

Water at Risk: Implications for the Headwaters Counties' Economies - Summary Report

This study is an update to the 2012 Report: Water and Its Relationship to the Economies of the Headwaters Counties, prepared by Coley/Forrest, Inc. under the direction of Jean Townsend. Both studies explore the relationship between water and economic activity in a portion of western Colorado where the interaction of precipitation, elevation, and location produces water for much of the State. The region inclusive of Eagle, Grand, Gunnison, Pitkin, Routt, and Summit counties, collectively known as the Headwaters Counties, encompasses the headwaters of the Colorado River and its tributaries. The water in the Headwaters Counties plays a special, dual role in meeting the needs of local residents, businesses, and visitors, while at the same time meeting legal obligations for providing water to water users elsewhere in Colorado and the western U.S.

The importance of this study rests in the fact that water resources emanating from the Headwaters Counties are neither consistent nor unlimited, overlaid upon considerable future uncertainty. Among those unknowns are the eventual interstate Colorado River allocations that will become a reality sometime down the road. Representing the Headwaters Counties, the Northwest Colorado Council of Governments (NWCCOG) through its Water Quality/Quantity Committee (QQ) retained Harvey Economics (HE) to prepare the economic components of this study. Lotic Hydrological (Lotic) and NWCCOG prepared the hydrology elements.

Economic Overview

The economic picture of the Headwaters Counties is positive, and prospects are bright - as long as there are adequate water supplies to sustain them where and when needed. Year-round population grew by six percent, housing units (including seasonal homes) by 12 percent, employment by 22 percent, and regional 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 recently expanded economic activity, much less meeting higher levels of activity, will be the challenge. Recreation and tourism have grown to become a primary economic driver; in 2024, this industry accounted for almost 18 million visitors, \$5.5 billion in travel spending, and 35,600 jobs. The bulk of this economic activity is water-based, including snow sports, fishing, and boating (Table SR-1).

Table SR-1.
Participation and Spending on Water-Based Outdoor Recreation, by River Basin within the Headwaters Counties, 2020

	Colorado Basin	Gunnison Basin	Yampa-White-Green Basin
Fishing			
<i>Participants</i>	316,660	161,433	72,844
<i>Days</i>	2,200,010	733,176	452,429
Snow Sports			
<i>Participants</i>	587,198	210,809	30,231
<i>Days</i>	1,094,509	NA	NA
Water Sports			
<i>Participants</i>	509,768	89,131	107,880
<i>Days</i>	3,989,369	391,790	360,857
All Water-Based Recreation			
<i>Participants</i>	2,722,032	974,253	508,231
<i>Days</i>	18,240,168	4,437,206	2,027,927
All Water-Based Recreation			
<i>Total GDP (\$M)</i>	\$2,092.2	\$480.7*	\$232.1*
<i>Total Jobs</i>	26,768	6,150*	2,970*
<i>Total Wages (\$M)</i>	\$1,275.9	\$293.1*	\$141.6*
<i>Total State/ Local Tax Revenues (\$M)</i>	\$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) NA – 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.

Source: Southwick Associates, *The Economic Contributions of Water-Related Outdoor Recreation in Colorado*, 2020.

About one-fifth of the Headwaters Counties' land is dedicated to crops and livestock. Other basic industries, including extractive industry, land development, and energy generation also rely directly on water.

The intense interest in the water flows from the Shoshone Hydroelectric Generating Station Plant, located in Garfield County, is emblematic of the importance and increasing uncertainty of water supply on the West Slope. The West Slope's interest in preserving the present flow regime stems in part from recreational, agricultural, and other economic benefits experienced from the present flow pattern.

Water Attributes and Economic Risks

From personal interviews with 28 individuals confronting Headwaters Counties water issues, hydrology snapshots, and our own analyses, we have identified challenges with the key water attributes in this region.

Water quantity. Water availability was consistently recognized by respondents as a pressing concern, with declining flows attributable to climate change, increasing competition for finite supplies, and transmountain diversions (TMDs). The spring and summer periods see large exports of water from Headwaters Counties through TMDs to Front Range communities and East Slope irrigators. In many subbasins within Headwaters Counties, TMDs consume more than half of the available streamflow in the watershed (Table SR-2).

Table SR-1.

Annual Transmountain Diversions as a Percentage of Available Streamflow at West Slope Subbasin Locations during Different Hydrologic Conditions

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 near Dillon (Laskey Gulch)	6	3	2	2	2
Colorado River below Windy Gap	80	77	62	48	38
Fraser River below 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 above Difficult Creek near Aspen	55	60	54	47	26
Tomichi Creek at Sargents	0	0	1	1	0
Williams Fork near Leal	22	11	6	3	2

Note: 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.

