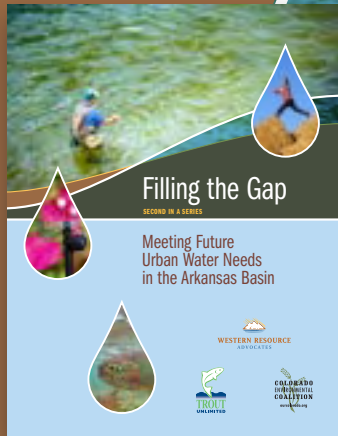


## Filling the Gap

Commonsense  
Solutions for Meeting  
Front Range Water Needs



## Filling the Gap

SECOND IN A SERIES

Meeting Future  
Urban Water Needs  
in the Arkansas Basin

WESTERN RESOURCE  
ADVOCATES

TROUT  
UNLIMITED

COLORADO  
COLLABORATIVE  
COALITION

# Filling the Gap

Commonsense Solutions  
for Colorado's Front Range

**JOINT EXECUTIVE SUMMARY OF  
SOUTH PLATTE AND ARKANSAS BASIN REPORTS**



**WESTERN RESOURCE**  
ADVOCATES



**COLORADO  
ENVIRONMENTAL  
COALITION**

ourcolorado.org

## Colorado's Water Future

Folks in Colorado have plenty to be thankful for—and water is right at the heart of it all.

Colorado's millions of people, its landscape, its fish and wildlife, and its farms and businesses all depend on water. We place great value on this natural resource. Whether it falls from the sky as rain or snow, and whether it ends up as an ear of corn, a bottle of beer, or instream habitat for trout, water is essential to Colorado's exceptional quality of life.

Sustaining Colorado's lifestyle and economy demands that we preserve the state's waterways. Healthy rivers and streams support a diversity of fish, wildlife, and ecosystems, and draw residents and visitors to our state's world-famous natural areas. Colorado's rivers provide gold-medal trout fisheries and whitewater recreation, and are focal points for urban greenways in communities from Fort Collins to Durango and from Steamboat Springs to Pueblo. Healthy waterways are key to Colorado's tourism industry, which injects billions of dollars into the economy each year, and to attracting new businesses to the state. All of this is at



Fly fishing and canoeing on Dillon Reservoir in Summit County, Colorado, one of the Front Range's principal water storage reservoirs.

risk, however, unless decision makers in Colorado prioritize an innovative and balanced 21st century approach for supplying water to a growing population, while sustaining Colorado's rivers and streams.

The Colorado Water Conservation Board, Interbasin Compact Committee, local communities, and citizens' roundtables at the river basin level are engaged in a water supply planning process known as the Statewide Water Supply Initiative (SWSI). The SWSI effort is intended to answer the important questions of how much water Colorado will need in the future, and how these needs can be met. This document summarizes the answer to those questions for the Front Range of Colorado from Western Resource Advocates, Trout Unlimited, and the Colorado Environmental Coalition.

This joint executive summary provides a synopsis of our *Filling the Gap* report series. *Filling the Gap: Commonsense Solutions for Meeting Front Range Water Needs* (2011) focused on the Front Range counties of the South Platte River Basin, and *Filling the Gap: Meeting Future Urban Water Needs in the Arkansas Basin* (2012) focused on the urban counties of the Arkansas River Basin.\* In these two reports, we employ widely accepted data to offer a realistic and balanced water supply portfolio that more than meets the projected needs of the entire Front Range while protecting Colorado's waterways, economy, and quality of life.

