



COLORADO WATER CONSERVATION BOARD Department of Natural Resources



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Statewide Water Supply Initiative Report Overview

December 2004



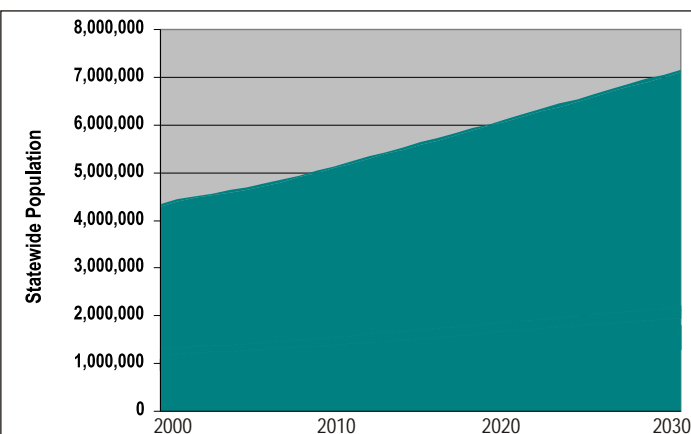
Introduction

Water in Colorado has always been both a source of life and an agent of change. Its path has carved our topography and shaped our culture. Aside from the air we breathe and land we inhabit, no natural resource is more precious. Nothing in the future will have a greater impact on our ability to sustain our way of life and preserve our environment for future generations than water.

Looking forward, it is hard to predict what Colorado will look like in the coming decades. We do know, however, that 2.8 million more people are expected to call Colorado home by the year 2030. Most of these new residents, almost 2.4 million, will live along the Front Range, but the greatest percentage increases will be seen in the Western Slope and mountain communities. We know these new residents will need water, more water than can be delivered today. Conservation will play an important role, but conservation alone cannot meet all these requirements. New storage projects will be needed and must be pursued, but these can take years or even decades to permit and construct and their success is uncertain. In this setting, cities will increasingly look to agricultural water to meet their needs, creating impacts on rural Colorado that need to be recognized and addressed.

Against this backdrop of change and the 2002 drought, the Colorado Water Conservation Board (CWCB) determined that it was important to understand and prepare for our long-term water needs.

With the approval of the 2003 General Assembly, CWCB commissioned the Statewide Water Supply Initiative (SWSI), an 18-month study to explore, basin by basin, existing water plan,



Basin	2000	2030	Increase In Population	Percent Change 2000 to 2030
Arkansas	835,100	1,293,000	457,900	55
Colorado	248,000	492,600	244,600	99
Dolores/San Juan/ San Miguel	90,900	171,600	80,700	89
Gunnison	88,600	161,500	72,900	82
North Platte	1,600	2,000	400	25
Rio Grande	46,400	62,700	16,300	35
South Platte	2,985,600	4,911,600	1,926,000	65
Yampa/White/Green	39,300	61,400	22,100	56
Total	4,335,500	7,156,400	2,820,900	65

Source: Colorado Department of Local Affairs Demography Section

Population Projections by Basin

supplies and existing and projected demands through the year 2030, as well as a range of potential options to meet that demand. This information will help local communities and water providers as they work to plan, manage, and efficiently use Colorado's surface and groundwater resources.

This document provides a brief overview of the results of a comprehensive and complex study. A more detailed overview is provided in the Executive Summary, and all supporting information and data can be found in the full report. Finally, for those most interested in implementation, you are encouraged to see Section 11 of the report.

Stakeholder Process

The overall objective of SWSI is to help Colorado maintain an adequate water supply for its citizens and the environment. SWSI is not intended to take the place of local water planning efforts. Rather, it is a "forum" to develop a common understanding of existing water supplies and future water supply needs and demands throughout Colorado, and possible means of meeting those needs. To help accomplish this goal, local interest groups and water experts were assembled in each of Colorado's eight major river basins. These "Basin Roundtables" included municipal users, agricultural users, local governments, water conservation and conservancy districts, recreational and environmental interests, and the business community.

