

HEADWATERS COUNTIES:

A Water Economy

2026 Update



WATER QUALITY / QUANTITY COMMITTEE

PREPARED FOR



NWCCOG.org | 970.468.0295
P.O. Box 2308 | Silverthorne, CO 80498

PREPARED BY



HARVEY ECONOMICS

HarveyEconomics.com | 720.889.2755 469
South Cherry Street, Suite 100
Denver, Colorado 80246

FUNDED BY

Report made possible by generous contributions from:



Table of Contents

1. Introduction & Study Perspective	1-12	4. Ground Level View of Water & the Economy	43-55
Letter from the Board.....	5	Interview Plan.....	44
Background and Study Purpose.....	6	Essential Attributes Affecting Economic Activity.....	45
The 2012 Report.....	8	Water Quality.....	46
Key New Influences Driving the Economic–Water Relationship.....	9	Timing of Water Availability.....	48
Overview of HE Report Outline.....	10	Water Location.....	49
Caveats and Limitations.....	12	Water Quality and Watershed Health.....	53
2. Hydrology Issues and Changes Since 2012	13-24	Temperature.....	51
Overview.....	14	Summary of the Headwaters Counties Interviews.....	55
Transmountain Water Diversions.....	15	5. Summary & Conclusions	56-59
Shoshone Hydroelectric Power Plant Operations.....	17	Water in the Headwaters Counties.....	57
Risks from Compromised Conditions.....	18	Headwaters Counties’ Economy and Water.....	58
Risks Imposed by Additional Transmountain Diversions.....	21	Economic Benefits of the Shoshone Water Rights.....	60
Recent Efforts to Address Compromised Conditions.....	23	Ground Level View.....	60
3. Economy of the Headwaters Counties	25-42	Conclusions.....	61
Recent Economic Activity and Growth in the Headwaters Counties.....	26	Appendix A:	62-64
Headwaters Counties’ Economies and the State Economy.....	29	List of Stakeholder Interviews	
Recreation and Tourism.....	30	Appendix B:	65-66
Agriculture.....	35	Interview Discussion Guide Example	
Extractive Industries.....	38	Appendix C:	67-85
Hydropower Generation and Shoshone Water Rights.....	39	Hydrology Overviews for the Headwaters Counties	
Public Water Supply and Real Estate Development.....	40	Eagle County.....	68
Summary of Headwaters Counties’ Economy.....	42	Grand County.....	70
		Gunnison County.....	74
		Pitkin County.....	77
		Routt County.....	79
		Summit County.....	82
		Appendix D:	86-91
		Selected Economic Information About the Headwaters Counties	
		Appendix E:	92-95
		Colorado Water Plan Future Planning Scenarios	
		Endnotes	96-101

1

Introduction & Study Perspective



Letter from the Board

The Headwaters Counties (Eagle, Grand, Gunnison, Pitkin, Routt, and Summit) are proud to be home to many of Colorado's premier recreational opportunities, rich agricultural lands, and thriving communities that benefit both residents and visitors. However, dwindling snowpack and rising temperatures continue to threaten our region's recreation economy as well as Colorado's long-term water security. These challenges extend beyond local residents, impacting the entire state and the 40 million people who rely on the Colorado River for water.

The Headwaters Counties are home to 16 diversion projects that remove water from the Colorado River and its tributaries to supply Colorado's eastern slope. In some cases, as much as 80% of a river's flow is diverted from its basin. Additionally, these headwaters play a critical role in helping Colorado meet its legal water obligations to downstream users in other states.

In 2012, The Northwest Colorado Council of Governments Water Quality/Quantity Committee (QQ) commissioned the first report on economic activity in the Headwaters Counties to counter a rising narrative that water was more valuable when diverted to Colorado's Front Range. This update was commissioned in 2025 to further highlight and elevate the strong economic value of water in the Headwaters Counties serving local communities and all Coloradans.

This report update emphasizes the value in water availability of the right quantity, quality, time, and place in the Colorado River headwaters and illustrates economic growth generated in the Headwaters Counties since 2012. Importantly, risk to water availability has grown exponentially since 2012, as we are faced with increasing demands and dwindling supplies.

It is our hope this report update demonstrates the hydrologic and economic realities to all who are served by water from the Headwaters Counties. Additionally, by elevating the collaborative initiatives undertaken to address the challenges facing a water-dependent economy, we hope to inspire action in all who rely on our most precious resource. We humbly ask you to join us in our efforts.



Nina Waters

Summit County Commissioner and QQ's Chair



Background & Study Purpose

This study is an update to a 2012 Report that explores the relationship between water and economic activity in a portion of western Colorado where the interaction of precipitation, elevation, and location produces water for the Headwaters Region, much of Colorado, and the Western United States. The Headwaters Region encompasses the headwaters of the Colorado River and its tributaries. The Headwaters Counties consist of Eagle, Grand, Gunnison, Pitkin, Routt, and Summit County, depicted in Figure 1-1, on the next page. The water in the Headwaters Counties plays a special, dual role in meeting the needs of residents, businesses, and visitors while at the same time, meeting legal obligations for providing water to 40 million people in Colorado and the western U.S.

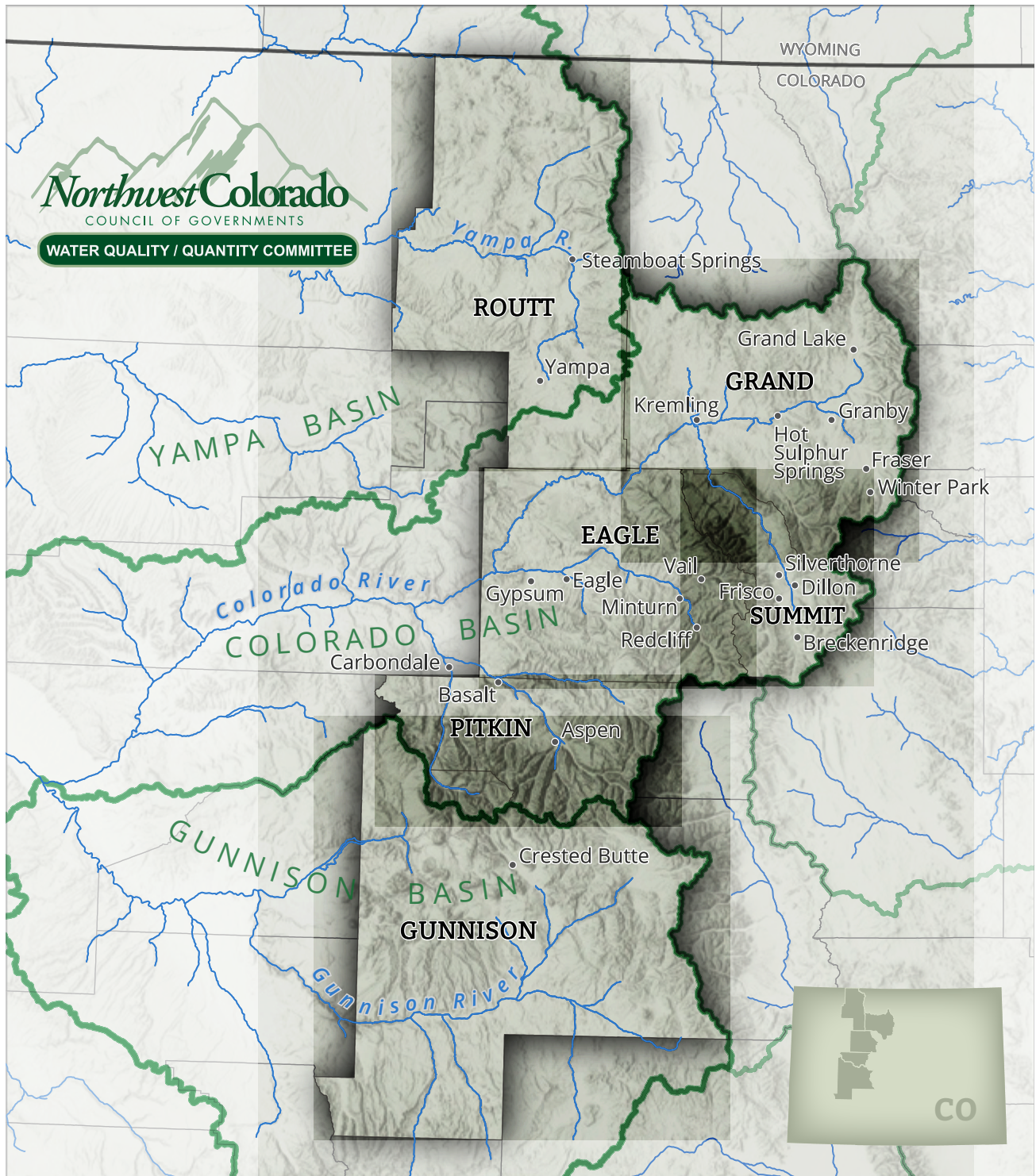


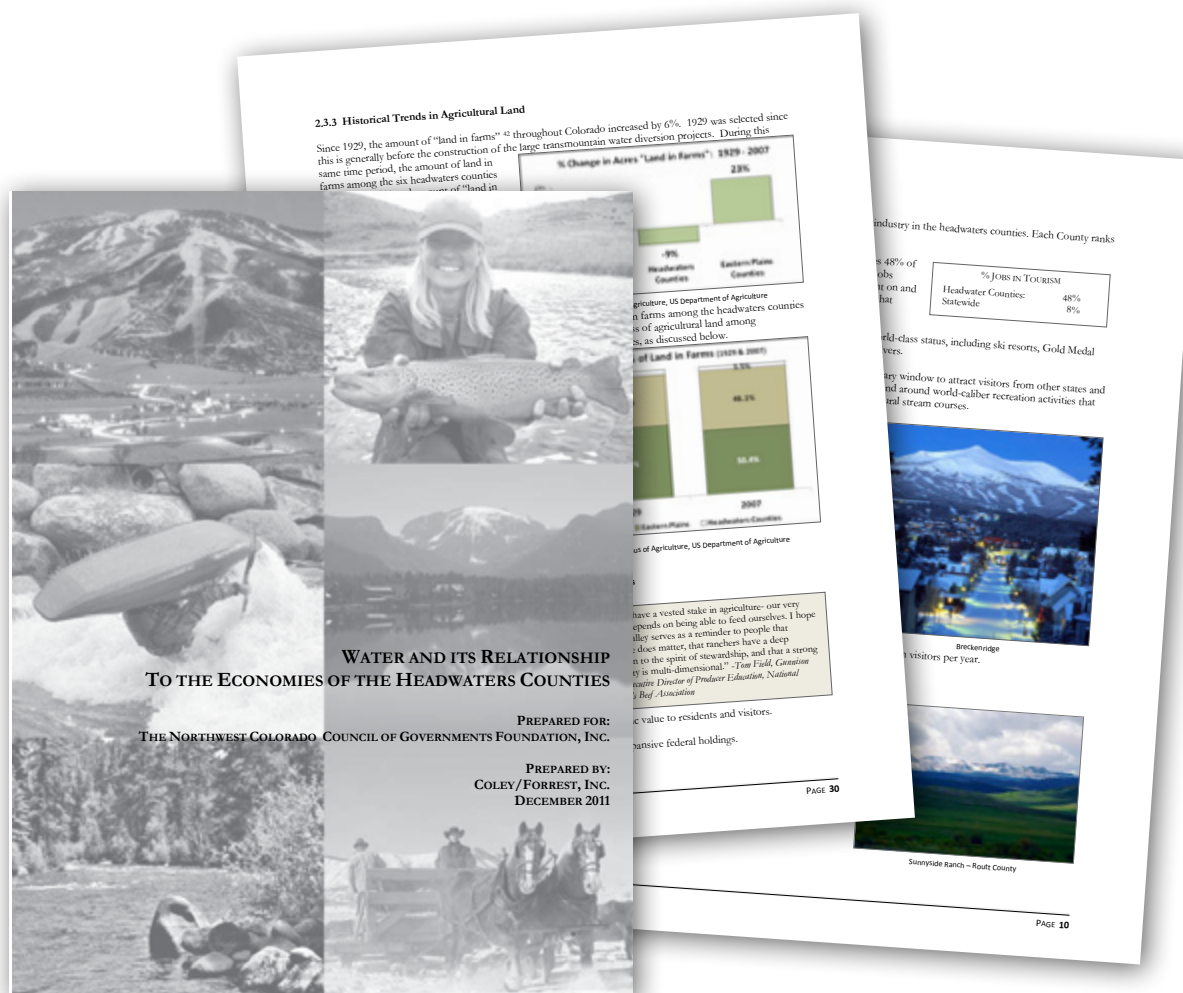
The study rests in the fact that water resources emanating from the Headwaters Counties are neither consistent nor unlimited, subject to considerable future uncertainty. Besides year-to-year weather variations, longer term climate changes are evident, and climate scientists expect these trends in climate change to continue. Regardless, economic activity in the Headwaters Counties is not standing still; leaders there seek prosperity, looking to further develop economic activity in their counties, the same as all counties around the State. At the same time, water providers on the Front Range in Colorado are seeking increased water supplies, identifying transmountain diversions (TMDs) from the Headwaters Counties as a potential source. Couple this with the uncertainty related to interstate Colorado River allocations under the Colorado River Compact, and it is clear the Headwaters Counties should be worried about water scarcity. In short, all these forces bear down upon the increasingly less predictable but indispensable water supplies originating in the Headwaters Counties.



Representing the Headwaters Counties, the Northwest Colorado Council of Governments (NWCCOG) through its Water Quality/Quantity Committee (QQ) sought a current understanding of the relationship of the local economies to the evolving availability of surface waters. NWCCOG retained Harvey Economics (HE) to prepare this study.

FIGURE 1.1
Map of the Headwaters Counties¹





The 2012 Report

This current HE report updates and expands upon a previous report, entitled Water and Its Relationship to the Economies of the Headwaters Counties, prepared by Coley/Forrest, Inc. under the direction of Jean Townsend, and completed in December 2011 (referred to as "the 2012 Report").² The earlier study demonstrated the linkage between water and economic activity in the Headwaters Counties and issues associated with the limited water availability when and where needed.

The 2012 Report was our jumping off point. That work placed in perspective the Headwaters Counties and the pressure on their water supply from other Colorado regions, other states, and Mexico through the Colorado River Compact. The significance of TMDs and the Headwaters Counties' response to them were clearly laid out in that report, while at the same time recognizing the Headwaters Counties' vital economic relationship with the Front Range and the State as a whole. The 2012 Report goes on to establish the economic importance and linkage of the key economic sectors that rely upon water in the Headwaters Counties. The report fully characterized the issues associated with Headwaters Counties' water supplies and the local water-dependent economic activities in the face of TMDs and the other myriad challenges which existed in 2011.

Key New Influences Driving the Economic–Water Relationship

The HE study does not repeat the comprehensive work performed to prepare the 2012 Report. Here, we focus on what has changed in the intervening 15 years for the Headwaters Counties, documenting the relationship between water and the Headwaters Counties' economies due to new and evolving influences. These include:

Economic Evolution of Colorado's West Slope:

Recreational amenities have diversified and expanded considerably, drawing ever larger numbers from the State's growing population, visitors throughout the U.S., and visitors from across the world. Although recreational water use is largely non-consumptive, the water must be present where and when users need it.

The Colorado Water Plan (2023) and Basin Implementation Plans (2022)

The State of Colorado embarked on an ambitious effort to identify water uses, available supplies, present and future shortages by river basin, and by county where possible.^{3,4} The intent was, in part, to provide a common database and a forum for identifying water shortages and alternative approaches to addressing those issues. The Water Plan identifies the relationship between land use planning, water supply planning, and potential water shortages.

Colorado River Cooperative Agreement:

West Slope municipalities, counties, special districts, and water supply associations including those in Eagle, Summit, and Grand Counties entered into an agreement with the Denver Board of Water Commissioners (Denver Water) in September 2013 whereby Denver Water committed to a host of measures to reduce the level of conflict with West Slope water interests.^{5,6} Parties to this agreement continue working to resolve differing interpretations of this agreement but generally rely upon its terms and conditions.

Hydrologic Considerations:

The hydrology in the Headwaters Counties is more challenging than it was 15 years ago. Competition for these water resources from both within the Headwaters Counties and outside has increased.

Relationship between Water and Land use:

Colorado has become increasingly aware that land use patterns and practices have a significant impact on the availability of water resources. In particular, how water is used to serve new land use development on the Front Range of Colorado has an out-sized impact on how much water is available for use in the Headwaters because of significant TMDs to support Front Range Growth.

Increased Understanding of Climate Change and its Impact on Headwaters Counties' Water Users:

In the past 15 years, a number of researchers at local, state, and federal levels have examined climate change impacts in terms of validity, magnitude, and effect. Streams and rivers are seeing lower flows and increasing temperatures. The experience of Headwaters Counties' ranchers, river guides, all types of recreational managers, and other residents bear out the growing threat of an uncertain climate future. The hydrologic ramifications of climate change are summarized in Section 2 of this report. The profound implications of climate change for the Headwaters Counties were highlighted in the many interviews HE conducted for this economic update.

Further development of Transmountain Diversions

The critical influence of TMDs, as described in the 2012 Report, has not diminished. Since then, certain additional diversion projects have been developed. TMDs are discussed in Section 2 of this report.

Update of NWCCOG Regional Water Quality Management Plan (208 Plan)

This update concludes that the biggest sources of water quality problems in the region stem from TMDs and runoff from in-basin land uses, both of which are exacerbated by climate change.

Bridging the Gap Report⁷

"Bridging the Gap" is a project initiated by NWCCOG, the Sonoran Institute, and partner organizations that share an interest in avoiding or minimizing the negative impacts of water transfers. By gathering the experiences of key stakeholders from recent water transfer projects, the report issues findings related to planning and community engagement, stakeholder involvement, permitting and negotiated agreements, and project mitigation.

In essence, the important economic contributions of the Headwaters Counties to the State are increasingly, but not fully, recognized by others around the State. As water leaders in the Headwaters Counties find seats at State water policy tables, they need others to understand just how vital water is to the Headwaters Counties so that they can preserve and expand their economic contribution to the State.

Overview of HE Report Outline

The HE Report examines each of the above issues to further explore the economic-water relationship in the Headwaters Counties and how it has changed since 2011. The HE study addresses these questions:

1

How has water-based economic activity changed over the past decade?

2

To what extent are changes in water resources driving changes in economic or social conditions, or, inversely, how are economic and social conditions driving changes in water resources?

3

How will this water-economic relationship change in the future?

The HE report structure, information sources, and study approach are outlined on the following page. Simply stated, the report provides a summary of hydrologic conditions and issues, documentation of economic activity and its relationship to water, and finally, how certain Headwaters Counties leaders perceive water issues and their effect on economic activity.

SECTION

1

INTRODUCTION & STUDY PERSPECTIVE

SECTION

2

HYDROLOGY

Prepared by Lotic Hydrological (Lotic) and NWCCOG, this section offers a summary of the primary surface water issues in each of the six Headwaters Counties, emphasizing changes that have occurred since 2012.

SECTION

3

ECONOMIC ACTIVITY

Headwaters Counties' economic activity levels are identified in Section 3 with a detailed presentation of the economic activity of the water-intensive sectors, or those driven by water availability. Based on extensive data gathering, HE examines the economic changes that have occurred in agriculture, recreation, mineral extraction, wastewater treatment, hydroelectric generation, and public water supply and development demands. HE presents economic data about each of the Headwaters Counties individually since the economies vary widely from county to county. This section establishes the importance of water-based economic activities in the Headwaters Counties.

SECTION

4

INTERVIEWS ABOUT THE WATER-ECONOMIC INTERACTION IN THE HEADWATERS COUNTIES

This section explores the dynamics of the water-economic relationship as expressed by the residents, businesses, and public leaders in the Headwaters Counties through a broad-based series of personal interviews with 28 individual stakeholders. The list of interviewees is set forth in Appendix A. A combination of in-person, video, and phone interviews were conducted from Summer 2024 to Summer 2025, utilizing an interview guide developed by HE, provided in Appendix B.

SECTION

5

CONCLUSIONS & IMPLICATIONS OF THE WATER-ECONOMIC RELATIONSHIP IN THE HEADWATERS COUNTIES

This final section summarizes the key observations in the foregoing sections and draws together findings in an effort to elevate the understanding of how vital, how delicate, and how challenging the water-economic relationship is for the Headwaters Counties in 2025.

Caveats and Limitations

HE recognizes certain limitations inherent with this 2025 economic update.

HYDROLOGY

This report does not rely upon or delve deeply into hydrologic conditions, since the Headwaters Counties' perception of water supply and the actions they take based on that perception and reliance on that supply is the focus of this work. We relied upon summary observations from our team of consultants and NWCCOG staff. Groundwater was not considered in this study, but we recognize that for a number of users, it is a mainstay of their supply.

ECONOMIC ACTIVITY

The economic profile is a snapshot in time, namely the mid-2020s. Numerous external influences will drive the economies in this Region in different directions in the future. Even so, the conditions we describe are likely to be foundational for at least the near term.

The economies of each of the Headwaters Counties are comprised of many separate activities; HE selected economic activities that are directly and closely linked to water. Certainly, there are other activities with a link to water, but HE concentrated on the basic economic sectors that drive the economies in the Headwaters Counties, and which are also heavily dependent on water.

INTERVIEWS

The list of people HE interviewed grew originally from suggestions by NWCCOG staff; that list was expanded according to suggestions from the first list of interviewees. Given the high degree of knowledge about water on the West Slope of Colorado, there are plenty of other well-informed people HE could have interviewed. We were unable to interview all the individuals we would have liked, given budget and time constraints.

POLICY RECOMMENDATIONS

In this report, HE and Lotic provide information about the relationship between water and economic activity but do not make any policy recommendations. HE offers this report in hopes it will provide insights and a foundation for water and policy decisions based upon the importance of water to the Headwaters Counties' economies and the interests of the State as a whole.



2

Hydrology Issues & Changes Since 2012



This section provides a foundation of the water-related conditions, recent changes, and key issues that influence the economies of the Headwaters Counties. This section was prepared by Lotic Hydrological (Lotic) and NWCCOG to update Chapter 3 of the 2012 Report with key changes that have occurred in Headwaters Counties since the previous report.

This Report is not intended to be a comprehensive examination of hydrology in the Headwaters Counties, but it does provide a useful to provide a hydrologic foundation as we explore the water-economic relationship in this Colorado region. We will return to these key issues in Section 4 as we review how Headwaters Counties' leaders perceive these issues and are addressing them.

Overview

Snowmelt and minimal amounts of rainfall are the only sources of water for most water users in Headwaters Counties; very little water is imported from other basins. In this region, few local water providers own large raw water storage facilities that could supplement water supply during drought conditions. The summer months see the greatest demand for water. Surface water diversions and in-basin reservoir releases support thousands of acres of irrigated agriculture. The spring and summer periods also see large exports of water from Headwaters Counties through transmountain diversions (TMDs) to Front Range communities and East Slope irrigators. Winter seasons that experience meager snowpacks typically lead to summer periods with constrained supply.

Recent research predicts that a warming climate will further constrain water supply in the coming decades and impose increased risk of compromised water quality conditions, as discussed later in this section.⁸ Rising air temperatures and reduced snowpack associated with long-term drought and a warming climate will continue to affect water availability in Headwaters Counties. It is highly unlikely that water supplies will become less constrained in the years to come.

While the 2012 Report provides an overview of water conditions in the Headwaters Counties overall, this update focuses on key conditions that inform current conditions and future risks to water quality and quantity in the Headwaters Counties.



Transmountain Water Diversions

Transmountain diversions export water from one basin to another, such as from the Colorado River Basin to the South Platte River Basin. These TMD projects are comprised of ditches, canals, pumps, aqueducts, tunnels, and reservoirs that collectively work to move water from west of the Continental Divide to communities on the east side of the Divide.⁹ TMDs are 100 percent consumptive as to the basin of origin because there are no return flows made available to downstream water users in the water's basin of origin once the water has been diverted to the Front Range. TMDs are an important consideration and constraint to water supply, reservoir storage, and stream flows for the Headwaters Counties while also playing a major water supply role for East Slope water users.

TRANSMOUNTAIN DIVERSION PROJECTS IN THE HEADWATERS COUNTIES

Nearly all of Colorado's major TMD projects originate in the Colorado Basin Headwaters Counties (Grand, Summit, Eagle, and Pitkin Counties): Grand River Ditch, Colorado-Big Thompson, Moffat Tunnel, Roberts Tunnel, Continental Hoosier System, Homestake Project, Twin Lakes Tunnel, and the Fry-Ark Project.¹⁰ The Headwaters Counties support 16 TMD projects overall (Figure 2.1).

Almost 500,000 acre-feet of water is taken from the Colorado River Basin each year.¹² The following table (Table 2.1) depicts estimates of aggregated annual TMD yields from the river basins in the Headwaters Counties.

FIGURE 2.1
Transmountain Water Diversion Projects¹¹



TABLE 2.1 • Estimates of Aggregated Annual TMD Yield from West Slope Basins, 1995-2024¹³

BASIN	MINIMUM	MEDIAN	MAXIMUM
Blue	16,406	75,144	134,483
Eagle	6,743	28,328	54,713
Gunnison*	0	834	3,195
North Platte	12,567	21,903	28,239
Roaring Fork**	39,038	105,070	170,165
Upper Colorado	154,274	290,464	382,145
Yampa***	31	1,898	5,342

*TMDs to Rio Grande
& Arkansas Basins only

**Includes Frypan River
subbasin TMDs

***TMDs to Colorado Basin

In many subbasins in the Headwaters Counties, TMDs consume more than half of the available streamflow in the watershed, depending on whether the year is an average, wet, or drought year. The percentages of stream flows consumed by TMDs for each subbasin are depicted in Table 2.2.

TABLE 2.2 • Amount of Available Streamflow that has been Diverted to the Eastern Slope at USGS Gauge Stations during Different Hydrologic Conditions^{14,15}

SUBBASIN	DROUGHT	DRY	AVERAGE	WET	FLOOD
Blue River at Blue River	36	38	31	20	8
Blue River at Dillon Dam (all major reservoir tribs.)	55	42	30	14	18
Straight Creek nr Dillon (Laskey Gulch)	6	3	2	2	2
Colorado River blw Windy Gap	80	77	62	48	38
Fraser River blw Crooked & Ranch Creeks	48	41	33	29	20
Eagle River near Minturn	44	30	24	18	20
Homestake Creek at Gold Park	70	64	53	46	48
Fryingpan River at Meredith (above Reudi Res.)	22	33	37	35	37
Roaring Fork abv Difficult Creek nr Aspen	55	60	54	47	26
Tomichi Creek at Sargents	0	0	1	1	0
Williams Fork near Leal	22	11	6	3	2

TMD projects compromise the aquatic and riparian ecosystems in Headwaters Counties and cause economic impacts. These impacts have existing and ongoing consequences for the environment. Table 2.3 includes examples of environmental impacts and economic consequences from TMDs. Risks from potential new TMDs or expansions of existing systems are discussed later in this section.

TABLE 2.3 • Examples of Environmental Impacts from Transmountain Diversions

DIRECT IMPACT	INDIRECT IMPACT	OTHER INDIRECT IMPACT
Increased pollutant concentrations	Loss of assimilative capacity	Loss of dilution flows that offset pollutant discharges from WWTP and acid mine drainage.
Loss of natural hydrograph	Lower base, flushing, and channel maintenance flows	Negative impacts to members' ability to treat water and wastewater
Increased temperatures, sediment	Associated fisheries impacts (degradation)	Impacts to terrestrial fauna; freezing of exposed fish spawning beds; aquatic species impacts
Loss of wetland values, functions	Increased flooding	Algal blooms, other extreme reactions to temp. increases
CBT pumping	Loss of pollution filtering	Low dissolved oxygen levels
Reductions in stream flows, generally	Loss of clarity in Grand Lake	Loss of aquatic, wildlife, and bird habitat
Loss of pollution filtering	Harm to water-based recreation	Reduction of recreation/ tourism; Regional economic impact
CBT pumping	Loss of clarity in Grand Lake	Regional economic impact
Reductions in stream flows, generally	Harm to water-based recreation	Regional economic impact

Shoshone Hydroelectric Power Plant Operations

The Shoshone Generating Station is a hydroelectric power plant located in Glenwood Canyon. The Station holds senior water rights that ensure a consistent, year-round water supply to the section of the Colorado River above the confluence with the Roaring Fork River, referred to as the Shoshone Water Rights. The administration of this water right results in a senior "call" that sends water downstream to fulfill the Shoshone Water Rights.

Because of the Shoshone Call to serve downstream users, the Upper Colorado River system through Grand County into Eagle County enjoys predictable stream flows that benefit the aquatic environment, water and wastewater providers, and the rafting/paddling economy as the called water flows down to Glenwood Canyon. Agricultural producers in the vicinity of Kremmling also benefit from reservoir releases that increase river levels, allowing irrigation pumps to access water. The water rights for several of the major TMD systems in the Headwaters Counties are junior to the Shoshone Water Rights. The environmental analysis to authorize recently permitted TMD projects (e.g., Windy Gap Firming, Moffat Collection System) relies upon the Shoshone Call providing water to the Colorado River to mitigate water quality impacts and protect native and endangered fish species.

When the Shoshone Generating Station shuts down for repairs, maintenance, or other reasons, it cannot exercise its water rights. In 2016, major water users, primarily located upstream of the Generating Station, signed the Shoshone Outage Protocol agreement. This agreement requires upstream water users to operate as if the Shoshone call were still in place during plant shutdowns, ensuring continued water flow in Glenwood Canyon.¹⁶ In 2023, the Colorado River District entered into a Purchase and Sale Agreement with Public Service Company of Colorado (PSCo) to permanently acquire the Shoshone Generating Station's water rights.¹⁷ In 2025, the Colorado Water Conservation Board (CWCB) voted to accept the River District and PSCo's proposal that the CWCB acquire an interest in the Shoshone Water Rights for an instream flow use on the Colorado River. The Headwaters Parties jointly supported the proposed acquisition during the CWCB hearing because of the region's reliance on the Shoshone flow regime to support its economy. As of 2026, the Colorado River District, PSCo, and CWCB filed an application before the Colorado Water Court in Garfield County to add an instream flow use to the Shoshone Water Rights. The case is still pending before the state court.



