Adams County Community Water Baseline Report

SEPTEMBER 2023

ADAMS COUNTY
COLORADO

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EXECUTIVE SUMMARY

Adams County's water systems are complex. Water supply is sourced from both ground and surface water with dozens of systems delivering water to County residents, business, and agricultural producers. In the coming decades the County is expected to encounter a host of challenges as it seeks to manage climate change, population growth, and other direct and indirect pressures to this system.

Due to these complexities, Adams County recognizes that water supply issues need to be prioritized to advance a sustainable future. Discussed as a Key Issue in the most recent Advancing Adams County Comprehensive Plan and as a strategy to meet the County's sustainability goals outlined in the 2030 Sustainable Adams County Plan, the Adams County Water Baseline Assessment is a step towards understanding current and future supply and demand.

While the County is not a water provider, this Baseline report aims to identify ways the County can support water providers and the community in water-related issues. **Specifically, the baseline aims to create an inventory of publicly available water supply information and includes:**

County-level metrics that quantify growth patterns, surface and groundwater supply, and changing land-use patterns (e.g., County population growth, number of water providers, number of self-supplied users)

Summary of water providers with key information for some of the largest providers (e.g., Land Use Authorities served, service population and connections, rates and development fees)

List of notable water supply related risks and vulnerabilities (e.g., diversity of water supplies and infrastructure, water quality concerns that impact water supply)

IN CONTEXT

The Colorado Water Plan estimates that if no new projects or strategies are implemented, modeling for the driest periods show Colorado communities could need between 230,000 and 740,000 acre-feet of additional water by 2050.

In the South Platte Basin, the average annual municipal and industrial water gap ranges between 190,000 and 400,000 acre-feet per year.

As one of the fastest growing counties in the State it is important to understand how growth is and will impact water resources, as well as the implication it has for other industries such as agriculture. Summarizing water demands and supplies, however, is a difficult task. Interconnected systems — managed by different entities with varying policies and planning objectives — make it challenging to summarize data in meaningful ways. Currently the County has 76 different water providers, with over 4,226 water rights, 300 diversion structures, and 14,277 wells (Colorado Department of Water Resources, 2023). Supplies are sourced from local watersheds and aquifers located inside and outside of the County. Together these systems supply water to Adam County's rapidly growing population which is projected to grow to over 740,000 people by 2040 (Adams County, 2022). Table 1 includes some summarizing key metrics and their implications for Adams County.

Table 1. Water and growth metrics for Adams County.

Metric		*Description*	*Implication*
POPULATION GROWTH	528,857	Total Adams County population in 2020	**The population of Adams County will increase by more than 200,000 people in 20 years.** The availability of water will likely influence where future development occurs.
	748,318	Projected total Adams County population in 2040	
	42%	Projected population growth from 2020 to 2040	
WATER SUPPLIES	53%	More than half of the top 15 largest water providers receive supplies that originate outside of local watersheds and aquifers	**The majority of the largest water providers in Adams County receive supplies that originate outside of the South Platte Basin.** These transbasin supplies have increased infrastructure and legal risks that are significant for regional and statewide planning.
WATER RIGHTS AND DIVERSIONS	4,226	Water rights administered under the prior appropriation doctrine (first in time, first in right)	**Understanding how water is used in the County can inform planning decisions and ensure demand does not outpace supply.** Water rights highlight who and how much water is being used. Diversions highlights where and how water is moving throughout the County.
	380,215 ac-ft	Water volumes diverted for use in the County in 2021	
	300	Structures actively diverting water in the County in 2021	
AGRICULTURAL LAND	42,226 acres	Irrigated agricultural land in 1987	**With urbanization there has been a decline in agricultural lands. However, there has also been a shift to more efficient irrigation technology.** Understanding these changes and agricultural water use can help the County sustain agriculture.
	20,439 acres	Irrigated agricultural land in 2020	
	52%	Decline in irrigated agricultural lands between 1987 and 2020	
WATER PROVIDERS	76	Centralized public water systems that provide safe drinking water to residents and businesses	**Centralized public water systems are the primary way people access water in the County.** The high number of water providers in Adams County (the 6th greatest number for any County in the State) makes coordination both important and challenging.
	52	Water providers reliant on groundwater	**Surface water supplies most water users in Colorado, with only 17% of Colorado's water use originating from groundwater.** In Adams County this is reversed, with two-thirds of water providers receiving their primary source of water from groundwater sources, creating management issues that are unique to Adams County.
	24	Water providers reliant on surface water	
	14,277	Water wells	
	6,070	Wells that are used for domestic or household applications	

ACKNOWLEDGEMENTS

Thank you to the following individuals who were instrumental in developing this water baseline report. This content is derived in part from a series of work sessions with Adams County staff and water service providers.

ADAMS COUNTY TEAM

Nick Eagleson, Senior Strategic Planner
Katie Keefe, Manager, Environmental Programs Design
Greg Labrie, PE, Development Engineer
David DeBoskey, AICP, Planner
Aaron Clark, Parks Planner

WATER SERVICE PROVIDERS

Steve Heger, Hyland Hills Parks and Recreation District
John Murphy, Aurora Water
Sarah Young, Aurora Water
Scott Olsen, City of Brighton
Paul Tedesco, City of Thornton
Mitch Terry, Crestview Water and Sanitation District
Julie Bowers, Denver Water
Austin Krcmarik, Denver Water
Mike DeMattee, North Washington Street Water and Sanitation District
Don Summers, Todd Creek Village Metropolitan District
Loretta Daniel, Arapahoe County
Alex Davis, Aurora Water
Marc Johns, City of Brighton
John Orr, City of Thornton
Josh Nims, City of Westminster
Clarice O'Hanlon, Crestview Water and Sanitation District
Greg Johnson, Denver Water
Gina Burke, Jehn Water Consultants
Tricia Williams, South Adams County Water and Sanitation District

CHAPTER 1

BACKGROUND

Adams County recognizes that water supply issues need to be prioritized to advance a sustainable future. Discussed as a Key Issue in the most recent Advancing Adams County Comprehensive Plan, and as a strategy to meet the County's Sustainability goals, outlined in the 2030 Sustainable Adams County Plan, the Adams County Water Baseline Assessment is a first step towards understanding current and future supply and demand, while also identifying ways the County can support water providers and the community in water related issues.

The County is not a water provider; therefore, this effort is unique in that this baseline aims to inventory the myriad water supply sources, providers, challenges, and opportunities across the County. The baseline assessment includes information from water providers across Adams County and aggregates information primarily from the State's Decision Support System. Ultimately, this baseline will inform the development of a water element for the County's Comprehensive Plan, a goal identified by Staff, the Board of County Commissioners, and outlined in the 2030 Sustainable Adams County.

The primary objectives of this baseline report are to:

1. **Aggregate water information for Adams County to better understand how surface and groundwater is used throughout the community.**

2. **Create an inventory of the largest water providers to understand:**
   - Who provides water in Adams County and where?
   - What are the providers' relative sizes and annual water demands?
   - What are the structures and costs for development fees and water rates?
   - What are the sources of water supply for the water providers in Adams County?

3. **Identify some of the key risks and vulnerabilities in Adams County that could inform a more comprehensive risk and vulnerability assessment.**

4. **Identify data gaps that need to be filled to create a complete picture of water issues and opportunities in the County.**

IN CONTEXT

2030 Adams County Sustainability Plan

Goal 9

Promote water use efficiency for new and redeveloped residential and commercial properties in unincorporated Adams County.

Advancing Adams County Comprehensive Plan

Key Takeaways from the Existing Conditions Report

"Availability of water, utilities, and services constrain future development and growth."

HB 20-1095

LOCAL GOVERNMNET WATER ELEMENTS IN MASTER PLANS

Passed in the 2020 Regular Session, House Bill 20-1095, outlines the requirements of a water element in master plans. The key components of the bill include:

After consideration of each of the following, where applicable and appropriate the master plan may include:

A. The general location and extent of an adequate and suitable supply of water.

B. If the master plan includes a water supply element, the planning commission shall consult with the entities that supply water for use within the county or region to ensure coordination on water supply and facility planning, and the water supply element must identify water supplies and facilities sufficient to meet the needs of the public and private infrastructure reasonably anticipated or identified in the planning process.

C. The water supply element must include water conservation policies, to be determined by the county, which may include goals specified in the state water plan adopted pursuant to section 37-60-106.3 and may include policies to implement water conservation and other state water plan goals as a condition of development approvals, including subdivisions, planned unit developments, special use permits, and zoning changes. A county with a master plan that includes a water supply element shall ensure that its master plan includes water conservation policies at the first amending of the master plan that occurs after the effective date of the this subsection (1)(d)(III), but in case later than July 1, 2025.

METHODOLOGY

To create a water baseline in Adams County, publicly available information from a variety of sources was gathered and analyzed. A summary of the information collected, and sources are outlined in Table 2. Specifically, groundwater and surface water information from Colorado's Decision Support System was used to inform key surface and groundwater trends. Outcomes of this analysis can be found in the Adams County Water Profile section of this report. Additionally, information on Adams County's 15 largest public water systems was summarized from publicly available water plans and websites (Table 3). A summary of the findings can be found in the Water Providers section of this report. Individual water provider tables for each of systems can be found in Appendix B: Water Provider Summaries.

Table 2. Data information and sources.

Information	*Data Source*	
Adams County Growth and Development Data	Advancing Adams County Comprehensive Plan	*(Adams County, 2022)*
Well Permit Data	Colorado Decision Support System Database	*(Colorado Department of Water Resources, 2023)*
Structures, Water Rights, Diversion Volumes	Colorado Decision Support System Database	*(Colorado Department of Water Resources, 2023)*
Irrigated Lands Data	Division 1 – South Platte GIS Data	*(Colorado Department of Water Resources, 2020)*
Water Master Plans, Water Efficiency Plans, Development Fees, Billing Information	Water provider websites and plans	*See Appendix C: Water Provider Session Summaries for a complete list of sources and references.*
Weather Data	National Oceanic and Atmospheric Administration (NOAA)	*(NOAA, 2023)*
Public Water System (PWS) Information	Colorado Department of Health and the Environment	*(CDPHE, 2023)*

In addition to information gathering and analyses, Adams County held two online meetings with select water providers (Table 3). At these meetings, Adams County presented draft data for review and received feedback on the effort. Discussions also explored the largest water-related risks and vulnerabilities in the County. These are discussed in greater detail in the Risks and Vulnerabilities section of this document. A summary of these sessions can be found in Appendix C: Water Provider Session Summaries.

Table 3. Water providers invited to online meetings and included in the water provider summaries.

Name	*State Source Type*	*2023 Service Population**
City of Aurora	Surface Water	487,365
City of Thornton	Surface Water	165,453**
City of Westminster	Surface Water	135,069**
South Adams County Water Sanitation District	Groundwater	67,210
City of Brighton	Groundwater Under the Influence of Surface Water	55,201
City of Northglenn	Surface Water	48,927
Crestview Water and Sanitation District	Purchased Surface Water	18,000
North Washington Street Water and Sanitation District	Purchased Surface Water	14,500
City of Federal Heights	Groundwater	11,678
Todd Creek Village Metro District	Groundwater Under the Influence of Surface Water	5,828
Town of Bennett	Groundwater	3,100
North Pecos Water and Sanitation District	Purchased Surface Water	2,500
Wikiup Mobile Home Park	Groundwater	2,500
Strasburg Water and Sanitation District	Groundwater	2,050
Kimberly Hill Mobile Home Park	Purchased Surface Water	2,005

Source: CDPHE, 2023

**Note some water providers serve multiple counties and service population estimates do not align with County boundaries. Therefore, some of the service population numbers include areas outside of Adams County and the sum of the service population of this list is greater than the total Adams County population.*

***Updated service populations provided by the City of Westminster and City of Thornton.*

CHAPTER 2

ADAMS COUNTY GROWTH AND DEVELOPMENT

Understanding how and where the County will grow is important for both land use and water planners to create viable and sustainable communities. As population grows, so does water demand, which can increase competition for water and create tension between industrial, agricultural, and municipal water providers (Rugland, 2022). Additionally decisions about codes, zoning, and ordinances can influence where and how the County grows. Understanding how population trends align to water use and supply is important for creating sustainable and resilient communities.

Adams County is one of the fastest growing counties in Colorado, averaging 1.7% annual population growth, compared to the State average of 1.4% (Adams County, 2022). The estimated 2022 population in Adams County is 527,575 (United States Census Bureau, 2023). By 2040, Adams County is projected to grow to approximately 740,000 people (an increase of over 200,000 people or approximately 37%). The County population is forecasted to be 820,000 by 2050 (Adams County, 2022). To meet this growing population an additional 71,000 housing units are needed by 2040 (~3,500 new housing units each year between 2020 and 2040) (Adams County, 2022).

These development trends influence how, where, and at what intensity water will be used. For example, high density residential and redeveloped areas can reduce overall water demands (Colorado Water Conservation Board, 2019). A 2018 study, completed by the Keystone Policy Center that analyzed Denver Water and Aurora Water customer data, found that a 10 – 50% shift of households moving to more dense building types can result in a 3.2 – 15.8% reduction in overall water demand (Keystone Policy Center, 2018). For reference this would equate to a 542 – 2,541 million gallon per year reduction in water use based on Aurora Water's 2009 – 2013 average water annual water use (Aurora Water, 2015). Additionally, in residential areas up to 50% of a residents' water can be used for lawn irrigation (Waskom & Neibauer, 2014). Codes that promote waterwise or xeric landscaping can have a significant impact on overall water demand.

Ensuring both land use planners and water providers understand these nuances and take an integrated water and land use planning approach can help create viable and sustainable communities in the future. Figure 1 shows where some of the land use changes and development have occurred between 2001 and 2016 within the County. The yellow boxes highlight areas with more medium and high intensity development. The water providers in these areas include Aurora Water, Thornton, Westminster, Brighton, Northglenn, Crestview Water and Sanitation, South Adams County Water and Sanitation, and Todd Creek Village Metro, among others.

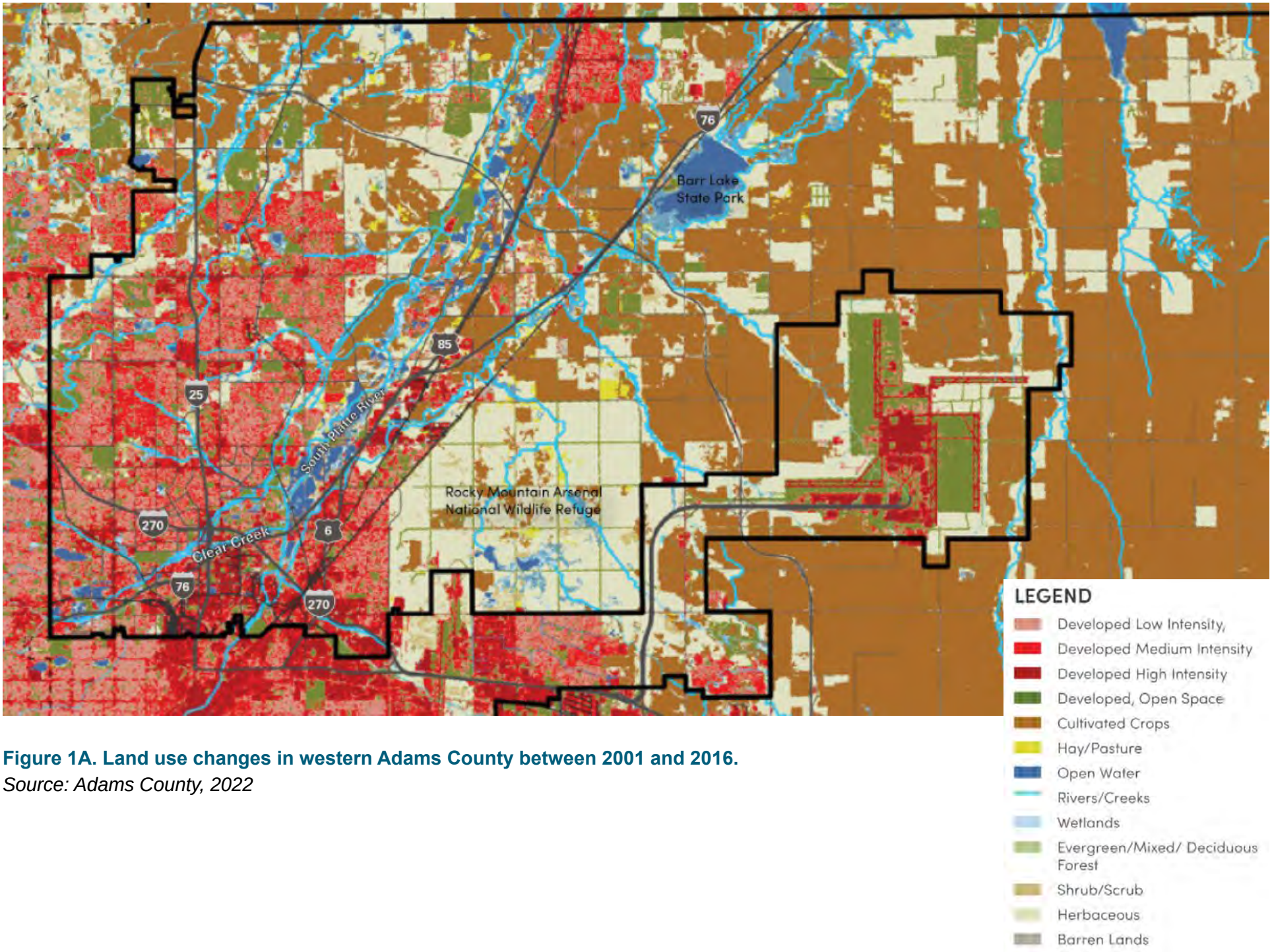


Figure 1A. Land use changes in western Adams County between 2001 and 2016.
Source: Adams County, 2022

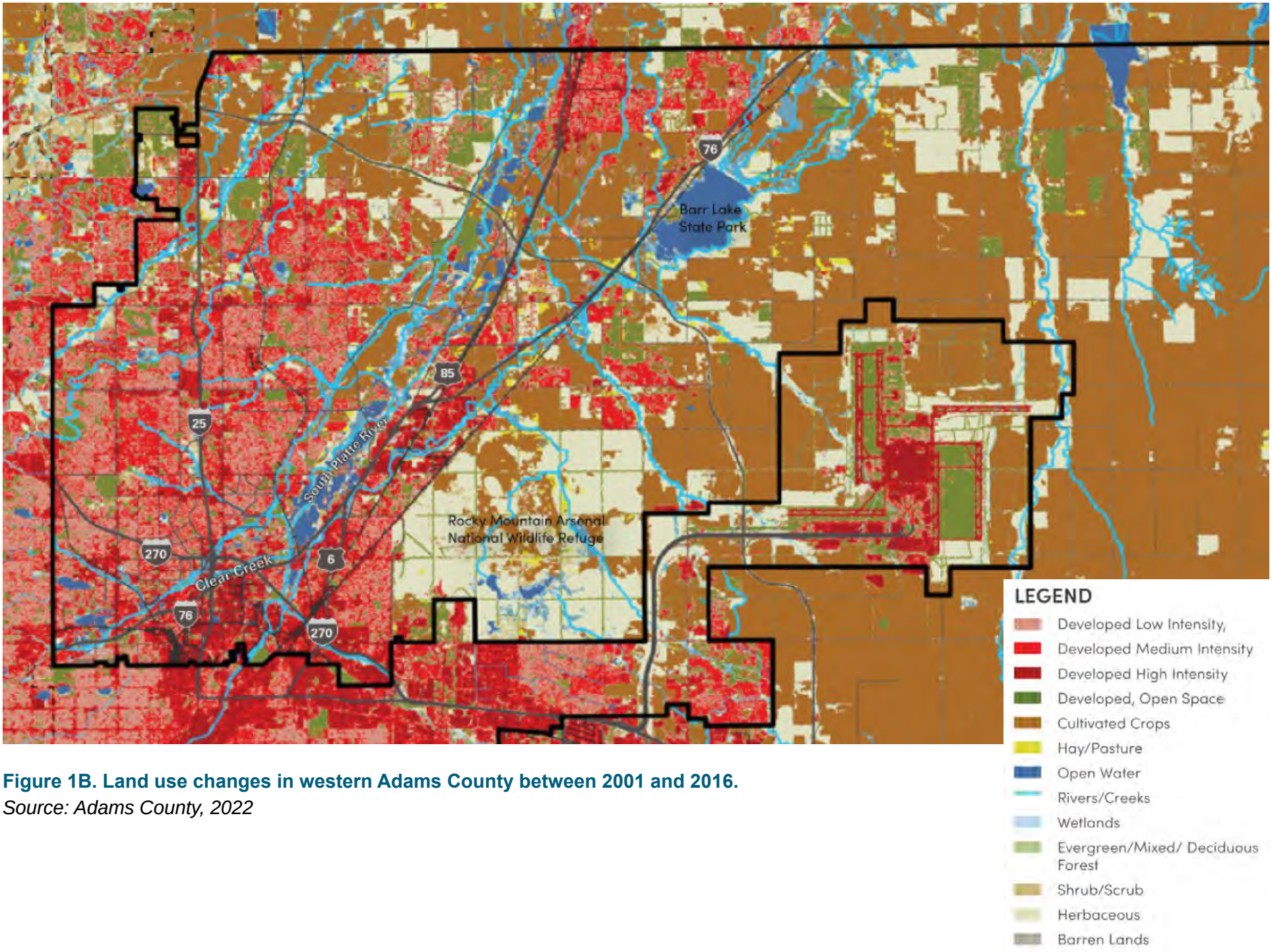


Figure 1B. Land use changes in western Adams County between 2001 and 2016.
Source: Adams County, 2022

Adams County has already implemented some of these best practices, including having a water supply standard in the development code. Section 5-04-05-06-04 Proof of Adequate Supply of the County's Development Standards and Regulations specifies that prior to plat approval, a subdivider must demonstrate water rights associated with the property, as well as analysis that there is appropriate supply for three-hundred years. Table 4 summarizes additional resources in Adams County for best practices related to integrating land use and water planning.

Table 4. Tools, Practices and Processes for Integrating Land Use and Water Planning into Codes and Ordinances

Strategy	*Adams County Related Links*
Building Codes	Adams County Adopted Building Codesw
Landscape and Irrigation Codes	Adams County Development Standards and Regulations, Section 4-19 Landscaping
Subdivision Regulations	Adams County Development Standards and Regulations, Chapter 5 Subdivision Design, Improvements and Dedication
Assured Water Supply	Adams County Development Standards and Regulations, Section 5-04-05 Water Supply Systems
Consistency Requirements and Formalized Collaboration	Adams County Development Standards and Regulations, Chapter 1 Administration Adams County Development Standards, Chapter 2 Application and Permitting Procedures Adams County Development Standards and Regulations, Chapter 10 Special District Guidelines and Regulations
Plumbing Codes	Adams County Adopted Building Codes
Zoning and Land Use Codes	Adams County Development Standards and Regulations
Annexation or Growth Policies	Advancing Adams Comprehensive Plan
Water Demand Offsets/Water Neutral Code	*Not available*

Source: Rugland, 2022

AGRICULTURAL LAND

Adams County values agriculture as an important component of the county's economy and cultural heritage. Like many Front Range communities, development pressures threaten agricultural lands. The conversion of agricultural lands to municipal development has had the "buy and dry" effect as land and water rights are transferred from agricultural to municipal uses. Between 1987 and 2020, the percentage of irrigated lands in Adams County decreased by 52% (Figure 2, Figure 3). When comparing Figure 2 and Figure 3, it is apparent that much of this change has occurred on the west side of Adams County, where urbanized areas and municipalities are located. In eastern Adams County, land conversions are less prominent–and in certain areas, irrigated lands have actually increased.

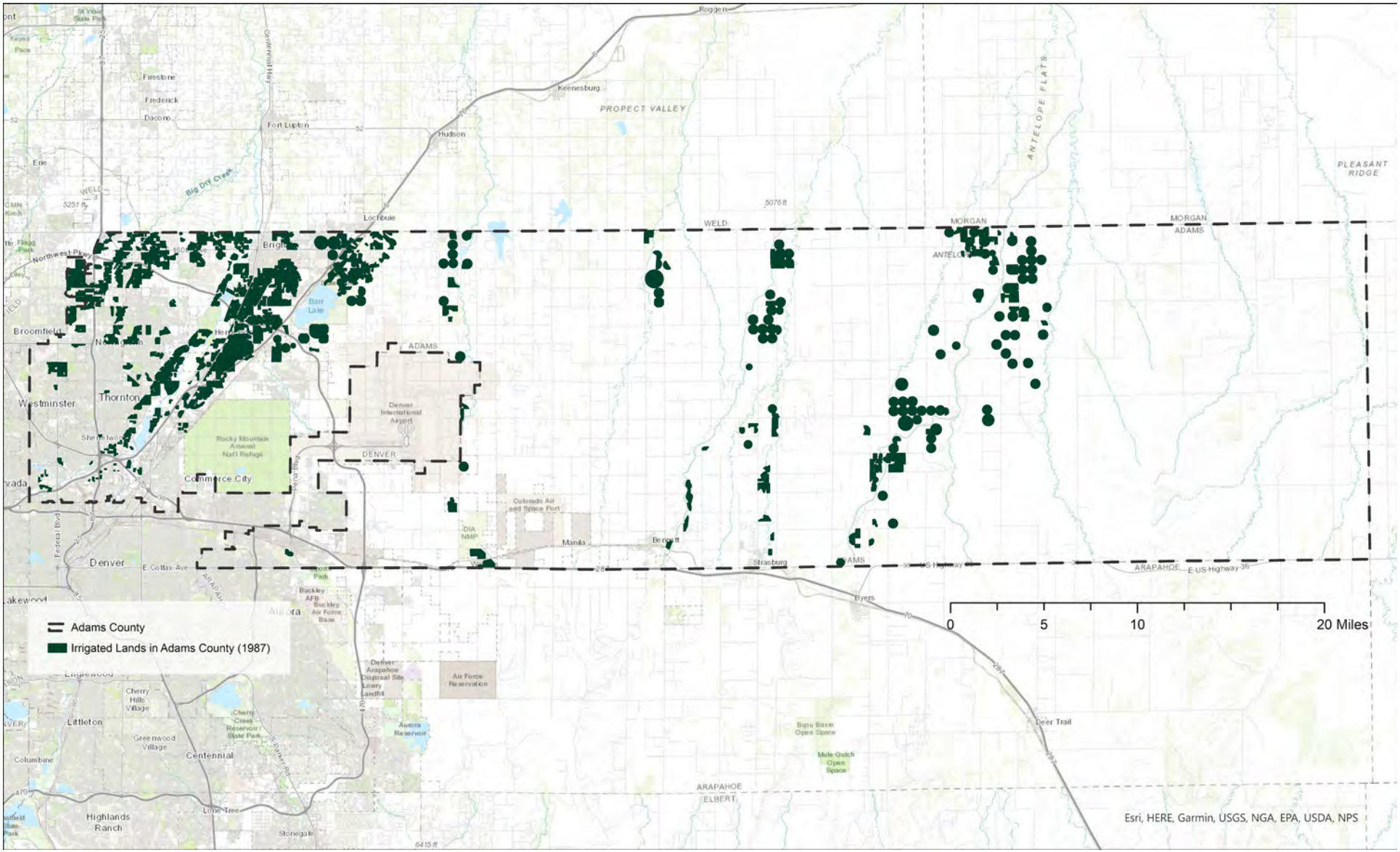


Figure 2. Map of Adams County irrigated lands in 1987.

Source: Colorado Department of Water Resources, 2023

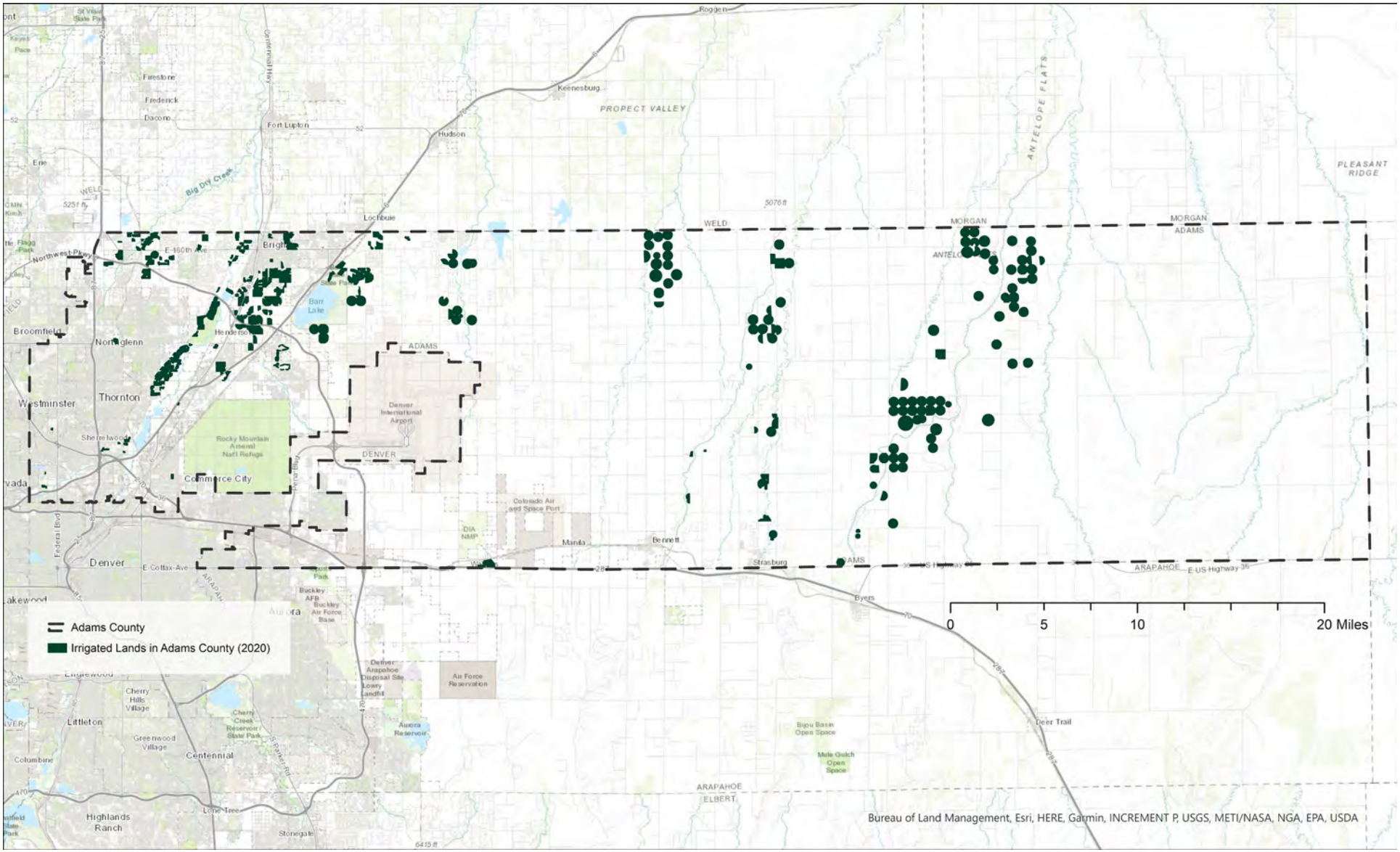


Figure 3. Map of Adams County irrigated lands in 2020.
Source: Colorado Department of Water Resources, 2023

In conjunction with this change in irrigated land area, the types of crops being irrigated have changed, too. Figure 4 summarizes crop types grown in Adams County by area in 1987 and 2020. Crop types included in the other category are small grains, sorghum grain, sunflower, and wheat spring.

