Navigating a Pathway Toward Colorado's Water Future

A Review and Recommendations Colorado's Draft Water Plan

Report of the
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Colorado Water Working Group

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Executive Summary

The Colorado Water Plan represents a unique opportunity to shape and direct Colorado's water future. The Draft Plan summarizes the remarkable efforts of many people over a ten-year period to define that course. Important progress has been made in determining current supply and demand conditions, projecting a range of demand futures, and considering alternative approaches to meeting these demands. Broad agreement has been reached that conservation measures should be implemented to manage future demand, that alternative forms of transfers of water from irrigated agriculture should be encouraged and permanent transfers discouraged, and that additional water supply projects will be necessary. The Draft strongly embraces efforts to maintain and enhance watershed health. But, in its current form, the Draft lacks any guiding mechanisms for directing actions towards these ends in a manner consistent with the Draft.

This report provides conclusions and recommendations in five areas. First, it calls for a concise Final Plan that sets forth a clear vision for Colorado's water future, with specified objectives and with well-defined processes for achieving those objectives consistent with articulated state policies.

Second, the report supports adoption of policies that emphasize the importance of actively managing projected demands through implementation of best conservation practices, that commit the state to implement facilitated alternative transfer procedures for moving some water from agriculture to other uses while discouraging permanent water transfers, that promote new or expanded water supply projects that are consistent with maintenance and enhancement of watershed health, and that support continued efforts to find a basis under which additional transmountain/transbasin projects might be acceptable. We propose strengthening the role of basin roundtables in evaluating proposed projects and activities for inclusion in basin plans on the basis of well defined review criteria. We suggest encouraging proponents to submit proposals to basin roundtables by making proposals adopted in basin plans potentially available for state funding and by promising them broad governmental support for review and permitting processes.

Third, the report promotes the use of watershed planning to identify the status of watershed health in water management areas and to develop specific actions to be taken to improve and maintain desired watershed conditions.

Fourth, the report calls for increased attention to water management to identify ways that Colorado's water resources can serve a broader range of interests and values.

Fifth, the report urges a commitment to actions that will help manage the risks associated with climate change, including the formation of a task force charged with highlighting those areas of risk and identifying actions that can be taken to manage their adverse effects.

Conclusions and Recommendations

One – Colorado's Water Future

Conclusion No. 1: The Draft Plan provides a lengthy recounting of the remarkable effort over the past ten years, through extensive state- and basin-level discussions and study, to develop a common understanding of Colorado's water situation, including the water resources available in the state, existing uses of those resources, and projected future demands—primarily for new urban uses but also for industry and agriculture as well as for nonconsumptive purposes. The Draft focuses on a projected "gap" between expected urban demands and known sources of supply and discusses the primary options available for meeting new demands. The Draft also addresses the importance of watershed health. It does a good job of capturing and recounting the information and ideas developed through studies, discussions, and reports. But it provides little guidance respecting how the planning process will actually help guide and direct those actions. As written, the Draft is not really a plan; it is a summary of a process that has identified problems, has discussed a number of options, has concluded that entities in need of new water supplies should move ahead with those efforts regarded as no/low regrets, and has suggested the state will support those efforts.

Recommendation No. 1: *The CWCB should prepare, as the Final State Plan, a concise, readable document that provides a broad vision for Colorado's water future, establishing clear objectives and the steps necessary to achieve those objectives. It should account for the full array of interests in the use of Colorado's rivers and aquifers, including consumptive and nonconsumptive values. It should account for the significant uncertainties associated with climate change. It should use the basin planning process to promote actions consistent with plan policies and objectives.*

Two – Meeting New Consumptive Use Demands

Conclusion No. 2: The planning process and its antecedents resulted primarily because of concerns about meeting future demands for water associated with continued urban growth in the state. The Draft Plan projects a "gap" in the water available to meet municipal and industrial (M&I) needs in 2050 of between 190,000 to 600,000 acre-feet, "dependent on the success water suppliers have in getting new projects built and the actual rate of population growth." It appears to support actions that would be consistent with what it terms a "no/low regrets" strategy, an approach that would rely heavily on development of new water supply projects, would achieve a low/moderate level of conservation, and would involve modest transfers of water from agriculture.

While the Draft suggests that actual steps taken to meet new consumptive use water demands will be monitored (presumably to see whether they follow this suggested approach), no concrete state policies or actions are provided that would guide and direct water suppliers to act in a manner consistent with these stated objectives.

