The Otero pump station intake is located below Twin Lakes Reservoir and conveys water to Colorado Springs Utilities and Aurora. Colorado Springs Utilities and Aurora also store Homestake water in Twin Lakes Reservoir and can exchange water from Pueblo Reservoir, Colorado Canal, Rocky Ford Canal, and Colorado Springs Utilities' return flows to Twin Lakes Reservoir for delivery via the Otero pump station.

Reclamation's Mount Elbert hydroelectric power plant, a component of the Fry-Ark Project, is located on the north shore of Twin Lakes Reservoir. The Mount Elbert forebay is an 11,143 AF reservoir (on top of an active conservation pool) located north of Twin Lakes Reservoir above the power plant. Water is delivered from Turquoise Reservoir to the forebay by the Mount Elbert Conduit. Power is generated by letting water flow from the forebay through two turbines, discharging into Twin Lakes. The power plant is designed to supply power during peak periods. During periods of off-peak electricity demand, the pumps can be reversed to pump water from Twin Lakes Reservoir back up to the forebay to generate additional power. This pump-back storage configuration allows for rapid adjustment of power output and quick start-up of the generating units.

Clear Creek Reservoir

Clear Creek Reservoir is owned by PBWW and is used to store a variety of water rights, including local Clear Creek rights and transbasin import water, including Ewing and Wurtz ditches. PBWW is able to move water by exchange into Clear Creek Reservoir from other parts of PBWW's system, including fully consumable return flows and water stored in Pueblo Reservoir. Total storage in Clear Creek Reservoir is 11,400 AF.

Pueblo Reservoir

Pueblo Reservoir is a 357,678 AF reservoir constructed by Reclamation on the mainstem of the Arkansas River as the terminal storage facility for the Fry-Ark Project. The reservoir includes a commitment to maintain a 30,000 AF minimum pool for fish, wildlife, and recreation purposes; an active conservation pool of 234,437 AF; a 65,952 AF joint-use pool; and a 27,024 AF flood control pool. Pueblo Reservoir is the only reservoir on the Fry-Ark Project authorized for flood control. Flood control operations are managed by the USACE–Albuquerque District. During flood control operations, releases from Pueblo Reservoir may be constrained or curtailed when flows at the Arkansas River–Avondale gage exceeds 6,000 cfs. Reclamation and the Colorado DWR District 2 manage routine releases from Pueblo Dam within the downstream channel capacity of 6,000 cfs. The joint-use pool at Pueblo Reservoir provides flood control space from April 15 through November 1 of each year but can be used to store water for agricultural and M&I uses for the remainder of the year. North and South outlet works at Pueblo Dam release water for nearby municipalities, including Pueblo, Pueblo West, the FVA, and future Southern Delivery System (SDS) and AVC participants. Separate outlet works service the Pueblo Fish Hatchery and the Bessemer Ditch. River outlet works and three spillway gates provide additional opportunities to discharge water from Pueblo Reservoir to the Arkansas River up to a channel capacity of 6,000 cfs. The Winter Water Storage Program also uses Pueblo Reservoir.

The active conservation pool includes 161,000 AF of storage allocated to municipal Fry-Ark Project participants. Municipalities are entitled to carryover supplies from one year to the next. Agricultural users have 2 years in which to use project water allocations. Additional non-project water can be stored in Pueblo Reservoir through excess capacity storage contracts with Reclamation. Current excess capacity storage is approximately 69,000 AF, and changes each year as storage contracts are renewed and contracted storage increases become effective. Excess capacity accounts are subject to spill in accordance with contractual spill priorities that favor the storage of Fry-Ark Project water and water stored for entities within SECWCD over out-of-district entities.

The AVC Environmental Impact Statement (Reclamation 2013) includes an evaluation of a master contract that describes a possible long-term excess capacity storage arrangement in Pueblo Reservoir between SECWCD and Reclamation. An estimated 27 individual participants, including municipalities, water augmentation entities, and others could contract with SECWCD for allocation of master contract storage space at Pueblo Reservoir.

John Martin Reservoir

The 335,000-AF John Martin Reservoir was originally built for flood control and irrigation storage for irrigators in both Colorado and Kansas, emerging from negotiations between the two states that eventually resulted in the Arkansas River Compact of 1948. The operation of the reservoir has evolved over time and includes the 1980 Operating Agreement revision that amended the distribution of water between the two states and added a recreation pool. Under the Operating Agreement, the reservoir stores water intended to be distributed 60 percent to Colorado irrigators and 40 percent to Kansas irrigators. There are a few accounts for other kinds of water, including storage of Amity Canal water from the Great Plains Reservoirs, water stored under the Winter Water Storage Program, and water stored in the Offset Account as part of the settlement with Kansas.

Trinidad Reservoir

Trinidad Reservoir was constructed by the USACE and began operations in 1977. It provides flood control and irrigation storage for agricultural users comprising 19,000 acres in the Purgatoire River Basin. The reservoir includes a flood control pool (50,000 AF), an irrigation pool (20,000 AF), a joint-use pool (39,000 AF), and a fish recreation pool (4,500 AF, also known as the "permanent pool"). The irrigation storage is under the transferred Model Reservoir senior storage right; Model Reservoir has been abandoned. The joint-use pool is for sediment, but available space is used for additional irrigation storage if John Martin Reservoir is spilling (indicating that water is available under the Arkansas River Compact).

The City of Trinidad also has the option, not currently exercised, for 7,100 AFY of Trinidad Project water. Using this option would require conversion to municipal use as well as either a new treatment plant below Trinidad Reservoir or the ability to exchange up to North/Monument, higher in the basin, to go through the existing treatment plant.

The administration of the reservoir and the repayment of federal funding for the irrigation portion of the reservoir is managed by the Purgatoire River Water Conservancy District. Reclamation manages irrigation and other storage contracts at this reservoir.

Colorado Canal Reservoirs

The Colorado Canal system has two major reservoirs: Lake Meredith (active storage of 40,413 AF) and Lake Henry (active storage 10,915 AF). For irrigation water, much of the irrigated acreage is upstream of Lake Meredith. To provide irrigation water to these portions of the Colorado Canal system, water is released from Lake Meredith to the mainstem and exchanged back up to the canal headgate at Boone.

More than 95 percent of the Colorado Canal, Lake Meredith, and Lake Henry shares have been purchased by municipal shareholders, although not all of the water available to municipalities is currently put to municipal use. Water for municipal use is stored in Lake Meredith and Lake Henry and released to the river, often for exchange upstream to Pueblo Reservoir or a municipal headgate.

Holbrook Canal Reservoirs

The Holbrook Canal system includes two major reservoirs: Holbrook Reservoir (7,472 AF) and Dye Reservoir (7986 AF). To use water stored in either of these reservoirs, water is released from storage back to the mainstem and exchanged back up to the Holbrook Canal through a reach that includes the Rocky Ford Ditch headgate.

Holbrook Reservoir is also currently used for a program known as "Restoration of Yield." When exchanges to Pueblo Reservoir are limited by low flow conditions, including as stipulated under the Arkansas River Flow Management Program, water can be stored in Holbrook Reservoir and exchanged up to Pueblo Reservoir at a later time when conditions are more favorable.

Fort Lyon Canal Reservoirs

The Fort Lyon Canal system includes two major reservoirs: Horse Creek Reservoir (28,000 AF, also known as Timber Lake) and Adobe Creek Reservoir (85,000 AF, also known as Blue Lake). These reservoirs are filled by the Fort Lyon Storage Canal (which does not irrigate any land directly) and make releases into the Fort Lyon Canal. Adobe Creek Reservoir also has a right for storage of Adobe Creek water. The Fort Lyon Canal can make direct diversions from the Arkansas River mainstem, Horse Creek, and Adobe Creek, as well as deliver water from the Horse Creek and Adobe Creek reservoirs.

Amity Canal Company Reservoirs

The Great Plains Reservoirs comprise four reservoirs in the Amity Canal System: Nee Gronda (Big Water), Nee Skah (Queens), Nee So Pah (Black Water), and Ne Noshe (Standing Water), with a combined capacity of 265,552 AF. These reservoirs are filled by the Kicking Bird Canal, which diverts from the Fort Lyon Canal. The Comanche Canal delivers water from these reservoirs to the Amity Canal for irrigation use. These reservoirs have large dead pools and high evaporative losses; the Amity Canal can store some Great Plains water in John Martin Reservoir to minimize losses. This is done under the consent of the Arkansas River Compact administration in the 1980 Operating Agreement. The Amity Canal has to pay a 35 percent storage charge to the administration for distribution. The storage charge water is distributed to irrigation systems in each state, excluding the Amity Canal.

3.2.5 Transmountain Systems

Configuration and operation of the four major transmountain systems is described below. Other transmountain imports to the basin include the Busk-Ivanhoe Tunnel and the Wurtz, Columbine, and Ewing ditches. In addition, the City of Aurora transports water out of the Arkansas basin via the Otero Pipeline.

Fry-Ark Project

The Fry-Ark project brings surface water from the Fryingpan River and other tributaries of the Roaring Fork River in the Colorado Basin for delivery to M&I and agricultural users in the Arkansas Basin.

Congress authorized the project in 1962 on the West Slope and construction began with Ruedi Reservoir on the west slope in 1964. Construction was continuous until the completion of the fish hatchery at Pueblo Dam in 1990, with the first deliveries of Fry-Ark Project water in 1972 and most major infrastructure in place by 1980.

Fry-Ark Project infrastructure on the West Slope includes Ruedi Reservoir on the Fryingpan River and two collection systems that collect surface water directly from 16 diversion structures on a number of Fryingpan and Roaring Fork tributaries. Water from Ruedi Reservoir is not conveyed into the Arkansas Basin; rather, the reservoir serves for regulation and replacement of water on the West Slope, and for providing water for irrigation, M&I needs, and environmental and recreational purposes.

Fry-Ark Project water is conveyed to the Arkansas Basin via the Charles H. Boustead Tunnel. Fry-Ark Project storage facilities in the Arkansas Basin include Turquoise Reservoir, the Mount Elbert forebay, Twin Lakes Reservoir, and Pueblo Reservoir. Water is also conveyed through the Mt. Elbert pump-storage power plant for electrical power generation. Boustead Tunnel discharges into Turquoise Reservoir, the highest Fry-Ark storage in the Arkansas Basin. From Turquoise Reservoir, water is conveyed to the Mt. Elbert forebay via a conduit, and from there into Twin Lakes Reservoir or down Lake Fork Creek. Twin Lakes Reservoir releases water into Lake Creek, which flows into the Arkansas River, for storage in Pueblo Reservoir (143 river miles downstream) or to project participants above Pueblo.

Major agricultural participants receiving Fry-Ark Project water include:

- Bessemer Ditch
- Excelsior Ditch
- Colorado Canal
- Rocky Ford Highline Canal
- Oxford Farmer's Ditch
- Otero Canal
- Catlin Canal
- Ft. Lyon Canal
- Holbrook Canal

Major municipal participants receiving Project Water include:

- Fountain Valley Authority
- Colorado Springs
  - Fountain
  - Security

    - Widefield
    - Stratmoor Hills
- PBWW
- Pueblo West
- St. Charles Mesa Water District
- Rocky Ford
- La Junta
- Las Animas
- Lamar
- Salida
- Cañon City
- Buena Vista

The SECWCD was established in 1958 to administer the Fry-Ark Project. SECWCD is responsible for repaying a portion of the construction cost of the Project plus annual operation and maintenance costs. Today, SECWCD continues to administer several programs related to the Fry-Ark Project. Return flows from this project are fully consumable. They are all owned by SECWCD; entities who wish to exchange their Fry-Ark return flows back into Pueblo Reservoir (or other basin storage) for reuse must purchase the exchange from SECWCD. Other entities within the SECWCD boundaries may also purchase return flows from SECWCD through CWPDA, AGUA, and LAWMA; many users do this for augmentation of groundwater supplies.

Blue River Project

The Blue River Project brings water from the Blue River in the Colorado Basin to Colorado Springs Utilities. The collection system on the West Slope includes several tunnel and pipeline facilities. Water comes through the Hoosier Tunnel to Montgomery Reservoir and then through the 30-inch Blue River Pipeline to tie into the rest of Colorado Springs Utilities' system. Blue River Project water is typically sent to Colorado Springs Utilities' North Slope water system and stored in North and South Catamount reservoirs and Crystal Reservoir. It can also travel via the Twin Rocks Pump Station to the Northfield water system for storage in Rampart Reservoir.

Homestake Project

The Homestake Project is a joint project between Colorado Springs Utilities and Aurora. Aurora has an additional agreement to provide the first 2,500 AF of Aurora's project yield to PBWW. Each party has an equal stake, and deliveries are divided evenly.

All project water for both Colorado Springs Utilities and Aurora is collected in Homestake Reservoir in the headwaters of the Eagle River and conveyed to the Arkansas Basin via Homestake Tunnel. The tunnel ends in Lake Fork Creek above Turquoise Reservoir. Similar to the Fry-Ark Project water, Homestake water is released from Turquoise to Twin Lakes Reservoir, passing through the Mt. Elbert forebay and power plant or Lake Fork Creek. From Twin Lakes Reservoir, the water is typically conveyed via pipeline to the Otero pump station. The pipeline to the Otero pump station transports TLCC, Fry-Ark Project, Colorado Canal, and other Colorado Springs Utilities exchange water in addition to Homestake Project water. The Otero pump station supplies the 66-inch Homestake Pipeline. This pipeline has a bifurcation south of Spinney Mountain Reservoir where the Aurora portion of the Homestake Project water is released into Spinney Mountain Reservoir and the Colorado Springs Utilities portion continues in a second, smaller pipeline, where it is boosted by the Twin Rock pump station. The Colorado Springs Utilities water from the Otero pump station, including Homestake water, can be either sent to the Northfield water system and stored in Rampart Reservoir, or sent via the Blue River pipeline to north Catamount Reservoir in the North Slope water system.

Twin Lakes Project

TLCC began developing the Twin Lakes Project in the 1930s with the intent of providing additional water supplies to the Colorado Canal. The Colorado Canal Company, Lake Meredith Reservoir Company, and the Lake Henry Reservoir Company were originally all part of TLCC but separated into distinct companies in the 1970s.

Water supplies owned by TLCC primarily consist of transbasin water, but about 10 percent of the yield comes from native rights stored in Twin Lakes Reservoir. Transbasin water is collected by the Independence Pass Transmountain Diversion system from the Roaring Fork River, Lost Man Creek, New York Creek, and Lincoln Gulch, and stored in the West Slope in Grizzly Reservoir. From there it passes through the Independence Pass Tunnel (also known as the Twin Lakes Tunnel) and into North Fork Lake Creek for storage in Twin Lakes Reservoir. Twin Lakes Reservoir was purchased by Reclamation and expanded for storage of Fry-Ark Project water, but TLCC maintains a contract for 54,452 AF of storage in the expanded reservoir.

Over time, shares of TLCC have been purchased by a number of entities, and Twin Lakes Project water has accordingly been transferred for use elsewhere. Major Twin Lakes shareholders include Colorado Springs Utilities, Aurora, PBWW, and Pueblo West. Colorado Springs and Aurora release their TLCC water from Twin Lakes Reservoir to the Otero pump station along with Homestake Project water, as described above, or can take delivery through the Southern Delivery System. PBWW releases water to its intake in Pueblo Reservoir.

3.2.6 Groundwater Pumping and Augmentation

Groundwater administration in the Arkansas Basin is unique and complex due to the Arkansas River Compact and subsequent litigation between Kansas and Colorado. All wells decreed after 1948 must replace any depletion to the river and to the Stateline flow resulting from pumping and pre-Compact wells may only be relieved of replacement to the extent of the 15,000 acre-feet of pre-Compact pumping by those specific wells recognized under the Kansas v. Colorado litigation and only when the stream depletions from this pumping does not impact a senior Colorado water right. These replacements must be made in the river reach and at the same time as the stream depletions occur, which is different from the timing of well water use. Stream depletions are determined by a complex modeling process. Designated nontributary wells with no surface water interaction are exempt from this requirement; however, this represents only a small fraction of groundwater supplies within the basin. Water for this purpose can include agricultural water rights converted to use for augmentation or water from transmountain projects or from the fully consumable return flows of those transmountain projects. More details on the requirements for replacing stream depletions resulting from groundwater pumping, including information on the administrative process and history of agreements and litigation between Kansas and Arkansas, is provided below.

Several groundwater augmentation associations have emerged to provide augmentation water to their member entities. These associations may have decreed augmentation plans allowing for owned or leased water rights to be used for augmentation, as well as replacement water under Rule 14 plans. The 1996 Amended Rules for the Use of Tributary Groundwater in Rule 14 allow the State Engineer to approve annual replacement plans for well users that do not have permanent water rights that can be included in a plan for augmentation approved by the Water Court. The two main well augmentation associations in the basin—AGRA and LAWMA—operate to some extent with leased water for replacing well depletions, and therefore have a need to use the replacement plan rather than Water Court-approved augmentation plans. The augmentation associations identified as “major” for inclusion in this report collectively represent a significant portion of groundwater users within the basin, although there are several smaller associations as well as many entities with individual augmentation decrees or water replacement plans. The UAWCD has a blanket augmentation plan to replace depletions from wells in its service area using TLCC water and other water rights it has purchased. All groundwater associations provide augmentation for both municipal and agricultural members from a wide variety of water supply sources.

The **Lower Arkansas Water Management Association** primarily includes members in the lower portion of the basin, including users below John Martin Reservoir. Along with some Fry-Ark Project return flows purchased from

SECWCD, most of LAWMA's supply comes from agricultural sources changed to augmentation use, including the X-Y Canal rights, Lamar Canal, Manvel Canal, Highland Ditch, and Keesee Ditch. LAWMA now operates solely under Rule 14 plans.

The **Arkansas Groundwater and Reservoir Association (AGRA)** is made up of two entities who recently merged, the Colorado Water Protective and Development Association (CWPDA), and the Arkansas Groundwater Users Association (AGUA). The former CWPDA primarily serves members located between Fowler and Las Animas. Primary sources of augmentation water include Fry-Ark Project return flows purchased from SECWCD; agricultural water, including the Catlin Canal, Ft. Lyon, and the Colorado Canal; and Fry-Ark Project water for municipal members. CWPDA also has municipal and irrigation "if and when" accounts in Pueblo Reservoir.

Former AGUA members are largely located higher up in the basin. Primary sources of augmentation water include Fry-Ark Project return flows purchased from SECWCD; fully consumable municipal return flows from several entities, including Cherokee Metro District, PBWW, and Colorado Springs Utilities; and agricultural water, including Excelsior Ditch rights owned by AGUA and Aurora's Rocky Ford Ditch rights. AGUA maintains an "if and when" account in Pueblo Reservoir and receives small allocations of Fry-Ark Project water.

3.2.7 Exchanges

Exchanges allow water users to divert or store water upstream of the original water right location. A water exchange is accomplished by diverting water at the desired, upstream location and replacing that water with a like quantity downstream, often via a reservoir release.

Major exchanges in the Arkansas Basin are listed in **Table 9.** Pueblo Reservoir is central to a significant number of exchanges in the basin. Several entities move water into Pueblo as an interim step to moving it higher up in the basin when exchange potential is available.

Table 9 - Major Exchanges

Entity	From	To
PBWW	Pueblo Reservoir	Clear Creek Reservoir
PBWW, Salida, Pueblo West, Aurora, or Colorado Springs Utilities	Pueblo Reservoir	Twin Lakes Reservoir
PBWW, Salida, Pueblo West, Aurora, or Colorado Springs Utilities	Pueblo Reservoir	Turquoise Reservoir
Ft. Lyon Canal	John Martin	Ft. Lyon Canal
Colorado Springs Utilities	WWTP on Fountain Creek	Pueblo Reservoir
PBWW	Return flow locations: • PBWW WWTP • Comanche Generating Station (St. Charles River) • EVRAZ / CF&I (Salt Creek)	Pueblo Reservoir
Aurora	Rocky Ford Ditch Headgate	Pueblo Reservoir
Colorado Canal shareholders, including Colorado Springs Utilities and Aurora	Lake Henry or Lake Meredith	Pueblo Reservoir
Colorado Canal shareholders	Lake Henry or Lake Meredith	CO Canal
Holbrook Canal	Dye or Holbrook reservoirs	Holbrook Canal

3.2.8 Other Programs

Voluntary Flow Management Program for the Upper Arkansas River

The VFMP uses water released from Turquoise and Twin Lakes reservoirs to the Arkansas River above Pueblo Reservoir to maintain flows for recreational and fishery purposes while satisfying the primary purposes of the Fry-Ark Project. Parties to the agreement are SECWCD, the Colorado Department of Natural Resources, CPW, Arkansas River Outfitters Association, and Trout Unlimited. Releases from Twin and Turquoise reservoirs are managed to meet the following flow parameters at the Wellsville gage:

- Minimum flow of 250 cfs year-round
- Flows during the winter incubation period (November 16 to April 30) of 250 – 400 cfs, depending on flows during the spawning period (October 15 to November 15)
- Flows maintained between 250 and 400 cfs from April 1 through May 15
- In higher flow years, reduction of flows to between 250 to 400 cfs from Labor Day through October 15
- Flow augmentation for recreational purposes to maintain flows at 700 cfs July 1 to August 15. The recreation target flow rate can be changed each year by agreement of the participating entities. CPW provides water to Reclamation to make up for evaporative losses to Fry-Ark Project water due to these releases.
- When flow rates must be altered, maintain daily change to 10 percent to 15 percent.

VFMP flow parameters are reviewed in the context of existing storage, anticipated imports, river conditions, and other factors, and can be subject to change as agreed by the parties.

Flow Management Program for the Arkansas River below Pueblo Reservoir

This flow management program is an agreement between six parties: cities of Pueblo, Aurora and Foundation; and PBWW, Colorado Springs Utilities, and SECWCD. The agreement itself is commonly known as the "6-party IGA." The agreement was reached in May of 2004 after the City of Pueblo filed for a recreational in-channel diversion (RICD) right for the reach of the river below Pueblo Reservoir and through the City of Pueblo, as part of the Arkansas River Corridor Legacy Project. The Legacy Project was a joint effort with USACE to enhance habitat and recreation on the Arkansas River through the City of Pueblo.

The remaining five parties to the agreement agreed to curtail exchanges into Pueblo Reservoir under certain flow conditions. The agreement concerns the reach from the gage above Pueblo (ARKPUECO) to the confluence with Fountain Creek. The measured flow governing the exchanges is the sum of the gage above Pueblo and the return flows from the fish hatchery at Pueblo Dam. Exchanges are curtailed when this flow is below the values in Table 10. The values are different in average and dry years. An average year is defined as one in which the "most likely" National Resources Conservation Services' Colorado Basin Water Supply Outlook Report water supply forecast is 100 percent of average or greater. A dry year is defined as one in which that forecast is 70 percent of average or greater.

Table 10 - Flow Management Program Below Pueblo Reservoir, Flow Targets

Period	Average Year, cfs	Drier Year, cfs
Oct 01 through Oct 15	250	150
Oct 16 through Nov 14	200	150
Nov 15 through Mar 15	100	100
Mar 16 through Mar 31	250	200
Apr 01 through Apr 15	350	250

Period	Average Year, cfs	Drier Year, cfs
Apr 16 through Apr 30	400	300
May 01 through May 22	450	350
May 23 through Jul 31	500	500
Aug 01 through Aug 15	450	350
Aug 16 through Sep 07	300	300
Sep 08 through Sep 30	250	150

Aurora, PBWW, Colorado Springs Utilities, Fountain, and SECWCD have also developed the Restoration of Yield program to maintain the yield on water rights they are not able to exchange due to the constraints of this flow management program. Currently, those rights can be stored in Holbrook, Dye, Henry, or Meredith reservoirs by agreement with the Colorado Canal and Holbrook Mutual Irrigation Companies. When exchange potential is available, water is released from those four reservoirs for exchange back into Pueblo Reservoir, minus transit losses accrued from Pueblo Reservoir to the agricultural reservoirs. These entities are investigating a new lined gravel pit reservoir along the Arkansas River below the confluence with Fountain Creek.

Winter Water Storage Program

The Winter Water Storage Program allows for the storage of agricultural water in the winter (November 16 to April 15), for release to irrigation ditches during the following irrigation season. It includes some storage in John Martin Reservoir in addition to storage in Pueblo Reservoir. Other storage vessels include Henry, Meredith, and Dye lakes, and Holbrook, Adobe, Horse Creek, and Great Plains reservoirs.

3.3 Environment and Recreation Uses

The process for evaluating non-consumptive (i.e.,E&R) uses in the Arkansas Basin has evolved over time. The SWSI 2010 effort assisted the BRT in collecting data and mapping E&R attributes by stream segment. The areas or stream segments with a higher density of attribute data for a specific stream segment or area was then identified as a focus area.

Nine subcategories, including five environmental and four recreational, were established that represented all individual attributes in the basin. These subcategories are listed below and followed by a brief description of each, along with the types of attributes represented by the broader category.

The list of attributes important to the Arkansas Basin has continued to grow and evolve and includes an array of environmental and recreational non-consumptive features. The attributes will be used for further assessment in future Basin Implementation Plan updates.

Environmental Subcategories

- Threatened and endangered species
- Audubon Important Bird and Biodiversity Areas (IBA)
- Significant riparian and wetland plant communities
- Special value waters
- National Wetlands Inventory (NWI) wetlands

Recreational Subcategories

- Waterfowl hunting (state wildlife areas)
- Significant fishing areas

- Birding trails
- Significant whitewater and flatwater boating waters

Threatened and Endangered Species

Attributes in this subcategory include state- and federally listed threatened and endangered plants and animals as well as other state species of concern. Many of these species are protected by state or federal mandates or have current management plans resulting from concern for the species' survival. Threatened and endangered species in the Arkansas Basin that were included as attributes in past analyses include the bald eagle, piping plover, least tern, lesser prairie chicken, Arkansas darter, and greenback cutthroat trout.

Audubon Important Bird and Biodiversity Areas

The IBA Program is a global initiative of BirdLife International that is implemented by Audubon and local partners in the United States. The program identifies areas vital to birds and other biodiversity and works to implement conservation strategies to minimize the effects of habitat loss and degradation. Audubon IBAs were included as an environmental attribute in the Arkansas Basin due to the protection potentially offered directly to sensitive bird species, and indirectly to other species and habitats.

Significant Riparian and Wetland Plant Communities

Data included in this subcategory are derived from the work of the Colorado Natural Heritage Program (CNHP), which serves as a comprehensive source of information on the status and location of Colorado's rare and threatened species and plant communities. The program provides scientific information and expertise, and aids in the conservation of the state's biological resources. The botany team at CNHP tracks the location and condition of more than 500 globally and/or state-imperiled plants in an effort to guide effective management and protection of those species and, thereby, prevent extinctions or statewide extirpations of Colorado's native plant species.

Special Value Waters

This subcategory includes a wide range of waters that have been designated as important for their beneficial features and uses, which may include public water supplies; domestic, agricultural, industrial and recreational uses; water quality; habitat; and the protection and propagation of terrestrial and aquatic species. The special value waters subcategory consists of Colorado Outstanding Waters, Gold Medal Trout Waters, waters with CWCB instream water rights or natural lake level water rights, waters with RICD structures, Bureau of Land Management Wilderness Study Area waters, Arkansas Wilderness Area waters, and Wilderness Study Area waters.

National Wetlands Inventory Wetlands

The NWI is maintained by the U.S. Fish and Wildlife Service, which produces information on the characteristics, extent, and status of the nation's wetlands and deepwater habitats. Wetlands provide many ecological, economic, and social benefits, and provide habitat for fish, wildlife, and a variety of plants that have environmental, commercial, and recreational importance. Wetlands are also important landscape features because they hold and slowly release floodwater and snow melt, recharge groundwater, recycle nutrients, filter contaminants, and provide recreational- and wildlife-viewing opportunities. Numerous wetlands are present throughout the basin, including emergent, forested, and scrub-shrub, and can be found in low-lying depressions and alongside ponds, lakes, and rivers.

Waterfowl Hunting

This subcategory is comprised of CPW parcels designated as waterfowl hunting areas, including State Wildlife Areas. CPW manages more than 300 State Wildlife Areas across the state, totaling more than 650,000 acres. These areas help manage and preserve wildlife habitat and provide the public with opportunities to hunt, fish, and watch wildlife. All state wildlife areas in the Arkansas Basin were included in this subcategory.

The Arkansas Basin is known for its prime waterfowl hunting areas. During the early winter months, cold air pushes duck populations from the northern arctic regions into southern regions, including the Arkansas Basin where high-quality habitat is present. In the spring, goose hunting is popular as the snow geese migrate through the area. Turkey and quail hunting is also popular within the basin, and Colorado's prime quail habitat is in southeastern Colorado within the Arkansas Basin.

Significant Fishing Areas

Attributes in this category include significant reservoir, lake, stream, and river fishing areas. The information was gathered from Nonconsumptive Needs Subcommittee members, Trout Unlimited, and other stakeholders. Some of these areas include trout lakes and streams, Pueblo fishing areas, State Wildlife Areas, State Fishing Units, and the Arkansas Headwaters Recreation Area.