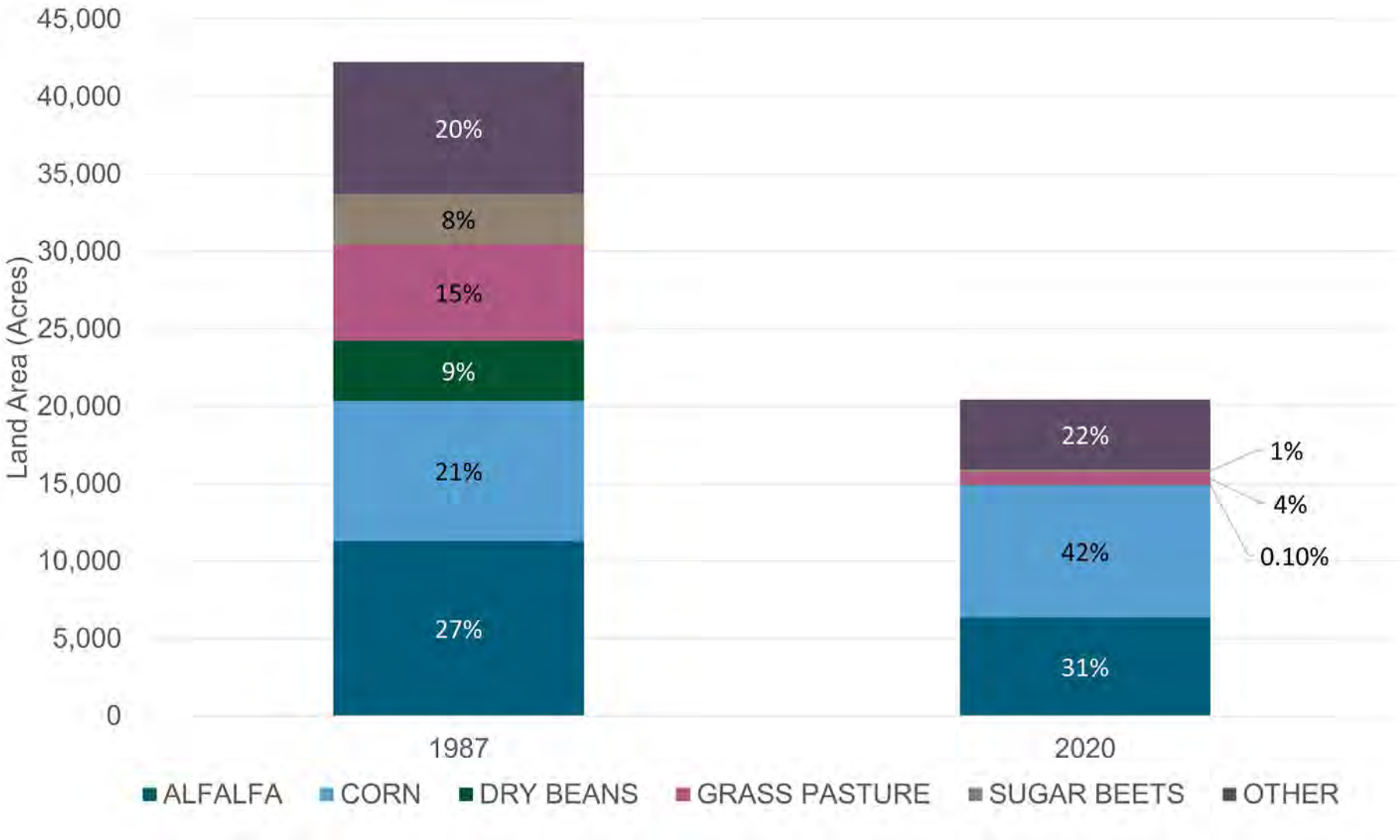


Figure 4. Irrigated agricultural land in Adams County
Source: Colorado Department of Water Resources, 2020

When it comes to Colorado's water supply, agriculture presents significant water demands, accounting for roughly 90% of water use (Colorado Water Conservation Board, 2023). Agriculture will also be heavily impacted as Colorado's climate continues to get hotter and drier, creating the potential for on-farm water shortages due to increased irrigation demand but lower available water supply (Colorado Water Conservation Board, 2022). Between 1989 and 2022, the average temperature in Adams County has increased by 2.4°F (NOAA, 2023). Rising temperatures contribute to longer growing seasons and higher evapotranspiration demands, both of which increase irrigation water demands. Water demands also vary by crop type, location, and weather. Table 5 outlines estimated seasonal water requirements for the crops grown near Adams County (Schneekloth & Andales, 2017). For reference, Kentucky Blue Grass, which is commonly found in parks and residential areas, requires an average of 18 inches of supplemental irrigation per season (Koski, 2012).

Table 5. Estimated seasonal water requirement (consumptive use) in Fort Lupton, Colorado.

Crop Type	*Consumptive Use (inches/season)*
Alfalfa	43.5
Grass hay/pasture	29.8
Dry Beans	17.7
Corn	24.8
Sugar beets	32.8

While some of the water-intensive crops like alfalfa are still common in Adams County, the methods used to irrigate agricultural land in Adams County have become significantly more efficient in the past 30 years. Between 1987 and 2020 the percentage of land irrigated with sprinklers, as opposed to flood irrigation, has increased from only 34% in 1987 to 70% in 2020 (Colorado Department of Water Resources, 2020). Sprinkler technology is considered 80% efficient, while flood irrigation's efficiency is 55% or less (Schneekloth & Andales, 2017).

CHAPTER 3

ADAMS COUNTY WATER PROFILE

Given the growth the County is experiencing, understanding water use and supply within the County can highlight key issues, considerations, and opportunities for the future. In Colorado, water is sourced from either surface or groundwater supply, however surface and groundwater are managed differently and require different considerations. Discussed in greater detail in the Tributary Water and Groundwater sections below, Table 6 provides a summary of each water type, its managing system, and its managing entity.

Table 6. Summary of water types, managing systems, and entities

Geographic Definition	*Legal Definition*	*Governing Act*	*Adjudicatory Body*	*Key Documentation*	*System of Administration*
SURFACE WATER					
Any water that is above ground (in lakes, rivers, streams, reservoirs, etc.) is referred to as surface water. This ultimately comes from snowmelt and rainwater that has collected above ground. Surface water is renewable, though it can be an inconsistent source of supply (Colorado River District, 2023).	All waters that are not classified as Non-Tributary Groundwater, Not Non-tributary Groundwater, Designated Groundwater, or Exempt Wells.	1969 Water Right Determination and Administration Act (C.R.S. 37-92-101 to 602)	Water courts of the water divisions in Colorado.	Water court decree	Prior Appropriation Doctrine; administered by the Office of the State Engineer
TRIBUTARY (ALLUVIAL) GROUNDWATER					
Groundwater that is hydrologically connected to a surface stream and has the ability to influence the amount or direction of flow in a surface water source (Colorado State University, 2023). Though it can be an inconsistent source of supply, tributary groundwater is considered a renewable source (Colorado River District, 2023).	All groundwater is assumed to be tributary unless otherwise defined. All waters that are not classified as Non-Tributary Groundwater, Not Non-tributary Groundwater, Designated Groundwater, or Exempt Wells.	1969 Water Right Determination and Administration Act (C.R.S. 37-92-101 to 602)	Water courts of the water divisions in Colorado.	Water court decree Well permits issued in reliance on water court decree Water-court decreed augmentation plan	Prior Appropriation Doctrine; administered by the Office of the State Engineer

Geographic Definition	*Legal Definition*	*Governing Act*	*Adjudicatory Body*	*Key Documentation*	*System of Administration*
NON-TRIBUTARY GROUNDWATER					
Groundwater that is not hydrologically connected to a surface stream. Non-tributary groundwater sources are considered a non-renewable source of supply (USGS, 2023).	Waters that do not influence the flows in a natural stream, in a meaningful way, as defined by statue.	1965 Ground Water Management Act (C.R.S. 37-90-101 to 104) Specific portions of the 1969 Water Right Determination and Administration Act (C.R.S. 37-92-101 to 602)	Office of the State of Engineers for well permits; water court for decrees.	Well permit is mandatory. Water court decree is optional.	Permitting and administration by the Office of the State Engineer. The rate of withdrawals will not deplete the natural flow of a stream at an annual rate greater than 1/10th of 1% of the annual rate of withdrawal (Colorado State University, 2023).
NOT NON-TRIBUTARY GROUNDWATER					
Groundwater that is withdrawn from specified Denver Basin aquifers. Groundwater in these aquifers impact stream flows, however are allocated differently due to unique hydrologic characteristics and economic significance.	Waters withdrawn from specified Denver Basin aquifers that do influence stream waters in a meaningful way but are allocated differently than tributary waters because of their unique hydrologic characteristics and importance to the economy.	1965 Ground Water Management Act (C.R.S. 37-90-101 to 104) Specific portions of the 1969 Water Right Determination and Administration Act (C.R.S. 37-92-101 to 602)	Office of the State of Engineers for well permits; water court for decrees.	Well permit Water-court decreed augmentation plan	Permitting and administration by the Office of the State Engineer. The rate of withdrawal will not deplete the natural flow of a stream at an annual rate greater than 1/10th of 1% of the annual rate of withdrawal (Colorado State University, 2023).

Geographic Definition	*Legal Definition*	*Governing Act*	*Adjudicatory Body*	*Key Documentation*	*System of Administration*
DESIGNATED GROUNDWATER					
Groundwater in alluvial aquifers that do not underlie a flowing stream and non-tributary groundwater where withdrawal has no more than a de minimis impact to surface water rights. Designated groundwater basins occur in regions of the state where most of the water is derived from groundwater or in areas where groundwater is not available to fulfill decreed surface water.	All groundwater in aquifers that have been officially "designated" by the Colorado Ground Water Commission.	1965 Ground Water Management Act (C.R.S. 37-90-101 to 104)	Colorado Ground Water Commission	Well permit Replacement Plan, when applicable	Modified prior appropriation to protect senior rights and maximize economic benefit of the aquifer (e.g., Replacement Plans) Colorado Ground Water Commission: Adjudicate water rights and issue large capacity permits Ground Water Management Districts: additional administrative authority within boundaries, varies between districts State engineer: administers small capacity wells
EXEMPT WELLS					
May be obtained in any aquifer statewide.	Small-capacity wells with uses that include residential, irrigation of home lawn and gardens, watering of domestic animals/ livestock, and drinking and sanitation purposed inside a commercial business.	1965 Ground Water Management Act (C.R.S. 37-90-101 to 104) Specific portions of the 1969 Water Right Determination and Administration Act (C.R.S. 37-92-101 to 602)	Office of the State of Engineers. Water court adjudication is optional in areas outside designated basins.	Wells permit	Permits issued for specified low-intensity uses authorized by the state, which may be made for so long as the supply exists. Wells are not administered for the benefit of surface rights, Designated Groundwater rights, or as part of Non-tributary or Not Not-tributary systems.

Source: Jones & Cech, 2009

TRIBUTARY WATER

This is the primary supply source for Adams County residents. Tributary water includes anything that “flows.” This includes stream, rivers, etc. as well as, tributary groundwater, which is groundwater that is hydrologically connected to a surface stream and can influence the amount or direction of flow in a surface water source (Colorado State University, 2023). All groundwater is assumed to be tributary unless otherwise defined.

Within Colorado there are eight natural hydrologic river basins. To facilitate and manage water issues in these regions, the Colorado Water Conservation Board (CWCB) has nine basin roundtables that align with the eight hydrologic basins, as well as one for the Denver metropolitan area to address the Metro area’s unique set of issues and considerations (Figure 5). Adams County is in the South Platte River basin and is a part of the South Platte Basin and Denver Metro roundtables (Figure 6).

The South Platte Basin is the most populus basin, and while it contains 80% of the State’s population, it only contains 20% of the State’s water supply (Colorado Water Conservation Board, 2022). In the South Platte Basin, modeling shows there may be forecasted gaps in the municipal and industrial sectors between 190,000 and 400,000 acre-feet per year (Colorado Water Conservation Board, 2022). In addition to these stressors, the South Platte Basin supports a significant amount of agriculture, with 85% of the basin’s water diversions supporting some of the most economically viable agricultural processes in the State (Colorado Water Conservation Board, 2022).

Figure 5. Colorado's eight major river basins, as well as the Metro roundtable, which is the only non-hydrologic basin roundtable managed by CWCB.
Source: CWCB, 2023

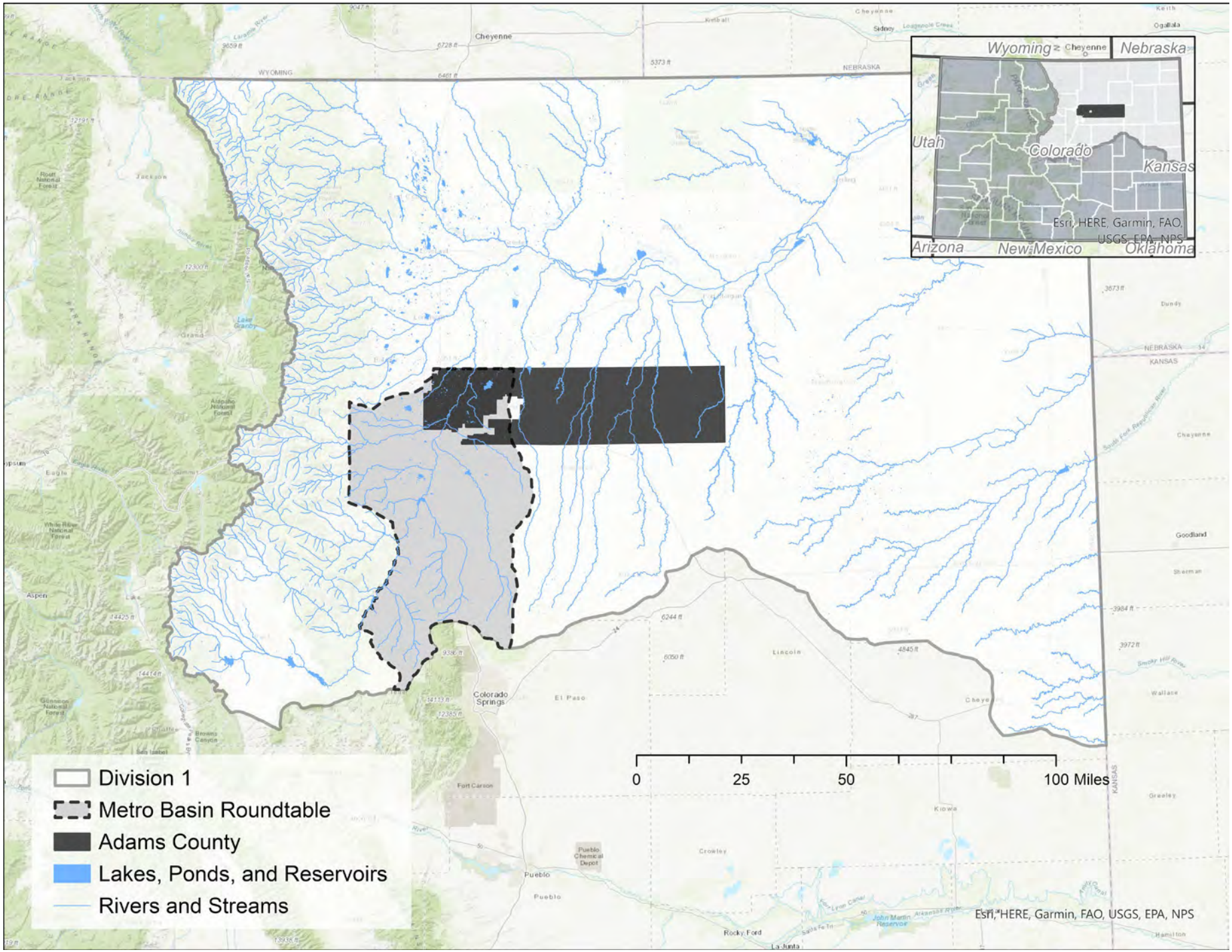


Figure 6. Adams County's location in the South Platte River basin

Source: Colorado Department of Water Resources, 2023

WATER RIGHTS AND WATER DIVERSIONS

Within the South Platte Basin, water rights and diversions determine how water is administered and "moves" throughout the basin. Across the State, Division of Water Resources offices employ Water Commissioners that enforce the water right priority system and water law for Colorado and track diversions, water use, etc. Divisions are aligned to the State's water basins. Adams County resides in Division 1 or the South Platte Basin (Figure 6). To understand how these details apply to Adams County, a review of the Water Rights and Water Diversions in the County was completed and summarized below.

WATER RIGHTS

Water rights provide insight on how water is being used in the County. Surface water and tributary groundwater is administered under the prior appropriation doctrine and governed by provisions outlined in the 1969 Water Right Determination and Administration Act (C.R.S. 37-92-101 to 602) and the 1965 Ground Water Management Act (C.R.S. 37-90-101 to 104), which is reviewed in greater detail below.

This doctrine outlines that no entity legally owns any of the surface water systems; however, the doctrine establishes the system of water rights that determines who can use the water, how much water can be used, and how water uses are determined. The four main guiding principles to the doctrine are summarized below (Jones & Cech, 2009; Colorado State University, 2023).

Guiding Principle	*Adams County Context*
To establish a water right, an entity must divert water and continue to apply it to a defined beneficial use. Recent changes also now allow recreational and environmental appropriation that do not have to be withdrawn from streams (e.g., in-stream flow water rights).	While Adams County has thousands of water rights for municipal and agricultural uses, the State database does not indicate that Adams County has any recreational or environmental water rights. More information on Water Rights in the County can be found in the Water Rights section.
The idea of "first in time, first in right" is applied to all water rights. This means users with more senior water rights have priority to divert and use water before users with more junior water rights.	State records list that the senior water right in Adams County was appropriated in 1900, however more senior rights may exist. The majority of water rights in the County have been established after 1975. More information on Water Rights in the County can be found in the Water Rights section.
Water can be diverted from a stream and used in other locations, including those in other drainage basins.	There are close to 300 points of diversion in Adams County and the County both receives water from other basins, primarily Colorado and Arkansas, and diverts water to other basins. More information on Water Diversion can be found in the Water Diversions section.
Once a water right has been established, the right to use the water can be sold to another person and the priority date will not change.	

In the water rights system, there are two types of water rights:

- **Direct flow water rights** allow a user to divert a certain flow rate, usually measured in cubic feet per second (cfs), of water for a specified beneficial use.
- **Storage water rights** allow a user to store a certain volume of water, usually measured in acre-feet(ac-ft), that is stored in a reservoir for later use.

Additionally, water rights are either considered to be “absolute” or “conditional”:

- **Absolute water right:** a water right that has been approved in Water Court. The owner may use it in perpetuity provided they are in accordance with the decree. The only time an absolute water right is cancelled in Water Court is if the water right has not been used for an extended period of time (minimum 10 years), after which the water right may be abandoned (Lytle Water Solutions, LLC, 2023; Kurath, 2015).
- **Conditional water right:** a water right appropriation has begun but is not complete. The owner has the right to use the water as outlined in the decree but has not actually put the water to beneficial use. To make a conditional water right absolute, water must be put to a beneficial use. Proof of use must be provided to Water Court (Kurath, 2015).

Every water right has a decreed beneficial use that is legally defined by the 1969 Water Rights Determination and Administration act (C.R.S. 37-90-101). Water right information is maintained by the Division of Water Resources.

In 2023, there were a total of 2,634 water rights in Adams County. Of these, 85% are associated with tributary/alluvial wells, or wells that are hydrologically connected to surface water systems, and 15% are associated with surface water. Figure 7 depicts constructed wells in Adams County, which includes both tributary *and* non-tributary wells. It also shows how the wells align with the tributary/alluvial aquifer system in the County.

To operate, these tributary wells have augmentation plans. Augmentation plans allow tributary well users to replace or “augment” surface water that is depleted due to well pumping so that the well user can pump even when they are not in priority (Water Education Colorado, 2020). Plans are approved in water court and applications must demonstrate where, when and how water will be used, how much augmentation water is needed to account for the well pumping, and an engineering analysis that demonstrates that senior water rights will not be affected by the well’s use (Colorado Division of Water Resources, 2020). Replacement sources of water include irrigation water rights that have been changed to augmentation use, releases from water storage areas, transbasin diversions, and water that is diverted from infiltration ponds (Water Education Colorado, 2020). For alluvial wells located in Designated Ground Water Basins, discussed below, Replacement Plans are required. Replacement

COMMON BENEFICIAL USES

Augmentation

CWCB Instream Flow and Natural Lake Levels

Commercial

Domestic

Dust Suppression

Evaporation from a Gravel Pit

Fire Protection

Fish and Wildlife Control

Flood Control

Industrial

Irrigation

Mined Land Reclamation

Municipal

Oil and Gas Production

Power Generation

Recreation on Reservoirs

Recreational In-Channel Diversions

Release from Storage for Boating and Fishing

Snowmaking

Stock Watering

Water Storage

(Colorado State University, 2023)

Plans are similar to Augmentation Plans however they approved by the Colorado Ground Water Commission. Within Adams County there are records for 142 augmentation/replacement plans, which is roughly 10% of the augmentation plans in the South Platte Basin (Water Education Colorado, 2020). Individual augmentation plans may be associated with multiple wells and cases.

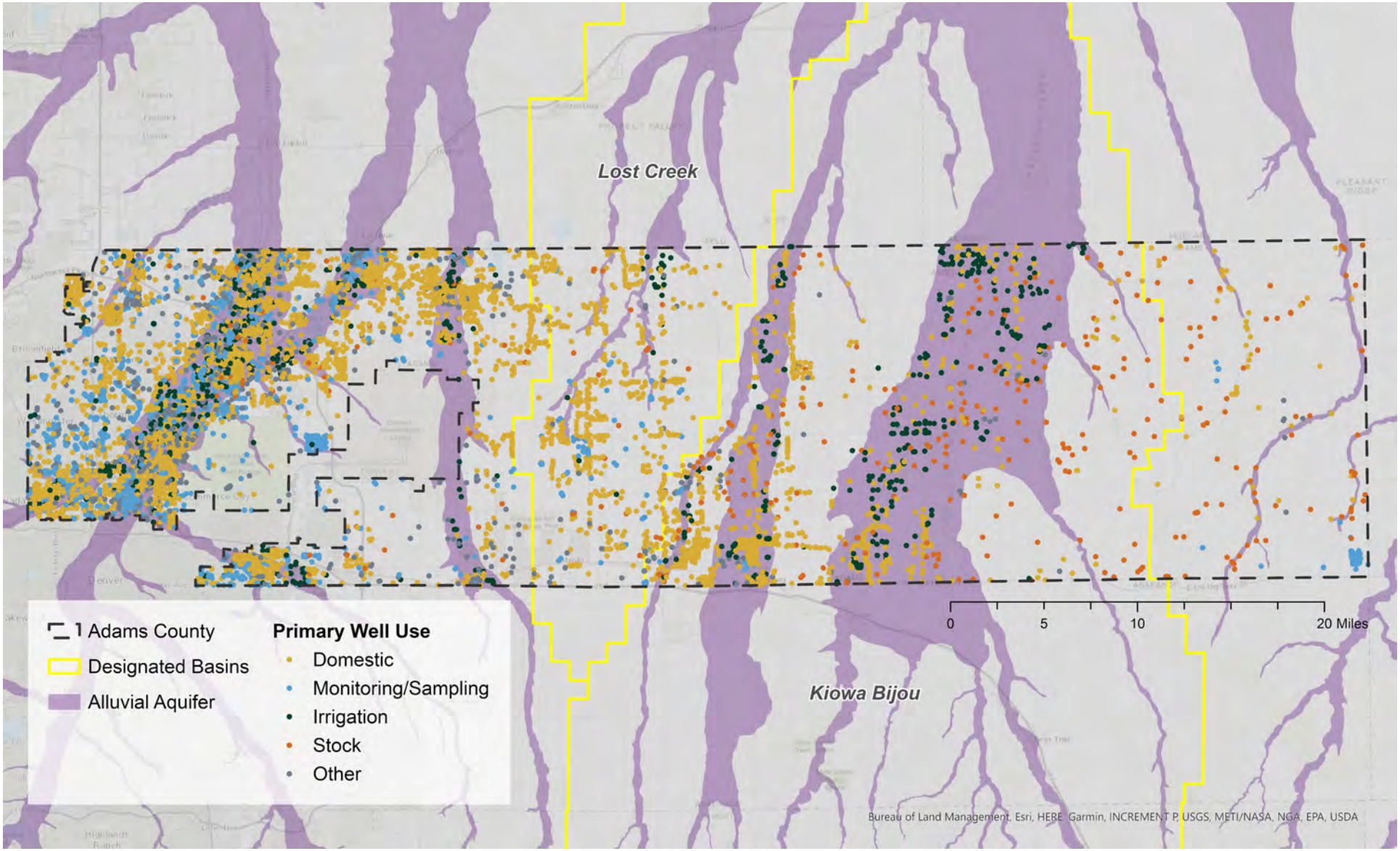


Figure 7. Permitted wells in Adams County over the tributary/alluvial aquifer system

Source: Colorado Department of Water Resources, 2023

Figure 8 and Figure 9 summarize Adams County Water Rights by beneficial use. For the analysis, direct flow totals were based on the max use on the decrees. Absolute storage rights were based on the total volumetric limit on a decree. When water rights were associated with more than one beneficial use, they were classified as mixed use.

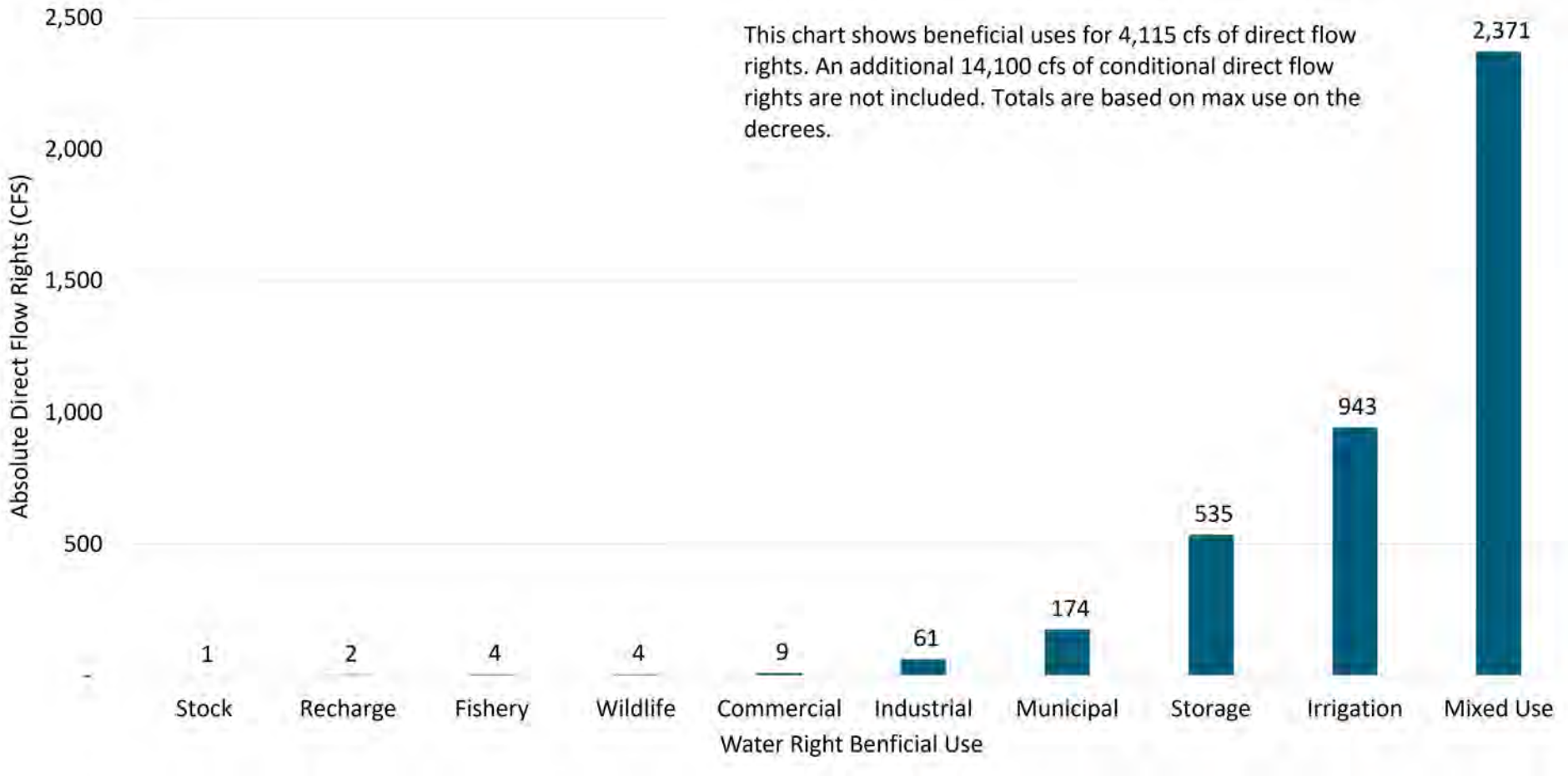


Figure 8. Absolute direct flow rights by beneficial use in Adams County (2023)
Source: Colorado Department of Water Resources, 2023

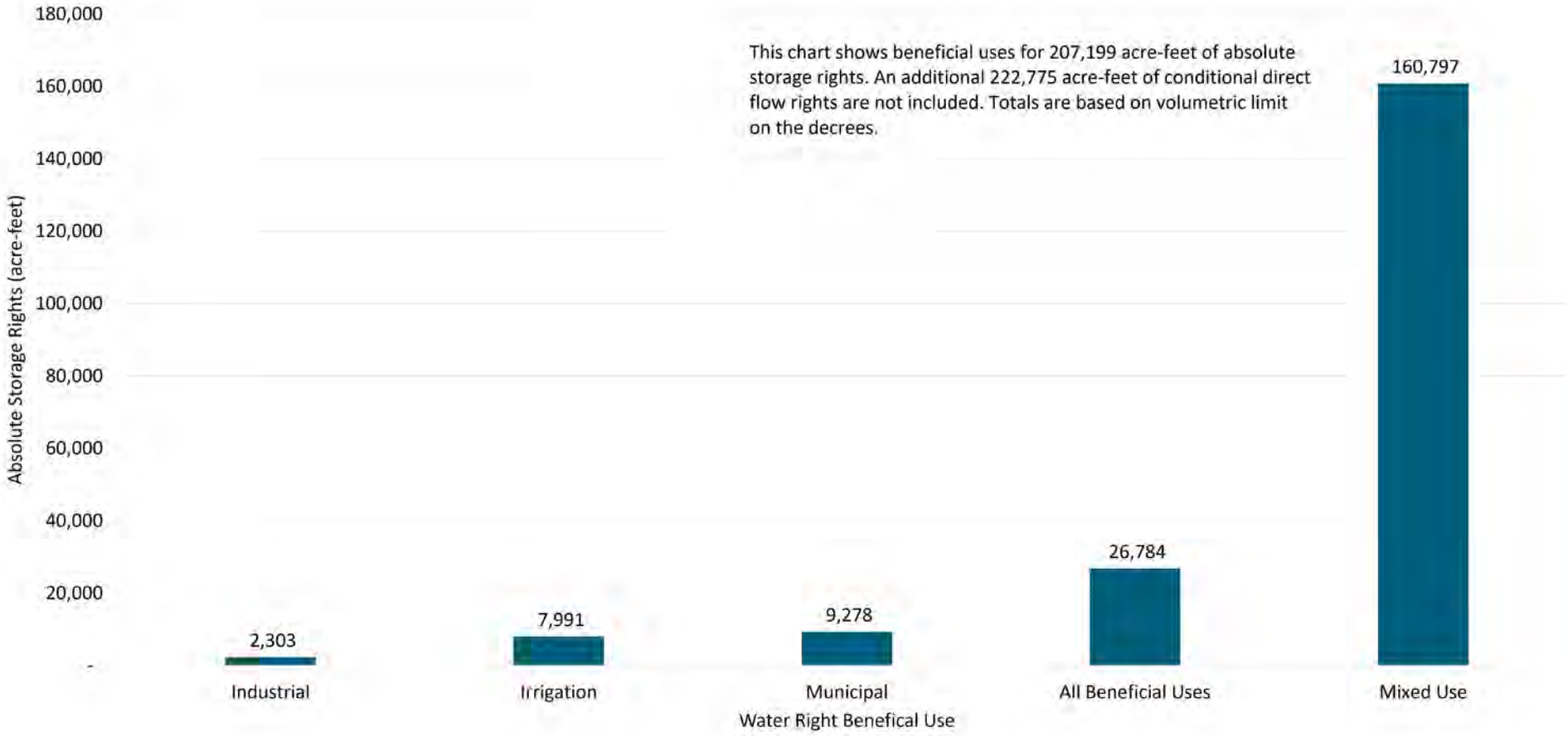


Figure 9. Absolute storage rights by beneficial use in Adams County (2023)
Source: Colorado Department of Water Resources, 2023

In Adams County the top beneficial uses for direct flow rights are mixed use, irrigation, storage, municipal, and industrial (Figure 8). The top beneficial uses for storage rights are mixed use, any beneficial use, municipal, irrigation, and industrial (Figure 9).

Over the past 100 years, water right appropriation has come in waves. Figure 10 displays the count of absolute direct and storage rights by appropriation year or “the earliest date approved by the water court demonstrating that a water right holder intends to put the water to beneficial use” (Colorado Division of Water Resources, 2020).