Recommendation No. 2: *The CWCB should adopt policies and procedures in the Final Water Plan that would provide clear incentives to water developers to take the actions necessary to meet new water demands in a manner consistent with the broad*

understanding reached through the basin roundtables, IBCC discussions, and the supporting analysis. Those policies should:

- emphasize conservation and reuse as the threshold strategies for managing additional M&I demands;

- clarify that new water supply projects involving additional water depletions meet standards for the protection of the water source's health;

- commit to putting in place viable alternative transfer mechanisms that would enable some water to move from irrigation to other uses in ways that minimize permanent dry up of irrigated lands; and

- acknowledge that any future development of transmountain diversion projects is contingent upon a determination of actual need and agreement on the terms and conditions under which such projects would be built and operated.

The CWCB should include in the Final Plan provisions that would invite all parties intending to take actions to meet additional consumptive demands to submit such proposed actions for inclusion in basin action plans. Basin roundtables would review proposed actions based on specified criteria respecting consistency with the policies outlined in the Final Plan.

Proposed actions found consistent with state policies and included in basin plans would be eligible for funding from the CWCB and would have support in related review and permitting processes.

Three – Maintaining and Enhancing Watershed Health

Conclusion No. 3: Watershed health, including environmental resiliency, is included as an objective of the Draft Water Plan, and the planning process has begun identifying areas of special environmental interest that warrant protection, but the mechanisms by which the current condition of Colorado's watersheds will be assessed and actions needed to improve and maintain watershed health will be identified and taken are not adequately defined, nor are the effects of a changing climate much considered.

Recommendation No. 3: *The CWCB and the Basin Roundtables should implement procedures under which watershed plans, developed at the level at which water rights are administered (water management districts), will be prepared. These watershed plans should assess the condition of the land and water within watershed boundaries and, where those conditions are not acceptable or where improvements are desired, define actions needed to achieve desired conditions. Plans should incorporate climate change risk management using the best available science, data, and impact monitoring. Plans should be developed first in watersheds in which new or additional water development is planned to help identify ways such new development can occur consistent with the maintenance of desired watershed health. Watershed plans should also identify opportunities for improved water management that would provide additional benefits.*

Four – Real Water Management

Conclusion No. 4: The Draft Plan pays only limited attention to existing water uses and management, focusing instead primarily on ways to meet future consumptive use water demands.

Recommendation No. 4: *The CWCB should direct the Basin Roundtables to develop strategies under which existing water uses and supporting stream flows can be managed to more effectively achieve greater benefits from the use of Colorado water, taking into account the changes that are resulting from climate change.*

Improved watershed management opportunities should be explored in the watershed planning process, and actions should be taken for their implementation.

Five – Climate Change Risk Management

Conclusion No. 5: The Draft Plan summarizes the current state of the science regarding the effects of climate change on Colorado's water resources but considers the consequences of these effects primarily in relation to the water supply-demand gap. It offers little guidance about actions the state, water suppliers, and water users should take in response to these effects.

Recommendation No. 5: *The CWCB, using best available science, should make explicit the increased risk associated with climate change to the array of interests in the uses of Colorado water and put in place the actions necessary to respond to and manage these risks. Climate change considerations should be built into the criteria to be used by the basin roundtables and the CWCB for including projects and activities in the Colorado Water Plan.*

The basin roundtables, together with the CWCB, should establish processes for monitoring climate-related conditions in the state's water basins and should develop responses as necessary to manage the adverse effects of climate change.

The Governor should establish a task force of climate scientists, water suppliers, water users, and other representative interests to identify those aspects of water use in the state that are most at risk because of climate change and to develop guidance for the basin roundtables and water suppliers and managers for managing these risks.

One – Colorado's Water Future

Conclusion No. 1: The Draft Plan provides a lengthy recounting of the remarkable effort over the past ten years, through extensive state- and basin-level discussions and study, to develop a common understanding of Colorado's water situation, including the water resources available in the state, existing uses of those resources, and projected future demands—primarily for new urban uses but also for industry and agriculture as well as for nonconsumptive purposes. The Draft focuses on a projected "gap" between expected urban demands and known sources of supply and discusses the primary options available for meeting new demands. The Draft also addresses the importance of watershed health. It does a good job of capturing and recounting the information and ideas developed through studies, discussions, and reports. But it provides little guidance respecting how the planning process will actually help guide and direct those actions. As written, the Draft is not really a plan; it is a summary of a process that has identified problems, has discussed a number of options, has concluded that entities in need of new water supplies should move ahead with those efforts regarded as no/low regrets, and has suggested the state will support those efforts.