Risks from Compromised Conditions

NWCCOG prepared hydrologic snapshots for each watershed in the Headwaters Counties provided in Appendix C. These snapshots provide an overview of the current hydrology of the region and present current challenges associated with water quality and quantity due to compromised conditions. They also highlight recent restoration efforts to address compromised conditions.



ENDANGERED RIVERS

Each year, American Rivers, a national conservation organization, selects the ten most endangered rivers in the United States. Selections are based on pending decisions that impact each river, the significance of the threat to human and natural communities, and the degree to which the proposed action would exacerbate or alleviate stress.

In 2022, American Rivers ranked the entire Colorado River as the most endangered river in the United States. 'There is not enough water in the Colorado River to meet all current needs. River management plans were built on a flawed assumption that the river carries nearly 18 million acre-feet [...] while in reality only about 13 million acre-feet has been historically available. The entire system is operating at a deficit, and climate change is expected to further reduce the river's flow by 10% to 30% by 2050.¹⁸



In 2014, American Rivers ranked the Upper Colorado River as the second most threatened river in the United States due to the threat of water diversions, finding that, "The Upper Colorado River and its tributaries are home to prized trout fisheries, drawing anglers and paddlers from across the country. However, more than 100 years of diversions have sapped the river of its lifeblood. If two new major proposed diversion projects advance without the right provisions, the river could become a shadow of its former self. Conversely, if the projects move forward with appropriate foresight and consideration for the long-term protection of the river's health, it could usher in a new era of stewardship and recovery for the Upper Colorado. The regulatory agencies, conservation interests, and people of Colorado must insist that the water projects contain key protections for river health."¹⁹

RISKS IMPOSED BY CLIMATE CHANGE

Climate change is an issue facing all of Colorado. Impacts are already apparent in the Headwaters Counties, and the magnitude of future impacts is likely to increase. The following is a summary of current and predicted changes to Colorado and its northern (Routt and Grand counties) and central mountains (Eagle, Summit, Pitkin and Gunnison counties) climate variables based on reports from Colorado State University and the Rocky Mountain Climate Organization.²⁰

Temperature

The historical data and predictions about Colorado's temperature are quite clear: temperature increases have occurred and will continue rising for the foreseeable future. Only one year in the past 24 years has been cooler than the 1971 to 2000 average. The average 2050 temperature is expected to be warmer than the warmest year on record through 2022. Temperatures in the northern and central mountains are projected to rise by five degrees, about the same as the State average. Summer and fall are likely to warm slightly more than spring and winter. For example, in Eagle County, the average summer day's temperature by 2050 is projected to be as hot as the single hottest day of the late 20th century.²¹ Vail Mountain is expected to have more winter days above 32 degrees than in the past.

Snow/Rainfall

The State has seen drier conditions in the past 24 years than during the 1951 to 2000 period, but future predictions of precipitation are uncertain, suggesting a range of plus or minus 7% by 2050. Grand and Routt counties are more likely to experience increased precipitation compared with the other Headwaters Counties. Vail Mountain, for example, is expected to have 7% more winter precipitation by 2050 compared with 1970 through 1999.²² Summit County ski areas are also likely to have increased wintertime precipitation.²³ Models suggest increasing precipitation in winter, but more precipitation will come in the form of rain rather than snow, as well as a potential for large declines (-10% to -25%) in summer precipitation.²⁴ Overall, increased winter precipitation will not make up for the higher temperature effects on diminished surface water in the summer and fall. Recent and future increases in air temperatures will continue to increase atmospheric evaporative demand, which increases evaporation from ground surfaces and reservoirs. Increased evaporation will reduce water availability in headwater watersheds even if precipitation remains steady. Heat waves and drought are also expected to dramatically increase in magnitude and frequency under future warming.

Snowpack/Snow Water Equivalent (SWE)

Snow water equivalent refers to the water content of snow, whereas snowpack refers only to depth. Recent research identified declines in SWE throughout the western U.S. over the last 40-70 years.²⁵ Over the 2001-2022 period, average April 1st SWE declined by 10.9% in the Colorado River Basin, 11.7% in the Gunnison Basin, and 18.5% in the Yampa-White Basin when compared to the 1951-2000 period. Additional SWE declines are projected by 2050: 6.5% in the Colorado Basin, 10.4% in the Gunnison Basin, and 15.0% in the Yampa-White Basin. Snowpack is also projected to decrease by 13% to 17% by 2050 in the Rocky Mountains, given expected temperature changes and earlier warming. Snowpack in Headwaters Counties' river basins will be 5% to 15% lower by 2050 compared with 2024. Given warmer falls, snowmaking operations are likely to change.

The timing of peak snowpack and snowmelt are also expected to shift up to several weeks earlier by 2050. Ski area openings and closings will be less certain, likely resulting in shorter ski seasons and threatening ski area economics.

Runoff

Snowmelt has come quicker than in the past, and with rising temperatures; this will occur still earlier and more intensely in the future. Snowmelt and runoff peaks are expected to occur as much as four weeks sooner than in the past. Stream-based recreation and water supply management will be challenged.

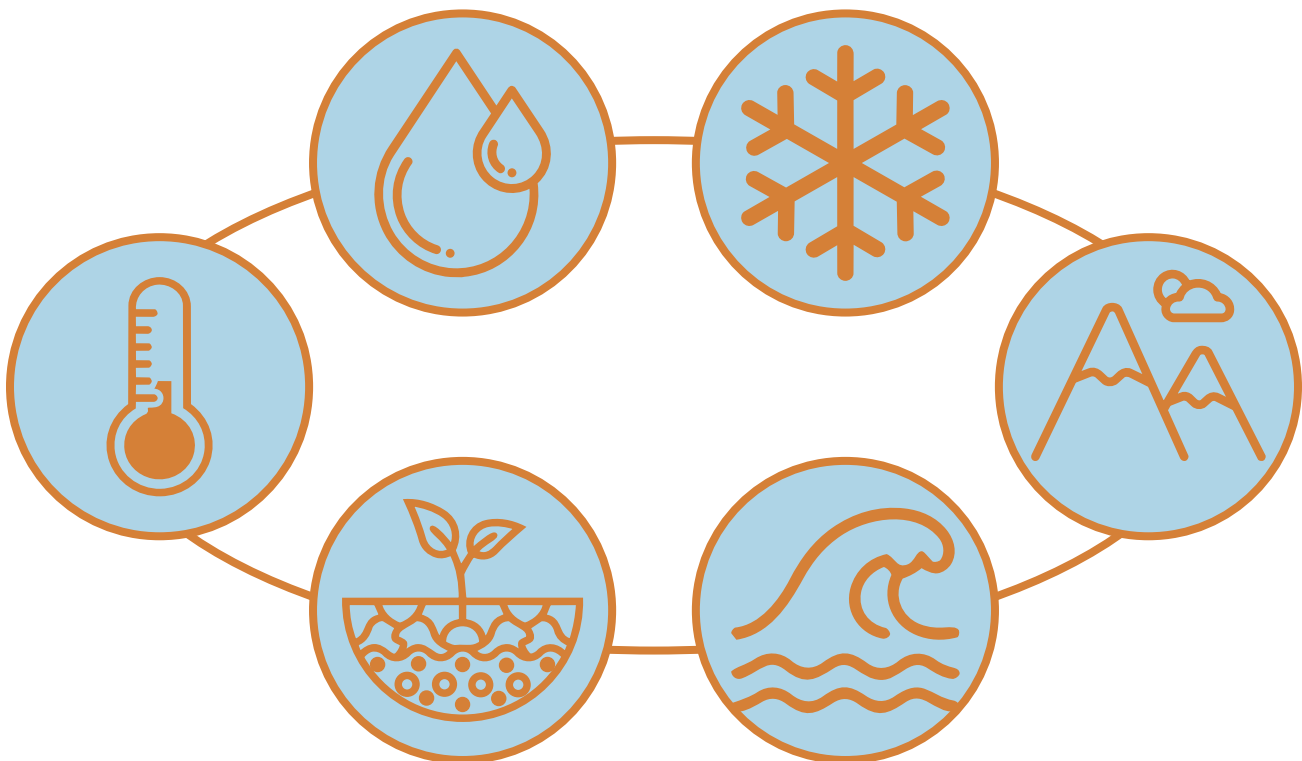
Streamflow

Changing snowpacks and increased evaporative demand already impact streamflow in headwater counties and will continue to do so in the years to come.²⁶ Estimates of natural streamflow runoff for the 2001-2022 period declined by 13% in the Gunnison Basin, while smaller declines were estimated in the Colorado Basin (5%) and the Yampa-White Basin (3%) when compared to the previous 30 years. Studies indicate that higher air temperatures drive 20% to 50% of these declines. Most climate models predict that streamflow will continue to decline under a warming future. Median annual streamflow reductions of 6.3% to 9% are expected by 2050 across the Colorado, Gunnison, and Yampa-White basins. Streamflow declines are not expected to be uniform. Summer and fall stream flows are projected to decline significantly due to earlier snowmelt, while winter and spring flows may be less impacted.

Soil Moisture

Soil moisture is important to agriculture since more irrigation water must be applied when the soil is drier. With increased temperatures, drier soil has been evident in the Headwaters Counties in late summer, requiring more irrigation to finish crops. Soil moisture is critical to forest health and wildfire risk. Large and intense wildfires have persistent impacts to water supply, particularly drinking water, water infrastructure, and may create significant impacts to recreation and tourism-based economic sectors.

Climate change also impacts Front Range water users. Landscaping in residential developments will consume more water as growing seasons lengthen and air temperatures rise. Moreover, warming trends will increase reservoir losses to evaporation and reduce municipal water supplies. Denver Water estimates that +2°F of warming could increase water demand by 6% and reduce water supply by 7%.²⁷



Risks Imposed by Additional Transmountain Diversions

Further reductions in stream flows from TMD projects will exacerbate existing constraints and may jeopardize supplies of water for human uses and the environment.

Since 2012, two major TMD systems in Grand County have undergone (or are currently undergoing) expansions, referred to as “firming projects” because increases in storage will allow for the “firming” of existing water supplies (i.e., increasing physical ability to use existing water rights):

Moffat Collection System Firming & Gross Reservoir Expansion (Denver Water)

The project will triple Gross Reservoir’s capacity from approximately 42,000 acre-feet to 119,000 acre-feet and will capture and store additional water from the Fraser and Williams Fork watersheds in Grand County during average and wet years. The Gross Reservoir expansion was under construction but, as of mid-2025, is currently suspended and in active litigation.²⁸

West Slope entities, including Headwaters Counties, negotiated the Colorado River Cooperative Agreement with Denver Water, which includes water quality and environmental enhancements associated with this Moffat Collection System Project and some “enhancements” that address impacts related to past transmountain diversion projects by Denver Water (among many issues).²⁹

Windy Gap Firming Project (Northern Water)

Windy Gap is a Northern Water reservoir constructed in 1985 on the western side of the Continental Divide, below the confluence of the Upper Colorado and Fraser Rivers. The Windy Gap Firming Project (WGFP) entails construction of a new storage reservoir on the Front Range, Chimney Hollow Reservoir, which would store water from the existing Windy Gap Project’s current water rights to improve reliability of the system. Increased depletions from the Colorado River are expected to average 21,300 acre-feet, ranging from no additional depletions in the driest years to 56,300 acre-feet of additional diversion in the wettest years.³⁰ Without mitigation commitments, the project could further reduce interannual variability in stream flows on the Colorado River below Windy Gap Reservoir.³¹

Grand County issued Northern Water a 1041 Permit for the WGFP, in addition to requisite federal permits, which include mitigation requirements to offset project impacts. Northern Water completed the construction of Chimney Hollow Reservoir on December 19, 2025.

A 2023 modeling study by the Colorado River District suggests the system is already limited by water availability. There may be a limit to future yields for TMDs if recent drying trends continue.³² If future hydrology remains similar to today, only 38% of the TMD demands projected for 2050 may be met. Decreased water availability and the calling of water by downstream senior water users on the Colorado River increase this potential water supply gap. One implication of these predicted shortages is that meeting future TMD demand may require significantly reducing storage volumes in West Slope reservoirs over time.

Despite these concerns, there are several potential future TMDs that would “firm” water rights in the Colorado River Basin, primarily in the Blue, Eagle, and Roaring Fork River Basins:

Continental-Hoosier System Firming Project (Colorado Springs Utilities)

The Continental-Hoosier System is an existing TMD project that exports water from the headwaters of the Blue River to the South Platte Basin to be stored in Montgomery Reservoir for municipal use by Colorado Springs Utilities. The Firming Project will expand Montgomery Reservoir, located in the South Platte Basin, to store, on average, an additional 4,000 acre-feet of water from the Blue River. This TMD is currently in the pre-application phase, with permitting anticipated over the next several years.³³

Eagle River/ Homestake Water Project (“Homestake Partners” of Colorado Springs Utilities and Aurora Water)

This conceptual TMD project, spearheaded by the “Homestake Partners” of Colorado Springs and Aurora, would consist of a new reservoir in the headwaters of Homestake Creek (Eagle River Watershed) to deliver water to Turquoise Lake in the Arkansas Basin via the Homestake Tunnel.³⁴ Total incremental depletions from the project are estimated at 17,900 acre-feet per year.³⁵ It is unclear whether this project would be tapped for the use of West Slope entities pursuant to the 1998 Eagle River Memorandum of Understanding (MOU), which contemplated a joint-use reservoir that would provide supplies to users on the East Slope (20,000 acre-feet per year average yield) and West Slope (10,000 acre-feet of firm yield).³⁶ West Slope signatories of the Eagle River MOU include the Colorado River District, Climax, Eagle River Water & Sanitation District, Upper Eagle Regional Water Authority, and Vail Associates. Field investigations for the Homestake Project are currently underway.³⁷

Wild Horse Reservoir Project (Aurora Water)

The Wild Horse Reservoir Project, proposed by Aurora Water, is a proposed off-channel reservoir southwest of Spinney Mountain Reservoir in the South Platte Basin to store water from Aurora Water’s existing water rights in the Roaring Fork, Frying Pan, and Eagle rivers. Aurora Water is working with federal and state agencies and Park County on environmental reviews and permit application processes.³⁸

Box Creek Reservoir (City of Aurora & Lake County)

Development of Box Creek Reservoir in Lake County would increase storage in the Arkansas Basin for use by the City of Aurora and Lake County. The project may enable increased TMDs from Headwaters Counties.³⁹

Arkansas Basin Reservoir Enlargements TBD

Enlargement of existing East Slope storage associated with the Fry-Ark Project may include Pueblo Reservoir in Pueblo County and Turquoise Reservoir in Lake County. Enlargement of these reservoirs may enable increased TMDs from Headwaters Counties.⁴⁰

Recent Efforts to Address Compromised Conditions

Local governments, nonprofits, and community members are undertaking efforts to address existing compromised conditions in the Headwaters Counties and to minimize and mitigate impacts from future risks. This section highlights just a few of those efforts.

EAGLE COUNTY

Over the past five years, the Town of Vail has addressed non-point source (NPS) pollution issues leading to aquatic life impairments in Gore Creek through Vail. The Town also instituted a [spill-reporting hotline](#) to reduce harmful releases into the Gore and undertook stormwater filtration projects and expansion of riparian (streamside) vegetation. Its efforts are showing progress towards reducing aquatic life impairment.

GRAND COUNTY

In an effort to minimize impacts from the recent TMD firming projects in Grand County, and to begin to address historical problems associated with existing TMDs, the Grand County Learning By Doing Cooperative Effort (LBD) formed as a partnership of East and West Slope water diverters and local stakeholders in Colorado. LBD emerged from inter-governmental agreements (IGAs) resulting from the Moffat Project and Windy Gap Firming Project (described above). Both IGAs establish a long-term partnership of cooperation, not conflict, among the groups. LBD has undertaken restoration projects such as the Fraser Flats River Habitat Project and the Cabin Creek Aquatic Organism Passage Project, along with extensive ongoing monitoring of stream conditions in Grand County.⁴¹

Since its construction in the mid-1980s, Northern Water's Windy Gap Reservoir reduced overall biodiversity and eliminated native sculpin and giant stoneflies, a critical food source for trout, in the Colorado River near the reservoir.⁴² As part of permitting Northern Water's Windy Gap Firming Project, Northern Water's Municipal Subdistrict agreed to initially study, then later to partially fund, reducing the footprint of Windy Gap Reservoir and creating a connectivity channel to mitigate impacts attributed to the project.⁴³ In October 2024, Northern Water, Grand County, the Colorado River District, Trout Unlimited, state agencies, and many other organizations completed the Colorado River Connectivity Channel at a cost of approximately 33 million dollars (Figure 2.2).⁴⁴ This one-mile channel bypasses Windy Gap Reservoir to connect key portions of the Colorado River which allows fish and macroinvertebrates to access more natural and restored habitat. Monitoring data indicates that the river is recovering.⁴⁵

FIGURE 2.2 • Colorado River Connectivity Channel⁴⁶



Colorado River Connectivity Channel delivering water to the Colorado River downstream of Windy Gap Reservoir.

GUNNISON COUNTY

In 2016, the Town of Crested Butte and Gunnison County signed a Memorandum of Understanding (MOU) with Mt. Emmons Mining Company and several state agencies to collaboratively address water quality, environmental health, and regulatory issues at the inactive Keystone Mine site. In October 2024, the community and MOU signatories shared a significant victory as a land exchange, mineral withdrawal, and conservation easement were executed to ensure that Mt. Emmons remains permanently mine-free and the company gains improved flexibility to manage impacts attributed to past mining activities on the site.⁴⁷

PITKIN COUNTY

In early 2026, Pitkin County used its tax-funded Healthy Rivers Fund to purchase about 71 acre-feet of water from the Twin Lakes TMD system for \$6.5 million. By controlling these water rights, Pitkin County will keep approximately 45 acre-feet of water in the Roaring Fork River.⁴⁸

ROUTT COUNTY

When faced with temperature compliance challenges at their wastewater treatment facility, the City of Steamboat Springs conducted a large-scale analysis to more fully understand the drivers of water temperatures in the Yampa River, worked with partner organizations to release water from local reservoirs, and implemented large-scale restoration activities to reduce stream temperatures and improve aquatic habitat. In 2026, the Yampa River and Walton Creek restoration project will begin construction.⁴⁹ The City of Steamboat Springs has engaged the community, local conservation groups, and state agencies throughout this effort.

SUMMIT COUNTY

The 19-mile stretch of the Blue River below Dillon Reservoir, between Silverthorne and Green Mountain Reservoir, lost its Gold Medal Fishery designation in 2016 due to the failure to meet Colorado Parks and Wildlife's (CPW) biological criteria.⁵⁰ In response, the community, water resource managers, and local businesses partnered to collect water quality and aquatic habitat data. This work informed the Integrated Water Management Plan, Blue River Habitat Restoration Plan, and supported improvements to the Town of Silverthorne's stormwater management system.⁵¹ As of 2026, project design, implementation, and monitoring are underway with the support of the Blue River Watershed Group, private landowners, and local, state, and federal agencies.

Summit County has partnered with various groups to clean up a host of mine sites and miles of river restoration in the Blue River Watershed (Figure 2.3).

FIGURE 2.3
Blue River Watershed Before and
After Restoration⁵²



3

Economy of the Headwaters Counties



This section provides an overview of the growth and development in the Headwaters Counties since 2010 to provide context for an examination of changes in water-dependent economic sectors. Of course, all human activity requires water, but certain activities are inextricably defined by the accessibility, timing, and quality of the available water. Kayaking does not exist without water. Hay crop yields are directly related to application of water at critical growing season times. **Each sector is discussed in order of water dependency and contribution to the Headwaters Counties' economies.**

Economies are driven by basic economic sectors that bring money into a county or region from outside that geographic area, whereupon that money circulates around that local area, served by non-basic, retail, or service-type sectors. **One special and very important aspect of the Headwaters Counties is that all the basic economic sectors in those counties are highly water dependent.** Hence, a threat to water availability, timing, or quality is a direct threat to the Headwaters Counties' economies.

The following data and discussion emphasize economic aspects of the Headwaters Counties as a whole, but also the distinct differences among the counties. As noted earlier, each of the six Headwaters Counties is unique in certain ways and alike in others. Attributes such as location, accessibility, topography, historical development, available resources, and amenities vary among the counties, influencing population levels, demographic characteristics, and economic activity. However, for all these counties, water is an essential ingredient of the local economy.

Recent Economic Activity and Growth in the Headwaters Counties

POPULATION

The Headwaters Counties are currently home to some 160,000 people, an increase of about 9,000 people between 2010 and 2023. All the population in these counties needs water to live, both the water they consume as well as water related to the economic sectors where they work. By 2050, these counties together are projected to comprise 192,500 residents, an increase of 32,700, or 20 percent, over the current population levels (Figure 3.1).

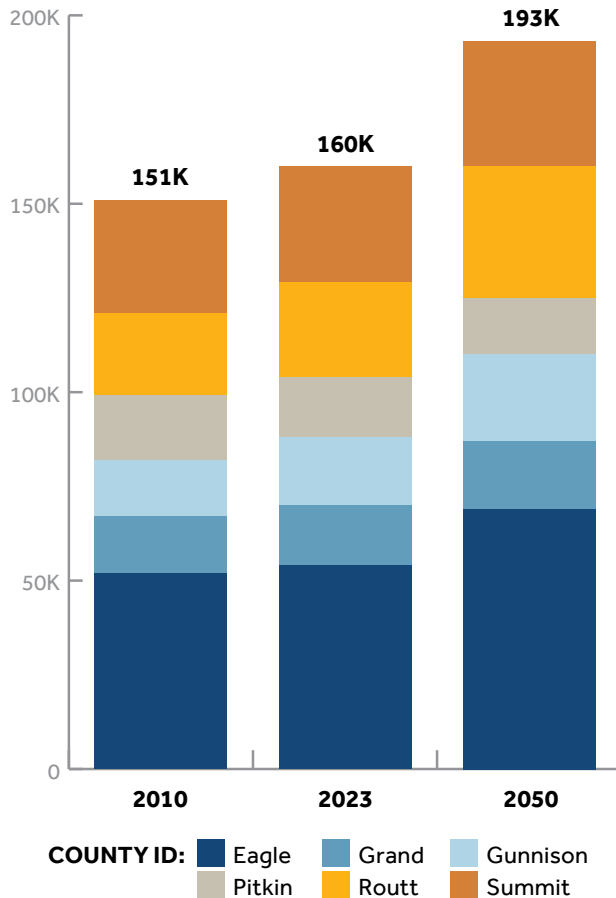
Gunnison, Summit, and Grand counties were the fastest growing of the six counties between 2010 and 2023, increasing by 13.0, 8.4, and 8.0 percent, respectively. Routt and Eagle counties are projected to grow by about 27 percent through 2050, assuming the water is there when needed.

For the Headwaters Counties, the change in the number of permanent residents does not tell the full story of habitation since these counties experience high levels of tourism and visitation, an important economic component. Together, the Headwaters Counties saw an estimated 17.8 million visitors in 2024.⁵⁴ Eagle County experienced the largest amount of visitation with 5.5 million visitors.⁵⁵

The Headwaters Counties need to ensure that the water will be available where and when needed at the proper quality to serve present and future populations and visitors. Further, peak seasonal demands must be met.

Variability in visitation impacts both water supply and treatment. Having such a high number of second homes and visitors in the Headwaters Counties makes this maximum demand quite large and variable throughout the year.

FIGURE 3.1
Population of Headwaters Counties⁵³



Note: Population data reflects permanent residents only; part-time residents or second-home owners are not included in the data.

HOUSING

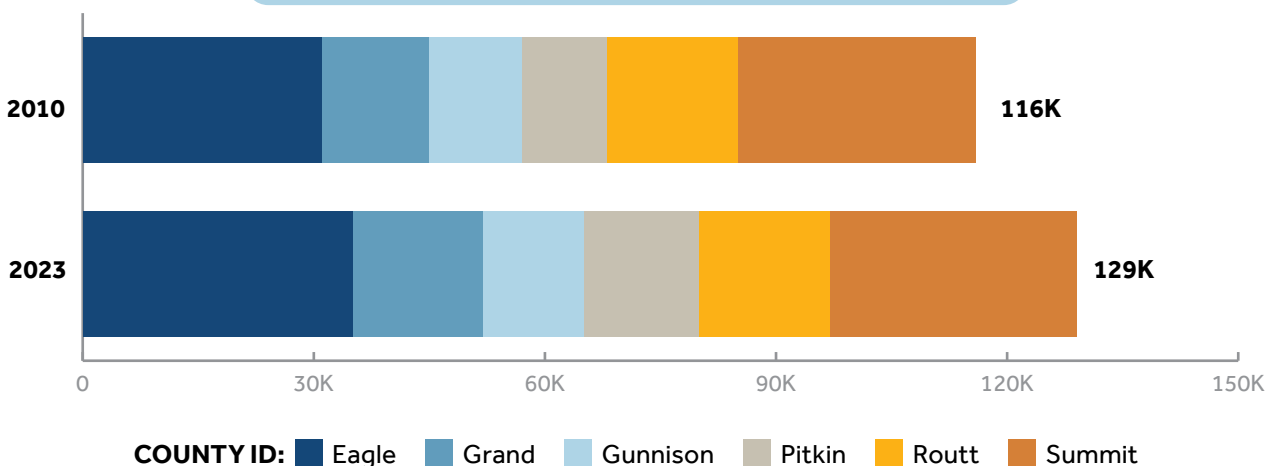
The dwelling unit count includes those for the year-round population and the seasonal units for visitors spending a night (or even a season) in the Headwaters Counties. The total number of housing units in the Headwaters Counties grew by 13,400 dwellings, or 12 percent, compared with a six percent population growth rate during the 2010 to 2023 period. This difference is attributable to increases in second homes and short-term rentals.

As shown in Figure 3.2, each of the Headwaters Counties experienced housing growth, all together totaling about 1,000 new houses per year since 2010.

Over 42 percent of housing units in the six-county region are for occasional use, about ten times the average rate across the State. Seasonal homes range from 28 percent to 69 percent among the six Headwaters Counties. The economic upshot of seasonal or second homes is captured mostly by stimulus in the seasonal and visitor data, but also in construction.

Regardless of whether dwellings are occupied full time or not, potable water must be available to serve them, even during peak days and seasons, and resulting wastewater must be returned to streams that will meet water quality standards.

FIGURE 3.2 • Housing Units in Headwaters Counties⁵⁶



Note: The State Demography Office does not prepare projections for housing units.

EMPLOYMENT

As illustrated in Figure 3.3, the Headwaters Counties' economies supported more than 139,000 jobs in 2023, an increase of 25,000 since 2010. This 22 percent increase compares with a 34 percent increase state-wide during the same period, suggesting that Headwaters Counties are not keeping up with Colorado as a whole.

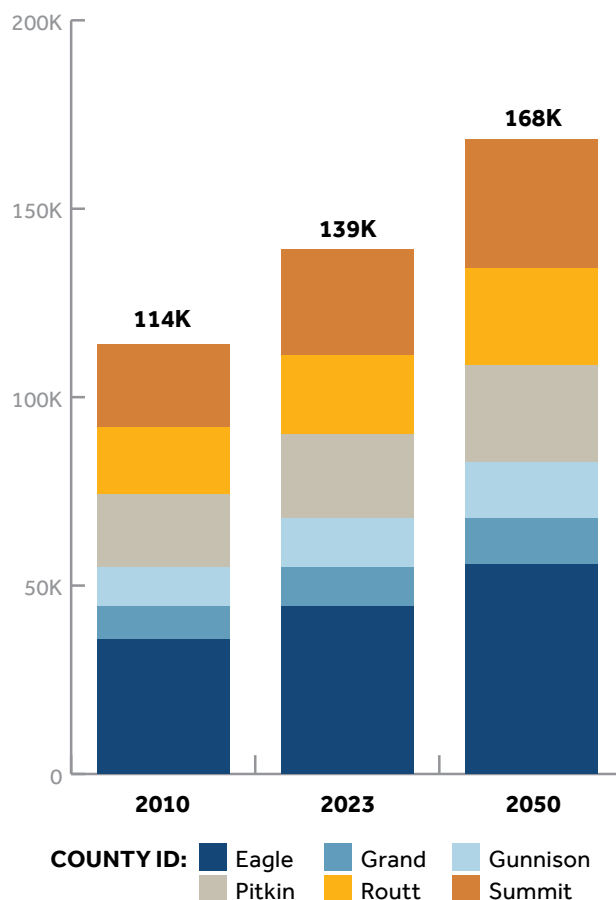
All six counties experienced job growth, with Summit, Eagle, and Gunnison counties having the highest percentage growth. An additional 29,000 job opportunities are expected in the Headwaters Counties by 2050.

Employment within heavily water-dependent economic sectors is discussed later in this section of the report.

GROSS DOMESTIC PRODUCT

Gross Domestic Product (GDP) is the most comprehensive, aggregate measure of economic activity in the Headwaters Counties. It is expressed as the total market value of all final goods and services sold in a given area. The GDP generated by the Headwaters Counties was \$15.7 billion in 2023, an increase of 37 percent from 2010. Given that essentially all the basic economic sectors in the Headwaters Counties are highly water-dependent, there is a direct relationship between economic activity in this area and water requirements.