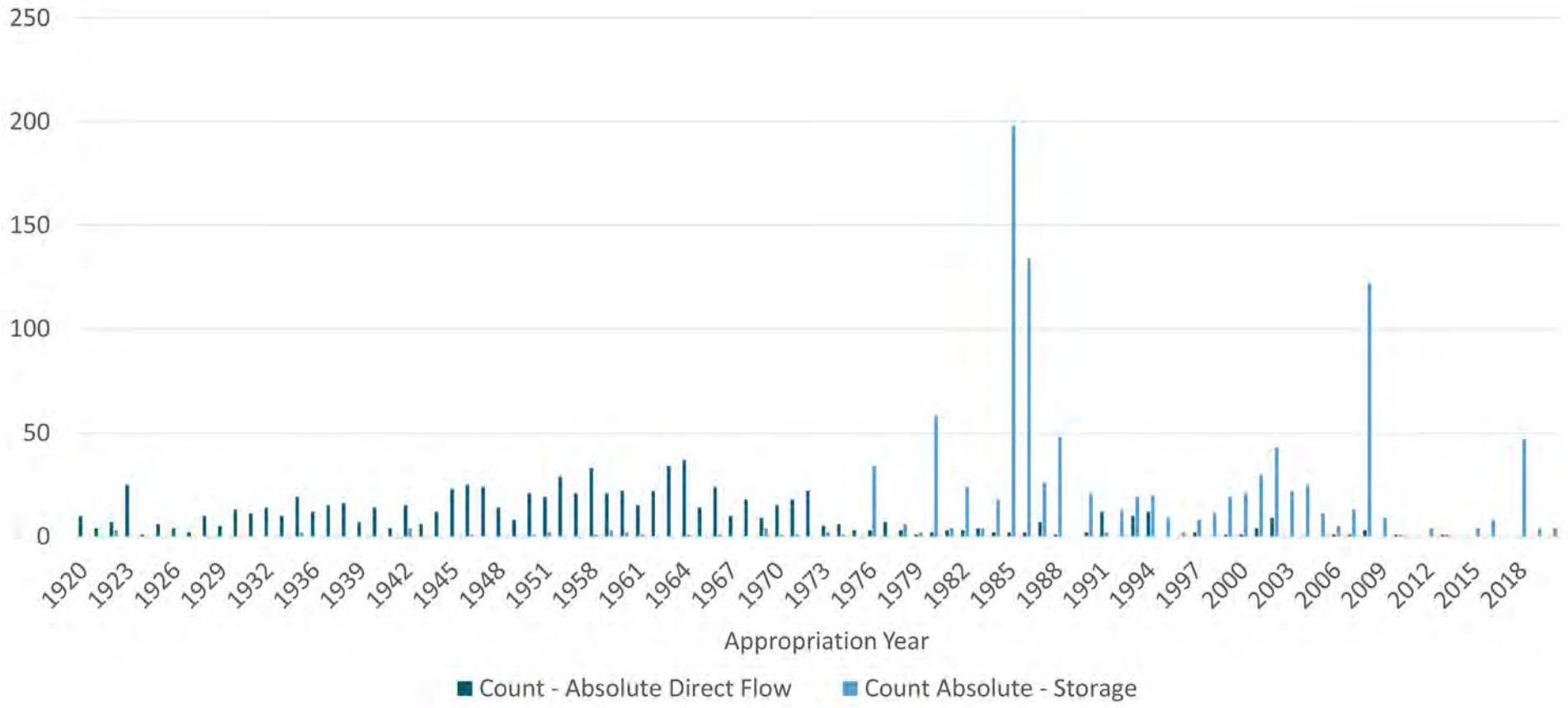


Figure 10. Count of absolute direct flow and storage rights by appropriation year
Source: Colorado Department of Water Resources, 2023

Conditional direct flow and storage rights are still being developed and reserve their priority date while being developed. The development of conditional water rights does not guarantee that water will be available to fulfill them, but they do indicate continued growing pressures on the region's water resources. The largest beneficial use associated with conditional direct flow storage rights is storage, followed by mixed use, irrigation, and municipal (Figure 11). The largest beneficial use associated with conditional storage water rights is municipal, followed by mixed use, irrigation, and all beneficial uses (Figure 12).

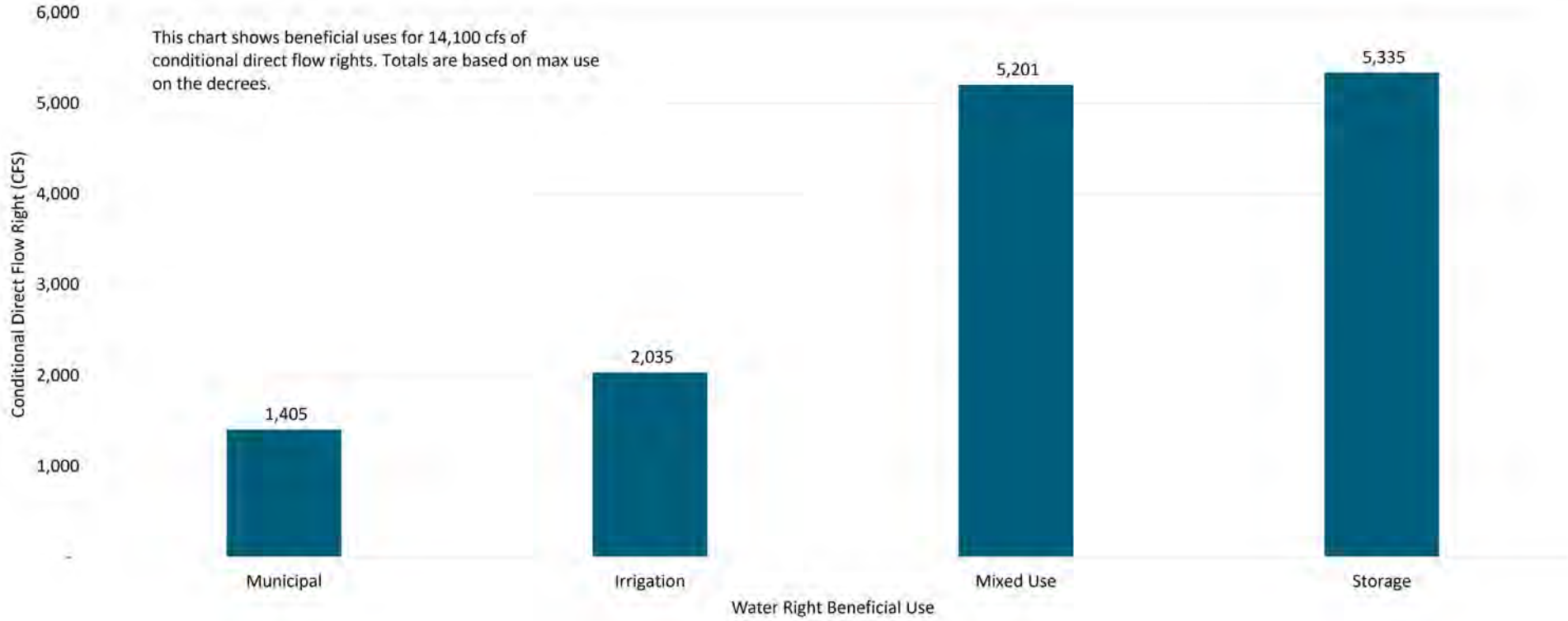
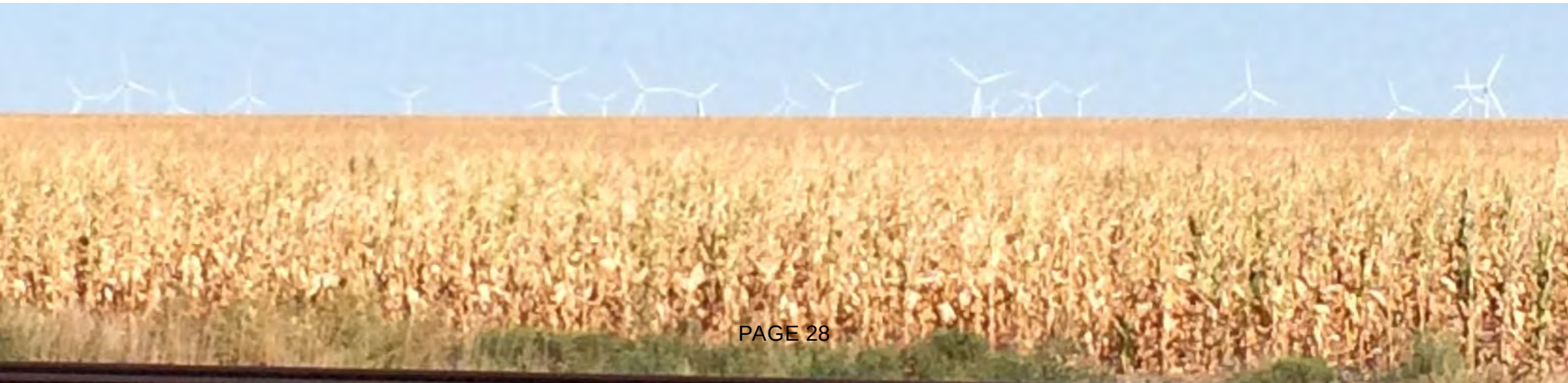


Figure 11. Conditional direct flow rights by beneficial use in Adams County (2023)
Source: Colorado Department of Water Resources, 2023



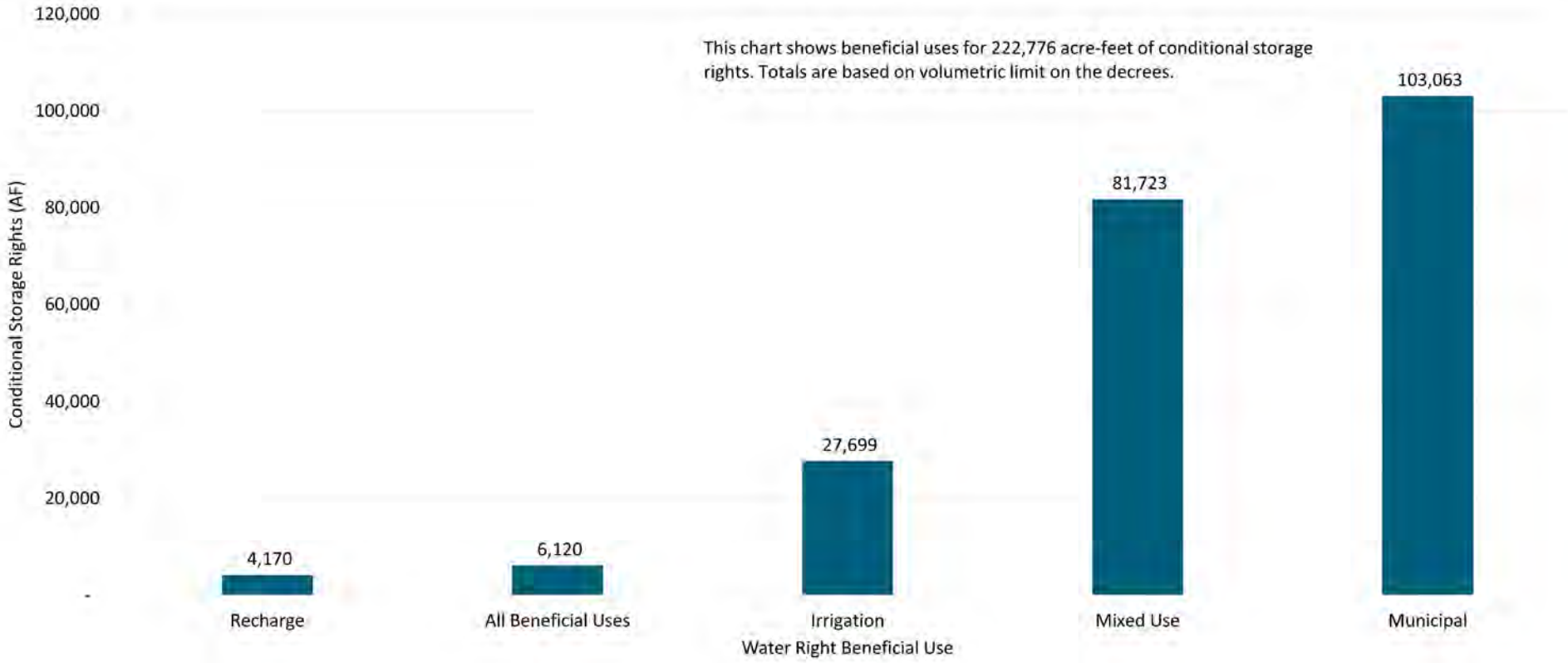


Figure 12. Conditional storage rights by beneficial use in Adams County (2023)
Source: Colorado Department of Water Resources, 2023

WATER DIVERSIONS

While water rights highlight how water is being used, water diversion highlights how water "moves" throughout the basin. The Department of Water Resources tracks diversions based on defined water districts within each water basin. Within Division 1 there are 15 different water districts. The three that reside in Adams County include (Figure 15):

- Clear Creek
- South Platte: Denver Gage to Greeley
- South Platte: Greeley to Balzac

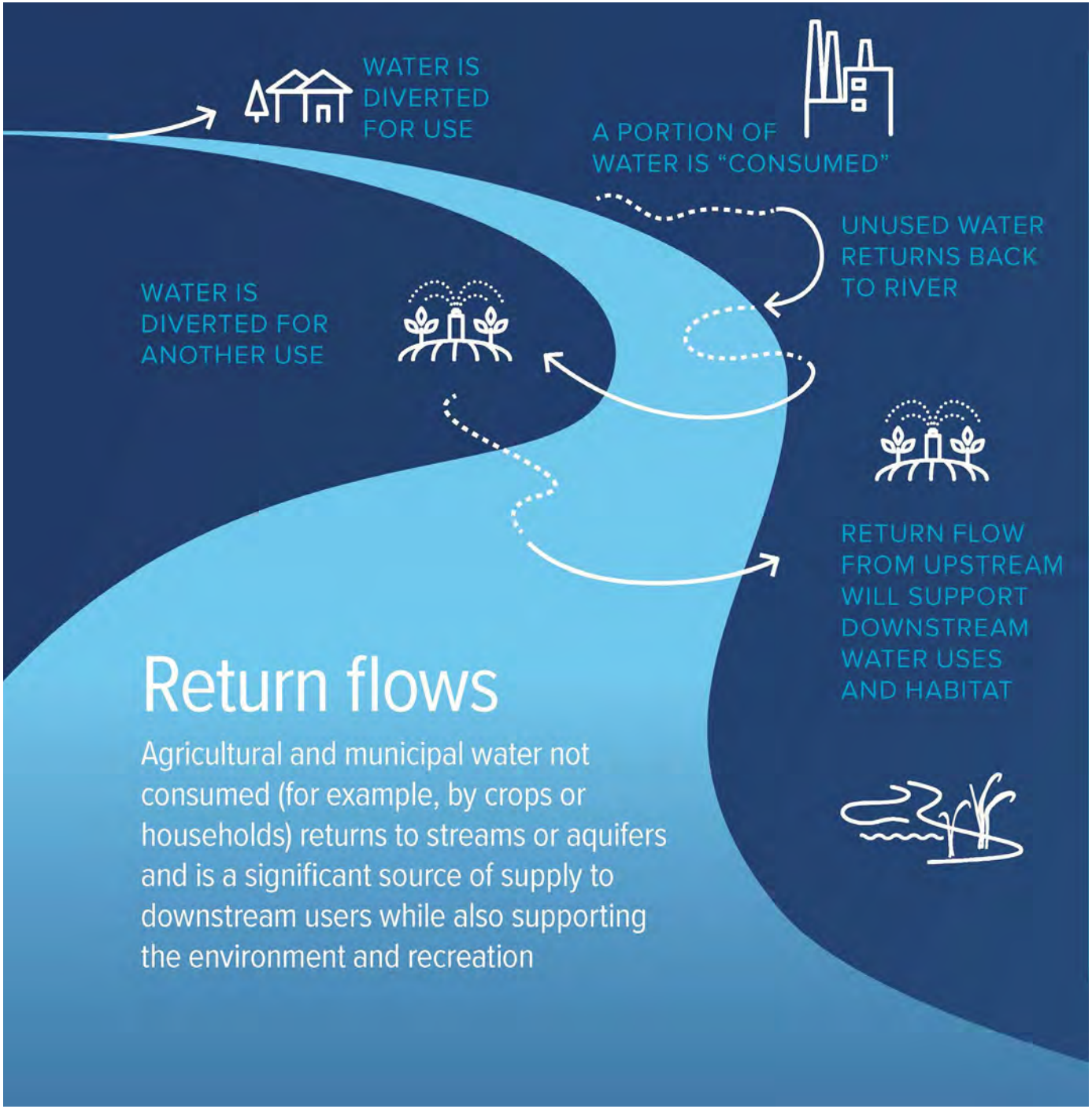


Figure 13. Return flow explanation from the Colorado Water Plan
Source: Colorado Water Conservation Board, 2023

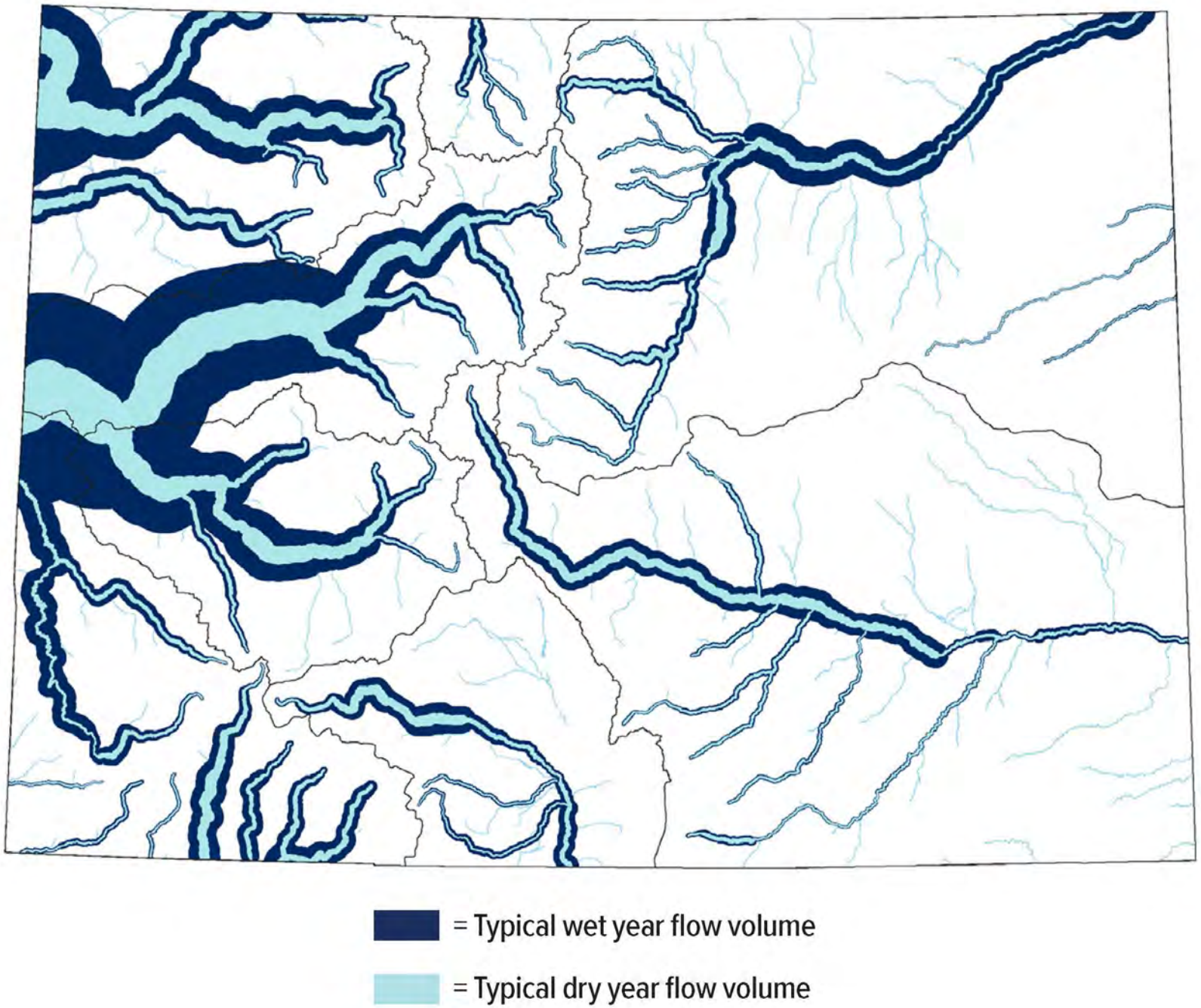


Figure 14. Variability of a typical wet vs. dry year for surface water hydrology

Source: Colorado Water Conservation Board, 2023

To understand diversion volumes, one must understand the concept of “return flows” or the concept that water is diverted, used, and returned multiple times to a watershed system (Figure 13). In Colorado, and Adams County, downstream users are dependent on return flows from upstream users for supply. Because of return flows, diversion volumes (e.g., how much water is diverted out of the river) are larger than the native flow volumes (e.g., what flows down the river). While highly variable from year to year due to varying precipitation patterns (Figure 14) for the South Platte Basin, the average annual native flow volume between 2000 and 2014 was 1.4 million acre-feet, while the average annual surface water diversion was 4 million acre-feet (Colorado Water Conservation Board, 2022). This difference means that each unit of water is “reused” nearly three times within the South Platte Basin (4/1.4 = 2.8).

Looking to Adams County, in 2021, a total of 380,215 acre-feet was diverted for use in the County (Colorado Department of Water Resources, 2023). This is roughly 27% of South Platte Basin’s total diversions. Return flows are like the South Platte with water being “reused” approximately 3 times. Diversions align with the population centers with 94% of the diversions originating in the west part of Adams County (Figure 15).

In 2021, Adams County had 3,643 active points of diversion, with active diversion records for 300 of the structures (Figure 17). Of those structures not maintained or without active diversion records, 88% are wells. For structures with active diversion records, the total volume diverted out of Adams County has increased 341% between 1980 and 2021 from roughly 86,308 acre-feet in 1980 to over 380,000 acre-feet in 2021 (Figure 17). Population growth, climate change, and policy decisions all influence diversion rates and volumes.

WEATHER AND CLIMATE IMPACT ON DIVERSIONS

As depicted in Figure 14, water availability and, in turn, diversions are influenced by weather patterns. Over the past 30 years, weather conditions have been changing in ways that reduce water availability (NOAA Regional Climate Centers, 2022). Between 1989 and 2022, the average temperature in Adams County has increased by 2.4°F (Figure 18). Rising temperatures contribute to longer growing seasons and higher evapotranspiration demands, both of which increase irrigation water demands. Higher temperatures also result in a higher proportion of precipitation falling as rain instead of snow, which reduces the duration of the runoff season and impacts water supply.

Precipitation patterns in Adams County are more variable and do not show a distinct increase or decrease in annual precipitation totals over the past 30 years (Figure 19). This is consistent with state modeling, which shows unclear projections for precipitation patterns and totals. Despite this variability in precipitation totals, models show that even moderate increases in precipitation are not enough to overcome the impacts from increased temperatures (Colorado Water Conservation Board, 2023). Like all of Colorado, Adams County will need to plan for these impacts, especially as it relates to water availability.

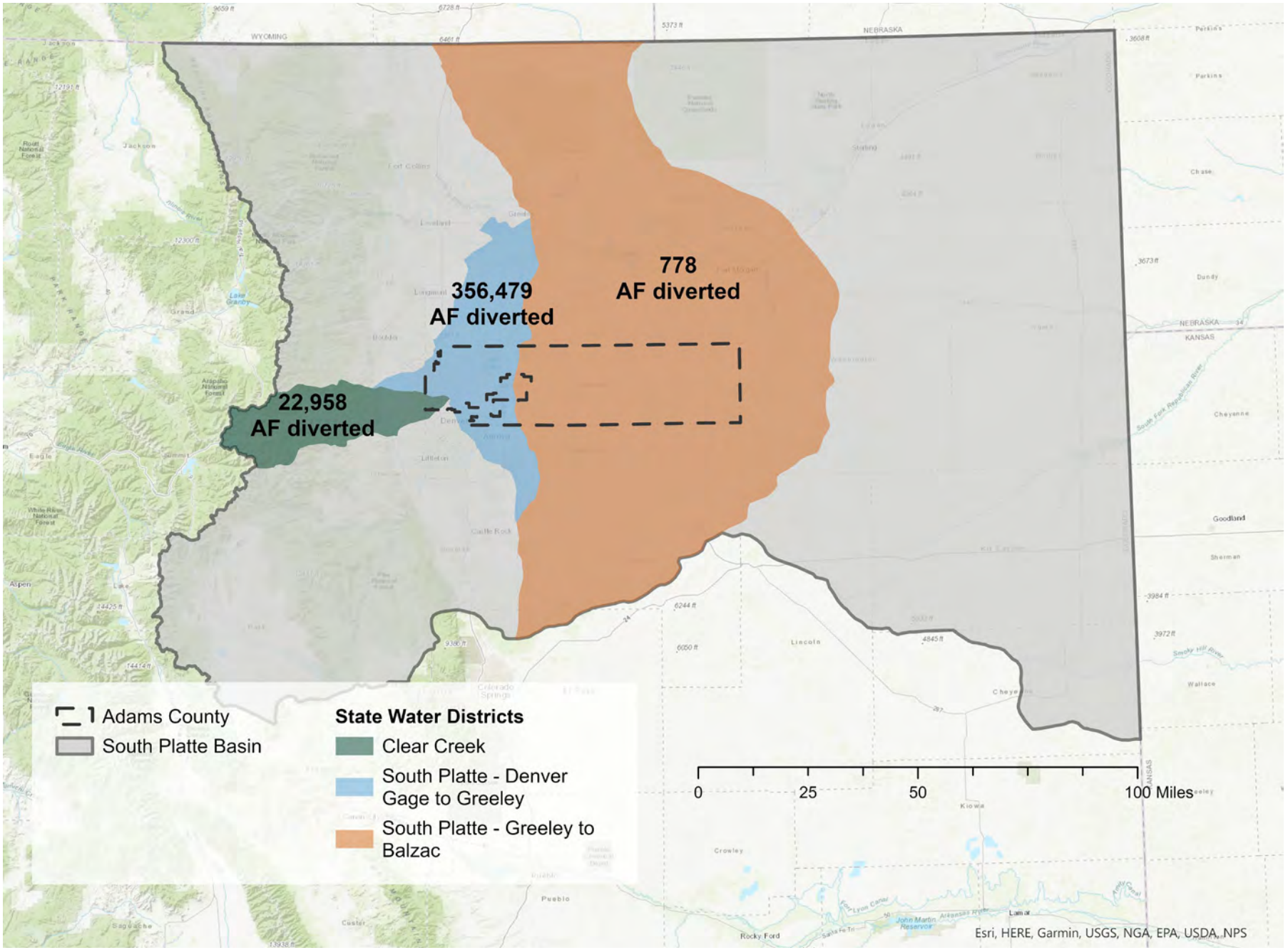


Figure 15. 2021 water divisions in Adams County by State Water District

Source: Colorado Department of Water Resources, 2023

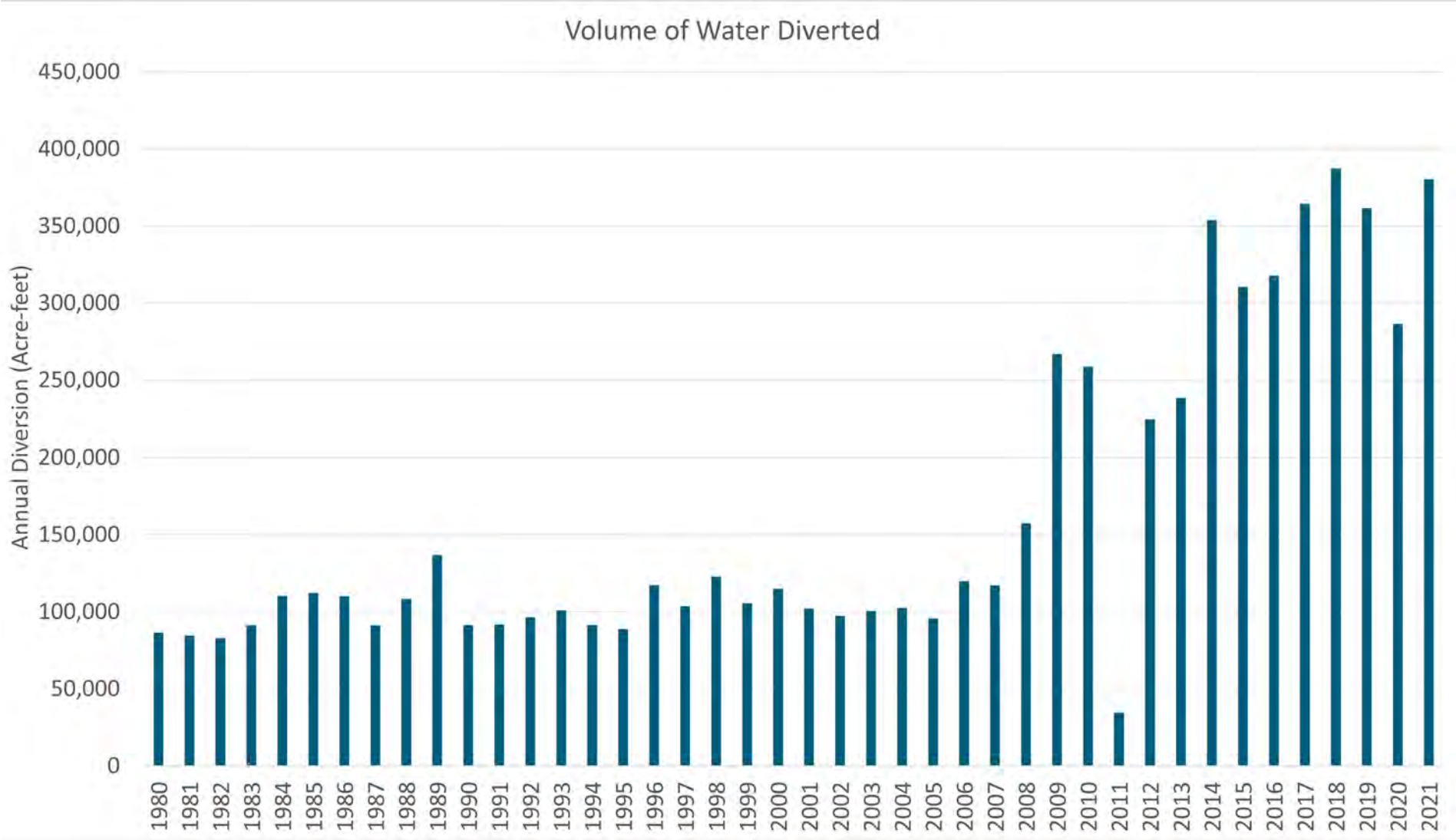


Figure 16. Volume of total water diverted in Adams County between 1980 and 2021

Source: Colorado Department of Water Resources, 2023

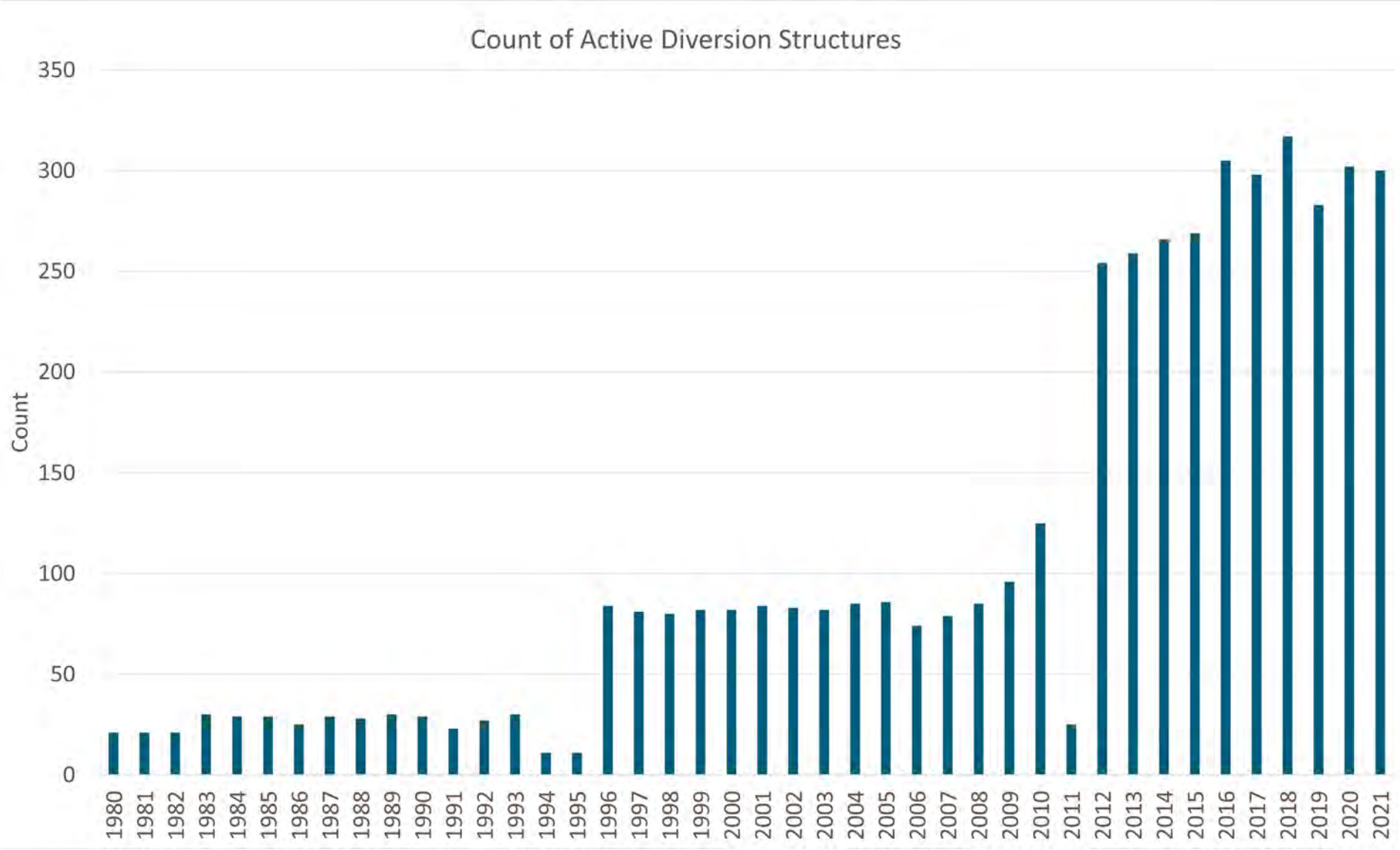


Figure 17. Count of active diversion structures in Adams County between 1980 and 2021