Extensive public fishing areas and access points occur along the entire Arkansas River, the river's numerous tributaries, and at the basin's many lakes and reservoirs. The Arkansas Headwaters Recreation Area, CPW, and local commercial fishing guides work together to maintain and provide access to these exceptional fishing areas in the Arkansas Basin.

Birding Trails

Colorado birding trail locations were received from the National Audubon Society. Birding trails provide watchable wildlife areas. Migrating birds, part-time residents, and year-round resident bird species often require habitat with immediate water features or habitat associated with water features. Some of the popular bird watching areas include Wet Mountain Valley in Custer County, Lake Pueblo, The Nature and Raptor Center of Pueblo, Pueblo City Park, Lake Henry, Lake Meredith, Lake Cheraw, Lake Holbrook, Rocky Ford State Wildlife Area, Picket Wire Canyon, and the Purgatoire River.

Significant Whitewater and Flatwater Boating Waters

Waters used for whitewater and flatwater recreational boating are included in this subcategory. Information was received from CPW, Nonconsumptive Needs Subcommittee members, and other stakeholders. Popular rafting areas are located along the Arkansas River from Granite through the Royal Gorge. The Arkansas Headwaters Recreation Area and CPW work with a number of local commercial rafting guides to provide rafting opportunities for locals and tourists on the Arkansas River, one of the most popular rafting destinations in the country.

3.3.1 Identifying Areas of Concern

Previous mapping efforts of non-consumptive features by 12-digit hydrologic unit code have highlighted areas with high concentrations of environmental and recreational attributes, primarily in three locations: 1) the mainstem of the Arkansas River upstream of Pueblo; 2) Fountain Creek watershed; and 3) areas around major reservoirs on the Lower Arkansas River between Las Animas and Eads.

To appropriately prioritize projects to be implemented, these focus areas and other areas throughout the basin will be further analyzed to determine the key areas of concern. Projects may be more critical in identified areas of concern for providing protections to environmental and recreational attributes. Not all attributes require protection, and projects may not be necessary for select areas where environmental and recreational attributes are at desirable and sustainable levels. This analysis will be supported by input from stakeholders, subject matter experts, and Basin Roundtable members.

At present, the E&R Subcommittee has identified the following priority objectives:

- Lake Isabel is an important fishing lake with multiple associated recreational activities that has insufficient water resources to cover evaporative loss. Due to limited water rights, the lake level has been lowered, thereby diminishing fishing and other recreational opportunities, and risking deleterious impacts associated with this reduced water level. It is a priority to obtain additional water rights to allow the lake to be raised to its full, functioning level.

- Grape Creek is an important fishery that runs through the Grape Creek Wilderness Study Area, which adds to its importance as a non-consumptive resource that has suffered from inadequate flow. Efforts are ongoing with DeWeese-Dye Ditch & Reservoir Company to re-operate the ditch to provide additional water flow through the stream during crucial periods.
- Important wetland resource evaluation needs to be accomplished. Although some information exists on the wetlands in this basin, it is not available basin wide.
- Chilili Ditch, a canal that runs through the center of Trinidad in Las Animas County, is extremely outdated and in serious need of renovation to improve non-consumptive resources. This priority would involve a project that addresses both consumptive and non-consumptive needs, including an update to the ditch diversion to make it fish friendly through the use of fish ladders or other methods that allow fish to move up and down the stream more easily.

The E&R Subcommittee will continue to identify priority areas as additional data and information are obtained from current projects and studies, stakeholder input, and from the public.

SECTION 4. CONSTRAINTS AND OPPORTUNITIES

Through the review of existing data and operations in the Arkansas River Basin, there are both constraints and several opportunities related to water resources development in the basin. These challenges can be met through the adaptive planning process prescribed by the Colorado Water Plan and the Basin Implementation Plans.

4.1 Constraints

Administration Constraints

- The Arkansas River Compact limits water development after 1948 if the development has the potential to reduce the usable water supply to which Kansas is entitled. Thus, post-compact water resources development, such as new reservoirs, enlargement of existing reservoirs, improved irrigation efficiency for canal systems, and tributary groundwater use that could impact the native water supply of the Arkansas River Basin, are not feasible unless offsets to the reduction of usable Stateline flow are provided.
- The Ark Basin is highly over-appropriated and therefore the yield of new projects or existing conditional water rights would be very limited unless accompanied by a plan for augmentation. Therefore, new water projects relying on new water rights are not feasible because the yield of existing conditional or new water rights would be very limited. The unmet demands for both municipal and agricultural future demands will have to be met from better management of existing supplies, including reuse of transbasin water supplies to the maximum potential.

Water Quality Constraints

The water quality in the Arkansas River Basin east of Pueblo is high in total dissolved solids and other constituents. The use of river water and alluvial groundwater requires expensive treatment. Alternative supplies are being considered, including the use of existing surface water rights through the recently initiated AVC feature of the Fry-Ark Project.

Supply Constraints

- Due to the highly over-appropriated nature of the Arkansas River Basin, any water resources project that will maximize the use of existing water supplies will require considerable engineering and legal support to ensure no injury to senior water rights.
- Baca County is located in the southeast part of the state with very limited surface water supplies, and the water sources for communities and irrigated farmlands are from aquifers underlying the county that include the Southern High Plains Designated Groundwater Basin (which lies outside of the Arkansas River Basin). The groundwater elevations have been monitored for a number of years and are generally declining, with the majority of the wells showing a decline in water levels under 15 feet for the last 10 years. The gradual mining of these aquifers is a serious issue that will require further attention.

Storage Constraints

The SEO Dam Safety Branch actively regulates more than 200 nonfederal dams in the Arkansas Basin with a total storage capacity of more than 473,000 AF[10]. Many of the nonfederal storage reservoirs in the Arkansas Basin were constructed in the late 1800s through the 1930s. These dams were constructed before modern engineering and construction practices, and most have not experienced significant investment since original construction. Just like highways and bridges, dams and appurtenances deteriorate with age. Aged and outdated dams are at increased risk of developing problems, failures, and State Engineer storage restrictions due to declining condition.

---

[10] Total storage capacity is physical capacity to the emergency spillway crest and includes dedicated flood storage.

Figure 6 below plots the number of major[11] non-federal water storage[12] dams constructed in the Arkansas Basin (excluding El Paso County) by decade.

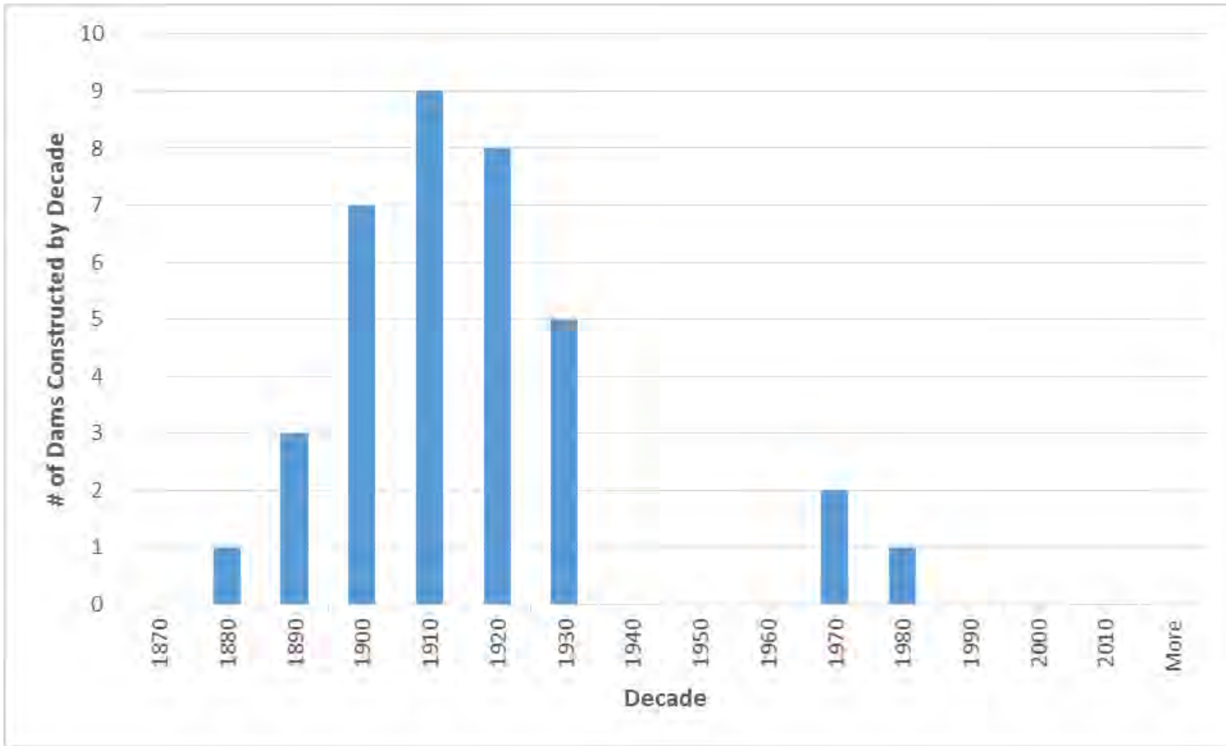


Figure 6 – Age of Major Storage Reservoirs in Arkansas River Basin

[11] Defined here as greater than 1,000 AF of storage capacity.

[12] Excluded flood control reservoirs.

Table 11 lists suggested rehabilitation projects for some of the largest non-federal water storage reservoirs in the Arkansas Basin to bring them up to modern engineering standards, including the date of original dam construction, suggested rehab work, and ballpark cost estimates.

Table 11– Examples for Rehabilitation of Nonfederal Reservoirs in Arkansas Basins to Modern Standards

Dam Name	Water District	Owner	Storage Capacity (AF)	Year Constructed	Suggested Rehab to Meet Modern Engineering Standards	DSB estimated repair cost
Lake Meredith	17	Colorado Canal/ Lake Meredith Co.	39,804	1926	spillway, outlet works repairs	$500,000
Horse Creek	17	Fort Lyon Canal Co.	28,746	1900	Embankment rehabilitation, including seepage collection system, outlet rehabilitation	$3,000,000
Clear Creek	11	PBWW	11,500	1910	Foundation seepage control measures	$1,000,000
Lake Henry	17	Colorado Canal/ Lake Henry Co.	9,500	1914	Seepage collection and control measures, proper abandonment and rehab of two outlet works	$500,000
St. Charles #3	14	Evraz / Rocky Mtn. Steel Mill	8,638	1913	Geotechnical evaluation, possible filter construction and outlet rehabilitation (currently in the design phase)	$3,000,000
Cucharas #5	16	Great Plains Irrigation Company	7,414	1913	Original dam was removed, with potential new dam construction project to replace it.	$20,000,000
Holbrook	17	Holbrook Mutual Irrigation Co (HMIC)	6,258	1890	Seepage collection measures, spillway modifications	$500,000
Dye	17	HMIC	3,614	1903	Embankment and outlet works rehabilitation	$2,000,000
Walsenburg Wahatoya and Daigre Dams	16	City of Walsenburg	934	1901-1910	Slope stabilization, seepage collection and control, and outlet rehabilitations	$3,000,000

4.2 Vulnerability Assessment

The Arkansas BRT's agricultural and M&I goals reflect the need to characterize the types of water supplies used to meet existing demands and to identify vulnerabilities associated with each type of supply. This characterization and vulnerability assessment will allow the BRT to implement strategies and develop projects to better manage different types of water supplies in the future. The following summarizes the results from a high-level characterization analysis of water supplies used to meet agricultural and M&I demands in each sub-region and a summary of how the types of water supplies may become more vulnerable in the future. Note that the characterization analysis for this effort is intended to inform the vulnerability discussion at the BRT-level on the predominant types of water supplies used by entities to meet their demands. It does not represent entities' complete water rights portfolio, nor does it capture the year-to-year variability of water supplies that entities may use.

4.2.1 Characterization of Agricultural Water Supplies

The current agricultural demand in the Arkansas River Basin is over 2 million acre-feet per year, with nearly 70% of that demand associated with irrigated acreage located between Pueblo Reservoir and the Kansas stateline. This area, located in the Lower Arkansas River region, has the largest concentration of agricultural demand in the basin and has the most diverse agricultural water supplies. As such, the characterization effort focused on the water supplies used to meet the agricultural demand in this area. Although an extensive characterization effort was not completed for other sub-regions, agricultural demands are primarily met using native water supplies in the Upper Arkansas River, Southern Tributaries, and Fountain Creek regions, whereas nontributary well supplies are the dominant source in the Southern High Plains region.

The agricultural characterization effort focused on water supply information provided by the Division 2 office for the 2000 to 2020 period; a period that captures several of the driest years on record; several irrigators experienced significant shortages due to dry conditions. As such, the characterization effort reflects the types of water supplies that were available and actually diverted or pumped for agricultural purposes, as opposed to supplies that could be used to meet the full agricultural demand. The water supplies used to meet agricultural demands were characterized into the following five general categories:

- Native. Water native to the Arkansas River Basin directly diverted for irrigation
- Project Water. Transbasin import supplies from the Fryingpan-Arkansas Project
- Winter Water. Water made available through the Winter Water Storage Program
- Other Reservoir Supply. Releases of stored water from reservoirs (e.g. Lake Meredith), excluding Project Water and Winter Water supplies. This may include reservoir releases of surplus municipal supplies/effluent and water stored under junior priorities.
- Ground Water Pumping. Water pumped primarily from alluvial wells; includes limited nontributary well pumping

Native water is the predominant water supply for agricultural uses in the Lower Arkansas River region, on average accounting for nearly 70% of the supply over the 2000 to 2020 period (see Figure 7). The remaining supplies are considered supplemental, including deliveries from the Winter Water Storage Program, the Fryingpan-Arkansas Project, other reservoir releases (see definition above), and supplemental pumping.

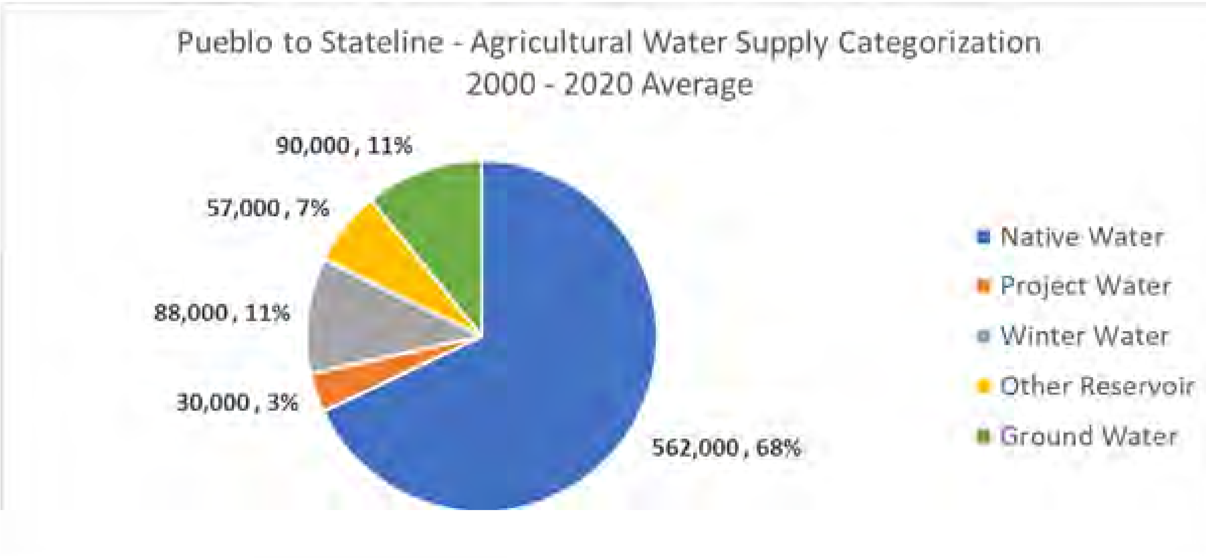


Figure 7. Pueblo to Stateline – Average Annual Agricultural Water Supply Characterization (2000 – 2020)

During very dry years, such as 2002 and 2012, the supplemental supplies are critical as native supplies are greatly reduced due to the dry conditions. Figure 8 below reflects the agricultural water supply characterization for 2012. As reflected, native supplies accounted for only half of the total water diverted or pumped that year and the supplemental supplies accounted for the remaining amount of water diverted or pumped. Also notable is the amount of native water diverted in 2012 compared to average; native diversions in 2012 were less than half of the average native supply on average. This fluctuation in native supplies indicates the vulnerability of this supply, particularly as future climatic conditions are projected to be drier. Maintaining these supplemental supplies, including the infrastructure needed to deliver these supplies, and developing additional supplies will be critical to meeting agricultural demands in the future.

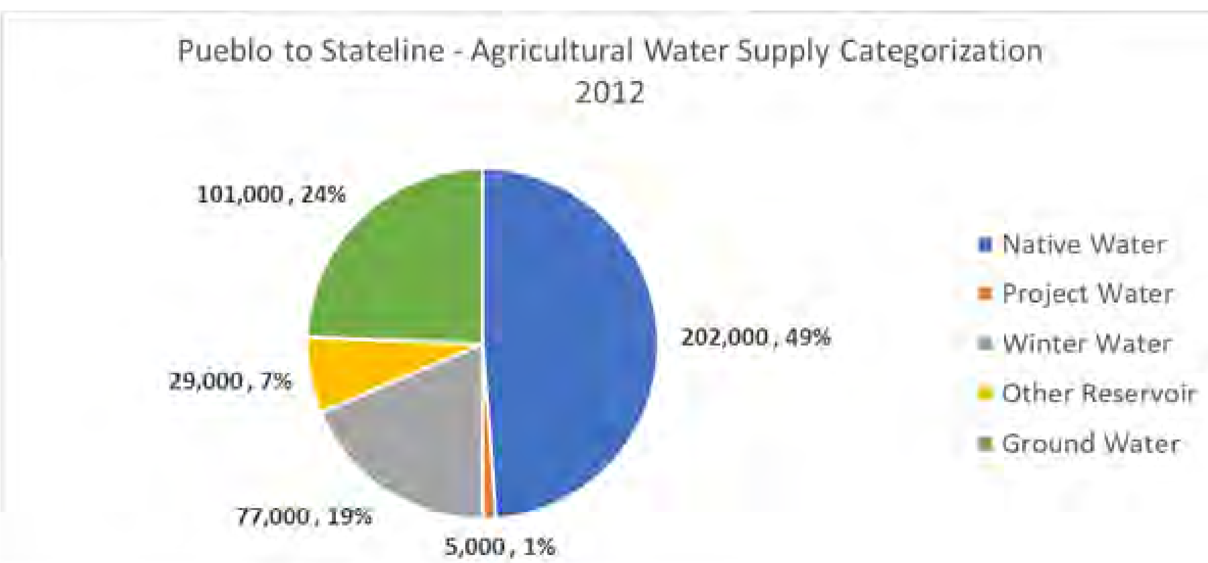


Figure 8. Pueblo to Stateline – Average Annual Agricultural Water Supply Characterization (2012)

4.2.2 Characterization of M&I Water Supplies

The current municipal demand in the Arkansas River Basin is approximately 178,500 acre-feet per year and the current industrial demand is approximately 58,700 acre-feet per year for a total M&I demand of 237,200 acre-feet. From a sub-region perspective, nearly 40% of the municipal demand occurs in Fountain Creek basin and 22% of the municipal demand occurs in the Lower Arkansas River basin as reflected on Figure 9. The majority of the industrial demand is attributable to the Colorado Fuel & Iron plant near Pueblo.

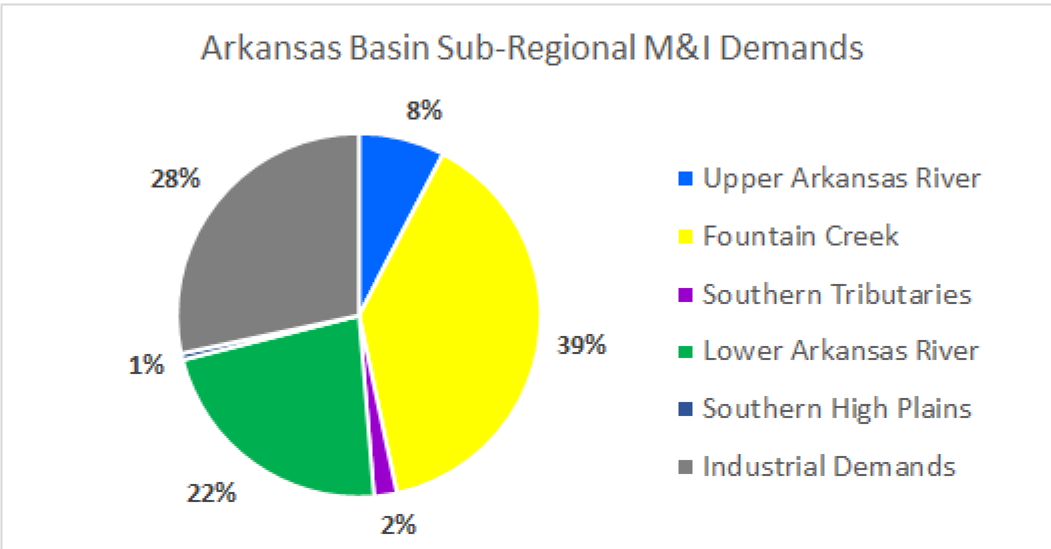


Figure 9. Arkansas Basin Sub-Regional M&I Demands

Using information from the Arkansas Decision Support System (ArkDSS) effort and the Technical Update, the water supplies used to meet the M&I demands were characterized into the following five general categories:

- Native. Water native to the Arkansas River Basin
- Changed Water Rights. Water rights originally decreed for a different use (typically senior irrigation water rights) changed to municipal uses through Water Court (i.e. buy and dry)
- Transbasin Imports/Reuse. Water imported into the Arkansas River basin, can generally be reused to extinction
- Alluvial Well Supply. Water pumped from alluvial wells
- Nontributary Well Supply. Water pumped from nontributary wells, typically from the High Plains Aquifer or designed ground water basins

The resulting characterization of municipal water supplies for each sub-region is reflected below in Figures 10 and 11. The municipal demands in the Upper Arkansas River and Southern Tributaries regions are predominantly met using changed water rights, reflective of smaller municipalities that have changed irrigation rights for municipal purposes to meet growing demands as other water supply options are limited. The Upper Arkansas River region also has significant alluvial well development; the depletions from which are augmented. The characterization of water supplies in the Fountain Creek region are dominated by Colorado Springs Utilities' demands and operations; a substantial portion of the Utilities' demand is met from imported supplies (approaching 70% in this sub-basin). However, other entities in the Fountain Creek sub-basin are served by changed water rights and wells. Similarly, the characterization of water supplies in the Lower Arkansas River region are largely attributable to the Pueblo Board of Water Works' demands and operations; Pueblo's demands are primarily met from both native and changed water rights. Although not graphically represented, the municipal demands in the Southern High Plains region are almost entirely met from nontributary well supplies.

Figure 10. Municipal Water Supplies for the Upper and Lower Arkansas River

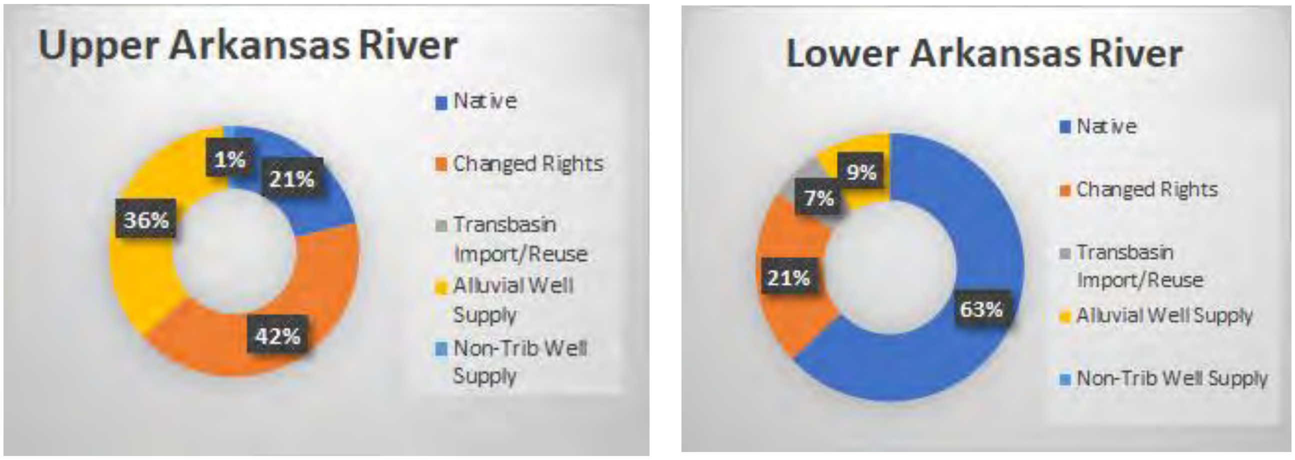
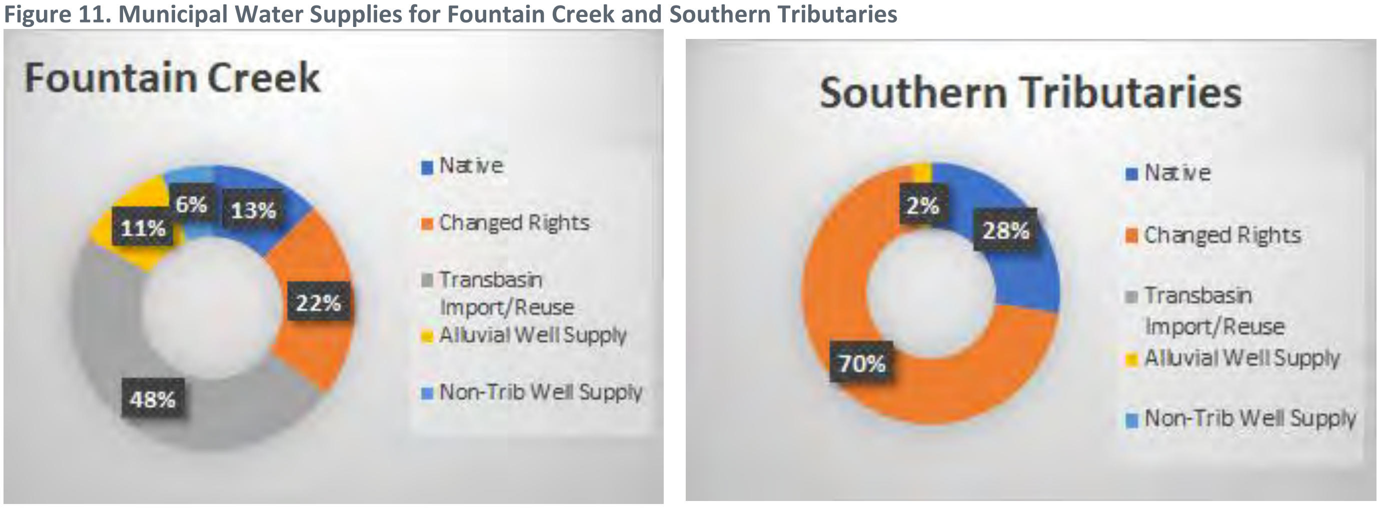


Figure 11. Municipal Water Supplies for Fountain Creek and Southern Tributaries



The characterization of water supplies used to meet industrial demands is largely reflective of Colorado Fuel and Iron (CF&I) demands and operations. CF&I relies predominantly on native supplies to meet demands at their plant, and changed water rights to a lesser degree. Accounting for all industrial demands in the basin, 87% are met from native supplies, 12% from changed water rights, and about 1% from transbasin imports.

4.2.3 Water Supply Vulnerabilities

The agricultural and M&I characterization effort summarized above indicates that the demands in the basin are met by a wide range of water supplies, all of which may be vulnerable in the future. Table xx summarizes the water supply types and potential vulnerabilities that may impact the ability for water users to divert or pump these water supplies in the future. Many of the basin's proposed projects seek to address these future vulnerabilities, however they tend to be specific to a certain entities' water needs. A more holistic approach of addressing vulnerabilities that overlap different supply types may result in regional solutions for the overall basin water supply in the future.

Table 12. Arkansas Basin Water Supply Vulnerabilities

Supply Type	Future Vulnerabilities
Native Water	Reductions to runoff volume under climate adjusted conditions Existing infrastructure may not be sufficient to divert lower flows Increased need for carry-over storage Water quality concerns due to wildfires and lower streamflow
Changed Water Rights	Senior changed water rights may not yield same amount under climate adjusted conditions Increased reliance on changed water rights as other supplies are reduced (i.e. safety net); may lead to increased agricultural dry up Reductions in exchange potential; may require more infrastructure
Transmountain Imports/Reuse & Project Water	Reductions to runoff volume on the Western Slope under climate adjusted conditions Potential Colorado River Compact Administration Increased reliance on reusable supplies may impact streamflow volume and water quality; may also require additional infrastructure to maximize reuse in the future
Winter Water	Reductions in winter-time flows due to climate adjusted conditions available for storage and use under the Winter Water Use Program
Other Reservoir Supply	Increased competition for existing storage due to increased need for storage and sedimentation concerns
Alluvial Well Supply	Contamination of alluvial supplies (e.g. Widefield Aquifer) More stringent water quality standards (e.g. Lower Arkansas communities) Reduction in augmentation supplies: Reduction in excess municipal supplies/return flows currently leased by augmentation providers as municipalities utilize these supplies to meet their own growing demand Potential reduction in transmountain supplies More competition for all augmentation supplies (e.g. changed water rights), increasing cost of agricultural and M&I water
Nontributary Well Supply	Declining aquifer levels More stringent water quality standards

4.3 Opportunities

1. The ability to capture and reuse transbasin water return flows can be enhanced with additional storage, including excess capacity space in Pueblo Reservoir, John Martin Reservoir, and new reservoirs, which could include a lined gravel pit reservoir below the confluence with Fountain Creek to capture transbasin return flows not immediately exchangeable to Pueblo Reservoir. This lined gravel pit is an example of a Restoration of Yield reservoir being evaluated by several water providers.