The focus of the Basin Roundtable meetings was information exchange on water use and on consensus building. SWSI was an important first step in developing open communication across a wide range of interests in each basin. However, the 18-month study period made it difficult to explore all issues in detail and to develop trust, a cornerstone of SWSI that was essential to its success. As SWSI was launched, it was met with support and the expressed need to work together, but it was also met with skepticism that local needs and interests would not be respected. Many water providers did not support state involvement in water supply planning. Smaller communities and less-populated portions of the state were concerned that their economic, social, and cultural future could be "sacrificed" for the needs of urban areas. Environmental and recreational interests expressed concern that the process was intended to push for the development of new water storage projects at the expense of the environment or recreation. West Slope communities were fearful that there

was a preordained outcome of SWSI to justify new large transbasin diversions.

Against this backdrop, SWSI faced challenges but made significant progress developing a comprehensive view of our water supply issues and our water future. However, it is also important to note that while the Basin Roundtable members helped guide the SWSI process, their involvement should not be construed as full endorsement of all of the findings, recommendations, and information presented.

Water has long been a divisive issue in the West, and thus it was important for this study to establish certain ground rules at the very outset that included:

- Local authority and control would not be replaced
- Bottom-up, not top-down
- All solutions explored
- Adherence to Colorado's Doctrine of Prior Appropriation

Two additional ground rules were set after commencement of the study. First, it was determined that the initial 18-month study would not evaluate transbasin diversion issues. This issue is highly charged, and would have threatened the ability of SWSI to produce meaningful results in the initial 18-month study period. Instead, the CWCB determined it would be most productive to focus on in-basin solutions first and undertake a subsequent effort in 2005 to focus on issues that reach across river basin boundaries. Second, following a tradition of local control over water planning, SWSI would not judge or evaluate the merits or likelihood of success of any of the projects or processes being pursued at the local level. Having the state evaluate each project or process and determine which are winners and losers would have extended state authority far beyond what it has ever been in water decision-making in this state, and would have jeopardized SWSI from the very outset. As a result, what is presented in the report is a catalogue of the solutions advanced by local providers.

SWSI can teach us a great deal. SWSI is the most far-reaching and comprehensive effort ever undertaken to understand our state's water supplies as well as the state's existing and future water demands. As a result of this study, we know more today about Colorado's current and future water use than we have ever known before. For example, we know significantly more about:



Implementation of SWSI will Take Place in Three Major Phases

- What is important to Coloradans about water management
- How much water Colorado will likely need in 2030 by basin
- What is being done to address these needs, statewide and within each basin
- How big a "gap" may exist between projected needs and identified potential solutions
- How important reducing uncertainty associated with implementing water projects is to minimizing the shortfall
- What additional options may be available to close the gap between supply and demand

In addition, we have a deeper understanding of the major trends that are shaping our water use and development, including:

- The intent of many local providers in urban areas to transfer water from agricultural to municipal use, and the impact that will have on agricultural rural communities
- The importance of recreation and the environment and the impact they are having on water use and development in the state
- The lack of financial and planning resources that face smaller, rural providers and agricultural users

But beyond these findings, SWSI has provided another critically important function for the state – a forum for dialogue focused on developing a common understanding of Colorado's water issues and needs. This forum, and this dialogue, present tremendous opportunities for Colorado; opportunities that could bear fruit long after the SWSI study has ended. It presents an opportunity to take a new approach to address water issues in this state – an approach based on cooperation and collaboration, rather than litigation and conflict.

Major Findings of SWSI

SWSI explored all aspects of Colorado's water use and development on both a statewide and an individual basin basis. As previously mentioned, SWSI focused on in-basin issues first. Analysis of supply and demand at the statewide level will be conducted in greater detail in 2005. Prior to addressing specific water issues and solutions, SWSI first explored the question: What is important to people in Colorado when they consider how water should be used and managed? Through the SWSI process, a set of nine major "water management objectives" was developed, refined, and then used to evaluate general options for addressing Colorado's future water needs. These water management objectives are extremely important to consider when developing water supply solutions. Water management solutions that meet multiple objectives are far more likely to enjoy the support of multiple interest groups and in turn have a higher likelihood of being successfully implemented.