Source: Colorado Department of Water Resources, 2023

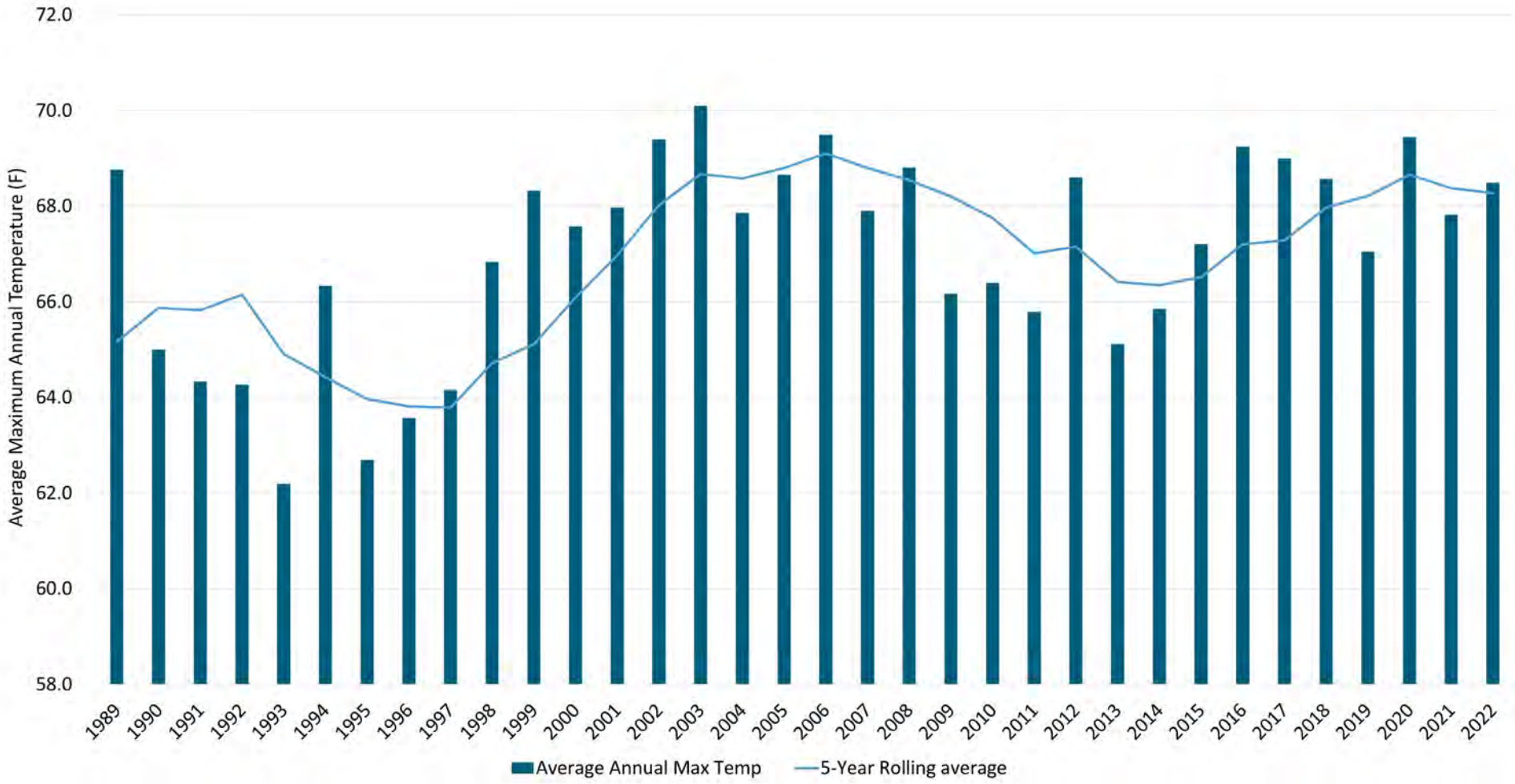


Figure 18. Average annual maximum temperature, Northglenn Colorado (Site ID: USC00055984)
Source: NOAA, 2023

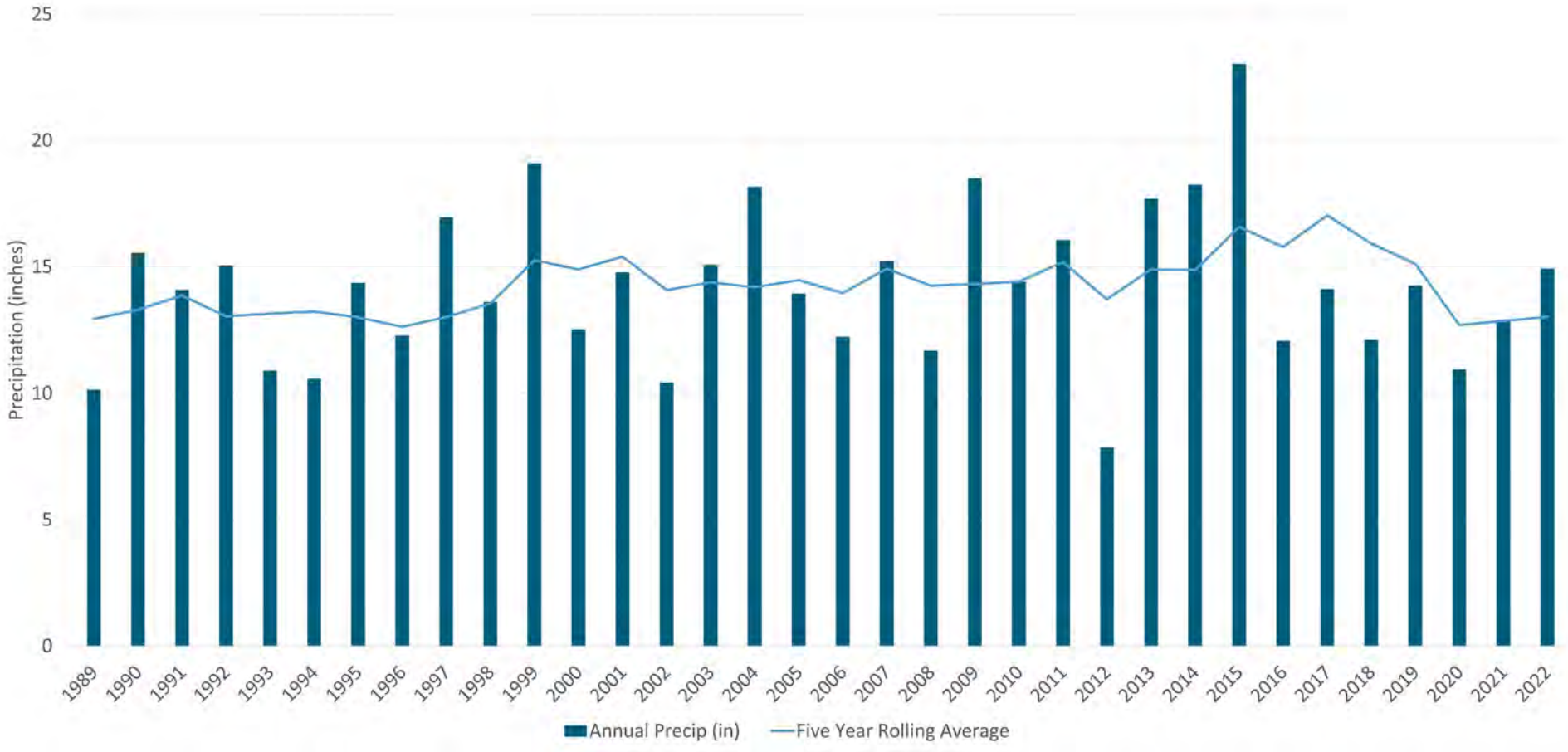


Figure 19. Total annual precipitation, Northglenn Colorado (Site ID: USC00055984)
Source: NOAA, 2023

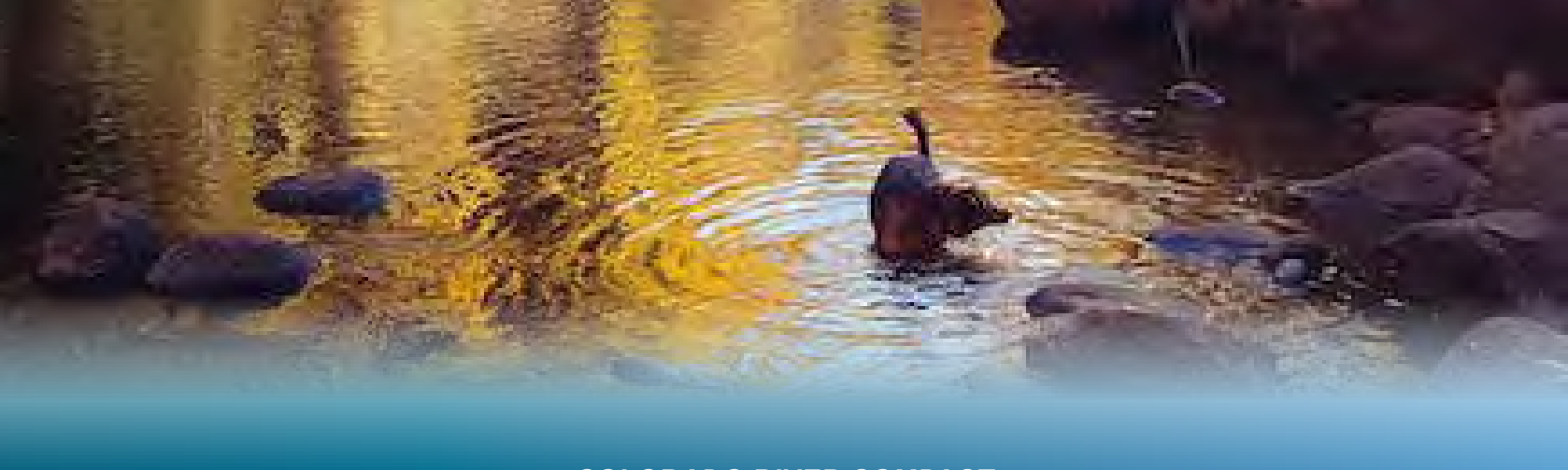
TRANSMOUNTAIN DIVERSIONS

In addition to diversion from the South Platte Basin, the County is also dependent upon transmountain diversion water (sometimes called trans-basin diversions). Transmountain diversions move water from one river basin to another across a mountain range. Transmountain diversions in Colorado typically move water from the west slope of the Continental Divide (where approximately 80% of the State's water resources originate) to the east slope of the Continental Divide (where approximately 80% of the State's population resides). Under Colorado Water Law, trans-basin and transmountain diversions are qualified as fully reusable (i.e., can be used to "extinction"), as the water source has already left the source watershed (Hobbs Jr., 2004). Native water supplies (i.e., water that originates and is used within the same watershed) cannot be reused without additional water court actions, as the return flows are obligated to more junior water right holders (Hobbs Jr., 2004).

Table 7 summarizes the 15 largest water providers in Adams County, based on population served, and what water basins supply their systems. In addition to South Platte Basin supplies, five of the 15 water providers receive water from the Colorado River Basin and one receives water from the Arkansas River Basin. Additionally, four purchase water from at least one of the providers that receives supply from the Colorado River Basin and therefore are indirectly receiving supply outside of the South Platte Basin. Collectively this means that more than half of the 15 largest water providers in Adams County either directly or indirectly receive water from outside the South Platte Basin.

Table 7. Water basins that supply water to Adams County water providers.

Public Water System/Water Provider	*Water Basins*
City of Aurora	Arkansas River Basin Colorado River Basin South Platte River Basin
City of Westminster	Colorado River Basin South Platte River Basin
City of Thornton	Colorado River Basin South Platte River Basin
South Adams County Water Supply and Sanitation District	South Platte River Basin
City of Brighton	South Platte River Basin (Also purchase water from the City of Westminster, indirectly supplied from Colorado River Basin as well)
City of Northglenn	South Platte Basin Colorado Basin
Crestview Water and Sanitation District	South Platte River Basin (100% of water purchased from Denver Water, indirectly supplied from Colorado River Basin as well)
North Washington Street Water Supply District	South Platte River Basin
City of Federal Heights	South Platte River Basin (98% of water purchased from the City of Westminster, indirectly supplied from the Colorado River Basin as well)
Todd Creek Village Metro District	South Platte Basin
Town of Bennett	South Platte Basin
North Pecos Water Supply District	South Platte River Basin (100% of water purchased from Denver Water, indirectly supplied from Colorado River Basin as well)
Wikiup Mobile Home Park	Unknown
Strasburg Water Sanitation District	South Platte Basin
Kimberly Hills Mobile Home Park	Unknown
Denver Water	South Platte River Basin Colorado River Basin



COLORADO RIVER COMPACT

The Colorado River Basin extends across six states, as well as the Country of Mexico. To manage water across the basin, the Colorado River Compact of 1922 divided the river into two basins: The Upper Basin (Colorado, New Mexico, Utah, Wyoming) and The Lower Basin (Arizona, California, and Nevada).

The compact outlines a framework for how the river is managed and dictates 7.5 million ac-ft (maf) per year allotments to the Upper and Lower Basins states. The 1928 Boulder Canyon Project Act and the 1948 Upper Colorado River Compact further established the following appointments by state:

Upper Basin:*
Colorado: 51.75% (3.9 maf/yr)
Utah: 23% (1.7 maf/yr)
Wyoming: 14% (1.05 maf/yr)
New Mexico: 1.25% (0.1 maf/yr)
**Upper Basin Sates was based on percentages, total developed based on 7.5 maf total.*

Lower Basin:**
California: 59% (4.4 maf/yr)
Arizona: 37% (2.8 maf/yr)
Nevada: 4% (0.3 maf/yr)

***Lower Basin Staes was based on quantity, percentages developed based on 7.5 maf total.*

Today these allocations are challenging, because while the original compact allocated 7.5 maf/yr to the Lower and Upper Basins States (15 maf/yr total), the Colorado Rivers average annual flow is only around 13.5 maf/yr. As a result, the Colorado River Interim Guidelines were put in place in 2007 to outline how shortage should be handled. Since then, the Colorado River Basin Drought Contingency Plan was developed in 2019 and most recently, in May of 2023, the Lower Basin States agreed to reduce their intake by 3 maf through the end of 2026 (~13% of their 7.5 maf/yr allotment). The Bureau of Reclamation has already initiated a process to update management process post 2026 (Lytle, 2022; Water Education Foundation, 2023; Womble, 2023).

From a water management standpoint this fact is significant, as transmountain supply may be subject to additional infrastructure risk (as the water travels farther) in addition to additional legal risks, especially for those that receive water supply from the Colorado River and are therefore subject to the Colorado River Compact of 1922.

GROUNDWATER

Non-tributary groundwater is sourced from aquifers that are not hydrologically connected to a surface stream. Non-tributary groundwater sources are considered a non-renewable source of supply because recharge rates are usually much slower than extraction rates (USGS, 2023). Across Colorado, surface water supplies most water users, with only 17% of Colorado's water withdrawals originating from groundwater (Colorado Water Conservation Board, 2023). Figure 20 provides a summary of groundwater to surface water withdrawal by county in Colorado. Unlike other counties in the state, Adams County receives a larger portion of its supplies from groundwater sources–particularly when you compare it to other Denver Metro counties.

Adams County groundwater is sourced from the Denver Basin aquifer system. While tributary (or surface) water is still the primary source for Adams County, groundwater plays an important secondary role. Of the 76 water providers in the CDPHE database for Adams County, 62% of water providers' primary source of supply is from groundwater and there are over 14,000 well permits in the County. Throughout the County, groundwater is also used as a primary source for agricultural irrigation. The sections below provide more detail on Adams County's groundwater supply, as well as how groundwater is administered in the County.

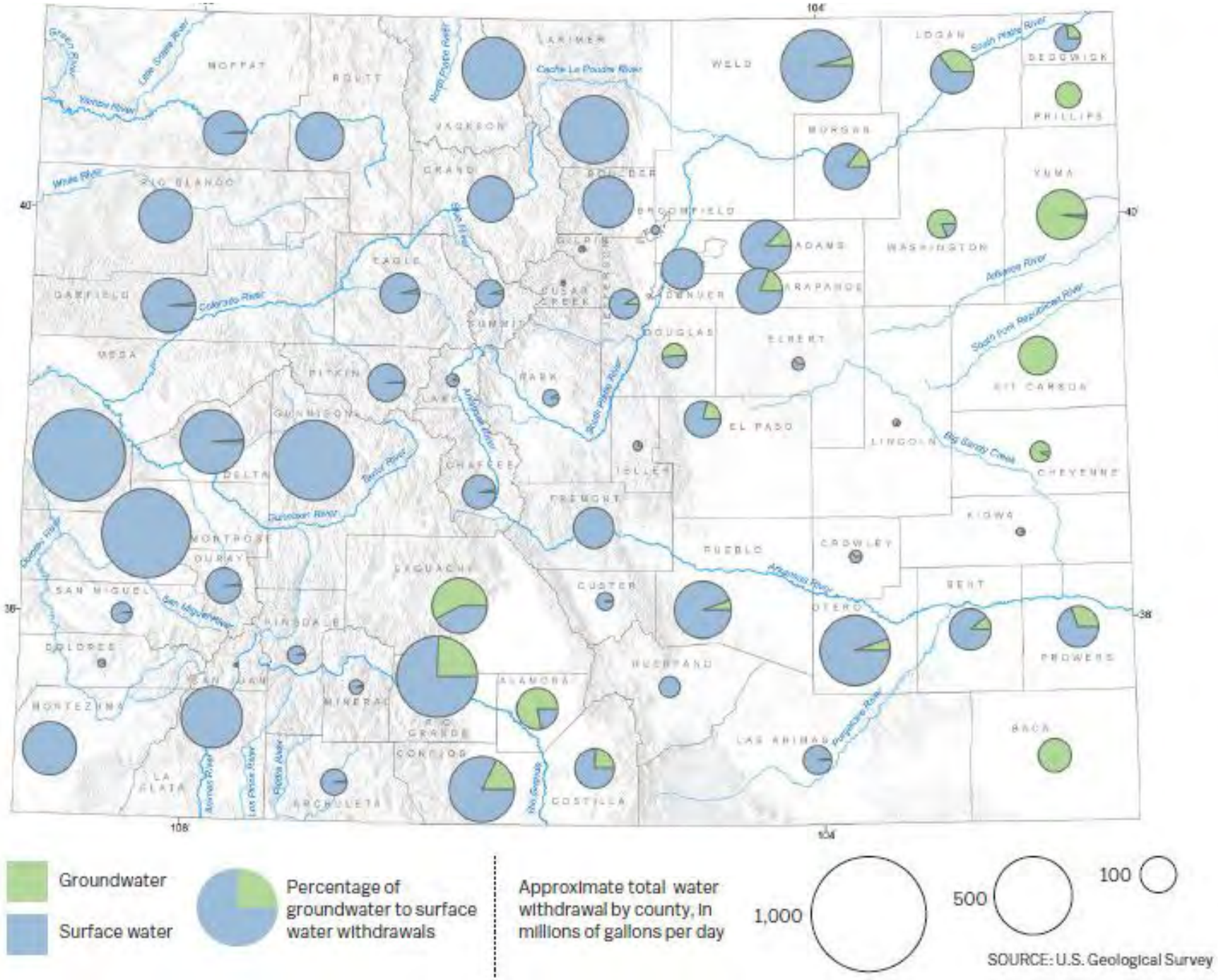


Figure 20. Comparison of Colorado groundwater and surface water withdrawal in 2010 by County

Source: Water Education Colorado, 2023

DENVER BASIN AQUIFER

Adams County mostly resides in the Denver Basin Aquifer System (Figure 21). The Denver Basin aquifer covers about 7,000 square miles from Greeley to Colorado Springs, and the Front Range to Limon, (USGS, 2000). It consists of four aquifers that are each separated by a confining layer that prevents water from “mixing” between each individual aquifer formation.

IN CONTEXT

Groundwater Aquifer: collective saturated spaces between layers of soil and rocks. Groundwater resides in these saturated zones beneath the surface (California Department of Water Resources, 2023).

Groundwater Basin: Layers of aquifers that are “stacked” to make up a groundwater basin (California Department of Water Resources, 2023).

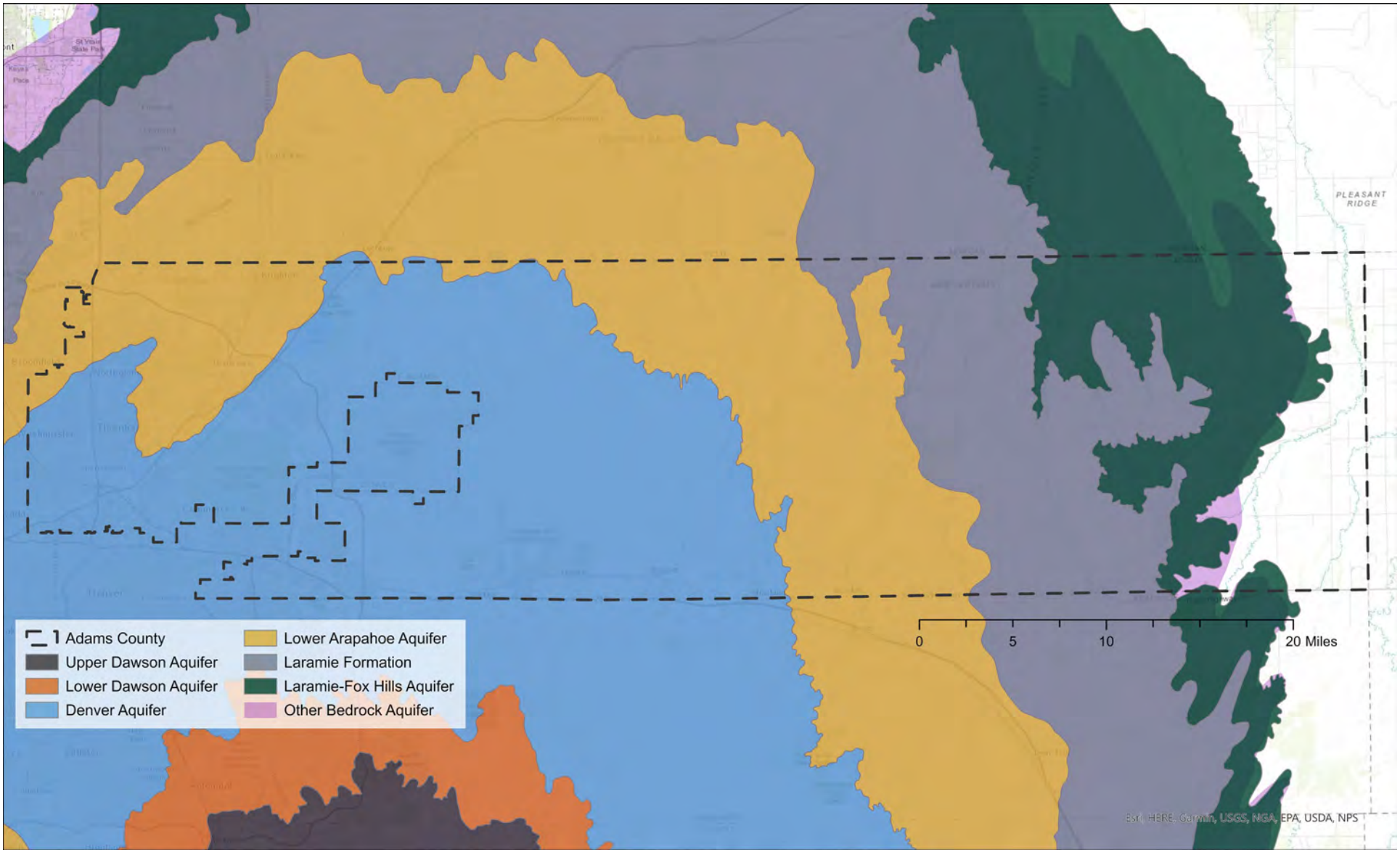


Figure 21. Map of the Denver Basin

Source: Colorado Department of Water Resources, 2020

Specifically, the Denver Aquifer, Arapahoe Aquifer, and Laramie Fox-Hill Aquifer formations are found in Adams County. Table 8 some key characteristics for these Denver Basin aquifer formations and how they are used. The aquifers are listed in the order of their formation, from the land surface down.

Table 8. Denver Basin Aquifer characteristics for aquifers located in Adams County

Aquifer	*Depth*	*Thickness*	*Well Yields*	*Groundwater Levels*
Denver	1,300 feet	800 – 1,000 Feet	20 – 50 gpm	Not as heavily used due to lower well yields. Receives some localized recharge from lawn irrigation where aquifer lies near land surface, however some areas have seen groundwater level supply declines of over 160 feet.
Lower Arapahoe & Upper Arapahoe	1,700 feet	0 – 400 feet	300 – 700 gpm	Heavily used due to high well yields. Aquifer has seen significant supply declines between 100 – 300 feet.
Laramie-Fox Hills	2,400 feet	0 -350 feet	100 – 150 gpm	Heavily used due to higher well yield, however high water temperatures and coal beds deep in aquifer make it a less desirable form of supply. Aquifer has seen significant supply declines, with some areas seeing groundwater declines of 50 – 250 feet.

Source: Jones & Cech, 2009; Douglas County, 2023

The Denver Basin Aquifer system has long been a source of supply. However, after the 2002 drought, declining levels and drying up of wells along the aquifer's western edge have led to concern about the basin's long-term viability as a reliable source of supply (Water Education Colorado, 2020). Table 9 summarizes changes in water levels between 2010 and 2020 for the Denver Basin Aquifer System's aquifers located in Adams County.

Table 9. Denver Basin's bedrock aquifers 2010 - 2020 water level changes

Aquifer	*2021 Range of Water Levels (ft)*	*2010 – 2020 Water Level Change, Feet*	
Denver	12 - 1167	Decrease	49.96
Lower Arapahoe	170-189	Increase	6.29
Upper Arapahoe	40-1770	Decease	13.24
Laramie-Fox Hills	34-1185	Decrease	10.74
Because the Denver Basin Aquifer System extends beyond Adams County boundaries, not all measurements were taken in Adams County. Additionally, while water levels provide a snapshot not all wells used to calculate these averages are monitoring wells and results can vary significantly depending on well age, pumping practices, and well structure (Water Education Colorado, 2014)*. Numbers presented here provide a snapshot of water level change in a complicated system.*			

Source: Flor, 2022

Aquifers are recharge in one of three ways: precipitation, irrigation return flows, and water movement between aquifers. On average, 5 million ac-ft of rain and snow falls across the Denver Basin aquifer systems (which extends beyond Adams County). Of this, 99% is lost to evaporation, transpiration by plants, or surface runoff. The remaining water (about 40,000 ac-ft) is left to recharge the entire 7,000 square miles of the Denver Basin system (USGS, 2000). For the shallower aquifers (e.g., Denver) in the Denver Basin, lawn irrigation may potentially play a role in replenishing aquifer water supply; however, for the deeper aquifers, which primarily supply municipalities, water recharge rates are concerning (Water Education Colorado, 2014). Between 1958 and 1978 there was 45,000 ac-ft of water discharge from aquifers – either by natural means to other water systems or via pumping (USGS, 2000). This means that the rate of discharge is greater than the rate of recharge (45,000 ac-feet withdrawal > 40,000 ac-ft recharge).

In response to declining rates Adams, Elbert, Weld, El Paso, and Arapahoe County have all enacted a 300 year-rule, which requires new development to demonstrate they can provide adequate water supply that lasts at least 300 years (Water Education Colorado, 2014). Douglas County also has water adequacy requirements that are specific to the Denver Basin. Adams County's water adequacy standards can be found in section 5-04-05-06-04 of the Development Standards and Regulations. Additionally, due to high use wells located in the Denver Basin, the State requires different well permitting requirements and administration. These are described in greater detail in the next section.

GROUNDWATER ADMINISTRATION

All new groundwater wells in Colorado are required to have a permit issued by the Colorado Division of Water Resources. As of February 2023, there were 14,277 constructed well permits in Adams County. Of these, 40% are for domestic uses, which include residential dwelling water use, limited lawn/garden irrigation and providing water for domestic animals or livestock (Colorado Division of Water Resources, 2023). A full summary of well permits by beneficial use is shown in Figure 22. Most wells are unmetered, so the exact water use volumes are unknown.