2. There is the opportunity for M&I water providers to increase conservation of existing supplies so as to better manage supplies during drought, often referred to as drought hardening.

3. Additional water management programs may be feasible to increase the use of reusable water sources, including through indirect and direct potable reuse. These programs need to be carefully evaluated using the best water resources engineering and modeling available to determine feasibility.

4. The Arkansas Valley Conduit (AVC) is a planned 130-mile pipeline with spurs that would serve as many as 40 communities and 50,000 people east of Pueblo. Construction of the AVC will begin in the fall of 2022. AVC will use Fryingpan-Arkansas water or water from participants' sources stored in Pueblo Reservoir. Pueblo Water will treat the water and transmit it to a point at the east end of its system. Participants will be connected to the AVC trunk line as it reaches their area. This will allow communities whose supplies are contaminated from radionuclides to receive clean drinking water years sooner than the completion of the entire AVC. . The AVC will improve water supplies to participating entities and cities.

5. The use of recently implemented ATMs in the Arkansas Basin provides an opportunity to study the effectiveness of these methods towards meeting municipal shortages while reducing the potential of permanent dry-up of farmland. The Super Ditch project, which involves rotational fallowing of irrigated farmland, is moving forward with several irrigation ditch partners and has obtained an exchange decree in Water Court in Case No. 10CW4. Additionally, two pilot rotational fallowing projects are underway under the Catlin Canal system.

6. The loss of water by Tamarisk infestation along the Arkansas River can be reduced by controlling this vegetation and a new concept being evaluated using insects to destroy Tamarisk in other states. For example, the Arkansas River Watershed Invasive Plants Partnership has released Tamarisk Leaf Beetles in the basin from 2009 to 2013; a good population has been established in Fountain Creek watershed and is expanding to the lower Arkansas River Basin. Hopefully this program will result in a long-term stable method to control the Tamarisk and increase the Basin's usable water supply.

7. The current level of water rights administration and accounting in the Arkansas River Basin by the Colorado DWR provides the ability to properly manage and account for new water supply projects, including exchanges and other new concepts.

8. There may be opportunities to partner with owners of non-federal water storage reservoirs in the Arkansas River Basin to bring them up to modern standards while creating additional storage in the basin for managing existing water supplies.

4.4 Summary

The adaptive planning process prescribed in the Colorado Water Plan and developed in the Arkansas Basin Implementation Plan (2015 and 2021 Update) evaluates the needs in the basin, identifies projects to meet those needs, and continuously develops a strategic vision for the BRT to help meet the water supply challenges of the basin. This 2021 BIP Update is not a comprehensive document of all of the previous planning efforts, but instead serves to streamline foundational information about the Arkansas Basin (included here in Volume II), and important planning data and solutions (contained in Volume I).

In the past two decades, the Arkansas Roundtable has moved from the general to the specific, from a sense that each water resource subject area is separate and in direct competition with all the others, to a profound understanding that all these types of water uses are inextricably linked. The recreational economy of the Upper Arkansas depends on transbasin diversions from the Colorado River watershed, municipal reservoir storage, and the senior agricultural water rights calling the water to the Lower Arkansas Valley. The result is a Gold Medal fishery, an environmental gem, but a fragile gem that depends on continued and improving watershed health.

We are literally all in this together.

The question of whether the Roundtable can meet its legislative charge to propose projects to meet the needs of the basin has no final answer, since the needs are dynamic and ever-changing, reflecting the changing society of the Basin's residents. The better question is whether those needs are more likely to be met, to the direct benefit of those basin citizens, through the continued dialogue and collaboration of the Arkansas Basin Roundtable membership. Through the BIP process, the answer is yes.

SECTION 5. REFERENCES

Technical Update to the CWP, 2019

Kuiper v. Atchison, Topeka, and Santa Fe, June, 1978.

Office of the State Engineer, 1996

Office of the State Engineer, 2005

Guide to Colorado Well Permits, Water Rights and Water Administration; DWR September 2012.

Guide to Colorado Well Permits, Water Rights and Water Administration, Sept 2012.

USGS 1985,

The AVC Environmental Impact Statement (Reclamation 2013)

Appendix A: Arkansas Basin Current and 2050 Planning Scenario Water Supply and Gap Revised Results

Analysis for Basin Implementation Plans

Technical Memorandum

Prepared for:

Colorado Water Conservation Board

Project Title:

Arkansas Basin
Current and 2050 Planning Scenario
Water Supply and Gap Revised Results

Date: June 14, 2021

Prepared by: Wilson Water Group

Reviewed by: Brown & Caldwell

Table of Contents

List of Figures

List of Tables

Section 1: Introduction

This technical memorandum summarizes the revised agricultural demands, municipal and industrial (M&I) demands, water supplies, and gap results for the Technical Update effort. This information was developed initially in September 2019 and the approach and results were documented in the Current and 2050 Planning Scenario Water Supply and Gap Results documentation. The approach and results were presented to stakeholders throughout the State and to the Basin Roundtables and feedback was obtained regarding areas where the approaches to developing the agricultural, municipal, and industrial demands or the modeling could be improved or refined. This technical document summarizes these revisions and the impact to the overall water supply and gap results in each basin and Statewide under Current and 2050 Planning Scenario conditions.

The following should be noted regarding this effort:

- The revisions were based on stakeholder input and may not include every aspect of the Technical Update. For example, one basin may only have revised M&I demands whereas another basin may only have revisions to modeling operations.
- Revisions to West Slope basins also impact the transbasin import supply gap estimated for basins that receive imports; revised import supply gaps are also included in the sections below if applicable.
- This document provides only a summary of the revisions; review specific spreadsheets and modeling datasets available on the Colorado Water Plan website for further information on revisions.
- The revised information herein supersedes any previously developed information. Documentation and reports relying on the information from September 2019 will reflect a note to this effect, but the documentation will not be updated.
- The revised information will be used in the Basin Implementation Plan Volume 1 and 2 reports and the Update to the Colorado Water Plan.

1.1 DELIVERABLES

The revised model results are provided both within this document and in separate Excel spreadsheets for each basin. The General Contractor Team for the Technical Update has developed several spreadsheets of more localized results at the Water District level for basins that have requested this detail. These spreadsheets have also been updated and provided to the Local Experts in each of those basins. Additionally, revised streamflow results were loaded into the Flow Tool and made available to the Local Experts. Lastly, the model input and output files were delivered to the General Contractor and made available to the public via the Colorado Water Plan website. These spreadsheets, modeling datasets, the revised Flow Tool, and this documentation serve as the deliverables for this effort.

1.2 DISCLAIMER

The technical data and information generated are intended to help inform decision making and planning regarding water resources at a Statewide or Basin-wide planning level. The information made available is not intended to replace projections or analyses prepared by local entities for specific project or planning purposes. The information or datasets provided are from a snapshot in time and cannot reflect actual or exact conditions in any given basin or the State at any given time. While this Technical Update strives to reflect the Colorado Water Conservation Board's (CWCB) best estimates of future water supply and demands under various scenarios, the reliability of these estimates is affected by the availability and reliability of data and the current capabilities of data evaluation. Moreover, the Technical Update cannot incorporate the varied and complex legal and policy considerations that may be relevant and applicable to any particular basin or project; therefore, nothing in the Technical Update or the associated Flow Tool or Costing Tool is intended for use in any administrative, judicial or other proceeding to evince or otherwise reflect the State of Colorado's or the CWCB's legal interpretations of state or federal law.

Furthermore, nothing in the Technical Update or any subsequent reports generated from these datasets is intended to, nor should be construed so as to, interpret, diminish, or modify the rights, authorities, or obligations of the State of Colorado or the CWCB under state law, federal law, administrative rule, regulation, guideline or other administrative provision.

Section 2: Arkansas Basin Revised Results

The following sections reflect the revisions implemented in the Arkansas Basin and the resulting agricultural and M&I demands, water supply, and gaps modeled results. As discussed above, refer to the original 2019 Technical Update documentation for more information on the demands and gaps in each basin.

2.1 ARKANSAS BASIN AGRICULTURAL REVISIONS

Many aspects of the Arkansas River Technical Update analyses were revised for this effort; agricultural demands were revised to incorporate recent efforts on the Arkansas River Decision Support System (ArkDSS) effort and municipal demands were revised based on user-supplied data. Development of the ArkDSS is currently underway, and when completed, it will consist of data, tools, and models that can be used to help decision-makers at the State and in the basin analyze and plan for current and future water resources conditions. Since the 2019 Technical Update, the ArkDSS effort has developed a series of irrigated acreage coverages and associated estimates of crop irrigation water requirements, as well as developed time series of surface water and ground water supplies used for agricultural purposes in the basin. The Technical Update agricultural demands, water supply, and gaps were revised to incorporate these components of the ArkDSS effort, resulting in a better estimate of current agricultural conditions in the basin. The net effect of these revisions was:

- A reduction to current irrigated acreage due to more accurate delineations of irrigated acreage in the basin; total acreage currently irrigated in the basin is approximately 428,900 acres.
- An increase to agricultural demand, largely due to higher estimates of crop irrigation water requirement resulting from use of the Penman-Monteith method as opposed to the Blaney-Criddle method to estimate crop potential consumptive use.
- An increase to the agricultural gap due to the increased agricultural demand.

No revisions were made to the amount of irrigated acreage removed in the Planning Scenarios due to urbanization, municipal transfers, or ground water sustainability factors. Other factors used to develop the demands for Planning Scenarios, such as climate adjustments to crop irrigation water requirements and sprinkler development, remained unchanged and were applied to the revised agricultural data.

2.2 ARKANSAS BASIN M&I REVISIONS

At the request of the Arkansas Basin Roundtable, in January 2021, ELEMENT updated the Arkansas Basin municipal baseline and projected water demands that were initially prepared for the Colorado Water Plan Technical Update analyses completed in 2019 (Technical Update; 2019 Analysis). The updated analysis incorporates revised 1051 reporting data submitted by the Pueblo Board of Water Work's (PBWW) from 2013 through 2016 and refinements related to the Southeastern Colorado Water Conservancy District Regional Water Efficiency Plan (SCWCD WEP) data. The explicitly modeled demands for PBWW and Colorado Springs Utilities were also updated. The updates affected the following baseline and projected demands:

- Pueblo County,
- Counties included in the Southeastern Regional WEP, and
- Non-revenue demands in counties that have data filled using the basin-wide distribution.

The following sections provide additional detail regarding the analysis and the results, which should supersede the initial results provided with the Technical Update.

2.2.1 PBWW UPDATES

During the Colorado Water Plan Technical Update analyses completed in 2019, ELEMENT had identified and worked with staff from the Colorado Water Conservation Board (CWCB) and PBWW to investigate issues with PBWW's 1051 data. These issues were not resolved at that time and with agreement from CWCB, the analysis proceeded with the reported PBWW 1051 data. In April of 2020, ELEMENT worked with PBWW staff, who corrected and resubmitted the PBWW 1051 data through CWCB's 1051 web portal and provided backup documentation.

In November of 2020, ELEMENT received authorization to make the updates to the Arkansas baseline demand data by incorporating the PBWW revised data and in January 2021 it was confirmed that the future demand projections should also be updated. Table shows a comparison of the Pueblo County demand data from the 2019 analysis and the updated analysis incorporating the revised PBWW. Water demand values are in acre-feet per year (AFY) and gallons per capita per day (gpcd).

Table 1: Pueblo County Baseline Demand Comparison

Analysis	2015 Population Per SWSI Update	Total County Systemwide Demand (AFY)	Total County Demand incl. NRW (gpcd)	Indoor Residential Baseline Demand (AFY)	Outdoor Residential Baseline Demand (AFY)	Indoor Non-Residential Baseline Demand (AFY)	Outdoor Non-Residential Baseline Demand (AFY)	Non-Revenue Baseline Demand (AFY)
2019 Analysis	163,196	72,522	397	11,582	11,343	16,882	7,946	24,769
Jan 2021 Update	163,196	38,371	210	10,944	10,168	8,138	5,111	4,011
Difference	0	(34,151)	(187)	(638)	(1,175)	(8,744)	(2,835)	(20,758)

2.2.2 REGIONAL WEP AND NON-REVENUE WATER UPDATES

Refinements related to the Southeastern Colorado Water Conservancy District Regional Water Efficiency Plan (SECWCD WEP) were also made to the Arkansas baseline municipal demands. The data in the WEP appears to be the same data that were used in the Final Environmental Impact Statement for the Arkansas Valley Conduit and Long-Term Excess Capacity Master Contract. At the recommendation of the Arkansas Basin Roundtable, ELEMENT further reviewed the information in these reports and concluded that a couple of adjustments to the 2019 analysis were warranted. Three water providers were originally classified as being located in Otero County instead of Prowers County: City of Lamar, May Valley Water Assoc, and Town of Wiley. These were updated, increasing the Prowers County baseline demands based on the updated demand reference; Lamar is the largest of these providers and was properly represented in the 2019 analysis because 1051 data were available.

ELEMENT also updated the logic for representing non-revenue water. The water providers included in the regional WEP tend to represent smaller populations, so subsequent impacts on county and basin-wide demands are minimal but we determined that the updated methodology is more consistent with information in the WEP. Rather than applying the basin-level non-revenue distribution as in the 2019 analysis, we applied the WEP average reported non-revenue in the update. In the 2019 analysis, the basin-level non-revenue for the Arkansas Basin was calculated at 18%, which was close to the SECWCD average non-revenue of 20%. With the updates to the PBWW described above, the basin-level non-revenue for the Arkansas basin is calculated at 9%, which is a significant decrease from the 2019 analysis and much different than the SECWCD WEP reported non-revenue value. This is described further in the following section below. To maintain consistency with the SECWCD WEP, a 20% non-revenue was applied to the data for providers included in the WEP.

2.2.3 UPDATED BASELINE

The updates related to PBWW and the Southeastern Regional WEP directly impacted demands in Pueblo County and counties represented in the SECWCD WEP. These changes, predominantly the revised demands for PBWW, changed the Arkansas Basin demand distribution, as shown in Table 2 below.

Table 2: Arkansas Basin Demand Distribution Comparison

	Residential		Non-Residential		
Analysis	Indoor	Outdoor	Indoor	Outdoor	Non-Revenue
2019 Analysis	29.1%	16.3%	19.5%	16.9%	18.3%
Jan 2021 Update	35.2%	19.4%	20.3%	16.5%	8.6%
Difference	6.1%	3.1%	0.8%	-0.4%	-9.7%

As part of the Technical Update that resulted in the 2019 Analysis, logic was defined to “fill” missing information for any county population that is not directly represented by water provider-reported demand data. This includes filling of per capita demands as well as filling the demand distributions as shown above. Keeping the same methodology from the 2019 Analysis, updates associated with the PBWW and SECWD data resulted in new filling values. This affects counties throughout the Arkansas basin that were filled using the updated basin demand distribution. However, a decision was made to not update counties located in multiple basins. For example, Elbert County demands were held constant from the 2019 analysis because it is located in both the Arkansas Basin and the Metro Basin. To avoid impacts to other basins, this update only affects counties located entirely within the Arkansas Basin. The overall demand in counties that cross basin boundaries wouldn’t change significantly if we were to update demands similarly to updates in counties that are located wholly within the Arkansas basin. Furthermore, updating the demand distribution in cross-basin counties wouldn't significantly impact the demand or gap results in either basin.

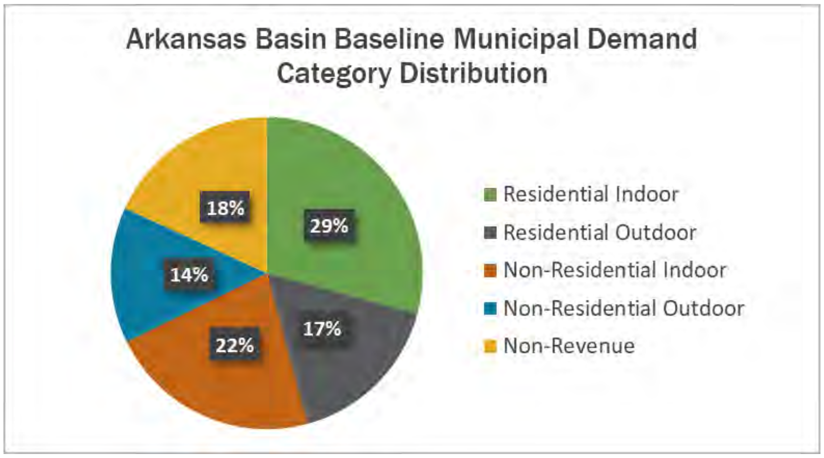
Table 3 below shows the impacts on the Arkansas Basin baseline demands based on the January 2021 updates as described above. Note that the systemwide demand for the Arkansas Basin has decreased by nearly 40,000 AFY and 34,000 AFY of this is directly attributed to the revised PBWW data for the population served by PBWW. Additional demand reductions are attributed to the significant decrease in non-revenue water as a percent of production at the basin level, which impacts the estimated demands for 21% of the basin's population, as shown in the comparison Figure 1 below.

Table 3: Arkansas Basin Baseline Demand Comparison

	Baseline (2015) AFY						
Analysis	Population	Residential Indoor	Non-Residential Indoor	Residential Outdoor	Non-Residential Outdoor	Non-Revenue	Systemwide
2019 Analysis	1,008,434	63,980	48,134	36,404	30,847	39,843	219,208
Jan 2021 Update	1,008,434	64,069	38,545	35,633	26,882	14,539	179,668
Difference	0	89	(9,589)	(771)	(3,965)	(25,304)	(39,540)

Figure 1: 2019 Analysis vs. 2021 Update: Sources of Water Demand Data in the Arkansas Basin

The comparison Figure 2 below shows the updated basin-level demand distribution. Updates to the PBWW demand data had the strongest influence on the basin-level distribution because of the population influenced and the magnitude of the demand changes.



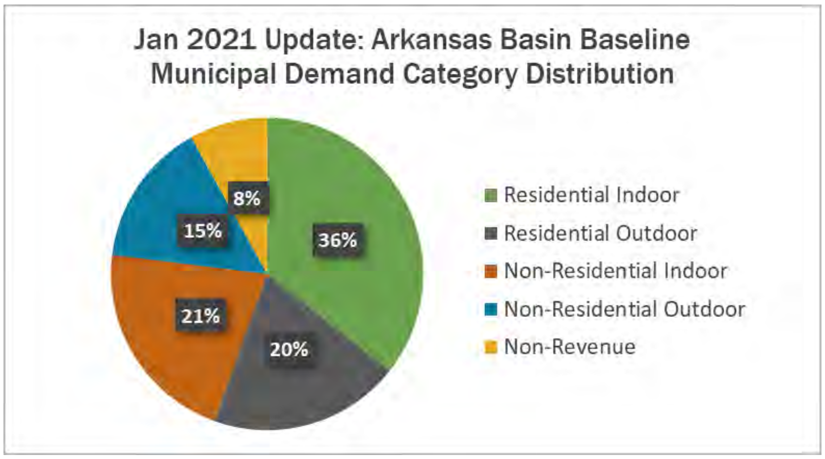
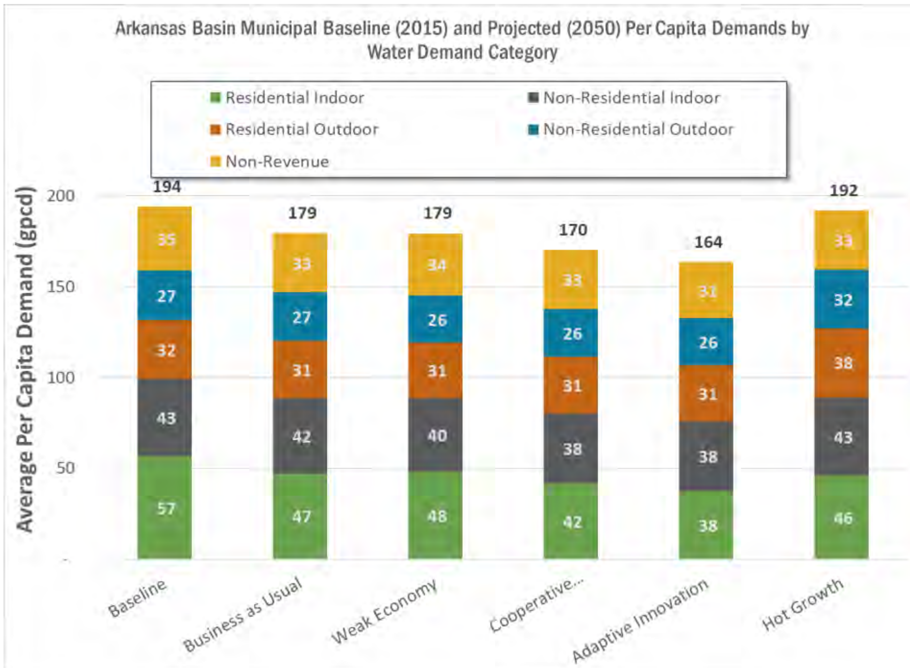


Figure 2: 2019 Analysis vs. 2021 Update: Categories of Water Usage in the Arkansas Basin

The comparison Figure 3 below shows the changes in per capita water demands for each projection scenario. The basin-scale per capita demands have decreased in each scenario, most strongly influenced by the updates to the PBWW demands.



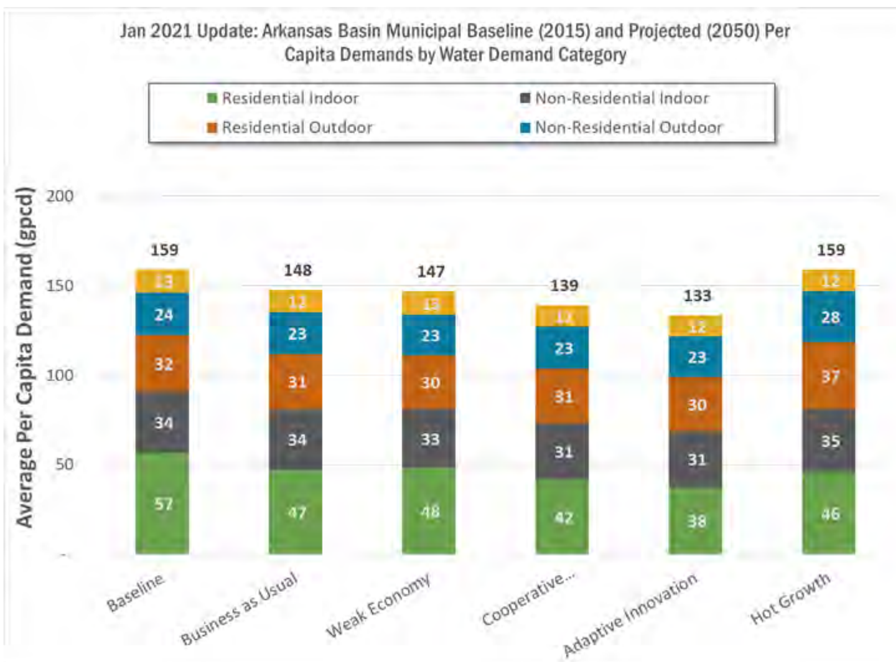


Figure 3: 2019 Analysis vs. 2021 Update: Arkansas Basin Municipal Baseline and Projected Per Capita Demands by Water Demand Category

Through this update, we found an inconsistency in some of the volumetric demand values for the four counties in the Arkansas Basin that have population located in multiple basins. A total of 12 demand values in Table 3-3 of the 2019 Technical Update Volume 2 documentation did not match the associated 2019 demand modeling in Excel Workbook 2. Upon investigation, we have concluded that the 2019 demand modeling analyses were correct and the 2019 documentation was incorrect for these select counties. Table 3-3 from the 2019 documentation is provided below followed by a new table showing the correct data from the 2019 demand modeling Workbook 2. The demands that would need to be corrected in the 2019 Technical Update documentation are identified in the table below. We confirmed that demands for the portions of these counties located in other basins were correctly documented in 2019. For example, Teller County has population located in both the Arkansas Basin and the South Platte Basin and the volumetric demand for the portion located in the South Platte Basin was correctly documented in 2019. Per capita and population values presented in the 2019 documentation and the 2019 demand modeling workbooks were also reviewed and confirmed to match each other.

Table 4: Table 3-3 of Volume 2: Arkansas Basin 2015 Baseline and 2050 Projected Volumetric Demands by County (AFY)

County	Baseline (2015)	Business as Usual	Weak Economy	Cooperative Growth	Adaptive Innovation	Hot Growth
Baca	1,192	921	916	852	831	1,008
Bent	1,295	1,400	1,365	1,280	1,262	1,556
Chaffee	3,473	4,945	4,778	4,476	4,425	5,525
Cheyenne*	171	149	135**	135	143**	176**
Crowley	1,296	1,703	1,654	1,546	1,525	1,899
Custer	832	1,082	1,047	983	971	1,208
El Paso	111,144	166,041	159,910	161,662	163,337	185,392
Elbert*	1,176	3,172	2,945**	2,790	2,815**	3,627**
Fremont	7,962	9,553	9,236	8,705	8,614	10,662
Huerfano	1,478	1,317	1,291	1,214	1,194	1,456
Kiowa	682	536	536	494	481	584
Lake	1,461	1,865	1,807	1,695	1,674	2,081
Las Animas	3,578	3,206	3,151	2,951	2,898	3,539
Lincoln*	1,197	1,704	1,614**	1,533	1,548**	1,942**
Otero	4,421	3,562	3,509	3,297	3,237	3,924
Prowers	3,151	2,888	2,833	2,660	2,616	3,198
Pueblo	72,522	96,277	94,074	95,539	97,912	106,171
Teller*	2,177	3,029	2,758**	2,730	2,849**	3,573**

*Counties with population located in multiple basins. This table represents the portion of the county located in the Arkansas Basin.

**Corrected values are represented (see detailed explanation above).

Table 5: 2019 Analysis – from Workbook 2 - Arkansas Basin 2015 Baseline and 2050 Projected Volumetric Demands by County (AFY)

County	Baseline (2015)	Business as Usual	Weak Economy	Cooperative Growth	Adaptive Innovation	Hot Growth
Baca	1,065	808	805	743	722	885
Bent	1,121	1,193	1,159	1,084	1,066	1,331
Chaffee	3,103	4,328	4,166	3,891	3,842	4,861
Cheyenne*	171	149	145	135	133	164
Crowley	926	1,235	1,190	1,112	1,098	1,386
Custer	744	948	915	856	844	1,063
El Paso	109,209	162,541	156,432	158,022	159,625	181,654
Elbert*	1,176	3,172	3,008	2,790	2,771	3,569
Fremont	7,115	8,397	8,093	7,604	7,514	9,413
Huerfano	1,321	1,157	1,133	1,060	1,040	1,282
Kiowa	488	380	379	348	338	415
Lake	1,306	1,633	1,577	1,474	1,454	1,830
Las Animas	3,197	2,810	2,761	2,572	2,518	3,110
Lincoln*	1,197	1,704	1,652	1,533	1,515	1,900
Otero	3,510	2,816	2,763	2,595	2,546	3,116
Prowers	3,470	3,203	3,156	2,960	2,909	3,519
Pueblo	38,371	49,921	48,161	48,900	50,088	56,450
Teller*	2,177	3,029	2,928	2,730	2,698	3,384

*Counties with population located in multiple basins. This table represents the portion of the county located in the Arkansas Basin.

**Corrected values are represented (see detailed explanation above).

The following tables represent the updated volumetric demands by county based on the January 2021 updates. Note that for the four counties that have population in multiple basins, the demands were held constant for this update. This decision was made to avoid impacts to basins not requesting updates, so these values were manually held constant. A second table below shows the difference in demands by county between the January 2021 update and the 2019 demand modeling workbooks. Note that a negative value represents a decrease in demand.