FIGURE 3.3
Number of Jobs in Headwaters Counties⁵⁷

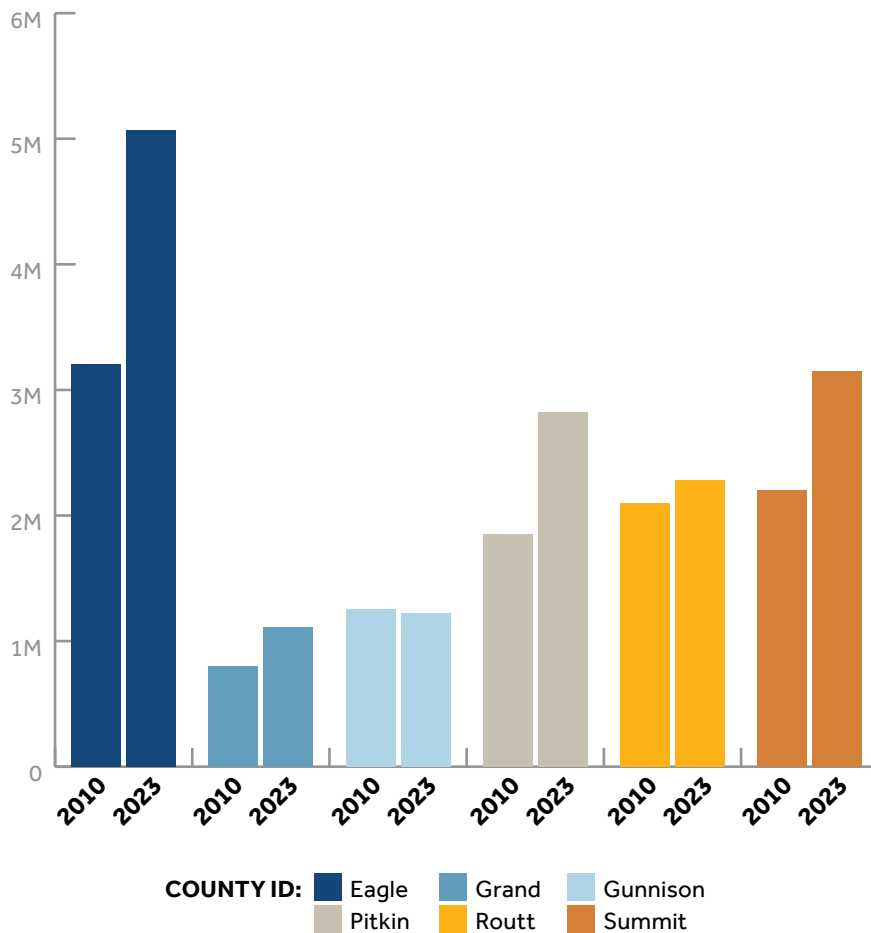


Notes: (1) Employment by place of work.
(2) Data depicts total number of jobs by county (part-time and full-time), which will be greater than total number of employed people due to multiple job holders.

Figure 3.4 illustrates each county's GDP in 2010 and 2023. Much of the GDP in the Headwaters Counties is inextricably related to the water intensive sectors in the counties.

Within each of the Headwaters Counties, the real estate rental and leasing sector comprised the largest percentage of GDP in 2023, followed by the recreation and hospitality sector for all counties other than Gunnison County.⁵⁹ That data indicates the importance and influence of tourism to the local economies. In Gunnison County, the mining and government sectors are also substantial components of the economy. Appendix D provides GDP by sector for each of the Headwaters Counties in 2023.

The Headwaters Counties' economies are driven by basic economic sectors that bring money into the region through sales of goods and services to non-residents visiting the area and sales to consumers or businesses located outside the six counties. These sectors include outdoor tourism, agriculture, mining, oil and gas production, and hydropower generation. Below, we identify the current level of activity for these key economic sectors, their relevance to the region, and their future prospects. Each of these sectors is directly and heavily dependent on water supplies to support on-going activities and associated economic benefits.⁶⁰

FIGURE 3.4 • Gross Domestic Product of Headwaters Counties⁵⁸

Notes: (1) GDP is defined as the total market value of all final goods and services produced.

(2) Data are presented in chained 2017 dollars.

Headwaters Counties' Economies and the State Economy

The Headwaters Counties' economies are inextricably linked to the State economy. Headwaters Counties' consumers spend disposable income on goods and services along the Front Range, and many Colorado residents frequent Headwaters Counties' resorts and communities year-round. Over 40 percent of the homes in the Headwaters Counties are second homes, mostly owned by residents elsewhere in Colorado. The bulk of western Colorado skier-days are believed to come from Front Range residents. Among other things, the State heralds its western Colorado outdoor recreation amenities, which help attract a workforce and businesses to the state.





Recreation and Tourism

ECONOMIC BENEFITS OF LOCAL TOURISM

Residents and visitors spend substantial sums on outdoor recreation and other tourism activities in the Headwaters Counties, supporting local businesses, creating employment opportunities, and generating sales tax revenue, as indicated in Table 3.1.

Nominal dollar travel spending in these six counties has increased by about 76 percent since 2013. Tourism-related employment amounted to more than 35,000 persons, or one quarter of Headwaters Counties total employment in 2024.

WATER-BASED RECREATION

Many recreational activities occur on and around mountain reservoirs and lakes; additional recreation takes place on or along rivers and streams. Warm weather water-based recreational activities include motorized and non-motorized boating, jet skiing, sailing, stand up paddle boarding, wind surfing, fishing, hiking, swimming, camping, picnicking, and wildlife watching.

The Headwaters Counties are home to 13 larger reservoirs, several located in state parks, and many other recreational lakes. Appendix D lists the state parks and major recreational reservoirs located in each of the Headwaters Counties. Natural lakes in Colorado's Headwaters Counties are essential for the State's ecological health, water security, and quality of life. These natural lakes are an important element of the mountains themselves and part of what is quintessentially Colorado.

Rivers and streams abound throughout the six counties. There are six river segments within the Headwaters Counties that are eligible for "Wild and Scenic River Designation" by federal agencies as of 2022.⁶²

Additionally, many of the United States' major areas for snow sports, including skiing and snowboarding, are located within the Headwaters Counties. Other popular winter sports include cross-country skiing, snowshoeing, snowmobiling, and ice fishing.

TABLE 3.1 • Economic Impacts of Travel Spending⁶¹

	TRAVEL SPENDING (\$M)		EARNINGS (\$M)		EMPLOYMENT		LOCAL TAXES (\$M)	
	2013	2024	2013	2024	2013	2024	2013	2024
Eagle County	\$958.9	\$1,702.0	\$231.0	\$409.1	7,380	8,730	\$36.9	\$75.7
Grand County	\$252.7	\$563.3	\$75.9	\$159.4	2,880	3,600	\$8.5	\$27.0
Gunnison County	\$170.3	\$372.5	\$43.3	\$106.9	2,100	2,610	\$6.2	\$16.1
Pitkin County	\$658.3	\$1,026.1	\$10.1	\$499.9	660	5,820	\$0.7	\$60.7
Routt County	\$339.7	\$678.1	\$151.2	\$315.6	3,920	5,110	\$12.0	\$37.2
Summit County	\$747.7	\$1,158.7	\$188.0	\$404.4	7,270	9,700	\$30.6	\$59.5
Headwaters Counties	\$3,127.6	\$5,500.7	\$699.5	\$1,895.3	24,210	35,570	\$94.9	\$276.2
% Change	75.9%		171.0%		46.9%		191.0%	

Notes: (1) These data reflect travel for all purposes, including both recreational and non-recreational activities.

(2) Taxes are primarily county and municipal sales tax and property tax.

Table 3.2, below indicates the level of participation and spending on water-based recreational activities in the river basins encompassing the Headwaters Counties.⁶³ There were about 2.1 million participants in snow sports, fishing, and other water sports in the Colorado, Gunnison, and Yampa-White-Green basins in 2020. This participation reflects more than 9.2 million activity days. A total of more than 4.2 million participants enjoyed about 24.7 million activity days participating in these activities.

In 2020, total GDP generated by water-based outdoor recreation in the Colorado, Gunnison, and Yampa-White-Green basins together amounted to more than \$2.8 billion.⁶⁴ In that same year, water-based outdoor recreation generated more than 35,800 jobs and more than \$1.7 billion in wages in those river basins.

Almost all outdoor recreational activities depend on water supplies at the right volume, place, time, temperature, and quality. As explained in the previous section, these various water requirements (volume, place, time, temperature, and quality) face present and future challenges in certain instances throughout the Headwaters Counties. Rising temperatures and uncertain stream flows can affect recreational experience, visitation levels, and the economic contribution generated by use of these reservoirs, lakes and rivers.

In theory, impingements to water supplies at the right place, time, temperature or quality could lead to a diminished level of recreation and tourism. This sub-optimal level of activity can translate into a reduced tourism economy for the Headwaters Counties. For example, a less than average snow year can result in a slow up-take of ski season ticket sales the next year.

TABLE 3.2 • Participation and Spending on Water-Based Outdoor Recreation⁶⁵
By River Basin within the Headwaters Counties, 2020

	COLORADO BASIN	GUNNISON BASIN	YAMPA-WHITE-GREEN BASIN
FISHING			
Participants	316,660	161,433	72,844
Days	2,200,010	733,176	452,429
SNOW SPORTS			
Participants	587,198	210,809	30,231
Days	1,094,509	N/A	N/A
WATER SPORTS			
Participants	509,768	89,131	107,880
Days	3,989,369	391,790	360,857
ALL WATER-BASED RECREATION			
Participants	2,722,032	974,253	508,231
Days	18,240,168	4,437,206	2,027,927
ECONOMIC IMPACT OF ALL WATER-BASED RECREATION			
Total GDP (\$M)	\$2,092.2	\$480.7*	\$232.1*
Total Jobs	26,768	6,150*	2,970*
Total Wages (\$M)	\$1,275.9	\$293.1*	\$141.6*
Total State/Local Tax Revenues (\$M)	\$272.4	\$62.6*	\$30.2*

Notes: (1) The Colorado Basin includes Eagle, Garfield, Grand, Mesa (partial), Pitkin and Summit counties.

(2) The Gunnison Basin includes Gunnison, Hinsdale, Mesa (partial), Montrose and Ouray counties.

(3) The Yampa-White-Green Basin includes Moffat, Rio Blanco and Routt counties.

(4) N/A – Not Available. Number of activity days for Snow Sports in the Gunnison and Yampa-White-Green Basins could not accurately be estimated due to non-disclosure rules/limited responses.

(5) The economic impacts presented for All Water-Based Recreation include direct, indirect and induced economic effects.

BOATING

During warm weather periods, private and commercial boating activity occurs throughout the Headwaters Counties. Commercial rafting data for specific river stretches located in Headwaters Counties is provided in Table 3.3.⁶⁶

Commercial rafting is especially active in Grand County in the upper stretch of the Colorado River. Of course, private boating is also quite popular in the Headwaters Counties.

The comparison of minimum to maximum year user days largely illustrates the variable magnitude and timing of stream flows and the vulnerabilities of this industry. Rapid snowmelt and earlier runoff can adversely affect the recreational boating activity levels.

Kayaking, especially whitewater kayaking of mountain streams in the Headwaters Counties, remains a popular sport. Routt County has the Steamboat Run. Gunnison County has the Gunnison Whitewater park. Avon and Vail have whitewater parks. Pitkin County has the Roaring Fork River and Gorge. Three new whitewater parks have been constructed since 2012: Gore Canyon Whitewater Park in Grand County, the Town of Eagle's Eagle River Park, and the Pitkin County Healthy Rivers Whitewater Park.

Since 2012, standup paddleboarding (SUP) has emerged to become an important surface water activity in the Headwaters Counties, as well as elsewhere in Colorado, with large bodies of flat water and even certain streams.⁶⁸ Active SUP sites include the Slate and East Rivers in Gunnison County and the North Star Preserve on the Upper Roaring Fork River in Pitkin County. Grand Lake and Blue Mesa Reservoir are major SUP attractions. No data on this sport has been published at this time.

Reduced water flows are particularly harmful to rafting, kayaking, and SUP activities and the economic contribution that comes with them. In July 2025, Pitkin County implemented a voluntary float closure at the North Star Nature Preserve. The 2026 Go Pro Mountain Games scheduled in Vail, including kayaking, rafting, and SUP events, will need to be moved 30 to 60 miles away while other boating events will be cancelled.⁶⁹ Watercraft can hit rocks and bottom out, causing safety and river habitat issues and even risk of trespassing.

TABLE 3.3 • Commercial Rafting Activity and Economic Impact⁶⁷

COUNTY	RIVER STRETCH	ANNUAL USER DAYS (2010-2024)		TOTAL USER DAYS (2024)	TOTAL ECONOMIC IMPACT (2024)
		Minimum	Maximum		
EAGLE	Eagle - Upper	13	1,640	399	\$168,021
	Eagle - Lower	227	8,851	8,801	\$3,706,151
GRAND	Colorado - Upper	33,866	50,681	35,183	\$14,815,759
GUNNISON	Gunnison - Upper	794	4,170	794	\$334,358
	Taylor	9,891	15,234	12,991	\$5,470,583
PITKIN	Roaring Fork - Upper	112	6,751	3,726	\$1,569,040
	Roaring Fork - Lower	221	7,245	2,206	\$928,959
ROUTT	Green / Yampa	3,755	15,645	5,636	\$2,373,351
SUMMIT	Blue	0	11,006	2,252	\$948,330
HEADWATERS COUNTIES					\$30,314,552

Note: Total economic impact includes estimates of direct user spending, plus indirect and induced effects of the circulation of direct expenditures throughout the local economy.

FISHING

The Headwaters Counties are home to many high-quality fishing locations, including Gold Medal Waters (GMW).⁷⁰ As of 2026, approximately 363 miles of water across 12 rivers and three lakes in Colorado have GMW designation. Gold Medal Waters located within the Headwaters Counties are identified in Appendix D.

A number of changes have occurred in the designations of Colorado's GMW since 2012. GMW stream miles more than doubled since 2012.⁷¹ Additionally, certain river segments within the State have been added to the Gold Medal Waters list since the 2012 Report. A second section of the Gunnison River spanning 12.5 miles between Gunnison and Almont and a 20-mile section of the Taylor River below Taylor Reservoir received GMW designation in 2023. In 2016, a second segment of the Colorado River between Canyon Creek and Rock Creek was added, bringing the total length of GMW on the Colorado River to approximately 40 miles.

While the Headwater Counties' many GMW attract anglers across the world, these waters run considerable risk from the myriad threats to streamflow and flatwater levels. Waters maintain Gold Medal status only as long as habitat and fish populations remain substantial. If conditions deteriorate, such as water stress from reduced stream flows or serious drought, trout habitats will worsen and fisheries risk falling below Gold Medal standards. Of note, a 19-mile stretch of the Blue River between Silverthorne and Green Mountain Reservoir lost its Gold Medal status in 2016. CPW downgraded that stretch of the river after prolonged monitoring showed degraded habitat, unnatural stream flow and sparse aquatic invertebrate populations.⁷²

In addition to GMW, fishing occurs in numerous other locations across the Headwaters Counties. In 2024, CPW added the "Colorado Quality Waters" (CQW) designation for bodies of water that provide great fishing with public access but do not meet the minimum biomass and density standards for Gold Medal designation. There are currently 52 waters with CQW designations, including eight rivers that also have segments with Gold Medal status.

Rising temperatures and lower stream flows will negatively affect angling, which will reduce participation and associated economic contribution. Headwaters Counties have experienced river closures to protect fish populations in recent years. Emergency closures, implemented by Colorado Parks and Wildlife, are mainly voluntary in nature and can be triggered when water temperatures rise above 71 degrees or when flows drop below 50 percent of average. Closures were rare until 2018, which was a particularly hot and dry summer. In recent years, closures have occurred on the Colorado, Yampa, Fraser, Crystal, and White rivers, among others.⁷³ The fishing industry is threatened by high temperatures, low stream flows, and environmental events such as mudslides or wildfires.



WINTER SPORTS

Headwaters Counties are home to multiple resorts offering a wide range of winter activities including skiing and snowboarding. The State reported 13.8 million ski visitor days in 2024, almost a quarter of the nation's total.⁷⁴ According to a study by RRC associates, the Colorado ski industry generated about \$4.85 billion and 51,000 jobs in the 2022-2023 season, which benefitted from adequate timely snowfall.⁷⁵ Approximately half the skier-days were enjoyed by out-of-state residents, indicating the benefit a healthy ski industry has on Colorado. The majority of the larger ski areas and resort communities are located in the Headwaters Counties. In Summit County alone, the economic impact of winter sports was \$1.2 billion in 2022.⁷⁶ Vail Resorts employs 7,500 people in Colorado. Aspen Ski Company's Pitkin County economic impact was \$1.8 billion in that year, employing 4,200 people. The ski industry is the primary economic stimulus for the Headwaters Counties in the winter months, and the strength of that stimulus helps drive these economies year-round.

Importantly, the Colorado ski industry cannot rely on natural snowfall alone. The resorts must have the ability to create manmade snow when natural snowfall is insufficient to support a high-quality visitor experience. Table 3.4 lists the ski areas and their estimated present and future snowmaking water needs.

The 2025/2026 ski season offered a sample of what challenges climate change and variation can present. Snowpack was about half the long-term average, closing ski runs, reducing employee hours, and reducing expenditures. Seven ski areas closed early.

Warmer falls and earlier snowmelt translate to increased snowmaking and potentially shorter seasons for the Headwaters Counties' ski resorts. Several ski areas within the Headwaters Counties (Grand, Summit, Eagle, and Pitkin) in Colorado have recently completed or are actively planning significant snowmaking expansions to combat variable natural snowfall. The following resorts are planning to expand snowmaking activities: Winter Park and Granby Ranch in Grand County; Copper Mountain, Arapahoe Basin, and Keystone Resort in Summit County; Vail Mountain in Eagle County; and Aspen Snowmass Ski Resort in Pitkin County. Other resorts have not announced massive snowmaking expansions for the 2026/2027 seasons, however, they are continuously upgrading current infrastructure and expanding terrain, which will likely result in the need for more snowmaking in the future. The economics of these ski resorts, operating at their present scale, would be at risk if ski seasons become too short.

TABLE 3.4 • Ski Areas and Snowmaking Demands, Headwaters Counties⁷⁷

COUNTY	SKI AREAS	SNOWMAKING DEMANDS (AF)		
		BASELINE	2050	INCREASE
Eagle	Beaver Creek Resort, Blue Sky Basin, Ski Cooper, Vail Ski Resort	1,310	1,310	0.0%
Grand	Granby Ranch, Ski Idlewild, Winter Park Resort	360	630	75.0%
Gunnison	Crested Butte Mountain Resort	270	650	140.7%
Pitkin	Aspen Highlands Ski Resort, Aspen Mountain Ski Resort, Buttermilk Ski Resort, Snowmass Mountain Ski Resort	1,000	1,000	0.0%
Routt	Steamboat Ski Resort, Howelson Hill Ski Area	290	570	96.6%
Summit	Arapahoe Basin Ski Area, Breckenridge Ski Resort, Copper Mountain Resort, Keystone Resort	1,610	2,880	78.9%
TOTAL		4,840	7,040	45.5%

Note: Routt County is currently in the formal review process of a new resort called Stagecoach Mountain Ranch which will rely heavily on snowmaking.



Agriculture

Agriculture, the most water-intensive and most consumptive of the Headwaters Counties' economic sectors, helps establish the character and identity of the region, and contributes to the local economies. Agriculture requires water where and when needed, in the proper amount and quality. In western Colorado, operators are often required to deficit irrigate or deliberately use less water on the crops than those crops actually need for maximum growth, which limits production, and dampens the potential for full economic benefits.

FARM AND RANCH LAND IN THE HEADWATERS COUNTIES

Agriculture in the Headwaters Counties is dominated by high-altitude, cool-weather products. The growing season is short, and level terrain is limited in the Headwaters Counties, so most of the agricultural land is dedicated to supporting livestock rather than traditional row crops. Hay, specifically alfalfa grass, is by far the most common crop across all the Headwaters Counties. About one fifth of the land in Headwaters Counties is dedicated to privately owned agriculture. Routt County has a large agricultural presence, with almost 670,000 acres of farmland including ranching, or about 44 percent of the county. Almost 60,000 of these acres are under irrigation. Summit County has the smallest amount of farmland acres (about 17,000 acres) and the smallest number of irrigated acres of the Headwaters Counties.



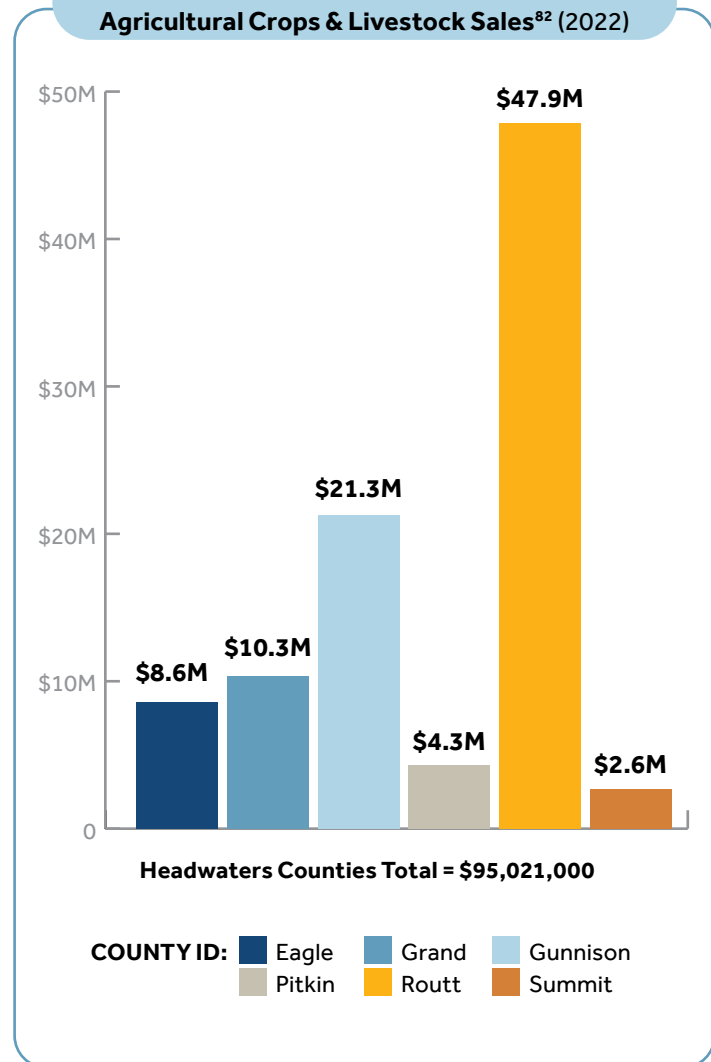
ECONOMIC OUTCOMES

About 2,000 people are employed within the farming and livestock sector in the Headwaters Counties, amounting to about one percent of total Headwaters Counties' employment.⁷⁸

In 2022, the Headwaters Counties produced more than \$95 million in market value of agricultural crops and livestock sales, ranging from about \$2.6 million in Summit County up to about \$47.9 million in Routt County, as shown in Figure 3.5.⁷⁹ Livestock makes up the bulk of agricultural sales, however the hay grown on irrigated land supports the animals. In the same year, the State's total market value of agricultural products sold was \$9.22 Billion.⁸⁰

Agriculture plays an indirect but important role in the Headwaters Counties' economies by supplementing the forces of attraction for visitors. Rural, agrarian lifestyle and aesthetics work in combination with vast, undeveloped public lands and recreational amenities to bring visitors who recreate in the counties.⁸¹ In this way, agriculture is a key ingredient to economic development in the Headwaters Counties.

FIGURE 3.5 • Market Value of Agricultural Crops & Livestock Sales⁸² (2022)



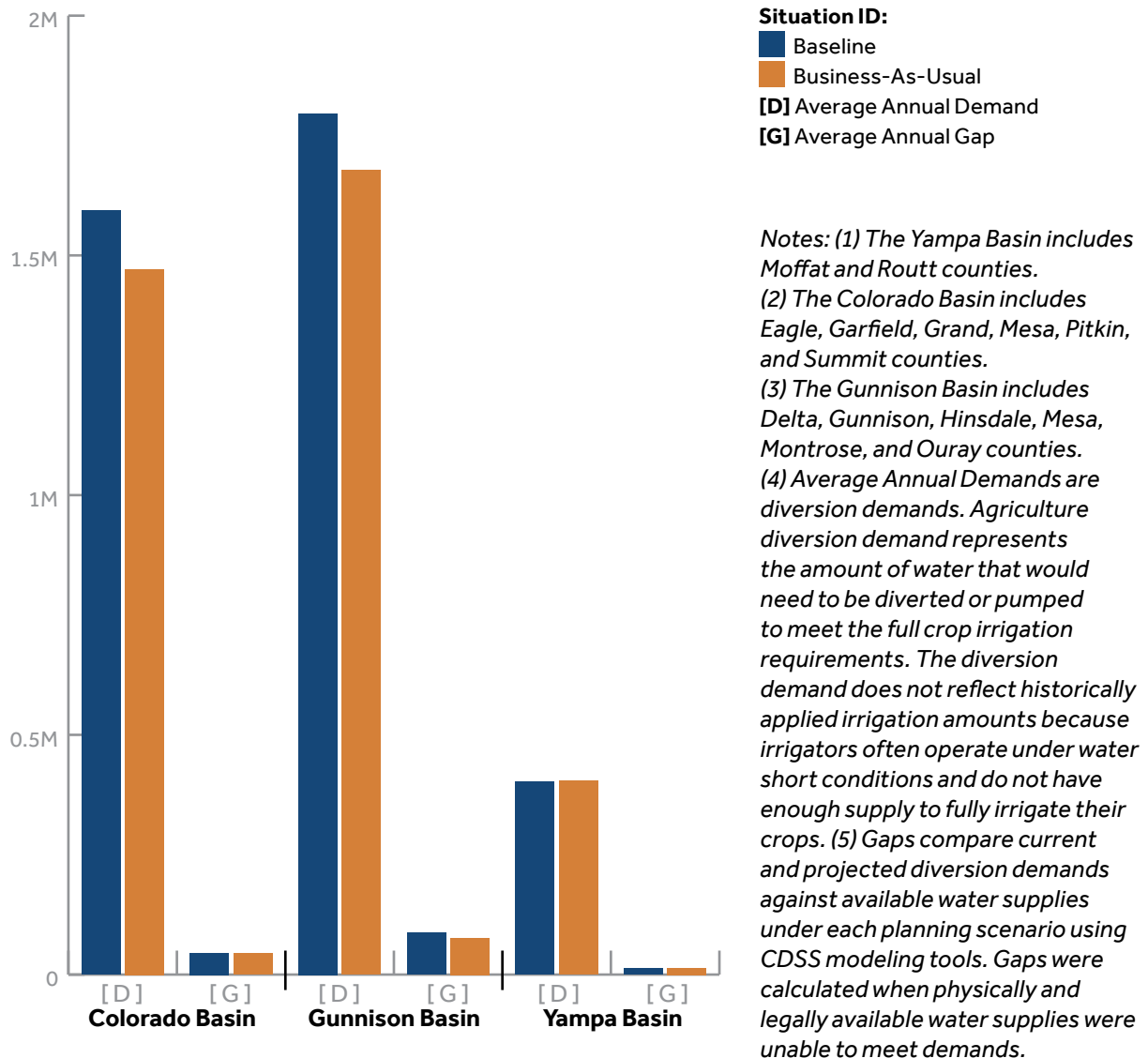
AGRICULTURAL WATER DEMANDS AND FUTURE NEED

The Colorado, Gunnison, and Yampa-White-Green Basin Implementation Plans (BIPs) offer data about baseline water demands, projected water demands and gaps between demands and available supplies under each Colorado Water Plan planning scenario at the river basin level.⁸³ Figure 3.6 illustrates projected agricultural demands and the projected agricultural water gap by 2050, under the Business-as-Usual scenario. This projected gap represents a future water shortfall where the available water supply is insufficient to meet expected demands. These gaps reflect the potential for agricultural land to be "shorted" on water due to inadequate supplies if no action is taken.

Appendix D of this report offers additional agricultural demand and gap data provided in the BIPs.

Currently, farmers and ranchers operate with a shortfall of water in many years, a situation projected to continue into the future. Those shortfalls, or gaps, result in unrealized economic benefits, both to agricultural operators and businesses that cater to those operators. Not only do the farmers and ranchers live with frequent shortfalls, but they also live with extreme uncertainty, which makes it nearly impossible to plan. Unrealized economic gain includes reduced production, lower sales volume and profit, lower employment, and less economic activity.

FIGURE 3.6 • Projected Agricultural Water Supply Gaps⁸⁴
By River Basin, in annual average, 2050





Extractive Industries

The petroleum and mining industries are water intensive. Oil and gas exploration and production requires large quantities of water for various operational processes. These include hydraulic fracturing (fracking), preparing drilling fluids, and cooling equipment used for injection into reservoirs for secondary recovery. Coal production requires water mainly for coal washing and dust control. These activities primarily occur in just two of the six Headwaters Counties – Gunnison County and Routt County.⁸⁵ Hard rock mining, such as molybdenum, also continues in the Headwaters Counties.

Oil, gas, and coal production is driven by a variety of factors, including national and global demands, costs of recovery and production, state and national regulations, and other considerations. Oil production is a minor activity and is declining in the two active Headwaters Counties.⁸⁶ Natural gas production is relatively modest in both counties but has increased in Gunnison County, amounting to less than one half of one percent of total statewide gas production in 2024. Coal production has decreased substantially in both counties but still comprised about 44 percent of total statewide coal production in 2024. Although volatility in demands and prices can change conditions rapidly, causing “boom and bust” cycles, it appears unlikely that coal production will recover in Colorado.⁸⁷ Appendix D presents the petroleum and coal production levels in Gunnison and Routt counties in 2010 and 2024.

In addition, Routt County contains an operating coal-fired power plant, Xcel Energy’s Hayden Station, which utilizes water primarily for cooling purposes. Unit 1 has approval from the Public Utilities Commission to close in 2028; Unit 2 has been approved for closure in 2027.⁸⁸ Renewable energy projects, such as geothermal development, might occur in the future.