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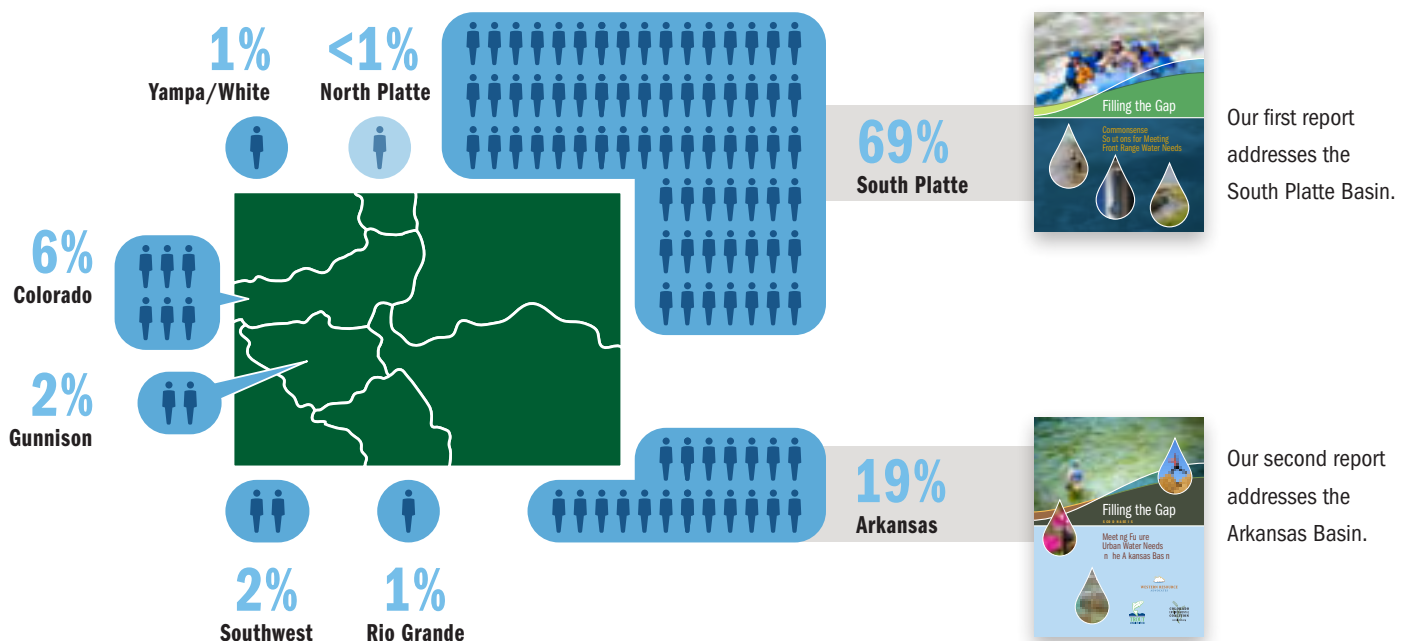
\* This executive summary addresses the water needs of Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Elbert, El Paso, Jefferson, Larimer, Pueblo, Teller, and Weld counties.

Our *Filling the Gap* series demonstrates that by developing select structural water projects, implementing increased water conservation and water reuse projects, and integrating agricultural and municipal water supply systems to allow for increased ag/urban cooperation, the Front Range of Colorado can meet its water needs through 2050 at a reasonable cost without highly damaging new water supply developments. **We commend the Front Range water managers, decision makers, and citizens who are working towards implementation of the *Filling the Gap* recommendations, and we urge them to pursue fully the strategies we present as soon as possible.**

Today, we must look beyond old ways of thinking and find innovative tools to meet our new challenges. The time is now to embrace water supply strategies that meet our consumptive water use needs while sustaining the nonconsumptive, instream flows that keep Colorado’s rivers and streams healthy. The methods and ideas laid out in the *Filling the Gap* reports should guide choices that are made as we embark on this new era of Colorado’s water future.

## FIGURE Nº 1 2010 POPULATION DISTRIBUTION BY RIVER BASIN.

The vast majority of Colorado’s population is concentrated east of the Rocky Mountains, in the Front Range area of the South Platte and the Arkansas basins.





We will not successfully solve 21<sup>st</sup> Century water management challenges in Colorado using 19<sup>th</sup> and 20<sup>th</sup> Century institutions and approaches. This is especially true in our State where heightened competition for over-allocated water resources by individual users or sectors is increasingly unproductive – there is not enough water! The use of multi-objective portfolio approaches is considered to be one of the most constructive options we have available if we are to protect and enhance environmental values while providing adequate and reliable water services to municipalities, industries, and farms.