SWSI Water Management Objectives

- ◆ *Sustainably Meet Municipal & Industrial Demands*
- ◆ *Sustainably Meet Agricultural Demands*
- ◆ *Optimize Existing and Future Water Supplies*
- ◆ *Enhance Recreational Opportunities*
- ◆ *Provide for Environmental Enhancement*
- ◆ *Promote Cost Effectiveness*
- ◆ *Protect Cultural Values*
- ◆ *Provide for Operational Flexibility*
- ◆ *Comply with All Applicable Laws, Regulations, and Water Rights*

With these water management objectives as a foundation, SWSI then examined our water needs and issues in detail. Major findings identified during this first phase of work are based on technical analyses and feedback gathered through Basin Roundtable input. Even though some of these findings are readily apparent to some, it was important that they be affirmed as part of building a foundation and common understanding. Other findings were determined and/or clarified through the SWSI process. These findings are summarized below.

1. Significant increases in Colorado's population – together with agricultural water needs and an increased focus on recreational and environmental uses – will intensify competition for water.

Basin	Estimated Water Demand In 2000 (AF)	Projected Water Demand with Level 1 Conservation in 2030 (AF)	Increase in Water Demand (AF)	Increase in Water Demand (AF)
Arkansas	256,900	354,900	98,000	38%
Colorado	74,100	136,000	61,900	84%
Dolores/San Juan/San Miguel	23,600	42,400	18,800	80%
Gunnison	20,600	35,500	14,900	72%
North Platte	500	600	100	20%
Rio Grande	17,400	21,700	4,300	25%
South Platte	772,400	1,182,100	409,700	53%
Yampa/White/Green	29,400	51,700	22,300	76%
TOTAL	1,194,900	1,824,900	630,000	53%

AF = Acre-Feet

Municipal & Industrial Gross Water Demand in 2000 and 2030

2. Projects and water management planning processes that local M&I providers are implementing or planning to implement have the ability to meet about 80 percent of Colorado's Municipal and Industrial (M&I) water needs through 2030.

3. To the extent that these identified M&I projects and processes are not successfully implemented, Colorado will see a significantly greater reduction in irrigated agricultural lands as M&I water providers seek additional permanent transfers of agricultural water rights to provide for the demands that would otherwise have been met by specific projects and processes.

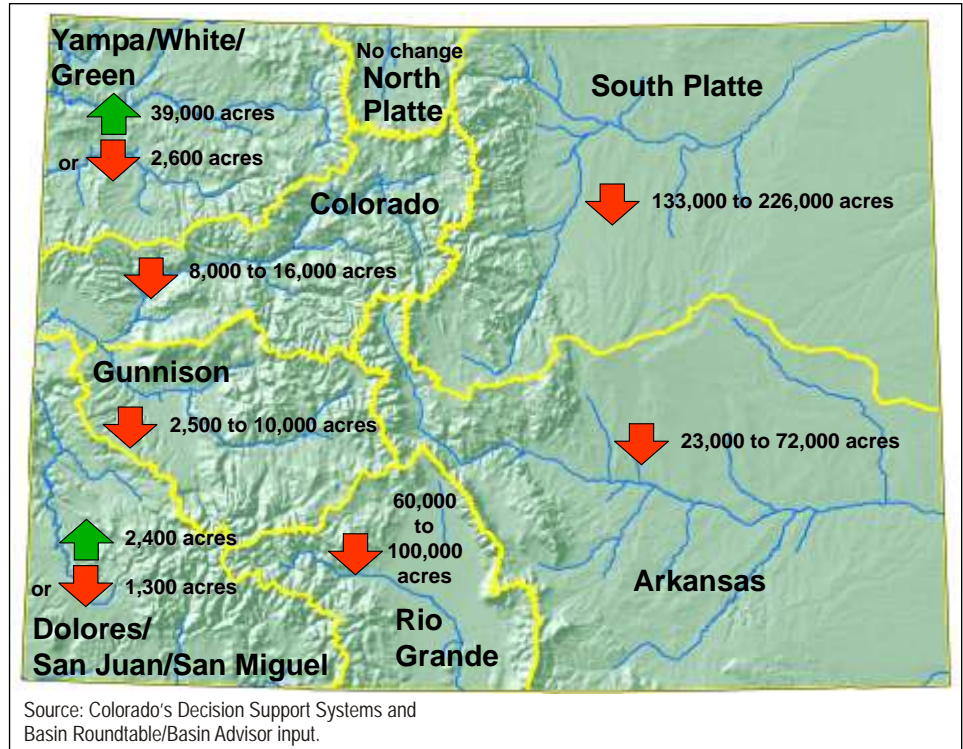
4. Supplies are not necessarily where demands are; localized shortages exist, especially in headwater areas, and compact entitlements in some basins are not fully utilized.