ECONOMIC OUTCOMES

Employment in extractive industries comprises a small component of total employment in the Headwaters Counties, but wages in this industry are generally higher than other local industries such as retail and hospitality sectors. Employment in the Headwaters Counties’ mining sector declined from 1,860 persons in 2010 to 1,160 persons by 2022, consistent with the trend in production levels.⁸⁹

Regarding other economic benefits, Gunnison County and Routt County jurisdictions have received millions of dollars in severance tax revenue and federal mineral lease revenues over the last decade. In 2024 alone revenues from those sources amounted to about \$1.48 million for Gunnison County and more than \$400,000 for Routt County jurisdictions.⁹⁰





Hydropower Generation and Shoshone Water Rights

Another sector that relies completely on water is hydropower generation. Like recreation, this use is non-consumptive. The amount of hydropower depends in part on the amount of water at the plant location. Climate-altered stream flows and transpiration (evaporation and plant water use) from reservoirs can affect the timing and volume of electricity output.

Within the Headwaters Counties, hydropower plants are in Gunnison, Pitkin, and Summit counties, as listed in Table 3.5. Altogether, almost 19 percent of the State's hydropower generation capacity resides in those Headwaters Counties.

ECONOMIC IMPLICATIONS OF THE SHOSHONE WATER RIGHTS

As discussed earlier in this report, the Shoshone Hydroelectric Generating Station located in Garfield County, and the associated Shoshone Water Rights have been gaining intense interest from the Headwaters Counties, other West Slope water providers, and East Slope water suppliers. Under the leadership of the Colorado River Water Conservation District, the West Slope is seeking to purchase the Shoshone Water Rights. Converting these water rights to instream flows would reduce the uncertainty of the continuation of water flows that benefit West Slope interests.⁹²



TABLE 3.5 • Hydropower Plants Located in Headwaters Counties⁹¹

HYDROPOWER PLANTS		GENERATING CAPACITY	PRODUCTION MODE	OPERATOR
Blue Mesa Powerplant (Gunnison County)		86.4 MW	Peaking	Bureau of Reclamation
Ruedi Powerplant (Pitkin County)		5.0 MW		City of Aspen
Green Mountain Powerplant (Summit County)		26.0 MW	Intermediate	Bureau of Reclamation
Headwaters Counties	3	117.4 MW		
Colorado	28	627.7 MW		
Headwaters % of State	10.7%	18.7%		

Note: Eagle, Garfield, and Routt Counties do not have any hydropower plants.

The economic implications of the Shoshone Water Rights, and the West Slope's interest in preserving the present flow regime is emblematic of the economic importance of water flows in the Headwaters Counties:

Recreational Benefits⁹³

These water rights, as currently exercised, can serve to protect the boating and fishing industries on the mainstem of the Colorado River and across the River Basin, which account for \$4 billion in GDP. In 2022, an estimated 150,000 boat riders used the Colorado River from Kremmling and through Glenwood Canyon, contributing over 1,100 jobs.

Agricultural Benefits⁹⁴

If the Shoshone Water Rights were not exercised in the present manor, upstream agricultural diversions, including irrigators in the Roaring Fork Valley, would be adversely affected. Water quality would likely diminish due to higher salinity levels. Together, these effects would reduce economic benefits to West Slope agriculture.

Recovery Program Costs⁹⁵

The federal government costs for maintaining the endangered fish recovery program on the Colorado River would increase if the water flows from the Shoshone Water Rights were lost. Water would need to be leased from other sources at an estimated cost of almost \$2.0 million per year in dry years. Salinity control and consumptive use mitigation costs would result in additional financial burdens for the federal government, amounting to total dry year costs of over \$20 million, or net present value of more than \$600 million, as water demand grows over time.



Public Water Supply and Real Estate Development

Besides the water-dependent economic and recreational activities discussed above, residents, employees, and visitors to the Headwaters Counties require water for human consumption. Public water systems (PWSs) provide potable water to at least 15 service connections, meaning they serve an average of at least 25 people.⁹⁶ The availability and quality of water supplies are key to serving these customers.

There are three types of PWSs: **1. Community** (eg. cities or towns)
2. Non-Transient, Non-Community (eg. schools or factories)
3. Transient, Non-Community Systems (eg. restaurants, parks or rest stops)

A total of 340 PWSs are located within the Headwaters Counties, as shown in Table 3.6. Altogether, the Headwaters Counties include about 15.6 percent of the total PWSs in the State. The availability and quality of water supplies are key to serving these customers.

Each PWS relies on surface water, groundwater, or both to meet public demands. About 80 percent or more of these PWSs are either fully or partially served by groundwater but the groundwater is often linked to or draws from surface water.⁹⁸

Although most municipal water providers in this region have conservation plans, residential and commercial water demands can be expected to increase over time.⁹⁹ As indicated earlier in this report, increasing population, visitation, business growth, and employment will drive municipal water needs in the Headwaters Counties. The Colorado Water Plan provides municipal water demand projections for the Headwaters Counties, estimating an increase of between 15 percent and 70 percent by 2050, depending on the specific planning scenario. These scenario projections are found in Appendix D.

The municipal water systems face at least two fundamental challenges with respect to water supply:

Divertible Water to Meet Future Demands

The Headwaters Counties' PWSs must compete for water along with the water-using economic sectors and TMDs, all of which face increasing needs. Climate change will intensify this competition. Whereas water must be available to meet needs, less water is likely to be available.

Adequate Stream Flows to Accommodate Wastewater Discharge

Municipal return flows must meet water quality standards, meaning that the dilution of wastewater discharge requires stream flows. This is especially problematic for Headwaters communities, where peak discharge driven in part by second homes and during tourist seasons can occur during low flows. Further, wastewater treatment facilities are installing increasingly costly, specialized cooling systems to lower the temperature of treated water (effluent) before it is discharged into streams.

Climate change will likely lead to more low flow conditions, creating a compounding effect on acquiring dependable supplies and meeting wastewater discharge standards.

TABLE 3.6 • Public Water Systems by Type, 2025⁹⁷

LOCATION	COMMUNITY WATER SYSTEMS	TRANSIENT, NON-COMMUNITY	NON-TRANSIENT, NON-COMMUNITY	TOTAL
Eagle County	24	21	3	48
Grand County	24	45	10	79
Gunnison County	20	50	2	72
Pitkin County	27	20	3	50
Routt County	23	22	5	50
Summit County	23	17	1	41
Headwaters Counties	141	175	24	340
Colorado	1,049	963	173	2,185
Headwaters % of State	13.4%	18.2%	13.9%	15.6%

Summary of Headwaters Counties' Economy

The economic picture of the Headwaters Counties is positive and prospects are bright, as long as there are adequate water supplies to sustain them. Year-round population grew by six percent, housing units (including second homes) by 12 percent, employment by 22 percent, and GDP by 37 percent since 2010. Driven by expanding interest in outdoor recreation and a better quality of life, second homes now account for about 40 percent of all dwellings in the Headwaters Counties. Population and employment in the Headwaters Counties are anticipated to grow by 20 percent and 21 percent respectively by 2050, presuming water supplies or other resources do not constrain economic expansion.

All the economic sectors which bring economic well-being to the Headwaters Counties depend heavily on water. Maintaining the recently expanded current levels of activity, much less meeting higher levels, will be the challenge.

Tourism in the Headwaters Counties has expanded substantially over the past decade. There is significant economic stimulus that comes from the tourists traveling to these counties in increasing numbers. We estimate these six counties saw almost 18 million visitors in 2024. Travel spending amounted to \$5.5 billion, and the number of jobs (including multiple job holders) reached about 35,600. The bulk of this economic activity is water-based, including snow sports, fishing, and boating. If water is not available to meet growing recreational needs, one might consider this to be a “gap” in available supply to meet tourism industry needs. This water use is largely non-consumptive; in fact, Headwaters Counties tourism consumes a very small amount for a very large economic benefit. However, for Headwaters Counties tourism to succeed, water must be available in sufficient amounts, exactly when needed, and with adequate quality.

Agriculture consumes more water than any other economic sector in the Headwaters Counties. About one fifth of the land in these six counties is dedicated to growing crops or raising cattle that depend on those crops. An estimated 173,000 acres are under irrigation in the Headwaters Counties. Irrigators are already dealing with a lack of available water. The gap in available water supplies is not expected to decrease in the future.

Petroleum and mining are also water-intensive economic sectors, concentrated in Gunnison and Routt counties. Oil and coal production has declined considerably since 2010; natural gas production has increased in Gunnison County. The nearly 1,200 mining jobs are high-paying, and this sector has brought economic growth benefits to the region. These water demands also have and will continue to diminish.

Hydropower, like recreation, represents a non-consumptive use, but generation depends in part on the volume of water passing through the turbines. About one fifth of the State's hydrogeneration capacity is in Gunnison, Pitkin, and Summit counties.

The intense interest in the Shoshone Water Rights demonstrates the high level of importance and increasing uncertainty of water supply on the West Slope.

Public water systems meet the municipal water needs of residents, visitors, businesses, and employees. These water requirements will increase 15 to 70 percent by 2050 in the Headwaters Counties. The PWSs must compete with the other water-using economic sectors and out of basin diverters, all of whom must deal with the pressures of climate change. These municipal systems must also discharge treated wastewater into streams with adequate flow.

4

Ground Level View of Water & Economy of the Headwaters Counties



Whereas Section 3 provides recently available data and analyses, **an understanding of the economic-water relationship within the Headwaters Counties is incomplete without considering the people who live that relationship each day.** As a major part of this study, HE embarked on a series of interviews with stakeholders in each of the six counties who regularly deal with hydrology and economic conditions. This section summarizes what was learned from these interviews.

Interview Plan

At this study's outset, HE received a list of people from QQ who were knowledgeable about and/or must confront water issues intersecting economic activity during their daily lives. We supplemented this list with suggestions from the original list of interviewees and our own contacts. The goal was to have a representative group of stakeholders from all six counties who could address the key study questions. A total of 28 interviews were conducted, in-person or virtually, during 2024 and 2025. A list of all the stakeholders interviewed is included in Appendix A. Many additional contacts were suggested during the interview period, but HE was limited by time and study resource constraints. Even so, the diversity in professional and geographic backgrounds of those interviewed led to robust and representative survey results.

Each Headwaters Counties' stakeholder was sent a list of discussion questions, a set of economic data, and a hydrologic snapshot (prepared by QQ) for their respective county prior to the interview. A representative discussion guide is found in Appendix B. The data related to economic and hydrologic conditions are summarized in previous sections of this report and detailed in Appendices C and D.

The HE interviews addressed certain essential attributes of water, including quantity, timing, location, quality and temperature, and how they interact with various economic sectors. Specifically, discussions revolved around the current conditions, changes since 2012, and what lies ahead for the Headwaters Counties.



Essential Attributes Affecting Economic Activity

Through the interviews, HE determined essential attributes that affect the economies of the Headwaters Counties. The attributes and consistent responses across all six counties are noted below:

WATER QUANTITY

Declining stream flow and reduced snowpack leading to increasing concern about water availability, especially later summer; climate variability, TMDs, and local development seen as causes.

WATER TIMING

Earlier spring runoff shifting away from peak needs for recreation and agriculture and affecting the ecosystem.

WATER LOCATION

TMDs, other transbasin diversions, and local development leading to shortages in some locations.

TEMPERATURE

Declining run-off and hotter summers leading to rising stream temperatures, resulting in fish kills, algae blooms, stream closures, and wastewater discharge compliance issues.

WATER QUALITY AND WATER SYSTEM HEALTH

Diminished flows, increased development, and traffic leading to higher concentrations of pollutants, mineral contaminants, dissolved solids, and PFAS; confusion about State and Federal standards.





Water quantity

Water availability, a core component of the local economies, was discussed in all the Headwaters Counties interviews and almost always mentioned as a pressing concern. It was repeatedly stated that climate change is exacerbating water shortages and increasing competition for finite supplies, with impacts especially felt by the agriculture and recreation sectors. Water scarcity across the Headwaters Counties leads to recreational closures or voluntary curtailments to protect vulnerable fish populations and stream health. Water users emphasize the need to retain local water rights and flow in rivers, while opposing increased transbasin transfers.

Local population growth and land development pressures are raising concerns about the adequacy of water supplies, but some developments can secure augmentation water. Reservoir operation is key for buffering water supply, with some releases timed for ecological and recreational needs.

“ *Water resources are constraining recreation and economic activity throughout the counties...and the agricultural economy is facing significantly more pressure than in the past. There are a lot of regulatory issues, there are market issues, but the water supply is just another uncertainty that creates pressure on the Headwaters Counties. There’s huge pressure from a water perspective especially as the value of water increases.*

~ Headwaters Counties Stakeholder

”

Eagle County

Rivers experiencing low flows or running dry in places are seen as affecting recreation, economic activity, development, and environmental health in the county. Eagle County stakeholders indicated that increased development and local population growth have heightened competition for limited supplies, highlighting tensions over water allocation between new housing, tourism, recreation, and agriculture. A recurring theme from Eagle County interviewees was the need for expanded storage (e.g., Bolts Lake, LEDE Reservoir) and system upgrades to buffer against increasing variability and scarcity.

Grand County

Grand County is by far the most impacted county with regards to TMDs. Stress on local flows resulting from upstream diversions and out of basin withdrawals were noted. Every Grand County interview pointed out that future demands – driven by local and Front Range population growth, land development, and increased recreation – will push further against existing water availability limits, risking the sustainability of economic growth and ecosystem health.

However, interviewees also described ongoing projects and approaches for adaptive river management to accommodate the new lower and more variable flow regimes. Inside and outside the basin, various interested parties have begun to pursue a goal of “right-sizing” river channels and competing interests’ expectations, given permanently altered hydrologic baselines in Grand County.

Gunnison County

Gunnison County interviewees expressed that they believe the overall water supply in Gunnison County currently supports existing uses but future demand and growth, especially residential and recreational development, may strain availability. Interviewees indicated that large TMDs have not been proposed in Gunnison County yet, which shields the local water supply to an extent. Sharing and balancing the limited water supply across multiple sectors is a growing focus in the county, with collaboration improving over the past decade.

Given its desirable location, Gunnison County respondents noted increasing pressure on agricultural irrigation from development and climate variability. Some are concerned that junior rights holders may face cutbacks. Some respondents perceived recent changes as including loss of agricultural land and change of water rights from agricultural to residential or recreational uses. Priorities include modernizing agricultural infrastructure and maintaining or improving efficient water use.

Pitkin County

Interviewees mentioned increasing pressure and developing conflicts over TMDs constraining the utility of flows. Future demand in the county is expected to rise due to increased recreation, tourism, and population growth; this will further strain available water resources. Uncertainty and variability in supply due to climate change (such as more frequent drought years, unpredictable snowpack, and reduced streamflow) make planning for both economic and resource management extremely challenging in Pitkin County.

Routt County

Although traditionally enjoying sufficient flows, the Yampa River is beginning to experience over-appropriation and scarcity along some tributaries and reaches. The Yampa Basin has historically experienced free river conditions most of the year, but according to interviewees responding to recent river calls, the frequency of those calls on the river are creating a sense of scarcity. Agricultural water users in certain areas are reportedly stressed from drought, altered runoff timing, and scarcity of stored water after extended dry periods. Water augmentation plans are being used more frequently as a resource management tool to serve large developments facing scarcity. While municipal water supplies in Steamboat Springs are currently sufficient, the primary constraints are infrastructure and funding, not water quantity. New water users acquiring existing water rights are focused on environmental flows and streamflow maintenance, which puts a strain on existing allocation priorities.

Summit County

Interviewees are concerned about how reduced snowpack and earlier, shorter runoff seasons have impacted water availability. These phenomena threaten recreation and tourism during both summer and winter.

Summit County interviewees noted increasing demand on water systems due to local population growth, land development, tourism, and a large influx of visitors. This increase caused stress on water supplies and infrastructure in the county. Summit County stakeholders expressed concerns about aquifer depletion and wells going dry in recent drought years, with expensive replacement consequences. The county also experienced challenges in coordination across multiple water providers and special districts, complicating management and conservation efforts countywide.



Timing of Water Availability

When water is available to use or divert (and when it is not) was a central theme of the Headwaters Counties interviews. Changes in patterns for both the accumulation and melting of snowpack were commonly mentioned. Earlier runoff due to warming temperatures was noted as a growing concern, leading to lower flows and water scarcity earlier in the warm season compared with the past. The result is reduced recreational opportunities and increased competition among users. A paramount issue is the uncertainty in water timing and its effects on the utility of economic planning.

Timing of water released from reservoirs affects both stream temperature and opportunities for recreation of all types. New water management strategies are being explored across all six counties, including alteration of the timing of reservoir releases to mitigate temperature impacts. Local adaptive and cooperation efforts aim to retime flows to benefit multiple water uses.

“

Because of the warming, our runoff comes earlier, which means we have a longer season of high air temperatures. That, coupled with so much water diverted to the Front Range, the water that's remaining is spread out into the original stream bed, but it's really shallow and really wide.

~ Headwaters Counties Stakeholder

”

Eagle County

Eagle County stakeholders generally agreed that shifting stream flows away from traditional peak periods creates a mismatch between when water is available and when it is most needed for farming, ecosystem, and/or recreational purposes. Increased temperatures are stretching the growing season, creating opportunities for more hay yields, but causing domestic grass and landscaping to require more water over more days. Multiple respondents discussed increased reliance on reservoirs and engineered solutions to capture snowmelt and release it later in the season to stabilize supplies and support late summer instream flows and water needs.

Grand County

Respondents attributed reduced late summer flows and altered timing of peak water availability to both climate change and hydrologic infrastructure impacted by TMDs. Grand County interviewees described how reservoir release timing, lagged agricultural return flows, and water management now play an outsized role in maintaining instream flows, especially during critical low-flow periods later in summer and fall. Survey respondents called for collaborative, responsive water management to address abrupt water shortages or temperature crises. Examples of management included emergency reservoir releases and coordination among districts during dry spells. County managers must conduct emergency reservoir releases for dam safety emergencies or federal drought responses in addition to local water shortages. Coordination between districts is key to ensure that all parties are working together when facing rising temperatures and supply shortages.

Gunnison County

Changes in runoff were observed as impacting water availability during the growing and recreational seasons. Variability in runoff and precipitation timing has created uncertainty and challenges in planning for all water uses.

Gunnison County respondents identified actions they have taken to deal with these issues. Water managers increasingly rely upon advanced modeling and monitoring tools such as snowpack aerial surveys, climate forecasting, flux towers, and enhanced streamflow models to better predict timing and inform water management decisions. Operators in the county are implementing strategic retention of snowmelt in reservoirs to extend streamflow later into the summer and early fall to support recreation and ecosystem needs.

Pitkin County

A consensus viewpoint of the stakeholders was that earlier runoff creates a mismatch in the timing of high water and peak visitation period for Pitkin County (typically in July). This reduces the amount of water present for key summer recreation and ecological needs. This shift in timing compresses recreation windows (especially for rafting and fishing) and stresses systems accustomed to peak flows in late spring or early summer.

Routt County

Runoff timing is increasingly variable from year to year, complicating irrigation water supply forecasting and management. Climate change projections with earlier runoff and reduced snowpack have credibility and are integrated into the long-term water planning horizons for the county.

Summit County

Less snowpack combined with drier springs are leading to extended base flow conditions persisting over the summer. Public perception can be confused due to contrasting visual cues like snow presence (oftentimes from snow making) in the winter when underlying dry soil and water scarcity have been the norm for long periods of time throughout the county.



Water Location

In addition to the “when,” there is also widespread concern within the Headwaters Counties about the “where” for surface water. Respondents note that over-appropriation and climate change is a bad combination. TMDs dictate that certain waters must be left in the stream and follow an ordained course to senior water rights holders on the East Slope. During the increasingly frequent dry periods, this means that less water is available for diversion. Transferred water (i.e., water right purchases or exchanges) alters local hydrology and may conflict with recreation and ecosystems in the Headwaters Counties.

Where they exist, many of the reservoirs in the Headwaters Counties support multiple uses and users on both sides of the Continental Divide, including municipal water supply, recreation, and agriculture. Location and jurisdictional boundaries create complexity in regional water coordination and economic planning.

Eagle County

Eagle County stakeholders expressed widespread recognition that geographically they are central, so they are inextricably tied to both upstream and downstream water uses, including transbasin and transmountain diversions, as well as interstate compacts. Interviewees emphasized that water systems are deeply interconnected; challenges anywhere in Colorado or neighboring states can have cascading effects locally, especially for stream flows and instream flow rights. Counties, towns, and water districts are working to coordinate regulations, water rights management, and delivery infrastructure to ensure that both urban and rural needs can be met.

Grand County

Large proportions of the headwaters supply are exported out of Grand County, altering the natural distribution. Diversion infrastructure, notably the federally owned Colorado-Big Thompson Project and Denver's Moffat projects, move water eastward and have reshaped both the hydrology and economic geography in Grand County. There is also widespread recognition of increasing local development adjacent to rivers and streams (e.g., Fraser River, Vasquez Creek), which is compressing riparian buffers and elevating the stakes for balancing economic activity with floodplain health and risk.

Gunnison County

Interviewees noted that the Gunnison Basin is mostly isolated from downstream impacts and out-of-basin diversions, which help preserve water within the county. Even so, they indicated that important tributaries and reservoirs, such as the Taylor River, Blue Mesa Reservoir, North Fork of the Gunnison, and the confluence areas, are critical focal points for water and infrastructure management. Federal lands make up a large portion of the watershed, which complicates the location of water need (land use) versus water location. This disparity strongly influences water allocation in Gunnison County.

“If it's a really low water year or a drought year, Denver Water is probably taking a lot of water out of the basin [mountain reservoirs], and it definitely snowballs really fast. If the lake is full, water recreation is big in the county, but there are years rafting companies don't open their business, because there is no water spilling [from the reservoirs].

~ Headwaters Counties Stakeholder

”



Pitkin County

Respondents noted major transbasin diversions result in shrinking local flows, especially during dry years. There is consensus on the importance of maintaining baseflows in local rivers for ecological, recreational, and aesthetic reasons, and concern that overuse and relocation put these functions at risk. Pitkin County interviewees mentioned the geographical overlap with neighboring counties (Garfield, Eagle) and the required coordination. They noted that the interconnected web of water rights and administration remains complex.

Routt County

Important storage reservoirs such as Stagecoach Reservoir are said to play a key role in managing release timing and flows. Stakeholders emphasized the importance of reservoir management, including strategic releases to maintain river health and recreation. The Fish Creek drainage is the primary municipal water source in the county, and its vulnerability to wildfire is a concern. The topic of transbasin diversions was less important to Routt County.

Summit County

Increasingly, pressures from development and housing growth in certain areas are prompting requests to connect to municipal water systems due to county well limitations. Summit County stakeholders expressed issues with water flowing underground in some river sections due to historic dredge mining.



Temperature

Increasing water temperatures are a major concern across all six counties, impacting fish habitat and recreational closures, especially in warm months. The timing and quantity of water releases from reservoirs can influence stream temperatures throughout the Headwaters Counties. Groups throughout the region are exploring temperature-sensitive flow management strategies to protect aquatic life and recreation. Water temperature issues linked to climate change have been increasingly integrated into water resource conversations since 2012. Maintaining minimum flows and timing releases for early in the day can mitigate temperature spikes throughout the stream systems of the Headwaters Counties.

“ With the rising temperature, you may have a decent snowpack on March 1st, but because it’s warmed up and started melting, and the wind is blowing and the water is just sublimating into gas; the snowpack ends up never making it to the stream.

~ Headwaters Counties Stakeholder

”

Eagle County

Temperature standards set by regulatory agencies are creating major infrastructure costs for utilities as they must invest in expensive cooling technology and may face additional compliance burdens. Since 2012, this has been considered as an emerging driver of capital costs in wastewater systems throughout Eagle County. Ecological effects of heat stress on fish and aquatic systems and economic losses in tourism and recreation were consistently cited as serious near- and long-term risks if warming trends continue.

Grand County

Increased water temperatures are making key stretches of waterways unsuitable for trout and threatening the recreation economy. It was also widely mentioned that higher water temperatures and lower dissolved oxygen are leading to fish kills and reduced aquatic invertebrate communities, with cascading effects on fishing and broader ecosystem health. Interviewees connect water temperature issues with greater overall climate and hydrologic variability, anticipating that both episodic events (droughts, heatwaves) and persistent trends will intensify challenges moving forward.

Gunnison County

According to interviewees, water temperature is less a concern for agriculture and more critical for fisheries and recreation in Gunnison County. Cold water releases from reservoirs provide some buffer against temperature spikes in some waterways in the county. Temperature-related regulations on water bodies (e.g., ~53-55°F limits) influence recreational fishery access in Gunnison County. Warmer water temperatures have led to fishing closures in some regional basins but are rarely an issue in the Gunnison Basin currently due to elevation and reservoir management. Climate change uncertainties may increase concerns around temperature variability and related ecological impacts.

Pitkin County

High temperatures are interacting with water quality; naturally occurring metals like copper become more toxic in warmer water, amplifying ecological risk during heat events or low flows in the stream system. Warmer water temperatures and reduced water quantity also change the timing and patterns of recreation in Pitkin County. These have resulted in discussions about extending voluntary fishing restrictions to other uses (rafting, swimming) to protect aquatic resources. All stakeholders suggested that collaborative or emergency responses (e.g., strategic reservoir water releases to cool rivers) are necessary but challenging to coordinate at scale throughout the county.

Routt County

Temperature-related recreational closures (e.g., tubing, fishing) are now managed based on scientific thresholds, often requiring temporary shutdowns during hot low-flow periods. Routt County stakeholders noted proactive management actions including strategic reservoir releases and river shading to lower water temperature downstream. Water temperature increases in Routt County are expected to continue, leading to more frequent closures and increased wastewater treatment costs. Municipal and environmental adaptation efforts continue in the county, though costs and staffing capacity present challenges.

Summit County

All interviewees indicated water temperature changes linked to warming climate trends are influencing aquatic species and ecosystem health throughout Summit County. There are widespread concerns in the county about increasing water temperatures stressing native trout and reducing habitat suitability in stream systems.



Water Quality and Watershed Health

Across the Headwaters Counties, interviewees noted that reduced stream flows correlate with degraded water quality, including increased dissolved solids, causing stress to aquatic ecosystems and complicating wastewater treatment compliance. Climate change accentuates the challenge of maintaining water quality and watershed health. Headwaters Counties' water leaders noted the efforts being made to manage and improve water quality, including collaborative watershed groups and innovative technologies to control the temperature of wastewater discharges. Adaptive management approaches and scientific collaboration are key to addressing the changing water quality parameters throughout the Headwaters Counties.



“*There's a much higher understanding of the impacts on water quality that are caused by lack of water supply. The quantity is clearly impacting the quality of our rivers, and we've got higher temperatures which lead to higher rates of dissolved solids when you're at lower rates of flow.*

~ Headwaters Counties Stakeholder

”

Eagle County

According to those interviewed, Eagle County is considered to have relatively high-quality water. However, some river sections are on the State's "Impaired Waters" 303(d) list, mostly due to legacy mining or increased urbanization. New State and Federal standards, including requirements for cooling effluent, PFAS management, and tighter discharge limits, are seen as both costly and hard to keep up with. Maintaining stream system health in the face of stricter standards is a pressing concern in Eagle County. All interviews mentioned local initiatives for watershed restoration, community education, and more advanced monitoring and conservation efforts as crucial for system-wide health.

Grand County

Grand County respondents emphatically supported multi-partner projects aimed at restoring aquatic health (e.g., removal of sediment, stream channel enhancements). These projects are noted as producing multiple benefits for fisheries, recreation, and water supply infrastructure. Stakeholders saw these as essential compensatory actions for both past and ongoing flow reductions. Each interviewee also acknowledged the hesitation but also recent progress in both agricultural landowner engagement and improved riparian management, especially fencing cattle and altering irrigation practices to reduce direct impacts on streams.

Gunnison County

Gunnison County water quality was generally perceived as good due to the county's location away from the Interstate 70 corridor and limited sources of pollutants like heavy industry. Future land development and municipal growth may challenge water treatment capacities. Aging wastewater infrastructure and tighter regulations present growing concerns for respondents around Gunnison County water system health. Drought conditions and decreased streamflow tend to concentrate pollutants and increase challenges for compliance with water quality regulations. Riparian health, wet meadow restoration, and erosion control projects are actively managed within the county to maintain system health.

Pitkin County

Respondents noted fish kills in sensitive areas like the North Star Nature Preserve, confirming governmental agency findings. Interviewees agreed that lower water quantity means less dilution for pollutants, thus exacerbating water quality issues throughout the county in dry years. Stakeholders also noted that water management across Pitkin County has historically prioritized quantity and availability; water quality has not been effectively integrated into long-term planning. This is increasingly viewed as a risk for both ecosystem and human health going forward. Collaboration across agencies and adaptive management (e.g., innovative reservoir releases to mitigate temperature or dilution crises) are recognized as vital for maintaining system health.

Routt County

Routt County respondents considered their water quality as historically good but there are new concerns due to changing climate and social conditions. Emerging issues include harmful algal blooms and nutrient exceedances. Both issues are expected to come under scrutiny via upcoming State nutrient standards, specifically in reservoirs like Stagecoach. Closures to recreation due to temperature thresholds have become more frequent since 2012. Temperature is affecting wastewater treatment discharge permits, with efforts to mitigate impacts through innovative measures such as water releases from storage and river shading to cool the river. Steamboat Springs has implemented nature-based solutions for water quality and temperature, including river and wetland restoration and tree planting. Nonpoint source nutrient discharge, primarily from agricultural activities, is another focus for current monitoring and management efforts in the County. The overall water system health efforts in Routt County include integrated watershed management plans, funding for infrastructure improvements, wildfire mitigation plans focused on watersheds, and collaboration among local stakeholders and nonprofits.

Summit County

There has been increasing public concern about water contamination, especially since the mid-2010s, through information gained from better monitoring and scientific research. Confusion about federal protections (e.g., PFAs testing) is causing worry about deteriorating water quality in the county. Some respondents noted that Summit County water system infrastructure is aging and lagging growth. Water conservation efforts were also noted, but constrained by perceived abundance, large visitor population, and varied messaging across jurisdictions.

Elevated water temperatures negatively impact recreational uses such as fishing and boating, sometimes leading to stream reach or river closures.

Summary of the Headwaters Counties Interviews

HE conducted 28 interviews with individuals from each of the six Headwaters Counties who could knowledgeably speak to what has changed regarding water and local economic conditions since 2012. These in-depth discussions revealed recurring themes.