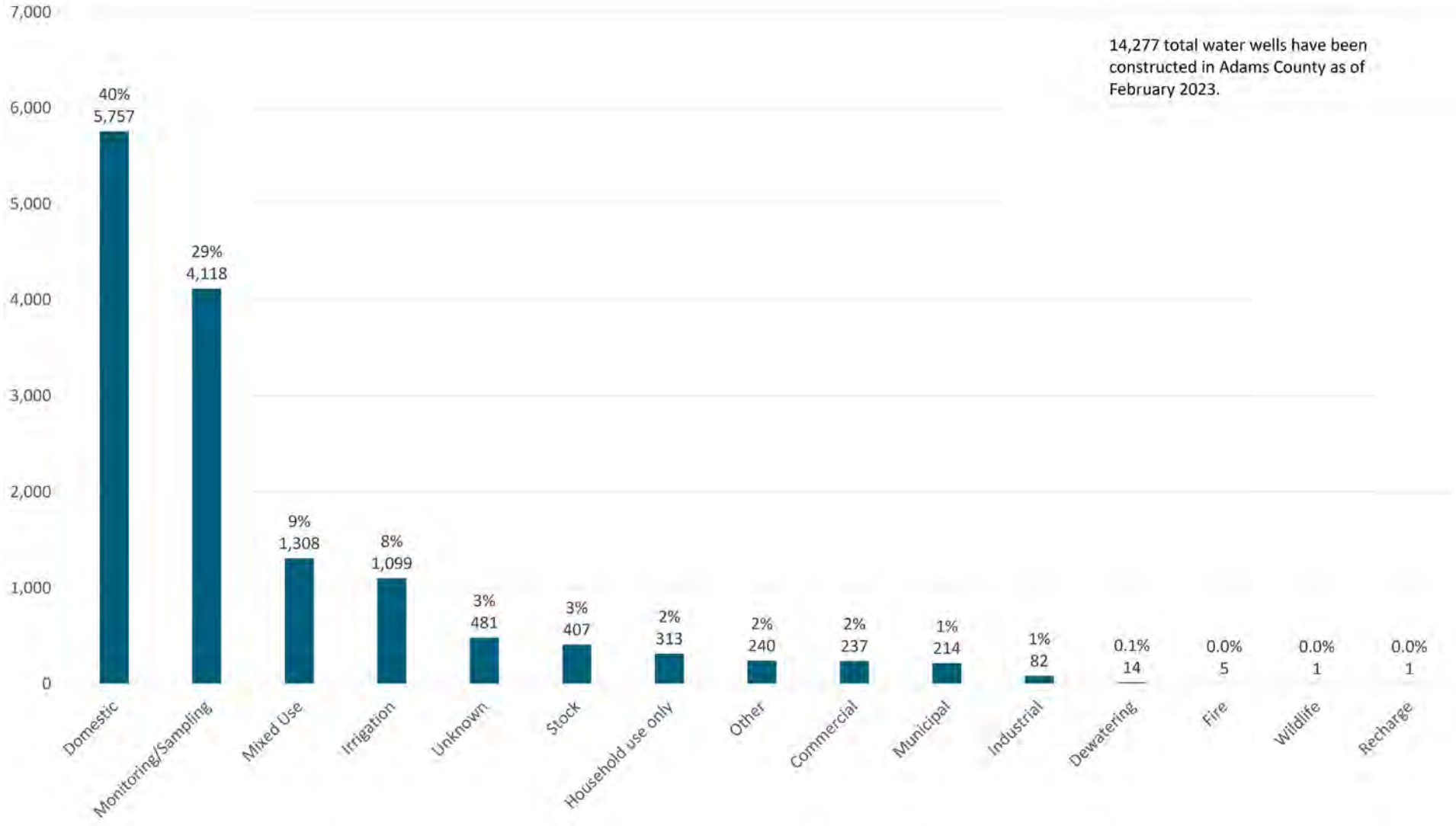


Figure 22. Groundwater wells in Adams County by beneficial use (2023)

Source: Colorado Department of Water Resources, 2023

Geospatially, the eastern versus western portions of Adams County show distinct differences for wells, with many domestic and monitoring wells located in the west and more irrigation and stock wells located in the east (Figure 23).

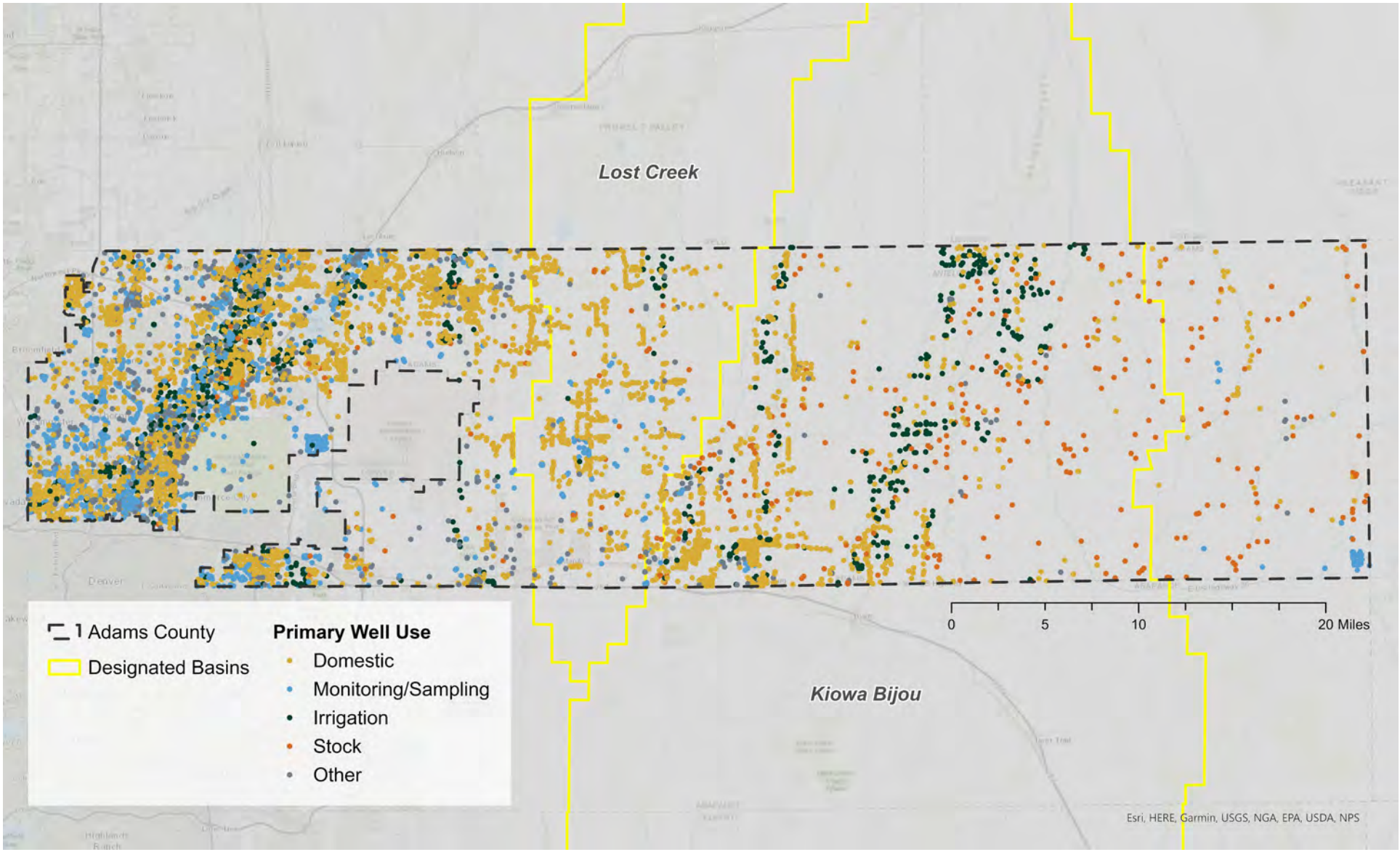


Figure 23. Map of constructed groundwater wells in Adams County by beneficial use (2023)
Source: Colorado Department of Water Resources, 2023

The type of well permit required for a groundwater well is dependent on the location and well type (Water Education Colorado, 2020). Tributary groundwater, or groundwater that is hydrologically connected to surface streams, falls under the prior appropriation doctrine and are also required to have augmentation plans, in addition to a well permit. All groundwater is assumed to be tributary unless proven otherwise. More details about tributary groundwater administration can be found in the Tributary Water section.

Groundwater in Adams County that is not tributary can be categorized into three groups: designated groundwater, nontributary groundwater, and Denver Basin groundwater. Water in each category has exceptions to Colorado's prior appropriation system and, as a result, each category is managed differently, with unique considerations. Table 6 provides a summary of differences between each, as well as how they compare to tributary water. The sections below further explains differences and their applications in Adams County as they pertain to well permitting.

DESIGNATED GROUNDWATER

Designated basins occur in regions of the state with very little surface water and, therefore, are heavily dependent on groundwater. In 1965, the State Legislature passed the Ground Water Management Act (C.R.S. 37-90-101 to 104), which created a Colorado Ground Water Commission and authorized the Commission, State Engineer, and local Ground Water Management Districts to administer a different permitting process for groundwater in these regions that allows more local control (Colorado State University, 2023).

Currently there are eight designated basins in Colorado (all on the eastern plains) and 13 different Ground Water Management Districts that manage water in these regions. In Adams County, two of these designated basins, the Kiowa-Bijou and Lost Creek, are managed by the North Kiowa Bijou Ground Water Management District and Lost Creek Ground Water Management District respectively (Figure 24).

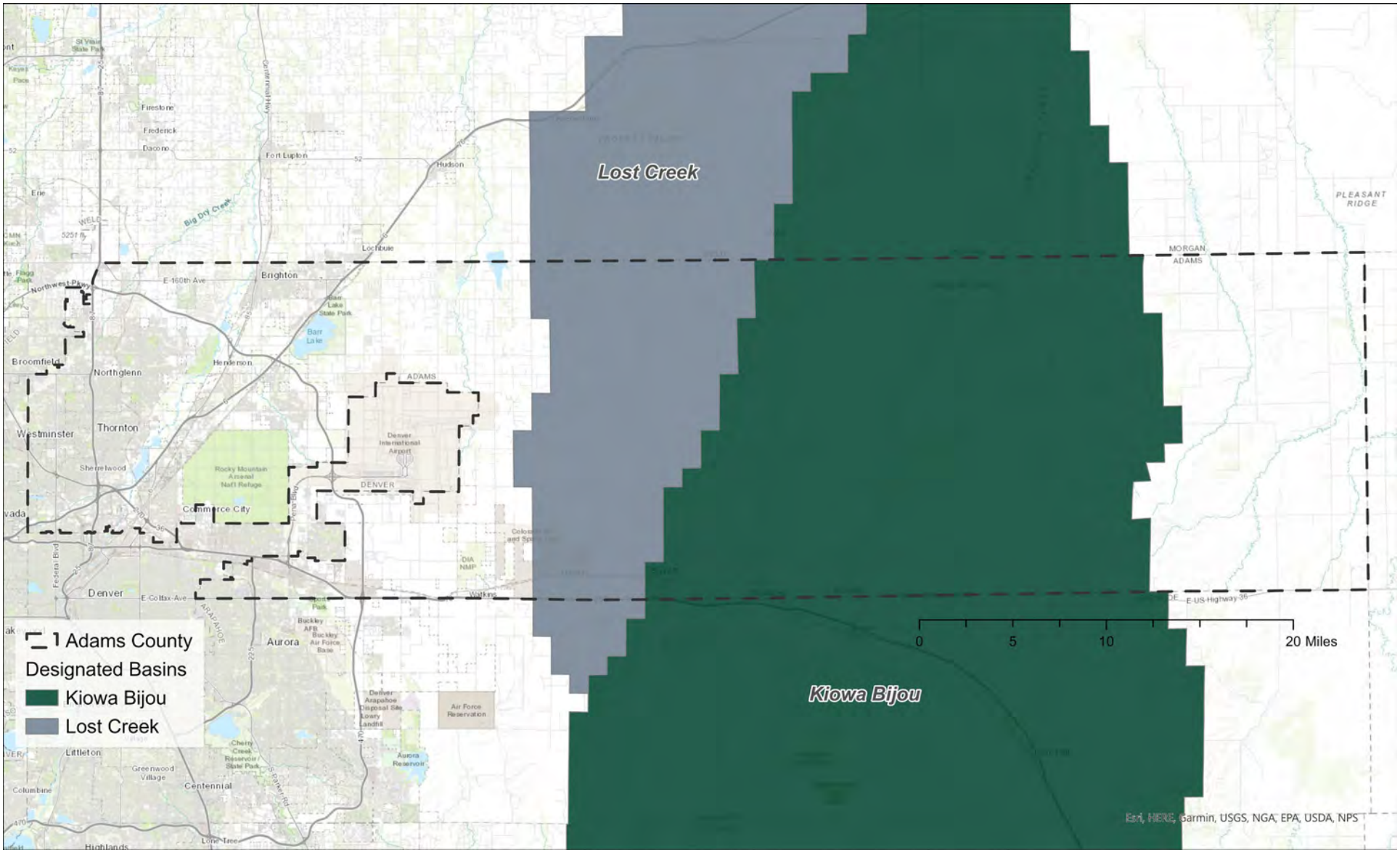


Figure 24. Designated groundwater basins in Adams County

Source: Colorado Department of Water Resources, 2020

Of the 14,277 permitted wells in Adams County, 13% (1,890) of the wells fall in the Kiowa-Bijou designated basin and 5% (734) fall in the Lost Creek designated basin. Of those located in the Kiowa-Bijou designated basin, 45% (843) are permitted for domestic use, 21% (400) are permitted for irrigation use, and 18% are for mixed use. Remaining use types include stock, monitoring/sampling, commercial, and industrial. In the Lost Creek basin, 49% (362) are permitted for domestic use, 32% (234) are permitted for mixed use, and 10% (74) are permitted for monitoring and sampling. Only 3% (25) are for irrigation. Remaining use types include stock and commercial. Figure 25 provides a summary of well permit by beneficial use type in each of the designated groundwater basins.

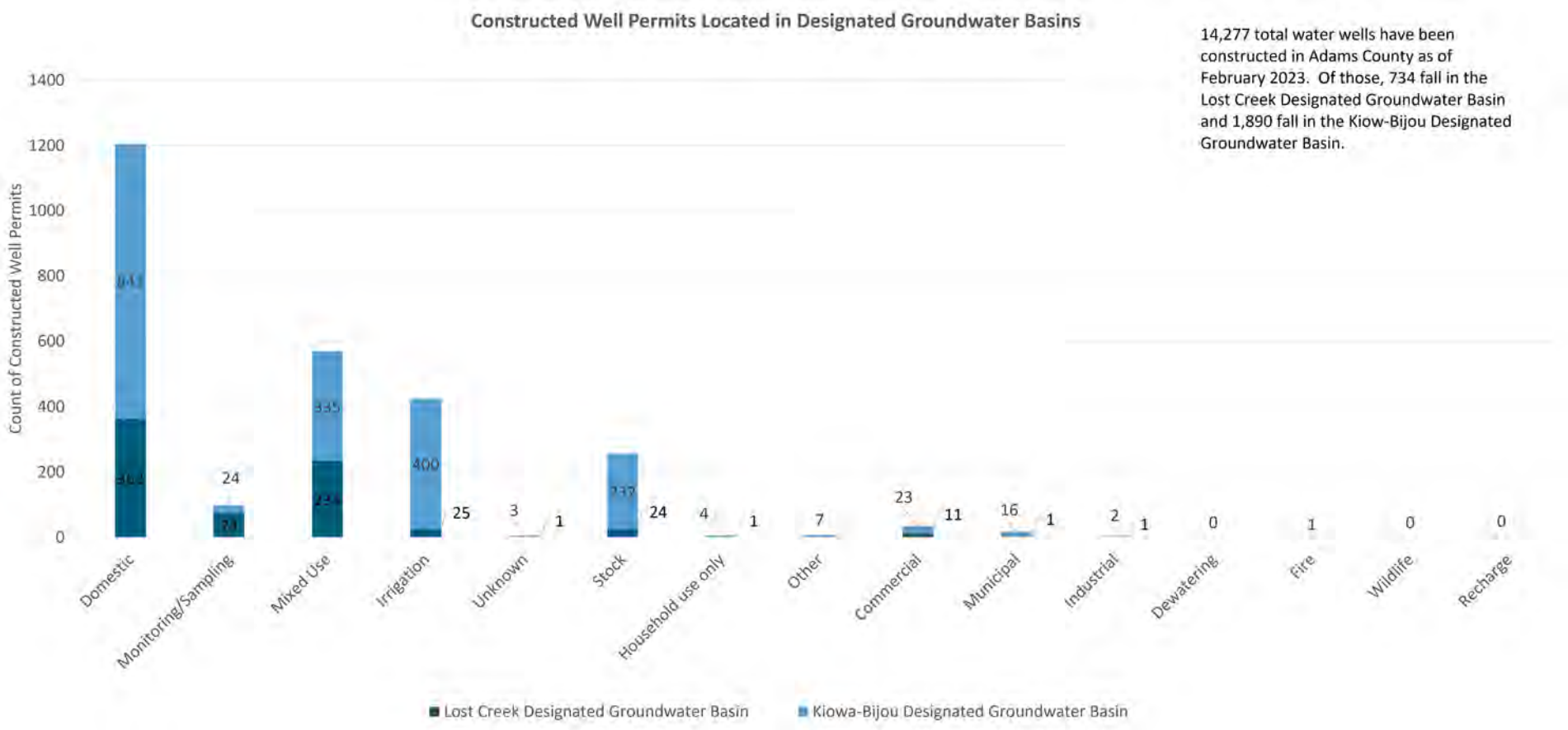


Figure 25. Groundwater wells in Adams County's designated groundwater basins by beneficial use (2023)
Source: Colorado Department of Water Resources, 2023

DENVER BASIN GROUNDWATER

As discussed above, Adams County mostly resides in the Denver Basin Aquifer System (Figure 21). Due to its extent, unique geological features, and location in major metropolitan areas, additional rules apply to groundwater use in the Denver Basin. For areas that reside in the Denver Basin but outside of Designated Groundwater Basins, wells are permitted and administered by the Office of the State Engineer. A water court-decreed augmentation plan is also required. In areas of the Denver Basin that lie within a Designated Groundwater Basin, the Colorado Ground Water Commission administers water rights and permits along with the local Designated Ground Water Management District.

In Adams County, 97% (13,845) of the well permits are in the Denver Basin Aquifer System. Of these, 19% (2,624) fall within a designated groundwater basin. Of the 81% that are not within a designated groundwater basin, 40% (4,543) are permitted for domestic use and 35% (3,939) are permitted for monitoring/sampling. Irrigation and mixed use each make up 6% of the permitted wells. Other use types include industrial, municipal, stock, fire, dewatering, wildlife, and recharge. Figure 26 provides a summary of well permit by beneficial use type for wells located in the Denver Basin but outside of the designated groundwater basins.

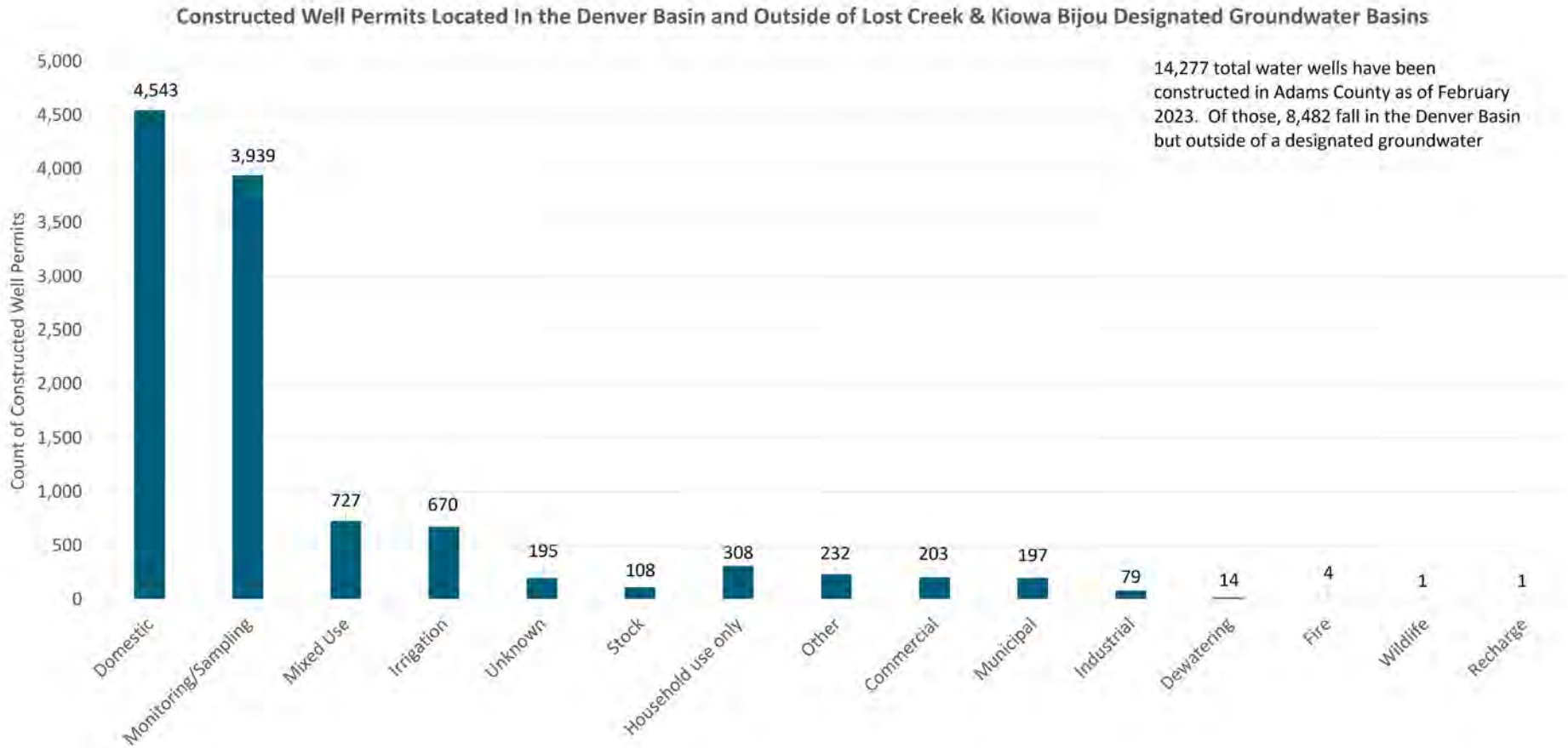


Figure 26. Groundwater wells in Adams County that are located in the Denver Basin but outside of any designated groundwater basins by beneficial use (2023)

Source: Colorado Department of Water Resources, 2023

EXEMPT WELLS

If a groundwater well is not located in a designated basin, it can be considered “exempt.” These wells are unique because they are exempt from prior appropriation under the assumption that they will not cause injury to existing surface and well water uses because of relatively minor water use. Allowable uses include residential, irrigation of home lawn and gardens, watering of domestic animals/livestock, and drinking and sanitation purposed inside a commercial business (Colorado Division of Water Resources, 2023). The State Engineer has a number of rules and policies in place that further define when an exempt well is permitted as defined in C.R.S. 37-92-602.

Adams County has 41 exempt wells. Thirty-three are for domestic purposes, six are for domestic/stock uses, and two are for stock uses.

NON-TRIBUTARY GROUNDWATER

Non-tributary groundwater, or groundwater that is not hydrologically connected to a stream or river, is managed depending on if it is in or out of a designated basin. Legally, for non-tributary groundwater that is located outside of a designated basin boundary, pumping cannot deplete the annual flow of a stream at a rate greater than one-tenth of one percent of the annual rate of withdrawal over a 100-year period. For example, if you pumped 100 ac-ft of water a year starting in 2000, by the year 2100 there must be less than 0.1 ac-ft per year depletion from any stream impacted by the pumping (Water Education Colorado, 2020). Non-tributary groundwater wells outside of designated basins are managed by the Office of the State Engineer for permitting and administration. Due to the extent of the Denver Basin, as well as the Designated Groundwater Basins, very few wells that fall into this category.

WATER PROVIDERS

Water in Adams County is provided to residents and business by a combination of the following:

- **Public water systems:** Centralized utilities that deliver potable water to their customers, which typically are residents and businesses. Public water systems must report to Colorado Department of Health and Environment (CDPHE) and all drinking water standards must comply with the Safe Drinking Water Act. Surface and groundwater are delivered to Adams County residents primarily via public water systems. Compared to other utility services, such as electricity and gas, water delivery is a highly distributed service.
- **Self-supplied users:** Residents and businesses that are not connected to a public water system. In Adams County, most self-supplied users rely on groundwater wells, though some may also purchase water from private water haulers or trucks. This water must be treated to the water quality standards associated with the water’s use. For example, households that rely on wells for indoor use often chlorinate the water retrieved from their groundwater wells, at a minimum.
- **Irrigation and ditch companies:** Irrigation and ditch companies sell non-potable (raw) water to their customers. These are typically public water systems, farmers, ranchers, or large industrial customers.

PUBLIC WATER SYSTEMS

The CDPHE Water Quality Control Division (WQCD) is a regulatory body responsible for water monitoring, pollution prevention, and safe drinking water. As such the WQCD maintains a public water system database for the State of Colorado. The CDPHE classifies public water systems into one of three groups: community, non-transient/non-community, and transient/non-community.

In the State of Colorado there are 2,079 public water systems (PWS). In Adams County, the database includes 76 PWS. Of the 64 counties in Colorado, Adams County ranks 6th for the greatest number of public water systems in the State. A breakdown of the 76 systems in Adams County is summarized in Table 10.

Table 10. Public Water Systems in Adams County

Public Water System Type	*Description*	*Number in Adams County*	*Total Estimated Service Population**	*Example*
Community	Supplies water to the same population year round	56	606,397	Municipal and Title 32 special district providers. Twenty of the 56 community providers (26%) are mobile home communities. Collectively these 20 mobile home communities provide water for over 19,000 people. Mobile home communities have a history of water quality and billing issues in Colorado, some of which are being addressed by the State's Mobile Home Act or the recently introduced House Bill 23-1257 which will launch a statewide effort to test water quality in mobile home communities. Four are metro districts.
Non-transient, non-community	Regularly serves at least 25 people at least 6 months of the year	6	1,361	Adams County Parks, John Auto Plaza, Colorado Aire and Space Port, Riverdale Animal Shelter, Joseph T Ryerson and San Inc, City of Aurora at Front Range Airport
Transient, non-community	Serves at least 25 people or 15 connections, open at least 60 days a year but population is characterized as flow-through traffic	14	2,695	Grocery stores, gas stations, campgrounds, lodging (e.g., Lulus Inn, Northglenn Moose Lodge, Barr Lake State Park)

Source: Colorado Department of Public Health and Environment, 2023

**Population estimates may include areas outside of Adams County*

Public water systems rely on a complex system of water supplies, storage, water treatment, and distribution infrastructure, to treat and deliver drinking water to their customers. Ideally, public water systems hold a diverse portfolio of water rights and avoid overreliance on a single water source. In Colorado, where the runoff season typically lasts from April through September, water storage is crucial to satisfy demands at other times of the year.

It is common for public water systems to provide water to other systems – under contractual agreements as part of daily business, or for short periods of time, in response to emergency situations.

All water delivered by public water systems is treated to drinking water standards; though increasingly, public water systems are constructing dual distribution systems to deliver potable and non-potable (raw or reclaimed) water separately. For these dual systems, with potable and non-potable water, non-potable water is commonly used for irrigation. Water used indoors is collected and treated through the sanitary sewer system. Treated effluent is discharged to downstream waterways. A portion of the water used for irrigation infiltrates into the ground and makes its way back to the river system as subsurface flow, though that process is slow. Flows returned to the river are then available for downstream water systems. Figure 27 provides a visual summary of these systems in urban settings.

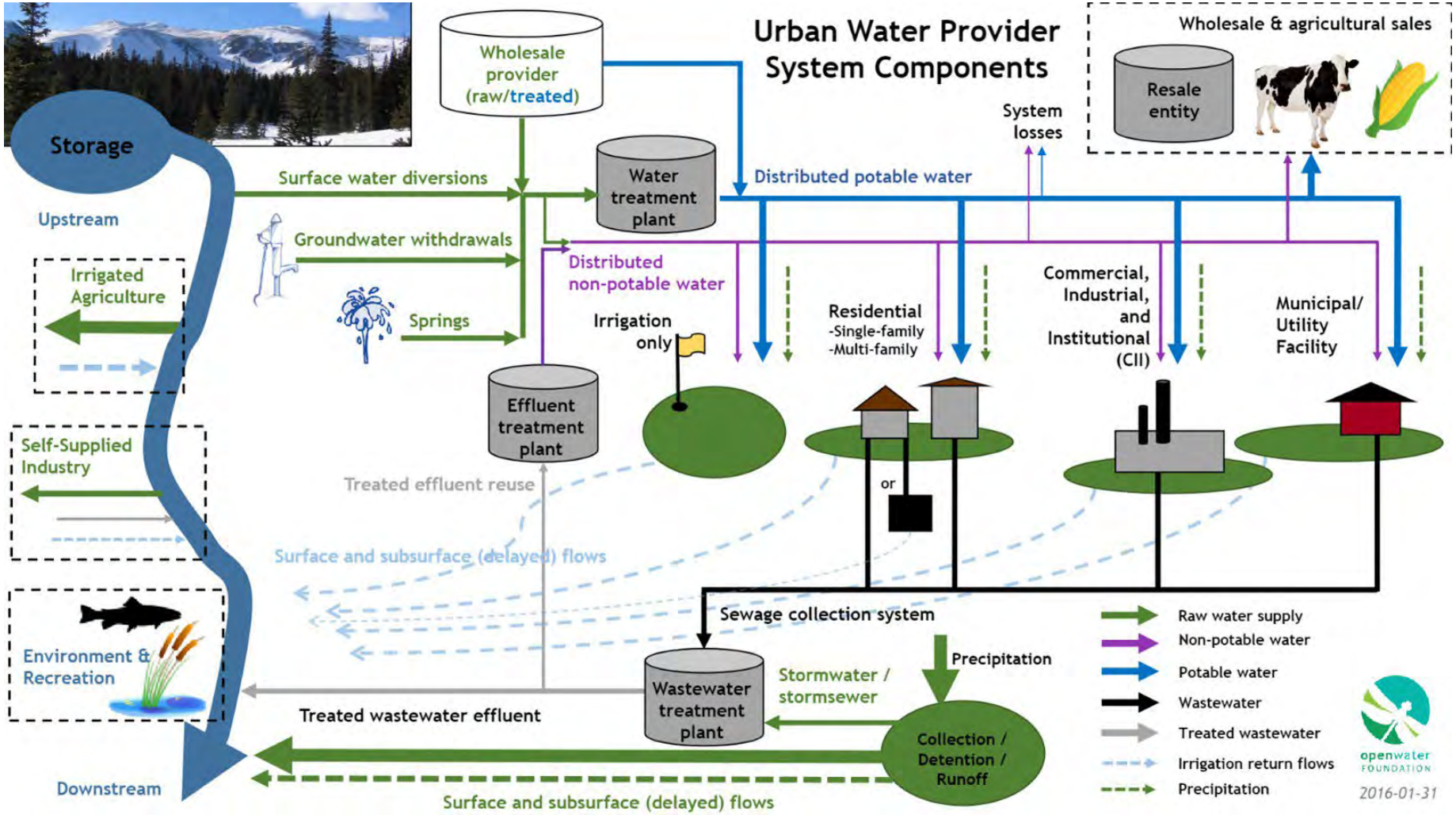


Figure 27. Public water systems schematic

Source: Open Water Foundation, 2016

Of Adams County's 76 public water systems, the top 15 largest by service population were reviewed to synthesize basic characteristics and annual water use data. Altogether the 76 water providers serve 610,453 people, however because County boundaries do not align to public water system boundaries, they serve areas that are both in and outside the county. The top 15 serve 584,042 people in and outside the County. Detailed information on each of the top 15 public water systems can be found in Appendix B: Water Provider Summaries. Table 11 details important characteristics across the 15 providers. See Appendix B: Water Provider Summaries for assumptions behind these metrics.

Table 11. Summarized metrics for the top 15 largest water providers

Description	*Metric*	*Implication*
Number with Water Efficiency Plans	6	In Colorado, water retailers that provide over 2,000 acre-feet of water are required to have a Water Efficiency Plan (WEP) that is updated every seven years. If an entity doesn't have an updated plan on file, they are not eligible to receive State funding or support (Colorado Water Conservation Board, 2023). Six of the water providers in Adams County are required to have WEPs. All six have a WEP on file; however, South Adams County Water and Sanitation District's is from 2011.
Number with Water Shortage or Drought Plans and/or Water Shortage/Drought ordinance language	7 (5 have plans and an ordinance; 2 have an ordinance)	Water shortages occur when the available water supply is less than estimated water demand. Two of the primary impacts on supply are drought and water quality issues. In response to shortages, water providers can enact water restrictions that are defined in a Water Shortage/Drought Plan and/or as an ordinance. These plans and ordinances are an important tool both for water providers to plan, as well as for water providers to have a response mechanism in the face of a water shortage emergency.
Number with Published Forecasts and/or Build Out Information	7	Like the County, water providers are planning for population growth and its impact on supply. In addition, many are taking into consideration the impacts of climate change. Planning timelines vary from provider to provider and are impacted by the amount of new or redevelopment that may occur, capital improvement projects, and more. Because they are all unique, making comparisons can be challenging.