Table 6: January 2021 Update - Arkansas Basin 2015 Baseline and 2050 Projected Volumetric Demands by County (AFY)

County	Baseline (2015)	Business as Usual	Weak Economy	Cooperative Growth	Adaptive Innovation	Hot Growth
Baca	1,065	808	805	743	722	885
Bent	1,121	1,193	1,159	1,084	1,066	1,331
Chaffee	3,103	4,328	4,166	3,891	3,842	4,861
Cheyenne*	171	149	145	135	133	164
Crowley	926	1,235	1,190	1,112	1,098	1,386
Custer	744	948	915	856	844	1,063
El Paso	109,209	162,541	156,432	158,022	159,625	181,654
Elbert*	1,176	3,172	3,008	2,790	2,771	3,569
Fremont	7,115	8,397	8,093	7,604	7,514	9,413
Huerfano	1,321	1,157	1,133	1,060	1,040	1,282
Kiowa	488	380	379	348	338	415
Lake	1,306	1,633	1,577	1,474	1,454	1,830
Las Animas	3,197	2,810	2,761	2,572	2,518	3,110
Lincoln*	1,197	1,704	1,652	1,533	1,515	1,900
Otero	3,510	2,816	2,763	2,595	2,546	3,116
Prowers	3,470	3,203	3,156	2,960	2,909	3,519
Pueblo	38,371	49,921	48,161	48,900	50,088	56,450
Teller*	2,177	3,029	2,928	2,730	2,698	3,384

*Counties with populations located in multiple basins. This table represents the portion of the county located in the Arkansas Basin.

Table 7: Calculated Difference by County (2019 analysis Workbook 2 and Jan 2021 update) - Arkansas Basin 2015 Baseline and 2050 Projected Volumetric Demands by County (AFY)

County	Baseline (2015)	Business as Usual	Weak Economy	Cooperative Growth	Adaptive Innovation	Hot Growth
Baca	(127)	(113)	(111)	(109)	(109)	(123)
Bent	(174)	(207)	(206)	(196)	(196)	(225)
Chaffee	(370)	(617)	(612)	(585)	(583)	(664)
Cheyenne*	0	0	0	0	0	0
Crowley	(370)	(468)	(464)	(434)	(427)	(513)
Custer	(88)	(134)	(132)	(127)	(127)	(145)
El Paso	(1,935)	(3,500)	(3,478)	(3,640)	(3,712)	(3,738)
Elbert*	0	0	0	0	0	0
Fremont	(847)	(1,156)	(1,143)	(1,101)	(1,100)	(1,249)
Huerfano	(157)	(160)	(158)	(154)	(154)	(174)
Kiowa	(194)	(156)	(157)	(146)	(143)	(169)
Lake	(155)	(232)	(230)	(221)	(220)	(251)
Las Animas	(381)	(396)	(390)	(379)	(380)	(429)
Lincoln*	0	0	0	0	0	0
Otero	(911)	(746)	(746)	(702)	(691)	(808)
Prowers	319	315	323	300	293	321
Pueblo	(34,151)	(46,356)	(45,913)	(46,639)	(47,824)	(49,721)
Teller*	0	0	0	0	0	0

The comparison Table 8 below shows the changes in annual demand for each projection scenario based on the January 2021 updates.

Table 8: Comparison of 2019 Analysis vs. 2021 Update of the Arkansas Basin Municipal Baseline (2015) and Projected (2050) Volumetric Demands (AFY)

	Baseline (2015)	Business as Usual	Weak Economy	Cooperative Growth	Adaptive Innovation	Hot Growth
2019 Analysis (no rounding)	219,208	303,352	293,842	294,540	298,095	337,222
Jan 2021 Update	179,668	249,423	240,423	240,409	242,721	279,332
Difference	(39,540)	(53,929)	(53,419)	(54,131)	(55,374)	(57,890)

The comparison Figure 4 below shows the change in annual volumetric demands by scenario for the 2019 analysis and the January 2021 update.

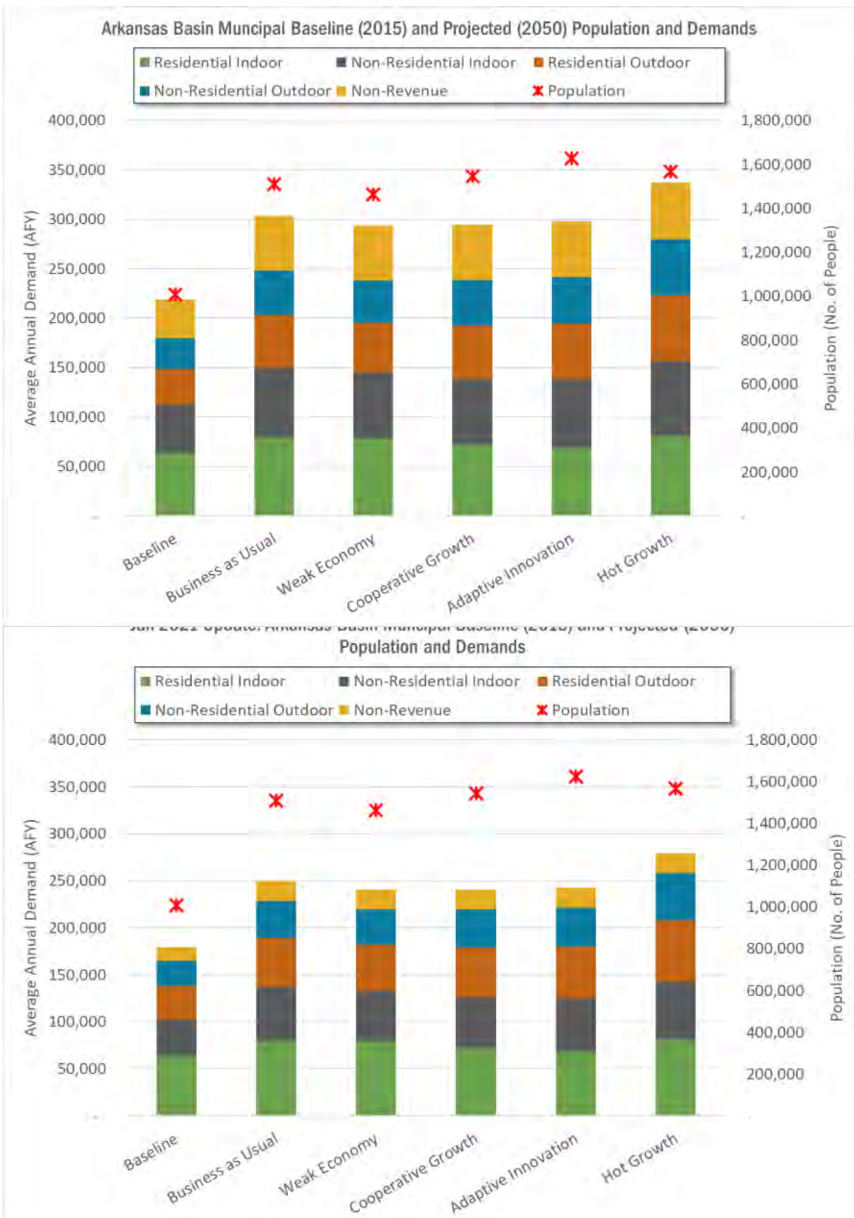


Figure 4: 2019 Analysis vs. 2021 Update: Arkansas Basin Municipal Baseline and Projected Population and Municipal Demands

In addition to the revised municipal demand, further coordination with Colorado Springs Utilities (Utilities) and PBWW was undertaken to better define the amount of existing supplies that the providers can reasonably grow into as their demand increases in the future. The 2019 Technical Update estimated that Utilities had approximately 18,000 acre-feet annually of existing supplies that may be available to meet future demands; no values were provided by PBWW. After additional discussion with the providers and comparison of internal planning efforts to the conditions reflected Planning Scenario, Utilities indicated that approximately 7,000 acre-feet of existing supplies would likely be available to meet future demands if current climate conditions were to be repeated in the future, as reflected in the Business as Usual and the Weak Economy Planning Scenarios. Analysis of Utilities' Integrated Water Resources Plan (IWRP) indicated that these supplies may not be as reliable, and demands may be greater under the warming climate conditions that are reflected in the Cooperative Growth, Adaptive Innovation, and Hot Growth scenarios. As such, Utilities indicated there may be negligible to no additional existing supplies that the provider could use to meeting growing demand in the future in under these Planning Scenarios.

PBWW has projected that it has sufficient water supplies to meet its projected demands through 2050 under all the Planning Scenarios. To the extent it can, PBWW leases its surplus water to others until it is needed for future growth in Pueblo. Part of PBWW's future water supply will come from shares that it owns in the Bessemer Irrigating Ditch Company (BIDC). The BIDC shares were recently changed in Case No. 2017CW3050, which decreed a total of 7,865 acre-feet of historical consumptive use credits which can be used to meet Pueblo's future municipal demand, among other uses. These shares are currently leased for continued agricultural irrigation use on the historically irrigated farms. As BIDC shares are converted to use in PBWW's system there will be a corresponding requirement to dry-up the historically irrigated farms. This dry-up, termed "municipal transfer" for the Technical Update, is accounted for in the agricultural demand estimates for the Planning Scenario.

Based on this revised information, the municipal gap in the Arkansas Basin was reduced by the quantities listed below in Table 9. These values reflect the combined water supplies developed by Utilities and PBWW that are currently available to meet anticipated growth in their respective municipal water demands.

Table 9: Arkansas Basin - Municipal Growth Into Existing Supplies

Business as Usual	Weak Economy	Cooperative Growth	Adaptive Innovation	Hot Growth
14,865 ac-ft	14,865 ac-ft	7,865 ac-ft	7,865 ac-ft	7,865 ac-ft

2.3 ARKANSAS BASIN REVISED WATER SUPPLY AND GAP RESULTS

The following tables reflect the revised demand, water supply, and gap results for the current condition and five planning scenarios, based on the revised data in the Arkansas Basin. These revised results and summarized on a basin-wide level (regional total) and at a sub-regional level. The five Arkansas Basin sub-regions were defined by the BRT based on factors such as water district boundaries, geography, water supplies, and water administration practices. The subregions and counties represented by each are shown listed in Table 10.

Table 10. Counties Representing the Arkansas Basin Subregions

Subregion	Water District(s)	County
Upper Arkansas	11, 12, 13	Chaffe, Custer, El Paso, Fremont, Gunnison, Lake, Park, Pueblo, Saguache, Teller
Fountain Creek	10	El Paso, Fremont, Pueblo, Teller
Southern Tributaries	15, 16, 18, 19, 79	Custer, Huerfano, Las Animas, Pueblo
Lower Arkansas	14, 17, 67	Baca, Bent, Cheyenne, Crowley, Custer, Elbert, El Paso, Fremont, Huerfano, Kiowa, Kit Carson, Las Animas, Lincoln, Otero, Prowers, Pueblo
Southern High Plains	66	Baca, Las Animas

*Counties with populations located in multiple subregions or basins.

The basin-wide and subregion agricultural demand, supply, and gap are summarized in Table 11 and Table 12, respectively. The agricultural demand and the resulting gap increased by approximately 5 percent due to the revised acreage data, CIR estimates, and water supply information. All subregional (and thus basin-wide) agricultural demands are projected to be similar or even reduced as compared to baseline for all planning scenarios, which is attributed to a predicted reduction of irrigated acres as result of increased urbanization, transfers of agricultural water rights to municipal uses, and declining aquifer levels in the Southern High Plains. Will still less than baseline, the Lower Arkansas River subregions is projected to account for almost two-thirds (about sixty-five percent) of the agricultural demand in this basin, with demand by other subregions raging from less than five percent to seventeen percent.

Table 11: Arkansas Basin Agricultural Water Supply and Gap Summary

	Agricultural Results	Baseline	Business as Usual	Weak Economy	Coop. Growth	Adaptive Innovation	Hot Growth
Average	Average Annual Demand (ac-ft)	2,021,019	1,883,846	1,873,552	1,972,670	1,795,599	2,001,617
	Average Annual Demand Increase from Baseline (ac-ft)	-	-	-	-	-	-
	Average Annual Gap (ac-ft)	736,834	696,943	695,489	838,888	876,877	978,067
	Average Annual Gap Increase from Baseline (ac-ft)	-	-	-	102,055	140,043	241,233
	Average Annual Percent Gap	36%	37%	37%	43%	49%	49%
	Average Annual CU Gap (ac-ft)	372,977	352,711	351,902	432,026	453,731	505,939
Critically Dry Maximum	Demand In Maximum Gap Year (ac-ft)	2,605,505	2,421,767	2,409,289	2,413,687	2,165,477	2,420,205
	Increase from Baseline Demand (ac-ft)	-	-	-	-	-	-
	Gap In Maximum Gap Year (ac-ft)	1,728,792	1,626,662	1,623,140	1,803,191	1,836,424	2,054,111
	Increase from Baseline Gap (ac-ft)	-	-	-	74,399	107,632	325,320
	Percent Gap In Maximum Gap Year	66%	67%	67%	75%	85%	85%

Table 12: Arkansas Basin Agricultural Water Supply and Gap Summary – By Subregion

	Agricultural Results	Baseline	Business as Usual	Weak Economy	Coop. Growth	Adaptive Innovation	Hot Growth
Upper Arkansas River	Average Annual Demand (ac-ft)	284,941	261,774	261,774	314,829	299,197	332,501
	Average Annual Demand Met (ac-ft)	213,467	193,276	193,276	205,531	179,624	199,668
	Average Annual Gap (ac-ft)	71,474	68,498	68,498	109,298	119,573	132,833
Fountain Creek	Average Annual Demand (ac-ft)	40,461	32,571	32,571	36,151	34,079	37,822
	Average Annual Demand Met (ac-ft)	35,503	28,583	28,583	31,497	29,176	32,381
	Average Annual Gap (ac-ft)	4,958	3,988	3,988	4,654	4,902	5,441
Southern Tributaries	Average Annual Demand (ac-ft)	173,060	169,391	169,391	204,855	196,385	218,295
	Average Annual Demand Met (ac-ft)	85,378	83,738	83,738	46,481	13,579	15,109
	Average Annual Gap (ac-ft)	87,682	85,653	85,653	158,374	182,806	203,186
Lower Arkansas River	Average Annual Demand (ac-ft)	1,410,896	1,319,545	1,314,797	1,322,237	1,192,170	1,331,041
	Average Annual Demand Met (ac-ft)	838,758	781,265	777,942	756,417	623,257	695,194
	Average Annual Gap (ac-ft)	572,138	538,280	536,855	565,820	568,913	635,846
Southern High Plains	Average Annual Demand (ac-ft)	111,661	100,565	95,019	94,599	73,769	81,957
	Average Annual Demand Met (ac-ft)	111,079	100,041	94,524	93,856	73,085	81,197
	Average Annual Gap (ac-ft)	582	524	495	743	684	760

The revised basin-wide M&I demand, supply and gaps are summarized in Table 13; sub-regional results are provided in Table 14. The M&I demand decreased by approximately 15 percent due to the revised water usage information, however the M&I gap had a more modest reduction due to the revised estimates of growth into existing supplies for major municipalities in the basin. At the subregional level, all of the planning scenarios project increased M&I water demands relative to the baseline scenario except for the Southern High Plains subregion. The Fountain Creek subregion is projected to accounts for about one-half of the overall basin M&I demand, followed by the Lower Arkansas River subregion at about thirty-five percent of basin demands. These subregional demands reflect projected per capita use and population increases which are shown by county in Section 2.2.3.

Table 13: Arkansas Basin M&I Water Supply and Gap Summary

	M&I Results	Baseline	Business as Usual	Weak Economy	Coop. Growth	Adaptive Innovation	Hot Growth
Average	Average Annual Demand (ac-ft)	237,235	309,391	294,528	299,135	302,338	345,662
	Average Annual Demand Increase from Baseline (ac-ft)	-	72,156	57,293	61,899	65,103	108,426
	Average Annual Gap (ac-ft)	-	57,291	42,428	54,034	57,238	100,561
	Average Annual Gap Increase from Baseline (ac-ft)	-	57,291	42,428	54,034	57,238	100,561
	Average Annual Percent Gap	0%	19%	14%	18%	19%	29%
Critically Dry Maximum	Demand In Maximum Gap Year (ac-ft)	237,235	309,391	294,528	299,135	302,338	345,662
	Increase from Baseline Demand (ac-ft)	-	72,156	57,293	61,899	65,103	108,426
	Gap In Maximum Gap Year (ac-ft)	-	57,291	42,428	54,034	57,238	100,561
	Increase from Baseline Gap (ac-ft)	-	57,291	42,428	54,034	57,238	100,561
	Percent Gap In Maximum Gap Year	0%	19%	14%	18%	19%	29%

Table 14: Arkansas Basin M&I Water Supply and Gap Summary – By Subregion

	M&I Results	Baseline	Business as Usual	Weak Economy	Coop. Growth	Adaptive Innovation	Hot Growth
Upper Arkansas River	Average Annual Demand (ac-ft)	15,584	19,783	18,819	17,964	17,970	22,404
	Average Annual Demand Met (ac-ft)	15,584	15,584	15,560	15,584	15,584	15,584
	Average Annual Gap (ac-ft)	-	4,199	3,259	2,380	2,386	6,819
Fountain Creek	Average Annual Demand (ac-ft)	110,043	159,905	153,427	155,506	157,129	178,619
	Average Annual Demand Met (ac-ft)	110,043	117,043	116,690	110,043	110,043	110,043
	Average Annual Gap (ac-ft)	-	42,862	36,737	45,463	47,086	68,576
Southern Tributaries	Average Annual Demand (ac-ft)	17,828	18,758	17,471	18,171	18,313	20,762
	Average Annual Demand Met (ac-ft)	17,828	17,828	17,322	17,815	17,828	17,828
	Average Annual Gap (ac-ft)	-	930	149	356	486	2,934
Lower Arkansas River	Average Annual Demand (ac-ft)	92,801	110,158	104,032	106,770	108,220	123,011
	Average Annual Demand Met (ac-ft)	92,801	100,666	98,995	100,666	100,666	100,666
	Average Annual Gap (ac-ft)	-	9,492	5,038	6,104	7,555	22,345
Southern High Plains	Average Annual Demand (ac-ft)	980	788	780	723	705	867
	Average Annual Demand Met (ac-ft)	980	788	780	723	705	867
	Average Annual Gap (ac-ft)	-	-	-	-	-	-

Table 15: Arkansas Basin Total Water Supply and Gap Summary

	Agricultural and M&I Results	Baseline	Business as Usual	Weak Economy	Coop. Growth	Adaptive Innovation	Hot Growth
Average	Average Annual Demand (ac-ft)	2,258,254	2,193,237	2,168,080	2,271,804	2,097,937	2,347,278
Average	Average Annual Gap (ac-ft)	736,834	754,233	737,916	892,922	934,115	1,078,629
Average	Average Annual Percent Gap	33%	34%	34%	39%	45%	46%
Critically Dry Maximum	Demand In Maximum Gap Year (ac-ft)	2,842,740	2,731,159	2,703,817	2,712,822	2,467,815	2,765,867
Critically Dry Maximum	Gap In Maximum Gap Year (ac-ft)	1,728,792	1,683,953	1,665,568	1,857,225	1,893,661	2,154,673
Critically Dry Maximum	Percent Gap In Maximum Gap Year	61%	62%	62%	68%	77%	78%

Due to revisions in the West Slope basins, the availability of water for import into the Arkansas Basin was also revised. As discussed in the 2019 Technical Update documentation, transbasin imports are reflected at their historical levels and a gap in the table below indicates that the historical import could not be diverted in the source basin due to a physical or legal limitation on the water supply at the diverting location. Although not incorporated into the basin-wide gap values, a reduction in transbasin supplies could increase the total Arkansas Basin gap by more than the values shown in the table due to reuse of these supplies throughout the basin. Note that there was a less than one percent change in the transbasin import supply gap as a result of revisions in the West Slope basins.

Table 16: Summary of Transbasin Imports to the Arkansas Basin

	Transbasin Import Supply Gap Results	Baseline	Business as Usual	Weak Economy	Coop. Growth	Adaptive Innovation	Hot Growth
Average	Average Annual Import Supply (ac-ft)	123,244	123,244	123,244	123,244	123,244	123,244
Average	Average Annual Import Supply Gap (ac-ft)	1,261	1,220	1,231	15,424	27,234	27,687
Average	Average Annual Import Supply Gap Increase from Baseline (ac-ft)	-	-	-	14,163	25,973	26,426
Average	Average Annual Import Supply Percent Gap	1%	1%	1%	13%	22%	22%
Critically Dry Maximum	Import Supply In Maximum Gap Year (ac-ft)	154,756	154,756	154,756	154,756	126,528	126,528
Critically Dry Maximum	Import Supply Gap In Maximum Gap Year (ac-ft)	8,086	8,086	8,086	35,788	49,639	48,685
Critically Dry Maximum	Increase from Baseline Import Supply Gap (ac-ft)	-	0	0	27,702	41,553	40,599
Critically Dry Maximum	Import Supply Percent Gap In Maximum Gap Year	5%	5%	5%	23%	39%	38%

Appendix B: Arkansas Basin Project Database

Arkansas Basin Project Database Update

Technical Memorandum

Prepared for:

Arkansas Basin Roundtable

Project Title:

Arkansas Basin Implementation Plan Project Database Update

Date: January 2021

From: Brown and Caldwell, LRE Water, Forsgren and Associates

Prepared by: Brown and Caldwell
Reviewed by: Wilson Water Group

Table of Contents

Section 1:
Project Database Update

The development of the Arkansas Basin Project Database began during the initial drafting of the Basin's 2015 Basin Implementation Plan (BIP). Following a thorough process to identify needs in the basin (which covered the whole range of type: agriculture, recreation, environment, municipal, water quality, conservation, and storage), the Arkansas Basin Roundtable (BRT) solicited projects that might address the identified needs. With updated information on future water needs and gaps estimated in the Technical Update to the Water Plan (2019), and revisions to the gaps described in the 2021 BIP, the Arkansas BRT again solicited projects to meet those needs. The process for completing this update, and the plan for continuing to pursue and support basin projects into the future is described in this Technical Memorandum.

1.1 PROJECT DATABASE UPDATE PROCESS

In the spring of 2020, the CWCB, in partnership with the Arkansas BRT, retained LRE Water and Forsgren and Associates to serve as the Arkansas Basin's Local Expert (LE). The scope of work for the LE included working with the BRT to update the basin's 2015 Projects List, formerly referred to as the Identified Projects and Processes (IPP) List. Specific updates were to include:

- Updating project information from projects identified in 2015, including filling-in missing core data (such as cost, yield, location, status)
- Adding new projects to the Project Database, and
- Developing a project prioritization, or "Tier" for each project, based on its readiness for implementation.

1.1.1 BASIN OUTREACH

The LE initially gathered information to update the Project Database through meetings with the Arkansas BRT and its members, as well as posting a "call" for new projects on the BRT's website. In addition, the LE held two outreach meetings, one for the upper Arkansas Basin, and one for the lower Arkansas basin, to explain the Project Database update process, gather data from meeting attendees, and spread the word that project data could be forwarded to the LE during the update process. BRT members were crucial in their outreach to stakeholders within their communities, and many projects were added to the Project Database through this outreach.

1.2 PROJECT DATABASE UPDATE STATUS

The timeframe for the Project Database update was from approximately May 2020 through May 2021. During that timeframe, 151 new projects were added, bringing the total amount of "active" projects to 361. The CWCB is currently working to develop an online database to store each basin's Project Database so that it can be accessed by BRTs and updated on a more regular basis. With the online database, the Project Database will become a better tool for project tracking and basin planning efforts.

Section 2:
Basin Projects Summary

The Arkansas Basin's Project Database was analyzed to help stakeholders better understand the types of projects that are being pursued in the basin, and to help future planning by highlighting where basin needs may not be addressed by planned projects.

2.1 PROJECT CATEGORIZATION

Figures 1 and 2 below summarize the major categories of projects in the current basin Project Database. In general, there is a fairly equal distribution of projects between those that are concepts, those that are planned, and those that are being implemented. In looking at project types, the largest category of projects is that which address watershed needs, with municipal projects being the second largest category. Projects meeting agriculture and storage needs are also well-represented in the Project Database.

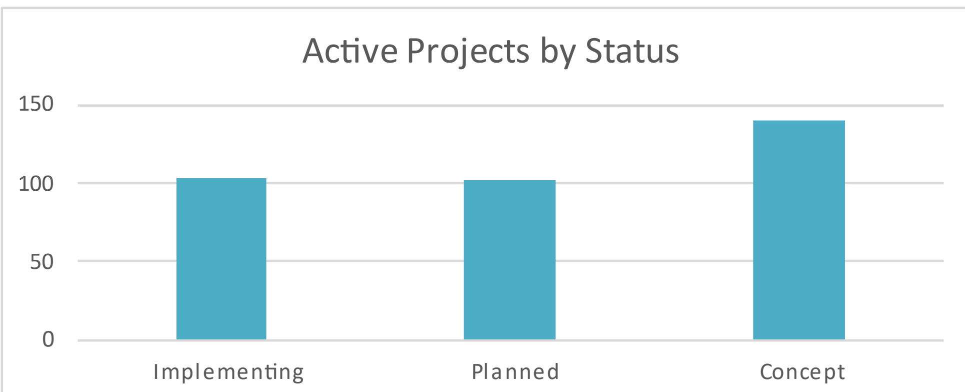


Figure 1. Arkansas Basin Active Projects by Status

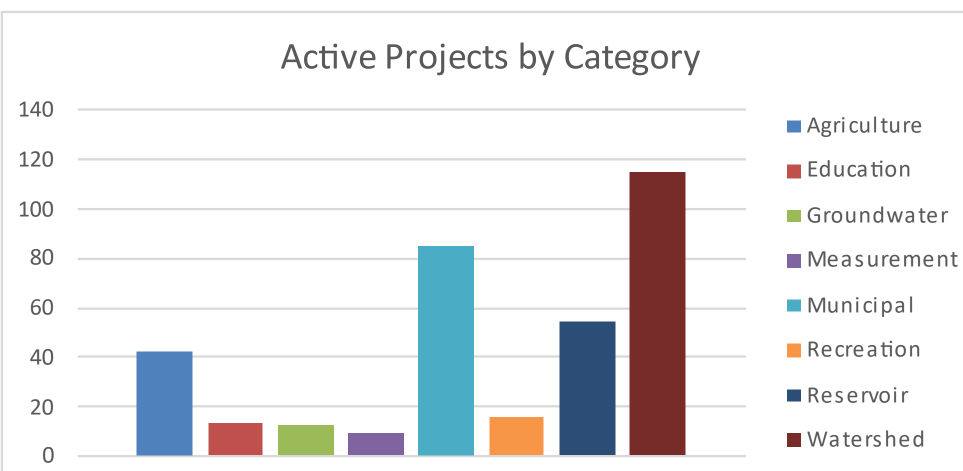


Figure 2. Arkansas Basin Active projects by Category

In recognition of the fact that many of the Arkansas Basin's needs are unique by region, the Project Database was analyzed by looking at projects on a regional basis. The regions were defined as the following (see Figure 3):

- Upper Arkansas Basin
- Fountain Creek
- Southern Tributaries
- Lower Arkansas Basin
- Southern High Plains

Figure 3. Arkansas Basin Subregions

Figure 4 shows that the greatest number of projects are focused on the mainstem of the Arkansas River. The categorization also includes projects benefitting the basin as a whole, as well as projects focused in the Colorado River basin that will benefit transmountain supplies.

Figure 5. shows the types of projects within each subregion by project type. Again, the largest number of projects are for watershed and municipal needs, with a significant number of agricultural and storage projects. Note that there are also projects to meet groundwater needs in the Lower Arkansas Basin and the Southern High Plains.