5. Increased reliance on nonrenewable, nontributary groundwater for permanent water supply brings serious reliability and sustainability concerns in some areas, particularly along the Front Range.

6. In-basin solutions can help resolve the remaining 20 percent gap between M&I supply and demand, but there will be tradeoffs and impacts on other users – especially agriculture and the environment.

7. Water conservation (beyond Level 1) will be relied upon as a major tool for meeting future M&I demands, but conservation alone cannot meet all of Colorado's future M&I needs. Significant water conservation has already occurred in many areas.

8. Environmental and recreational uses of water are expected to increase with population growth. These uses help support Colorado's tourism industry, provide recreational and environmental benefits for our citizens, and are an important industry in many parts of the state. Without a



Projected Changes in Irrigated Acreage by 2030

Mechanism to fund environmental and recreational enhancement beyond the project mitigation measures required by law, conflicts among M&I, agricultural, recreational, and environmental users could intensify.

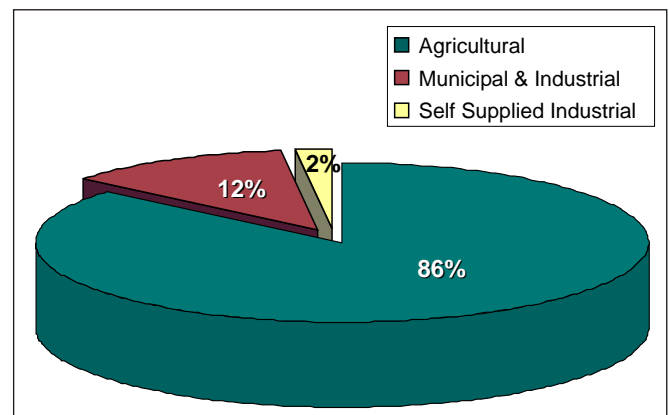
9. The ability of smaller, rural water providers and agricultural water users to adequately address their existing and future water needs is significantly affected by their financial capabilities.

10. While SWSI evaluated water needs and solutions through 2030, very few M&I water providers have identified supplies beyond 2030. Beyond 2030, growing demands may require more aggressive solutions.

Basin	Current Estimated Irrigated Acres	Gross Diversions (AF)
Arkansas	405,000	1,770,000
Colorado	238,000	1,764,000
Dolores/San Juan/San Miguel	255,000	953,000
Gunnison	264,000	1,705,000
North Platte	116,000	397,000
Rio Grande	633,000	1,660,000
South Platte	1,027,000	2,606,000
Yampa/White/Green	118,000	642,000
TOTAL	3,056,000	11,497,000