Recommendation No. 1: *The CWCB should prepare, as the Final State Plan, a concise, readable document that provides a broad vision for Colorado's water future, establishing clear objectives and the steps necessary to achieve those objectives. It should account for the full array of interests in the use of Colorado's rivers and aquifers, including consumptive and nonconsumptive values. It should account for the significant uncertainties associated with climate change. It should use the basin planning process to promote actions consistent with plan policies and objectives.*

Discussion: In 1984, a former director of the Colorado Department of Natural Resources offered a highly skeptical assessment of water planning, suggesting it was a futile search for utopia.[1] In his view, "Colorado's plan for its water resources was put in the Constitution more than one hundred years ago."[2] We've come a long way since that time. Responding to an unprecedented drought in 2002, state water leaders recognized that growing water demands and highly variable and increasingly uncertain water supplies meant it was time for an extended conversation about Colorado's water future. No longer would it be sufficient simply to rely on the uncoordinated actions of thousands of appropriators, big and small, to determine that future.

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[1] [1] D. Monte Pascoe, Plans and Studies: The Recent Quest for a Utopia in the Utilization of Colorado's Water Resources, 55 U. COLO. L. REV. 391 (1983-1984). Interestingly, Colorado had already produced a water plan, working in cooperation with the Bureau of Reclamation under the 1965 Water Resources Planning Act. Colorado State Water Plan, Phase I – Appraisal Report (February 1974).

[2] Pascoe, 55 U. COLO. L. REV. at 417.

A subsequent DNR director—and law school Dean, David H. Getches, viewed water planning as articulating policy and applying that policy to facts in pursuit of "informed decisionmaking."[3] In the water resources context, planning has most often been applied to the process preparatory to building water development facilities, such as dams. As expressed interests in the uses of water and its sources broadened, water planning also broadened to address these additional interests. As Dean Getches noted, early state water planning processes varied widely in approach, and "these usually have been little more than proposals for particular structural developments. Few plans assess a full range of alternatives for water supply or deal with water management issues."[4] Consequently, "western states have not developed a future vision for use and protection of their water resources."[5]

In May 2013, Governor Hickenlooper issued an executive order directing the Colorado Water Conservation Board (CWCB) to prepare a Colorado Water Plan.[6] The Executive Order explained the need for a plan to address (1) the gap between water supply and water demand; (2) the effects of drought on the supply gap; (3) the "unacceptable" rate of purchase and transfer of water rights from irrigated agriculture; (4) the work of the Interbasin Compact Commission (IBCC) and the basin roundtables;[7] (5)

[3] David H. Getches, Water Planning: Untapped Opportunity for the Western States, 9 J. ENERGY L. & POL'Y 1 (1988-1989) (hereinafter Getches)("water planning must be a strategic effort that integrates policy with the best available resource information, providing guidance and assistance for future actions.").
[4] Getches at 2.
[5] *Id*.
[6] D2013-005, Executive Order, Directing the Colorado Water Conservation Board to Commence Work on the Colorado Water Plan, May 14, 2013 (Executive Order).
[7] In 2005, the Colorado General Assembly enacted the Colorado Water for the 21st Century Act for the described purpose of "Negotiation of Interbasin Compacts Regarding the Equitable Division of the State's Waters." HB 05-1177, *codified at* Colo. Rev. Stat. §§37-75-101 to -106.This legislation formalized the basin roundtables and described their purpose as "to facilitate continued discussions within and between basins on water management issues, and to encourage locally driven collaborative solutions to water supply challenges." Colo. Rev. Stat. §37-75-104(1)(a). The roundtables were directed to, "[u]sing data and information from the statewide water supply initiative and other appropriate sources and in cooperation with the on-going statewide water supply initiative, develop a basin-wide consumptive and nonconsumptive water supply needs assessment, conduct an analysis of available unappropriated waters within the basin, and propose projects or methods, both structural and nonstructural, for meeting those needs and utilizing those unappropriated waters where appropriate." Colo. Rev. Stat. §37-75-104(1)(c). In addition, the legislation established a 27-member Interbasin Compact Committee (IBCC) "to facilitate the process of interbasin compact negotiations." Colo. Rev. Stat. §37-75-105(1)(a).

the need to integrate water quality and water quantity considerations; (6) interstate water concerns; and (7) the ability of the CWCB to perform this work.[8]

James Eklund, Director of the CWCB, transmitted a draft of the Water Plan to the Governor on December 14, 2014. The transmittal letter states:

> Ultimately, the CWCB intends for Colorado's Water Plan to be a meaningful document that meets the following criteria:
> 1. Fosters collaborative solutions to responsibly address the looming gap between supply and demand. The effect of this is to fortify Prior Appropriation Doctrine, not undermine it.
> 2. Identifies and tests cost-effective alternatives to the permanent "buy & dry" of irrigated lands.
> 3. Asserts that Colorado will protect its compact entitlements, act affirmatively to avoid compact curtailments where possible, and demonstrate effective state-based policy to prevent federal erosion of state and local water authority.
> 4. Encourages strong cooperation by interested stakeholders to move regulatory and permitting efforts more quickly through the processes by front-loading state involvement.
> 5. Aligns state policies, resources, and funding to support Colorado's water values and actionable objectives.[9]

While this transmittal letter identifies only a limited set of objectives, the Draft Plan in fact addresses a considerable array of policy issues in the context of discussing approaches to meeting Colorado's future water needs. It recognizes the need for additional water supply projects but promotes a collaborative approach to developing such projects that could result in such projects incorporating additional objectives with broader benefits that would produce more widespread support. It seeks to guide the process of addressing new consumptive use water demands away from transfers of water from irrigated agriculture, except under arrangements that would not require permanent loss of irrigated land or transfer of water right ownership. It makes a strong case for the many benefits of reducing new demands through conservation measures. It suggests the possibility of additional transmountain diversions to bring water from the Colorado River basin to the Front Range but only under mutually agreeable conditions. It acknowledges the importance of nonconsumptive uses of water, supports future protection and restoration activities, and embraces watershed management as a valuable means of

[8] Executive Order at 2-3.
[9] Letter from James Eklund to Governor Hickenlooper, Submittal of 2014 Draft of Colorado's Water Plan, December 10, 2014.

achieving multiple interests in uses of land and water. In a state that historically has taken a very decentralized approach to water matters, the Draft Plan suggests a considerably more active role for the state itself and for collaborative decision-making processes at the state, basin, and local level.

The Draft is written in terms of challenges to be addressed. It summarizes these challenges as

- Growing water supply gap;
- Agricultural dry-up;
- Critical environmental concerns;
- Variable climatic conditions;
- Inefficient regulatory process;
- Increasing funding needs.[10]

The Draft Plan offers a summary of what it calls "Colorado's water values."[11] The values are stated as:

- A productive economy that supports vibrant and sustainable cities, viable and productive agriculture, and a robust skiing, recreation, and tourism industry;
- Efficient and effective water infrastructure promoting smart land use; and
- A strong environment that includes healthy watersheds, rivers and streams, and wildlife.[12]

An important objective of the Water Plan is to "[a]lign[] state policies, resources, and funding to support Colorado's water values and actionable objectives."[13]

We would encourage a reframing of a more focused final Plan to offer an affirmative vision of Colorado's water future along the lines suggested by this statement of water values. That reframing would begin with the health of its watersheds, including its rivers and aquifers, as the basis of that future, would acknowledge the array of values and uses served by state water resources, would state clearly its policies respecting the manner in which the state's water resources are currently being used and the manner in

[10] Colorado Water Conservation Board, Colorado's Water Plan (Draft), December 10, 2014 at 3 (Draft Plan).
[11] Draft Plan at 2.
[12] Id.
[13] Draft Plan at ii.

which future needs and interests in the use of state waters should be achieved, and would clearly articulate the ways in which the actions outline in the Plan will help achieve and maintain these stated objectives.[14] To be meaningful, that vision must also take full account of the realities of climate change and its effects on water resources and their uses.

The present document, in many respects, serves more as a summary of the planning process than as a plan. It does a good job of pulling together the materials developed throughout the process into a single document, but the product is lengthy and does not readily serve the function of guiding the state and its water community toward a well-articulated water future. The Draft should stand alone as a comprehensive summary document, but the CWCB should produce a more focused document as the Final Plan, with a clear vision for the future, well defined objectives to be achieved, explicit policies that will guide actions necessary to achieve those objectives, and a plan for how those actions will occur.

[14] A similar conclusion is reached in Harris Sherman, Colorado Water Plan Close, But Not There Yet, Denver Post, March 28, 2015, available online at http://www.denverpost.com/opinion/ci_27798660/colorados-water-plan-close-but-not-there-yet.