The amount of available water has declined

due to a combination of drier summers and falls, earlier snowmelt, increasing demands from vibrant economies, increasing local population and economic growth, and transbasin diversions. This is beginning to impinge upon recreational opportunities and agriculture.

Headwaters Counties respondents clearly see rising temperatures as a growing major concern.

Threats to fish, boating activity, aquatic species, habitat, and the length of the ski season are at stake. Algal blooms and stream closures are widely understood to be “canaries in the coal mine.”

The “when” and “where” of water resources in the Headwaters Counties were recognized as important economic risk factors. Climate change, transbasin diversions, and increasing local demands mean water might not be in a stream when needed (i.e., due to early runoff). Water also might not be where it is needed due to instream use or diversion.

There were, of course, differences between the counties. For instance, counties that are further away from the I-70 corridor perceive themselves to be generally more protected from water issues than other counties due to issues like CDOT road maintenance and visitor overuse. Although not in the I-70 corridor, Grand County respondents recognized the challenges from TMDs.

Headwaters Counties' leaders and the public are increasingly concerned about threats to water quality.

The most widespread water quality threats include the impacts of TMDs, climate change, and past and present land use practices. Based on the interviews, the most common water quality concerns stem from increased water temperatures, altered flow regimes, and elevated metal concentrations attributed to historic mining and mineralized geology.

Headwaters Counties' leaders and a more informed public are increasingly concerned about threats to water quality and deterioration,

whether from mining-related and natural mineralization, lower stream flows, or higher water temperatures. Warmer temperatures and degraded water quality have negatively impacted recreation and fish health as well as county aesthetics.

A universal observation was that the level of uncertainty with respect to water resources rendered economic planning much more difficult.

This will hinder investment in the communities and constrain otherwise promising future county endeavors, such as land planning and economic development.

While also raising environmental issues, reservoirs are seen as increasingly important, functioning as a buffer against these myriad challenges.

There is a growing appreciation for their potential in supplementing water supply, improving the timing of releases, and as a hedge against uncertainty.



5

Summary & Conclusion



This final section is a summary of the foregoing report and HE's conclusions about the prospects for the economic-water relationship in Colorado's Headwaters Counties. This report is an update of a 2012 report; **we have focused on current circumstances of that relationship, how it has changed in the past 15 years, and what is driving that change.** In fact, a myriad of significant influences have emerged or evolved which bear upon the economic-water relationship in the Headwaters Counties: a further evolution of the West Slope economy toward recreation and tourism; climate change; greater competition for water supplies (TMDs and intra-basin); and more multi-level government involvement in the West Slope's water system (State Water Plan, Colorado River Cooperative Agreement, NWCCOG Water Quality Plan update, etc.).

Section 2: Water in the Headwaters Counties

Prepared by Lotic and QQ, this section summarizes key water conditions, risks, and management responses in the Headwaters Counties, with emphasis on transmountain diversions (TMDs), climate change, and mitigation efforts. Snowmelt and rainfall remain the primary water sources in the Headwaters Counties, with limited storage capacity and heavy reliance on seasonal runoff. Water availability is increasingly constrained by variable snowpack and growing demand, particularly during summer months when both irrigation and transmountain exports peak.

Overall, the Headwaters Counties face a convergence of pressures from intensive TMDs, climate-driven hydrologic change, and increasing demand. While these risks are significant and likely to grow, ongoing collaborative management, restoration investments, and policy efforts provide important pathways to mitigate impacts and sustain water resources for ecological and economic uses.

TRANSMOUNTAIN DIVERSIONS

TMDs are a dominant influence on water quantity and river health. Nearly all major Colorado TMD systems originate in the Headwaters Counties, exporting close to 500,000 acre-feet annually with no return flows to the basin of origin. Resulting impacts include degraded water quality, altered hydrographs, higher stream temperatures, habitat loss, and diminished recreation-based economies.

CLIMATE CHANGE

Now more widely understood, climate change introduces compounding risks that further stress already limited supplies. Rising temperatures (projected to increase by roughly 5°F by 2050) are driving reduced snowpack, earlier snowmelt, earlier runoff peaks and higher evaporative losses. Snow water equivalent has already declined across major basins and is expected to drop further. Summer and fall stream flows are projected to decline, while drought, heat waves, and wildfire risks intensify. These changes threaten agricultural productivity, municipal water supplies, aquatic ecosystems, and recreation economies, while also increasing water irrigation demand due to drier soils.



OVERALLOCATION AND ADDITIONAL WATER DEVELOPMENT

The Colorado River system is already operating at a structural deficit, with historical allocations exceeding actual supply. Additional or expanded TMD projects, such as the Moffat and Windy Gap Firming efforts, are expected to further reduce stream flows and limit natural variability.

EFFORTS TO MITIGATE RISKS AND IMPROVE CONDITIONS

Collaborative initiatives such as Grand County's Learning By Doing program bring together East Slope and West Slope stakeholders to implement restoration projects and monitor river health. Infrastructure modifications, such as the Colorado River Connectivity Channel, are restoring habitat connectivity and improving ecological function near major diversion structures. Local watershed groups and governments are investing in habitat restoration, mine reclamation, stormwater improvements, and water quality monitoring, while some jurisdictions are directly acquiring water rights to maintain instream flows. Additional measures include pollution reduction programs, temperature mitigation strategies, and large-scale river restoration projects.



Section 3: Headwaters Counties' Economy & Water

The Headwaters Counties have experienced economic expansion since 2010, driven largely by water-dependent sectors and the region's strong recreational appeal. Population increased from roughly 151,000 in 2010 to about 160,000 in 2023, with projections of nearly 193,000 by 2050, assuming the water and other resources are available where and when needed. The Headwaters Counties' economy is substantial by all measures, considering 17.8 million annual visitors, 139,000 jobs, and gross domestic product (GDP) of approximately \$15.7 billion. Housing growth has outpaced population increases, largely due to second homes and short-term rentals, which now represent over 40 percent of the housing stock.

Across all measures, the unifying feature of the Headwaters Counties' economy is its dependence on water. Population growth, visitation, housing expansion, and economic activity each require reliable water supplies in sufficient quantity, timing, and quality. Seasonal peaks in tourism and second-home occupancy intensify water demand and place added stress on water supply and wastewater systems. As a result, future economic growth remains contingent on the availability and management of water resources, making water both a limiting factor and a foundational asset for the region.

The Headwaters Counties' economy is driven by basic sectors that bring external revenue into the region: recreation and tourism, agriculture, extractive industries, and hydropower generation. Each of these sectors is highly water-dependent, although they differ in the nature and intensity of that dependence.

RECREATION AND TOURISM

Recreation and tourism are a dominant economic force in the Headwaters Counties. Travel spending has increased substantially, by approximately 76 percent since 2013, and supports over 35,000 jobs, or about one-quarter of total regional employment. Central to the region's economic identity, both winter sports and warm-weather recreation are tied directly to water in some form.

Water-based recreation activities occur across rivers, streams, reservoirs, and lakes, and include boating, rafting, kayaking, paddleboarding, fishing, and associated shoreline activities such as camping and wildlife viewing. In 2020 alone, more than 4.2 million participants generated roughly 24.7 million activity days in water-based recreation across the relevant river basins.

These activities experience water-related vulnerabilities. Commercial rafting and paddleboarding fluctuate with streamflow conditions. Fishing, particularly in designated Gold Medal Waters, attracts visitors globally but is highly sensitive to streamflow, water temperature, and habitat conditions; declining flows have already led to downgrades and periodic fishing closures.

Winter sports, including skiing and snowboarding, reported 13.8 million skier-visits in 2024 in Colorado, the majority of which occurred in the Headwaters Counties. Ski resorts depend on natural snowfall and increasingly through snowmaking, which will need to increase with climate change.

Across all these activities, water availability is critical, defined not only by volume but also by timing, temperature, and quality. Variability in snowpack, earlier runoff, and reduced stream flows can diminish recreation levels, disrupt events, and reduce visitor spending. As such, water-based recreation represents a largely non-consumptive but highly sensitive economic sector that delivers significant economic benefit relative to its water use.

AGRICULTURE

Agriculture remains the largest water consuming sector in the Headwaters Counties. The region is characterized by high-altitude, short growing seasons, and a predominance of livestock operations supported by irrigated hay production, particularly alfalfa. About one-fifth of the land base is dedicated to agriculture, with approximately 173,000 irrigated acres. Producers frequently operate under deficit irrigation conditions, limiting crop yields and reducing economic returns. Agriculture plays a critical indirect role in maintaining the rural character and scenic landscapes that attract visitors.

EXTRACTIVE INDUSTRIES

Extractive industries, including oil, gas, coal, and hard rock mining, are present primarily in Gunnison and Routt Counties. These activities are water-intensive but represent a relatively small and declining portion of the regional economy. Employment in mining has fallen from about 1,860 jobs in 2010 to roughly 1,160 in 2022, reflecting broader declines in coal and modest activity in oil and gas. Despite their smaller scale, these industries contribute higher-than-average wages and generate public revenues through severance taxes and mineral lease payments.

HYDROPOWER

Hydropower generation is an entirely water-dependent, non-consumptive sector. Approximately 19 percent of Colorado's hydropower capacity is located within the Headwaters Counties. The economic contribution of this sector depends on the timing and volume of stream flows, which influence power generation levels.



ECONOMIC BENEFITS OF THE SHOSHONE WATER RIGHTS

The Shoshone Water Rights represent one of the most significant economic assets influencing the Headwaters Counties and the broader Colorado River system. These senior water rights maintain critical stream flows in the Colorado River by limiting upstream diversions when flows fall below specified levels.

As a result, these rights provide widespread and multi-sector economic benefits. From a recreational perspective, the Shoshone flows help sustain boating and fishing conditions along the Colorado River, supporting a recreation economy that generates billions of dollars in GDP. For agriculture, the Shoshone Water Rights help maintain downstream water availability and quality. Without ownership of these rights, upstream diversions could increase, reducing irrigation supplies and raising salinity levels. Among other benefits, the federal government obtains benefits from the Shoshone Water Rights by avoiding costs to maintain flows for endangered fish species.

Section 4: Ground Level View

Beyond the hydrologic and economic data, HE sought viewpoints about the various water issues and the local economy through a series of 28 interviews with stakeholders from the Headwaters Counties who live and work through these issues. We identified a representative group among all six counties, following a structured interview guide.

WATER QUANTITY

Water availability, a core component of the local economies, was discussed in all the Headwaters Counties interviews. Declining water availability is the most universal concern, driven by climate change, TMDs and increasing competition for water in general. Respondents believed reduced supply was leading to recreation limits (i.e., closures) and a constraint on economic activity and planning.

TIMING OF WATER AVAILABILITY

In each county, respondents noted an earlier spring runoff which creates a mismatch between water supply and peak demand for the summer recreation and agricultural irrigation season. The result is compressed activity windows and the inability to plan effectively.

WATER LOCATION

Respondents pointed out that where water is located is as critical as how much water exists. TMDs, over-appropriation, and climate change contribute to this problem. Conflicts between Headwaters Counties' water users occur as a result.

WATER TEMPERATURE

Respondents in each county noted rising water temperatures as an issue, stemming from reduced flows and earlier runoff. Fish stress, algal blooms, and waterway closures have been experienced. Higher utility costs to control discharge temperatures were noted.

WATER QUALITY AND WATERSHED HEALTH

A commonly recognized phenomenon is that water quality is declining in tandem with reduced flows. Respondents attribute this to increased temperatures, development, and land use pressures. They note a higher concentration of pollutants, algal blooms, and some confusion about evolving regulatory standards.

Conclusion

The Headwaters Counties have experienced growth and economic development since 2012 and their prospects are bright, but these economies are vulnerable to a myriad of water risks. TMDs have long been a constraint, and they are likely to increase. But increasing climate change and in-basin competition for water have emerged as additional factors posing significant threat. Together, these water risks create a certain precariousness at a time when economic expansion seeks more water resource accommodation.

The Headwaters Counties and other leaders in water policy are aware of these pressing challenges. In response, they are initiating collaborative processes and seeking to build awareness of the challenges the Headwaters water-dependent economies face.

A

Appendix

List of Stakeholder Interviews



A combination of in-person, video and phone interviews were conducted with the following individuals, who provided valuable insights and information related to water-economic relationships in the Headwaters Counties. HE would like to express our gratitude to the interviewees for their time and participation in this study.

NAME	POSITION	ORGANIZATION
Jeremy Rietmann	Town Manager	Town of Gypsum
	Municipal Representative	NWCCOG - Economic Development District
Andy Rossi	General Manager	Upper Yampa Water Conservancy District
Luke Schumacher	Resort Manager	Three Rivers Resort
	Director	Gunnison County Chamber of Commerce
Mark Schumacher	Owner-Operator	Three Rivers Resort
Jon Stavney	Executive Director	Northwest Colorado Council of Governments
Ryan Thompson	Water Superintendent	Town of Frisco
Rachel Tuyn	Director	NWCCOG - Economic Development District
Pete Wadden	Watershed Health Specialist	Town of Vail - Environmental Sustainability
Nina Waters	County Commissioner	Summit County
	County Representative	NWCCOG - Economic Development District
	Chair	NWCCOG - Water Quality/Quantity Committee
Will Yates	District Manager	Buffalo Mountain Metro District
Chiara Zavagno	Water Operator Lead	Town of Frisco
Heather Allen	Community Programs Director	High Country Conservation Center
David Baumgarten	Former County Attorney	Gunnison County
Julie Baxter	Water Resources Manager	City of Steamboat Springs
Kristin Brownson	Public Works Assistant Director	Town of Breckenridge - Public Works
Jessie Burley	Sustainability and Parking Manager	Town of Breckenridge - Public Works
	Vice Chair	Colorado Communities for Climate Action
Kathy Chandler-Henry	Chair	Eagle County Board of County Commissioners
	Chair	Colorado River District
	Eagle County Representative	NWCCOG - Water Quality/Quantity Committee
Sonja Chavez	General Manager	Upper Gunnison River Water Conservancy District
David Costlow	Executive Director	Colorado River Outfitter Association
Scott Cowman	Director of Environmental Health	Routt County
	Vice Chair	Routt County Wildfire Mitigation Council
James Dilzell	Executive Director	Eagle River Coalition
Mike Eytel	Water & Sewer Manager	Town of Silverthorne

Kayli Foulk	Water Quality Specialist	Grand County - Water Resource Management
Mark Helman	Utilities Superintendent	Town of Dillon
Diane Johnson	Communications and Public Affairs Manager	Eagle River Water and Sanitation District
Kirk Klancke	President	Colorado River Headwaters Chapter of Trout Unlimited
	Vice President	Gunnison County Water Information Network
	President	Gunnison County Drought Preparedness Committee
Heather Lewin	Director of Watershed Science & Policy	Roaring Fork Conservancy
Vanessa Lodsdon	Executive Director	Blue River Watershed
Rick Lofaro	Executive Director	Roaring Fork Conservancy
April Long	Director	Ruedi Water Development Committee
	Secretary	NWCCOG - Water Quality/Quantity Committee
Laura Lynch	Water Division Manager	Town of Breckenridge
Sonja Macys	County Commissioner	Routt County
	Engineering Technician	Colorado Division of Water
Katherine Morris	Water Quality Manager	Grand County - Water Resource Management
Ed Moyer	County Manager	Grand County - Water Resource Management
Andy Mueller	General Manager	Colorado River District
David Norris	Director of Business Operations	Eagle River Water and Sanitation District



B

Appendix

Interview Discussion Guide Example¹⁰⁰

1. What role do you see water playing in the local economy / different industries in your county (i.e., agriculture, recreation, economic development, etc.) – now and in the future?
2. What impacts or changes have you seen in the county because of current water challenges / issues (i.e., impacts to development, tourism / recreation, environment, etc.)?
3. How has the local conversation surrounding water – availability, quality, temperature, management – changed in the last 10 years?
4. What are the major concerns surrounding water in your county (i.e., availability, water management, quality, etc.)?
 - Are water resources constraining economic activity in some way? If so, describe how and to what extent.
 - In the future, will water resources be adequate to support economic sectors?
 - Do you anticipate changes in water quality or water temperature? If so, describe how and what effect it will have on economic sectors.
5. What actions have been taken / are being planned / considered to address specific concerns or challenges? What are the plans to meet increasing future demands?
6. How are economic conditions and their relationship to water resources likely to change in the future, given your expectations about:
 - Climate change;
 - Technological change;
 - Land development and increasing demand;
 - In or out-migration to the county;
 - Macroeconomic conditions; and
 - Governmental influence?
7. Refer to climate change slide: Are these changes credible? Would they change your answer(s), and if so, how?
8. How do water challenges in other areas of Colorado (adjacent counties / Front Range) or in neighboring states affect your county?
9. What will be the key drivers to changes in economic activity (recreation, agriculture, growth & economic development, mining sectors, etc.) in the future?
10. How will those key drivers change economic factors in the future?
11. What can be done to improve your outlook on economic or social conditions?

EXHIBIT B.1 • Indications of Climate Change in Colorado¹⁰¹

CLIMATE CHANGE VARIABLE	2000 – 2023 COMPARED TO 1951 – 2000	PROJECTED CHANGE BY 2050 FROM 1971 – 2000	LEVEL OF CONFIDENCE
Spring Snowpack	Lower 3% - 23%	Lower 5% - 30%	Medium
Runoff Timing	Earlier	Earlier	High
Stream Flow	Lower 3% - 19%	Lower 5% - 30%	Medium
Summer Soil Moisture	Declines	Declines	High
Evaporative Demand	Increase 5%	Increase 8% - 17%	High



C

Appendix

Hydrology Overviews for the
Headwaters Counties

Eagle County

EAGLE RIVER WATERSHED

This fact sheet provides an overview of the hydrology of Eagle County and the Eagle River watershed. The fact sheet is a starting point for understanding economic, hydrologic, and watershed health, and is not meant to fully capture the complexity of the Eagle River watershed.

The Eagle River Watershed, depicted in E.C.1, flows from the Continental Divide (which serves as the eastern boundary of Eagle County), westward to the confluence of the Colorado River downstream of Dotsero.¹⁰²

For key sections of the Eagle River and its tributaries, this fact sheet includes a brief description and summary of key influences.

EAGLE RIVER HEADWATERS

This section includes Homestake Creek, where Homestake Reservoir provides water supplies to in-basin water users and transmountain diverters Colorado Springs and Aurora.

KEY INFLUENCES:¹⁰³

- Upstream transmountain diversions and reservoirs alter flows, resulting in a 32% to 38% reduction from natural annual flow volumes in dry years.
- Degraded water quality conditions cause sensitive fish species, such as rainbow trout and sculpin, to be absent.
- Discharges associated with Eagle Mine and urban runoff from Minturn are likely impacting aquatic insect communities.

GORE CREEK WATERSHED

Gore Creek headwaters begin in the watershed to the east of Vail Pass and runs through Vail. The confluence with the Eagle River is downstream of Vail and Minturn.

KEY INFLUENCES:¹⁰⁴

- Town and residential development and the golf course have caused significant alteration to continuity, lateral extent, and structure of riparian forest communities. Water storage and operations of Black Lakes produce modest impacts to the flow regime. Peak flows in dry years have declined 21% relative to natural pre-development conditions.
- There are declines in late summer stream flows between 1996-2020.
- Gore Creek is listed on Colorado's 303(d) list of impaired waterways due to low aquatic macroinvertebrate health index scores, which negatively impacts fishing opportunities. The Town of Vail and partners are working on a 'Restore the Gore' program and will spend around \$1 million per year on restoration efforts.

- Upstream of Vail, on a tributary of Gore Creek, are the Black Lakes Reservoirs operated by Eagle River Water and Sanitation District that provide storage capacity and instream flows.
- Recreation: The Town of Vail hosts the Go Pro Mountain Games every June, which includes activities centered on Gore Creek in the Town.



EAGLE RIVER

The Eagle River mainstem runs from the confluence of Gore Creek, below the Town of Minturn, to the confluence with the Colorado River downstream of Dotsero.

KEY INFLUENCES: ¹⁰⁵

- Upstream water use and management have altered flows on the Eagle River mainstem, with total annual flow volumes in dry years reduced by 22% to 26% compared to natural historic conditions. Peak flows during dry years have also dropped by 20% to 22%.
- The Eagle River from the confluence of Gore Creek down to Squaw Creek, which is just past the Town of Edwards ("Middle Eagle River") has the lowest count of aquatic insects of anywhere on the mainstem Eagle River, which negatively impacts fishing opportunities.
- Water temperatures in the lower reaches of the Eagle River (generally below Wolcott) often approach or exceed WQCD and Colorado Parks and Wildlife (CPW) thresholds for impairment of aquatic life. Due to elevated water temperatures, periodic summer fishing closures have been implemented along sections 2, 3, and 4 of the Lower Eagle, which negatively impacts fishing opportunities.

OTHER NOTABLE TRIBUTARIES

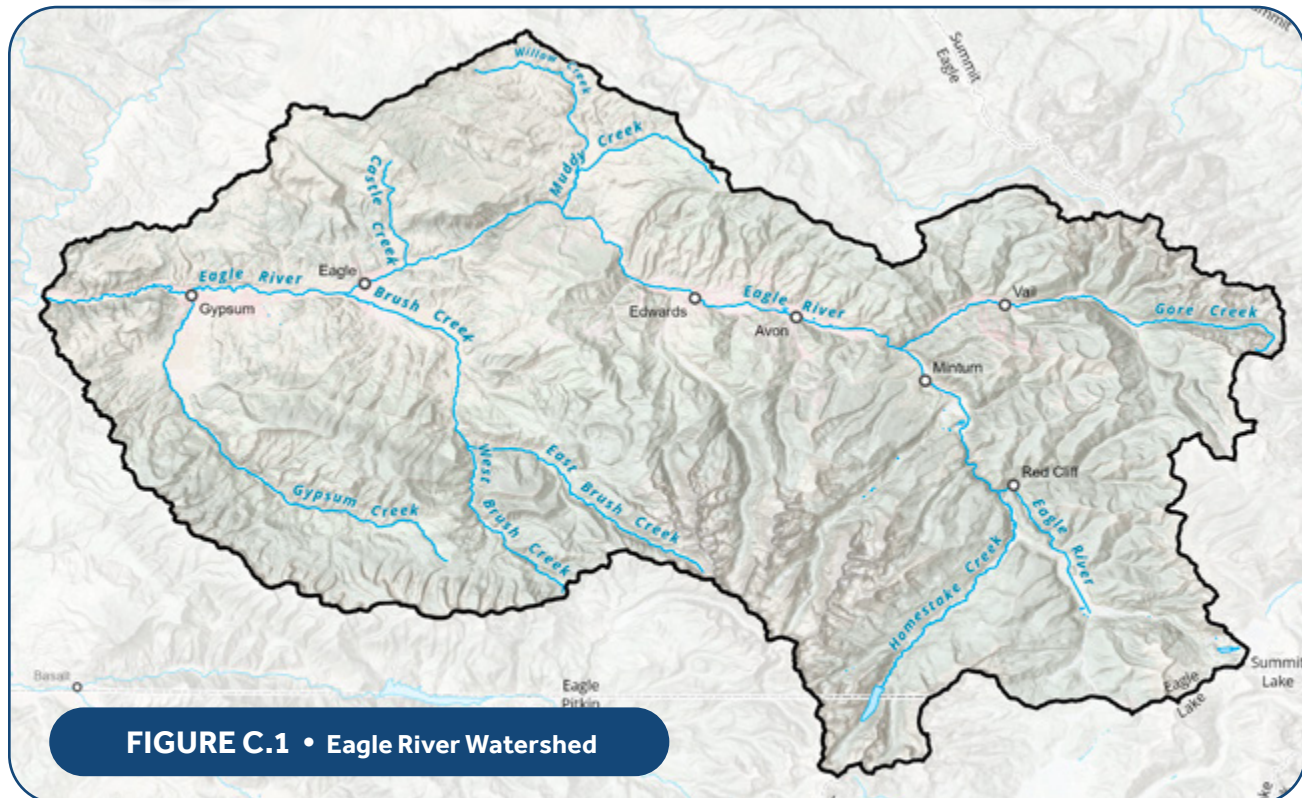
BRUSH CREEK is a tributary of the Eagle River that flows through the Town of Eagle. **Key Influences:** ¹⁰⁶

- Summer baseflows of typical and dry years have decreased 25% to 37% when compared to natural historic conditions. The frequency of years with peaks above the natural 4-year recurrence has decreased by more than 50%.

GYPSUM CREEK is a tributary of the Eagle River that flows through the Town of Gypsum. **Key Influences:** ¹⁰⁷

- The frequency of years with peaks above the natural 4-year recurrence has decreased by 90%. Peak flows during typical and dry years have decreased by 37% to 60% compared with natural conditions. Summer baseflows in average and dry years have decreased by 50% to 80%.
- Barriers to fish passage exist at low flows at multiple locations on Gypsum Creek, which impacts fishing opportunities.

[EAGLE COUNTY CONTINUED]



POTENTIAL FUTURE DRIVERS OF DEGRADATION

The Eagle River Headwaters may experience a transmountain diversion at some future point. In 2021, the Forest Service permitted Colorado Springs and Aurora to conduct exploratory drilling for a reservoir site called “Whitney Reservoir,” which would be located near the Holy Cross Wilderness Area, six miles south of Red Cliff.

There are a host of factors that drive future watershed conditions and impact to the County water resources as well, such as increased municipal water demand, new reservoirs and TMDs, wildfire, urbanization, and climate change. These potential drivers of future degradation have various impacts on the watershed depending on the variable being considered. For example, climate change is generally predicted to negatively impact stream flows, although the precise effects across years and seasons is uncertain. Increased reservoir capacity and TMDs may improve base flows in dry years but may negatively impact peak flows and flushing flows.¹⁰⁸

LOCAL WATERSHED ORGANIZATIONS

Eagle River Coalition

EagleriverCO.org

Formerly the Eagle River Watershed Council

Eagle County Conservation District

eaglecountycd.com

Grand County

COLORADO RIVER HEADWATERS

FRASER RIVER

Fraser River to the confluence of the Colorado River near Windy Gap Reservoir. The Fraser River is the most significant tributary to the Colorado River because of the significant population that lives in the Fraser River Valley (Winter Park, Fraser, and Tabernash), and because of the significant diversions in the tributaries to the Fraser River for Denver Water's transmountain diversion systems. Tributaries to the Fraser River include Jim Creek, Vasquez Creek, St. Louis Creek, Tenmile Creek, and Ranch Creek.

KEY INFLUENCES:

- Water diversions, namely Moffat Tunnel Collection System transmountain diversion, often reduce stream flows below levels needed for proper ecosystem function.¹¹⁰ The Fraser River has a myriad of ongoing water quality issues such as elevated temperatures and low flows.¹¹¹
- Urban activity from the towns of Winter Park and Fraser.¹¹²
- Grazing.¹¹³
- Recreation (i.e., fishing pressure).¹¹⁴
- Impacts from Highway 40. A sediment removal pond that was constructed in 2010 below Berthoud Pass has improved the aquatic environment, especially in the upper sections.¹¹⁵
- A \$30 million project (Colorado River Connectivity Channel) has built a natural river channel around Windy Gap Reservoir to improve aquatic habitat in the Fraser and Colorado Rivers. The Connectivity Channel not only reconnects aquatic habitat but will reduce stream temperatures and restore natural river processes that are currently impacted by Windy Gap dam.¹¹⁶
- Grand County Learning By Doing completed a stream restoration project on the Fraser River in 2017.¹¹⁷

This fact sheet provides an overview of the hydrology of Grand County. The fact sheet is a starting point for understanding hydrologic and watershed health and is not meant to fully capture the complexities of hydrology in Grand County.¹⁰⁹

The Colorado River watershed, depicted in Figure C.2, in Grand County originates in Rocky Mountain National Park and flows westward through Grand County where key tributaries such as the Fraser, Williams Fork, and Blue River add stream flows.

This fact sheet includes a brief description and summary of the key influences in sections of the Colorado River and the Fraser River.

[GRAND COUNTY CONTINUED]

LOCAL WATERSHED ORGANIZATIONS

East Grand Water Quality Board

co.grand.co.us/1380/East-Grand-Water-Quality-Board

Grand County Learning By Doing

GrandCountyLearningByDoing.org

The Grand County Learning By Doing Cooperative Effort (LBD) is a unique partnership of East and West Slope water diverters and local stakeholders in Colorado. LBD emerged from inter-governmental agreements (IGAs) resulting from two water diversion projects, both impacting rivers in Grand County: Denver Water's Moffat Project and the Northern Water Subdistrict's Windy Gap Firing Project. Both IGAs establish a long-term partnership of cooperation, not conflict, among the groups. With a shared vision of river health, LBD cooperatively responds to setbacks in the aquatic environment. LBD engages in a cooperative process to manage aquatic resources by protecting, and where possible, restoring and enhancing aquatic environments.