—Peter Binney, Director of Sustainable Infrastructure, Merrick & Company, former Director of Aurora Water

## Growing Water Demands

Approximately 80% of Colorado’s population lives in the South Platte and the Arkansas basins (Figure 1). Most of the population in these two basins is concentrated along the Front Range, an area of the state immediately east of the Rocky Mountains and generally extending from Fort Collins to Pueblo. Under a medium-growth scenario, the population of the Front Range is projected to nearly double between 2010 and 2050 to a total of 7.2 million people (Figure 2).

Increasing population along the Front Range is the primary driver for growing water demands in Colorado. Accounting for the effects of passive conservation, which occur with new, more efficient development and when older, inefficient appliances and fixtures are replaced over time, water demand for 7.2 million residents and related industry in the Front Range will be approximately 1.37 million acre-feet\* annually (446 billion gallons) in 2050.

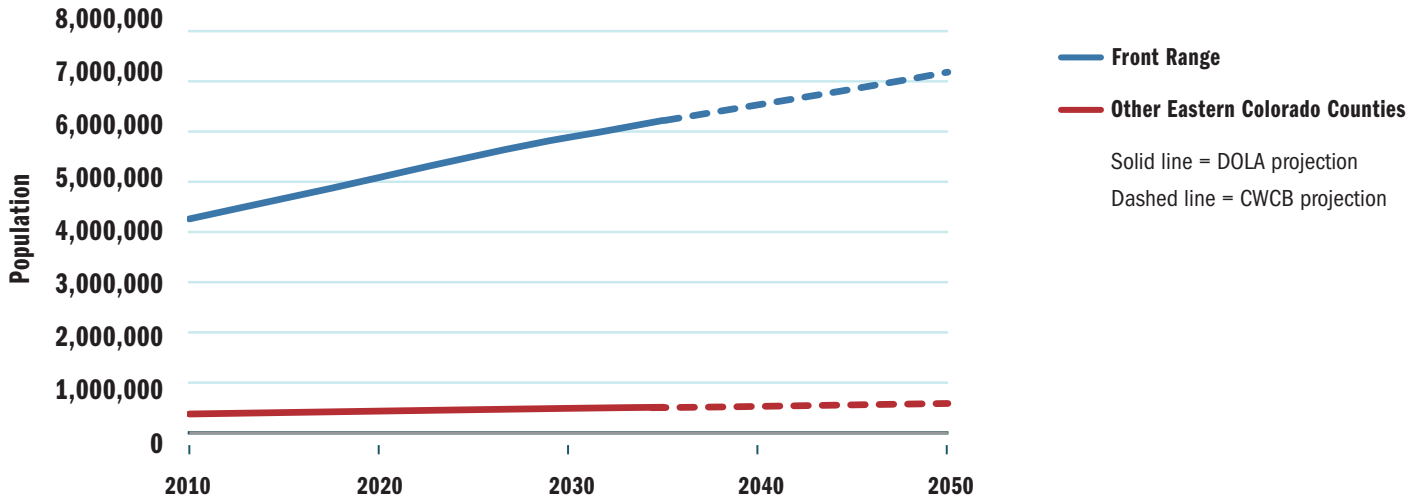
\* One acre-foot equals 325,851 gallons (the amount of water two to four families use in one year).

This means that within the next 40 years, the Front Range will need to fill an annual water supply gap of 428,000 acre-feet (139 billion gallons) in order to meet its projected future water demands (Figure 3).

The *Filling the Gap* series relies on the same data used by Colorado’s *Statewide Water Supply Initiative* report to project future water demand, and includes both municipal and industrial (M&I) and self-supplied industrial demands. It is worth noting that our reports were produced to inform water supply planning from a statewide perspective, and the data presented therein should not supplant individual water provider information for local planning purposes. Furthermore, the water supply gap is projected for the Front Range as a whole, and does not take into account more localized water supply and demand issues, such as local climate variations and water infrastructure system flexibility. This aggregation of data to a multicounty level assumes a more dynamic and integrated water system along the Front Range than what currently exists today, a goal we think worthy of pursuing.