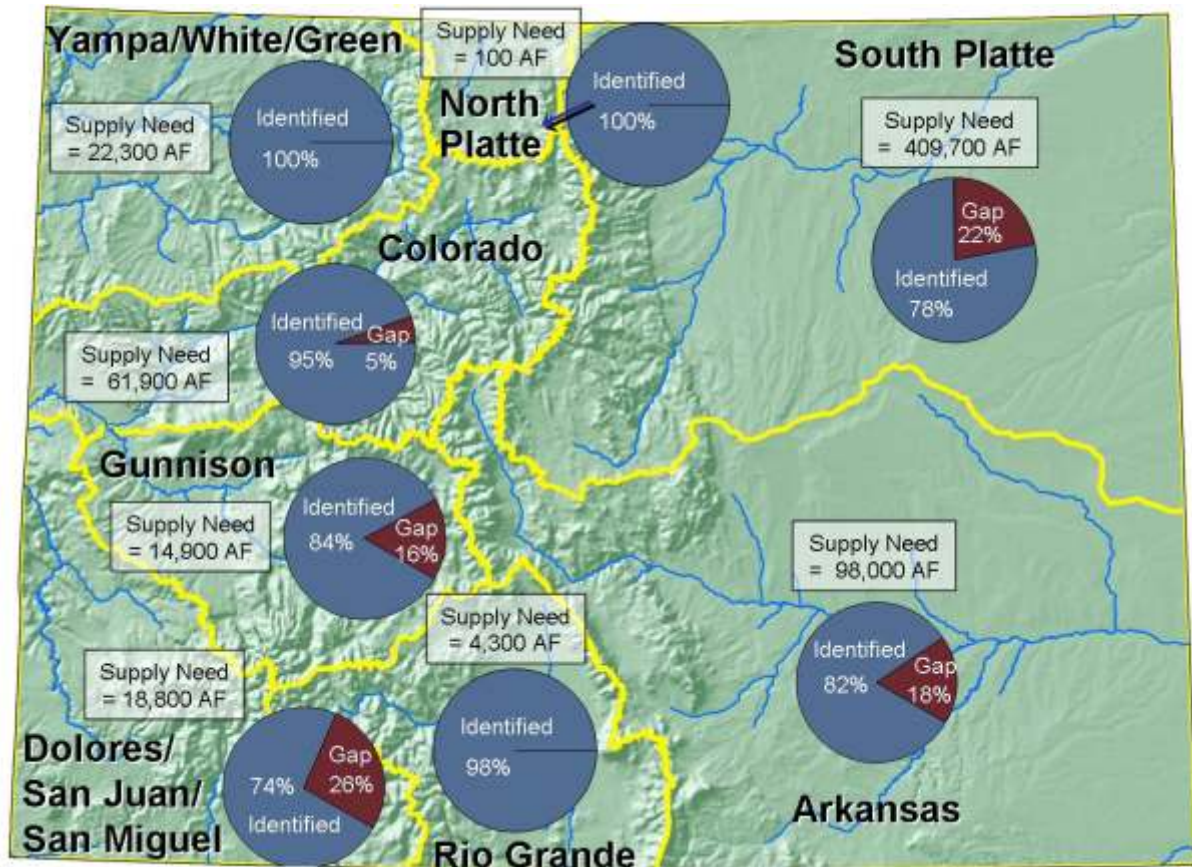
Source: Colorado's Decision Support Systems and Basin Roundtable/Basin Advisor input.

Irrigated Acres by Basin



Relative Proportions of Agricultural, M&I, and SSI Gross Water use in 2030

By 2030, Colorado will Need an Additional 630,000 AF of Water as Outlined Below



Effectiveness of Identified Projects and Processes in Meeting 2030 M&I and SSI Demands

Key Recommendations

SWSI has challenged the CWCB to find the proper balance between statewide policy and local decision-making. The CWCB remains committed to honoring and respecting local control of water resource development, private property rights, and the Prior Appropriation System. At the same time, our state is changing rapidly and the complexity and scope of water resource management issues requires our full attention and creativity. By taking both a county level and statewide view, we have been able to see how our individual efforts and water resource planning affect Colorado cumulatively.

Based on the information we have collected over the last several years, via SWSI and other CWCB efforts, it is clear that the state has a key role in developing technical information, helping facilitate resolution of regulatory conflicts, and providing financial assistance. In the future, if a more comprehensive view of water resource development is going to take place, the state will likely need to become a more substantial financial partner. Developing water projects that serve multiple users, implementing solutions to address environmental or recreational needs, and addressing impacts to agriculture and our rural communities may require direct implementation by the state. However, at this time it is not that

clear that Coloradans are prepared to support these concepts. These overarching concepts will need to be discussed and analyzed in light of the data and information that SWSI has developed and in continued discussions over the next few years.