Grand County Water Information Network

GSWIN.org

Kawuneeche Valley Ecosystem Restoration Collaborative

kvcollab.org

Upper Colorado River Wild & Scenic Stakeholder Group

upcowildandscenic.com

COLORADO RIVER

Colorado River from the headwaters (Rocky Mountain National Park) to the confluence of the Fraser River upstream of Windy Gap Reservoir. This section of the Colorado River sees issues such as excess fine sediment, high stream temperatures, and habitat connectivity.¹¹⁸

KEY INFLUENCES:¹¹⁹

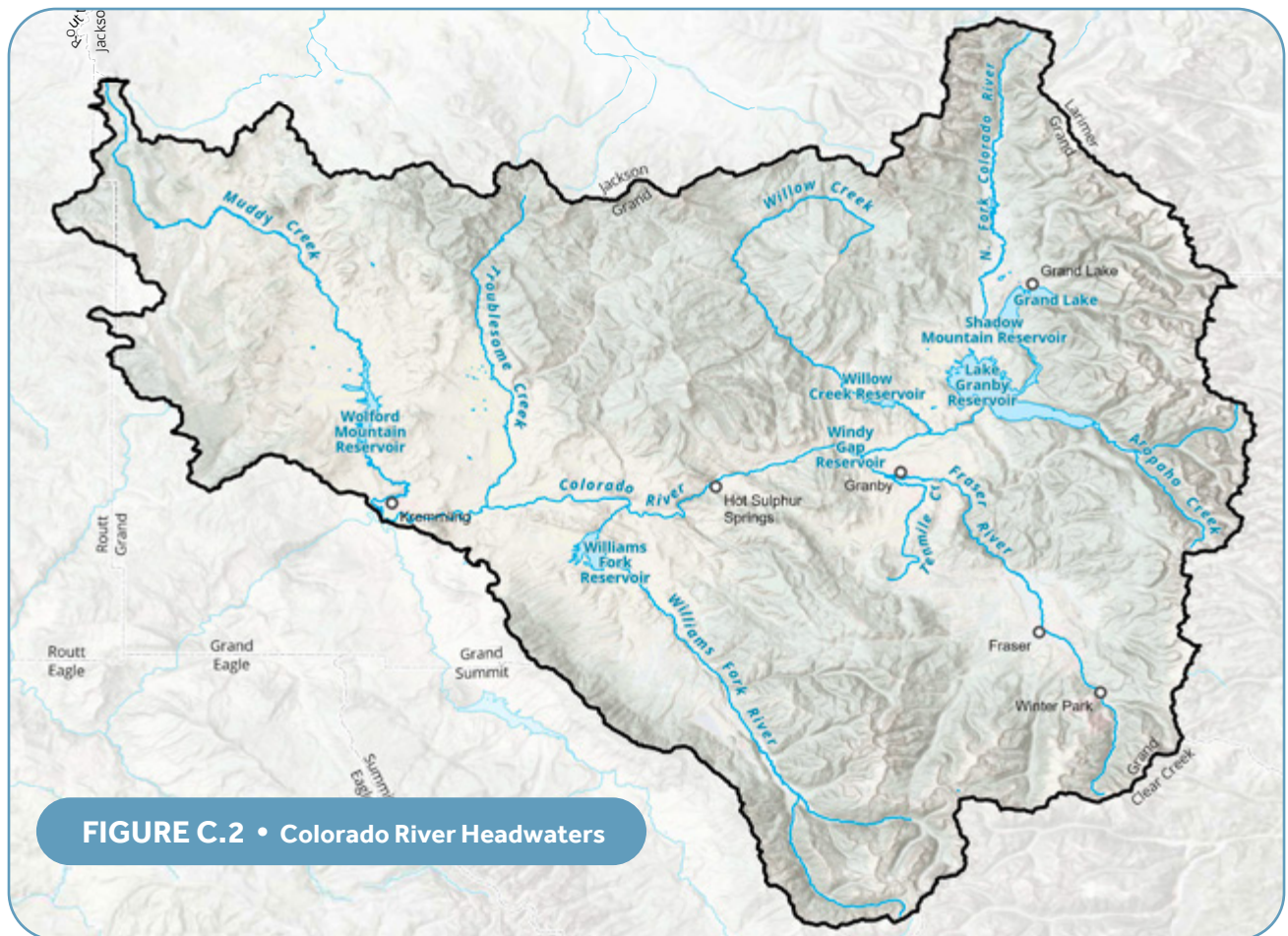
- Water diversions, namely the Colorado-Big Thompson Project transmountain diversion.
- Flows below Granby Reservoir are highly variable due to variable reservoir releases, with low flows failing to meet ecological targets.
- Erosion and altered flow conditions cause habitat degradation.

COLORADO RIVER MAINSTEM

This section has altered natural hydrology, which causes habitat loss, increased sedimentation, and high stream temperatures.

KEY INFLUENCES:¹²⁰

- Altered natural hydrology from historical flow manipulation from transmountain diversions and reservoir operations at Windy Gap Reservoir and Granby Reservoir.
- Agriculture, urbanization, and development have caused riparian habitat loss and increased sedimentation into the river.
- Low flows and climate change have contributed to high stream temperatures, which negatively impacts aquatic life. Increased sedimentation from land use changes has degraded habitat quality.



Gunnison County

GUNNISON RIVER WATERSHED

This fact sheet provides an overview of the hydrology of the Gunnison River watershed in Gunnison County (see Figure C.3). It is a starting point for understanding hydrologic and watershed health and is not meant to fully capture the complexity of the Gunnison River watershed.¹²¹

The Gunnison River originates at the confluence of the East River and Taylor River near the unincorporated town of Almont. From there, it flows southwest through the Gunnison Valley, passing through the City of Gunnison and into Blue Mesa Reservoir—the largest body of water in Colorado—before continuing west through Black Canyon. The river joins the Colorado River near Grand Junction. The Gunnison River is a major tributary of the Colorado River and contributes an average of one-fifth to one-sixth of the Colorado River Basin's total annual flow that leaves the state.¹²² Most of the headwaters of the Gunnison River, including and upstream of Blue Mesa Reservoir, are within the QQ Region.¹²³

THE EAST RIVER

The East River and its tributaries originate on public lands upstream of Crested Butte and joins the Taylor River near Almont. Major tributaries include the Slate River, Coal Creek, and Cement Creek. Key trends and influences include:

KEY TRENDS:

- In low flow years, the Town of Crested Butte lacks enough water to irrigate parks and public spaces.¹²⁴
- Coal Creek is one of the most heavily used tributaries in the East River Watershed and provides drinking water to the Town of Crested Butte. A feasibility analysis is being prepared for the Slate River as a redundant water supply source due to concerns over Coal Creek's vulnerability to wildfires.¹²⁵
- Recreation occurs year-round and is a critical part of the local economy and culture.¹²⁶

KEY INFLUENCES:

- Problematic E. coli levels in the Upper Slate River and Washington Gulch due to improper disposal of pet and human waste, grazing, runoff and irrigation return flows.
- Crested Butte Mountain Resort is a major economic driver and draws water from the East River for snowmaking.¹²⁷
- A history of mining has led to streams that are impaired for a number of metals, such as cadmium, copper, and zinc.¹²⁸

TAYLOR RIVER

Taylor River is a 22-mile river that flows from Taylor Park Dam down to Almont, where it joins the East River. The flow of the Taylor River is controlled by the dam at Taylor Park Reservoir.¹²⁹ Key trends and influences include:

KEY TRENDS:

- In June 2022, the headwaters of the Taylor River were designated as “Outstanding Waters” by the Colorado Water Quality Control Commission.¹³⁰
- In January 2023, 20 miles of the Taylor River below Taylor Park Reservoir and 12.5 miles of the Gunnison River west of the Town of Gunnison at Twin Bridges were designated as Gold Medal waters by Colorado Parks and Wildlife.¹³¹

KEY INFLUENCES:

- Climate change, which has altered snowpack accumulation and snowmelt patterns, has decreased the consistency of Taylor Park Reservoir fills. As a result, there may be inconsistent or insufficient flow levels to meet recreational flow preferences while still fulfilling agricultural uses.¹³²
- Local water managers are implementing demand management strategies in response to drought conditions. Programs like the System Conservation Pilot Program offer financial incentives to water users who reduce consumption, aiming to store conserved water in reservoirs like Blue Mesa Reservoir.¹³³

RECREATION ACCESS:

The Upper Taylor is a mix of public and private lands, and public access is not continuous.¹³⁴ The Taylor River has historically been a hot spot for conflict between private landowners and public river users.¹³⁵ Several private landowners have tried to prevent the public from boating on streams running through their property by erecting physical barriers across the streams.¹³⁶ A few notable public access points include:

- Gunnison has a Whitewater Park located one mile from downtown Gunnison on Highway 50, which is mainly used by kayakers.¹³⁷

- Public access points along the Taylor River include the Taylor River State Wildfire Area (below Taylor Park Dam), Lottis Creek Campground (giving access to lower sections), and other campgrounds.
- Near the confluence of the Taylor and East Rivers in Almont on the east side of Highway 135.¹³⁸
- Van Tuyl Easement near Gunnison.¹³⁹
- Tomichi Creek State Wildlife Area near Gunnison.

TOMICHI CREEK

Tomichi Creek¹⁴⁰ is a major tributary of the Gunnison River that originates near Monarch Pass and flows westward past the town of Gunnison. The valley upstream of Gunnison is marked by agricultural uses. Key trends and influences include:

KEY TRENDS:

- Trout Unlimited and Colorado Water Trust have initiated restoration projects in response to localized dry ups, which cause habitat degradation and barriers to fish movement.¹⁴¹

KEY INFLUENCES:

- The Pitch Mine is an inactive uranium mine located in Saguache County. The mine owners, Homestake Mining Company, have proposed a discharger-specific variance which would allow additional uranium to flow into Marshall and Tomichi Creeks, potentially elevating uranium concentrations in existing domestic wells. The Water Quality Control Commission will consider Homestake's proposal in early 2026.
- The lower portion of Tomichi Creek has a site-specific temperature standard.
- This area is experiencing rapid growth and development.

[GUNNISON COUNTY CONTINUED]

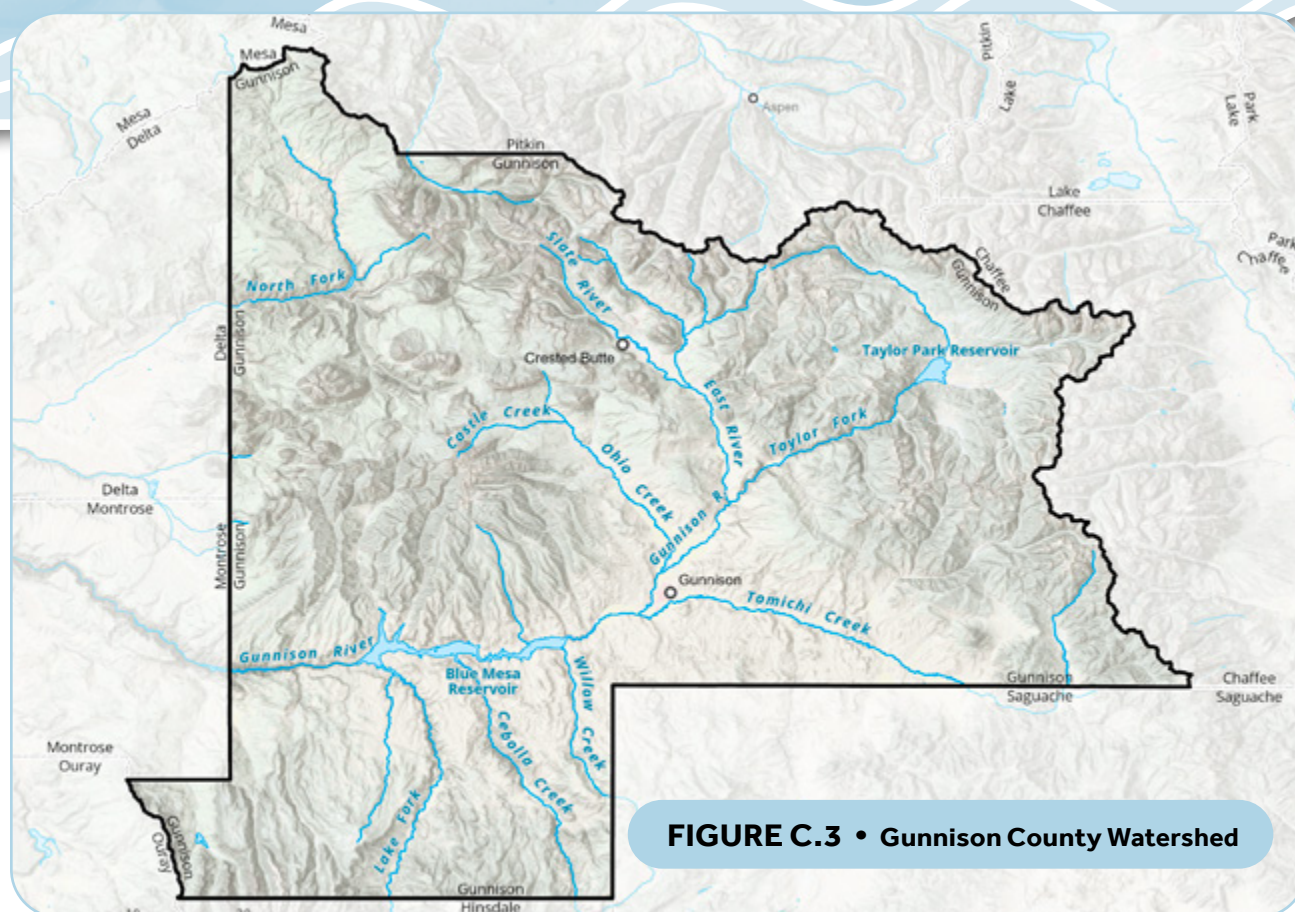


FIGURE C.3 • Gunnison County Watershed

LOCAL WATERSHED ORGANIZATIONS

Upper Gunnison River Water Conservancy District
ugrwcd.org

Gunnison Basin Roundtable
gunnisonriverbasin.org/roundtable

Coal Creek Watershed Coalition
coalcreek.org

High County Conservation Advocates
hccacb.org

OUTFITTERS ON THE TAYLOR AND GUNNISON RIVERS

Three Rivers Resort & Outfitting
3riversresort.com

Scenic River Tours
scenicrivertours.com

AEI Outfitter
aeiflyfishing.com

Western Anglers
westernanglers.com

Pitkin County

ROARING FORK RIVER WATERSHED

ROARING FORK

River Roaring Fork River from headwaters to confluence with the Colorado River in Glenwood Springs.

KEY INFLUENCES:

- Transmountain diversions, diverting water from the upper Roaring Fork watershed to the Arkansas River Basin via the Independence Pass Transmountain Diversion System, reduce annual water yields by approximately 40%.¹⁴³
- Diversions for agriculture and municipal.¹⁴⁴
- Climate change.¹⁴⁵
- Degradation of riparian habitat, 140 of the 185 miles of surveyed streams in the watershed exhibit moderately to severely degraded riparian habitats.¹⁴⁶

FRYINGPAN RIVER

Fryingpan River from its headwaters near the Continental Divide to its confluence with the Roaring Fork River in Basalt is a Gold Medal trout fishery.

KEY INFLUENCES:

- Transmountain diversions divert on average 41% of the Upper Fryingpan Watershed to the Front Range.¹⁴⁷
- Ruedi Reservoir has modified the river's natural flow regime. Ruedi Reservoir was authorized to provide replacement storage to the Western Slope for water diverted to the Eastern Slope. This stored water can be released during times of low flow, which is crucial for sustaining both environmental flows and water supply for municipalities, agriculture, and other uses.¹⁴⁸
- The Fryingpan River is one of the most popular fly-fishing spots in the world, which contributes millions annually to the local economy.¹⁴⁹

This fact sheet provides an overview of the hydrology of the Roaring Fork River Watershed (see Figure C.4) and is a starting point for understanding hydrologic and watershed health. The fact sheet is not meant to fully capture the complexity of the Roaring Fork watershed.

The Roaring Fork Watershed spans approximately 1,450 square miles, originating at Independence Pass and flowing 70 miles to its confluence with the Colorado River in Glenwood Springs. Its main tributaries include the Fryingpan River and Crystal River, which collectively support recreational activities such as fishing, rafting, and kayaking.

Urbanization, climate change, and increased recreational use place additional pressures on the watershed. Key environmental impacts include reduced stream flows, habitat fragmentation, and water quality issues stemming from sedimentation and nutrient runoff.¹⁴²

This fact sheet includes a brief description and summary of key influences for sections of the Roaring Fork River, including major tributaries of the Fryingpan and Crystal Rivers.

[PITKIN COUNTY CONTINUED]

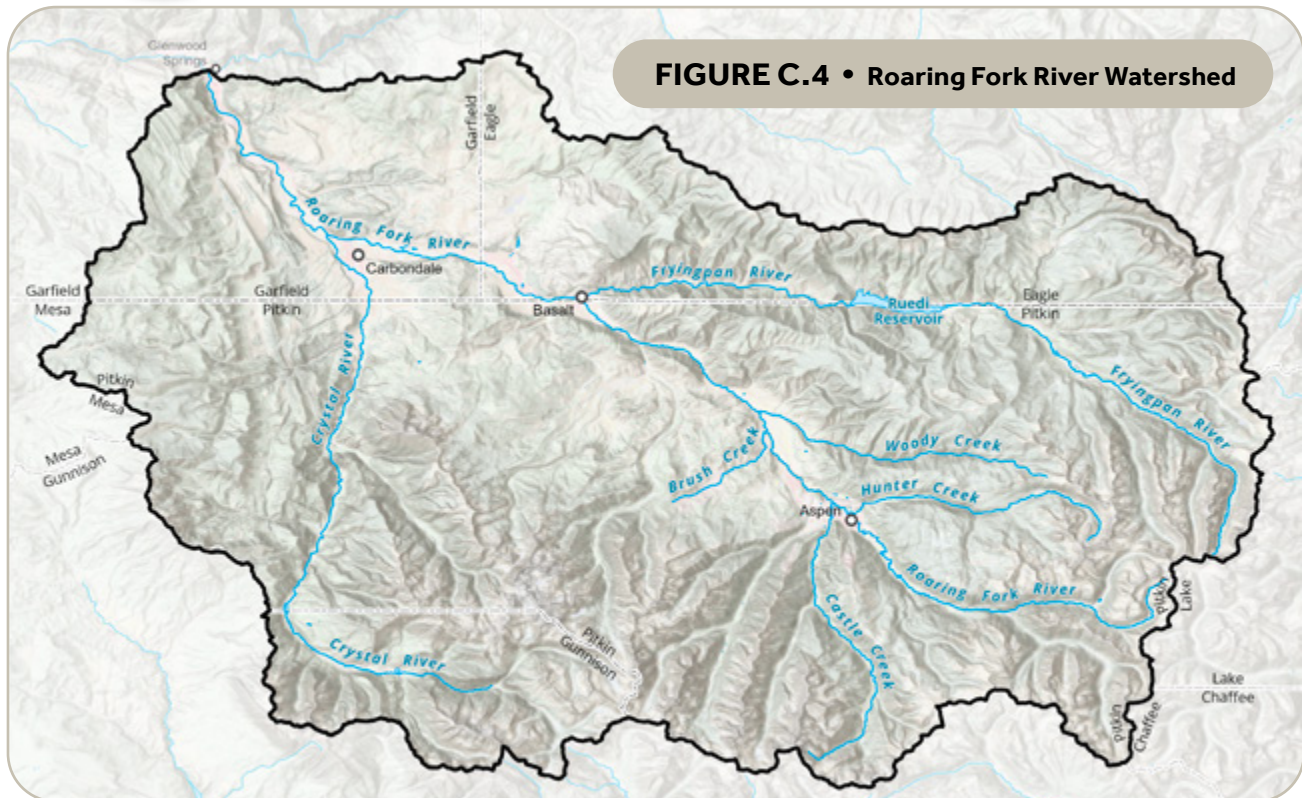


FIGURE C.4 • Roaring Fork River Watershed

CRYSTAL RIVER

Crystal River from its headwaters near Maroon Bells-Snowmass Wilderness to its confluence with the Roaring Fork River in Carbondale.

KEY INFLUENCES:

- In-basin agricultural and municipal water diversions cause reduction in late summer and fall stream flows in the lower Crystal River. Between 1955 and 2000, 66% of the years had stream flows below the Colorado Water Conservation Board's instream flow rights.¹⁵⁰
- Historical mining activities have contributed to water quality issues (elevated levels of iron, selenium, aluminum).¹⁵¹
- A summit organized by the Wild & Scenic Feasibility Collaborative is evaluating community interest in pursuing a Wild & Scenic designation for the Crystal River.¹⁵²

LOCAL WATERSHED ORGANIZATIONS

Roaring Fork Conservancy
Roaringfork.org

Aspen Valley Land Trust
avlt.org/

Ruedi Water & Power Authority
facebook.com/profile.
php/?id=100064679511048

Routt County

YAMPA RIVER WATERSHED

UPPER YAMPA RIVER (SECTION 1)

Upper Yampa River from its headwaters to Steamboat Springs.

This high mountain valley includes the scenic Flat Tops Mountain range and has an active agriculture and recreation community.

Key trends and influences include:

KEY TRENDS:

- Climate change is reducing snowpack in the Flat Tops, which impacts spring runoff and water availability.¹⁵⁴
- The water quality is generally good.¹⁵⁵
- Stagecoach Reservoir, upstream from Steamboat Springs on the Yampa River, is the largest storage facility in the UYRB with a total capacity of approximately 36,500 acre-feet.¹⁵⁶ In recent years, CPW has closed portion of the reservoir due to toxic blue green algae growth, which are increased by "warmer water temperature, long summers and more nutrient pollution in the watershed."¹⁵⁷ Algae growth has also been a problem in Elkhead Reservoir. Community members worry that pending development proposals could worsen water quality in Stagecoach Reservoir.¹⁵⁸

KEY INFLUENCES:

- Four (YamColo, Stagecoach, Lake Catamount, and Sheriff) of the eight reservoirs with an active storage capacity of over 4,000 acre-feet are in this area.¹⁵⁹ Stagecoach State Park leases recreational facilities from the Upper Yampa Water Conservancy District (UYWCD), who manages Stagecoach and YamColo Reservoirs. Oak Creek residents consume surface water that flows from Sheriff's Reservoir.
- The biggest impact on water quality is sedimentation from roads.¹⁶⁰

This fact sheet provides an overview of the hydrology of the Yampa River watershed (see Figure C.5) in Routt County. It is a starting point for understanding hydrologic and watershed health and is not meant to fully capture the complexity of the Yampa River watershed.

The Yampa River in Routt County, Colorado originates in the Flat Tops Wilderness Area and winds through the town of Steamboat Springs, joining the Green River in Echo Park. This river is particularly significant for its relatively undeveloped nature compared to many other Colorado rivers, making it a key asset for local wildlife and a destination for outdoor enthusiasts. The Yampa River is a free-flowing system for almost its entire 300-mile journey to Dinosaur National Monument.¹⁵³ The headwaters of the Yampa River are within the NWCCOG Region, culminating at the Routt County boundary near the confluence of Elkhead Creek and the Yampa between Hayden and Craig.

[ROUTT COUNTY CONTINUED]

UPPER YAMPA RIVER (SECTION 2)

Upper Yampa River through the City of Steamboat Springs. Steamboat Springs is known for its recreation and tourism-based economy. According to the 2023 census, 13,508 people live in Steamboat Springs. The Elk River joins the Yampa River just west of Steamboat Springs. Key trends and influences include:

KEY TRENDS:

- The Yampa River/Walton Creek Confluence Restoration project aims to restore river and floodplain habitat around Steamboat Springs and is on hold due to the federal funding freeze of B2E funding.¹⁶¹
- It is unclear why water temperatures regularly exceed state regulatory standards. Possible causes include loss of riparian vegetation and the warming effects of the shallow Lake Catamount.¹⁶²
- The natural flow regime is in good condition due to few diversions.¹⁶³
- Floodplain connection is significantly impaired in the Chuck Lewis State Wildlife Area and downstream segments. On most sections, the floodplain is inundated only in very high runoff years. Loss of floodplain connection decreases the exchange of water, sediment, organic matter, nutrients, and organisms between the river, floodplain, and alluvial aquifer.¹⁶⁴
- The river is closed for recreational use (tubing and angling) if there are two days of water temperatures higher than 75 degrees or if flows drop below 85 cfs at the stream gage at Fifth Street Bridge, which may impact the local economy.¹⁶⁵

KEY INFLUENCES:

- Most of the municipal water supply is diverted from Fish Creek, directly east of Steamboat Springs.¹⁶⁶
- In 2005, the City of Steamboat Springs was granted a Recreational In-Channel Diversion (RICD) at Charlies' Hole on the Yampa River near Bud Werner Memorial Library. The RICD has associated water rights of up to 1,700 cfs during peak runoff and up to 120 cfs in late summer.¹⁶⁷
- Urban development in Steamboat Springs has reduced riparian vegetation, floodplain connectivity, and stream stability.¹⁶⁸
- Nonnative fish such as northern pike, especially upstream of Steamboat Springs, is the most significant threat to native and sport fish via predation and competition.¹⁶⁹

ELK RIVER

Elk River from its headwaters to the confluence of the Yampa River. This encompasses the Mt. Zirkel Wilderness area, and some upper reaches of Elk River are classified as Outstanding Waters.¹⁷⁰ Key trends and influences include:

KEY INFLUENCES:

- Agriculture is the largest consumptive water user.¹⁷¹
- Water quality issues with E. Coli and mercury.¹⁷²
- Lack of coordination between landowners that are making river modifications.¹⁷³

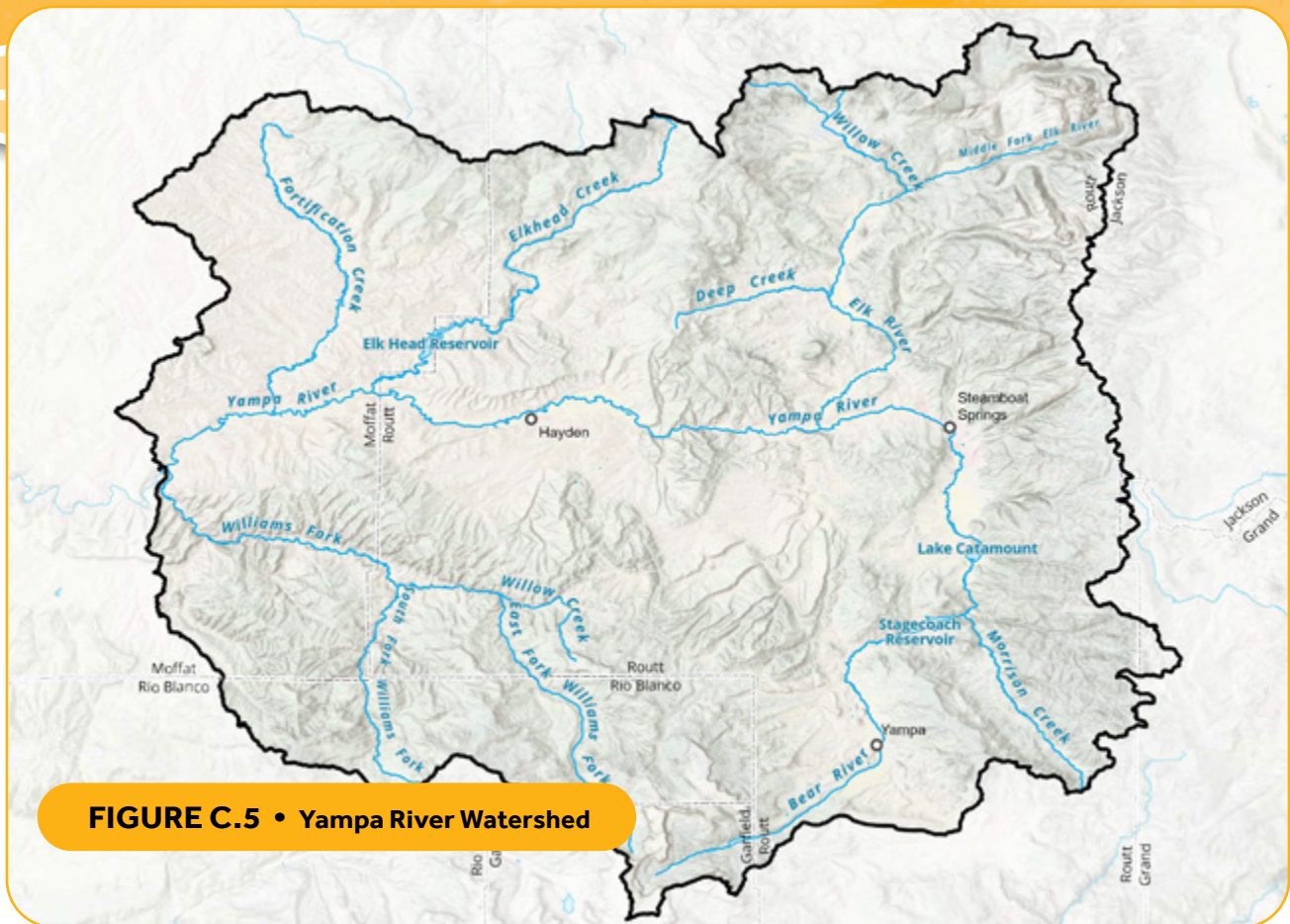


FIGURE C.5 • Yampa River Watershed

MIDDLE YAMPA RIVER

Middle Yampa River from Elk River to Elkhead Creek. Hayden is the largest town in this section with a population of 1,919 according to the 2023 census. Key trends and influences include:

KEY INFLUENCES:

- The Town of Hayden pumps water out of the Yampa River for its municipal water supply.¹⁷⁴
- The oldest water rights on the Yampa River with an 1880 date are located here and are still used to irrigate hay meadows and water livestock.¹⁷⁵
- Excess sediment from erosion caused by overgrazing.¹⁷⁶
- Degraded stream banks and eroding channels, causing the river to move away from major irrigation headgates.¹⁷⁷

LOCAL WATERSHED ORGANIZATIONS

Community Agriculture Alliance
communityagalliance.org

Friends of the Yampa
friendsoftheyampa.com
This organization also manages the Yampa River Fund
yampariverfund.org

Upper Yampa Water Conservancy District
upperyampawater.com

Yampa White Green Basin Roundtable
yampawhitegreen.com

Yampa Valley Sustainability Council
yvsc.org

Note: The portion within the NWCCOG Region is approximately from the headwaters to the confluence with Elkhead Creek between Hayden and Craig.¹⁷⁸

Summit County

BLUE RIVER WATERSHED

This fact sheet provides an overview of the hydrology of the Blue River Watershed (see Figure C.6) and is a starting point for hydrologic and watershed health and is not meant to fully capture the complexity of the Blue River watershed.

The Blue River flows approximately 65 miles through Summit and Grand Counties to the confluence with the Colorado River near Kremmling.