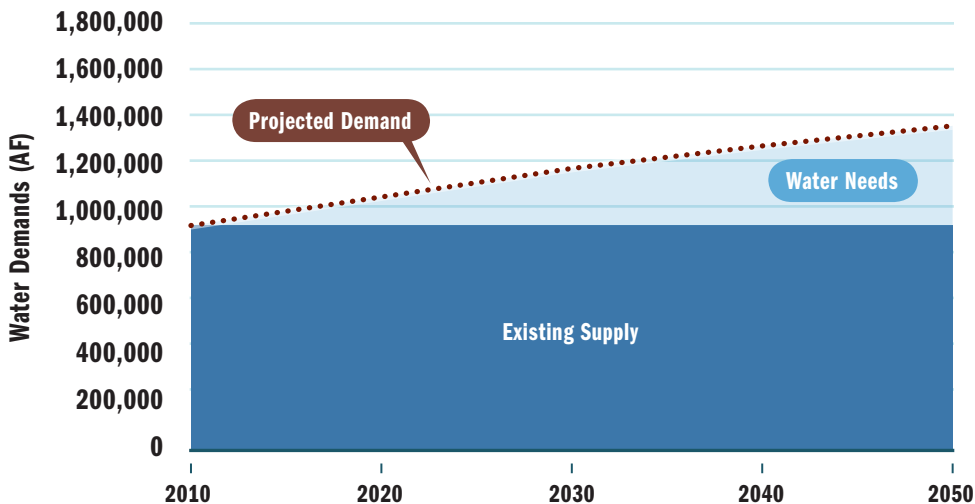
## FIGURE Nº 2 POPULATION PROJECTIONS FOR THE FRONT RANGE OF COLORADO.

The population of the Front Range of Colorado is expected to increase by 70% over the next 40 years under a scenario of medium population growth. To put this growth into perspective, this would be equivalent to adding in the Front Range five new cities the size of Denver by 2050.



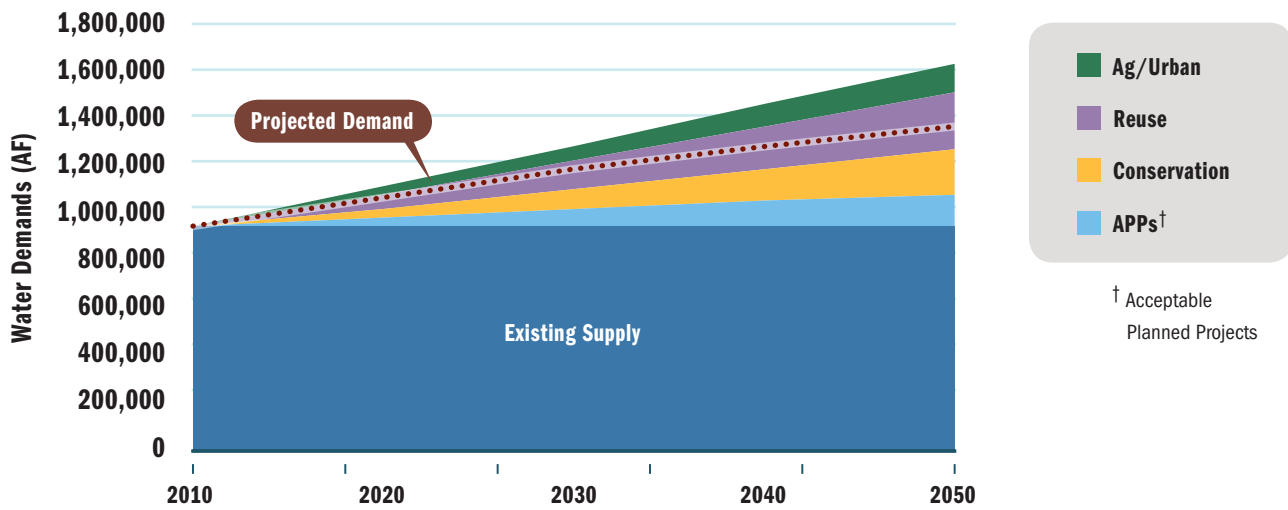
## FIGURE Nº 3 FUTURE WATER NEEDS FOR THE FRONT RANGE OF COLORADO.

Using the most current Colorado Water Conservation Board data, we assume the Front Range will need an additional 428,000 acre-feet by 2050 to fully meet projected demands.