Two – Meeting New Consumptive Use Demands

Conclusion No. 2: The planning process and its antecedents resulted primarily because of concerns about meeting future demands for water associated with continued urban growth in the state. The Draft Plan projects a "gap" in the water available to meet municipal and industrial (M&I) needs in 2050 of between 190,000 to 600,000 acre-feet, "dependent on the success water suppliers have in getting new projects built and the actual rate of population growth." It appears to support actions that would be consistent with what it terms a "no/low regrets" strategy, an approach that would rely heavily on development of new water supply projects, would achieve a low/moderate level of conservation, and would involve modest transfers of water from agriculture.

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- emphasize conservation and reuse as the threshold strategies for managing additional M&I demands;

- clarify that new water supply projects involving additional water depletions meet standards for the protection of the water source's health;

- commit to putting in place viable alternative transfer mechanisms that would enable some water to move from irrigation to other uses in ways that minimize permanent dry up of irrigated lands; and

- acknowledge that any future development of transmountain diversion projects is contingent upon a determination of actual need and agreement on the terms and conditions under which such projects would be built and operated.

The CWCB should include in the Final Plan provisions that would invite all parties intending to take actions to meet additional consumptive demands to submit such proposed actions for inclusion in basin action plans. Basin roundtables would review proposed actions based on specified criteria respecting consistency with the policies outlined in the Final Plan.

Proposed actions found consistent with state policies and included in basin plans would be eligible for funding from the CWCB and would have support in related review and permitting processes.

Discussion: The driver of the Water Plan and its antecedents was concern about having sufficient water available to meet future consumptive use needs, especially for urban and industrial growth. To emphasize this concern, the analysis characterizes the difference between the projected demands for water out to 2050 and the sources of supply identified

today as a "gap."[15] In the Draft Plan, the gap is listed first on the list of challenges: "The gap between municipal water supply and demand is growing, and conservation and the completion of proposed water projects are likely insufficient to address projected 2050 shortfalls that could total more than 500,000 acre-feet statewide."[16] Many assumptions are packed into the analysis that projects such a gap, beginning with expected population growth, including expected per capita water uses, projected levels of active and passive conservation,[17] the "success rate" in constructing identified new water supply projects, and the amount of water shifted from agricultural to urban uses. It assumes that ordinary efforts of water suppliers will fall short, dramatically short, of meeting demands, though the reasons for the inability of water suppliers to meet future demands are unspecified. In reality, there is no gap today and there may not be a gap in 2050.

Options for Meeting the Gap

More usefully, the process made explicit the options for meeting future consumptive use and discussed their advantages and disadvantages. No one option is sufficient; some mix of approaches will be necessary. The Draft Plan employs "scenario planning" with associated water demands to project a range of possible supply responses.[18] In addition, the IBCC identified those potential actions regarded as likely and necessary no matter the precise magnitude of future demands, denominated as the "no and low regrets" actions.[19] The Draft Plan reviews each of the basin implementation

[15] Draft Plan at 100 ("The Statewide Water Supply Initiative in 2010 indicated that under current conditions the M&I gap could be between 190,000 and 630,000 acre-feet, depending on how many planned projects are implemented and the rate of population growth in Colorado.").
[16] Draft Plan at 3.
[17] The Draft Plan distinguishes these two sources of conservation, referring to conservation that occurs because of "natural" replacement rates of plumbing and appliances as passive and conservation resulting from specific actions taken by water providers, called active. Draft Plan at 73, 76.
[18] Draft Plan at 86-96. Scenarios include business as usual, weak economy, cooperative growth, adaptive innovation, and hot growth. Id. at 90-92. The IBCC synthesized five "portfolios" of actions that could be taken to meet the projected low, medium, and high demands associated with the scenarios. The portfolios represent different mixes of conservation, new supply, and water transfers.
[19] Draft Plan at 92. *See* Memorandum from Rebecca Mitchell to Colorado Water Conservation Board Members, September 13, 2013 (no and low regrets summary). As summarized, these include: (1) implement "low/medium" conservation strategies; (2) successfully implement at least 80% of the IPPs; (3) implement reuse strategies; and (4) plan for new water supplies. Draft Plan at 100-01. Note that ag to urban transfers are not included.

plans (BIPs) prepared by the roundtables and the proposals for meeting gaps but concludes that, even with these proposals, gaps remain.[20]

The scenario planning approach, while perhaps useful conceptually, presupposes the planner is also the implementer and that the actions taken by the implementer are better informed and more capable of adapting as new information becomes available. In fact, the actions discussed in the Draft Plan and in the BIPs will be taken by hundreds of water suppliers of widely varying sizes all around the state. The Draft Plan provides no suggestion as to what will guide the actions of these many and diverse entities, what will motivate water suppliers to implement even low/medium conservation measures, what will motivate them to implement water-conscious land use planning, what will encourage them to use alternative transfer mechanisms (ATMs) rather than permanent water right acquistions, what will encourage them to improve and protect watershed health.