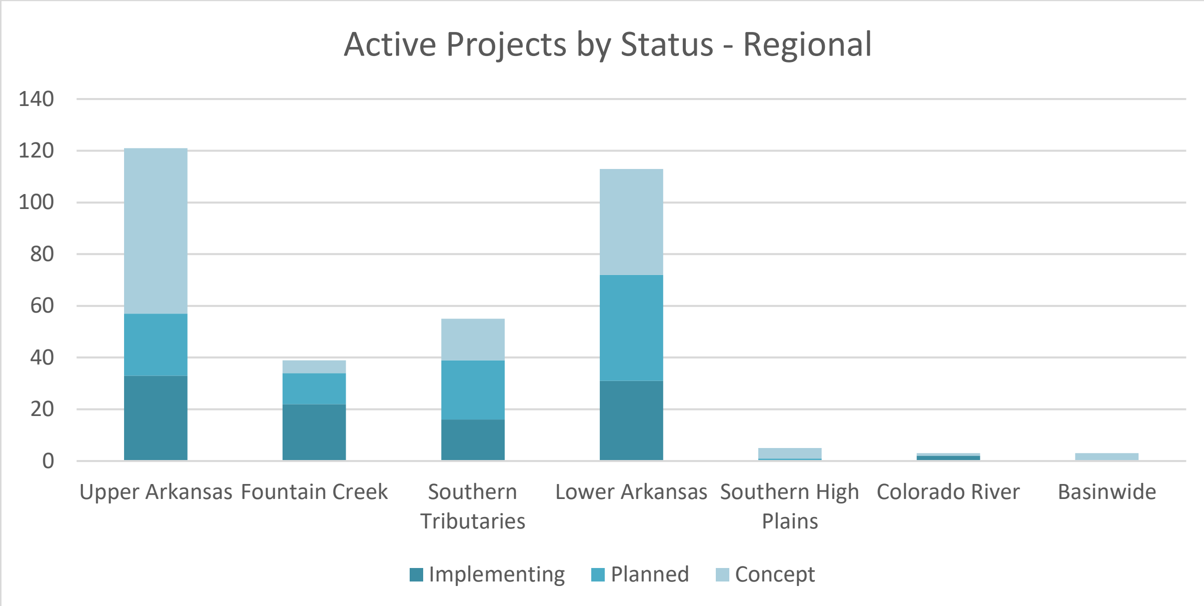


Figure 4. Active Projects by Subregion

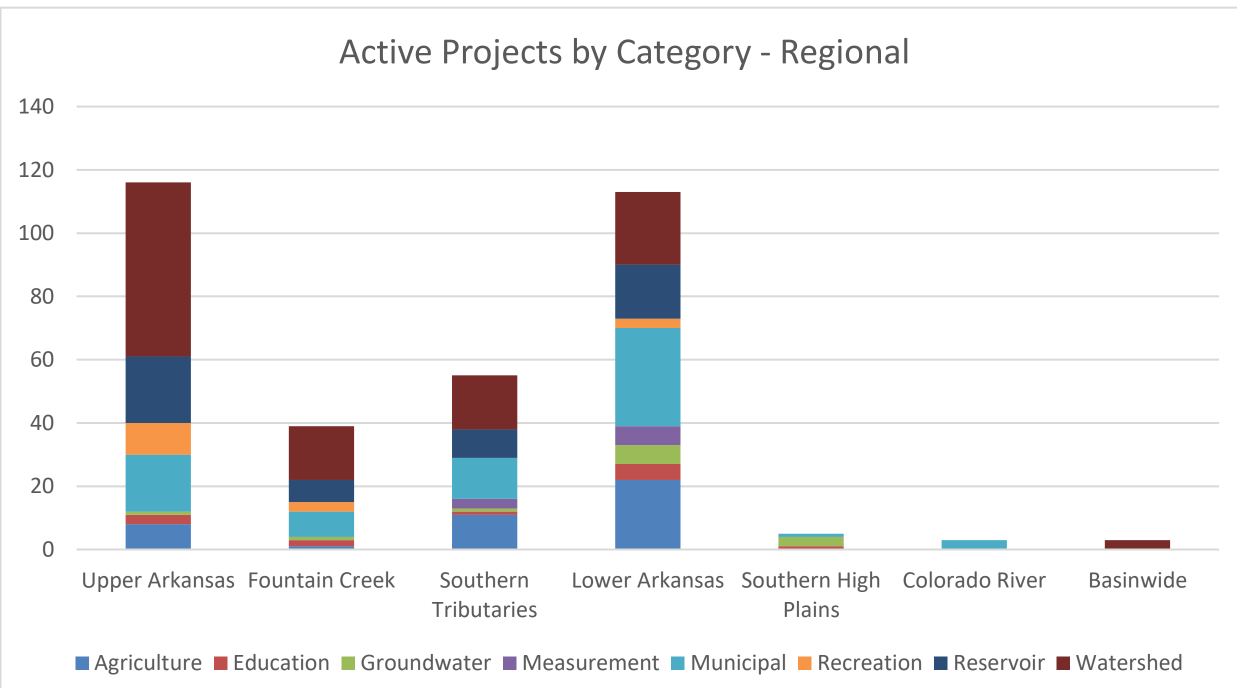


Figure 5. Active Projects by Category and Subregion

2.1.1 PROJECT TIERING

A new feature of the Projects Database for the BIP Update is the assignment of "tiers" to projects. The project tiering exercise is a tool that roundtables can use to do a preliminary characterization of projects and associated project readiness. It facilitates a "first-pass"

TIER 1	**Ready** *Ready to launch and has full data set*
TIER 2	**Pursuing** *Almost ready to move forward and has a significant amount of data*
TIER 3	**Developing** *Project is developing but still needs to be fleshed out*
TIER 4	**Considering** *Project not yet moving forward but should be kept on the list*

process and helps standardize data-gathering to allow for project updates and movement through the tiers as they advance toward funding. Project tiering was initially developed as a tool for basin-level WSRF grant approval discussions, where the data fields describing alignment with BIPs, local planning, and criticality are likely to be considered. Note that some of these categories are subjective and were considered differently across basins. Tiering has no bearing on whether a project can be funded. Project proponents can apply for CWCB funding whether or not their project is in the database, and inclusion of a project in the database does not guarantee funding, nor signify support by the roundtable. For the CWCB in the long term, it will be useful for identifying immediate and long-term project costs and associated funding needs. Data fields describing level of readiness, alignment with the Colorado Water Plan, and the amount of available project data will also be considered.

Table 1 below provides some overall statistics on the 2020 Arkansas Basin Project Database, including tiering.

Table 1. Summary of Arkansas Basin Projects

Total projects	361
New projects added in 2020	151
Projects completed	270
Projects being implemented	103
Projects identified as meeting M&I needs	140
Projects identified as meeting Ag needs	119
Projects identified as meeting E&R needs	180
Tier 1 projects	27
Tier 2 projects	67
Tier 3 projects	152
Tier 4 projects	115
TOTAL COST OF ALL PROJECTS	$3,636,000,000
PERCENTAGE OF PROJECTS WITH AN ESTIMATED COST	34%

Projects that are concepts, planned, or are being implemented were the basis for the above data summary (with the exception of data specifically describing projects completed or being implemented).

Project_ID	Project_Name	Project_Description	Key_Word_1	Key_Word_2	Key_Word_3	Key_Word_4	Status	Lead_Proponent	Lead_Contact	Municipal_Ind_Need	Agricultural_Need	Envr_Rec_Need	Admin_Need	Latitude	Longitude	County	Water_District	Estimated_Yield	Yield_Units	Estimated_Capacity	Capacity_Units	Estimated_Cost	Overall_priority
ARK-2015-0001	CSWD Cucharas River Bank Intake Structure	Conduct permitting and construct facilities for an improved water treatment p[ant river bank intake structure	Supply & Demand Gap	Funding	Land Use		Planned	CSWD	Board chairman	100	0	0	0	37.332049	-105.096323	Huerfano	16	0				$ 400,000.00	Tier 3
ARK-2015-0002	Baker Creek Water Treatment Plant Storage	This project would increase the water storage capacity of the Cucharas Sanitation and Water District's Baker Creek water	Supply & Demand Gap	Funding	Storage		Planned	CSWD	CSWD Board Chairman	50	0	50	0	37.345076	-105.126966	Huerfano	16					$ 200,000.00	Tier 3
ARK-2015-0004	Huerfano River Futile Call Administration Model and Gages	Transit or futile call model development as requested by DEO and HCWCD. Except for one monitoring well, the project is	Additional			Water right administration	Implementing	DEO, HCWCD	HCWCD DEO	33	33	33	0	37.870263	-104.601141	Huerfano	79					$ 300,000.00	Tier 1
ARK-2015-0006	Cucharas Basin Regional Augmentation Plan	Similar to the almost completed 2015-0005, this is a basin-wide augmentation program for the Cucharas River. Five 5 reservoirs are under design and junior water rights have been	Supply & Demand Gap	Storage	Land Use	Municipal	Planned	Huerfano County Water Conservancy District		80	10	10	0	37.770339	-104.66546	Huerfano	16	200	acre-feet (AF)	150	acre-feet (AF)	$ 8,000,000.00	Tier 1
ARK-2015-0009	La Veta Town Lakes Expansion	Enlarge to hold conditional storage decree and direct flow rig transfer to storage.	Supply & Demand Gap	Storage	Watershed Health,	Municipal	Planned	Town of La Veta, HCWCD	Town LV; mayor Doug Brgoch	50	0	50	0	37.494007	-105.00423	Huerfano	16					$ 400.00	Tier 3
ARK-2015-0010	La Veta Mexican Ditch Transfer Facilities	Complete facilities for Mexican Ditch transfer from 00CW 130, return flow pond, measuring devices and satellite uplinks piping, survey and monument land dry up.	Land Use	Supply & Demand Gap	Watershed Health, Environment &	Municipal	Implementing	Town of La Veta, HCWCD	Town LV; mayor Doug Brgoch	50	0	50	0	37.494795	-105.005636	Huerfano	16					$ 1,000,000.00	Tier 1
ARK-2015-0012	City of Walsenburg Water System Rehabilitation	Rehabilitation of municipal raw water pipeline and treated water storage improvements.	Supply & Demand Gap	Funding		Municipal	Planned	City of Walsenburg, HCWCD	City Administrator 719-738-1048	100	0	0	0	37.596173	-104.850402	Huerfano	16						Tier 3
ARK-2015-0014	Huerfano River Watershed Assessment	Initiate collaborative watershed assessment; design and construct mitigation facilities.	Watershed Health, Environment &	Agriculture	Education, Outreach &		Concept	Huerfano County Water Conservancy District		10	20	70	0	37.666972	-105.4511	Huerfano	79					$ 200,000.00	Tier 3
ARK-2015-0015	Lower Purgatoire River Flow Augmentation	Winter flow augmentation during WWSP period.	Watershed Health, Environment &				Concept	CPW	CPW SE Region Aquatics	0	0	100	0	37.159294	-104.528915	Las Animas	19						Tier 4
ARK-2015-0016	Lower Purgatoire River Native Fish Project	Native fish habitat protection, riparian protection, Instream flow/maintenance of natural flow regime as opportunities allow	Watershed Health, Environment & Recreation	Conservation			Concept	CPW	CPW SE Region Aquatics	0	0	100	0	38.064497	-103.178803	Las Animas	17						Tier 4
ARK-2015-0017	Lower Purgatoire River Habitat Project	Riparian protection/enhancement, instream flow appropriation instream habitat improvement, land use protection.	Watershed Health, Environment &	Conservation			Concept	CPW	CPW SE Region Aquatics	0	0	100	0	37.129432	-104.63235	Las Animas	19						Tier 4
ARK-2015-0018	Lower Purgatoire River Management	Stream habitat improvement/bank stabilization.	Watershed Health, Environment &	Agriculture			Concept	CPW	CPW SE Region Aquatics	0	50	50	0	37.065792	-104.953014	Bent Las Animas	19						Tier 4
ARK-2015-0019	Lower Purgatoire River Aquifers	Develop deep water aquifers pursuant to CPW decrees.	Watershed Health, Environment &	Agriculture			Concept	CPW	CPW SE Region Aquatics	0	50	50	0	37.15863	-104.962979	Bent Las Animas	19						Tier 4
ARK-2015-0020	Grape Creek Management - CPW 1	Instream flow filing and protection, flow stabilization, water management efficiency, instream habitat improvement, land	Watershed Health, Environment &	Agriculture	Conservation		Planned	CPW, BLM	CPW SE Region Aquatics	0	50	50	0	38.4066	-105.326376	Custer Fremont	12						Tier 3
ARK-2015-0021	Grape Creek Management - CPW 2	Flow enhancement and habitat/species protection for Grape Creek.	Watershed Health, Environment &	Conservation			Planned	CPW	CPW SE Region Aquatics	0	0	100	0	38.20896	-105.451035	Custer Fremont	13						Tier 3
ARK-2015-0022	John Martin Reservoir Permanent Pool	Maintain 10,000 - 15,000 AF pool to support fishing and flat water boating on reservoir in cooperation with Colorado Parks	Watershed Health, Environment &	Storage			Implementing	CPW	CPW SE Region Water Specialist	0	0	100	0	38.075137	-102.949149	Bent	67						Tier 2
ARK-2015-0023	Upper Arkansas River Placer Gold Panning/Dredging Operations	Reduce threats from recreational dredging operations to improve instream and riparian habitat for sport fishery by	Watershed Health, Environment &				Implementing	CPW	CPW SE Region Aquatics	0	0	100	0	38.795846	-106.111001	Chaffee Lake	11						Tier 2
ARK-2015-0026	Hydraulic Diversion Structure, Canyon City	Reconstruction of a water diversion structure with addition of boat chute and fish ladder.	Watershed Health, Environment &	Agriculture			Concept	CPW/ARWC/AROA/Canon City Hydraulic and Irrigating	CPW SE Region Water Specialist	0	50	50	0	38.429767	-105.270966	Fremont	12						Tier 4
ARK-2015-0027	Cañon City Municipal Diversion Structure	Incorporate boat chute and fish ladder retrofit.	Watershed Health, Environment &			Municipal	Concept	CPW/ARWC/AROA/Cañon City	CPW SE Region Water Specialist	50	0	50	0	38.434145	-105.253272	Fremont	12						Tier 4
ARK-2015-0028	Oil Creek Diversion Structure, Canon City	Reconstruction of a water diversion structure with addition of boat chute and fish ladder.	Watershed Health, Environment &	Agriculture			Concept	CPW/ARWC/AROA/Oil Creek Ditch Company	CPW SE Region Water Specialist	0	50	50	0	38.434114	-105.256964	Fremont	12						Tier 4
ARK-2015-0029	Fremont Diversion Structure, Canon City	Incorporate boat chute and fish ladder retrofit.	Watershed Health, Environment &	Agriculture			Concept	CPW/ARWC/AROA/Ditch Company	CPW SE Region Water Specialist	0	50	50	0	38.427178	-105.18956	Fremont	12						Tier 4
ARK-2015-0031	EVRAZ Steel Pueblo Diversion Structure (formerly CF&I Diversion Structure or Minnequa Dam),	Incorporate boat chute and fish ladder retrofit with take-out, portage trail, and put-in.	Watershed Health, Environment &			Municipal	Concept	CPW/EVRAZ Steel	CPW SE Region Water Specialist	50	0	50	0	38.414591	-105.159902	Fremont	12						Tier 4
ARK-2015-0032	Salida Low Head Dam / Mt. Shavano Fish Hatchery Diversion	Retrofit or replace existing diversion structure, boat chute, and fish ladder.	Watershed Health, Environment &				Planned	CPW/Multiple Stakeholders	CPW SE Region Water Specialist	0	0	100	0	38.631135	-106.062595	Chaffee	11						Tier 3
ARK-2015-0033	Minnequa Dam, Florence	Incorporate boat chute and fish ladder retrofit with take-out, portage trail, and put-in.	Watershed Health, Environment &			Municipal	Concept	CPW	CPW SE Region Water Specialist	50	0	50	0	38.414591	-105.159902	Fremont	12						Tier 4
ARK-2015-0034	MacKenzie Avenue Bridge, Canon City	Incorporate put-in and take-out for rafting.	Watershed Health, Environment &				Concept	CPW	CPW SE Region Water Specialist	0	0	100	0	38.422176	-105.178719	Fremont	12						Tier 4
ARK-2015-0037	Southern Red Belly Dace Management (Example: Low Back Creek near Florence, CO)	Southern red belly dace population and habitat protection, instream flow protection, riparian protection, native fish habitat	Watershed Health, Environment &	Conservation			Implementing	CPW	CPW SE Region Aquatics	0	0	100	0	37.839261	-104.665851	Bent El Paso	79						Tier 2
ARK-2015-0038	Arkansas Darter Management (Example: Black Squirrel Creek, near Air Force Academy)	Arkansas darter population and habitat protection, instream flow protection, riparian protection, fish passage (diversion	Watershed Health, Environment &	Conservation			Implementing	CPW	CPW SE Region Aquatics	0	0	100	0	37.839261	-104.665851	Bent El Paso	79						Tier 2
ARK-2015-0043	Cutthroat Trout Management (Example: Upper Ark small headwater tributaries)	Improved cutthroat trout habitat through Instream flow maintenance, instream habitat improvement, land	Watershed Health, Environment &	Conservation			Implementing	CPW	CPW SE Region Aquatics	0	0	100	0	38.608997	-106.06534	Chaffee Custer	11						Tier 2
ARK-2015-0045	Two Buttes Reservoir Management	Improved efficiency of water storage and management, valve replacement, dredging for sport fishing, waterfowl, shore birds	Watershed Health, Environment &	Storage	Agriculture	Municipal	Implementing	CPW	CPW SE Region Water Specialist	33	33	33	0	37.637362	-102.543647	Baca	67						Tier 2
ARK-2015-0046	Arkansas River Flows below Pueblo Dam	Instream flow filing and protection, flow enhancement during low/no flow, water management coordination. Currently listed	Watershed Health, Environment &	Agriculture	Conservation	Municipal	Concept	CPW	CPW SE Region Water Specialist	33	33	33	0	38.259908	-104.690048	Pueblo	14						Tier 3
ARK-2015-0047	Arkansas River Riparian	Riparian protection, native fish habitat protection, fish passag (diversion retrofit), maintenance of natural flow regimes as	Watershed Health, Environment &	Conservation			Implementing	CPW	CPW SE Region Aquatics	0	0	100	0	38.10561	-103.75145	Bent Chaffee	17						Tier 3
ARK-2015-0048	Arkansas River Native Fish	Native fish habitat protection, riparian protection, Instream flo protection, fish passage (diversion retrofit), natural flow	Watershed Health, Environment &	Conservation			Implementing	CPW	CPW SE Region Aquatics	0	0	100	0	38.098861	-102.506401	Bent Chaffee	67						Tier 3
ARK-2015-0049	Lower Arkansas River Management	Flow and reservoir level protection for native fish, sport fish, plover/terns, waterfowl, fishing recreation and hunting.	Watershed Health, Environment &	Conservation			Implementing	CPW	CPW SE Region Aquatics	0	0	100	0	38.268285	-104.726249	Bent Otero	10						Tier 3
ARK-2015-0050	Lower Arkansas River Water Management - CPW 1	Flow and reservoir level protection for native fish (downstream in Arkansas River), sport fish, plover/terns, waterfowl, fishing	Watershed Health, Environment &	Conservation	Agriculture		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.067212	-102.93801	Bent El Paso	67						Tier 4
ARK-2015-0051	Lower Arkansas River Water Management - CPW 2	Water delivery and transit efficiency to enhance riparian, sport fishery, shorebird and waterfowl, hunting, watchable wildlife.	Watershed Health, Environment &	Agriculture			Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.310805	-102.747644	Bent Otero	67						Tier 3
ARK-2015-0052	Lower Arkansas River Seasonal Water Management	Riparian protection and enhancement, stabilize reservoir wat delivery and storage during breeding season (April 1 -	Watershed Health, Environment &	Conservation	Agriculture		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.240197	-103.033414	Bent El Paso	67						Tier 3
ARK-2015-0053	Lower Arkansas River Riparian Habitat	Riparian improvement and function, flow enhancement	Watershed Health, Environment &	Conservation			Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.176028	-104.125227	Bent El Paso	14						Tier 4
ARK-2015-0054	South Arkansas River Instream Flow Appropriation	Instream flow appropriation.	Watershed Health, Environment &	Agriculture			Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.514508	-105.974714	Chaffee	11						Tier 3
ARK-2015-0055	Monument Creek Management	Preble's meadow jumping mouse (PMJM) habitat protection, riparian and land use protection, zoning, riparian	Watershed Health, Environment &	Conservation	Land Use		Implementing	CPW	CPW SE Region Aquatics	0	0	100	0	38.954729	-104.833351	El Paso	10						Tier 3
ARK-2015-0056	Monument and Fountain Creek Habitat Management	Flow management and enhancement, improved native fish habitat.	Watershed Health, Environment &	Agriculture			Implementing	CPW	CPW SE Region Aquatics	0	50	50	0	38.520198	-104.614929	El Paso Pueblo	10						Tier 2
ARK-2015-0057	Fountain Creek Management	Riparian protection, native fish habitat protection, fish passag (diversion retrofit), stormwater management.	Watershed Health, Environment &	Agriculture	Conservation		Implementing	CPW	CPW SE Region Aquatics	0	50	50	0	38.520198	-104.614929	El Paso Pueblo	10						Tier 2
ARK-2015-0058	Four Mile Creek Water Management - CPW 1	Improved efficiency of water storage and management in the Four Mile Creek - Arkansas River drainage, coordination of	Watershed Health, Environment &	Agriculture			Implementing	CPW	CPW SE Region Aquatics	0	50	50	0	38.793347	-105.272293	Fremont Teller	12						Tier 1
ARK-2015-0059	Four Mile Creek Water Management - CPW 2	Flow and pond storage level protection for native fish, sport fish, waterfowl, fishing recreation and hunting.	Watershed Health, Environment &	Conservation	Agriculture		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.895433	-105.180351	El Paso Fremont	12						Tier 4
ARK-2015-0061	Chalk Creek Instream Flow Appropriation	Extend existing instream flow appropriation.	Watershed Health, Environment &	Agriculture			Implementing	CPW	CPW SE Region Water Specialist	0	50	50	0	38.74113	-106.066811	Chaffee	11						Tier 2
ARK-2015-0062	Voluntary Flow Management Plan (VFMP) - CPW 1	Riparian protection, native fish habitat protection, fish passag (diversion retrofit as needed), recreation flows, maintenance	Watershed Health, Environment &	Conservation	Agriculture		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	39.201856	-106.353771	Chaffee Fremont	11						Tier 3
ARK-2015-0063	Voluntary Flow Management Plan (VFMP) - CPW 2	Continued support, cooperation and enhancement of the VFMP.	Watershed Health, Environment &	Agriculture			Implementing	CPW	CPW SE Region Water Specialist	0	50	50	0	39.201725	-106.353787	Chaffee Fremont	11						Tier 2
ARK-2015-0064	Voluntary Flow Management Plan Supplemental Water - CPW 1	Acquire approximately 2,000 acre-feet (AF) of additional storage in an enlarged Clear Creek Reservoir for VFMP flow	Watershed Health, Environment &	Storage	Agriculture		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	39.021451	-106.246	Chaffee Fremont	11						Tier 3
ARK-2015-0065	Voluntary Flow Management Plan Supplemental Water - CPW 2	Acquire approximately 2,000 AF of storage and/or water in Turquoise Reservoir for VFMP flows and reservoir level	Watershed Health, Environment &	Agriculture	Storage		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	39.271271	-106.37781	Chaffee Fremont	11						Tier 3
ARK-2015-0066	Voluntary Flow Management Plan Supplemental Water - CPW 3	Acquire approximately 2,000 AF of storage and/or water in Trout Creek Reservoir for VFMP flows and reservoir level	Watershed Health, Environment &	Agriculture	Storage		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.807869	-106.087097	Chaffee Fremont	11						Tier 3
ARK-2015-0067	Voluntary Flow Management Plan Supplemental Water - CPW 4	Acquire approximately 2,000 AF of storage in a newly constructed Box Creek Reservoir for VFMP flows and	Watershed Health, Environment &	Agriculture	Storage		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	39.136371	-106.365666	Chaffee Fremont	11						Tier 3
ARK-2015-0068	Voluntary Flow Management Plan Supplemental Water - CPW 5	CPW continue to acquire approximately 1,000 AF of leased water for VFMP.	Watershed Health, Environment &	Agriculture	Storage		Planned	CPW	CPW SE Region Water Specialist	0	50	50	0	38.268965	-104.739537	Chaffee Fremont	10						Tier 3
ARK-2015-0069	Voluntary Flow Management Plan Supplemental Water - CPW 6	CPW to acquire approximately 2,000 AF of water rights for VFMP.	Watershed Health, Environment &	Agriculture	Storage	rafting and outfitting	Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.268767	-104.738496	Chaffee Fremont	10						Tier 3
ARK-2015-0070	Voluntary Flow Management Plan Supplemental Water - CPW 7	CPW to work with AROA, PBWW, Aurora, CSU, to assist with the acquisition of water and storage rights for VFMP.	Watershed Health, Environment &	Agriculture	Storage		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.268422	-104.73665	Chaffee Fremont	10						Tier 3
ARK-2015-0073	Clear Creek Reservoir Gauging Station Reconstruction	Reconstruction of gauging station to allow kokanee salmon and trout to pass.	Watershed Health, Environment &				Concept	CPW	CPW SE Region Aquatics	0	0	100	0	39.021687	-106.243091	Chaffee	11						Tier 4
ARK-2015-0076	Rocky Mountain Fen Research Program	Study to analyze fen wetlands.	Watershed Health, Environment &	Education, Outreach &	Funding		Implementing	Aurora Water, Others		0	0	100	0			Chaffee	11						Tier 3
ARK-2015-0087	Re-operate CPW Storage Rights in DeWeese Reservoir	Timing problems, inappropriate amounts for release of water that goes down Grape Creek through the Grape Creek	Storage	Watershed Health, Environment &			Implementing	BLM; Nonconsumptive Needs Committee	CDOW, Colorado Division of Wildlife	0	0	100	0	38.203225	-105.463229	Custer Fremont	13						Tier 2
ARK-2015-0095	Southern Delivery System Phase I with Local System Improvements	Construct a pipeline from Pueblo Dam to Colorado Springs with pump stations and outlet works is complete. Colorado	Supply & Demand Gap				Implementing	Colorado Springs Utilities, Town of Fountain, Security	Kim Gortz	100	0	0	0	38.325863	-104.382411	El Paso Pueblo	10	36960	acre-feet (AF)	NA	NA	$ 880,000,000.00	Tier 1
ARK-2015-0096	Southern Delivery System Phase II	Construct Bostrom Reservoir and Williams Creek Reservoir. Complete system capacity upgrades	Storage	Supply & Demand Gap		Municipal	Planned	Colorado Springs Utilities, Town of Fountain, Security	Kim Gortz	100	0	0	0	38.748583	-104.586791	El Paso	10			30000	AF	$ 500,000,000.00	Tier 3
ARK-2015-0097	Eagle River Joint-Use Project (Eagle River MOU)	The ERMOU Joint Use Water Project (ERMOU Project) derives from the 1998 Eagle River MOU among East and West Slope water users for development of a joint use water project in the Eagle River basin that minimizes environmenta	Storage	Supply & Demand Gap	Watershed Health, Environment & Recreation	Municipal	Implementing	MOU Partners (Cities of Aurora and Colorado Springs; Eagle Park Reservoir Company (consisting of the	Jason Cowles	85	0	15		39.42176	-106.31378	El Paso Lake	37	165,000.0	acre-feet (AF)			$ 300,000,000.00	Tier 1
ARK-2015-0098	Continental-Hoosier Storage Enlargement Project	Continental-Hoosier System Project (CHS)- an effort undertaken by Colorado Springs Utilities to improve resiliency	Storage	Supply & Demand Gap			Implementing	Colorado Springs Utilities	Kim Gortz	100				39.393076	-106.052554	El Paso	36	4000	AF			$ 135,000,000.00	Tier 2