**FIGURE N° 4 OUR PORTFOLIO FOR MEETING THE PROJECTED DEMAND OF THE FRONT RANGE IDENTIFIED IN SWSI 2010.\***

Our balanced portfolio more than fills the projected needs of the Front Range of Colorado while protecting the state’s environment, economy, and vibrant quality of life.



\* Our South Platte Basin report covers the years 2008–2050, whereas our Arkansas Basin report is based on 2010–2050 data. Accordingly, this figure assumes implementation of our South Platte Basin portfolio from 2008–2050, and of our Arkansas Basin portfolio from 2010–2050.



Underwater rainbow Trout.

# Our Water Management Portfolio

The *Filling the Gap* series explores four water supply strategies for meeting growing needs along Colorado’s Front Range—acceptable planned projects, water conservation, reuse, and voluntary cooperative water sharing with the agricultural sector. **This balanced portfolio would provide 250,000 acre-feet (81 billion gallons) of water in excess of the Front Range’s 2050 demands while protecting our rivers, economy, and quality of life (Figure 4).** Importantly, our portfolio meets future needs more cheaply and without the need for new, large, environmentally damaging transbasin diversions that have been a hallmark of traditional water supply planning.

## Acceptable Planned Projects

Some of the state of Colorado’s *structural* Identified Projects and Processes (IPPs) could be acceptable to our groups if designed and implemented pursuant to the “smart” principles listed on the back cover. We refer to these projects as Acceptable Planned Projects, or APPs. The list of APPs for the South Platte and Arkansas basins include Chatfield Reservoir Reallocation, Halligan Reservoir Enlargement, Seaman Reservoir Enlargement, Gross Reservoir Expansion, Windy Gap Firing Project, Rueter-Hess Reservoir Expansion, Beebe Draw Aquifer Recharge, East Cherry Creek Valley’s Northern Project, and the Eagle River Joint Use Project. The Southern Delivery System is also accounted for in the APP category because it is a permitted *structural* project under construction that is not yet operational. Collectively, these APPs can provide 149,000 acre-feet of new supply to the Front Range annually by 2050.

Our innovative 21st century approach provides more flexibility and less risk than do dams and pipelines against the impacts of social, economic, and climate change.



The Moffat Pipeline, part of Denver Water’s Gross Reservoir Enlargement project. Photo: Mark Conlin.

## Conservation

Published literature and studies by the state of Colorado indicate that per capita water use can be significantly reduced over the next 40 years through conservation techniques, practices, and technology. Accounting for both active and passive conservation savings, a 34% reduction in per capita demand—the state’s “high” conservation strategy under SWSI— would result in an annual reduction in water demand in the Front Range of 454,000 acre-feet by 2050. For the purposes of this report, passive conservation savings are accounted for as a reduction in the future demand projections, and 60% of the active conservation savings are allocated to meet future demands.

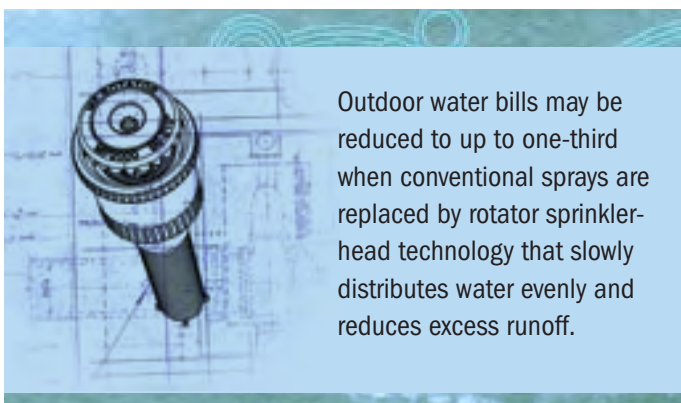
Achieving the water savings from a high conservation strategy will require an immediate and enduring investment in conservation programs, but no unreasonable measures that aren’t already being implemented in many western communities. In addition, water utilities should not be expected to do this alone. Our proposed conservation levels will require a sustained, coordinated effort between utilities, the state, city planners, private industry, the general public, and the conservation community. By dedicating a little more than half of active water conservation savings to meeting future needs, 192,000 acre-feet of additional water supply will be made available annually by 2050 (Table 1).