Selecting Actions for Inclusion in Basin Plans

We believe a more productive strategy would be to have all actions for meeting future needs that would like to be included in basin plans undergo a structured review process that would ensure their compatability with basin interests and state policies.[21] We would design the review process to encourage implementation of best available conservation practices to manage and limit demands for new consumptive uses, including the use of land use management. We would require that new water supply projects involving removal and depletion of water from streams and aquifers meet standards for mantenance and enhancement of the health of these sources. We would favor use of alternative transfers of water from agriculture by enabling such proposed transfers included in basin plans to be able to use specially-established transfers procedures designed for their facilitation.[22]

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[20] Draft Plan at 143. The basin roundtables attempted to identify all IPPs in their basins and were supposed to make at least a preliminary evaluation of their viability, but it appears these efforts varied widely across the roundtables and were not based on a clear, comprehensive set of review criteria. In practice, the basin implementation plans appear to have included virtually all proposals presented to the roundtables.

[21] Water suppliers would, of course, be free to pursue meeting new water demands as they chose. The option of working through the basin planning process would be potentially attractive because it would evidence widespread support for the action, would make the action available for funding, and would likely greatly facilitate the various approval processes needed for implementation.

[22] Our proposal is set out in Appendix B.

Uses of water begin at the source from which the water is taken. Colorado's water basins represent logical geographic, hydrological, and political units within which to do meaningful planning for water development, protection, and management. The basin roundtables are in the best position to judge the conditions of the surface and ground water sources within their region. With appropriate direction from the CWCB and the IBCC, they are best positioned to evaluate the benefits and costs of existing and new water development. The roundtables can continue to develop collaborative approaches to meeting state and basin water needs and interests while working under guidance developed at the state level and with the support of CWCB staff, local water providers and users, and other stakeholders to identify actions to be taken to meet Colorado's water needs.

The basin implementation plans developed under the first phase of the planning process provide a good starting point for the next phase—development of basin action plans. We propose that the roundtables engage in a rigorous screening process to determine the suitability of proposals for inclusion in their basin action plans. Criteria to be applied in this screening process should be developed by the CWCB and the IBCC, potentially using the suggestions offered in this report and other ideas. Inclusion in the plans would represent a firm commitment to move these projects and activities ahead. In this way we believe the actions taken to achieve Colorado's desired water future are more likely to reflect the policies developed in this planning process. To incentivize this approach we propose making state funding potentially available to help bring actions included in basin plans to fruition. We believe that the screening process would result in the development of plans and activities with widespread support among an array of interests and would enable state and local governments to support efforts to obtain the permissions necessary for their implementation. The availability of funding and permitting support should help insure the implementation of these desired projects and activities.

Conservation and New Water Supply Projects

The Draft Plan suggests that the most important option for meeting the gap is successful development of already planned water supply projects.[23] While such projects have historically been the primary means of meeting new consumptive use demands, there is nothing in the Draft that explains why development of these proposed projects is the preferred strategy. At a time when the state's water community is taking a fresh look at how we should meet our future water needs, a look that acknowledges the changing interests of its citizens in the uses made of water, there is a surprising lack of discussion about what constitutes a "good" water supply project. Despite recognition of the many benefits of actively managing demands for water rather than simply assuming water suppliers should meet whatever demands are made, there is nothing in the Draft that would encourage water suppliers to first implement best conservation practices before determining the extent of additional actions needed to meet remaining demands. We believe the final plan should make express as state policy that local governments, including special districts, should first actively implement best measures to manage demand and then pursue additional actions as necessary to meet remaining demand for new water supplies.

The Draft Plan emphasizes the essential role that water conservation and water reuse will play in reducing the gap and talks about taking a "comprehensive statewide approach."[24] Governor Hickenlooper is quoted as saying: "Every conversation about water should start with conservation."[25] The Draft Plan recognizes additional benefits associated with water conservation beyond reducing water demands.[26]

In 2010, with funding from the CWCB and with the help of a technical and stakeholder workgroup, Colorado WaterWise produced a *Best Practices Guidebook for Municipal Water Conservation in Colorado*.[27] It features "fourteen best practices that outline the potential benefits and costs for active water conservation measures, indoor and outdoor, residential and non-residential practices."[28] Based on these best practices,

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[23] Draft Plan at 93.
[24] Draft Plan at 144.
[25] Draft Plan at 145.
[26] Draft Plan at 145. Listed are reducing wastewater discharges, reducing outdoor irrigation runoff, and delaying the need for new projects.
[27] Draft Plan at 73.
[28] Id.