The river plays a critical role in supplying water to both local and regional communities. The Blue River watershed supplies approximately 30% of Denver Water's needs through divisions via the Roberts Tunnel.¹⁷⁹ Dillon Reservoir provides significant storage for Denver Water. The reservoir also serves as a popular recreation spot, offering boating, fishing, and hiking opportunities. Green Mountain Reservoir, approximately 16 miles above the confluence with the Colorado River, provides "compensatory storage" for the Colorado-Big Thompson Project transmountain diversion project, which means its stored water is sent to the "historic user pool" of senior water rights holders in the Colorado Basin to prevent injury.

This fact sheet includes a brief description and summary of influences for key sections of the Blue River and its tributaries.

BLUE RIVER (SECTION 1)

Blue River from its headwaters Blue River from its headwaters to Dillon Reservoir Outlet. The Blue River flows from its headwaters near the Continental Divide through the town of Breckenridge to Dillon Reservoir.

KEY TRENDS:

- Instream flows, which are water rights held by CWCB to preserve the natural environment to a reasonable degree, are met or exceeded 90% of the time.¹⁸⁰
- The fishery appears to be in decline in Sub reach 1.4, while upstream the fishery is exceptionally poor in Reach 1.3, most likely due to fragmentation, low flows, and impaired water quality.¹⁸¹

KEY INFLUENCES:

- Transbasin diversions.¹⁸² Colorado Springs Utilities is proposing to expand its existing collection system by increasing storage on the Continental-Hoosier System. This project could potentially include new or expanded reservoir storage facilities in Reach 1 and the enlargement of Montgomery Reservoir in Park County.¹⁸³ Filling the additional storage would require increased TMD water from the Headwaters Counties.
- Climate change causes changes in snowmelt timing and quantity.¹⁸⁴

- Decimation of riverbed from dredge boat mining activities with more recent efforts to reconstruct and/or restore the streambeds.¹⁸⁵
- Historic mines cause heavy metal contamination throughout the reach. Summit County and the Town of Breckenridge operate a Water Treatment Plan to remove zinc and cadmium at the French Gulch / Willington-Oro Mine site, but state standards are still often exceeded. Various projects continue to address legacy mining.¹⁸⁶
- Urbanization and local municipal use.¹⁸⁷

BLUE RIVER (SECTION 2)

Blue River from Dillon Reservoir Outlet to Green Mountain Reservoir Outlet. The Blue River, bracketed between Dillon Reservoir and Green Mountain Reservoir.

KEY TRENDS:

- The 19-mile stretch between Silverthorne to Green Mountain Reservoir lost its Gold Medal Fishery designation in 2016 due to the failure to meet CPW's biological criteria.¹⁸⁸ Alterations to the flow regime and temperatures below Dillon Reservoir are likely contributing to the decline, at least partially.¹⁸⁹
- The Blue River Watershed Group, in collaboration with Trout Unlimited, is leading the Blue River Habitat Restoration Project to improve aquatic habitats downstream of Dillon Reservoir and restoring Gold Medal fishing status by addressing habitat degradation and enhancing water quality.¹⁹⁰

- Agricultural users in this section are sometimes unable to divert their full water rights.¹⁹¹
- Rafting and float fishing are popular with flows in the 450-700 cfs range.¹⁹² According to the Colorado River Outfitters Association, commercial user days on the Blue River range from 0 (2002, 2012, 2013) to 11,006 (2019) (CROA 2019). This wide range of commercial use may be a result of varied flows that limit commercial operations in Reach 2. In 2019, direct expenditures to commercial operators on the Blue River was just under \$1.5 million, generating an overall economic impact of over \$3.8 million.¹⁹³
- The Town of Silverthorne has obtained a conditional Recreational In Channel Diversion water right of 100 cfs flow for May-September with the ability to call for up to 600 cfs during major holiday weekends to provide enhanced recreational experiences.¹⁹⁴
- Walk-wade fishing is popular, and ideal flows are 100 cfs to 350 cfs (McCormick 2020). In the 2020 TU Angler Survey, 68% of participants indicated being "neutral" or "dissatisfied" with this reach. There is concern among local outfitters about client experience that may impact future visitation.

KEY INFLUENCES:

- Transbasin diversions and flow regulations reduce the volume and timing of flows which may be diminishing habitat conditions.¹⁹⁵
- Urban development.
- Climate change, which is predicted to increase occasional water supply shortages.¹⁹⁶

[SUMMIT COUNTY CONTINUED]

BLUE RIVER (SECTION 3)

Blue River from Green Mountain Reservoir Outlet to the confluence of the Colorado River near Kremmling. Blue River downstream of Green Mountain Reservoir to its confluence with the Colorado River, which is approximately 16 miles long. Most of the land is federal property managed by the BLM and USFS, and agricultural property held in private ownership. Approximately 8 miles of the Blue River is located within the Blue Valley Ranch (BVR), which has implemented a large-scale restoration effort including the installation of grade control structures, bank protection and off-channel wetlands.

KEY TRENDS:

- The BLM finalized a land exchange with BVR, involving the trade of nine federal parcels totaling 1,489 acres in Grand County for nine private parcels totaling 1,830 acres in Grand and Summit counties. As part of the agreement, BVR will fund river restoration projects and provide \$600,000 to Summit County for open space acquisition. While the initiative has received support from local officials and Trout Unlimited, some anglers and advocacy groups have expressed concerns over the loss of certain fishing spots and the potential for future development on exchanged lands.¹⁹⁷
- Private float fishing exists on this reach, but no commercial outfitters are permitted. There are three boat access points but limited public access once floating through this stretch.¹⁹⁸
- The management of Green Mountain Reservoir to meet demands of the "historic user pool" of senior water rights since 1985 has developed an unnatural second peak in the months of Sept. and Oct.

KEY INFLUENCES:

- Rapid flow changes (i.e., ramping) from Green Mountain Reservoir in late summer and fall affects trout spawning habitat and poses a safety risk to recreationists.¹⁹⁹
- Temperature standards exceeded in shoulder seasons due to reservoir operation regimes with unclear impacts to local fisheries and overall system.

BLUE RIVER TRIBUTARIES

Many tributaries are marked by significant impacts from legacy mining (Upper Blue, Swan, Snake, 10 Mile Creek, etc.). Notable tributaries include:

SNAKE RIVER from its headwaters to Dillon Reservoir has a history of mining that has caused poor water quality that does not support fish life.²⁰⁰ The Snake River Watershed Task Force undertook substantial legacy mine remediation over several decades to address water quality issues. Monitoring through 2019 shows substantial reductions in copper, iron, and lead loads and smaller reductions for several other metals below the cleanup work at the Pennsylvania Mine. A growing body of research suggests climate change is accelerating the pace at which acidic water and heavy metals run out of the basin.²⁰¹

TENMILE CREEK, from its headwaters to Dillon Reservoir, is primarily impacted by Climax Mine. Water quality issues due to metal mining activities. Water quality improves below the West Tenmile Creek confluence.²⁰²

STRAIGHT CREEK from its headwaters above Eisenhower Tunnel to the Blue River below Dillon Reservoir, serves as the drinking water supply for Dillon and is impacted by I-70.

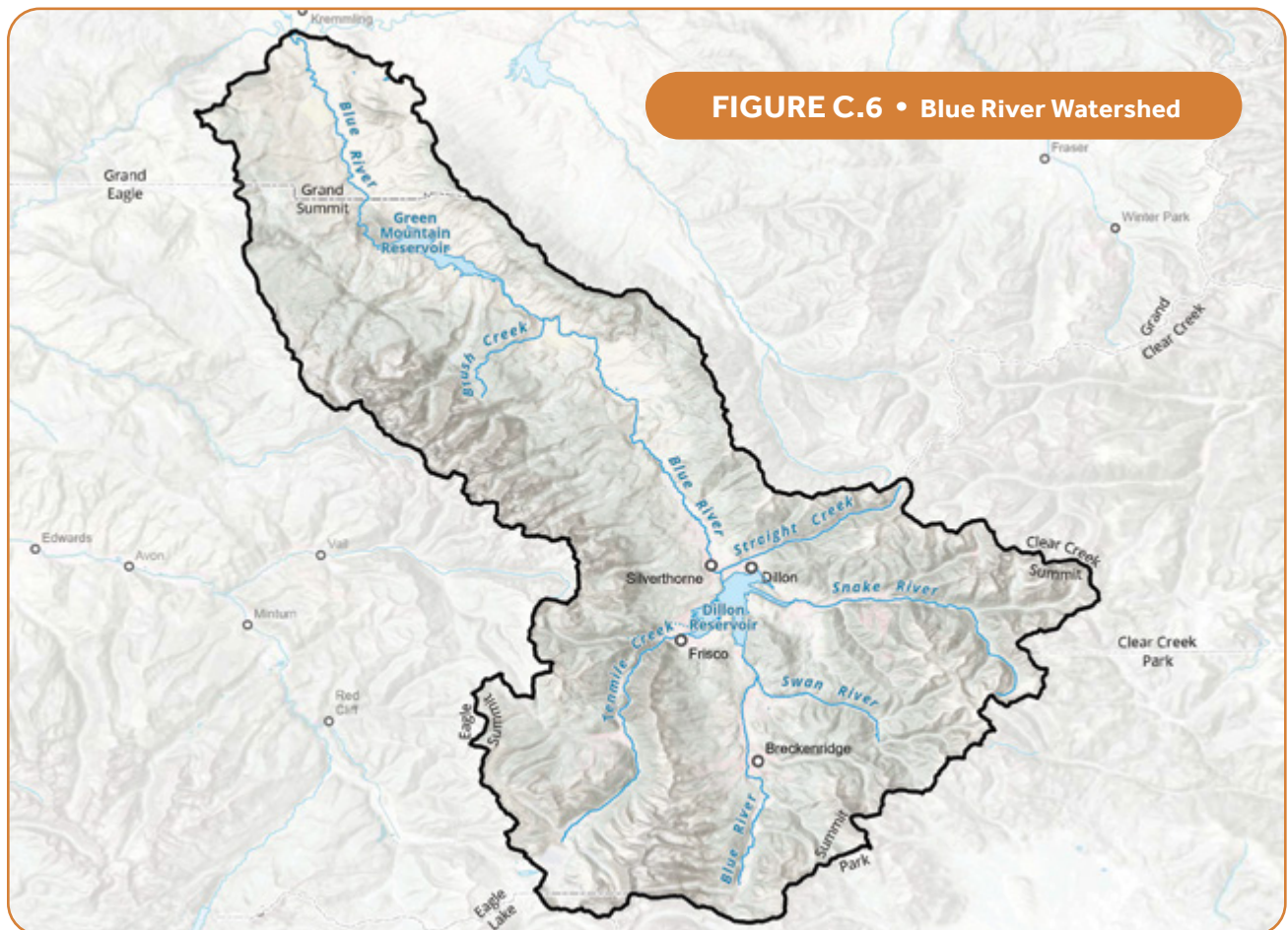


FIGURE C.6 • Blue River Watershed

LOCAL WATERSHED ORGANIZATIONS

Summit Water Quality Committee

Blue River Watershed Group

blueriverwatershed.org

High Country Conservation Center

highcountryconservation.org

Friends of the Dillon Ranger District

fdrd.org

D

Appendix

Select Economic Information About the Headwaters Counties

This Appendix is a supplement to the information presented in Section 3, providing additional data describing the economic activities of the Headwaters Counties.



EXHIBIT D.1 • Gross Domestic Product of Headwaters Counties²⁰³

By Industry, 2023, in Thousands of Dollars

ECONOMIC SECTOR	EAGLE COUNTY	GRAND COUNTY	GUNNISON COUNTY	PITKIN COUNTY	ROUTT COUNTY	SUMMIT COUNTY
All industry total	\$5,071,876	\$1,112,678	\$1,225,711	\$2,823,427	\$2,282,963	\$3,147,916
Agriculture, forestry, fishing & hunting	\$4,771	\$1,917	\$3,565	\$3,365	\$8,485	\$2,120
Mining, quarrying, and oil & gas extraction	\$5,783	\$2,096	\$152,513	\$3,798	\$61,868	(D)
Utilities	\$13,392	\$10,160	\$16,738	(D)	\$176,993	(D)
Construction	\$393,401	\$91,176	\$92,297	\$123,271	\$149,448	\$184,943
Manufacturing	\$51,630	\$11,637	\$13,300	\$8,955	\$16,704	\$30,832
Wholesale trade	\$67,981	(D)	\$7,721	(D)	\$46,490	(D)
Retail trade	\$299,843	\$61,232	\$70,320	\$138,684	\$124,083	\$215,225
Transportation & warehousing	\$152,560	\$8,057	\$82,808	\$37,886	\$38,601	\$25,606
Information	\$53,870	\$8,556	\$24,277	\$49,083	\$30,000	\$47,320
Finance, insurance, real estate, rental & leasing	\$1,602,330	\$505,302	\$283,336	\$819,268	\$710,514	\$1,159,357
Professional and business services	\$526,047	\$47,460	\$94,905	\$370,701	\$224,626	\$276,213
Educational services, health care & social assistance	\$570,837	(D)	\$35,107	\$75,192	\$111,626	\$143,707
Arts, entertainment, recreation, accommodation & food services	\$933,250	\$200,574	\$145,491	\$867,596	\$303,746	\$747,521
- Arts, entertainment & recreation	\$309,389	\$84,357	\$74,180	\$472,833	\$159,399	\$91,466
- Accommodation & food services	\$624,262	\$116,754	\$71,480	\$395,462	\$144,511	\$657,482
Government and government enterprises	\$318,874	\$121,328	\$181,910	\$249,368	\$240,957	\$229,673
Other Services	\$109,525	\$20,945	\$25,535	\$62,193	\$43,052	\$58,812

Notes: (1) GDP is defined as the total market value of all final goods and services produced. (2) Data are presented in chained 2017 dollars.

(3) (D) = Not shown to avoid disclosure of confidential information; estimates are included in higher-level totals.

EXHIBIT D.2 • State Parks and Recreational Reservoirs in the Headwaters Counties²⁰⁴

EAGLE COUNTY	PITKIN COUNTY
Homestake Reservoir (Eagle/Pitkin)	Grizzly Reservoir
LEDE Reservoir	Homestake Reservoir (Eagle/Pitkin)
Ruedi Reservoir (Eagle/Pitkin)	Ruedi Reservoir (Eagle/Pitkin)
Sylvan Lake State Park	
GRAND COUNTY	ROUTT COUNTY
Grand Lake	Elkhead Reservoir State Park (Moffat / Routt)
Lake Granby	Lake Catamount
Meadow Creek Reservoir	Pearl Lake State Park
Monarch Lake	Stagecoach State Park / Reservoir
Shadow Mountain Reservoir	Steamboat Lake State Park
Williams Fork Reservoir	Yampa River State Park (Moffat / Routt)
Willow Creek Reservoir	
Wolford Mountain Reservoir	
GUNNISON COUNTY	SUMMIT COUNTY
Blue Mesa Reservoir	Dillon Reservoir
Lake Irwin	Green Mountain Reservoir
Morrow Point Reservoir (Gunnison/Montrose)	
Paonia State Park	
Taylor Park Reservoir	

Notes: Lake Catamount is part of the private Catamount Ranch and Club.

EXHIBIT D.3 • Gold Medal Fishing Waters in Headwaters Counties²⁰⁵

COUNTY	RIVER / RESERVOIR	DESCRIPTION
Eagle County	Gore Creek	Between Red Sandstone Creek and the confluence with the Eagle River
	Fryingpan River	From the Ruedi Reservoir Dam downstream to the confluence with the Roaring Fork River
	Roaring Fork River	Below the confluence with the Fryingpan until the Roaring Fork joins the Colorado River in Glenwood Springs
Grand County	Colorado River	- Between Windy Gap Reservoir at the Fraser River confluence near Granby and Troublesome Creek - Canyon Creek and extending to Rock Creek
Gunnison County	Gunnison River	Below Crystal Reservoir Dam and extends just beyond the confluence with the North Fork of the Gunnison
Pitkin County	Fryingpan River	From the Ruedi Reservoir Dam downstream to the confluence with the Roaring Fork River
Routt County	Steamboat Lake	1,053 surface acres
Summit County	Blue River	- Between Dillon Reservoir Dam and the Hamilton Creek Road bridge - Below Green Mountain Reservoir Dam and stretching to the confluence with the Colorado River near Kremmling

EXHIBIT D.4 • Oil and Natural Gas Production²⁰⁶

Headwaters Counties and State of Colorado, 2010 and 2024

LOCATION	OIL PRODUCED (BBLs)			NATURAL GAS PRODUCED (MCF)		
	2010	2024	Change	2010	2024	Change
Gunnison County	1,179	337	-71.4%	2,077,657	3,655,639	76.0%
Routt County	65,550	25,016	-61.8%	42,076	29,053	-31.0%
Headwaters Counties	66,729	25,353	-62.0%	2,119,733	3,684,692	73.8%
Colorado	33,180,664	170,315,160	413.3%	1,663,009,088	1,853,317,732	11.4%
Headwaters % of State	0.2%		0.0%	0.1%		0.2%

EXHIBIT D.5 • Coal Production²⁰⁷

Headwaters Counties and State of Colorado, 2010 and 2024

LOCATION	COAL PRODUCTION (TONS)		
	2010	2024	Change
Gunnison County	4,836,531	3,524,045	-27%
Routt County	7,725,525	1,284,609	-83%
Headwaters Counties	12,562,056	4,808,654	-62%
Colorado	25,205,411	11,031,710	-56%
Headwaters % of State	50%	44%	

EXHIBIT D.6 • Colorado Water Plan Municipal Water Demand Projections (2050)²⁰⁸

Headwaters Counties

COUNTY	MUNICIPAL DEMANDS (AF)					
	BASELINE	BUSINESS AS USUAL	WEAK ECONOMY	COOPERATIVE GROWTH	ADAPTIVE INNOVATION	HOT GROWTH
Eagle County	10,449	15,846	14,327	16,147	14,953	18,799
Change from Baseline		52%	37%	55%	43%	80%
Grand County	4,915	7,006	6,430	7,144	6,572	8,280
Change from Baseline		43%	31%	45%	34%	68%
Gunnison County	3,171	4,088	3,163	4,145	4,413	5,635
Change from Baseline		29%	0%	31%	39%	78%
Pitkin County	7,829	8,761	8,006	8,761	8,474	10,606
Change from Baseline		12%	2%	12%	8%	35%
Routt County	6,211	8,779	5,667	8,911	11,060	14,204
Change from Baseline		41%	-9%	43%	78%	129%
Summit County	7,215	8,806	8,212	8,665	7,912	10,044
Change from Baseline		22%	14%	20%	10%	39%
Headwaters Counties	39,790	53,286	45,805	53,773	53,384	67,568
Change from Baseline		34%	15%	35%	34%	70%

Note: Projections for each planning scenario represent the year 2050.

EXHIBIT D.7 • Projected Municipal and Industrial Water Supply Gaps²⁰⁹
By River Basin, in 2050

BASIN	BASILINE	BUSINESS AS USUAL	WEAK ECONOMY	COOPERATIVE GROWTH	ADAPTIVE INNOVATION	HOT GROWTH
COLORADO						
Irrigated Acres	200,700	187,100	187,100	187,100	187,100	187,100
Average IWR (AF)	443,500	412,800	412,800	468,200	454,400	505,000
Average Annual Demand (AF)	1,593,300	1,471,200	1,471,200	1,656,700	1,289,600	1,743,700
% Chg Annual Demand		-7.7%	-7.7%	4.0%	-19.1%	9.4%
Average Annual Gap (AF)	45,200	44,000	44,000	76,700	61,900	104,400
% Chg Annual Gap		-2.7%	-2.7%	69.7%	36.9%	131.0%
Maximum Annual Gap (AF)	146,800	142,700	142,500	173,200	135,600	214,700
GUNNISON						
Irrigated Acres	234,700	220,000	220,000	220,000	220,000	220,000
Average IWR (AF)	531,700	497,600	497,600	577,900	546,400	607,400
Average Annual Demand (AF)	1,796,000	1,677,000	1,677,000	1,967,100	1,307,200	2,040,600
% Chg Annual Demand		-6.6%	-6.6%	9.5%	-27.2%	13.6%
Average Annual Gap (AF)	87,700	76,500	76,700	158,500	110,400	222,300
% Chg Annual Gap		-12.8%	-12.5%	80.7%	25.9%	153.5%
Maximum Annual Gap (AF)	368,800	322,200	322,400	473,300	326,600	596,800
YAMPA						
Irrigated Acres	78,900	78,400	78,400	82,400	92,300	92,300
Average IWR (AF)	151,400	151,200	151,200	191,300	214,900	239,600
Average Annual Demand (AF)	402,500	403,600	403,600	522,500	461,000	684,300
% Chg Annual Demand		0.3%	0.3%	29.8%	14.5%	70.0%
Average Annual Gap (AF)	13,600	13,900	13,900	36,500	50,500	77,200
% Chg Annual Gap		2.2%	2.2%	168.4%	271.3%	467.6%
Maximum Annual Gap (AF)	64,900	63,900	63,700	95,800	104,100	154,300

Notes: (1) The Yampa Basin includes Moffat and Routt counties.
(2) The Colorado Basin includes Eagle, Garfield, Grand, Mesa, Pitkin and Summit counties.
(3) The Gunnison Basin includes Delta, Gunnison, Hinsdale, Mesa, Montrose, and Ouray counties.
(4) Industrial demands include large industry, snowmaking, energy development and thermoelectric sectors.
(5) Average Annual Demands are diversion demands.
(6) Gaps compare current and projected diversion demands against available water supplies under each planning scenario using CDSs modeling tools.
Gaps were calculated when physically and legally available water supplies were unable to meet demands.

EXHIBIT D.8 • Projected Agricultural Water Supply Gaps²¹⁰
By River Basin, in 2050

BASIN	BASILINE	BUSINESS AS USUAL	WEAK ECONOMY	COOPERATIVE GROWTH	ADAPTIVE INNOVATION	HOT GROWTH
COLORADO						
Irrigated Acres	200,700	187,100	187,100	187,100	187,100	187,100
Average IWR (AF)	443,500	412,800	412,800	468,200	454,400	505,000
Average Annual Demand (AF)	1,593,300	1,471,200	1,471,200	1,656,700	1,289,600	1,743,700
% Chg Annual Demand		-7.7%	-7.7%	4.0%	-19.1%	9.4%
Average Annual Gap (AF)	45,200	44,000	44,000	76,700	61,900	104,400
% Chg Annual Gap		-2.7%	-2.7%	69.7%	36.9%	131.0%
Maximum Annual Gap (AF)	146,800	142,700	142,500	173,200	135,600	214,700
GUNNISON						
Irrigated Acres	234,700	220,000	220,000	220,000	220,000	220,000
Average IWR (AF)	531,700	497,600	497,600	577,900	546,400	607,400
Average Annual Demand (AF)	1,796,000	1,677,000	1,677,000	1,967,100	1,307,200	2,040,600
% Chg Annual Demand		-6.6%	-6.6%	9.5%	-27.2%	13.6%
Average Annual Gap (AF)	87,700	76,500	76,700	158,500	110,400	222,300
% Chg Annual Gap		-12.8%	-12.5%	80.7%	25.9%	153.5%
Maximum Annual Gap (AF)	368,800	322,200	322,400	473,300	326,600	596,800
YAMPA						
Irrigated Acres	78,900	78,400	78,400	82,400	92,300	92,300
Average IWR (AF)	151,400	151,200	151,200	191,300	214,900	239,600
Average Annual Demand (AF)	402,500	403,600	403,600	522,500	461,000	684,300
% Chg Annual Demand		0.3%	0.3%	29.8%	14.5%	70.0%
Average Annual Gap (AF)	13,600	13,900	13,900	36,500	50,500	77,200
% Chg Annual Gap		2.2%	2.2%	168.4%	271.3%	467.6%
Maximum Annual Gap (AF)	64,900	63,900	63,700	95,800	104,100	154,300

Notes: (1) The Yampa Basin includes Moffat and Routt counties.

(2) The Colorado Basin includes Eagle, Garfield, Grand, Mesa, Pitkin and Summit counties.

(3) The Gunnison Basin includes Delta, Gunnison, Hinsdale, Mesa, Montrose, and Ouray counties.

(4) IWR = Irrigation Water Requirement.

(5) Average Annual Demands are diversion demands. Agriculture diversion demand represents the amount of water that would need to be diverted or pumped to meet the full crop irrigation requirements. The diversion demand does not reflect historically applied irrigation amounts because irrigators often operate under water-short conditions and do not have enough supply to fully irrigate their crops.

(6) Gaps compare current and projected diversion demands against available water supplies under each planning scenario using CDSS modeling tools. Gaps were calculated when physically and legally available water supplies were unable to meet demands.

FE

Appendix Colorado Water Plan Future Planning Scenarios



The Colorado Water Plan includes descriptions of the five future planning scenarios as provided in this appendix. Further information and data from the Colorado Water Plan relied upon in this report are available in the Analysis and Technical Update to the Water Plan (2019) and on the Colorado Water Conservation Board's website, at cwcb.colorado.gov/colorado-water-plan. Exhibit E.1 (presented in the Update to the Water Plan) provides a visual description of each of the Water Plan's five future planning scenarios.

Business as Usual

Recent trends continue into the future. Few unanticipated events occur. The economy goes through regular economic cycles but grows overtime. By 2050, Colorado's population is close to 9 million people. Single family homes dominate, but there is a slow increase of denser developments in large urban areas. Social values and regulations remain the same, but streamflow and water supplies show increased stress. Regulations are not well coordinated and create increasing uncertainty for local planners and water managers. Willingness to pay for social and environmental mitigation of new water development slowly increases. Municipal water conservation efforts slowly increase. Oil-shale development continues to be researched as an option. Large portions of agricultural land around cities are developed by 2050. Transfer of water from agriculture to urban uses continues. Efforts to mitigate the effects of the transfers slowly increase. Agricultural economies continue to be viable, but agricultural water use continues to decline. The climate is similar to the observed conditions of the 20th century.

Weak Economy

The world's economy struggles, and the state's economy is slow to improve. Population growth is lower than currently projected, which is slowing the conversion of agricultural land to housing. The maintenance of infrastructure, including water facilities, becomes difficult to fund. Many sectors of the State's economy, including most water users and water-dependent businesses, begin to struggle financially. There is little change in social values, levels of water conservation, urban land use patterns, and environmental regulations. Regulations are not well coordinated and create increasing uncertainty for local planners and water managers. Willingness to pay for social and environmental mitigation decreases due to economic concerns. Greenhouse gas emissions do not grow as much as projected, and the climate is similar to the observed conditions of the 20th century.

Cooperative Growth

Environmental stewardship becomes the norm. Broad alliances form to provide for more integrated and efficient planning and development. Population growth is consistent with current forecasts. Mass transportation planning concentrates more development in urban centers and mountain resort communities, thereby slowing the loss of agricultural land and reducing the strain on natural resources compared to traditional development. Coloradans embrace water and energy conservation. New water-saving technologies emerge. Ecotourism thrives. Water-development controls are more restrictive and require both high water-use efficiency and environmental and recreation benefits. Environmental regulations are more protective and include efforts to reoperate water supply projects to reduce effects. Demand for more water-efficient foods reduces water use. There is a moderate warming of the climate, which results in increased water use in all sectors and in turn, affects streamflow and supplies. This dynamic reinforces the social value of widespread water efficiency and increased environmental protection.

Adaptive Innovation

A much warmer climate causes major environmental problems globally and locally. Social attitudes shift to a shared responsibility to address problems. Technological innovation becomes the dominant solution. Strong investments in research lead to breakthrough efficiencies in the use of natural resources, including water. Renewable and clean energy become dominant. Colorado is a research hub and has a strong economy. The relatively cooler weather in Colorado (due to its higher elevation) and the high-tech job market cause population to grow faster than currently projected. The warmer climate increases demand for irrigation water in agriculture and municipal uses, but innovative technology mitigates the increased demand. The warmer climate reduces global food production, which increases the market for local agriculture and food imports to Colorado. More food is bought locally, which increases local food prices and reduces the loss of agricultural land to urban development. Higher water efficiency helps maintain streamflow, even as water supplies decline. The regulations are well defined, and permitting outcomes are predictable and expedited. The environment declines and shifts to becoming habitat for warmer-weather species. Droughts and floods become more extreme. More compact urban development occurs through innovations in mass transit.

Hot Growth

A vibrant economy fuels population growth and development throughout the state. Regulations are relaxed in favor of flexibility to promote and pursue business development. A much warmer global climate brings more people to Colorado with its relatively cooler climate. Families prefer low-density housing, and many seek rural properties, ranchettes, and mountain living. Agricultural and other open lands are rapidly developed. A hotter climate decreases global food production. Worldwide demand for agricultural products rises, which increases food prices. Hot and dry conditions lead to a decline in streamflow and water supplies. The environment degrades and shifts to becoming habitat for species adapted to warmer waters and climate. Droughts and floods become more extreme. Communities struggle to provide services needed to accommodate rapid business and population growth. Fossil fuel, the dominant energy source, is supplemented by production of oil shale, coal, natural gas, and oil in the state.