ARK-2015-0102	Cache Creek Reservoir		Storage	Supply & Demand Gap			Concept							39.04247	-106.26534	Chaffee	11	3000	AF	7620	AF	$	7,000,000.00	Tier 4
ARK-2015-0106	Water Rights Acquisition - Bessemer	Acquisition of shares in the Bessemer Irrigating Ditch Company (BIDCo) and Water Court approval of the change o	Supply & Demand Gap			Municipal	Implementing	Pueblo Water		100	0	0	0	38.271314	-104.611416	Pueblo	10	7200	AF			$	65,000,000.00	Tier 1
ARK-2015-0133	Arkansas Valley Conduit	Not Provided	Supply & Demand Gap	Land Use	Education, Outreach &	Municipal	Implementing	SECWCD	Chris Woodka	100	0	0	0	38.247604	-104.792286	Bent Crowley	14	5023	AF			$	328,000,000.00	Tier 2
ARK-2015-0149	Purgatoire River Reaches 5 and 6 Habitat Improvement Project	Reaches 5 and 6 of the Purgatoire River, located in the Boulevard Addition Nature Park, are a continuation of a	Watershed Health, Environment &	Land Use	Conservation		Implementing	TU (PRATU), City of Trinidad, PRWCD		0	0	100	0	37.170231	-104.50926	Las Animas	19							Tier 2
ARK-2015-0150	Trinidad/Purgatoire River Reach 4 Demonstration Project	Not Provided	Watershed Health, Environment &	Land Use			Implementing			0	0	100	0	37.170231	-104.50926	Las Animas	19							Tier 3
ARK-2015-0158	Groundwater Quality Study Phase 2 - Upper Black Squirrel	Contract with USGS to monitor wells and develop a report on water quality for the basin.	Watershed Health, Environment &	Education, Outreach &			Implementing	Pikes Peak Regional Water Authority, El Paso County,		0	0	100	0	38.967668	-104.481708	El Paso	10							Tier 2
ARK-2015-0159	Hale Reservoir Renovation	The reservoir will be dredged, expanded, and the dam rebuilt. Wetlands will be restored.	Watershed Health, Environment &	Storage	Conservation	Municipal	Implementing	Cross Creek Metropolitan District	Elise Bergsten	50	0	50	0	38.71073	-104.685116	El Paso	10			11	acre-feet (AF)	$	4,000,000.00	Tier 2
ARK-2015-0160	Mount Pisgah Dam / Wrights Reservoir Outlet Works Rehabilitation	The old outlet structures operate poorly. Design and replace outlet structure with new facilities.	Watershed Health, Environment &	Conservation			Implementing							38.793576	-105.272917	Teller	12							Tier 2
ARK-2015-0161	Administrative Tools for Lease Fallowing in the Arkansas River Valley	Not Provided	Education, Outreach & Innovation	Funding	Land Use		Implementing							38.047266	-103.393961	Bent Crowley	17							Tier 3
ARK-2015-0167	Lamar Raw Water Transmission Line Replacement Project	Not Provided	Watershed Health, Environment &			Municipal	Implementing			100	0	0	0	38.096344	-102.619203	Prowers	67							Tier 3
ARK-2015-0171	Membrane Zero Liquid Discharge Demo Project (La Junta Reverse Osmosis Brine)	Not Provided	Watershed Health, Environment &	Education, Outreach &	Funding		Implementing							37.984946	-103.523456	Otero	17							Tier 4
ARK-2015-0174	Fountain Creek Flood Control District		Watershed Health, Environment &				Concept			0	0	100	0			El Paso Pueblo	Multiple							Tier 4
ARK-2015-0177	Westside	Westside of Ark. River, many tributaries to Arkansas River. Forest health issues, major mountain pine beetles past	Watershed Health, Environment &	Land Use	Conservation	Mountain Pine Beetle, Urban	Implementing	USFS-WAPA	Salida Ranger District; Leadville	33	33	33	0	38.496164	-106.041364	Chaffee	11							Tier 2
ARK-2015-0178	North Trout	Headwaters of Trout Creek that flows to Arkansas River. Forest health issues, major mountain pine beetles past	Watershed Health, Environment &	Land Use	Conservation	Mountain Pine Beetle, Urban	Implementing	USFS	Salida Ranger District	0	50	50	0	38.806823	-106.087404	Chaffee	11							Tier 1
ARK-2015-0179	Herring Park	Headwaters to Badger Creek that flows to lower Arkansas River. Forest health issues, major mountain pine beetles past decade. Disperse recreation, road management, urban interface, Rx benefits, wildlife habitat improvement, range betterment. 7,200 acres	Watershed Health, Environment & Recreation	Land Use	Conservation	Mountain Pine Beetle, Urban Interface,	Implementing	USFS	Salida Ranger District	0	50	50	0	38.465675	-105.861245	Fremont Park	12							Tier 2
ARK-2015-0180	Spruce Creek	Spruce Creek is a tributary to South Arkansas to Arkansas River. Forest health issues, major mountain pine beetles past decade. Road management, urban interface, Rx benefits,	Watershed Health, Environment & Recreation	Land Use	Conservation	Mountain Pine Beetle, Urban Interface,	Implementing	USFS	Salida Ranger District	0	50	50	0	38.492787	-106.129345	Chaffee	11							Tier 2
ARK-2015-0181	Cree Creek	Cree Creek flows to South Arkansas, then to Arkansas River. Forest health issues, major mountain pine beetles past	Watershed Health, Environment &	Land Use	Conservation	Mountain Pine Beetle, Urban	Implementing	USFS - WAPA	Salida Ranger District	33	33	33	0	38.542875	-106.227743	Chaffee	11							Tier 2
ARK-2015-0184	Little Annie	Midstream of Fourmile Creek, flows to Arkansas River. Forest health issues, major mountain pine beetles past decade. Roa	Watershed Health, Environment &	Land Use	Conservation	Mountain Pine Beetle, Urban	Implementing	USFS	Salida Ranger District	0	50	50	0	38.63582	-106.078633	Chaffee	11							Tier 2
ARK-2015-0186	Poncha Loop	Along Poncha and Silver Creeks that flows to South Arkansas, then to Arkansas River. Major disperse recreation	Watershed Health, Environment &	Land Use	Conservation	Mountain Pine Beetle, Urban	Planned	USFS-TriState	Salida Ranger District	33	33	33	0	38.422323	-106.128531	Chaffee Saguache	11							Tier 2
ARK-2015-0188	Cleveland Mountain	Little Cochetopa Creek flows to South Arkansas, then to Arkansas River. Forest health issues, major mountain pine	Watershed Health, Environment &	Land Use	Conservation	Mountain Pine Beetle, Urban	Planned	USFS-TriState	Salida Ranger District	33	33	33	0	38.456721	-106.169504	Chaffee	11							Tier 3
ARK-2015-0195	Jones Mountain	Near Ptarmigan Lake. Past spruce management area (20 years). Currently being infested with spruce beetles. Salvage	Watershed Health, Environment &	Land Use	Conservation	Mountain Pine Beetle, Urban	Concept	USFS	Salida Ranger District	0	50	50	0	38.7772818	-106.3845385	Chaffee	11							Tier 4
ARK-2015-0196	Fooses Creek	Fooses Creek flow to Fooses Lake/Salida Hydro, to South Arkansas, to Arkansas River. Forest health, lodgepole issues,	Watershed Health, Environment &	Agriculture	Conservation	Municipal	Concept	USFS-WAPA	Salida Ranger District	33	33	33	0	38.52417	-106.27191	Chaffee	11							Tier 4
ARK-2015-0197	Box Creek	Box Creek to Arkansas River. Forest health issues including dwarf mistletoe and small pockets of mountain pine beetle.	Watershed Health, Environment &	Agriculture	Conservation		Implementing	USFS	Leadville	0	0	100	0	39.134124	-106.359744	Lake	11							Tier 2
ARK-2015-0198	Tennessee Creek	Headwaters to the Arkansas River. Many tributaries including West Tennessee Creek, East Tennessee Creek, Halfmoon	Watershed Health, Environment &	Land Use	Conservation	Municipal	Implementing	USFS, Multiple Partners (Aurora, Pueblo, Colo.	Leadville	50	0	50	0	39.316901	-106.339974	Lake	11							Tier 1
ARK-2015-0201	Greenhorn	Headwaters of St. Charles and water sources from Rye to Beulah. Last vegetation management – timber sales	Watershed Health, Environment &	Land Use	Conservation	Municipal	Implementing	USFS	San Carlos Ranger District	50	0	50	0	37.984087	-105.045438	Huerfano Pueblo	15							Tier 1
ARK-2015-0202	12 Mile	Water flows from this area affect Beulah and St. Charles Drainage. Last vegetation management – small timber sales	Watershed Health, Environment &	Agriculture	Land Use	Municipal	Implementing	USFS	San Carlos Ranger District	33	33	33	0	38.053908	-105.011191	Custer Pueblo	15							Tier 3
ARK-2015-0203	East Central Wets	Water flows from this project area affect Beulah and Rye. Las vegetation management – small sales (30 years). The 11,000	Watershed Health, Environment &	Agriculture	Land Use	Municipal	Planned	USFS	San Carlos Ranger District	33	33	33	0	38.127491	-105.093977	Custer Pueblo	12							Tier 3
ARK-2015-0205	Cuchara	Above water intake for Cuchara – water flows down to multip water storage structures for Walsenburg. Last management –	Watershed Health, Environment &	Agriculture	Conservation	Municipal	Planned	USFS	San Carlos Ranger District	33	33	33	0	37.36992	-105.099144	Huerfano	16							Tier 3
ARK-2015-0210	Monarch Pass to Monarch Park Sediment Project	Meeting with CPW and CDOT to reduce the amount of sediment reaching the South Arkansas River along Highway	Watershed Health, Environment &			Municipal	Implementing	USFS-CDOT	Salida Ranger District	50	0	50	0	38.542911	-106.312183	Chaffee	11							Tier 3
ARK-2015-0218	DeWeese Reservoir TMDL Project	Grape creek and its tributaries that flow into Lake DeWeese Reservoir. Project area is approximately 273,000 acres. This	Watershed Health, Environment &	Agriculture	Conservation		Implementing	USFS, NRCS		0	50	50	0	38.187677	-105.481175	Custer	13							Tier 2
ARK-2015-0221	Upper Monument Creek	Restore the forest and reduce the severity of future wildfires by thinning the forest and using prescribed fire. Project area is 70,000 acres with treatments being planned for approximately 25,000 acres. Done in collaboration with the Front Range	Watershed Health, Environment & Recreation	Conservation	Land Use		Implementing	USFS, TNC, Front Range Roundtable, Colorado Springs Utilities, CSFS	Mark Shea	50		50		38.969419	-104.93926	El Paso Teller	10							Tier 1
ARK-2015-0222	Catamount	Restore the forest and reduce the severity of future wildfires by thinning the forest and using prescribed fire. Done in	Watershed Health, Environment &	Conservation	Land Use		Implementing	USFS, Colorado Springs Utilities, BLM, CUSP, CSFS	Mark Shea	50		50		38.916648	-105.083327	El Paso Fremont	10							Tier 1
ARK-2015-0224	Watershed Health Collaborative	Formation of a basin-wide collaborative to address watershed health risks and protection of water supply and quality.	Watershed Health, Environment &	Conservation			Planned	ABRT		0	0	100	0	38.25947	-104.554771	Arkansas Basin	10							Tier 2
ARK-2015-0225	Watershed Health Strategic Plan	Basin-wide strategic watershed plan including projects, programs, and processes to mitigate watershed health risks.	Watershed Health, Environment &	Conservation	Education, Outreach &		Planned	ABRT						38.25947	-104.554771	Arkansas Basin	10							Tier 2
ARK-2015-0226	Mine Reclamation	Reclamation of mined lands within the Arkansas Basin	Watershed Health, Environment &	Land Use			Concept	ABRT								Chaffee Fremont	11							Tier 4
ARK-2015-0229	South Arkansas Habitat Improvement	Improve channel and bank stability to reduce erosion and sedimentation. Restoration will improve fish and riparian	Watershed Health, Environment &	Conservation			Planned	TU						38.524588	-106.142573	Chaffee	11							Tier 3
ARK-2015-0230	Boulevard Addition Nature Park: Purgatoire Invasive Species Removal and Habitat Restoration	Rehabilitate poor riparian and water quality/quantity conditions in the Purgatoire Watershed, through the removal and control	Watershed Health, Environment &	Conservation	Land Use		Implementing	Purgatoire Watershed Partnership		0	0	100	0	37.157305	-104.530532	Las Animas	19							Tier 3
ARK-2015-0231	Minnie Canyon: Purgatoire Invasive Species Removal and Habitat Restoration	Rehabilitate poor riparian and water quality conditions in the Purgatoire Watershed, in Minnie Canyon area to improve	Watershed Health, Environment &	Conservation	Land Use		Implementing	Purgatoire Watershed Partnership		0	0	100	0	37.642332	-103.558137	Otero	19							Tier 3
ARK-2015-0232	Fountain Creek Corridor Master Plan	Identification of restoration needs and techniques outlined in the plan are intended to mitigate flood impacts, erosion and	Watershed Health, Environment &	Agriculture		Municipal	Implementing	Fountain Creek District, LAVWCD		33	33	33	0	38.367037	-104.612421	El Paso Pueblo	10							Tier 2
ARK-2015-0234	Fountain Creek: Invasive Species Removal and Habitat Restoration	Removal of invasive species on a project basis and habitat enhancement incidentally created by creek restoration	Watershed Health, Environment &	Conservation		Municipal	Implementing	Fountain Creek District, Colorado Springs Utilities	Mark Shea	50	0	50	0	38.367037	-104.612421	El Paso Pueblo	10							Tier 2
ARK-2015-0235	Greenview Trust	Restore wetlands, stabilize eroding banks, improve water quality, protect irrigation diversion, develop trails and	Watershed Health, Environment &	Agriculture	Conservation		Planned	Fountain Creek District; LAVWCD	Bill Banks	0	50	50	0	38.282201	-104.603236	Pueblo	10							Tier 2
ARK-2015-0240	Pueblo Levy, 8th Street to Arkansas Confluence	Remove sedimentation, install riffle structures, remove invasive species, stabilize eroding banks, remove railroad	Watershed Health, Environment &	Conservation		Municipal	Implementing	Fountain Creek District	Bill Banks	50	0	50	0	38.282201	-104.603236	Pueblo	10							Tier 1
ARK-2015-0245	Fountain Mobile Home Park	Restore eroding stream bank, reconfigure stream by removing sediment bars, restore bank vegetation. Project Name is	Watershed Health, Environment &	Conservation		Municipal	Implementing	El Paso County		50	0	50	0	38.68062	-104.710041	El Paso	10							Tier 1
ARK-2015-0250	Purgatoire River Watershed Riparian Rehabilitation	PRW is one of Colorado's most ecologically intact watersheds. Encroachment of non-native invasive plants is a	Watershed Health, Environment &	Conservation			Implementing	Tackling Tamarisk on the Purgatoire (TTP) Partnership						37.539473	-103.660383	Bent Las Animas	19							Tier 2
ARK-2015-0258	Green River Riparian Restoration Project	The Colorado Wyoming Water Authority has model water availability in the Green River under the State of Colorado's	Supply & Demand Gap	Watershed Health, Environment &			Concept	Colorado Wyoming Water Authority, South Metro Water								Bent Crowley	Wyoming							Tier 3
ARK-2015-0259	SECWCD Regional Water Conservation Plan Implementation	Includes data collection, plan updating, reporting, outreach to partners, and funding development.	Conservation	Supply & Demand Gap		Municipal	Implementing	SECWCD	Chris Woodka, Kevin Meador	100	0	0	0	38.278235	-104.560052	Bent Crowley	67	7,500	acre-feet (AF)	7,500	acre-feet (AF)	$	600,000,000.00	Tier 1
ARK-2015-0260	Water Quality Working Group	The working group will develop solutions for protecting local water supplies in an efficient, consistent, pragmatic manner.	Watershed Health, Environment &	Education, Outreach &	Agriculture	Municipal	Planned	SECWCD	Chris Woodka, Garrett Markus	33	33	33	0	38.08009	-102.907177	Arkansas Basin Bent	17							Tier 2
ARK-2015-0261	Master Meter Improvements	Support the development of a master metering program that installs master meters on production wells and/or treatment facility effluent lines to increase accuracy of water being placed in production to improve management of system-wide water loss.	Conservation	Supply & Demand Gap		Municipal	Concept	SECWCD	Chris Woodka	100	0	0	0			Bent Chaffee Crowley El Paso Fremont	67							Tier 4
ARK-2015-0262	Local Water Conservation Planning	Projects include creating new and updating old water conservation plans for any covered entity (as defined by	Conservation	Education, Outreach &		Municipal	Planned	SECWCD	Chris Woodka	100	0	0	0	38.278235	-104.560052	Bent Chaffee	10							Tier 3
ARK-2015-0263	Water Loss Management Audits	Projects will include conducting AWWA M-36 Water Audits on all MC and AVC project participants to track improvements	Supply & Demand Gap	Conservation			Planned	SECWCD	Chris Woodka	100	0	0	0	38.278235	-104.560052	Bent Chaffee	10							Tier 3
ARK-2015-0280	Sherman Mine/Upper Iowa Gulch Restoration	The Sherman Mine sits almost at 11,000 feet in elevation at the top of Iowa Gulch above the town of Leadville, CO. The	Watershed Health, Environment &				Implementing	BLM		0	0	100	0	39.226451	-106.281125	Lake	11							Tier 2
ARK-2015-0284	Smith Goodale Wetland Project	Property purchase and well project to keep pond full. Serves birds, fishing, waterfowl hunting, and flat water boating.	Watershed Health, Environment &	Land Use			Concept			0	0	100	0			Prowers	67							Tier 4
ARK-2015-0285	Clay Creek Project	Examining if domestic artesian well can be used for wetland restoration. For waterfowl hunting, wildlife watching, and	Watershed Health, Environment &	Education, Outreach &			Concept			0	0	100	0			Bent	67							Tier 4
ARK-2015-0288	Amity Pit Restoration	Working with gravel company to restore gravel pit. Completed one end of pit restoration with 150 AF of water and providing	Storage	Watershed Health, Environment &	Conservation		Concept	CPW		0	0	100	0	38.045869	-102.191252	Prowers	67							Tier 4
ARK-2015-0289	Great Plains Reservoirs Collaborative Management	Collaborative management effort to support the needs of the reservoir owners, agriculture, recreation, environment,	Watershed Health, Environment &	Agriculture	Storage		Concept	CPW	CPW SE Region Water Specialist	0	50	50	0	38.322487	-102.746854	Kiowa	67							Tier 3
ARK-2015-0290	John Martin Reservoir Wetlands Maintenance Program	Partnering with Fort Lyons with water rights and wetlands restoration project.	Watershed Health, Environment &				Concept	CPW	CPW SE Region Water Specialist	0	0	100	0	38.066955	-102.956963	Bent	67							Tier 3
ARK-2015-0293	Pueblo Fish Hatchery Bypass Flow	Seeking water to serve State fish hatchery and then use that water below dam when they are not releasing any water.	Watershed Health, Environment &				Concept	CPW	CPW SE Region Water Specialist	0	0	100	0	38.263451	-104.722586	Pueblo	14							Tier 4
ARK-2015-0297	Hecla Wash Project	The Hecla Wash project aims to work with a partnership to implement ecologically sustainable watershed restoration	Watershed Health, Environment &				Implementing	CPW	CPW SE Region Water Specialist	0	0	100	0	38.699882	-106.059591	Chaffee	11							Tier 2
ARK-2015-0481	Project Title Missing		Watershed Health, Environment &				Concept		Mike Kissack	0	0	100	0			Chaffee	11							Tier 4

ARK-2015-0482	Project Title Missing						Concept		Mike Kissack							Chaffee	11						Tier 4
ARK-2015-0483	Project Title Missing		Watershed Health, Environment &				Concept		Mike Kissack	0	0	100	0			Chaffee	11						Tier 4
ARK-2015-0484	Project Title Missing						Concept		Mike Kissack							Chaffee	11						Tier 4
ARK-2015-0485	Project Title Missing						Concept		Mike Kissack							Chaffee	11						Tier 4
ARK-2015-0486	Upper Arkansas Multi-Use Project	Enlargement of existing Trout Creek Reservoir, development of gravel pit storage, development of alluvial storage for estimated total increase of 15,000 to 20,000 AF. Delivery of irrigation water by gravity flow to existing pivot irrigation systems on 200	Supply & Demand Gap	Agriculture	Storage	Municipal	Planned	Upper Arkansas Water Conservancy District	Gracy Goodwin	33	33	33	0	38.808735	-106.086443	Chaffee	11						Tier 3
ARK-2015-0487	Upper Arkansas Water Storage Coalition	Create an entity that includes parties with the same or similar needs and develop joint projects to address these needs.	Education, Outreach & Innovation	Supply & Demand Gap	Storage		Planned	Upper Arkansas Water Conservancy District	Gracy Goodwin					38.513604	-105.974619	Chaffee Lake	11						Tier 3
ARK-2015-0488	Ordway Bypass	The Crowley County Water System currently relies on the Town of Ordway's distribution system to get water to the	Storage			Municipal	Planned	Crowley County, Town of Ordway		100	0	0	0	38.230953	-103.756484	Crowley	17						Tier 4
ARK-2015-0489	New Metering Stations	Relocate the Crowley County Water System meters at Road H and at Road J to new above ground stations. Change out to	Additional			Municipal	Planned	Crowley County, Town of Ordway, 96 Pipeline		100	0	0	0	38.230953	-103.756484	Crowley	17						Tier 3
ARK-2015-0490	Acquire Water Rights - Crowley County 1	The county water providers do not have sufficient firm water rights to meet the potable water needs of the population,	Supply & Demand Gap	Watershed Health, Environment &	Agriculture	Municipal	Concept	Crowley County, Crowley County Water Association,		33	33	33	0	38.326695	-103.784824	Crowley	17						Tier 4
ARK-2015-0491	Acquire Water Rights, Lake Henry, Lake Meredith Crowley County 2	There are currently no water right provisions to maintain permanent pools in Lake Henry and Lake Meredith. The	Watershed Health, Environment &	Storage	Conservation		Concept	Crowley County, CPW		0	0	100	0	38.326695	-103.804824	Crowley	17						Tier 4
ARK-2015-0492	Sanitary Sewer Return Flow Capture	The municipal sanitary sewer treatment systems in the county rely on evaporation for disposal of the effluent.	Supply & Demand Gap	Watershed Health, Environment &		Municipal	Concept	Town of Sugar City, Town of Ordway, Town of Crowley,		50	0	50	0			Crowley	17						Tier 4
ARK-2015-0493	Crowley County / CCWA Potable Water Storage	Add a water storage tank on the north side of the system at about County Lane 15.	Storage			Municipal	Concept	Crowley County, Crowley County Water Association		100	0	0	0	38.326695	-103.764824	Crowley	17						Tier 4
ARK-2015-0494	Crowley County Source Water Protection Partnership Plan Implementation	There are four participants in the Source Water Protection Plan prepared in March 2013. Design and implementation	Funding	Agriculture	Watershed Health,	Municipal	Planned	Crowley County, Crowley County Water Association,		33	33	33	0	38.154876	-103.957496	Crowley	17						Tier 3
ARK-2015-0495	96 Pipeline System Improvements	Install a booster station at the Ordway / 96 Pipeline Storage Tanks. Install new piping.	Storage	Watershed Health, Environment &	Agriculture	Municipal	Concept	Crowley County, 96 Pipeline Water Association		33	33	33	0	38.2180608	-103.7560606	Crowley	17						Tier 4
ARK-2015-0496	County Wide Valve Installation and Replacement	The water provider systems were not originally constructed with a sufficient number of valves to isolate areas in the event	Funding	Agriculture		Municipal	Concept	Crowley County, Crowley County Water Association,		50	50	0	0			Crowley	17						Tier 3
ARK-2015-0497	Acquire Short Term and Periodic Water Rights	The prolonged drought has caused severe loss and damage to previously revegetated irrigated land. Unfortunately, several	Watershed Health, Environment &	Land Use	Agriculture		Concept	Crowley County		0	50	50	0			Crowley	17						Tier 4
ARK-2015-0498	Denver Basin Formations and Alluvium Interaction Project (Upper Big Sandy Water Balance)	The Arkansas Basin Roundtable is funding a study to determine the water balance in the Upper Big Sandy DGWB.	Watershed Health, Environment &	Education, Outreach &	Agriculture	Municipal	Planned	Upper Big Sandy Groundwater Management		33	33	33	0	39.164898	-103.97214	El Paso Elbert	67						Tier 3
ARK-2015-0499	Management and Education	Continue to monitor groundwater levels and educate public about water use and conservation. Preserve local District's	Watershed Health, Environment &	Education, Outreach &	Agriculture	Municipal	Planned	Upper Big Sandy Groundwater Management		33	33	33	0	39.198146	-103.903609	El Paso Elbert	67						Tier 2
ARK-2015-0500	Metering Program	Upper Big Sandy GWMD adopted rules to provide for metering of high capacity wells. Project provides financial	Funding	Agriculture	Agriculture	Municipal	Planned	Upper Big Sandy Groundwater Management		50	50	0	0	39.09662	-104.207101	El Paso Elbert	67						Tier 3
ARK-2015-0501	Ramah Dam Restoration Project	Work with CPW to restore viability of Ramah Dam to provide water storage, recharge, recreation, and environmental use.	Watershed Health, Environment &	Storage	Agriculture	Municipal	Concept	Upper Big Sandy Groundwater Management		33	33	33	0	39.097817	-104.206635	El Paso Elbert	67						Tier 3
ARK-2015-0502	Flood Control Dam Retiming and Recharge Project	Pilot project to select flood control dam and constructed recharge/infiltration ponds below the dam to time releases that	Education, Outreach & Innovation	Watershed Health, Environment &	Agriculture	Municipal	Planned	Upper Big Sandy Groundwater Management		33	33	33	0	39.198146	-103.903609	El Paso Elbert	67						Tier 2
ARK-2015-0503	Noxious Tree Mitigation Program - Big Sandy	Eradicate noxious trees.	Watershed Health, Environment &		Agriculture	Municipal	Planned	Upper Big Sandy Groundwater Management		33	33	33	0	39.156088	-104.039497	El Paso Elbert	67						Tier 3
ARK-2015-0504	Big Sandy Pumpback Project	Groundwater currently exits the basin at the eastern boundary. Project would pump the underflow from the eastern	Supply & Demand Gap	Watershed Health, Environment &	Agriculture	Municipal	Concept	Upper Big Sandy Groundwater Management		33	33	33	0	38.11177	-102.48347	Bent El Paso	67						Tier 3
ARK-2015-0505	Fountain Creek Flood Issues	Construct a dam on Fountain Creek.	Watershed Health, Environment &	Land Use			Concept									Bent El Paso	10						Tier 4
ARK-2015-0506	Elbert County Water Monitoring Network	Better water management and development regulations for counties dependent on aquifers. Funding has been received.	Funding	Watershed Health, Environment &			Implementing	Elbert County, USGS						39.0738	-103.9455	Elbert	67						Tier 2
ARK-2015-0507	Town of Limon Water System Improvements	Construction, replacement and/or rehabilitation of wells to enhance production and efficiency of permitted town wells an	Watershed Health, Environment &	Agriculture		Municipal	Planned	Town of Limon		33	33	33	0	39.274582	-103.694718	Elbert Lincoln	67						Tier 2
ARK-2015-0508	Town of Limon Wastewater Collection System	Assessment and potential replacement or rehabilitation of wastewater collection and treatment system infrastructure to	Watershed Health, Environment &			Municipal	Concept	Town of Limon		50	0	50	0	39.26794215	-103.684451	Lincoln	67						Tier 4
ARK-2015-0509	Arkansas Valley Agricultural Irrigation Management		Watershed Health, Environment &	Agriculture			Concept									Las Animas	19						Tier 4
ARK-2015-0510	Town of Aguilar Municipal Storage	Aguilar waiting on decision on funding - engineering is complete but funding needed	Funding	Storage	Supply & Demand Gap		Planned							37.40362579	-104.6550362	Las Animas	18						Tier 2
ARK-2015-0511	North Fork to North Lake Aqueduct Repair	City of Trinidad - Existing aqueduct is from the 1930s. The aqueduct is a concrete channel. A pipe will be laid in the	Watershed Health, Environment &	Funding		Municipal	Planned			50	0	50	0	37.240633	-105.044303	Las Animas	19						Tier 3
ARK-2015-0512	Browns Creek to Monument Lake Conveyance	City of Trinidad - Remove half and replace with full pipe. Engineering complete	Funding	Watershed Health, Environment &		Municipal	Planned			50	0	50	0	37.222152	-105.051328	Las Animas	19						Tier 2
ARK-2015-0513	Valdez and Burro Canyon River Crossing of Potable Transmission Line	City of Trinidad - Stabilize river bank and transmission line.	Watershed Health, Environment &			Municipal	Planned			50	0	50	0	37.127457	-104.687676	Las Animas	19						Tier 3
ARK-2015-0514	Segundo Potable Water Transmission Line Replacement	The City of Trinidad's potable water transmission line serves several small communities upstream of Trinidad, including	Watershed Health, Environment &	Supply & Demand Gap	Funding	Municipal	Planned			50	0	50	0	37.122352	-104.723279	Las Animas	19						Tier 3
ARK-2015-0515	Santa Fe Pumphouse Transmission line Replacement	This portion of Trinidad's transmission line fills a satellite potable water storage tank. Replace 24" line. Approximately	Watershed Health, Environment &	Storage		Municipal	Planned			50	0	50	0	37.14115	-104.867224	Las Animas	19						Tier 3
ARK-2015-0516	City of Trinidad Watershed Forest Plan	Mature forest requires treatment for watershed health and potential fire damage. Site specific forest plan for use in	Watershed Health, Environment &			Municipal	Concept			50	0	50	0	37.211294	-105.047042	Las Animas	19						Tier 4
ARK-2015-0517	Trinidad Project Infrastructure Upgrade	Repair and replace deteriorating ditch diversion structures an canal embankments.	Watershed Health, Environment &	Agriculture		Municipal	Concept	Purgatoire River Water Conservancy District		33	33	33	0	37.17148	-104.510091	Las Animas	19						Tier 4
ARK-2015-0518	El Moro - Hoehne Pipeline Association Water Line Replacement	The requesting entity is a rural water association serving 180 families. The project will replace damaged and leaking pipe.	Funding	Watershed Health, Environment &		Municipal	Planned	El Moro - Hoehne Pipeline Association		50	0	50	0	37.220523	-104.466967	Las Animas	19						Tier 3
ARK-2015-0519	Our Water, Our Watershed	Implement environmental education and watershed curriculum. Provide participants with a better understanding of	Watershed Health, Environment &	Education, Outreach &	Conservation		Planned	PWP						38.06698	-103.1775	Bent Las Animas	17						Tier 3
ARK-2015-0520	Baca-Picketwire Headgate Improvement	Repair gates and inlets to improve safety and water flow; install wall and regrout rip rap to maintain integrity of headgate	Funding	Watershed Health, Environment &	Agriculture		Planned	PWP						37.172915	-104.505755	Las Animas	19						Tier 4
ARK-2015-0521	Powell Arroyo Siphon Protection Structure	Address integrity of ditch structure that carries water to 30-50 users. Prevent streambed erosion by stabilizing retention	Watershed Health, Environment &	Funding			Concept	Baca Ditch Co.						37.193621	-104.478733	Las Animas	19						Tier 3
ARK-2015-0522	Chilili Ditch Diversion and Improvement	Install headgate that disperses cfs decree accurately to maintain river flow for fish habitat and divert water to all water	Watershed Health, Environment &	Funding	Agriculture		Concept	Chilili Ditch Co., PWP	Kastner					37.172925	-104.498965	Las Animas	19						Tier 3
ARK-2015-0523	Birdseye Dam and Reservoir	Construction of a new non-jurisdictional dam that will provide 30 acre-feet of storage in the upper reaches of the drainage.	Storage	Supply & Demand Gap			Planned	Lake County	Board of County Commissioners,					39.308045	-106.223623	Lake	11	31	acre-feet (AF)	30	acre-feet (AF)	$ 2,000,000.00	Tier 1
ARK-2015-0524	Lake County Small Reservoir Permitting	Exploration of opportunities within the county and county property	Supply & Demand Gap	Land Use	Storage	Municipal, Ag, Environmental	Concept	Lake County	Board of County Commissioners,	33	33	33		39.202297	-106.304919	Lake	11						Tier 4
ARK-2015-0525	Lake County Increased Storage	Parkville Water District	Supply & Demand Gap	Storage		Municipal	Concept	Parkville Water District	Rego Omergic					39.202297	-106.384919	Lake	11						Tier 4
ARK-2015-0526	Delapp Ditch Improvements	Rehabilitation of existing Delapp ditch that has not been maintained recently. Meet storage and delivery needs and	Supply & Demand Gap	Storage	Watershed Health,	Economic Diversity and	Concept	Lake County	County Commissioner,	0	50	50	0	39.255654	-106.345455	Lake	11						Tier 3
ARK-2015-0527	Flume Replacement at Big Evans Reservoir	Replace existing wooden flume with new 300-foot concrete flume.	Storage	Funding	Watershed Health,	Municipal	Planned	Parkville Water District	Rego Omergic	50	0	50	0	39.258663	-106.266896	Lake	11						Tier 3
ARK-2015-0528	Outlet Replacement at Mountain Lake Dam	Replace the existing outlet works gate valve, located in the dam, with a new gate valve on upstream face of the dam.	Funding	Storage	Watershed Health,	Municipal	Planned	Parkville Water District	Rego Omergic	50	0	50	0	39.263672	-106.209376	Lake	11						Tier 3
ARK-2015-0529	As-Built Survey - Hayden Meadows Pond	The as-built survey, certifying the storage volume of the Hayden Meadows Pond was not completed at the end of	Agriculture	Watershed Health, Environment &	Supply & Demand Gap	Municipal	Implementing	Lake County	County Commissioner,	33	33	33	0	39.070884	-106.482016	Lake	11	47	acre-feet (AF)	47	acre-feet (AF)	$ 5,600.00	Tier 1
ARK-2015-0530	Telemetry System for Hayden Meadows Pond	Install new telemetry equipment at Hayden Meadows Pond to document accurately and efficiently the inflows and	Agriculture	Watershed Health, Environment &	Supply & Demand Gap	Municipal	Concept	Lake County	County Commissioner,	33	33	33	0	39.165035	-106.323903	Lake	11			47	acre-feet (AF)	$ 15,000.00	Tier 3
ARK-2015-0531	Fountain Creek Stormwater Management	Not Provided	Watershed Health, Environment &				Implementing							38.255711	-104.590945	Pueblo	10						Tier 4
ARK-2015-0532	Project Title Missing						Concept									Pueblo							Tier 4
ARK-2015-0534	Super Ditch Delivery Engineering	Project to supply water for municipal and agriculture needs.	Agriculture			Municipal	Implementing	LAVWCD and others	Nate Finnell	0	100	0	0	38.060354	-103.347066	Bent Crowley	17						Tier 3
ARK-2015-0535	Ag-Muni Conservation Easement Demonstration	Purchase conservation easements throughout the Lower Arkansas Valley with a municipal leasing component to create	Conservation	Agriculture	Land Use		Implementing	LAVWCD and others						38.054639	-103.721387	Bent Crowley	17						Tier 2
ARK-2015-0536	Use of Head Stabilization Ponds for Recharge	Quantify all return flows from all rule 10 plan ponds.	Watershed Health, Environment &	Agriculture			Implementing	LAVWCD and others						38.060354	-103.347066	Bent Crowley	17						Tier 3
ARK-2015-0537	Tail Water Study	Determine accurate tail water information for better administration of Colorado, Kansas compact.	Education, Outreach & Innovation	Watershed Health, Environment &	Agriculture		Implementing	LAVWCD and others						38.060354	-103.347066	Bent Crowley	17						Tier 2
ARK-2015-0538	Storage Using Recharge	Identify and build recharge sites throughout the Lower Arkansas Basin to allow for better management of return	Education, Outreach & Innovation	Supply & Demand Gap	Agriculture		Implementing	LAVWCD and others						38.060354	-103.347066	Bent Crowley	17						Tier 3
ARK-2015-0539	Lake Level - Lake Isabel	Develop water or a plan to keep lake level high.	Education, Outreach & Innovation	Supply & Demand Gap	Agriculture		Implementing	LAVWCD and others						37.984482	-105.052633	Bent Crowley	15						Tier 3
ARK-2015-0540	Aging Infrastructure Replacement	Replace aging infrastructure for agriculture and municipalities	Funding	Agriculture		Municipal	Implementing	LAVWCD and others						38.060354	-103.347066	Bent Crowley	17						Tier 3
ARK-2015-0541	Lake Levels	Develop water or a plan to keep lake level high. Need to make deals with owner of water rights to keep lake levels high for	Watershed Health, Environment &	Storage			Implementing	LAVWCD and others						38.060354	-103.347066	Bent Crowley	17						Tier 3
ARK-2015-0542	Rehabilitation of Dams	Dams in the state have been neglected for many years and maintenance has been deferred. These dams are in need of	Funding	Education, Outreach &	Watershed Health,		Concept	LAVWCD and others						38.25947	-104.554771	Baca Bent	10						Tier 4
ARK-2015-0544	Project Title Missing						Concept									Otero							Tier 4