**With over-appropriated rivers in our state, a growing water supply and demand imbalance on the Colorado River, future population booms expected along the Front Range and throughout the Colorado River Basin, and the significant uncertainties of climate change, it is imperative to prioritize water conservation and reuse as strategies to meet future water needs.**

## Reuse

A state study on water reuse in the Denver area and nearby cities concluded that reuse in the South Platte Basin would grow to more than 170,000 acre-feet annually in the years beyond 2030. Additionally, the Arkansas Basin has established a strong precedent for reuse, and we conclude that reuse in the Arkansas Basin could rise to 46,500 acre-feet annually by 2050. Together, the Front Range will have approximately 246,000 acre-feet of reuse water available annually in 2050 by maximizing exchange opportunities and substitution plans, significantly increasing direct and indirect reuse, and constructing the Denver metro area’s Water, Infrastructure, and Supply Efficiency (WISE) project and Aurora’s Prairie Waters project, as well as two additional projects planned by the El Paso County Water Authority and Pueblo Board of Water Works.

Residential/Commercial MP 2000  
Rotator Nozzle, Hunter Industries.



Outdoor water bills may be reduced to up to one-third when conventional sprays are replaced by rotator sprinkler-head technology that slowly distributes water evenly and reduces excess runoff.



**TABLE**

**№ 1**

**ALLOCATION OF OUR CONSERVATION STRATEGY'S WATER SAVINGS.**

In parallel with the Statewide Water Supply Initiative, we use passive conservation to reduce demands, and a portion of active conservation savings to meet future water needs.

	<b>M&amp;I Passive Conservation</b>	<b>M&amp;I Active Conservation</b>	<b>Total Acre-Feet</b>
Savings allocated as reduction in future demand projections	100%	0%	134,000
Savings allocated to meeting future demands	0%	60%	192,000
Savings allocated to system reliability	0%	40%	128,000
<b>Total</b>			<b>454,000</b>

	Passive Conservation	Active Conservation
% of total savings for the conservation strategy	30%	70%

“Water conservation is a critical way we can protect and preserve one of the West’s most precious resources. As our western economies are inextricably tied to clean water and healthy flowing rivers, investments in conservation are essential as part of our efforts to protect our water supply for generations of Coloradans to come.”

—Michael F. Bennet,  
United States Senator for Colorado



Pipes moving reclaimed water.

## Ag/Urban Cooperation

Cooperative agreements between agricultural irrigators and urban municipal suppliers based on rotational land fallowing, deficit irrigation, temporary water leasing, and/or a number of other alternative transfer methods are a central feature of current discussions about future municipal water supply. In fact, with the creation of the Super Ditch, the Arkansas Basin is well on its way to developing the institutions necessary for a comprehensive ag/urban cooperative sharing program. Pilot projects are already in place and larger projects are contemplated.

Our ag/urban cooperation strategy is premised on agreements that would lease water to municipalities on a temporary basis at a price attractive to irrigators, on schedules that are sufficiently reliable for municipal suppliers and that are established well in advance of actual reallocation of water. Based on state reports and various engineering analyses, and assuming the physical and administrative structures are put in place, we believe that voluntary and compensated ag/urban cooperative water sharing arrangements can provide 129,000 acre-feet of new supply for the Front Range annually by 2050 without permanently drying irrigated acreage.



Center pivot irrigation of a cornfield, eastern Colorado.



After reading *Filling the Gap: Meeting Future Urban Water Needs in the Arkansas Basin*, I am once again impressed with the exceptional work of Western Resource Advocates on issues relating to water in Colorado. They are joined in this effort by Trout Unlimited and the Colorado Environmental Coalition, two other groups that care deeply about the future of Colorado. The report tackles one of the thorniest issues I wrestled with as Governor – how to protect the Arkansas River Basin. Different stakeholders have locked horns over this problem, but answers have been elusive. This report presents real solutions going forward, and everyone who cares about the Arkansas River Basin should pay attention.



— Bill Ritter, Jr., Former Governor of Colorado

## Recommendations

Planning for Colorado’s water future is at a critical juncture. The SWSI process presented an abundance of information regarding water supplies, and the basin roundtables and Interbasin Compact Committee are engaged in discussions about what the next steps should be. Moving forward, it is imperative that all stakeholders are involved in the important planning processes occurring at the local and state levels.