FIGURE E.1 • Illustration of Drivers Associated with Planning Scenarios²¹¹

Drivers	A Business as Usual	B Weak Economy	C Cooperative Growth	D Adaptive Innovation	E Hot Growth
A. Economy/Population					
B. Urban Land use	 No change in density	 No change in density	 Higher density	 Higher density	 Lower density
C. Climate Status/Water Supply	 Same as 20th century observed	 Same as 20th century observed	 Between hot and dry and 20th century observed	 Hot and dry	 Hot and dry
D. Energy Water Needs	 Low (no oil shale)	 Moderate (no oil shale)	 Low (no oil shale)	 Low (no oil shale)	 High (oil shale)
E. Agricultural Conditions	 Total ag water demands decrease - Decrease in irrigated acres due to urbanization - Ag exports and demands lower - Ag is less able to compete with urban areas for water	 Total ag water demands slightly decrease - Slight decrease in irrigated acres due to urbanization - Ag exports and demands constant - Ag is less able to compete with urban areas for water	 Total ag water demands slightly higher - Slight decrease in irrigated acres due to urbanization - Ag exports down and local demands up - Ag is better able to compete with urban areas for water - Increased ET due to climate change	 Total ag water demands slightly higher - Slight decrease in irrigated acres due to urbanization - Ag exports down and local demands up - Ag is better able to compete with urban areas for water - Increased ET due to climate change	 Total ag water demands higher - Significant decrease in irrigated acres due to urbanization - Ag exports and demands high - Ag is better able to compete with urban areas for water - Increased ET due to climate change
F. Availability of New Water Efficiency Technology	 - M&I Moderate - Ag: Efficiencies are increased	 - M&I Moderate - Ag: Efficiencies are increased	 - M&I High - Ag: Efficiencies are increased	 - M&I High - Ag: Much higher efficiencies are implemented	 - M&I Moderate - Ag: Efficiencies are increased
G. Social/Environmental Values	 No change	 No change	 - Increased awareness - Increased willingness to protect environment and stream recreation	 - Increased awareness - Increased willingness to protect environment and stream recreation	 - Full use of resources - Low willingness to protect environment and stream recreation
H. Regulatory Constraints	Regulation  Deregulation No change	Regulation  Deregulation No change	Regulation  Deregulation Increased	Regulation  Deregulation Increased but expedited	Regulation  Deregulation Reduced
I. M&I Water Demands	 Middle of the five scenarios	 Lowest of the five scenarios	 Second lowest of the five scenarios	 Second highest of the five scenarios	 Highest of the five scenarios

Endnotes



- 1 Lotic Hydrological. <https://lotichydrological.com/index.html>
- 2 <https://www.nwccog.org/wp-content/uploads/2024/10/QQ-Report-Water-and-Economies-of-Headwater-Counties2012.pdf>
- 3 <https://cwcb.colorado.gov/colorado-water-plan>
- 4 <https://cwcb.colorado.gov/colorado-water-plan/basin-implementation-plans>
- 5 <https://www.denverwater.org/your-water/water-supply-and-planning/environmental-planning-and-stewardship/colorado-river-cooperative-agreement>
- 6 <https://www.coloradoriverdistrict.org/colorado-river-cooperative-agreement/>
- 7 <https://sonoraninstitute.org/files/Bridging-the-Gap-2024web.pdf>
- 8 Xiao, M., Udall, B., & Lettenmaier, D. P. (2018). On the causes of declining Colorado River streamflows. *Water Resources Research*, 54, 6739–6756. <https://doi.org/10.1029/2018WR023153>
- 9 Citizens Guide to Colorado's Transbasin Diversions. <https://watereducationcolorado.org/publications-and-radio/citizen-guides/citizens-guide-to-colorados-transbasin-diversions/>. See also, <https://waterknowledge.colostate.edu/water-management-administration/agreements-compacts-treaties/#1529011498512-cba05b8e-704f>.
- 10 Colorado Division of Water Resources, Division 5 Office webpage, <https://dwr.colorado.gov/division-of-fices/division-5-office> (2026).
- 11 oley/Forrest, 2012 Report.
- 12 Lotic Hydrological, Estimated Transmountain Diversion Impacts to West Slope Headwaters Subbasins, Technical Brief submitted to NWCCOG, p. 19 (Dec. 2025). Basin TMD yield is the sum of daily diversions from any diversion structure recognized as transferring water out of basin. Daily values are summed to annual totals and characterized by summary statistics across the 30-year period. The Colorado Basin Implementation Plan estimated an average of approximately 483,600 acre-feet of water per year diverted from the Colorado Basin to other basins.
- 13 Lotic Hydrological, Estimated Transmountain Diversion Impacts to West Slope Headwaters Subbasins, Technical Brief submitted to NWCCOG, p. 19 (Dec. 2025).
- 14 Lotic Hydrological, Estimated Transmountain Diversion Impacts to West Slope Headwaters Subbasins, Technical Brief submitted to NWCCOG, p. 19 (Dec. 2025).
- 15 Stream flow from each gauge location was analyzed and the following percentiles were used to define the hydrologic conditions: drought 0 to 10th percentile, dry 10 to 25th percentile, average 25 to 50th percentile, wet 75 to 90th percentile, and flood 90 to 100th percentile.
- 16 <https://crwcd.wpenginepowered.com/wp-content/uploads/2021/02/shoshone-outage-protocol-agreement-no-13xx6c0129-shop.pdf>
- 17 <https://www.coloradoriverdistrict.org/shoshone-permanency-takes-a-step-forward-with-historic-water-deal/>
- 18 https://www.americanrivers.org/wp-content/uploads/2022/04/MER2022_Report_Final_04062022.pdf
- 19 <https://www.prnewswire.com/news-releases/american-rivers-announces-americas-most-endangered-rivers-of-2010-95385554.html>
- 20 Bolinger, R.A., J.J. Lukas, R. S. Schumacher, and P.E. Goble, Colorado State university, *Climate Change in Colorado*, 3rd edition, 2023; and Sauders, et. al, Rocky Mountain Climate Organization, *Climate Change in the Headwaters Water and Snow Impacts*, 2018.
- 21 Sauders, et. al, Rocky Mountain Climate Organization, *Climate Projections in Eagle County, Colorado*, 2021.
- 22 Sauders, et. al, Rocky Mountain Climate Organization, *Climate Projections in Eagle County, Colorado*, 2021.
- 23 Sauders, et. al, Rocky Mountain Climate Organization, *Climate Projections in Summit County, Colorado*, 2021.
- 24 Chapter 2 in Bolinger, R.A., J.J. Lukas, R.S. Schumacher, and P.E. Goble, 2024: *Climate Change in Colorado*, 3rd edition. Colorado State University, <https://doi.org/10.25675/10217/237323>.
- 25 Chapter 3 in Bolinger, R.A., J.J. Lukas, R.S. Schumacher, and P.E. Goble, 2024: *Climate Change in Colorado*, 3rd edition. Colorado State University, <https://doi.org/10.25675/10217/237323>.
- 26 Chapter 2 in Bolinger, R.A., J.J. Lukas, R.S. Schumacher, and P.E. Goble, 2024: *Climate Change in Colorado*, 3rd edition. Colorado State University, <https://doi.org/10.25675/10217/237323>.
- 27 <https://www.denverwater.org/your-water/water-supply-and-planning/climate-change>. Accessed on 6/4/2024
- 28 <https://coloradosun.com/2025/04/05/denver-water-seeks-stay-federal-ban-gross-dam-construction/>
- 29 Sonoran Institute, *Bridging the Gap Report*, at 26 (Dec. 2024), <https://www.nwccog.org/wp-content/uploads/2026/02/Bridging-the-Gap2024.pdf>.
- 30 Colorado River Risk Study Phase IV Final Report, 2023, https://crwcd.wpenginepowered.com/wp-content/uploads/2024/05/2024_03_29-Phase-4-WaterSmart-CRD-TRANSMITTAL-multiple-deliverables.pdf
- 31 Sonoran Institute, *Bridging the Gap Report*, at 26 (Dec. 2024), <https://www.nwccog.org/wp-content/uploads/2026/02/Bridging-the-Gap2024.pdf>.
- 32 Colorado River Risk Study Phase IV Final Report, 2023, https://crwcd.wpenginepowered.com/wp-content/uploads/2024/05/2024_03_29-Phase-4-WaterSmart-CRD-TRANSMITTAL-multiple-deliverables.pdf
- 33 <https://www.csu.org/current-projects/continental-hoosier-system>
- 34 <https://www.csu.org/blog/homestake-water-project-decision>.
- 35 Colorado River Risk Study Phase IV Final Report, 2023, https://crwcd.wpenginepowered.com/wp-content/uploads/2024/05/2024_03_29-Phase-4-WaterSmart-CRD-TRANSMITTAL-multiple-deliverables.pdf
- 36 The Eagle River Join Use Water Project, 2021 https://www.csu.org/Documents/Eagle%20River%20Joint%20Use%20Water%20Project_OVERVIEW_032221.pdf
- 37 <https://www.denvergazette.com/2021/03/24/colorado-springs-aurora-approved-to-perform-exploratory-drilling-for-new-reservoir-in-the-white-river-national-forest-1f018a4f-8aa8-52c3-8a39-ad4f30c183ad/>.

- 38 <https://wildhorsereservoir.org/>.
- 39 South Platte Basin Implementation Plan Volume II, Appendix C
- 40 <https://www.secwcd.org/content/enlargement>. Accessed on 6/4/2024
- 41 For more information, visit grandcountylearningbydoing.org
- 42 <https://coloradotu.org/colorado-river-connectivity-channel>. Accessed on 5/7/2026.
- 43 <https://www.northernwater.org/environmental/river-health-and-restoration/connectivity-channel>. Accessed on 5/7/2026.
- 44 <https://coloradosun.com/2024/10/17/windy-gap-reservoir-nearly-crashed-an-aquatic-ecosystem-a-33-million-water-project-is-undoing-the-damage/>. Accessed on 5/7/2026.
- 45 <https://www.ucra.us/projects>. Accessed on 5/7/2026.
- 46 Photo courtesy of Northern Water.
- 47 <https://www.cpr.org/2024/10/08/crested-butte-celebrates-permanent-protections-for-its-red-lady-a-victory-47-years-in-the-making/>. Accessed on 5/7/2026.
- 48 <https://aspenjournalism.org/pitkin-county-looks-to-boost-roaring-fork-streamflows-with-water-purchase/>. Accessed on 5/7/2026.
- 49 City of Steamboat Springs Temporary Modification Update 2025. <https://drive.google.com/drive/folders/1fRJAcVTN3Yv65FCTWxrAPfRouo6jgav>. Accessed on 5/7/2026.
- 50 Blue River stretch loses Gold Medal Status. (March 24, 2016). Colorado Trout Unlimited, <https://coloradotu.org/blog/2016/03/blue-river-loses-gold-medal-status>
- 51 <https://www.blueriverwatershed.org/blue-river-habitat-restoration-project>. Accessed on 5/7/2026.
- 52 Summit County, Colorado Mines to open space <https://www.summitcountycogov/1184/Mines-to-Open-Space>
- 53 Colorado State Demography Office, 2025.
- 54 Harvey Economics estimates based on Dean Runyon Associates (2025) and Longwoods International (2024) reports obtained from the Colorado Tourism Office.
- 55 Ibid.
- 56 Colorado State Demography Office, 2025; Census Bureau, American Community Survey, 2022 5-Year Data.
- 57 Colorado State Demography Office, 2025.
- 58 U.S. Bureau of Economic Analysis, 2025.
- 59 The recreation and hospitality sector includes arts, entertainment, recreation, accommodation and food services.
- 60 While water availability is a necessary component of the on-going success of these water-dependent economic sectors, other factors such as state, national, and global economic conditions influence activity levels and economic outcomes.
- 61 Dean Runyan Associates, The Economic Impact of Travel in Colorado, 2024p State, Regional, and County Impacts, 2025.
- 62 Bureau of Land Management, Colorado NLCS Wild and Scenic Rivers Suitable or Eligible, 2022. <https://gbp-blm-egis.hub.arcgis.com/maps/6ffee09db-c394390a1601ed85e29dab4/>
- 63 Data for All Water-Based Recreation includes recreational activity occurring on or along the water, which also encompasses activities such as trail sports, camping, picnicking and wildlife watching.
- 64 It is not possible to reliably estimate the Headwaters Counties' portion of these river basins.
- 65 Southwick Associates, The Economic Contributions of Water-Related Outdoor Recreation in Colorado, 2020.
- 66 The river segments focused on in this study are the same as identified for the Headwaters Counties in the 2012 Report.
- 67 Colorado River Outfitters Association, Commercial River Use in the State of Colorado, 1988-2024.
- 68 Glide SUP, 2024 Guide to Colorado.
- 69 Denver Post, May 1, 2026.
- 70 Gold Medal waters consistently produce a trout standing stock of at least 60 pounds per acre and an average of at least 12 "quality trout" (14+ inches) per acre. Gold Medal water designation can only be applied to waters that are accessible for fishing by the general angling public. River segments must be at least 2 miles in length and lakes must be a minimum of 50 acres. <https://coloradogoldmedalwater.tu.org/gold-medal-waters/>
- 71 Colorado Parks and Wildlife, FishingBrochure, 2026.
- 72 Blue River stretch loses Gold Medal Status. (March 24, 2016). Colorado Trout Unlimited, <https://coloradotu.org/blog/2016/03/blue-river-loses-gold-medal-status>
- 73 Low river flows trigger calls, closures, stressed fish - Colorado Water Trust
- 74 <https://coloradosun.com/2025/06/05/colorado-ski-er-visits-third-busiest-season/>
- 75 RRC Associates, Economic Impact of Skiing in Colorado, 2024.
- 76 Gitnux, Colorado Ski Industry Statistics, 2026.
- 77 Colorado Water Conservation Board, Analysis and Technical Update to the Colorado Water Plan, 2019; Harvey Economics, 2025.
- 78 U.S. Bureau of Economic Analysis, 2025.
- 79 USDA Census of Agriculture, 2022.
- 80 USDA 2022 Census of Agriculture State Profile
- 81 Hjerpe, et. al., "Amenity Migration and Public Lands: Rise of the Protected Areas," National Library of Medicine, April 2020; Landscape Magazine, "Second Homes, the New Investment Option", Fall 2022.
- 82 USDA Census of Agriculture, 2022
- 83 Demands are diversion demands. Agriculture diversion demand represents the amount of water that would need to be diverted or pumped to meet the full crop irrigation water requirements. Gaps compare current and projected diversion demands against available water supplies under each planning scenario using Colorado Decision Support System (CDSS) modeling tools.
- 84 Colorado Basin Implementation Plan, 2022; Gunnison Basin Implementation Plan, 2022; Yampa-White-Green Basin Implementation Plan, 2022.
- 85 <https://cdle.colorado.gov/offices/the-office-of-just-transition/coal-in-colorado>; <https://ecmc.colorado.gov/>.
- 86 Colorado Energy & Carbon Management Commission, 2025.

- 87 <https://cdle.colorado.gov/offices/the-office-of-just-transition/coal-in-colorado>
- 88 <https://cdle.colorado.gov/offices/the-office-of-just-transition/coal-in-colorado>
- 89 U.S. Bureau of Economic Analysis.
- 90 Colorado Department of Local Affairs, Division of Local Government, <https://dlg.colorado.gov/direct-distribution-severance-tax-federal-mineral-lease>.
- 91 U.S. Bureau of Reclamation, 2025; City of Aspen, Colorado, 2025.
- 92 Located in Glenwood Canyon along the Colorado River, the Shoshone Hydroelectric Plant is an essential water right for the Colorado Basin. The plant holds very senior water rights and could call for water year-round whenever the Colorado River is flowing below 1,250 cfs (1,408 cfs including the junior water right). Placing a call requires the cessation of all junior diversions above the Shoshone Plant. These operations maintain important streamflows for a wide range of users. Excel Energy owns the 16 MW hydropower plant.
- 93 Moyer, Amy, Director of Strategic Partnerships. Shoshone Water Rights Preservation Project Upper Basin Environmental Drought Mitigation, Bucket 2 Ecosystem ("B2E") Financial Assistance Program. November 13, 2024. USFS-BLM, Biological and Recreational Resources Dependent on Colorado River Flows Through Glenwood Canyon. September 2024.
- 94 Moyer, Amy, Director of Strategic Partnerships. Shoshone Water Rights Preservation Project Upper Basin Environmental Drought Mitigation, Bucket 2 Ecosystem ("B2E") Financial Assistance Program. November 13, 2024.
- 95 BBC Research and Consulting, "Benefits form the Shoshone Water Rights to the Federal Government," U.S. Bureau of Reclamation, Grand Valley Project, 1994.
- 96 Colorado Department of Public Health and Environment (CDPHE), Water Quality Control Division, Public Water System Info, <https://cdphe.colorado.gov/dwinfo>.
- 97 Colorado Department of Public Health and Environment, Water Quality Control Division, 2025.
- 98 Colorado River Basin Implementation Plan (BIP) 2022 Update - Volume 1, Section 4: Municipal and Industrial (M&I) Water Needs.
- 99 Conservation can be a challenge with a high percentage of second homes.
- 100 These are the non-sector interview questions. Additional sector-specific questions were added as appropriate for Agricultural, General, Municipal, and Recreational Sector interviews.
- 101 Source: Climate Change in Colorado, 2024
- 102 Note that the Colorado River also flows through Eagle County, where the County has helped development many recreational access points along the river. This watershed is discussed in the "Middle Colorado" fact sheet. A small portion of the Roaring Fork Watershed also is included in Eagle County.
- 103 Eagle River Community Water Plan ("Eagle CWP"), Report Cards for Upper Eagle 1: Rex Flats to Cross Creek and Upper Eagle 2: Cross Creek to Gore Creek, accessed Sept. 30, 2024.
- 104 Eagle CWP Report Cards for Upper Gore Creek: Black Gore to Vail WWTP and Lower Gore Creek: Vail WWTP to Eagle River, accessed September 30, 2024.
- 105 Eagle CWP, Report Cards for Gore Creek to Avon WWTP, Middle Eagle 2: Avon WWTP to Squaw Creek, Lower Eagle 1: Squaw Creek to Hollingsworth Ditch, Lower Eagle 2: Hollingsworth Ditch to Brush Creek, Lower Eagle 3: Brush Creek to Gypsum Creek, and Lower Eagle 4: Gypsum Creek to Colorado River, accessed September 30, 2024.
- 106 Eagle CWP Report Card for Brush Creek: Town Diversion to Eagle River, accessed October 6, 2024.
- 107 Eagle CWP Report Card for Gypsum Creek: USFS Boundary to Eagle River, accessed October 6, 2024.
- 108 Eagle River Community Water Plan ("Eagle CWP"). See, for example, Lower Eagle 2: Hollingsworth Ditch to Brush Creek, accessed Sept. 30, 2024.
- 109 For the sake of brevity, important watersheds in Grand County are not included in this fact sheet, including Willow Creek, Williams Fork, Blue River, and Muddy Creek.
- 110 2010 Grand County Stream Management Plan ("2010 GC SMP"). Stream Reach Summaries for FR1, FR2, FR3, FR4, FR5, FR6, FR7, FR8, FR9, and FR10, accessed November 26, 2024.
- 111 Comprehensive Watershed Assessment ("CWA"), prepared for Grand County Learning By Doing, https://www.grandcountylearningbydoing.org/uploads/6/2/2/2/62221315/watershed_assessment_final_052124.pdf, accessed November 26, 2024.
- 112 Id.
- 113 Id.
- 114 2010 GC SMP.
- 115 Id.
- 116 Learning By Doing 2023 Annual Report, https://www.grandcountylearningbydoing.org/uploads/6/2/2/2/62221315/2023_annual_report_learning_by_doing_final-web.pdf, accessed December 2, 2024.
- 117 <https://www.grandcountylearningbydoing.org/projects.html>
- 118 2010 GC SMP. Stream Reach Summaries for CR1, CR2, and CR3, accessed November 26, 2024.
- 119 Id.
- 120 CWA, prepared for Grand County Learning By Doing, https://www.grandcountylearningbydoing.org/uploads/6/2/2/2/62221315/watershed_assessment_final_052124.pdf, accessed December 2, 2024.
- 121 The Lake Fork of the Gunnison River Watershed is not included in this report since only a small part of this watershed is in Gunnison County. The northern part of Gunnison County extends beyond the Gunnison River Watershed (e.g., Marble and Somerset).
- 122 2022 Gunnison Basin Implementation Plan ("BIP"), at pg. 6. https://dnrweblink.state.co.us/cwcbsearch/0/edoc/216709/Gunnison_BIP_Volume1_2022.pdf, accessed 4/9/2025.
- 123 Most of the Lake Fork of the Gunnison River Watershed is located in Hinsdale County. Some tributaries to Tomichi Creek extend into Saguache County (e.g., Marshall Creek, Cochetopa Creek).
- 124 2019 Upper Gunnison River Basin Watershed Assessment and Management Planning - Phase 1 ("2019 UGRWCD"), Chapter 6 at p. 313, <https://ugrwc.org/wp-content/uploads/2020/03/191226-CWCB-Final-Report-Phase-I-.pdf>

- 125 Reaman, Mark, "Town Developing Plan to Protect Drinking Water Sources," Crested Butte News, September 4, 2024, <https://crestedbuttenews.com/2024/09/town-developing-plan-to-protect-drinking-water-sources/>
- 126 2019 UGRWCD, Chapter 6 at p. 168.
- 127 2019 UGRWCD, Chapter 6 at p. 139.
- 128 Id.
- 129 <https://www.uncovercolorado.com/activities/taylor-river-whitewater-rafting>
- 130 <https://coyotegulch.blog/2022/06/25/upper-taylor-and-soap-creek-designated-as-outstanding-waters-the-gunnison-country-times-gunnisonriver-coloradoriver-coriver/>
- 131 <https://coloradooutdoorsmag.com/2023/01/18/colorado-gold-medal-waters-gunnison-and-taylor-rivers>
- 132 Communication with Seth Mason.
- 133 Nettles, Katherine, "River District Talks Water Use Reduction," Crested Butte News, March 15, 2023, <https://crestedbuttenews.com/2023/03/river-district-talks-water-use-reduction>
- 134 Id.
- 135 The Colorado Attorney General issued a formal legal opinion in 1983 stating that persons who float or boat on Colorado streams across private lands without the owner's permission do not commit trespass, so long as they do not touch the stream banks or beds. This opinion provides guidance to law enforcement and agency officials and enforcement is inconsistent among various county and local officials.
- 136 <https://www.americanwhitewater.org/content/Wiki/access:co>
- 137 <https://www.uncovercolorado.com/river-tubing-kayaking/gunnison-river>
- 138 <https://gunnisoncrestedbutte.com/blog/things-to-do-in-almont>
- 139 38
- 140 Several tributaries to Tomichi Creek originate in Saguache County.
- 141 Colorado Water Trust, <https://coloradowatertrust.org/projects/tomichi-creek-coats-bros-ditch>, accessed 4/9/2025.
- 142 Upper Roaring Fork River management plan 2017 ("2017 Upper Roaring Fork"), <https://www.coloradosmp.org/wp-content/uploads/2020/05/Upper-Roaring-Fork-River-Management-Plan.pdf>, accessed January 12, 2025.
- 143 Id.
- 144 Id.
- 145 Roaring Fork watershed plan: March 2012 ("2012 RFWP"), <https://www.roaringfork.org/media/1171/20120412-roaring-fork-watershed-plan-final.pdf>, accessed January 12, 2025.
- 146 Roaring Fork Watershed Regional Water Efficiency Plan: August 2015 ("2015 WEP"), https://roaringfork.org/media/1567/wep_rfregional_plan_20150812.pdf, accessed January 12, 2025.
- 147 2012 RFWP.
- 148 Basalt Water Conservancy District. Water Rights, <https://bwcd.org/about-us/water-rights>, accessed January 26, 2025.
- 149 Condon, S. (August 16, 2013). Concerns arise about Fryingpan River's health. The Aspen Times, <https://www.aspentimes.com/news/concerns-arise-about-fryingpan-rivers-health>
- 150 2016 Crystal River Management Plan, https://www.roaringfork.org/media/1352/crmp_noappendix_bleeds.pdf, accessed January 26, 2025.
- 151 Id.
- 152 Sackett, H. (April 29, 2023). Community summit kicks off talks on how best to protect Colorado's Crystal River. The Colorado Sun, <https://coloradosun.com/2023/04/29/colorado-crystal-river-protect-summit/>
- 153 American Rivers. Yampa River. <https://www.americanrivers.org/river/yampa-river/>, accessed 3/25/2025.
- 154 Assessment of Streamflow and Water Quality in the Upper Yampa River Basin ("Water Quality"), at p. 37. <https://pubs.usgs.gov/sir/2021/5016/sir20215016.pdf>, accessed 2/4/2025.
- 155 The Upper Yampa River Watershed Group 2014 State of the Watershed Report ("Upper Yampa 2014"), at p. 22. https://routtcountycd.com/wp-content/uploads/2020/02/2014WatershedReport_V.2_Interactivepdf.pdf, accessed 2/4/2025.
- 156 Water Quality at p. 5. <https://pubs.usgs.gov/sir/2021/5016/sir20215016.pdf>, accessed 2/4/2025.
- 157 Suzie Romig, Algae Under Scrutiny in Yampa River - a rising concern for watershed groups, Craig Daily Press (Oct. 4, 2024), <https://www.craigdailypress.com/news/algae-under-scrutiny-in-yampa-river-a-rising-concern-for-watershed-groups/>; see also CPW issues warning over toxic algae at Stagecoach Reservoir | SteamboatToday.com.
- 158 The Colorado community of Stagecoach is paradise to its residents. A luxury resort could turn it upside down. (July 28, 2024). The Colorado Sun. <https://coloradosun.com/2024/07/28/stagecoach-colorado-discovery-luxury-resort/>.
- 159 Upper Yampa 2014, at p. 21.
- 160 Upper Yampa 2014, at p. 22.
- 161 17 Colorado environmental projects are in limbo after Trump halts spending from Biden-era law. (January 23, 2025). The Colorado Sun. <https://coloradosun.com/2025/01/23/17-colorado-environmental-projects-limbo-trump-fundinbiden-era-law/>
- 162 Yampa River Health Assessment & Streamflow Management Plan ("Yampa River Health Assessment"), at p. 21. <https://friendsoftheyampa.com/wp-content/uploads/2018/09/Steamboat-Springs-River-Health-and-Streamflow-Management-Plan.pdf>, accessed 3/25/2025.
- 163 Id. at p. 20.
- 164 Id. at p. 21.
- 165 Yampa River closes for recreation in Steamboat Springs due to high water temps. (August 7, 2024). Steamboat Pilot & Today. <https://www.steamboatpilot.com/news/yampa-river-closed-for-recreation-in-steamboat-springs-due-to-high-water-temps>
- 166 Upper Yampa 2014 at p. 23.
- 167 Id.
- 168 Yampa River Health Assessment, at p. 20.
- 169 Id. at p. 21.

- 170 Upper Yampa 2014, at p. 25.
- 171 *Id.*
- 172 2016 Upper Yampa River Watershed Plan ("Upper Yampa Watershed Plan"), at p. 17. <https://friendsoftheyampa.com/wp-content/uploads/2018/09/Upper-Yampa-Basin.pdf>, accessed 3/25/2025.
- 173 Upper Yampa Watershed Plan at p. 46.
- 174 Upper Yampa 2014, at p. 28.
- 175 *Id.*
- 176 Upper Yampa 2014, at p. 29.
- 177 *Id.*
- 178 <https://www.americanrivers.org/river/yampa-river/>
- 179 2021 Blue River Integrated Water Management Plan ("IWMP"). Phase 1, Section 4.1.1 at p. 13, <https://www.blueriverwatershed.org/iwmp-910563-666782.html>, accessed January 20, 2025.
- 180 IWMP Phase I, Section 4.1.2 at p. 15.
- 181 IWMP Phase 1, Section 4.1.6 at p. 20.
- 182 IWMP Phase 1, Section 4.1.5 at p. 18-19.
- 183 IWMP Phase 1, Section 4.1.6 at p. 20.
- 184 *Id.*
- 185 *Id.*
- 186 *Id.* at Section 4.1.3. at p. 17.
- 187 IWMP Phase 1, Section 4.1.1 at p. 13.
- 188 Blue River stretch loses Gold Medal Status. (March 24, 2016). Colorado Trout Unlimited, <https://coloradotut.org/blog/2016/03/blue-river-loses-gold-medal-status>
- 189 IWMP Phase 1, Section 4.2.7. at p. 40.
- 190 Blue River Watershed Group seeks community input as it pursues project to restore habitat downstream of Dillon Reservoir. (October 21, 2024). Summit Daily, <https://www.summitdaily.com/news/blue-river-watershed-group-seeks-community-input-as-it-pursues-project-to-restore-habitat-downstream-of-dillon-reservoir/>
- 191 *Id.*
- 192 IWMP Phase 1, Section 4.2.1 at p. 25.
- 193 *Id.*
- 194 *Id.*
- 195 IWMP Phase 1, Section 4.2.4 at p. 28.
- 196 *Id.*
- 197 Federal government says land exchange proposed by billionaire in Grand and Summit counties is complete. (January 14, 2025). Summit Daily, <https://www.summitdaily.com/news/blue-valley-ranch-colorado-paul-tudor-jones-land-exchange/>
- 198 IWMP Phase 1, Section 4.3.1 at p. 47.
- 199 *Id.*
- 200 2009 Snake River Watershed Plan. <https://snakerivertf.wordpress.com/wp-content/uploads/2017/10/snake-river-watershed-plan-2013-with-appendices.pdf>, accessed January 26, 2025.
- 201 Elizabeth Miller, "Climate change is eroding work to clean up the Snake River. Is Summit County snowmaking making it worse?" Colorado Sun, Feb. 16, 2022, Climate change is eroding cleanup of pollution in a Summit County river, accessed March 18, 2025.
- 202 IWMP Phase 1, Section 4.1.6 at p. 20.
- 203 U.S. Bureau of Economic Analysis, 2025.
- 204 Coley/Forrest Inc., 2011; Colorado Parks and Wildlife, 2025; UncoverColorado.com, 2025.
- 205 <https://coloradogoldmedalwater.tu.org/gold-med-al-waters/>
- 206 Colorado Energy & Carbon Management Commission, 2025.
- 207 Colorado Energy & Carbon Management Commission, 2025.
- 208 Colorado Water Conservation Board, Analysis and Technical Update to the Colorado Water Plan, 2019.
- 209 Colorado Basin Implementation Plan, 2022; Gunnison Basin Implementation Plan, 2022; Yampa-White-Green Basin Implementation Plan, 2022.
- 210 Colorado Basin Implementation Plan, 2022; Gunnison Basin Implementation Plan, 2022; Yampa-White-Green Basin Implementation Plan, 2022.
- 211 Colorado Water Conservation Board, 2019.



WATER QUALITY / QUANTITY COMMITTEE

NWCCOG.org | 970.468.0295 | P.O. Box 2308 | Silverthorne, CO 80498

For PDF copies of this report visit NWCCOG.org