SWSI 2010 developed low, medium, and high strategies for "active" water conservation.[29] Estimated savings statewide by 2050 range from 160,000 acre-feet under the low strategy to 461,000 acre-feet under the high strategy.[30] The study forecasts an additional 154,000 acre-feet of savings by 2050 because of "passive" conservation.[31] In addition, SWSI 2010 forecasts that water reuse will provide from 41,000 to 63,000 acre-feet of additional supply.[32] The Draft Plan notes that higher density development would result in reduced water demands as well.[33]

The "no and low regrets" path developed by the IBCC contemplates conservation actions that would produce savings of 340,000 acre-feet, with half of that amount dedicated to reducing new demand.[34] In addition, passive conservation is expected to produce savings of 150,000 acre-feet by 2050. According to the Draft Plan, "[w]hile conservation and reuse are not 'silverbullets,' we can achieve benefits by creating scalable technical resources, bolstering local initiatives through financial incentives, and sharing best-practices."[35] The Draft Plan lists thirteen conservation-related actions that emerged from the various efforts associated with the planning process.[36]

While the Draft Plan clearly envisions an important role for conservation in helping to reduce future demands for water, it leaves open how this is to occur. The process appears to have done a good job of helping to develop substantial information

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[29] "For the purposes of CWCB's technical work, conservation savings were divided into two categories. The first is passive conservation, which was used to reduce demand projections. Passive conservation results from the replacement of old indoor fixtures and appliances with newer, more efficient ones. Active conservation, which takes a concerted effort on the part of water providers and/or property owners, is treated as a method to address the water supply gap." Draft Plan at 71, footnote a.

[30] Draft Plan at 74.

[31] Id. The proposed actions under each strategy and the expected results are summarized in the Draft Plan at Table 5-2, at 75.

[32] Draft Plan at 77.

[33] Draft Plan at 78.

[34] "Implement strategies to meet medium levels of conservation and apply at least half of these savings to meet future M&I needs to support approximately 1 million people and the jobs needed to support them in the near future (170,000 acre-feet)." Draft Plan at 93. At another point the Draft Plan states: "Implement strategies at the basin level to meet medium levels of conservation, and apply half of that to meet the M&I Gap, equivalent statewide to 67,000 acre-feet per year by 2030 and 167,000 acre-feet by 2050." Draft Plan at 100. The assumption that only half of the conservation savings would be applied to reducing new demands is obviously conservative. All reductions in demands, whether for new or existing uses, reduce the need for the water supplier to be able to reliably meet demands within the service area.

[35] Draft Plan at 144.

[36] Draft Plan at 156-58.

about the many ways that urban water demands, both existing and new, can be reduced.[37] Most of the basin roundtables emphasized the need for conservation, and some identified specific conservation implementation plans that are presently in the works. Interestingly, the IBCC determined that only the most modest of the three defined levels of conservation would be appropriate as part of the no/low regrets actions.[38] Consequently the Draft Plan only assumes that this level of conservation will be achieved—only a third as much as would be achieved by taking actions needed to achieve a high level of conservation by 2050.[39]

Several of the larger urban water providers on the Front Range have in fact been actively pursuing conservation and have already adopted many of the strategies identified in SWSI 2010 report.[40] According to the Draft Plan, "[m]any water providers have adopted best practices, including landscape efficiencies, water loss management, and inclining block rate structures."[41] But much of the expected new demand will occur outside of these water supply areas, raising the question of what will motivate these water supply entities to implement aggressive conservation measures.

We believe a better way to encourage adoption of best conservation practices, including for land use, would be for the Final Plan to adopt a clear policy favoring aggressive use of practicable best conservation practices by all entities having to meet new consumptive use demands. To encourage water suppliers to follow this policy, we suggest that local governments, special districts, and their water suppliers submit proposals for conservation actions to the basin roundtable, together with their proposals for acquiring additional water supplies. Assuming these proposals meet the review criteria and are included in the basin plans, the activities they propose would be eligible

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[37] See, e.g., *Best Practices Guidebook for Municipal Water Conservation in Colorado*.