ARK-2015-0545	Project Title Missing						Concept									Otero							Tier 4
ARK-2015-0546	Project Title Missing						Concept									Otero							Tier 4
ARK-2015-0547	Project Title Missing						Concept									Otero							Tier 4
ARK-2015-0548	Project Title Missing						Concept									Prowers							Tier 4
ARK-2015-0549	Project Title Missing						Concept									Prowers							Tier 4
ARK-2015-0550	Outlet Replacement at Mountain Lake Dam	Replace the existing outlet works gate valve, located in the dam, with a new gate valve on upstream face of the dam.	Funding				Planned	Parkville Water District						39.263759	-106.210134	Lake	11						Tier 3
ARK-2015-0551	Recovery of Yield Group (ROY)	The ROY Participants are developing projects and methods to recapture, store, and exchange water that is foregone to	Storage		Conservation	Municipal	Implementing	Colorado Springs Utilities, PBWW, Aurora, SECWCD,	Kim Gortz	100	0	0	0	38.26194	-104.698248	Bent Crowley	14			27500	acre-feet (AF)		Tier 3
ARK-2015-0552	Clear Creek Reservoir Expansion	Raise the existing Clear Creek Dam by as much as 36' to add 18,500 AF of additional storage capacity.	Supply & Demand Gap	Storage	Funding		Planned	Pueblo Water						39.020751	-106.246591	Chaffee	11						Tier 3
ARK-2015-0553	Project Title Missing						Concept									Fremont							Tier 4
ARK-2015-0554	Elbert County Water Study	Study will provide a summary of past data collected in Elbert County and from the Well Monitoring Network to evaluate	Watershed Health, Environment &	Supply & Demand Gap	Agriculture	Municipal	Concept	Elbert County		33	33	33	0	39.0738	-103.9255	Elbert	67						Tier 3
ARK-2015-0555	Restore Historic Palmer Lake	A Jackson photo of Palmer Lake in 1874 shows that it is a natural lake, probably spring fed. The project will restore the	Funding	Watershed Health, Environment &			Planned	Palmer Lake Restoration 501(c)3		0	0	100	0	39.123102	-104.912078	El Paso	10						Tier 3
ARK-2015-0556	Water Rights Delivery Analysis for All Water Related Proposed Projects	Perform a detailed hydrologic and hydraulic analysis of proposed projects to determine the river flows based on all	Funding	Education, Outreach &	Agriculture		Concept	Town of Cheraw		0	100	0	0			Arkansas Basin	17						Tier 3
ARK-2015-0557	Head Gate Replacement at Two Buttes Reservoir	Head gates at Two Buttes Reservoir are part of the original Two Buttes Irrigation Company and are leaking several	Watershed Health, Environment &	Storage	Conservation		Implementing	Baca County, CPW, NRCS, Baca County Conservation		0	0	100	0	37.635594	-102.538899	Baca	67						Tier 3
ARK-2015-0558	Pueblo Dam Hydroelectric Project	The proposed 7.0 megawatt (MW) facility would be located on the Pueblo Dam River Outlet (Dam). A powerhouse would be	Education, Outreach & Innovation			Municipal	Implementing	SECWCD		100	0	0	0	38.268606	-104.726953	Pueblo	10						Tier 3
ARK-2015-0559	Phantom Canyon Reservoir	Preliminary design of a 54,000 AF storage vessel in the vicinity of existing Brush Hollow Reservoir. Off-channel on	Storage	Agriculture	Watershed Health,	Municipal	Implementing			33	33	33	0	38.46	-105.05	Bent El Paso	12						Tier 1
ARK-2015-0560	Front Range Aggregates Storage Vessel	Two off-channel storage vessels of 4,000 AF each (total 8,000 AF) as Mined Land Reclamation Permit mitigation at	Storage	Supply & Demand Gap	Watershed Health,		Concept	Front Range Aggregates						38.492	-105.4	Fremont	12						Tier 4
ARK-2015-0561	Two Buttes Creek Tamarisk Removal Project	Partner with NRCS to identify and eradicate tamarisk along the Two Buttes Creek flow line. Addition to previous efforts.	Funding	Watershed Health, Environment &	Agriculture		Planned	Natural Resources Conservation Service, Baca		0	50	50	0	37.51038	-103.056359	Baca Las Animas	67						Tier 3
ARK-2015-0562	Depleted Ground Water Levels in the Southern High Plains	Study options for recharge and cropping systems to maintain static water level of existing irrigation and municipal ground	Education, Outreach & Innovation	Agriculture		Municipal	Concept	Southern High Plains Groundwater Management		50	50	0	0			Baca Bent	66						Tier 4
ARK-2015-0563	Town of Walsh Water Supply Project	Find ways to acquire reliable and sustainable water supply for the Town of Walsh.	Supply & Demand Gap	Watershed Health, Environment &	Agriculture	Municipal	Planned	Southern High Plains Groundwater Management		33	33	33	0	37.387916	-102.283773	Baca	67						Tier 3
ARK-2015-0564	Well Monitoring in Southern High Plains Designated Groundwater Basin	Partner with state engineering and groundwater commission to continue well monitoring in Southern High Plains Water	Agriculture			Municipal	Planned	Southern High Plains Groundwater Management		50	50	0	0	37.41061	-102.302462	Baca Bent	67						Tier 3
ARK-2015-0565	Recharge Options to Ogallala Aquifer	Examine existing and past proposals to recharge Ogallala Aquifer, and study lost water going to Kansas agriculture.	Education, Outreach & Innovation	Watershed Health, Environment &	Agriculture	Municipal	Concept			33	33	33	0			Baca	66						Tier 3
ARK-2015-0566	Advancing Options for Conservation and Water Reuse in a Constrained Environment	Make available to the public proven methods to cope with water scarcity. Examine low water cropping systems and	Education, Outreach & Innovation	Agriculture	Watershed Health,	Municipal	Concept			33	33	33	0			Baca	66						Tier 3
ARK-2015-0567	Produced Saltwater Use on Gravel Roads	Find a way to make produced salt water available to the county road and bridge department for use on gravel roads.	Education, Outreach & Innovation	Watershed Health, Environment &			Concept	Baca County		0	0	100	0			Baca Huerfano	Multiple						Tier 4
ARK-2015-0568	Emergency Relief from Environmental Mandates to Small Operations	Emergency funding to mitigate financial consequences to Two Buttes for CDPHE mandated filtration systems operation and	Funding	Watershed Health, Environment &		Municipal	Planned	Town of Walsh, Town of Vilas, Baca County		50	0	50	0	37.628145	-102.559139	Baca	67						Tier 3
ARK-2015-0569	Town of Hugo Wastewater Treatment System	Assessment and potential replacement or rehabilitation of wastewater collection and treatment system infrastructure to	Education, Outreach & Innovation	Watershed Health, Environment &			Concept	Town of Hugo						39.13616911	-103.4726915	Lincoln	67						Tier 4
ARK-2015-0570	Town of Hugo Water System Improvements	Construction, replacement and/or rehabilitation of wells to enhance production and efficiency of permitted town wells and	Watershed Health, Environment &	Funding			Concept	Town of Hugo						39.13616911	-103.4926915	Lincoln	67						Tier 4
ARK-2015-0571	2015 Proposed Instream Flow Appropriation - Beaver Creek	Instream flow project for Beaver Creek from the confluence of East and West Beaver Creeks to the confluence at Patton	Watershed Health, Environment &				Concept	CPW		0	0	100	0	38.560767	-105.021459	Fremont	12						Tier 4
ARK-2015-0572	2015 Proposed Instream Flow Appropriation - West Beaver Creek	Instream flow project for West Beaver Creek from the confluence at Douglas Gulch to the confluence at East	Watershed Health, Environment &	Education, Outreach &	Conservation		Concept	CPW		0	0	100	0	38.722024	-105.07248	Fremont Teller	12						Tier 4
ARK-2015-0576	2015 Proposed Instream Flow Appropriation - Arkansas River	Instream flow project for Arkansas River from the outlet of the fish hatchery to the confluence at Fountain Creek.	Watershed Health, Environment &	Education, Outreach &	Conservation		Concept	CPW, City of Pueblo		0	0	100	0	38.266747	-104.45647	Pueblo	14						Tier 4
ARK-2015-0577	PPRWA Infrastructure study phase 1 & 2	design storage, conveyance and treatment infrastructure for small water purveyors dependent on Denver Basin Aquifer	Education, Outreach & Innovation				Implementing	PPRWA									10						Tier 2
ARK-2020-0001	BMP Implementation for 9-Element Plan and TMDL compliance					water quality	Concept	LAWCD									17						Tier 4
ARK-2020-0002	Upgrade of small water delivery systems for connection to the AVC		Supply & Demand Gap				Concept	LAWCD									17						Tier 4
ARK-2020-0003	Soil Health and Development of Ag Marketing for new cropping types		Agriculture				Concept	LAWCD									67						Tier 4
ARK-2020-0004	Aging Infrastructure Upgrades for ditch systems		Agriculture				Concept	LAWCD									67						Tier 4
ARK-2020-0005	Telemetry and more precise water accounting for ditch systems		Agriculture				Concept	LAWCD									17						Tier 4
ARK-2020-0006	9 Element Plan from Pueblo to JMR	Additional 9 Element Plan from Pueblo to JMR to connect with the work completed by CSU on the 9 Element plan of JMR to				water quality	Concept	LAWCD									17						Tier 4
ARK-2020-0007	Sedimentation Removal Projects along the Ark River		Watershed Health, Environment &				Concept	LAWCD									17						Tier 4
ARK-2020-0008	Box Creek Reservoir	water rights in the Colorado and Arkansas River basins. No new water rights are associated with this project, thus	Storage	Supply & Demand Gap	Additional	Municipal Joint Use	Planned	Aurora Water	Alexandra Davis	100	0	0	0	39.202495	-106.344777	Lake	11	0	acre-feet (AF)	60,000	acre-feet (AF)	$ 600,000,000.00	Tier 2
ARK-2020-0009	Non-Potable Water Resource Plan	The Non-Potable Water Resource Plan will evaluate the condition and trends of the existing non-potable system within	Conservation	Supply & Demand Gap		Municipal	Implementing	Colorado Springs Utilities	Kim Gortz	100						El Paso	10						Tier 1
ARK-2020-0010	Alternative Transfer Method (ATM) Project	The ATM Project is exploring water sharing opportunities between agriculture entities and Colorado Springs Utilities.	Supply & Demand Gap	Agriculture	Land Use	Municipal	Implementing	Colorado Springs Utilities	Kim Gortz	100							10						Tier 3
ARK-2020-0013	Fountain Creek Mitigation Program	Restore eroding stream bank, reduce sedimentation, restore and improve bank vegetation, install flow control structures,	Watershed Health, Environment &				Implementing	Fountain Creek District	Bill Banks								10						Tier 3
ARK-2020-0014	City of Colorado Springs Stormwater Improvements	Restore eroding stream bank, reduce sediment generation, restore bank vegetation, install stormwater control structures,	Watershed Health, Environment &				Implementing	City of Colorado Springs, Colorado Springs Utilities	Richard Mulledy								10						Tier 3
ARK-2020-0015	Envision Chaffee County - Chaffee County Recreation Management Plan	Manage recreation impacts county wide to reduce water quality impacts on the Arkansas River and associated sub-		Watershed Health, Environment &			Implementing	Chaffee County	Cindy Williams							Chaffee	11						Tier 2
ARK-2020-0016	Envision Chaffee County - Recreation Balance and Rapid Response Plan	Plan will address impacts associated with dispersed camping and other recreation activities through rapid response		Watershed Health, Environment &			Implementing	Chaffee County	Cindy Williams							Chaffee	11						Tier 3
ARK-2020-0017	Envision Chaffee County - Implementation of County wide CWPP	Long term coordination, collaboration, planning and implementation of various cross boundary forest health and		Watershed Health, Environment &			Implementing	Chaffee County, USFS, BLM, CSFS, CPW, AWRC, water	Cindy Williams							Chaffee	11						Tier 3
ARK-2020-0018	RMRI - Restoring the Arkansas Headwaters	Restoration of the Arkansas Headwaters is a collaborative effort that builds on local momentum of forest management		Watershed Health, Environment &			Implementing	USFS, National Wild Turkey Foundation, Chaffee County,	Patrick Mercer							Chaffee Lake	11						Tier 3
ARK-2020-0019	CSFS - Colorado Springs Utilities Pikes Peak Watershed Forest Management Plan	This is an ongoing partnership where the CSFS works under a service agreement with Colorado Springs Utilities to		Watershed Health, Environment &			Implementing	CSFS, Colorado Springs Utilities	Mark Shea								11						Tier 3
ARK-2020-0020	USFS-CSFS-Colorado Springs Utilities MOU Partnership	Partnership works to fund $3 million annually by the USFS and Utilities to support forest restoration and wildfire mitigation		Watershed Health, Environment &			Implementing	USFS, CSFS, Colorado Springs Utilities	Mark Shea							El Paso Lake	10						Tier 3
ARK-2020-0021	St. Charles Mesa Cottonwood Irrigation Ditch #2 Headgate/Augmentation Station Project	Cottonwood Irrigating Ditch #2 (CID2) Diversion headgate and Parshall flume repair/replacement, along with the addition of a	Agriculture	Supply & Demand Gap		Diversion Structure	Implementing	St. Charles Mesa Water District & UAWCD	Gracy Goodwin	80	20	0	0	38.8324	-106.1715	Chaffee	11	0	acre-feet (AF)			$ 184,000.00	Tier 2
ARK-2020-0022	Round Mountain Reservoir Feasibility Study and Design project	Conduct a feasibility study of building a new off channel reservoir near Grape Creek south of Westcliffe CO. Also	Storage	Watershed Health, Environment &	Agriculture	Municipal	Implementing	Round Mtn Water and Sanitation District & UAWCD	Gracy Goodwin	80	10	10		38.118572	-105.631536	Custer	11	150	AF			$ 232,500.00	Tier 2
ARK-2020-0023	Cottonwood Reservoir Rehabilitation	Increase spillway capacity to improve the overall dam safety and construct a concrete labyrinth type spillway wall. Also	Agriculture	Watershed Health, Environment &	Storage	Municipal	Planned	Upper Arkansas Water Conservancy District	Gracy Goodwin	70	15	15		38.78	-106.280556	Chaffee	11						Tier 3
ARK-2020-0024	Mesa McKenna Pipeline	Piping a portion of the mainline, as well as, the laterals and add meters to the property of the 53 shareholders. This would	Agriculture				Concept	Mesa McKenna Ditch Company	Gracy Goodwin		100					Chaffee	11			0	cfs	$ 700,000.00	Tier 4
ARK-2020-0025	DeWeese Reservoir Enlargement Feasibility Study	Conduct a feasibility study to analyze a possible enlargement of the reservoir by raising the dam and spillway. This will	Storage	Agriculture	Watershed Health,	Municipal	Implementing	DeWeese Dye Ditch and Reservoir Company &	Gracy Goodwin	10	70	20		38.2027	-105.4639	Custer	11					$ 225,000.00	Tier 2
ARK-2020-0026	Colorado Springs Water-Wise Rules	Eliminates water waste by limiting outdoor watering to no more than three days a week, fixing irrigation leaks, using shutoff	Conservation	Education, Outreach &	Supply & Demand Gap		Implementing	City of Colorado Springs, Colorado Springs Utilities	Julia Galluci								10						Tier 2
ARK-2020-0027	Colorado Springs Transforming Outdoor Water Use and Landscapes	Program suite that includes two grants from CWCB to transform landscape choices and water use for residential and	Conservation	Education, Outreach &	Land Use		Implementing	City of Colorado Springs, Colorado Springs Utilities	Julia Galluci								10						Tier 2
ARK-2020-0028	Trout Creek Park Alluvial Aquifer Storage Pilot Project	Develop a underground water storage demonstration project. Construct and deliver fully consumable water to infiltration/re-	Storage	Agriculture		Municipal	Implementing	Upper Arkansas Water Conservancy District	Gracy Goodwin	65	35			38.792778	-106.088056	Chaffee	11	20,000	AF			$ 220,000.00	Tier 2
ARK-2020-0029	Pueblo Low Head Dam Hazard Mitigation	Hazard Mitigation or removal of low head dam and create boating passage through the affected reach of the Arkansas	Watershed Health, Environment &				Planned	Pueblo Board of Water Works, City of Pueblo, Pueblo	Scot Burbidge								14						Tier 3
ARK-2020-0030	Conservation Garden at Lake Ranch	Create a conservation garden to show various demonstration areas for various vegetation, irrigation technologies, soil	Conservation	Education, Outreach &	Watershed Health,	Agriculture, Municipal	Concept	Upper Arkansas Water Conservancy District	Gracy Goodwin	10	30	60				Chaffee	11					$ 150,000.00	Tier 4
ARK-2020-0031	Town Of Walsh Water System	Walsh is facing problems trying to pump out of the current well systems and maintain the uses. The current wells are old and	Additional	Storage			Planned	Baca County								Baca	66						Tier 3
ARK-2020-0032	Sheridan Lake Water System	Sheridan Lake is down to one well and that one well has radio nuclides in it. This system needs wells to be upgraded and	Additional	Funding		Municipal	Planned	Baca County								Baca	67						Tier 2
ARK-2020-0033	Two Buttes Delivery System	The town of Two Buttes has been reduced to one small well due to the low water table, poor water quality form other wells,	Additional	Funding		Municipal	Planned	Baca County	Spike Ausmus							Baca	67						Tier 2
ARK-2020-0034	High Plains Aquifer Sustainability	A look at how to maintain the aquifer storage for municipal and agricultural uses in the high plain storage system.	Agriculture	Additional	Storage	Municipal	Concept	Baca County	Shilioh Freed							Baca	66						Tier 3
ARK-2020-0035	Two Buttes Reservoir Permenant Pool	In order to move ARK-2015-0045 and Ark-2015-0557 a steady supply of water needs to be in the reservoir. This work	Watershed Health, Environment &	Storage			Concept	Baca County	Spike Ausmus							Baca	67						Tier 4