Source: Lotic Hydrological, *Estimated Transmountain Diversion Impacts to West Slope Headwaters Subbasins*, 2025.

Due to climate change, snowpack and its water content has declined, and further declines are expected. Delayed snowfall late in the year and early snowmelt is a clear threat to the viability of the ski industry. Snowmelt has come quicker with rising temperatures; this will occur still earlier and more intensely in the future with impacts felt especially by the agriculture and recreation sectors. Water scarcity across the Headwaters Counties leads to river closures or voluntary curtailments to protect vulnerable fish populations and stream health.

“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

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. Earlier spring runoff is shifting away from peak needs for recreation, agriculture, and the ecosystem. The historical data and predictions about Colorado’s temperature are quite clear: temperature increases have occurred and will continue to rise for the foreseeable future. The result is reduced recreational opportunities and increased competition among users. Reservoir operations have shifted in part because of changes in runoff and increased demand. Timing of water released from reservoirs affects both stream temperature and opportunities for recreation of all types. A paramount issue is the uncertainty in water timing and its effects on the utility of economic planning.

“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

Water location. In addition to the “when,” there is also widespread concern within the Headwaters Counties about the “where” for surface water. Over-appropriation, including TMDs, and climate change are a difficult combination for this region. TMDs dictate where and when the water flows 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 Headwaters Counties’ use. Transferred water (i.e., water rights purchases or exchanges) alter 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.

“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

Water temperature. Increasing water temperature is a major concern across all six counties, impacting algae blooms, fish habitat, and recreational closures, especially in the warmer months. The timing and quantity of water releases from reservoirs can influence stream temperatures throughout the Headwaters Counties. Higher water temperatures and lower dissolved oxygen levels are leading to stream closures, fish kills, and reduced aquatic

invertebrate communities, with cascading effects on fishing and broader ecosystem health. Treated wastewater discharges risk violations because of higher stream water temperatures.

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 also critical to forest health and wildfire risk. Large and intense wildfires have persistent impacts to water supply, particularly drinking water and water infrastructure, and may create significant impacts to recreation and tourism-based economic sectors.

“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

Water quality and watershed health. Headwaters Counties’ leaders and the public are increasingly concerned about threats to water quality. Reduced stream flows correlate with degraded water quality, including increased dissolved solids, causing stress to aquatic ecosystems and complicating wastewater treatment compliance. According to respondents, the most widespread water quality threats include the impacts of TMDs, climate change, and past and present land use practices. Water quality concerns stem from increased water temperatures, altered flow regimes, and elevated metal concentrations attributed to historic mining and mineralized geology.

“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

Efforts to Address Threatened Conditions

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 early in the season can mitigate temperature spikes throughout the stream systems of the Headwaters Counties.

Headwaters Counties’ water leaders noted efforts by collaborative watershed groups to manage and improve water quality through innovative technologies, scientific collaboration, and adaptive management. These steps to control the temperature of wastewater discharges are key to addressing the changing water quality parameters throughout the Headwaters Counties.

While also raising environmental issues and not always the silver bullet, reservoirs are seen as increasingly important, functioning as a buffer against these challenges. There is a growing appreciation for their potential in supplementing water supply, improving the timing of releases, and as a hedge against uncertainty.

Local governments, nonprofits, and community members are undertaking efforts to mitigate compromised conditions in the Headwaters Counties and to minimize future risks. To minimize impacts from TMDs, *Grand County Learning By Doing* (LBD) was formed as a partnership of East and West Slope water diverters and local stakeholders in Colorado, promoting long-term cooperation, not conflict, to solve aquatic issues. 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. In response to the loss of a stretch of Gold Medal Waters for fishing on the Blue River, Summit County businesses, private landowners, local, State, and federal governmental entities came together and are now implementing the Blue River Habitat Restoration Plan. There are numerous other efforts by public and private entities to respond to the myriad water-related risks in the Headwaters Counties.

In sum, our economic research, hydrologic data, and on-the-ground observations by those who live in the Headwaters Counties all point to the same conclusions. Together, TMDs, climate change, and expanding local water needs from growing economies combine to present considerable uncertainty about the economic-water relationship in the future. In recent years, a sense of mutual responsibility to address these challenges has begun to emerge. Regardless, economic activity in the Headwaters Counties is not standing still; leaders there seek to further develop economic activity and prosperity in their counties, same as all counties around the State.