Color Legend: Land Use Metric Water Rights Metric Water Providers

Description	Metric	Implication
Estimated Average Single Family Winter Monthly Water Cost	$22– $27	The EPA considers drinking water affordable if water costs do not exceed 2.5% and wastewater costs do not exceed 2% of an area's median household income (MHI) (AWWA, 2013). Based on the 2021 American Community Survey data, this means a combined water and wastewater bill should not exceed $303 per month in Adams County (Federal Reserve Bank of St. Louis, 2022). Given the focus of this report, only winter water costs were estimated, which is a proxy for monthly costs for indoor water use (e.g., excludes any water used for irrigation). Exploring a more wholistic water cost estimate is a recommended next step, especially for equity considerations and as water costs continue to rise in Colorado.
Estimated Range of Water Development Fees for a Single-Family Development	$3,100 - $36,000	The average cost to build a 2,000 square foot home in Colorado in 2023 is $299,300 (Abraham & Tynan, 2023). This estimate excludes the cost of land but includes the cost of labor and materials. Average water supply fees, which do not include other plant investments and infrastructure development fees associated with water, make up roughly 5.5% of this total cost. Between 2011 and 2018, the price of water sold from the Colorado Big-Thompson (CB-T), a federal water project that supplies water to many water providers across the Front Range, increased by over 400% (Smith, 2019). While CB-T costs are one data point, this trend is not expected to change, and water will continue to comprise a significant percentage of development costs.
Estimated Total Annual Municipal Water Use	36,411 million gallons/year	This represents an aggregate total water use for 8 of the 15 largest water providers in the County that have publicly available water use information. For context, roughly 325,437 million gallons annually are used for Municipal and Industrial uses in Colorado (Colorado Water Conservation Board, 2023). This means 8 of Adam's County Water providers account for roughly 11% of the State's total Municipal Water Use. While it provides interesting context, it is important to note that the 8 water providers included in this summary serve areas outside of Adams County and are not the only water providers in Adams County. A more complete and robust data effort is required to create a more accurate estimate.
Estimated Average Gallons Per Person Per Day (GPCD)	100	This represents an aggregate GPCD for 8 of the 15 largest water providers in the County that have publicly available water use information. GPCD is a common metric used by the State and others to normalize water use compared to population. For reference, the state average, reported in 2023 Colorado Water Plan, is 164 GPCD (Colorado Water Conservation Board, 2023). GPCD is heavily influenced by weather and if providers have non-potable irrigation systems. While it provides interesting context, it is important to note that the 8 water providers included in this summary serve areas outside of Adams County and are not the only water providers in Adams County. A more complete and robust data effort is required to create a more accurate estimate.

Color Legend: Land Use Metric Water Rights Metric Water Providers

SELF-SUPPLIED USERS

Self-supplied users most commonly use groundwater. Limited information is available for the 14,277 groundwater wells in Adams County. Of the 14,277 wells, 6,070 are used for domestic or household use. Assuming Adams County's average household size of 2.89 people, roughly 17,542 people receive water from a groundwater well (United States Census Bureau, 2023).

Wells located outside of designated basins typically do not exceed pumping rates of 15 gallons per minute, however restrictions on annual volume pumped are not restricted (Water Education Colorado, 2020). Wells within designated basins typically do not exceed pumping rates of 50 gallons per minute, however total annual volume pumped cannot exceed 5 ac-ft per year (Water Education Colorado, 2020).

IRRIGATION AND DITCH COMPANIES

Ditch companies are regulated under C.R.S. 7-42- 101. Below is a list of the mapped ditches in Adams County. Table 12 summarizes Adams County ditches and their water sources that are listed in the Colorado Decision Support System. There are 56 listed, with 27 sourced from the South Platte River. The remaining 29 are sourced from a variety of gulches and creeks (Colorado Department of Water Resources, 2023).

Table 12. Adams County ditches and water sources

Structure Name	*Water Source*
Beebe Canal	South Platte River
Big Dry Creek Ditch	Big Dry Creek
Bramkamp Ditch	Muddy Creek
Brantner Ditch	South Platte River
Brewers Gulch Ditch	Grange Hall Creek (Aka Brewers Gulch)
Brighton Ditch	South Platte River
Brothe Ditch and Res	Muddy Creek
Burlington Ditch 1st	First Creek
Burlington Ditch 2nd	Second Creek
Burlington Ditch 3rd	Third Creek
Clear Cr Platte River D	Clear Creek
Colo Agricultural D	Clear Creek

Structure Name	*Water Source*
Hoffman Gulch Divr	Hoffman Gulch
Hubbel Ditch	South Platte River
Ken Mitchell Lakes Gravity Inlet	South Platte River
Kershaw Ditch	Clear Creek
Liberty Spg Collection D	South Platte River
Little Burlington Cnl	South Platte River
Montgomery Mathes Seep D	South Platte River
Moore Ditch	Muddy Creek
Neres Cnl	South Platte River
Nile Ditch (Upper)	Bijou Creek
Northglenn Dev A Ditch	South Platte River
O Brian Ditch 1st Cr	First Creek

Structure Name	Water Source
Comanche Ditch	Comanche Creek
Cundall Divr Pt 1	Big Dry Creek
Cundall Divr Pt 2	Big Dry Creek
Denver-Hudson Cnl	South Platte River
Desanti Headgate	Beebe Draw
East Burlington Cnl	South Platte River
Ell Triangle Ditch	Comanche Creek
Emerald Diversion 1	Box Elder Creek
Faden Water System	South Platte River
Fisher Ditch	Clear Creek
Ford Seep Ditch	South Platte River
Fulton Ditch	South Platte River
Gardeners D Lammers Enlt	South Platte River
Gardeners Ditch	South Platte River
German Ditch	Big Dry Creek
Henrylyn Irr Ditch	South Platte River

Structure Name	Water Source
O Brian Ditch 2nd Cr	Second Creek
O Brian Ditch 3rd Cr	Third Creek
Orr Drain	South Platte River
Reithmann Bros	Second Creek
Rogers Pit Diversion Point 1	South Platte River
Rullo Ditch 1	South Platte River
Rullo Ditch 2	South Platte River
Sigwardt Seepage Ditch 1	South Platte River
Slough Drainage	Clear Creek
Speer Cnl	South Platte River
Swanson Ditch	West Bijou Creek
Tcvs-01	South Platte River
Thornton West Sprat-Platte Pit Diversion	South Platte River
Washita Ditch	Comanche Creek
West Burlington	South Platte River
Whipple Ditch	Big Dry Creek

Figure 28 shows the mapped ditches and canals is Adams County, which are all located on the western half of the County. A review of irrigation and ditch companies was beyond the scope of this project; however, it is an area of potential future work.

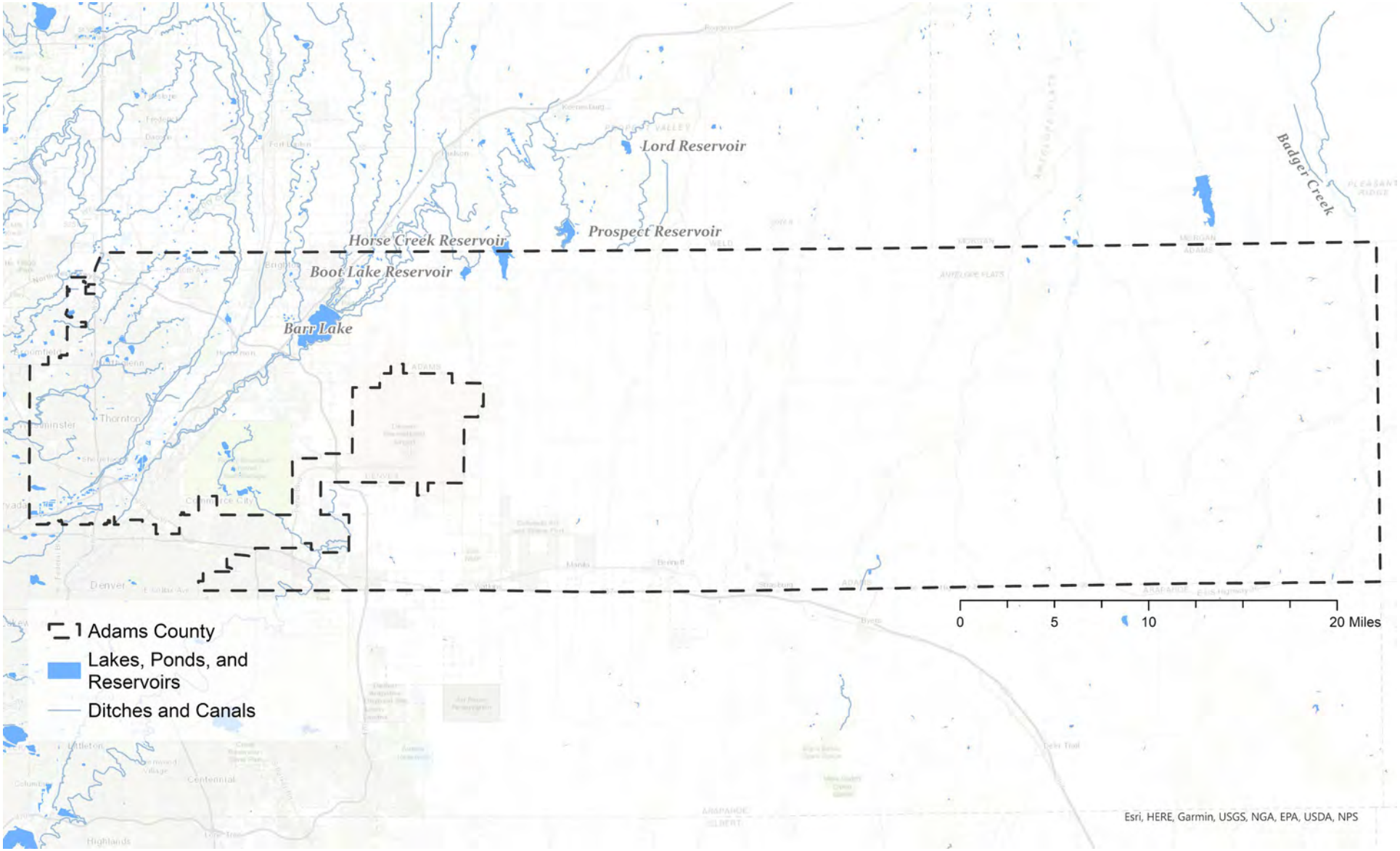


Figure 28. Map of Adams County's ditches and canals
Source: Colorado Department of Water Resources, 2020

CHAPTER 4

RISKS AND VULNERABILITIES

As identified in the recent Advancing Adams County Comprehensive Plan and the 2030 Sustainable Adams County Plan water is a key issue for Adams County. This is further emphasized in the South Platte Basin Implementation Plan and the Colorado Water Plan, which both estimate the gaps and the need to implement innovative solutions to create a reliable future water supply.

While a comprehensive water risk and vulnerability assessment was beyond the scope of this effort, key risks and vulnerabilities were discussed with water providers at both work sessions. A full summary of the work sessions can be found in Appendix C: Water Provider Session Summaries.

For the initial review, risks and vulnerabilities were organized into the following categories:

Table 13. Risk and vulnerability definitions

Risk and Vulnerability	*Definition*
Demand	Risks related to changes in required volumes, timing and quality of water that will need to be delivered to meet customer demand
Climate and Hydrology	Risks related to weather variability and other hydrologic factors that affect sources of supply
Watershed	Risks related to physical watershed conditions that impact yields
Operational and Infrastructure	Risks related to how providers deliver physically and legally available water to customers (includes storage, treatment, and distribution)
Administrative and Legal	Risks related to conditions, regulations, cost, or polices that could impact legal allocation or availability of water supplies
Health and Social	Risks that reduce a community's access to safe, clean, and affordable drinking water

Source: Stantec, RTI International, 2019
Adapted from the Fort Collins Utilities Water Supply and Vulnerability Study Draft Report

Providers were asked to identify examples of risk and vulnerabilities that fell into each of these six categories. A summary of the discussion and identified examples are outlined in Table 14.

IN CONTEXT

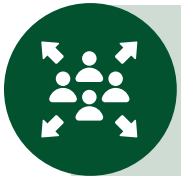
The Colorado Water Plan estimates that if no new projects or strategies are implemented, modeling for the driest periods show Colorado communities could need between 230,000 and 740,000 acre-feet of additional water by 2050.

In the South Platte Basin, the average annual municipal and industrial water gap ranges between 190,000 and 400,000 acre-feet per year.

Table 14. Water provider identified risks and vulnerabilities in Adams County

Risk and Vulnerability	*Provider Identified Examples*	
Demand	• **Population Growth**	• **Water Quality**
Climate and Hydrology	• Demand hardening/passive efficiency gains changing supply and storage balance • Run-off timing changes • **Climate Change Unknowns/Uncertainty**	
Watershed	• Contaminants (e.g., mining, industrial, other)	• **Wildfire**
Operational and Infrastructure	• Infrastructure with single points of failure or no redundancy • Aging Infrastructure	• Security risks • Staffing shortages
Administrative and Legal	• Stricter water administration • Colorado River drought and compact issues • **Infrastructure approval from County, CDPHE, EPA** • Emerging contaminants and changing regulations	• Increasing costs of water quality regulations • Capital for infrastructure • Rising costs
Health and Social	• Increased and worsening algae blooms • PFAS	• **Equity**

While the County does not have direct influence over many of the identified risks, there are a few that the County can impact. These are identified in **green text** in Table 14 and include:



Population growth: Land use decisions made by the County influence the type and rate of growth, as well as where the growth may occur in the County. Adams County's water adequacy requirements are one example that is already in place today. Other examples include regulations on landscape codes and density. Coordination with providers can help planning efforts, while also promoting "smart from the start" and water-wise development.

Equity: Adams County can help ensure equitable access to clean, affordable drinking water by supporting residents and water providers through strategies like information sharing and providing education resources, especially in unincorporated Adams County and in mobile home communities which can be vulnerable to water quality and billing issues.

Infrastructure approval: By working with providers the County can better understand what improvements could be made to the infrastructure approval process to ensure the process still meets County needs while also supporting providers. An example approach is Arapahoe County which created a dedicated series of quarterly Utility Coordination Meetings to provide updates and coordinate on capital and other projects

The below topics the County does not have direct influence upon, but partnerships and coordination can help develop collaborative solutions that could benefit the region. These are identified in **yellow** within Table 14 and include:

Water Quality: With tightening regulations and growing concerns about water quality, especially for groundwater sources, the County can work with providers and the Health Department to ensure equitable access to clean drinking water. Focusing on these solutions is a recommended next step for future phases of work.

Climate Change: Climate scientists expect Colorado to become hotter, dryer, and have more variable precipitation with shifts from snow to rain. In turn, these changes will impact runoff, the frequency and intensity of wildfires, and water providers' ability to store and treat water. By working with providers, the County can support water provider efforts, including water conservation and projects that increase the region's resiliency. Potential examples include:

- Promote water provider water conservation programs
- Support water shortage and drought communications, especially when they vary throughout the County
- Promote low water and xeric landscaping in development codes
- Deliver water conservation programs (e.g., Larimer County's Larimer County Conservation Corp program)

Wildfire: The likelihood of wildfires is expected to increase both in Adams County and in the watershed where Adams County water originates. As discussed in the Adams County Hazard Mitigation Plan, debris, turbidity, and ash can degrade water quality for years after a wildfire. This impacts water supply. Adams County can work with providers and other agencies to implement mitigation and adaptation projects to decrease the potential impact. Examples include La Plata County, which has implemented a number of mitigation projects with the support of the Colorado Strategic Wildfire Action Program.

CHAPTER 5

CONCLUSION AND NEXT STEPS

CONCLUSION AND NEXT STEPS

This assessment provides a snapshot of Adams County's growth and water resources and serves as a baseline to educate readers on regional water supplies, demands, and issues. Adams County is growing rapidly. With over 70 water providers, 4,226 water rights, 300 diversion structures, and 14,277 wells, the County's water systems are complex. Systems are managed and administered by many different agencies. County residents and businesses receive water from all over the State. Over the past 40 years water diversions in the County have increased by more than 340%. Additionally, with a larger percentage of the County receiving water from groundwater sources, the County faces water quality and supply issues that are different compared to much of Colorado.

While the County is not a water provider, integrated water and land use planning is a tool the County can deploy to sustainably grow, while creating resilient communities. Building on this baseline report, trend analyses to understand changes over time, as well as exploration of other topics such as water quality, watershed health, and stormwater systems could help the County develop a more comprehensive understanding to inform decision making in the future and better partner with water providers. Specifically, topic areas in which to explore the County's role could include:

- Shaping land use based on future water availability beyond the controls of the Water Providers
- Supporting or helping coordinate programs across providers
- Landscaping and other water efficiency best practices on private and public properties (e.g. education, program development, efficiency opportunities for agriculture),
- Coordinating across providers and communication for water shortages and quality emergencies
- Supporting capital improvement needs and implementation
- Coordinating water supply planning to build resiliency

In addition to these topics, exploration of data gaps that were outside of scope for this project include:

- Establishing a better understanding of self-supplied and ditch water users
- Analyzing how findings relate to land use planning and development regulations
- Completing a comprehensive risk and vulnerability assessment that ranks water-related risks and prioritizes solutions for County implementation (e.g., program design, resource sharing)
- Exploring cost and equity impacts for residents that consider water and wastewater costs
- Incorporating this report's findings and information, with any additional analyses into a water element of the County's comprehensive water master plan

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APPENDIX A. KEY TERMINOLOGY

- **Absolute Water Right:** A water right has been approved in Colorado Water Court. The owner may use it in perpetuity provided they are in accordance with the decree. The only time an absolute water right is cancelled in Water Court is if the water right has not been used for an extended period of time (minimum 10 years), after which the water right may be abandoned (Lytle Water Solutions, LLC, 2023; Kurath, 2015).
- **Absolute Direct Flow Water Right:** A water right that allows a user to take water directly from the surface stream or groundwater for application to beneficial use, typically through a ditch or a pipeline. Water right is limited to a flow rate and/or a maximum annual volume measured in acre-feet (Kurath, 2015; Colorado State University, 2023; Lytle Water Solutions, LLC, 2023).
- **Absolute Direct Flow Storage Right:** A water right that allows a user to impound a specific volume of water for storage and future use measured in acre-feet. Usually, the storage water right is for one fill per year, unless otherwise specified in the water right decree (Colorado State University, 2023) (Kurath, 2015) (Lytle Water Solutions, LLC, 2023).
- **APEX Water Rights:** A water right for alternative point/exchange flow/volumetric transaction. Exchange decrees allow for an upstream diverter to take water that would usually flow to a downstream diverter. The upstream diverter must provide the downstream diverter with a suitable replacement supply of water in amount, time, and quality from another source (Colorado State University , 2023). Exchanges can be approved without an exchange decree, however the benefit to an exchange decree is that if new rights are established the exchange can continue to operate under the decreed exchanger terms without having to mitigate impacts to rights that are more junior (Jones & Cech, 2009).
- **Augmentation Decree:** A water court decree that allows a water user to divert out of priority by replacing water depletions made to the stream that would cause injury to senior water rights users (Water Education Colorado, 2021).
- **Augmentation Plans:** In an over appropriated system, a court-approved augmentation plan is required to get a well permit for withdrawal of tributary (stream-connected) groundwater or to obtain a new surface diversion. Augmentation plans allow for out-of-priority diversions by providing replacement water in terms of time, place, quantity, and quality (Kurath, 2015; Colorado State University, 2023).
- **Beneficial Use:** As defined by the 1969 Water Right Determination and Administration Act - *Beneficial use is the use of that amount of water that is reasonable and appropriate under reasonably efficient practices to accomplish without waste the purpose for which the appropriation is lawfully made (C.R.S. 37-92-101 et seq.).* This definition is purposely flexible to allow for a variety of uses. Common beneficial uses include (Colorado State University , 2023):

Augmentation	Fish and Wildlife Culture	Power Generation
Colorado Water Conservation Board Instream Flows and Natural Lake Levels	Flood Control	Recreation on Reservoirs
Commercial	Industrial	Recreational In-Channel Diversions
Domestic	Irrigation	Release from Storage for Boating and Fishing

Dust Suppression	Mined Land Reclamation	Snowmaking
Evaporation from a Gravel Pit	Municipal	Stock Watering
Fire Protection	Oil and Gas Production	Water Storage

- **Central Colorado Water Conservancy District:** Created to develop, manage and protect water resources for Northeast Colorado, Central Colorado Water Conservancy District has been in operation since September 1965. The district stretches along the South Platte River from Commerce City to Fort Morgan. Policy and goals are established by a 15-member Board of Directors who are appointed by a district judge. Since its beginning, the Board of Director's goal has been to advocate and support the development of water resources within the South Platte River basin (CCWCD, 2023).
- **Colorado Ground Water Commission (CGWC):** Regulatory and adjudicatory body authorized by the General Assembly to manage and control groundwater within the eight Designated Groundwater basins in eastern Colorado. Under Title 37, Article 90 of the Colorado Revised Statues the CGWC has authority to adjudicate water rights and issue large capacity well permits. The CGWC also has authority to create Ground Water Management Districts within predetermined designated groundwater basins. The CGWC has delegated most of its functions to the State Engineer. However it has not delegated determination of designated groundwater basins, creation of management districts, adoption of policy, or approval of variances from rules (Colorado Division of Water Resources, 2023).
- **Conditional Water Right:** A water right appropriation that has started but has not been finalized. The owner has the right to use the water as outlined in the decree but has not actually put the water to beneficial use. To make a conditional water right absolute, water must be put to a beneficial use. Proof of use must be provided to the Colorado Water Court (Kurath, 2015).
- **Designated Groundwater Basin:** Designated Groundwater Basins (Designated Basins) are areas in the eastern plains of Colorado with very little surface water where users rely primarily on groundwater as their source of water supply. Designated groundwater rights are administered separately from water rights outside of the Designated Basins (DWR, 2023).
    - Small capacity wells within the Designated Basins, consisting of those domestic, livestock watering, commercial, monitoring and observation, and firefighting wells that qualify under section C.R.S. 37-90-105 are permitted and administered by the State Engineer (DWR, 2023).
- **Ground Water Management Districts:** Local districts with additional administrative authority that manage water in designated groundwater basins. Ground Water Management Districts are created by the Colorado Ground Water Commission (Colorado State University, 2023).
- **Native flow:** A term used to describe the water that flows down a river.
- **Non-tributary Groundwater:** Water outside of a designated groundwater basin, the pump of which will not materially impact a surface stream in 100 years at a rate greater than 0.1 percent of the annual rate of withdrawal. Non-tributary groundwater is allocated and administered as non-tributary of Denver Basin groundwater (Water Education Colorado, 2021).
- **Tributary Groundwater:** Groundwater that is connected to a natural stream either through surface or underground flows and is recharged from precipitation, including seasonal runoff from snowmelt and irrigation return flows. All groundwater in Colorado is assumed to be tributary unless shown to be non-tributary to a surface stream. Colorado's prior appropriation system regulates tributary groundwater (Water Education Colorado, 2021).

- **Replacement Plan:** Replacement plans are like augmentation plans. Within Designated Ground Water Basins, replacement plans are approved by the Ground Water Commission to protect existing water rights by replacing water that is depleted by any new well activity (Colorado Division of Water Resources, 2020).
- **Return Flow:** Water that returns to surface or groundwater after human use (Texas A&M, 2023)
- **River Basins:** A area of land that drains all the streams and rainfall to a common outlet (Water Science School, 2018).
- **Water Divisions:** The Colorado Division of Water Resources Division Offices are located in the seven major river basins throughout the state. Adams County is in the South Platte River Basin or Division 1.Division Offices employ Water Commissioners to ensure that the water rights priority system is followed, enforcing the decrees and water laws of the State of Colorado. Other Division Office staff manage use and measurement rules to ensure that Colorado remains in compliance with interstate and interbasin agreements. Hydrographers in these offices measure streamflow and reservoir levels and manage the statewide satellite monitoring system. Hydrogeologists analyze well logs and measure well levels to determine aquifer characteristics, while Dam safety engineers verify the safety of Colorado's dams and inspect dam construction projects. (Colorado Division of Water Resources, 2023)
- **Water District:** To help with administration and enforcement, within each Water Division in Colorado are water district. For example, with in the South Platte Water Division there are 15 different water district.

APPENDIX B: WATER PROVIDER SUMMARIES

The **Provider Summaries,** presented here, are one component of the Water Baseline Report. A summary table was created for the 15 largest Public Water Systems in Adams County, as defined by the "population served" in the Colorado Department of Health and Environment (CDPHE) Water System Database. The provider tables aim to help the County, and others, share a baseline understanding of:

- Who provides water in Adams County
- What are the providers' relative sizes and annual water demands
- What are the structures and costs for development fee and water rates
- What are the sources of water supply for the County

To answer these questions, information for each system was collected using publicly available sources including:

- CDPHE Public Water System Database
- Colorado Decision Support System database
- Water Quality/Consumer Confidence Reports
- Water Efficiency Plans
- Water Shortage or Drought Plans
- Water Master Plans or Integrated Water Resource Plans
- Information publicly available on websites (e.g., development fees, rates)

DEFINITIONS AND ASSUMPTIONS

The following definitions and assumptions were used to populate the provider tables.

DEVELOPMENT FEES

When applicable, the following assumptions were made to estimate **development fee costs** for a single-family property:

- If development fees break out a water resource component, the estimate only includes the water resource component
- If there are differences for single-family attached vs. detached, single-family detached is assumed
- If there is an irrigation component based on lot size, a lot of 4,000 square feet is assumed
- If there is a calculation based on tap or meter size, a ¾ inch tap is assumed
- Additional assumptions specific to a provider are included in the individual summary tables

RATES

When applicable, the following assumptions were made to estimate the monthly water costs for a single-family property.

Note that while these assumptions were used to create a baseline, methodologies for calculating rates vary widely by water provider. As a result, it can be difficult to make direct comparisons without looking at specific details and rate structures. When reviewing please keep these details in mind, especially if comparing between providers.

- AWWA's Residential End Uses of Water Version 2 Executive Report estimates the average household indoor daily water use to be 138 gallons per household per day with an average of 2.65 people per household. Assuming there are 31 days in the month this equates to 4,278 gallons per household per month. To create a range, the report assumes a "low water use household" uses 10% below this average (3,850 gallons/month) and a "high water use household" uses 10% above this average (4,705 gallons/month). To calculate estimated monthly water costs these two ranges (3,850 and 4,705 gallons/month) were applied to each water provider's rates. Estimates are rounded. These estimates do not include any irrigation use.
- If the base charge is not included as part of the usage fee, the base charge is listed in the table but not included in the cost estimate.
- Assumptions specific to a provider are included in the individual summary tables.

Definitions used to classify rate structure are from the Environmental Protection Agency and include:

- Flat Fee: All customers charged the same fee regardless of water used
- Unform Rate: Constant per price unit for all metered water consumed
- Increasing Block Rate: Unit price increases with higher water use
- Declining Block Rate: Unit price decreases with higher use
- Seasonal: Unit price changes during different times of the year
- Water Budget Rates: Rate structure based on water budget for the property

PROVIDER SUMMARY TABLE DEFINITIONS

Below is an example of the three tables that summarize information for each of the water providers. All information was gathered from publicly available sources. If there were multiple sources with conflicting information, the most recent source was used. When information could not be found it is marked as "unknown."

Summary Table	
Webpage	Water provider main webpage
Areas Served	Geographic areas for service providers. Because Adams County boundaries do not align with Water District boundaries sometimes areas served will include areas outside of Adams County's boundaries.
Service Population	Service population as defined by CDPHE
Number of Service Connections	Number of service connections as defined by CDPHE
Customer Class Distribution	Percent breakdown of customer class types (e.g., percent residential, percent non-residential)
Average Annual Water Use	Average annual water use in acre-feet. Specific definition varies by provider.
Development Fee Structure	Fee type. See specific assumptions above.

Development Fee Cost Estimate	Fee estimation for single-family detached home. See specific assumptions above.
Rate Structure	Rate structure type as defined by the EPA. See specific assumptions above.
Monthly Cost Estimate	Estimated monthly cost for single-family home. See specific assumptions above.
Major Infrastructure	• Water and wastewater treatment facility names and capacity • Miles of pipe available • Other important infrastructure of significance (e.g., reclaim system)

Water Supply			
Name	**Average Annual Volume from Source (Percent)**	**Average Volume from Source (Acre-Feet/Year)**	**Associated Infrastructure/Notes**
Water Supply Name, will vary by provider and available information	Percent from source in a year.	Total volume from source in a year in acre-feet.	Additional notes on associated reservoirs, groundwater systems, etc.

Plans and Future Conditions	
Build Out Estimates	• Build Out or Planning Horizon Year • Build Out or Planning Horizon Service Population • Build Out or Planning Horizon Estimated Demand • Percent increase from Current 2023 population • Percent increase from Current YEAR water use
Water Shortage Plan or Drought Management Plan	If available, link to plan or water restrictions. If the provider includes a plan, lists out different action levels.
Water Efficiency Plan (WEP)	If available, link to plan and information on the plan's goals.
Planned Infrastructure and Improvements	Future infrastructure of significance (e.g., treatment facility expansion, reservoir acquisition or expansion)

AURORA WATER

Summary Table	
Webpage	https://www.auroragov.org/residents/water
Areas Served	City of Aurora, Unincorporated Adams County **Portion of this provider is also located in Arapahoe and Douglas County.*
2023 Service Population	487,365 (2023) (CDPHE, 2023)
Number of Service Connections	91,912 (2023) (CDPHE, 2023)
Customer Class Distribution	95% Residential, 5% Non-Residential

Annual Water Use	2009 – 2013 Annual Water Demand: 52,200 acre-feet (total includes billed non-potable, billed potable, and non-revenue water) (Aurora Water, 2015)
Development Fee Structure	Water Service Connection Fees: (Aurora Water, 2023) • Single-Family Detached: based on number of bathrooms, outdoor based on square footage • Single-Family Attached: per unit; outdoor based on square footage • Single-Family Detached and Attached Outdoor Use Fees: varies by lot size, developments adopting the new conservation ordinance pay the lower outdoor connection fee • Multi-Family: per unit • Commercial: meter size • Irrigation Only: varies by square foot of landscaped area and non-conserving, water conserving, and z-zone landscape type

Development Fee Cost Estimate	• Cost for Single Family Development at 2023 rates: $12,245 (Aurora Water, 2023)
	  • Calculation only includes water service connection fee
	  • Assumes 1 – 2 bathrooms with 4,000 square feet of irrigated area with the connection fee of $1.508 per square foot

Rate Structure	Increasing Block Rate (Aurora Water, 2023)
Monthly Water Cost Estimate	Average monthly water use cost for single-family home at 2023 rates: $22-$26 • Assumes Residential Tier I • Excludes base charges ($13.51 for a 5/8 or 3/4 inch tap), sewer, and stormwater (Aurora Water, 2023).