We believe Colorado can chart an innovative path forward, one that differs from the traditional approach of building large dams and pipelines, to meet growing water needs along the Front Range. **Our portfolio of APPs, conservation, reuse, and ag/urban sharing would produce approximately 250,000 acre-feet (81 billion gallons) of water in excess of the Front Range’s 2050 demands.** While each strategy has its individual trade-offs, our portfolio does not require new, large-scale, environmentally damaging, transbasin diversions from the Western Slope.

Based on our data analysis, this report offers several key recommendations that water planners and policy makers should consider carefully in forging Colorado’s water future:

We believe Colorado can chart an innovative path forward, one that differs from the traditional approach of building large dams and pipelines, to meet growing water needs along the Front Range.



- ✓ Close the projected Front Range gap with balanced strategies that are more cost-effective and environmentally friendly than traditional transbasin diversion projects.
- ✓ Implement more aggressive water conservation strategies. Conservation is often the cheapest, fastest, and smartest way to gain “new” water supplies, and there are significant opportunities to boost existing water conservation efforts in the Front Range.
- ✓ Protect Colorado’s rivers, streams, and lakes as an integral part of any future water development strategy. Nonconsumptive uses of water—for fishing, whitewater recreation, and other uses—are worth billions of dollars annually to our state economy and are critical to the quality of life in this state.
- ✓ Maximize the role of reuse in meeting the future water needs of Colorado’s residents, and work to improve public perception and acceptance of reuse projects.
- ✓ Pursue only those Identified Projects and Processes that can be constructed and operated according to the “smart” principles.
- ✓ Cooperate with agriculture on voluntary water sharing agreements that benefit both municipalities and the agricultural community without permanently drying irrigated acres.

By following these recommendations, Colorado can more than meet the future water needs of the Front Range while protecting our rivers, economy, and quality of life.



# The Smart Principles

Western Resource Advocates, Trout Unlimited, and the Colorado Environmental Coalition recommend that future water supply management and development efforts adhere to a set of basic “smart” principles. We initially published these principles in 2005 in the *Facing Our Future* report, where we used them to evaluate water storage and supply projects at that time proposed for the South Platte and Arkansas river basins. Our *Filling the Gap* series built on these smart water supply principles to analyze projects proposed for the entire Front Range of Colorado. We offer these principles as a guide to assure protection of rivers and other natural resources against damage that often results from structural water supply projects. The smart principles are:

- 1 — Make full and efficient use of existing water supplies and reusable return flows before developing new diversion projects.
- 2 — Improve use of existing water supply infrastructure by integrating systems and sharing resources among water users to avoid unnecessary new diversions and duplication of facilities.
- 3 — Recognize the fundamental political and economic inequities and the adverse environmental consequences of new transbasin diversions.
- 4 — Expand or enhance existing storage and delivery before building new facilities in presently undeveloped sites, and expand water supplies incrementally to better utilize existing diversion and storage capacities.
- 5 — Recognizing that market forces now drive water reallocation from agricultural to municipal uses, structure voluntary transfers, where possible, to maintain agriculture and, in all cases, to mitigate the adverse impacts to rural communities from these transfers.
- 6 — Involve all stakeholders in decision-making processes and fully address the inevitable environmental and socioeconomic impacts of increasing water supplies.
- 7 — Design and operate water diversion projects to leave adequate flows in rivers to support healthy ecosystems under all future scenarios, even if water availability diminishes in the future as a result of climate change or other factors.
- 8 — Seek to develop “multi-purpose projects” to spread project benefits as well as costs.



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Western Resource Advocates is a nonprofit environmental law and policy organization dedicated to protecting the West's land, air, and water.



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Trout Unlimited's mission is to conserve, protect and restore North America's coldwater fisheries and their watersheds.



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Colorado Environmental Coalition works to protect Colorado's environment by educating and mobilizing citizens, providing technical and organizing assistance to environmental organizations and other allies, and uniting and supporting them in coalitions that defend and preserve Colorado's natural heritage and quality of life.

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Download the full reports at:  
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