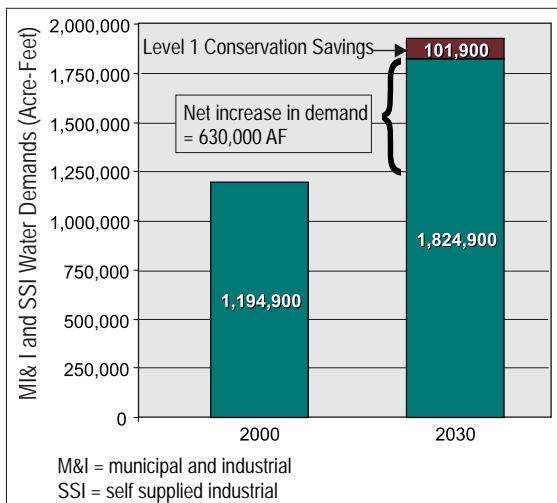
The development and analysis of water supply and demand data, coupled with dialogue and input gathered through the Basin Roundtable Technical Meetings, Public Meetings, and CWCB Board Meetings, has led the CWCB and SWSI project team to some preliminary recommendations. The following key recommendations have been developed to address Colorado's future water needs. These recommendations are a synthesis by the project team of comments and information gathered during the process and build on key findings. These recommendations are not meant to be consensus recommendations from Basin Roundtable participants.

1. Ongoing Dialogue Among all Water Interests

Ongoing communication and dialogue among all interest groups will help ensure wise management of Colorado's water resources into the future, and may help to reduce conflict among interest groups. Both in-basin discussions and transbasin dialogue are needed to move forward in understanding and addressing the state's water needs. A

continuation of the Basin Roundtable process was supported in many of the basins, considering the depth, breadth, and complexity of the issues discussed in the Basin Roundtable technical meetings conducted in each basin through this first phase of analysis. It will take time for this information to “take root” and develop to the point of common understanding before it can truly change the dialogue and debate in the state. Colorado will be restricted in our ability to move forward in meeting our water needs until this happens. Key topics for continuing in-basin and transbasin dialogue could include:

- Issues associated with possible competition for the same sources of water
- Broadening the dialogue to include representatives of future growth areas not currently represented, and local governments and stakeholders in basins that may be impacted by another basin’s source of supply
- Trade-offs of in-basin agricultural transfers vs. new water supply development (either in-basin or transbasin); as discussed earlier, the next phases of SWSI will evaluate supply and demand at the statewide level
- Ensuring that future water transfer projects be planned in a way that both the area of origin and the area of beneficial use derive mutual benefits from the proposed project
- Identifying and implementing changes needed to improve and streamline permitting processes
- Collaborative implementation of the Identified Projects and Processes and further development of the Options for Future Alternatives



Projected M&I Water Demand

2. Track and Support the Identified Projects and Processes

Identified Projects and Processes play a critical role in meeting Colorado's future M&I needs. Consequently, there is a need to track and support their implementation. The state should work with individual providers and project sponsors to identify key elements of their future water supply portfolio, then develop a monitoring mechanism to track the progress of those key

projects and processes and provide support where needed. Helping identify and resolve implementation issues will be extremely important. Implementation issues will differ with each project but improvements to the permitting process, creating multiple project benefits, and developing greater opportunity for financial support will be key factors to reducing implementation hurdles.

3. Develop a Program to Evaluate, Quantify, and Prioritize Environmental and Recreational Water Enhancement Goals

Progress was made in this first phase of SWSI toward identifying the level of interest in enhancements of flows for environmental and recreational uses beyond the CWCB's existing instream flow program, which is intended to protect the natural environment to a reasonable degree. CWCB should identify stream segments or ecological areas for flow prioritization or enhancement. This program could build from the existing authorities of the CWCB In-Stream Flow program and the "conserve, protect, and restore" approach brought forth through many of the SWSI Basin Roundtable discussions.

4. Work Towards Consensus Recommendations on Funding Mechanisms for Environmental and Recreational Enhancements

SWSI Basin Roundtable discussions indicated a strong interest in further environmental and recreational enhancements. While many roundtable participants concurred that there may be an overall willingness of environmental and recreational beneficiaries to pay for such enhancements, the lack of an existing mechanism for such payment was highlighted. Further dialogue among and between Basin Roundtables should include discussion of alternative payment mechanisms, with the goal of developing a consensus recommendation to be promoted by the CWCB and/or the State Legislature.