Major Infrastructure	• Water Treatment:
	  • Griswold Water Treatment Facility (Coagulation and direct filtration and disinfection process), 80 MGD capacity
	  • Wemlinger Water Treatment Facility (Coagulation and direct filtration and disinfection process), 80 MGD capacity
	  • Binney Water Purification Facility (Softening, Advanced UV oxidation, filtration, granular activated carbon filtration and disinfection process), 50 MGD capacity
	• Wastewater: City of Aurora Sanitary Sewer and Metro Wastewater District
	• Sand Creek Water Reuse Facility, 5 MGD capacity (Aurora Water, 2019)
	• Pipelines (Aurora Water, 2019)
	  • 1,437 miles of potable water pipes
	  • 134 miles of raw water mains
	  • 21 miles reclaimed water distribution pipes
	  • 1,059 miles of wastewater pipes

Water Supply				
Name		**Average Yield, 2009 - 2013 (Percent)**	**Average Yield, 2009 – 2013 (Acre-Feet/Year)** (Aurora Water, 2015)	**Associated Infrastructure/Notes**
Colorado Basin	Homestake	15%	12,900	Located in Upper Eagle County in the Colorado River basin, the Homestake System is a cooperative effort with Colorado Springs that collects water from Homestake Middle Fork, East Fork, Sopris, Missouri, Fancy and French creeks through a series of pipes and tunnels. The Homestake System is jointly owned by Aurora and Colorado Springs utilities (50/50 split). As part of the project Aurora also has a contract that allows Homestake water to be stored in Turquoise Reservoir. The water feeds into Homestake Reservoir and then is taken into the Arkansas River Basin through the Homestake Tunnel and into Turquoise Reservoir. (Aurora Water, 2023)
	Busk-Ivanhoe	3%	2,600	The Busk-Ivanhoe system diverts water from Ivanhoe Creek, a tributary to the Frying Pan River on Colorado's Western Slope. Water flows through the Carlton Tunnel under the Continental Divide to Busk Creek, and then into Turquoise Reservoir. Aurora owns 50% of the Busk-Ivanhoe Water System Authority (BI) water rights, with the other half owned by the Pueblo Board of Water Works (PBWW). The system is jointly operated.
	Twin Lakes Transmountain Diversion	3%	2,220	Aurora owns approximately 5% of the Twin Lakes Company, which owns the Twin Lakes system. The Twin Lakes project diverts water from tributaries of the Roaring Fork River in the Colorado River Basin. Water is delivered to Grizzly Reservoir, the diversion point for the Twin Lakes Tunnel. The system's dam and reservoir is owned and operated by Bureau of Reclamation. (Aurora Water, 2023)
	Columbine Ditch	1%	1,268	Aurora purchased the Columbine Ditch from the Pueblo Board of Water Works in 2010 in partnership with the Climax Mine and then formed the Fremont Pass Ditch Company (FPDC). Aurora owns 2,000 shares or 75% of the Fremont Pass Ditch Company. The Columbine Ditch diverts water from the tributaries to the East Fork Eagle River in the Colorado River Basin. This transmountain system brings water via open ditch into Lake County above Leadville. The Columbine ditch empties into Chalk Creek and then into the East Fork of the Arkansas River. It is then stored by exchange in Twin Lakes or Turquoise Lake in the Arkansas River Basin.
	Long-term Pueblo Lease	6%	5,000	This lease began in 1997 and had a 15-year term, with the option for an additional 10-year extension. This option was exercised in 2012 and extends the lease until the year

				2022. The first 2,500 ac-ft of this 5,000 ac-ft lease delivery is provided out of the 2,500 ac-ft of Homestake yield that Aurora owes the PBWW. The second 2,500 ac-ft is delivered to Aurora in either Twin Lakes or Turquoise Reservoir before the end of each calendar year. Payment for this lease increases with the rate increases of PBWW and the City of Aurora. PBWW has the right to withhold this lease during certain emergency drought situations (e.g., 2002).
Arkansas Basin	Twin Lakes Native	3%	230	Twin Lakes are natural lakes south of Leadville. The Twin Lakes Company also holds water rights in the Arkansas Basin. Dam and Reservoir owned and operated by Bureau of Reclamation. (Aurora Water, 2023)
	Buffalo and Burrows	1.5%	1,277	The Burrows and Buffalo Park water rights are a combination of several ditches and priority dates located near Leadville, Colorado. These agricultural rights derive water from the Arkansas River and have been converted in Water Court so the portion of the water that was historically consumed can be taken for municipal use. The water rights are diverted and stored by exchange in either Twin Lakes or Turquoise Reservoir.
	Hayden and Spurlin Shaw	1%	898	The Hayden and Spurlin-Shaw ranches are located south and southwest of Leadville in Lake County. The joint effort of Lake County and Aurora on the Hayden Ranch and the Spurlin-Shaw Ranch in Case No. 98CW137 changed this irrigation water right to Municipal and Industrial use.
	Colorado Canal	7%	6,200	The Colorado Canal System is comprised of the Colorado Canal Company, the Lake Meredith Company, and the Lake Henry Company. The Colorado Canal diverts water from the Arkansas River near Boone, downstream of Pueblo. The City of Aurora owns approximately 29% of the Colorado Canal system.
	Rocky Ford Ditch and Rocky Ford II	16%	13,360	The Rocky Ford Ditch has an appropriation date of May 15, 1874, making it one of the most senior in the Arkansas River system. Aurora owns 95% of the Rocky Ford Ditch shares. These shares have been purchased and converted to municipal use under two separate cases: Rocky Ford I, also referred to as the Resource Investment Group (RIG) purchase (83CW18, Division 2) and Rocky Ford II (99CW169, Division 2). The Rocky Ford I shares were purchased and adjudicated for municipal use in the mid 1980's while the Rocky Ford II shares were purchased in the late 1990's and adjudicated in 2003. These cases change the use of the water to include municipal uses and allow alternate points-of-diversion at Pueblo Reservoir and other locations. In addition, exchanges from the point-of-diversion to the Upper Arkansas River Basin are adjudicated under separate exchange cases.
South Platte River Basin	Rights Above Spinney	27%	23,639	Located in Park County, south of Fairplay on the Middle Fork of the South Platte River, Spinney Mountain Reservoir is the main storage reservoir for all of Aurora's Colorado and Arkansas River rights, as well as Aurora's western Park County water rights. Aurora owns the reservoir, which was completed in November 1981. Spinney Mountain Dam impounds a maximum of 53,651 acre-feet of water.

	Tarryall Basin Rights	9%	7,565	
	Rights at Strontia	2%	1,429	Strontia Springs Dam is 6.2 miles upstream of the mouth of Waterton Canyon on the South Platte River. Completed in 1983, this dam rises 243 feet above the South Platte streambed. Aurora Water owns approximately 10% of this reservoir which provides 700 AF of storage. Water is brought to the city via a pipeline to Rampart Reservoir for treatment at several different treatment plants based on need.
	Junior Lower SP Rights	3%	2,190	
	Prairie Water Project Pumping at Wellfield	5%	4,176	
	Exchange to Strontia	0.4%	389	
	Groundwater	2%	1,583	

Plans and Future Conditions	

Build Out Estimates	• **Planning Horizon**: 2070 (Aurora Water, Stantec, 2017)
	• **Planning Horizon Annual Demands at WPF Intakes:** (Aurora Water, Stantec, 2017)
	  • Baseline plus scenario: 95,332 acre-feet/year
	  • Fast growth: 115,811 acre-feet/year
	  • Fast and hot scenario: 130,158 acre-feet/year
	  • Hot baseline: 106,972 acre-feet/year
	• **Percent increase from current 2015 water demand:** 101%-174% (Aurora Water, Stantec, 2017)

Water Shortage Plan or Drought Management Plan	Aurora Water Management Plan (Aurora Water, 2017) **Stages:** • **Normal:** 30 months of supply based on current demand. • **Stage I: Severely Dry:** 30 – 25 months of supply based on current demand. Demand reduction goal of 20%. • **Stage II: Exceptionally Dry:** 24 – 13 months of supply based on current demand. Demand reduction goal of 50%. • **Stage III: Emergency Conditions:** 12 months or less of supply based on current demand. Demand reduction goal of 100%.
Water Efficiency Plan (WEP)	2015 Municipal Water Efficiency Plan (Aurora Water, 2015)

Planned Infrastructure and Improvements	• **Goal:** 10% reduction in GPCD from 2014 by 2040 • Challenger, Kirby-Dersham, Walker, Everist, Clare, Arkansas Gravel Pits (Aurora Water, Stantec, 2017) • Other storage developments (Recovery of Yield Storage Development, Mountain Storage Upper South Platte, Terminal Reservoir, Box Creek Reservoir, Pueblo Reservoir Enlargement, Box Creek Reservoir Additional Space, Lower South Platte Storage) (Aurora Water, Stantec, 2017) • New Rampart Supply Pipeline (Aurora Water, Stantec, 2017) • Prairie Waters Project North Campus Expansion to 20, 30, and/or 40 MGD (Aurora Water, Stantec, 2017) • Wemlinger Blended Water Pipeline (Aurora Water, Stantec, 2017) • Denver Basin Groundwater as drought augmentation (Aurora Water, Stantec, 2017) • Expanded Otero Conveyance (Aurora Water, Stantec, 2017)

CITY OF WESTMINSTER

Summary Table	
Webpage	https://www.cityofwestminster.us/water
Areas Served	City of Westminster, portions of unincorporated Jefferson County, portions of unincorporated Adams County, and City of Federal Heights (wholesale)
Service Population	135,069 (2022) (CoW)
Number of Service Connections	33,554 (2022) (CoW)
Customer Class Distribution	• Single Family: 92.9% • Multi-Family: 1.8% • Commercial: 2.6% • Municipal: 0.4% • Potable Irrigation: 1.8% • Reclaimed Irrigation: 0.5% • Wholesale <0.1% CoW, 2022 (City of Westminster, 2020)
Annual Water Use	• 2018-2022 Average Annual Water Use: 18,789 acre-feet CoW, 2022

Development Fee Structure	• Water Resource Fees: (City of Westminster, 2021)
	  • Single Family Detached: number of bathrooms
	  • Single Family Attached: number of bedrooms
	  • Multi-Family: number of bedrooms
	  • Residential Irrigation for SF and private areas: square feet
	  • Non-residential: square footage and business type
	  • Irrigation: Landscape hydrozone and square footage of irrigated area

Development Fee Cost Estimate	• Cost for single family development at 2023 rates: $29,826 o 3 bathrooms or less: Single family detached home with 2,000 square feet of irrigated landscape (City of Westminster, 2021)
Rate Structure	Increasing block rate (City of Westminster, 2023)
Monthly Water Cost Estimate	Average monthly cost for single family home: $14-$17 • Assumes Tier 1 rates (City of Westminster, 2023).

Major Infrastructure	• Water treatment plants: (City of Westminster, n.d.)
	  • Semper Water Treatment Facility (conventional filtration), 44 million gallons per day (MGD) capacity
	  • Northwest Water Treatment Facility (membrane micro-filtration), 15 MGD capacity
	• Wastewater: Big Dry Creek Wastewater Treatment Facility, 7 MGD typical treatment (City of Westminster, 2023)
	• Pipelines:
	  • 554 miles of distribution pipes (City of Westminster, 2023)
	  • 400 miles wastewater pipes (City of Westminster, 2023)
	• 120 reclaimed water sites (City of Westminster, 2023)

Water Supply

Name	**Average Volume/Year (Percent)** (City of Westminster, 2020)	**Average Volume/Year 2019 (Acre-Feet/Year)** (City of Westminster, 2020)	**Notes**
Clear Creek	70%	12,309	• Travels from Clear Creek to Standley Lake via Farmers' High Line Canal and Reservoir Company, Church Ditch Water Authority, and Farmers Reservoir and Irrigation Company (City of Westminster, 2017; City of Westminster, 2020).

			• Westminster owns about 50% of Standley Lake, which can store 13 billion gallons of water (City of Westminster, 2023; City of Westminster, 2020).
Denver Water	15%	2,638	• Colorado River water provided through contract with Denver Water (City of Westminster, 2020).
Reclaimed System	10%	1,758	• Reclaimed wastewater that has been further treated and disinfected to provide supply for landscape irrigation • Currently has 120 reclaimed water sites covering over 1,100 irrigated acres (City of Westminster, 2023; City of Westminster, 2020)
Other	7%	1,231	• South Platte gravel pit water exchanges (City of Westminster, 2020).

Plans and Future Conditions	

Build Out Estimates	• **Build Out Year:** 2040 (City of Westminster, 2020)
	• **Build Out Service Notes:** The City of Westminster is largely built out with only 5 – 10% of the land in the City available to be developed and a similar amount that could be redeveloped (City of Westminster, 2023).
	• **Build Out Water Demand:** Evaluated in Westminster's Water Supply Plan, under expected baseline conditions which assumes development is completed largely in line with the existing Comprehensive Plan map, water conservation trends continue, and Wattenberg Reservoir is completed, there is sufficient water to support the water needs of the community at buildout. Important components of these assumptions include:
	  • **Drought is the greatest threat to the city's water supply.** The City's water supply can vary by as much as 11,100 acre-feet depending on weather and drought management activities.
	  • **Conservation measures by customers are the best way for the City to secure its water supply.** Adding or changing development types can impact how much water the City will need. Moving to a high-conservation, xeric-landscaping future could save the City between 3,690 acre-feet and 4,200 acre-feet depending on land use trends. Moving to a low-conservation future would cost the City between 8,660 acre-feet and 9,343 acre-feet depending on land use trends; Increased demand of this magnitude would result in significant water supply shortfalls.
	  • **Climate change is not a major driver of ultimate water needs.** As the City learns more and climate change models improve, additional study in this area will be needed.

Water Shortage Plan or Drought Management Plan	Drought Management Plan (2019) **Action Levels:** • **Drought Watch:** Abnormally dry conditions. Increase monitoring, public awareness, and preparation for response if conditions worsen.

	• **Stage 1: Mandatory Water Restrictions.** Severely dry conditions. Imposes mandatory watering restrictions and requires effort on the part of the customers. Initiates initial mandatory and additional conservation measures to avoid or reduce shortages and relieve stressed sources. Development of new sources may be necessary. • **Stage 2: Ban on Lawn Watering.** Extremely dry conditions. At Stage 2, the City imposes mandatory watering restrictions. Stage 2 drought restrictions are severe and will likely result in damage to or loss of landscapes. Avoid depletion of water sources, provide minimum water supplies to protect public health and safety, support. • **Stage 3: Rationing. exceptionally dry conditions.** Activates a rationing program for City of Westminster customers. Conditions that would lead to a Stage 3 drought are highly unlikely. Stage 3 will include rationing of indoor water use. Avoid depletion of water sources, provide minimum water supplies to protect public health and safety, support essential and high priority water uses, and to avoid unnecessary economic impacts.
Water Efficiency Plan (WEP)	Water Conservation and Efficiency Plan (2020) **Goals:** • Reduce systemwide water use from 126 gallons per capita per day (GPCD) to 110 GPCD or lower by 2030, a 12.5% reduction over 10 years. • Offer efficiency programs for all customer types by expanding programs to homeowners associations, commercial customers, multifamily units, and irrigation accounts. • Communicate the benefits and importance of water efficiency to all customers through relevant and timely outreach materials.
Planned Infrastructure and Improvements	• Development of a new Water Treatment Facility along Westminster Boulevard (City of Westminster, 2023)

CITY OF THORNTON

Summary Table	
Webpage	https://www.thorntonco.gov/government/infrastructure/water/Pages/default.aspx
Areas Served	Unincorporated Adams County, City of Thornton
Service Population	165,453 (2023) (CDPHE, 2023)
Number of Service Connections	35,596 (2023) (CDPHE, 2023)
Customer Class Distribution	(City of Thornton, 2018) • Residential, single-family: 87% • Multi-Family: 9% • Commercial, Industrial, Institutional: 2% • Irrigation/Sprinkler: 2%

	Note: While breakdown is from the 2018 Water Efficiency Plan, data is from 2015.
Annual Water Use	• 2022 annual water use: 20,299 acre-feet (City of Thornton, 2018)
Development Fee Structure	Water Resource Fees (City of Thornton, 2022) • Domestic Connections: Varies by size and type of domestic connection • Multifamily (Master Meter Connection): Meter size • Irrigation Connections: Meter size • Commercial Connections: Meter size

Development Fee Cost Estimate	• Cost for single family development at 2023 rates: $36,207
	  • Assumes single family (up to 7,000 sq. ft.)
	  • Only includes Water Resource Fee (City of Thornton, 2022)

Rate Structure	Increasing block rate (City of Thornton, 2023)
Monthly Water Cost Estimate	Average monthly water use cost for annual single-family home at 2023 rates: $23-$28 • Assumes Tier 1 Indoor water use for a home that has not exceeded its average Winter Consumption (AWC) (City of Thornton, 2023).

Major Infrastructure	• Water Treatment Facilities:
	  • Wes Brown Water Treatment Plant, 50 MGD capacity
	  • Thornton Water Treatment Plant, 20 MGD capacity
	• Wastewater: Metro Wastewater Reclamation District (City of Thornton, 2023)
	• Emergency situation interconnects with Denver Water and City of Northglenn

Water Supply			
Name	**Percent of Total Storage Capacity**	**Storage Capacity (acre-feet)** (City of Thornton, 2018)	**Notes**
Standley Lake	26.5%	11,832	• Upper Clear Creek Basin system, delivered via Farmers' High Line Canal and Croke Canal. • Delivered to Thornton Water Treatment system via 11-mile pipeline.
West Gravel Lake No. 1	1.1%	503	• Lower Cleer Creek Basin system, delivered from Lower Clear Creek Canal and Colorado Agricultural Canal. • Water stored in Brannan Lakes can be pumped back into Lower Creek Canal and conveyed to West Gravel Lakes for Storage. • West Gravel Lakes is pumped to the Wes Brown Treatment Plant.
West Gravel Lake No. 2	3.9%	1,723	
West Gravel Lake No. 3	1.4%	614	
Brannan West	0.4%	168	
Brannan East	0.8%	340	
South Tani	16.2%	7,241	• South Platte River Basin system, delivered via Burlington Canal. These 5 reservoirs are connected via a series of pipes and water is pumped to the Wes Brown Water Treatment Water Treatment Plant from East Gravel Lake No. 4. • 11 South Platte Alluvial Wells provide water to South Dahlia. • 1 South Platte Alluvial Well provides water to East Gravel No. 4.
East Gravel Lake No. 4	6.3%	2,807	
South Dahlia	4.0%	1,777	
North Dahlia	5.8%	2,568	
East Sprat Platte	3.4%	1,526	
West Cooley	9.6%	4,282	• Supplied by Burlington Canal. Pump station can return water to South Platte River to Operate Exchanges. Water can also be pumped back up to East Gravel No. 4.
Hammer	4.7%	2,116	
Rogers	5.0%	2,212	
Duck Lake	0.8%	378	• South Platte River Basin system, high mountain reservoir on Geneva Creek. Water is released and conveyed down the South Platte River to be recaptured at Burlington Canal.
Wellington	3.9%	1,739	• South Platte River Basin system, high mountain reservoir on Buffalo Creek. Water is released and conveyed down the South Platte River to be recaptured at Burlington Canal.
Cooley East Reservoir	6.3%	2,800	• Former sand and gravel mine that Thornton converted into water storage facility. Stores South Platte Basin River water. Pump station on the southwest corner of the reservoir.

Plans and Future Conditions	
Build Out Estimates	• **Build Out Year:** 2065 (City of Thornton, 2018) • **Build Out Service Population:** 258,830 (City of Thornton, 2018) • **Build Out Estimated Demand:** 51,071 acre-feet (City of Thornton, 2018). This estimate does not include Thornton's raw water demands or adjustments for future water conservation activities. • **Percent increase from Current 2023 population:** 52% • **Percent increase from Current 2015 water use:** 151%
Water Shortage Plan or Drought Management Plan	Drought Management Plan (2023) **Drought Stages** • **Drought Watch:** Projected July 1 storage at 75% to 45% of full capacity or if drought is present in our watersheds. Interdepartmental Drought Team activated and actively monitors Thornton's drought triggers. • **Stage 1: Moderate to Severe:** Projected July 1 storage at 75% to 45% of full capacity. Mandatory irrigation restrictions vary depending on severity of shortage. • **Stage 2: Extreme:** Projected July 1 storage at 50% to 35% of full capacity. Outdoor water use is prohibited, with limitations on uses associated with community vitality. Drought surcharge may be activated. • **Stage 3: Exceptional:** Projected July 1 storage levels are critically low, and shortage is projected to continue. Mirrors Stage 2 with additional limitations on certain uses.
Water Efficiency Plan (WEP)	Water Efficiency Plan (2018) • Goal: Realize 1,071 acre-feet of water saved by 2024

Planned Infrastructure and Improvements	• Water Treatment Plants: (City of Thornton, 2023)
	  • Wes Brown Water Treatment Plant Treatment Process Optimization
	  • Thornton Water Treatment Plant Demolition
	• Thornton Water Project (Larimer County to Thornton)
	• Zadel Pit Acquisition and Improvements: 2,021 acre-feet of raw water storage (City of Thornton, 2023):
	• Gravel Pit Acquisition: Cooley East Reservoir 2,587 acre-foot of raw water storage (City of Thornton, 2023):
	• Advanced Metering Infrastructure (AMI) (City of Thornton, 2023):

SOUTH ADAMS COUNTY WATER AND SANITATION DISTRICT

Summary Table	
Webpage	https://www.sacwsd.org/

Areas Served	Commerce City, Unincorporated Adams County
Service Population	67,210 (2023) (CDPHE, 2023)
Number of Service Connections	21,138 (2023) (CDPHE, 2023)
Customer Class Distribution	• Residential, single family: 88% (SACWSD, 2011) • Multi-family, all other: 12% (SACWSD, 2011)
Annual Water Use	2010 annual water use: 8,517 acre-feet
Development Fee Structure	Type: 19 different tap fee schedules, based on numerous water resource agreements as well as locations on the property within the district (SACWSD).
Development Fee Cost Estimate	Unknown
Rate Structure	Increasing block rate (Residential) (SACWSD, 2023)
Monthly Water Cost Estimate	Average monthly water use cost for annual single-family home at 2023 rates: $21-$26, • Assumes lowest use tier • Excludes service fees, softening fees, sewer fees, and any other fees (SACWSD, 2023)

Major Infrastructure	• Water treatment facilities:
	  • Klein Water Treatment Facility, Capacity Unknown
	  • Ennis Water Softening Facility, Capacity Unknown
	• Non-potable separated irrigation system
	• Wastewater: Williams Monaco Wastewater Treatment Plant (SACWSD)
	• 300 miles of sewer mains (SACWSD)
	• 350 miles of distribution pipes (SACWSD, 2022)

Water Supply				
Name	**Well Count** (SACWSD, 2011)	**Average Volume from Source (Percent)**	**Average Volume from Source (Acre-Feet/Year)** (SACWSD, 2011)	**Associated Infrastructure/Notes**
South Platte River Tributary Alluvial Groundwater Wells (Potable Water)	11	86%	8,274	Augmentation plan to account for withdrawals and returns to the river. The District's shallow wells are first pumped to Klein Water Treatment Facility, then blended with Denver Water before delivery to storage reservoirs (SACWSD, 2022; SACWSD, 2011).
South Platte River Tributary Alluvial Groundwater Wells (Irrigation Water)	34			Non-potable alluvial well system for irrigation. Supplies about 33,000 residents and businesses. The system runs from April 15 to October 15 (SACWSD, 2023; SACWSD, 2011).
Arapahoe Formation Non-tributary wells	3			Arapahoe formation only has a 100-year life. Alternative sources of supply will be needed to account of supply from this source (SACWSD, 2022; SACWSD, 2011).
Denver Water	N/A	13%	1,320	Sourced from both sides of the Continental Divide (South Platte River, Dillon Reservoir, creeks/canals above Fraser River). Water is blended with alluvial well water. (SACWSD, 2022; SACWSD, 2011).

Plans and Future Conditions	
Build Out Estimates	• **Build Out Year:** 2056 (SACWSD, 2011) • **Build Out Service Population**: 54,000 ERUs (1 ERU = 1 Single Family resident with 3.2 people per residence or 0.4 acres of development, 2.5 ERUs = commercial development) (SACWSD, n.d.) • **Build Out Water Demand:** 27,000 acre-feet per year (SACWSD, n.d.) • **Percent increase from 2010 annual water use:** 217%
Water Shortage Plan or Drought Management Plan	No formal plan, however, the District requires a mandatory irrigation schedule of: • Irrigation shall not occur between the hours of 10AM and 6PM. • Residents are allowed three watering days a week. Watering days are based on even/odd last number of street address. More information at: https://www.sacwsd.org/184/Irrigation-system.
Water Efficiency Plan (WEP)	Water Conservation Plan (2011)
Planned Infrastructure and Improvements	Building out large separate non-potable irrigation system

CITY OF BRIGHTON

Summary Table	
Webpage	https://www.brightonco.gov/306/Water
Areas Served	City of Brighton **Portion of this provider is also located in Weld County.*
Service Population	55,201 (2023) (CDPHE, 2023)
Number of Service Connections	12,019 (2023) (CDPHE, 2023)
Customer Class Distribution	• Residential: 59.0% (City of Brighton, 2016) • Commercial: 16.8% (City of Brighton, 2016) • Municipal: 2.8% (City of Brighton, 2016) • Irrigation: 15% (City of Brighton, 2016) • Schools: 0.8% (City of Brighton, 2016) • Other: 0.1% (City of Brighton, 2016)
Annual Water Use	2011 – 2015 Average Retail Water Sold: 4,691 acre-feet (City of Brighton, 2016)
Development Fee Structure	Water Resource Fee (City of Brighton, 2018) • Residential: Tap size, water resource component fees for taps greater than 1'' will be developed based on water demands under specific site review. • Multi-Family: Number of units • Commercial: Tap size, water resource component fees for taps greater than 1'' will be developed based on water demands under specific site review.
Development Fee Estimate	Cost for single family development at 2023 rates: $11,000 (City of Brighton, 2018) • Assumes a 0.75-inch tap • Only includes water resource fee
Rate Structure	• Residential: Increasing block rate • Multi-Family: Increasing block rate • Irrigation: Uniform rate • Commercial: Uniform rate (City of Brighton, 2023)
Monthly Water Cost Estimate	Monthly water use cost for annual single-family home at 2023 rates: $13-$17 • Assumes first 3,000 gallons under first tier. Remainer falls under second tier for Residential and Residential Irrigation category. • Excludes residential monthly fixed charge ($16.06), sewer or storm drainage charge and water treatment plant fee (City of Brighton, 2023).

Major Infrastructure	• Reverse Osmosis Water Treatment Plant, Capacity Unknown (City of Brighton)
	• Greensand Filter Plant, Capacity Unknown (City of Brighton)
	• Wastewater Treated at one of three treatment plants
	  • City of Brighton Wastewater Treatment Plant
	  • Metro Wastewater Reclamation District's Northern Treatment Plant (owned by Metro Wastewater Reclamation District)
	  • Lochbuie Wastewater Treatment Plant (owned by Town of Lochbuie)
	• Pipelines (City of Brighton)
	  • 250 miles of distribution pipes
	  • 170 miles sewer pipe
	• Interconnects (City of Brighton)
	  • City of Westminster

Water Supply

Name	Well Count	Average Volume from Source (Percent)	Average Volume from Source (Acre-Feet/Year)	Associated Infrastructure/Notes
South Platte Tributary Groundwater Wells	12	59%	4,500 (City of Brighton, 2016)	Augmentation plan, augmented with ditch water. Treated at the Reverse Osmosis Water Treatment Plant, generates concentrate that is about 20% of well-water influence (in 2013). This is returned to the river under a separate discharge permit (City of Thornton, 2023).
BeeBe Draw Groundwater Wells		12%	900 (City of Brighton, 2016)	Augmentation plan, augmented with ditch water. Treated at the Greensand Filter Plant, required backwashing makes up about 8% of BeeBe systems. The treated water is sent from the treatment plants to four different water storage tanks that consist of 8.3, 5, 3, and 0.5 million gallons (three ground and one elevated) before entering the distribution system of approximately 212 miles of pipe by pumping or gravity.
Westminster Interconnect		29%	Maximum of 2,240 (City of Thornton, 2023)	The city also has a permanent lease agreement with the City of Westminster for the delivery of up to 2 MGD of treated water from the City of Thornton distribution system (City of Thornton, 2023).
Non-potable irrigation ditch system	Unknown	Unknown	Unknown	Utilizes both surface and groundwater supplies via two ditch systems. The non-potable system can also use unused portions of the City's groundwater rights (City of Brighton, 2016).

Plans and Future Conditions	
Build Out Estimates	Unknown

Water Shortage Plan or Drought Management Plan	• Appendix D of Water Conservation Plan Update
	• Mandatory Water Restriction dates are May 1 – September 30:
	  • No watering between 10 a.m. and 6 p.m.
	  • Watering is limited to 3 days a week. Watering schedule is based on address.
	  • Do not allow water to pool in gutter, street, or property.
	• Sod installation is prohibited May 1 – September 30 for areas in excess of 200 sq. ft.
	• Municipal Code Section 13-4-130(b) details fines for non-compliance.

Water Efficiency Plan (WEP)	2016, Water Conservation Plan Update (City of Brighton, 2016) Water metric/goals: • Continue reducing residential water use by up to 10% for the next seven to ten years (100-120 million gallons from residential). • Reduce per connection peak summertime water use by 15% over the next seven to ten years (30 million gallons from schools and irrigation). • Reduce real and apparent water losses by 25% – 35% over the next seven to ten years (as large as 30 million gallons).
Planned Infrastructure and Improvements	• Water Treatment Plant expansion project

CITY OF NORTHGLENN

Summary Table	
Webpage	https://www.northglenn.org/residents/water/
Areas Served	City of Northglenn **Portion of this provider is also located in Weld County ("Section 36") where the City of Northglenn's Wastewater Treatment Plant is located.*
Service Population	48,927 (2023) (CDPHE, 2023)
Number of Service Connections	10,203 (2023) (CDPHE, 2023)
Customer Class Distribution	• Residential: 93.9% (City of Northglenn, Element Water Consulting, 2020) • Multi-Family: 1.5% (City of Northglenn, Element Water Consulting, 2020) • CII: 3.7% (City of Northglenn, Element Water Consulting, 2020) • Schools: 0.2% (City of Northglenn, Element Water Consulting, 2020) • Municipal: 0.7% (City of Northglenn, Element Water Consulting, 2020)

Annual Water Use	• 2014 – 2018 Average total metered water use: 4,233 acre-feet (City of Northglenn, Element Water Consulting, 2020)
Development Fee Structure	Equivalent residential units for smaller meters, larger based on meter size (City of Northglenn, n.d.)
Development Fee Cost Estimate	Cost for single family development at 2023 rates: Unknown
Rate Structure	• Single Family Residential: Increasing block rate • Non-Residential: Increasing block rate • Irrigation only (outside use only): Uniform • Domestic Only (inside use only): Uniform (City of Northglenn, n.d.)
Monthly Water Cost Estimate	Average monthly water use cost for annual single-family home at 2023 rates: $17-$22, • Assumes single family residential customer rates, Tier 1 for the first 3,000 gallons and Tier 2 for the remainder. • Excludes fixed charge ($15.31 for a ¾ inch tap), sewer charge, stormwater impact fees, or other fees. (City of Northglenn, n.d.)
Major Infrastructure	• Water treatment facility: Northglenn Water Treatment Plant, 14 MGD capacity • Wastewater: Northglenn Wastewater Treatment Plant

Water Supply			
Name	**Average Volume from Source (Percent)**	**Average Volume from Source (Acre-Feet/Year)**	**Associated Infrastructure/Notes**
Berthoud Pass Ditch	Unknown	600 (Ross, 2022)	• Originates at Berthoud Pass ditch in Rocky Mountains in Current Creek Basin. Berthoud Pass ditch is a transmountain diversion from the Colorado River to the South Platte Basin (Dickinson, 2000) • Water right is 600 acre-feet per year, available between May 15 and October 15 • Stored in Standely Lake (City of Northglenn, 2023)
Croke Canal	Unknown	Unknown	• Farmers Reservoir and Irrigation Company system • Stored in Standely Lake (City of Northglenn, 2023)
Church Ditch	Unknown	Unknown	• Starts at Clear Creek and runs through Golden, Arvada, and Westminster • Stored in Standely Lake (City of Northglenn, 2023)

Plans and Future Conditions	

Build Out Estimates	• **Planning Horizon**: 2050
	• **Future Population:** 42,555
	• **Future Water Demands Under Different Planning Scenarios:**
	  • Future population, advanced conservation program with climate change: 4,846 acre-feet/year
	  • Future population, current conservation program, climate adjusted: 5,016 acre-feet/year
	  • Future Population, Current Per-Capita Use: 5,304 acre-feet/ year
	• **Percent increase from Current 2023 population:** 10%
	• **Percent increase from Current 2014 – 2018 average total metered water use:** 14 – 25%
	(City of Northglenn, Element Water Consulting, 2020)

Water Shortage Plan or Drought Management Plan	Drought Mitigation and Response Plan (2021) **Drought Stages** • **Stage 1: Voluntary Restrictions**: Annual reduction goal 0 – 5%; Seasonal Use Reduction Goal: 0 -10% • **Stage 2: Mandatory Restrictions:** Annual reduction goal 23%; Seasonal Use Reduction Goal: 37% • **Stage 3: Turf Irrigation Ban:** Annual reduction goal 47%; Seasonal Use Reduction Goal: 73% • **Stage 4: Emergency Rationing:** Annual reduction goal 60%; Seasonal Use Reduction Goal: 100%

Water Efficiency Plan (WEP)	Water Efficiency Plan (2020) • Support Integrated Water Resource Plan and achieve advanced conservation savings of 457 acre-feet/ year by 2050.
Planned Infrastructure and Improvements	• Water Treatment Solids Handling Improvements – at least 80% of outflow will be recycled back into drinking water treatment process (City of Northglenn, n.d.)