ARK-2020-0036	Purgatoire River Water Conservancy District - River Headgates Remote Controls	Remote control abilities of district ditch company river diversion headgates.	Agriculture	Supply & Demand Gap	Education, Outreach &		Concept	Purgatoire River Water Conservancy District	Purgatoire River Water Conservancy							Las Animas	19						Tier 4
ARK-2020-0037	Purgatoire River Water Conservancy District - Picketwire & Baca Ditches Separation	Partial separation of the Picketwire Ditch Company and Baca Ditch Company ditches.	Agriculture				Concept	Purgatoire River Water Conservancy DIstrict	Purgatoire River Water Conservancy							Las Animas	19						Tier 4
ARK-2020-0039	Non-Potable Conversion	Convert outdoor irrigation demand from potable to non-potable supply	Supply & Demand Gap	Municipal			Planned	CO Dept. of Corrections		100													Tier 3
ARK-2020-0040	Twin Lakes Veg Management Project	Wildfire mitigation, improve forest health	Watershed Health, Environment &				Concept	NFS	Leadville Ranger District			100					11						Tier 4
ARK-2020-0041	Marshall Pass Veg Management Project	Due to the recent spruce beetle epidemic this is needed to improve forest health and provide wildfire mitigation	Watershed Health, Environment &				Implementing	NFS	Salida Ranger District			100					11						Tier 3
ARK-2020-0042	Lake County Forest Management Project	Lake County will focus on fuel mitigation and forest health projects identified through Lake County CWPP and in	Watershed Health, Environment &				Concept	Lake County									11						Tier 4
ARK-2020-0043	Lake County Culverts Replacement	Lake County, will prioritize culvert replacement with bridges f river and tributary health to fish passage and habitat and	Watershed Health, Environment &				Concept	Lake County									11						Tier 4
ARK-2020-0044	Mercury Levels and Water Quality Management in the Arkansas River	Respond to findings regarding Mercury levels and utility operations in Lake and water quality in Arkansas River	Watershed Health, Environment &				Concept	Lake County									11						Tier 4
ARK-2020-0045	Storage Space in Basin	Obtain more storage space in the basin (Turquoise or Pueblo to store Derry 3 Water.	Storage				Concept	Lake County									11						Tier 4
ARK-2020-0046	Storage Facility Construction	Explore other storage facility construction in Lake and in partnership with UAWCD.	Storage				Concept	Lake County									11						Tier 4
ARK-2020-0047	Hayden Reservoir Management	Manage Hayden Reservoir to best meet needs regarding Lak County Augmentation Plan as well as recreation use.	Storage	Watershed Health, Environment &			Concept	Lake County									11						Tier 4
ARK-2020-0048	River restoration below Sugarloaf Damn	Manage investments in river restoration below Sugarloaf Damn in partnership with USFS to address recreation impacts	Watershed Health, Environment &				Concept	Lake County									11						Tier 4
ARK-2020-0049	Lake Augmentation Plan - DeLappe Ditch	Explore DeLappe Ditch improvement as needed to exercise Lake Augmentation Plan and most efficiently use Lake sources of water. Consider working with MMGC and Lake irrigation water use and relationship	Watershed Health, Environment & Recreation	Storage			Concept	Lake County									11						Tier 4
ARK-2020-0050	Lake Augmentation Administration	Explore and develop Lake Augmentation administration with basin partners	Storage	Additional			Concept	Lake County									11						Tier 4
ARK-2020-0051	Develop Lake Enterprise priorities		Storage	Additional			Concept																Tier 4
ARK-2020-0052	Education and Outreach to Lake community	Lake needs to continue to educate public and promote partnerships in matters of water, storage, environment, conservation. Many overlapping projects regarding forest and river health are prioritized by stakeholders and Lake has limited financial and capacity resources to address. Build social licensing and potentially pursue a ballot measure for revenue stream	Education, Outreach & Innovation	Watershed Health, Environment & Recreation	Agriculture	Municipal	Concept	Lake County		25	25	25	25				11						Tier 4
ARK-2020-0053	Funding for Lake County Activities	Plan for long term revenue generation in forest health priorities, similar to Chaffee's success with 1A.	Funding	Watershed Health, Environment & Recreation			Concept	Lake County									11						Tier 4
ARK-2020-0054	Guidance, and Relationship Building with ARWC to Implement Projects in Lake	Utilize ARWC for capacity building and guidance in Lake both to implement fuel mitigation projects and to help establish institutional knowledge, responsibilities, and relationships/engagements within the basin, especially focusing on the Upper Basin as we begin	Additional	Education, Outreach & Innovation	Funding	Watershed Health, Environment & Recreation	Concept	Lake County									11						Tier 4
ARK-2020-0055	Development of Land Use Priorities and Recreational Planning with USFS and other	Work with USFS to develop land use priorities regarding recreation use and management. To include Master Planning	Land Use	Watershed Health, Environment &	Conservation		Concept	Lake County									11						Tier 4
ARK-2020-0056	Purgatoire River Baca-Picketwire Diversion Dam Complex Restoration Project	The purpose of this item is to request a Letter of Support from the Arkansas Basin Roundtable supporting the Purgatoire	Agriculture	Watershed Health, Environment &		Municipal	Planned	Purgatoire Watershed Partnership, in partnership	Julie Knudson, Executive	33	33	33				Las Animas	19						Tier 2
ARK-2020-0057	AY Minnie Mine, Iowa Gulch in Leadville	Work would take place here to regrade an unstable mine waste pile adjacent to the mineral belt trail, a county road, and	Conservation	Watershed Health, Environment &	Education, Outreach &	Recreation	Concept	Trout Unlimited Inc	Jason Willis	0	0	100	0	39.235291	-106.257513	Lake	11	0		2	area (acres)	$ 300,000.00	Tier 3
ARK-2020-0058	Halfmoon Creek, Fish Passage	Currently a BOR trans-mountain diversion poses a barrier to fish passage up the halfmoon creek drainage. Funds would b	Watershed Health, Environment &	Conservation	Agriculture	Administration	Concept	Trout Unlimited Inc	Jason Willis	0	0	100	10	39.185751	-106.383644	Lake	11			2	miles	$ 250,000.00	Tier 4
ARK-2020-0059	South Arkansas River	TU has worked with various partners on habitat improvement for fish and macroinvertebrates on the South Arkansas from	Watershed Health, Environment &	Storage	Agriculture	Administration	Concept	Trout Unlimited Inc	Jason Willis	0	33	50	27	38.522237	-105.98963	Chaffee	11			3	miles	$ 220,000.00	Tier 4
ARK-2020-0060	Abandoned mine land (AML) projects, Garfield, CO	A draining mine adit contributes flow to the headwaters of the middle fork of the Arkansas River and should be lined and	Watershed Health, Environment &	Land Use	Conservation	Administration	Concept	Trout Unlimited Inc	Jason Willis	0	0	100	15	38.570893	-106.324002	Chaffee	11			2	miles	$ 150,000.00	Tier 4
ARK-2020-0061	AML projects in Leadville	Aspects of past cleanups remain in the south evans gulch area as well as the headwaters of the iowa gulch near the	Watershed Health, Environment &	Land Use	Conservation	Administration	Concept	Trout Unlimited Inc	Jason Willis	0	0	100	15	39.253972	-106.223779	Lake	11	1	cubic feet per second (cfs)	2	miles	$ 175,000.00	Tier 4
ARK-2020-0062	AML characterization on Lake Creek	Partners in the Lake County region have expressed interest in quantifying metal loading along Lake Creek to discern natural	Watershed Health, Environment &	Agriculture	Additional	Municipal Administration	Concept	Trout Unlimited Inc.	Jason Willis	25	25	50	15	39.070864	-106.456343	Lake	11			8	miles	$ 50,000.00	Tier 3
ARK-2020-0063	Burned area response projects	Various aspects remain for on-the-ground reclamation throughout the burn scar of the Decker Fire. These include	Watershed Health, Environment &	Land Use	Agriculture	Administration	Planned	Trout Unlimited Inc.	Jason Willis	0	15	85	15	38.507334	-105.997161	Chaffee	11			4	area (acres)	$ 65,000.00	Tier 3
ARK-2020-0064	Culvert replacement projects	US-50 near Monarch pass on USFS lands	Watershed Health, Environment &	Conservation	Additional	Administration	Planned	Trout Unlimited Inc	Jason Willis	0	0	100	15	38.499445	-106.327864	Chaffee	11			1	miles	$ 55,000.00	Tier 3
ARK-2020-0065	Revegetation projects	Monarch pass area post-logging measures. Typically logging and steep slope logging can leave behind a scar that can	Watershed Health, Environment &	Agriculture	Conservation	Administration	Concept	Trout Unlimited Inc.	Jason Willis	0	15	85	15	38.50889	-106.320171	Chaffee	11			30	area (acres)	$ 450,000.00	Tier 3
ARK-2020-0066	South Booster Pump and Cimarron Water Main Upgrade, Phase One	Upgrades/Replacement to an existing pump station and replace existing transmission main. This will provide improved	Conservation	Supply & Demand Gap		Municipal	Planned	City of La Junta	Thomas Seaba	100				37.981333	-103.54754	Otero	17					$ 1,400,000.00	Tier 3
ARK-2020-0067	South Booster Pump and Cimarron Water Main Upgrade, Phase Two	Upgrades/Replacement to an existing pump station and replace existing transmission main. This will provide improved	Supply & Demand Gap	Conservation		Municipal	Planned	City of La Junta	Thomas Seaba	100				37.981333	-103.54754	Otero	17					$ 800,000.00	Tier 3
ARK-2020-0068	Residential Meter Replacement	Replacement of all residential water meters. This will provide improved operational efficiency, reduce water and revenue	Conservation			Municipal	Implementing	City of La Junta	Thomas Seaba	100				37.981333	-103.54754	Otero	17	30	AF			$ 657,000.00	Tier 2
ARK-2020-0069	Pasquale Springs Upgrade	Upgrade the Pasquale Springs diversion structure so that the structure can provide the maximum 3.1 cfs (2 mgd) as per the	Supply & Demand Gap	Conservation		Municipal	Implementing	City of Salida	David Lady	100				38.54371	-105.99794	Chaffee	11	2,240	ac-ft	3.1	cfs		Tier 1
ARK-2020-0070	Harrington Ditch Piping	Piping of the Harrington Ditch between U.S. Highway 50 and Salida;s water treatment plant will provide the following	Supply & Demand Gap	Watershed Health, Environment &		Municipal Water Systems	Planned	City of Salida	David Lady	20		80		38.51151	-106.067589	Chaffee	11	104	ac-ft				Tier 3
ARK-2020-0071	Fryingpan-Arkanas Project Water Diversion Structure	A diversion intake structure north of the City of Salida would permit Salida to take delivery of its Project Water annually to	Supply & Demand Gap	Land Use	Storage	Municipal	Concept	City of Salida	David Lady	100				38.54981	-106.027554	Chaffee	11	700	ac-ft	5	cfs		Tier 3
ARK-2020-0072	Vandaveer Ranch Reservoir	Construct a lined reservoir on the Vandaveer property and obtain the necessary storage rights to maintain a larger supply	Supply & Demand Gap	Conservation	Storage	Municipal	Concept	City of Salida	David Lady	100				38.52062	-105.99143	Chaffee	11	685	ac-ft	2.23	cfs		Tier 3
ARK-2020-0073	North Fork Reservoir Expansion	The expansion of North Fork Reservoir would increase Salida's storage capacity above the MWS intake at the	Supply & Demand Gap	Storage		Municipal	Concept	City of Salida		100				38.61040	-106.320854	Chaffee	11	500	ac-ft	60	cfs		Tier 4
ARK-2020-0074	Briscoe Ditch - City Golf Course	This would allow the City to utilize the current irrigation supply treated Harrington Ditch water—in the municipal system	Supply & Demand Gap	Watershed Health, Environment &	Land Use	Municipal	Concept	City of Salida	David Lady	33		67		38.53892	-106.008139	Chaffee	11	100	ac-ft	1	cfs		Tier 4
ARK-2020-0075	South Arkansas River Restoration-lowest 1.2 mile reach	Central Colorado Conservancy and Trout Unlimited have been working on a River Health Assessment and Conceptual	Watershed Health, Environment &	Land Use	Conservation		Planned	Central Colorado Conservancy	Buffy Lenth			100		38.31206	-105.592684	Chaffee	11						Tier 3
ARK-2020-0076	Arkansas Headwaters Wetland Focus Area Committee Priority Conservation/Restoration	The Arkansas Headwaters Wetland Focus Area Committee worked with the Colorado Natural Heritage Program to identify	Watershed Health, Environment &	Land Use	Conservation		Planned	Arkansas Headwaters Wetland Focus Area	Buffy Lenth			100				Chaffee Lake	11						Tier 3
ARK-2020-0080	Headgate Restoration Program, Huerfano County	Initiated by HCWCD, with c. $70K support from CWCB, aims at the protection and restoration of headgates (irrigation and	Watershed Health, Environment &	Agriculture	Supply & Demand Gap	Municipal	Implementing	Huerfano County Water Conservancy Dist		10	90			37.624807	-104.782031	Huerfano	16	90000	AF			$ 10,000,000.00	Tier 2
ARK-2020-0081	Spring Creek Fire Remediation, Huerfano County	Initiated by HCWCD, with c. $1M of CWCB WRP funding, this project for which ARWC is the contractor seeks to	Watershed Health, Environment &	Agriculture	Additional	Municipal Flood Mitigation	Implementing	Huerfano County Water Conservancy District		55	25	20		37.51186	-105.04001	Huerfano	16					$ 10,000,000.00	Tier 1
ARK-2020-0082	Flood Warning Gages, Huerfano County	Following the 2018 Spring Creek Fire (over 60% hydrophobic soil), the HCWCD obtained funding from CDHSEM and CWCB to position seven flood warning gages below the burn scar and above population centers within Huerfano County.	Watershed Health, Environment & Recreation	Supply & Demand Gap		Flooding	Implementing	Huerfano County Water Conservancy District				100		37.62481	-104.78203	Huerfano	16	NA		NA		$ 180,000.00	Tier 2
ARK-2020-0083	Britton Ponds Enlargement (BPE)	42 ac-ft new reservoir. Received funding from local match.	Watershed Health, Environment &	Agriculture	Storage	Municipal	Planned	HCWCD	Carol Dunn	75	15	10		37.33388	-105.09053	Huerfano	16	22	acre-feet (AF)	42	acre-feet (AF)	$ 6,500,000.00	Tier 1
ARK-2020-0084	South Baker Creek Reservoir (SBCR)	New 122 ac-ft reservoir. Received funding from local match.	Watershed Health, Environment &	Agriculture	Storage	Municipal	Planned	HCWCD	Carol Dunn	75	15	10		37.35017	-105.10741	Huerfano	16	54	acre-feet (AF)	122	acre-feet (AF)	$ 13,000,000.00	Tier 1
ARK-2020-0085	Bruce Canyon Reservoir (BCR)	New 1406 ac-ft reservoir. Received funding from local match.	Watershed Health, Environment &	Agriculture	Storage	Municipal	Planned	HCWCD	Carol Dunn	75	15	10		37.46980	-105.02968	Huerfano	16	622	acre-feet (AF)	1406	acre-feet (AF)	$ 19,000,000.00	Tier 1
ARK-2020-0086	La Veta Town Lakes Enlargement (LVLE)	102 ac-ft enlargement of existing resevoir. Received funding from local match.	Watershed Health, Environment &	Agriculture	Storage	Municipal	Planned	HCWCD	Carol Dunn	75	15	10		37.49344	-105.00429	Huerfano	16	102	acre-feet (AF)	102	acre-feet (AF)	$ 6,600,000.00	Tier 1
ARK-2020-0087	Maria Stevens Reservoir Enlargement (MSRE)	642 ac-t enlargement of existing reservoir. Received funding from local match.	Watershed Health, Environment &	Agriculture	Storage	Municipal	Planned	HCWCD	Carol Dunn	75	15	10		37.66843	-104.67877	Huerfano	16	271	acre-feet (AF)	642	acre-feet (AF)	$ 8,400,000.00	Tier 1
ARK-2020-0088	Lake County Inclusion in UAWCD Augmentation Plan	Incorporating Lake County into the Upper Arkansas Water Conservancy District and including them under UAWCD's	Supply & Demand Gap	Municipal	Additional	Agricultural	Concept	Upper Arkansas Water Conservancy District	Gracy Goodwin	90	10					Lake	11						Tier 3
ARK-2020-0089	Mesa McKenna Pipeline	Piping a portion of the mainline, as well as, the laterals and add meters to the property of the 53 shareholders. This would	Supply & Demand Gap	Agriculture	Additional		Concept	Upper Arkansas Water Conservancy District	Gracy Goodwin		100					Chaffee	11					$ 700,000.00	Tier 3
ARK-2020-0090	Helena Ditch Improvements	Repair aging infrastructure, piping sections of the ditch, add telemetry and improved gaging station, repairs to diversion	Conservation	Supply & Demand Gap	Agriculture	Municipal	Concept	Upper Arkansas Water Conservancy District	Gracy Goodwin	40	60					Chaffee	11						Tier 4
ARK-2020-0091	Pueblo Tailwater Erosion Project	The goal of this project is to maintain and improve in-stream fish habitat in the tailwater below the Pueblo Reservoir	Watershed Health, Environment &				Concept	TU Chapter 509	Steve Wolfe			100		36.261182	-104.694981	Pueblo	14					$ 28,700.00	Tier 3
ARK-2020-0092	Chilili Ditch & Habitat Project	Approximately one mile of river near Trinidad where there is a convergence of agricultural, ecological, and recreational	Agriculture	Watershed Health, Environment &	Conservation	Municipal	Concept	Purgatoire Watershed Partnership	Julie Knudson	33	33	33					19						Tier 3
ARK-2020-0093	Antonio-Lopez Ditch Project	The in-stream irrigation infrastructure for the Antonio-Lopez ditch is located just downstream from the Trinidad Reservoir	Conservation	Watershed Health, Environment &	Agriculture	Municipal	Concept	Purgatoire Watershed Partnership	Julie Knudson	33	33	33					19						Tier 4
ARK-2020-0094	Purgatoire River Upper Watershed Assessment & Enhancement Project	The Purgatoire Watershed Partnership is currently working with multiple partners to conduct stakeholder outreach and	Agriculture	Watershed Health, Environment &	Conservation		Concept	Purgatoire Watershed Partnership	Julie Knudson	33	33	33					19						Tier 3
ARK-2020-0095	Purgatoire River Middle Watershed Assessment & Enhancement Project	The Purgatoire Watershed Partnership is currently working with multiple partners to conduct stakeholder outreach and	Agriculture	Watershed Health, Environment &	Conservation	Municipal	Concept	Purgatoire Watershed Partnership	Julie Knudson	33	33	33					19						Tier 3
ARK-2020-0096	Purgatoire River Lower Watershed Assessment & Enhancement Project	The Purgatoire Watershed Partnership is currently working with multiple partners to conduct stakeholder outreach and	Agriculture	Watershed Health, Environment &	Conservation	Municipal	Concept	Purgatoire Watershed Partnership	Julie Knudson	33	33	33					17						Tier 3

ARK-2020-0097	Palmer Land Trust project: Bessemer Farmland Conservation Project	The Bessemer Farmland Conservation Project is a long-term, multifaceted, landscape-scale conservation initiative that	Conservation	Land Use	Agriculture	Watershed Health,	Concept	Palmer Land Conservancy	Ed Roberson								14						Tier 3
ARK-2020-0098	Town of Hugo Water Devlivery System Upgrades	The town of Hugo is facing leaking and deteriorating 50+ year old pipes that need to be upgraded. There are about 21,320	Municipal				Implementing	Town of Hugo	Maria Nestor	100				39.022942	-103.371474	Lincoln	67					$ 750,000.00	Tier 2
ARK-2020-0099	Town of Hugo Wastewater Sewage Lines	Hugo is having issues with delivery of sewage water to the treatment facility putting pressure on fresh drinking water. The	Municipal				Implementing	Town of Hugo	Maria Nestor	100				39.022942	-103.371474	Lincoln	67					$ 500,000.00	Tier 2
ARK-2020-0100	Town of Hugo Water Tower Upgrade	Hugo has been working with NRCS to complete a PER report to replace the water tower in the town. The work is something	Municipal				Concept	Town of Hugo	Maria Nestor	100				39.022942	-103.371474	Lincoln	67					$ 5,000,000.00	Tier 3
ARK-2020-0101	Town of Hugo Water Tower Stand Pipe	The water tower stands 150 feet in the air and the line from that to the city is in critical condition with the possibility of	Municipal	Storage			Implementing	Town of Hugo	Maria Nestor	100				39.022942	-103.371474	Lincoln	67					$ 100,000.00	Tier 2
ARK-2020-0102	Fort Lyon Canal Company Master Plan Project	Wateway 1 Control Upgrade: Construct adjustable check and remove weir at Wasteway 1 to provide hydraulic control and	Agriculture	Watershed Health, Environment &	Conservation		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent					38.00862447	-103.578277	Las Animas	17					$ 517,000.00	Tier 3
ARK-2020-0103	Fort Lyon Canal Company Master Plan Project	Wasteway 2 Control Upgrade: Construct adjustable check at Wasteway 2 to provide hydraulic control	Agriculture	Watershed Health, Environment &			Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent					38.00448014	-103.5445295	Las Animas	17					$ 611,000.00	Tier 3
ARK-2020-0104	Fort Lyon Canal Company Master Plan Project	Lower Diversion Dam Replacement: Install overshot gates and a skimming weir	Agriculture	Watershed Health, Environment &			Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent					38.01130858	-103.5886133	Las Animas	17					$ 2,945,000.00	Tier 3
ARK-2020-0105	Fort Lyon Canal Company Master Plan Project	Upper Diversion Dam Replacement: Replacement two radial gates and provide bypass flow measurements	Agriculture	Watershed Health, Environment &			Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 7,371,300.00	Tier 3
ARK-2020-0106	Fort Lyon Canal Company Master Plan Project	Upgrade/Replacement of Checks: Replace the perpetual check, raise/reconfigure lower check dam, replace rock	Agriculture	Watershed Health, Environment &			Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 1,500,000.00	Tier 3
ARK-2020-0107	Fort Lyon Canal Company Master Plan Project	Measurement in Return Flow Channel on Lower Diversion Dam	Agriculture	Watershed Health, Environment &			Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent					38.01130858	-103.5886133	Las Animas	17					$ 340,000.00	Tier 3
ARK-2020-0108	Fort Lyon Canal Company Master Plan Project	Relocate Kicking Bird Flume	Agriculture	Watershed Health, Environment &			Planned	Amity Mutual Irrigation Company	Terry Howland							Las Animas	67					$ 1,000,000.00	Tier 3
ARK-2020-0109	Fort Lyon Canal Company Master Plan Project	Kicking Bird Canal/Fort Lyon Canal Bifurcation Upgrade: Replace bifurcation gates and add telemetry	Agriculture	Watershed Health, Environment &			Planned	Amity Mutual Irrigation Company	Terry Howland					38.12399444	-103.0019062	Las Animas	67					$ 550,000.00	Tier 3
ARK-2020-0110	Fort Lyon Canal Company Master Plan Project	Earth removal (phase 2) for left bank expansion	Agriculture	Watershed Health, Environment &			Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 4,397,000.00	Tier 3
ARK-2020-0111	Adobe Creek Enlargement	Enlargement of Adobe Creek Reservoir to maximum opertation water surface 4138	Agriculture	Watershed Health, Environment &	Storage		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 10,871,000.00	Tier 3
ARK-2020-0112	Adobe Creek Fish Screen	Installation and maintenance of fish screen on Adobe Creek Reservoir	Watershed Health, Environment &				Planned	Colorado Parks and Wildlife								Las Animas	17					$ 847,600.00	Tier 3
ARK-2020-0113	CSU Aurora Colorado Canal	Improve wasteway out of storage canal that is used to pass lake Meredith Release	Storage	Agriculture			Planned	Colorado Springs Utilities, Pueblo, Farmer's Group								Las Animas	17					$ 1,000,000.00	Tier 3
ARK-2020-0114	Lower Diversion Dam	Modernizing the telemetry at the Lower Diversion Dam	Agriculture	Storage	Funding		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent					38.01130858	-103.5886133	Las Animas	17					$ 350,000.00	Tier 3
ARK-2020-0115	Horse Creek Reservoir	Replace wooden flume below Horse Creek Reservoir and add telemetry	Agriculture	Storage	Funding		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent					38.11087545	-103.3780815	Las Animas	17					$ 600,000.00	Tier 3
ARK-2020-0116	Horse Creek Reservoir	Automation and measuring at bifurcation	Agriculture	Storage	Funding		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 400,000.00	Tier 3
ARK-2020-0117	Thurston Reservoir	Replace outlet works at Thurston Reservoir and install measuring device	Agriculture	Storage	Funding		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 1,300,000.00	Tier 3
ARK-2020-0118	Adobe Creek Reservoir	Automate Release Gates	Agriculture	Storage	Funding		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 250,000.00	Tier 3
ARK-2020-0119	Distribution Headgates: Replace and automate	Automate User Headgates, add telemetry to measuring devices and upgrade weekracks	Agriculture	Storage	Funding		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 3,250,000.00	Tier 3
ARK-2020-0120	Basin Enlargement	Clean and enlarge basin structure that aids in deliveries to western system laterals	Agriculture	Storage	Funding		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 350,000.00	Tier 3
ARK-2020-0121	Timber Lake	Replace outlet from storage canal into Timber Lake	Agriculture	Storage	Funding		Planned	Fort Lyon Canal Company	Jerred Hoffman, Superintendent							Las Animas	17					$ 200,000.00	Tier 3
ARK-2020-0122	Upper Arkansas Watershed Resiliency Plan	The Agricultural Needs Assessment project is a subset of a larger project -the Upper Arkansas Watershed Resiliency	Agriculture	Watershed Health, Environment &	Education, Outreach &		Planned	Upper Arkansas Conservation District (UACD)	Upper Arkansas Conservation District		100			38.534718	-105.998901	Chaffee	11					$ 110,000.00	Tier 3
ARK-2020-0123	Mount Elbert Water Association (MEWA) Infrastructure and capacity/management	MEWA administers and manages water delivery to the subdivision of Pan Ark. Major maintenance, repair, and	Supply & Demand Gap	Conservation	Storage	Municipal	Concept		Jeff Johnson, MEWA President	100						Lake	11						Tier 4
ARK-2020-0124	Water Quality and Delivery for outlying subdivisions	Water quality and delivery to outlying neighborhoods, especially trailer home parks, in the county need to be	Supply & Demand Gap	Conservation		Municipal	Concept		Sarah Mudge, Lake BOCC	100						Lake	11						Tier 3
ARK-2020-0125	Badger Creek Riparian Restoration	Following a watershed assessment, and two demonstration projects approved by the Division of Water Resources the	Watershed Health, Environment &	Conservation	Agriculture	Municipal	Planned		Buffy Lenth Central Colorado	20	30	50		38.67	-105.816944	Fremont	12					$ 500,000.00	Tier 2
ARK-2020-0126	Water Delivery and Sanitation Systems for Twin Lakes	The subdivision of Twin Lakes, when created, did not best address water consumption and sanitation. Overlapping set	Conservation	Supply & Demand Gap		Municipal	Concept		Sarah Mudge, Lake BOCC	100						Lake	11						Tier 4
ARK-2020-0127	Bessemer Ditch Company	Bessemer Ditch is trying to upgrade the accounting on the ditch to help with the eligible acres on the Frying Pan	Agriculture				Concept		Bessemer Ditch		100			38.2649163	-104.7775932	Pueblo	14						Tier 3
ARK-2020-0128	Catlin Canal System Upgrades Phase One	Ditch lining and sealing for seepage and water efficiency that will work with compact compliance.	Agriculture				Implementing		Catlin Canal		100			39.0369527	-103.7182831	Otero	17						Tier 2
ARK-2020-0129	Catlin Canal System Upgrades Phase 2	Ditch upgrades for automated headgates and telemetry to ensure proper delivery of water to comply with Fry-Ark,	Agriculture				Implementing		Catlin Canal		100			39.0369527	-103.7182831	Otero	17						Tier 2
ARK-2020-0130	Upper Arkansas Watershed Resiliency Plan	The Upper Arkansas Watershed Partnership is a group of water users/stakeholders dedicated to expanding education	Watershed Health, Environment &	Agriculture	Education, Outreach &	Municipal	Planned	Upper Arkansas Conservation District (UACD)		20	40	40		38.534718	-105.998901	Chaffee	11						Tier 3
ARK-2020-0131	Ordway Water Line Bypass	Add a 8" water line bypassing the Town of Ordway's water lines. Construct a 300,000 gallon tank north of Ordway.	Supply & Demand Gap	Conservation	Storage	Municipal	Implementing			100						Crowley	17					$ 2,000,000.00	Tier 3
ARK-2020-0132	Replacement of Water Distribution Mains	Replace old, failing, and leaking water distribution mains throughout the City's service area. This would also include	Funding			Municipal	Concept																Tier 4
ARK-2020-0133	Water Treatment Plant Improvements	Undertake the necessary modifications to the City's water treatment plant for accepting AVC water and blending with the	Funding			Municipal	Concept																Tier 3
ARK-2020-0134	Replacement of Water Meters	Replacement of water meters throughout the City's distribution system.	Funding			Municipal	Concept																Tier 3
ARK-2020-0135	Prepare a Water Sampling Plan	Develop a sampling monitoring plan that will pinpoint sampling points and determine times when samples shall be taken.	Education, Outreach & Innovation	Watershed Health, Environment &		Municipal	Concept																Tier 4
ARK-2020-0136	Well Optimization Plan	Determine seasonal selenium concentration production from each of the City's wells and craft a plan that optimizes wells	Education, Outreach & Innovation	Conservation		Municipal	Concept																Tier 3
ARK-2020-0137	Water Conservation Plan	Creating a new water conservation plan to achieve an overall goal of reducing water production with specific attention to	Education, Outreach & Innovation	Conservation	Agriculture		Concept																Tier 4
ARK-2020-0138	Wetlands Pilot Project	Develop a wetlands pilot project to determine if wetlands are a viable option for the removal of selenium from the WTP waste	Watershed Health, Environment &	Education, Outreach &		Municipal	Concept																Tier 4
ARK-2020-0139	Total Inorganic Nitrogen (TIN) Preliminary Engineering Study	Undertake a report and determine how best to address TIN reduction in the discharge of the City's wastewater treatment	Education, Outreach & Innovation			Municipal	Concept																Tier 4
ARK-2020-0140	Arsenic Preliminary Engineering Study	Undertake a report and determine how best to address arsen reduction in the discharge of the City's wastewater treatment	Education, Outreach & Innovation			Municipal	Concept																Tier 4
ARK-2020-0141	Nonpoint Source Projects	Undertake various nonpoint source projects with the local lan owners who are using the property for agricultural purposes to	Education, Outreach & Innovation	Agriculture			Concept										Multiple						Tier 4
ARK-2020-0142	Wastewater Treatment Plant Improvements	Undertake improvements to the WWTF based upon TIN and arsenic PER recommendations.	Education, Outreach & Innovation			Municipal	Concept																Tier 4
ARK-2020-0144	Widefield Aquifer Recharge Association Project (WARA)	WARA was established by Widefield and Security joining in a May 21, 2003 Establishing Agreement. The City of Fountain	Supply & Demand Gap	Storage		Municipal	Planned	Widefield Aquifer Recharge Association	Lucas Hale, District Director	100				38.721138	-104.72331	El Paso	10	2030	acre-feet (AF)	2	MGD	$ 9,000,000.00	Tier 2
ARK-2020-0145	City of Fountain, Colorado Reservoir Project	In 2007, the City of Fountain purchased the LaFarge (now Martin-Marietta) gravel pit on the West side of the City of	Storage	Conservation	Education, Outreach &	Municipal	Planned	City of Fountain, Colorado	Dan Blankenship, P.E., Utility Director	100				38.649875	-104.72331	El Paso	10			1200	acre-feet (AF)	$ 18,000,000.00	Tier 3
ARK-2020-0146	Fountain Mutual Irrigation Company Flow Bypass Plan	The Fountain Mutual Irrigation Company (FMIC) is a private company organized to divert surface water from Fountain	Agriculture	Watershed Health, Environment &		Municipal	Concept	Fountain Mutual Irrigation Company	Gary Steen, P.E.	40	40	20		38.749823	-104.69412	El Paso	10					$ 8,000,000.00	Tier 3
ARK-2020-0147	Water Rights Acquisition						Planned																Tier 4
ARK-2020-0148	Effluent Management and Reuse						Planned																Tier 4
ARK-2020-0149	Multi-Agency Regional Collaboration						Planned																Tier 4
ARK-2020-0150	Groundwater and Well System Management and Rehabilitation						Planned																Tier 4
ARK-2020-0151	Integrated Water Resource Plan						Planned																Tier 4
ARK-2020-0152	Rehabilitate West Pueblo Ditch Project	CWPDA has purchased a former gravel pit mine near Pueblo Dam with the intention of turning the reservoir into a storage	Storage	Agriculture		Municipal	Implementing	CWPDA	Dan Tucker	20	80			38.271208	-104.720167	Pueblo	14			30	CFS	$ 100,000.00	Tier 2
ARK-2020-0153	Pueblo East Storage Project	CWPDA has purchased two gravel pit mines, one lined, one unlined, with the intention of converting these mines to	Storage	Agriculture		Municipal	Implementing	CWPDA	Dan Tucker	20	80			38.268997	-104.539336	Pueblo	14			2000	AF	$ 3,500,000.00	Tier 2
ARK-2020-0154	Pueblo West Storage Project	CWPDA has purchased a former gravel pit mine near Pueblo Dam with the intention of turning the reservoir into a storage	Storage	Agriculture		Municipal	Implementing	CWPDA	Dan Tucker	20	80			38.263492	-104.692442	Pueblo	14			1200	AF	$ 200,000.00	Tier 2
ARK-2020-0155	Cucharas Dam Reconstruction	Reconstruction of the now removed Cucharas Reservoir Dam directly downstream of the former dam alignment. Obtain	Supply & Demand Gap	Watershed Health,	Storage	Agriculture with Conservation	Planned	Randy Case II	Randy Case II	40	40	20		37.74905	-104.5988	Huerfano	79	14,376	AF	66,362	AF	$ 35,000,000.00	Tier 1
ARK-2020-0156	Orlando Canal and Reservoir	Revitalization of Orlando Canal and Reservoir for irrigation on decreed lands. Restore full irrigation use for future	Supply & Demand Gap	Agriculture	Storage	Conservation	Planned	Randy Case II	Randy Case II	40	40	20		37.77757	-104.80337	Huerfano	79	7,935	AF	3,118	AF		Tier 3
ARK-2020-0157	Robert Rice Ditch	Revitalization of Robert Rice Ditch to irrigate on decreed lands. Collapsed water culvert under railroad must be repaired	Supply & Demand Gap	Agriculture	Conservation		Planned	Randy Case II	Randy Case II	50	50	0		37.78371	-104.77358	Huerfano	79	327.8	AF				Tier 3
ARK-2020-0158	Huerfano Valley Ditch and Reservoir	Revitalization of Huerfano Valley Ditch and Reservoir to maximize irrigation on decreed lands. Maximize irrigation use	Supply & Demand Gap	Agriculture	Storage	Conservation	Planned	Randy Case II	Randy Case II	50	50	0		38.00136	-104.4729	Pueblo	14	5,014	AF	2,017	AF		Tier 3