5. Create a Common Understanding of Future Water Supplies

To more accurately assess the alternatives available to the state in meeting our future water needs, the analysis of supply availability for each basin will determine developable flows, taking into account factors such as:

- Existing water rights
- Hydrologic conditions
- Compact interpretations
- Federal laws
- Operations of federal facilities

6. Develop Implementation Plans Towards Meeting Future Needs

While many of the Identified Projects and Processes are already progressing toward implementation, their successful implementation, and the success of any current or future

option, for meeting our water needs will have some degree of uncertainty. To better facilitate successful implementation, the following should be addressed in more detail:

- Addressing gaps in rural areas and smaller water providers
- The limitations of agricultural users' ability to pay for needed supply firming and facility enhancements
- Project permitting and mitigation assistance, recognizing that permit requirements and mitigation have resulted in uncertainty and increased project costs for many users, resulting in many M&I providers moving towards agricultural transfers due to greater certainty and flexibility
- Consideration of a state/federal/local project permitting assistance "team"
- Monitoring and assisting the State Engineer's Office in its Dam Safety Rulemaking to revise the Probable Maximum Precipitation criteria and Spillway Design Criteria to help reduce costs of new projects and increase storage
- Promoting and supporting multiple-benefit projects and solutions

7. Assess Potential New State Roles in Implementing Solutions

The needs and challenges identified by water providers, users, and stakeholders throughout Colorado suggested that new or expanded State roles in several areas may be worth investigating further, such as:

- State role in implementing projects/options to address the remaining gap in each basin, such as possible reconnaissance or feasibility-level investigations

- Enhancing knowledge and use of existing state and federal loan and grant programs, and further assessing the need to expand or revise them
- Developing concepts for new funding programs
- Enhanced role in informing and educating the public about water sources, use, conservation, and options for meeting future needs
- Refining irrigated acreage loss estimates associated with agricultural water transfers and incorporating those results into Colorado's Decision Support Systems
- Developing water availability and sustainability estimates for non-tributary groundwater areas, especially the Denver basin and Northern and Southern high plains
- Promoting conjunctive use of surface water and groundwater resources
- Promoting and facilitating coordinated operations of existing facilities and infrastructure

8. Develop Requirements for Standardized Annual M&I Water Use Data Reporting

Objective evaluations, comparisons, and projections of water use from county to county and basin to basin were made more difficult in SWSI's first phase by the lack of a consistent set of M&I water use data. To facilitate future efforts, the State should consider developing a standardized water supply and water use reporting mechanism and work with water providers/users to develop consensus on the database format and reporting mechanisms.



Overview of Report

The full SWSI report provides the background and detail that forms the basis for this Executive Summary. The contents of each section of the full report are described in the table below.

Addressing Colorado's water future will require a long term commitment and persistence. The issues are complex, and

affect our social, cultural, and economic future. SWSI does not provide all the answers. No single study can answer questions that have been challenging the best minds in our state for decades. But what SWSI does provide is a common foundation from which all Coloradans can work together to forge solutions that meet all of our needs.

Section	Title	Overview
1	Introduction	Introduction and background on SWSI and Colorado water resources; acknowledgements
2	Statewide Demographic, Economic and Social Setting	Historical and projected demographics; population projections; economic drivers; statewide social, environmental, and institutional and regulatory settings; overview of water quality
3	Physical Environment of the Major River Basins	Background of each of Colorado's 8 major river basins as it relates to water management
4	Legal Framework for Water Use	Major components of Colorado's legal framework for water management
5	Projected Water Use	Projection of future water demands
6	Water Needs Assessment	Identified Projects and Processes; flow issues and recreational components in each basin
7	Availability of Existing Water Supplies	Availability of water supplies throughout Colorado
8	Options for Meeting Future Water Needs	Discussion of types of options available for meeting future water needs
9	Evaluation Framework	Framework for evaluating water management solutions, and its application in SWSI
10	Basin-Specific Options	Water management solutions that could be used to address remaining gaps between supplies and demands
11	Implementation	Summary of basin issues; CWCB's implementation process; funding opportunities; and next steps

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