CRESTVIEW WATER AND SANITATION DISTRICT

Summary Table	
Webpage	https://crestviewwater.com/
Areas Served	City of Westminster, Unincorporated Adams County
Service Population	18,000 (2023) (CDPHE, 2023)
Number of Service Connections	4,491 (2023) (CDPHE, 2023)
Customer Class Distribution	93% Residential 7% Non-residential
Average Annual Water Use	2018 – 2022 Average annual water use: 1,744 (based on water sales)
Development Fee Structure	Water Connection Fees (Crestview Water and Sanitation District, 2023) Meter size with SFRE for all customer types
Development Fee Estimate	Cost for single family development at 2023 rates: No development fees. Tap fees for water and sanitary sewer including permit and inspection fees (Crestview Water and Sanitation District, 2023) • Assumes meter size of 5/8'' x 3/4'', 1 SFRE • Only include water connection fee • Does not include Denver Water connection fee
Rate Structure	• Residential: Increasing block rate • Multi-Family: Increasing block rate • Commercial: Uniform rate (Crestview Water and Sanitation District, 2023)
Monthly Water Cost Estimate	Average monthly water use cost for annual single-family home at 2023 rates: $26-32, • Assumes residential water volume charge Tier 1 only. • Excludes all other fees and charges, including the water service charge ($14.24/month). (Crestview Water and Sanitation District, 2023)
Major Infrastructure	• Water treatment plants: Not applicable. Denver Water Master Meter distributor. • Wastewater treated by Metro Water Recovery (average annual treatment of 1,320 acre-feet/year) (Crestview Water and Sanitation District, 2023)

Water Supply			
Name	**Average Volume from Source (Percent)**	**Average Purchased Water (Acre-Feet/Year)**	**Associated Infrastructure/Notes**
Denver Water	100%	1,841 (Crestview Water and Sanitation District, 2023)	Master meter distributor contract with Denver Water. As described by Denver Water: • "A Master Meter distributor owns and is responsible for construction, operations, maintenance, and replacements of its water system. Denver Water delivers water to Crestview through master meters at a 'Wholesale Master Meter' rate. Crestview is responsible for reading the meters of its individual customers and billing according to rate schedules established by Crestview." (Denver Water, 2023)

Plans and Future Conditions	
Build Out Estimates	90% of buildout complete (approximate)
Water Shortage Plan or Drought Management Plan	No formal Water Shortage or Drought Management Plan. However Article VI, Section – E of Rules and Regulations includes "Restrictions on Water Use; Rationing."
Water Efficiency Plan (WEP)	No Water Efficiency Plan, but website does include conservation tips.
Planned Infrastructure and Improvements	15-year water Main replacement schedule. Sewer mains lined each year.

NORTH WASHINGTON STREET WATER SERVICE DISTRICT

Summary Table	
Webpage	https://nwswsd.colorado.gov/
Areas Served	Unincorporated Adams County
Service Population	14,500 (2021) (CDPHE, 2023)
Number of Service Connections	3,637 (2023) (CDPHE, 2023)
Customer Class Distribution	Unknown
Average Annual Water Use	Unknown
Development Fee Structure	System development fees: (NWSWSD, 2023)

	• Single Family Unit or Commercial: Meter Size • Multifamily: Bedroom Units
Development Fee Estimate	• Cost for single family development at 2023 rates: $7,100 (NWSWSD, 2023) o Assumes a ¾ inch meter. o Only includes system development fees, cost estimate does not include Denver Water tap fees.
Rate Structure	Increasing block rate (NWSWSD, 2023)
Monthly Water Cost Estimate	Monthly water use cost for annual single-family home at 2023 rates: $39-$44 • Assumes minimum 4,000 gallon per month charge of $39.42 plus additional rate above minimum for the reminder. • Excludes sewer rates (NWSWSD, 2023)
Major Infrastructure	• Water Treatment Plants: Not applicable, Master meter distributer for Denver Water • Wastewater treated by Metro Wastewater Reclamation District

Water Supply

Name	Average Volume from Source (Percent)	Average Volume from Source (Acre-Feet/Year)	Associated Infrastructure/Notes
Denver Water	100%	Unknown	Master meter distributor contract with Denver Water. As described by Denver Water: • "A Master Meter distributor owns and is responsible for construction, operations, maintenance, and replacements of its water system. Denver Water delivers water to NWSWSD through master meters at a 'Wholesale Master Meter' rate. NWSWSD is responsible for reading the meters of its individual customers and billing according to rate schedules established by NWSWSD." (Denver Water, 2023)

Plans and Future Conditions

Build Out Estimates	Unknown
Water Shortage Plan or Drought Management Plan	No formal plan but has adopted Rules for Outdoor Water Use: (NWSWSD, 2022) • Water rules enforced May 1 to Oct 1st • Water during cooler times of the day - lawn watering is not allowed between 10 a.m. and 6 p.m. • Water no more than three days per week. • Do not allow water to pool in gutters, streets and alleys. • Do not waste water by letting it spray on concrete or asphalt. • Repair leaking sprinkler systems within 10 days. • Do not irrigate while it is raining or during high winds.

	• Use hose nozzle with a shut-off valve when washing your car.
Water Efficiency Plan (WEP)	No
Planned Infrastructure and Improvements	Unknown

CITY OF FEDERAL HEIGHTS

Summary Table	
Webpage	https://www.fedheights.org/utilities
Areas Served	City of Federal Heights
Service Population	11,678 (2021) (CDPHE, 2023)
Number of Service Connections	1,335 (2023) (CDPHE, 2023)
Average Annual Water Use	478.5 million gallons avg. per year (2016-2022)
Customer Class Distribution	88.5% Residential – 10.1% Commercial – 1.4% Government
Development Fee Structure	Water Tap Fees (Federal Heights, 2023) • Single Family Dwelling (includes mobile homes on individually owned lots): Flat fee • Multifamily: Dwelling unit • Mobile Home Parks: Mobile home unit per dwelling unit • Commercial: Tap Size
Development Fee Cost Estimate	Cost for single family development at 2023 rates: $12,959. o Only includes water tap fee. o Does not include any corresponding Westminster tap fees. (Federal Heights, 2023)
Rate Structure	Increasing block rate (City of Federal Heights, 2023)

Monthly Water Cost Estimate	Average monthly water use cost for annual single-family home at 2023 rates: $27-$34, (City of Federal Heights, 2023) • Assumes Residential Tier 1 for the first 4,000 gallons, then Tier 2 for the rest, • Excludes sewer rates and fees.
Major Infrastructure	• Water Treatment Plants: None – City of Westminster purchased water system with 1 City well in operation • Wastewater: Contract with City of Thornton and Metropolitan Wastewater Reclamation District for wastewater services

Water Supply			
Name	**Average Volume from Source (Percent)**	**Average Volume from Source (Acre-Feet/Year)**	**Associated Infrastructure/Notes**
City of Westminster	98%	(City of Westminster, 2020) 1,432.2 avg.	• 2007 City of Westminster water contract (Federal Heights, 2023). Water is provided via three wholesale water accounts from the City of Westminster (City of Westminster, 2020). • Between 2020 and 2023 percent delivered water varied between 99 – 97% (Federal Heights, 2023). Between 2020 and 2023 percent delivered water varied between 99 – 97% (Federal Heights, 2023).
Arapahoe Aquifer Well	2%	36.4 avg.	• 800-foot deep well, located within the city limits of Federal Heights. • Between 2020 and 2023 percent delivered water varied between 3-1%. In 2020, the well was offline for most of the year for repairs (Federal Heights, 2023).

Plans and Future Conditions	
Build Out Estimates	More than 95% built out
Water Shortage Plan or Drought Management Plan	No known plan Per City of Westminster as needed (98% Purchased water system)
Water Efficiency Plan (WEP)	No known plan
Planned Infrastructure and Improvements	General water main replacements as needed due to age, Sewer main lining project completed – 1 pending sewer bypass line install 1,200 feet in 2023

TODD CREEK VILLAGE METRO DISTRICT

Summary Table	
Webpage	https://toddcreekvillage.org/

Areas Served	City of Brighton, Unincorporated Adams County, City of Thornton **Portion of this provider is also located in Weld County.*
Service Population	5,828 (2021) (CDPHE, 2023)
Number of Service Connections	2,301 (2023) (CDPHE, 2023)
Customer Class Distribution	Unknown
Average Annual Water Use	Unknown
Development Fee Structure	Tap Fees (includes Water Connection and Infrastructure, Water Resource Fee, and Capital Construction Reverse Fee): (Todd Creek Village Metropolitan District, 2023) o Residential: Meter size and lot size o Accessory Dwelling Unit: Flat fee o Commercial: Meter size or based on use
Development Fee Cost Estimate	Cost for single-family development at 2023 rates: $35,000 (Todd Creek Village Metropolitan District, 2023) • Assumes a 0.75'' tap for a 10,000 square foot lot or smaller
Rate Structure	Increasing block rate (Todd Creek Village Metropolitan District, 2023)
Monthly Cost Estimate	Monthly water use cost for annual single-family home at 2023 rates: $25-$31 • Assumes potable water usage fee for a lot up to 10,000 square feet • Estimate is not based on the conservation fee schedule • Does not include base charge ($57.75), or other rates/fees (Todd Creek Village Metropolitan District, 2023).
Major Infrastructure	• Water Treatment: Reverse Osmosis Water Treatment Plant • Wastewater Provider: Unknown • Separate Raw Water Irrigation System

Water Supply

Name	Average Volume from Source (Percent)	Average Volume from Source (Acre-Feet/Year)	Associated Infrastructure/Notes
Alluvial Wells Near the South Platte River	Unknown	Unknown	Unknown

Plans and Future Conditions

Build Out Estimates	• **Build Out Year:** Unknown • **Build Out Service Population:** 12,900 total units (Tood Creek Village Metropoloitan District, 2023) • **Build Out Water Estimated Water Availability:** 11,000 acre-feet per year (Concerning The Application For Water Rights Of: Todd Creek Village Metropolitan Distirct In Jefferson, Adams, and Weld Counties, 2017)

	• **Percent increase from Current 2023 population:** 121%
Water Shortage Plan or Drought Management Plan	No known plan.
Water Efficiency Plan (WEP)	No known plan.
Planned Infrastructure and Improvements	Unknown

SOUTH TOWN OF BENNETT

Summary Table	
Webpage	https://townofbennett.colorado.gov/utility-billing-division
Areas Served	Town of Bennett **Portion of this provider is also located in Arapahoe County.*
Service Population	3,100 (2023) (CDPHE, 2023)
Number of Service Connections	867 (2023) (CDPHE, 2023)
Customer Class Distribution	Unknown
Annual Water Use	Unknown
Development Fee Structure	Water Development Fee (Town of Bennett, 2023) • $24,896/Single Family Equivalent (SFE)
Development Fee Cost Estimate	Cost for single-family development at 2023 rates: $24,896 (Town of Bennett, 2023) • Assumes 1 SFE • Only includes Water Development Fee
Rate Structure	Increasing block rate (Town of Bennett, 2023)
Monthly Cost Estimate	Monthly water use cost for annual single-family home at 2023 rates: $34-$38 • Assumes base charge ($34.46) for the first 4,000 gallons, and applies second tier for the reminder • Excludes sewer rates (Town of Bennett, 2023).
Major Infrastructure	• Water Treatment Plant: Not applicable; quality of current groundwater sources only require chlorination (Town of Bennett, 2019). • Wastewater Provider: Water Resource Recovery Facility, 0.4 MGD capacity (AQUA Engineering, 2023). Treated effluent permitted by CDPHE to be used for irrigation and construction needs (Town of Bennett, 2019).

Water Supply				
Name	**Number of Wells**	**Average Volume from Source (Percent)**	**Average Volume from Source (Acre-Feet/Year)**	**Associated Infrastructure/Notes**
Denver Aquifer	11	Unknown	2,989	North Water System: Serves Town north of I-70 • 7 wells (Well #s: 3, 4, 5, 6D, 6UA, 7, and 8) • 3 booster pumping stations • 4 storage tanks (3.7 acre-feet of storage) South Water System: Serves Antelope Hills development • 4 wells (Well #s: 9, 10, 11, and 13) • 1 booster pump station • 1 storage tank (1.1 acre-feet of storage) (Town of Bennett, 2019)
Upper Arapahoe Aquifer				
Lower Arapahoe Aquifer				
Laramie-Fox Hills Aquifer				

Plans and Future Conditions	
Build Out Estimates	Unknown
Water Shortage Plan or Drought Management Plan	No known plan, but the Town of Bennett has adopted the following water restrictions: • Watering is not allowed between the hours of 10:00 a.m. and 6:00 p.m. Hand watering will be permitted during these hours. • Residents who lay new seed or sod may apply for a special permit with the Town Clerk for exemption from these watering restrictions. • Any person who is found to have violated these limitations may be subject to a fine.
Water Efficiency Plan (WEP)	No known plan
Planned Infrastructure and Improvements	• Currently in negotiations for a renewable water resource that will result in a three-part water portfolio of groundwater, renewable water, and recycled water (Town of Bennett, 2023).

NORTH PECOS WATER SERVICE DISTRICT

Summary Table	
Webpage	https://northpecoswater.org/district-information/
Areas Served	Unincorporated Adams County
Service Population	2,500 (2021) (CDPHE, 2023)
Number of Service Connections	402 (2023) (CDPHE, 2023)

Customer Class Distribution	Unknown
Annual Water Use	Unknown
Development Fee Structure	Water System Development Charge (North Pecos Water Service District, 2023) • Based on tap size for ¾ to 4-inch meters • Meters larger than 6 inches the charge is established by the Board of Directors
Development Fee Cost Estimate	Cost for Single Family Development at 2023 rates: $6,000 (North Pecos Water Service District, 2023) • Assumes ¾ inch meter • Only includes the Water System Development Charge
Rate Structure	Base Charge by meter size, water use is on an increasing block rate (North Pecos Water Service District, 2023)
Monthly Water Cost Estimate	Monthly water use cost for annual single-family home at 2023 rates: $19-$23 • Assumes Tier 1 of monthly water use charges for those within district boundaries • Excludes all other fees or rates, including the base charge ($25 per a ¾ inch tap) (North Pecos Water Service District, 2023).
Major Infrastructure	Unknown

Water Supply

Name	Average Volume from Source (Percent)	Average Volume from Source (Acre-Feet/Year)	Associated Infrastructure/Notes
Denver Water	100%	Unknown	Master Meter distributor contract with Denver Water. As described by Denver Water: • "A Master Meter distributor owns and is responsible for construction, operations, maintenance, and replacements of its water system. Denver Water delivers water to North Pecos Water Service District through master meters at a 'Wholesale Master Meter' rate. North Pecos Water Service District is responsible for reading the meters of its individual customers and billing according to rate schedules established by North Pecos Water Service District." (Denver Water, 2023)

Plans and Future Conditions

Build Out Estimates	Unknown
Water Shortage Plan or Drought Management Plan	No known plan, but website links to Denver Water's Rules for outdoor water use (North Pecos Water Service District , 2023).
Water Efficiency Plan (WEP)	No known plan.

Planned Infrastructure and Improvements	Unknown

WIKIUP MOBILE HOME PARK

Summary Table	
Webpage	https://www.bayshorehomesales.com/communities/Wikiup
Areas Served	Henderson (unincorporated Adams County)
Service Population	2,500 (2023) (CDPHE, 2023)
Number of Service Connections	339 (2023) (CDPHE, 2023)
Customer Class Distribution	Unknown
Average Annual Water Use	Unknown
Development Fee Structure	Not applicable
Development Fee Cost Estimate	Not applicable
Rate Structure	Unknown
Monthly Cost Estimate	Unknown
Major Infrastructure	Unknown

Water Supply				
Name	**Number of Wells**	**Average Volume from Source (Percent)**	**Average Volume from Source (Acre-Feet/Year)**	**Associated Infrastructure/Notes**
Arapahoe Aquifer	2	100%	120	Two wells associated with Wikiup Mobile Home Park: • Well # 1: Main well • Well # 2: Peak well (Wikiup Mobile Home Park, 2022) Well permit number is 11096-F and outlines an estimated average annual use to be 120 acre-feet/year (Well Permit Information).

Plans and Future Conditions	
Build Out Estimates	Unknown
Water Shortage Plan or Drought Management Plan	No known plan.
Water Efficiency Plan (WEP)	No known plan.
Planned Infrastructure and Improvements	Unknown

STRASBURG WATER SERVICE DISTRICT

Summary Table	
Webpage	http://www.strasburgwater.com/
Areas Served	Strasburg **Portion of this provider is also located in Arapahoe County.*
Service Population	2,050 (2023) (CDPHE, 2023)
Number of Service Connections	330 (2023) (CDPHE, 2023)
Customer Class Distribution	Unknown
Annual Water Use	Unknown
Development Fee Structure	Water System Development Fees • Single Family Detached Residence with ¾'' Service Line: $3,100 • ¾ to 3 Inch Taps: Equivalent residential units

	• Larger than 4’”” Determined by the District
Development Fee Cost Estimate	Cost for single family development at 2023 rates: $3,100 (Strasburg Sanitation and Water District, 2018) • Assumes a ¾ inch tap • Only includes Water System Development Fee
Rate Structure	Uniform Rate
Monthly Water Cost Estimate	Average monthly water use cost for annual single-family home at 2023 rates: $7-$8 • Does not include base rate ($8/EQR/mo), sewer charges or other rates and fees (Strasburg Sanitation and Water District, 2018).
Major Infrastructure	• Water Treatment: Unknown • Wastewater Provider: Eastern Adams County Metropolitan District

Water Supply

Name	Count of Groundwater Wells	Average Volume from Source (Percent)	Average Volume from Source (Acre-Feet/Year)	Associated Infrastructure/Notes
Groundwater Wells	6	100%	Unknown	• Well #1 at the office is a shallow well at 128 feet. • Well #2 at the office is 560 feet. • Well #3 at Aspen St. is 565 feet. • Well #4 at Monroe St. is 622 feet. • Well #5 and Well #6 are south of town; shallow wells at about 60 feet. (Strasburg Sanitation and Water District, 2023)

Plans and Future Conditions

Build Out Estimates	Unknown
Water Shortage Plan or Drought Management Plan	No known plan.
Water Efficiency Plan (WEP)	No known plan, but the district does link to Water Conservation Tips.
Planned Infrastructure and Improvements	Unknown

KIMBERLY HILLS MOBILE HOME PARK

Summary Table

Webpage	https://www.fedheights.org/index.asp?SEC=83A2459C-6C14-45E1-8231-55471519788BandDE=0A5D1AD9-1F10-4FA7-8E6F-7599AF864812
Areas Served	City of Federal Heights
Service Population	2,005 (2023) (CDPHE, 2023)
Number of Service Connections	687 (2023) (CDPHE, 2023)
Customer Class Distribution	Unknown
Average Annual Water Use	Unknown
Development Fee Structure	Not applicable
Development Fee Cost Estimate	Not applicable
Rate Structure	Unknown
Monthly Cost Estimate	Unknown
Major Infrastructure	Unknown

Water Supply

Name	Average Volume from Source (Percent)	Average Volume from Source (Acre-Feet/Year)	Associated Infrastructure/Notes
City of Federal Heights	100%	Unknown	Purchased water from City of Federal Heights. (Kimberly Hill MHP, 2022)

Plans and Future Conditions

Build Out Estimates	Unknown
Water Shortage Plan or Drought Management Plan	No known plan.
Water Efficiency Plan (WEP)	No known plan.
Planned Infrastructure and Improvements	Unknown

PINES LAKE RANCH

Summary Table

Webpage	https://www.bayshorehomesales.com/communities/PineLakesRanch
Areas Served	Thornton
Service Population	1,965 (2023) (CDPHE, 2023)
Number of Service Connections	726 (2023) (CDPHE, 2023)

Customer Class Distribution	Unknown
Average Annual Water Use	Unknown
Development Fee Structure	Not applicable
Development Fee Cost Estimate	Not applicable
Rate Structure	Unknown
Monthly Cost Estimate	Unknown
Major Infrastructure	Unknown

Water Supply			
Name	**Average Volume from Source (Percent)**	**Average Volume from Source (Acre-Feet/Year)**	**Associated Infrastructure/Notes**
City of Thornton	100%	Unknown	Purchased water from City of Federal Heights. (Pines Lake Ranch, 2022)

Plans and Future Conditions	
Build Out Estimates	Unknown
Water Shortage Plan or Drought Management Plan	No known plan.
Water Efficiency Plan (WEP)	No known plan.
Planned Infrastructure and Improvements	Unknown

DENVER WATER

Information in this section is copied from Denver Water's Distributors webpage.

Denver Water provides water service through contractual relationships with distributors. There are three main kinds of contracts: Total Service, Read and Bill, Master Meter. Within Adams County there are seven distributors that fall into one of these three categories (Denver Water, 2023).

TOTAL SERVICE

Under Total Service contracts, Denver Water owns the water system and is responsible for its operation, maintenance, and replacement. Denver Water reads each individual customer's meter and bills each individual customer at the established "Total Service" rate. In Total Service Areas, water service is provided to the customers in the same manner as that provided to customers inside Denver (Denver Water, 2023). Adams County's Total Service distributor includes:

- Berkeley Water and Sanitation District (TS176)

READ AND BILL

Under Read and Bill contracts, the distributor owns and is responsible for construction, operation, maintenance, and replacement of its water system into which Denver Water delivers water. Denver Water reads the meter of each individual customer and bills each individual customer at the established “Read and Bill” rate (Denver Water, 2023). Adams County’s Read and Bill distributors include:

- North Lincoln Water and Sanitation District (RB063)
- Phillips Petroleum Company (RB075)

MASTER METER

A Master Meter distributor owns and is responsible for construction, operation, maintenance, and replacement of its water system. Denver Water delivers water to the distributor through one or more master meters and bills the distributor at the established “Wholesale (Master Meter)” rate. The Distributor, not Denver Water, is responsible for reading the meters of its individual customers and for billing its individual customers according to rate schedules established by the Distributor (Denver Water, 2023). Adams County’s Master Meter distributors include:

- Crestview Water Service District (MM236)
- North Washington Street Water Service District (MM192)
- North Pecos Water and Sanitation District (MM210)
- South Adams County Water and Sanitation District (MM184)

APPENDIX C: WATER PROVIDER SESSION SUMMARIES

To review data and gather feedback, two water provider sessions were held in the spring and summer of 2023. Attendees are summarized in Table 15. Excluding The Brendle Group and Adams County staff, the sessions 12 different organizations participated in the sessions, including all but two of the County's top ten largest water providers by service population.

Table 15. Water provider summary attendees.

Name	Organization
Nick Eagleson	Adams County
David DeBoskey	Adams County
J. Byron Fanning	Adams County
Lia Campbell	Adams County
Katie Keefe	Adams County
Aaron Clark	Adams County
Steve Heger	Hyland Hills Parks and Recreation District
Loretta Daniel	Arapahoe County
John Murphy	Aurora Water
Alex Davis	Aurora Water
Sarah Young	Aurora Water
Shelby Sommer	Brendle Group
Abbye Neel	Brendle Group
Zak Siegel	Brendle Group
Marc Johns	City of Brighton
Scott Olsen	City of Brighton
John Orr	City of Thornton
Paul Tedesco	City of Thornton
Josh Nims	City of Westminster
Mitch Terry Crestview Water	Crestview Water and Sanitation District
Clarice O'Hanlon	Crestview Water and Sanitation District
Julie Bowers	Denver Water
Greg Johnson	Denver Water
Austin Krcmarik	Denver Water
Gina Burke	Jehn Water Consultants
Mike DeMattee	North Washington Street Water and Sanitation District
Tricia Williams	South Adams County Water and Sanitation District
Don Summers	Todd Creek Village Metropolitan District

Notes and poll questions from the sessions are summarized below.

What information would be helpful to see from the County?

- Population projects to your horizon year
- Long term capital projects that may require coordination of utility relocations

- Be a regional leader on climate change adaptation/mitigation
- Not sure yet
- I don't know yet
- Where everyone is on water efficiency programs
- I don't know yet
- Request from water providers if they are able to supply water and sanitary services to developments of size larger than 100 SFREs before making decisions to allow these
- I am not sure yet
- I find this to be a difficult question to answer since most of the large water providers are doing their bit and don't need to rely on the County as a water provider or the County to help
- More coordination between water suppliers
- You mention water provider perspectives; what other perspectives are you looking at in this process? What sort of "control" is the County looking for?
- Not sure what the County is proposing here
- Iterative process that continues to make water fixture and appliance standards more stringent. Comprehensive landscape codes that require efficient irrigation and water wise plants
- Connect stakeholders who may not otherwise be engaged with each other
- I'm not sure
- Nothing that interferes with currents practices

Which questions are you most interested in? (Select all that apply)

Question	Count
How is Adams County growing?	5
What are the components of the Adams County's water supply?	8
What are the water supply risks and vulnerabilities in Adams County?	12
How can Adams County help?	10

Do you serve any parts of unincorporated Adams County?

	Count
Yes	8
No	1
I am not sure.	4

Does any of your supply originate from a basin outside the South Platte?

	Count
No	8
Colorado	7
Arkansas	3

Does your organization rely on groundwater?

	Count
No	8
I am not sure.	1
Yes: 0 -20%	4
Yes: 21 – 40%	0
Yes: 41 – 60%	1

Yes: 61 – 80%	1
Yes: 81 – 100%	1

Do you have any of these water policies in place?

- Water harvesting
- Artificial turf
- Development type (cluster/density/reduced lot size)
- Submetering multifamily or commercial units
- Water reuse
- Urban growth boundary
- Turf limits
- Smart meters
- Infill zoning
- Development type – transit-oriented
- Soil quality requirements
- Irrigation system efficiency requirements
- Development type – mixed use
- Indoor fixture efficiency standards for new development or green plumbing codes
- Water efficiency standards for new development
- Conservation oriented rates and fees
- Xeriscape requirements
- Water conservation goals and objectives

	Count
Yes, we have many of these.	7
Yes, we have a few.	1
No, we don't have these policies but they are under discussion.	1
No, we don't have these policies.	1

Examples:

- Prairie Waters is a great example of reuse and Aurora's new Turf Ordinance is also a great new policy.
- Aurora water has a Larger Water Users Guide, which provides guidelines about water use and new development in their service area.

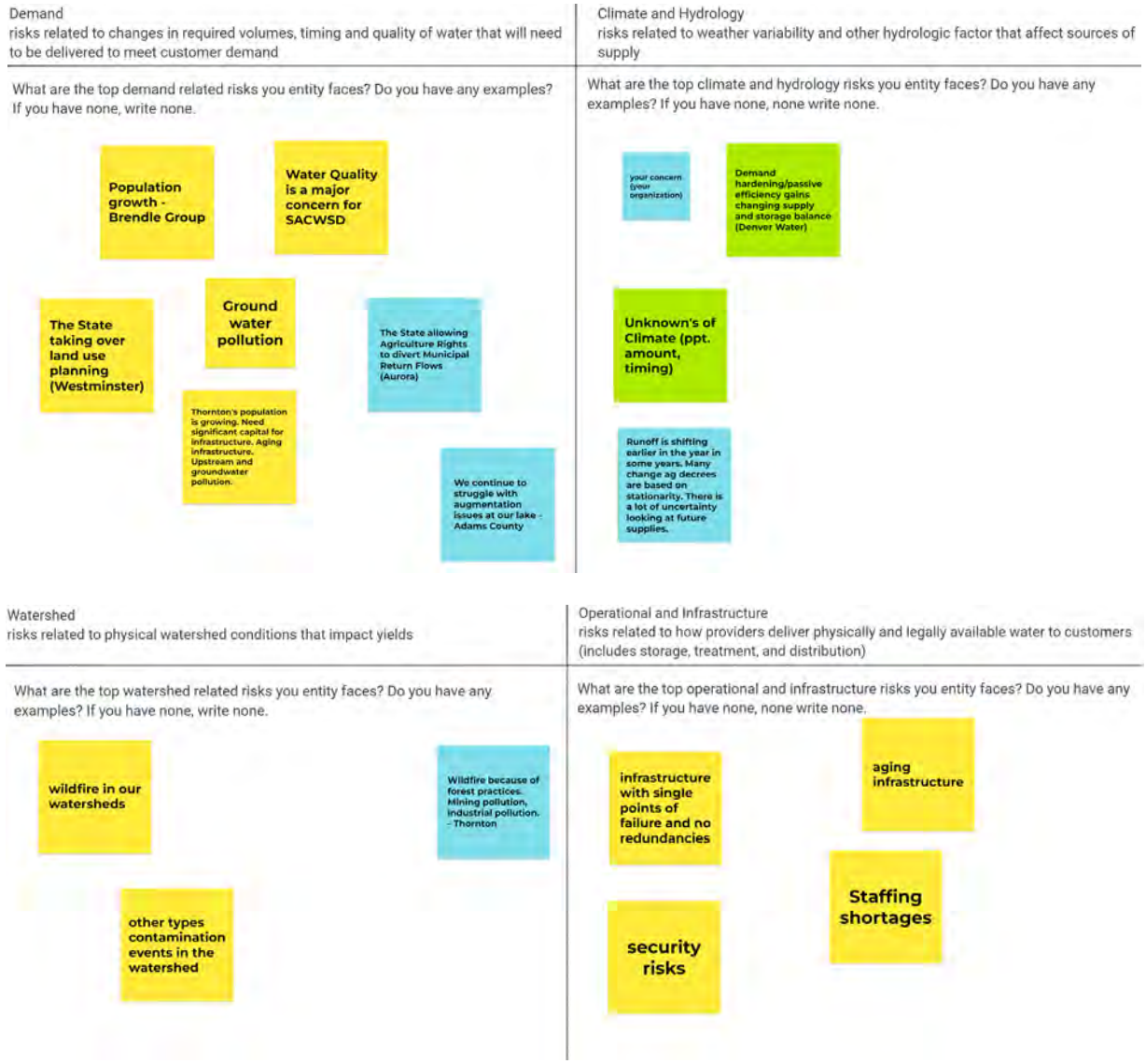
Risks and Vulnerabilities Discussion

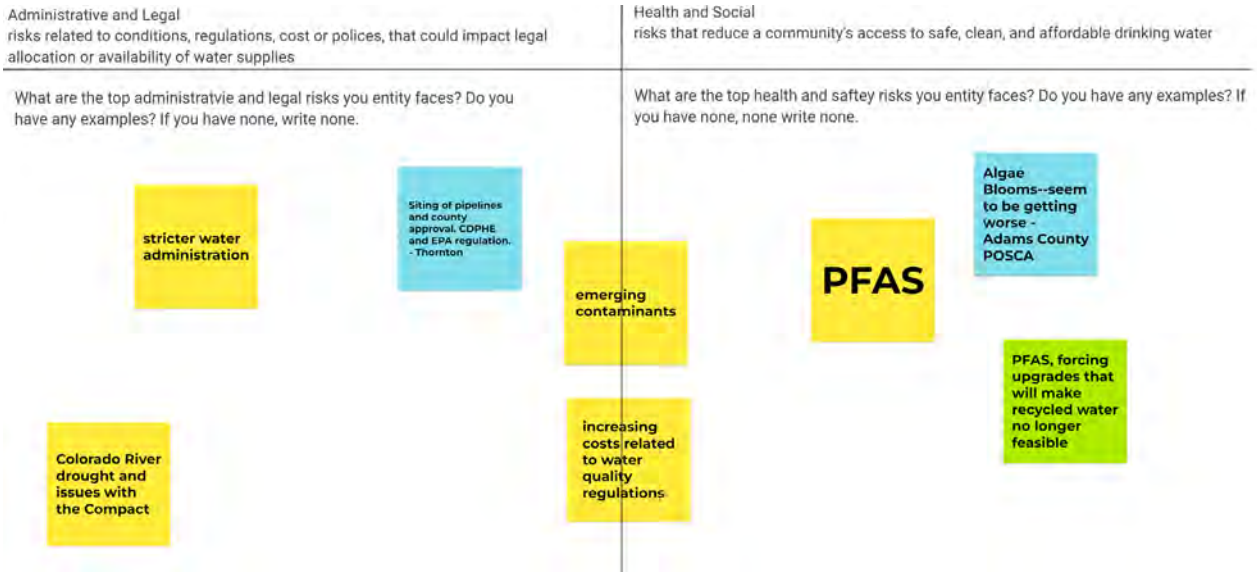
To evaluate risks and vulnerabilities participants completed a JamBoard exercise where water providers were asked to provide examples of risks and vulnerabilities for their organization that fell into one or more of the following categories:

Risk and Vulnerability	Definition
Demand	Risks related to changes in required volumes, timing and quality of water that will need to be delivered to meet customer demand
Climate and Hydrology	Risks related to weather variability and other hydrologic factors that affect sources of supply
Watershed	Risks related to physical watershed conditions that impact yields
Operational and Infrastructure	Risks related to how providers deliver physically and legally available water to customers (includes storage, treatment, and distribution)

Administrative and Legal	Risks related to conditions, regulations, cost or polices, that could impact legal allocation or availability of water supplies
Health and Social	Risks that reduce a community's access to safe, clean, and affordable drinking water

Images from the JamBoards and a bulleted summary of the accompanying discussion are outlined below:





- Demand climate and hydrology
    - The potential to go beyond what our water supply is currently projected to supply.
    - High cost related to infrastructure that we don't currently have funding for.
    - Denver water – just went through a water efficiency value stream. Continue seeing demands harden over time since customers are doing great job with efficiency. Service area is constrained by other municipalities and governments. Chance future supply and needs for storage will change because of that.
    - How are organizations tackling these unknowns on supply systems, or is this a gap?
- Watershed, operational and infrastructure
    - Wildfires
    - Individual users
    - Single points of failure
- Administrative and legal, health and social
    - PFAS, other emerging contaminants echoed by multiple participants
- Other ideas
    - Land use control advocacy