[38] The SWSI 2010 report identified low, medium, and high levels of conservation actions that could be taken and estimated the likely demand reductions associated with each level. Colorado Water Conservation Board, *Appendix L: SWSI 2010 Municipal and Industrial Water Conservation Strategies* (2011), 12. http://cwcb.state.co.us/water-management/water-supplyplanning/Documents/SWSI2010/AppendixL_SWSI2010MunicipalandIndustrialWaterConservationStrategies.pdf. Draft Plan at 74, Table 5-1.

[39] The "low" level is projected to produce about 160,000 acre-feet reduction in demand by 2050 statewide while the "high" level would be expected to produce a demand reduction of about 460,000 acre-feet. Draft Plan, Table 5-1.

[40] Draft Plan at 145-46.

[41] Draft Plan at 145.

for state funding. In our view, state funding support should be used to encourage implementation of best conservation practices.

Transferring Water from Agriculture

One of the six primary "challenges" identified in the Draft Plan is "agricultural dry up:"

> Irrigated agriculture is being lost by the purchase and permanent transfer of agricultural water rights. At the current rate of transfer, there will be a major reduction in Colorado's agricultural lands in the future. This could impact Colorado's economy and food security. In addition, rural communities could dry-up along with agriculture if enough agricultural business goes away.[42]

The Draft Plan suggests as much as 700,000 acres of irrigated farmlands might be dried up by 2050 if current patterns continue, including as much as one third of the irrigated lands in the South Platte basin.[43] The Draft states: "The status quo is counter to Colorado's Water Values, …, leading to large quantities of water being transferred out of the agricultural sector to satisfy M&I water supply needs."[44]

Irrigated agriculture accounts for 89 percent of all water consumed in Colorado.[45] Municipalities consume an additional 7 percent, and industrial uses account for about 4 percent.[46] Approximately 3.3 million acres of land in the state are irrigated.[47] All forms of agriculture in Colorado generate combined revenues of about $7 billion per year, in an economy with a total value of $294 billion, or about 2.3% of the state's total revenues.[48] Colorado's agricultural economy employs about ½ of 1 percent of the state's workforce.[49] While maintaining a strong agricultural economy is important to Colorado, some of the

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[42] Draft Plan at 3.
[43] Draft Plan at 189
[44] Draft Plan at 89.
[45] Draft Plan at 71.
[46] Id.
[47] USGS, Estimated Uses of Water in the United States 2010, Table 7.
[48] U.S. Bureau of Economic Analysis, Colorado Gross Domestic Product – 2013, available online at http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=1#reqid=70&step=10&isuri=1&7003=200&7035=-1&7004=naics&7005=-1&7006=08000&7036=-1&7001=1200&7002=1&7090=70&7007=2013&7093=levels. *See also* Summit Economics and The Adams Group, Water and the Colorado Economy, at 29.
[49] Elizabeth Schuster et al., Understanding the Value of Water in Agriculture: Tools for Negotiating Water Transfers, University of Arizona (Jan. 2012).

water presently consumed to grow crops needs to be available for other uses. The question is not whether this should happen but how.[50]

The Draft Plan commits Colorado to develop mechanisms that promote making some agricultural water available for new uses,[51] but in a manner that actually strengthens the state's agricultural sector. We support this goal. The modest state-level economic importance of irrigated agriculture dramatically underrepresents its local and regional importance, especially in that large part of the state that is still predominantly rural in character. Without irrigated agriculture, many rural parts of the state would have little economic activity. Moreover, it neglects the widespread preference for irrigated meadows and fields over many dry landscapes and the importance of ranching and farming for maintaining productive open spaces. A major attraction of making irrigation water available through ATMs is the revenues these transactions would return to the irrigators, to their agricultural operations, and to their communities. We would expect these revenues to exceed those that would be returned through traditional agricultural use of the water and that some of these additional revenues would be invested in improving agricultural operations. Thus, new water municipal and other demands for water could become a source of revenue for the strengthening of Colorado's agricultural economy.

The Draft Plan provides a list of "types of ATMs promoted in Colorado" that illustrates a range of options but without much discussion about their different purposes, their strengths and weaknesses, and what would be necessary for their successful implementation.[52] The Draft suggests the need for more data, developed through pilot programs.[53] It notes that "[e]xecuting ATMS can be difficult because of institutional, legal, financial, and court-related barriers."[54] Thus the Draft serves more to raise questions about the viability of ATMs as a meaningful alternative to permanent transfers than to point the way to their implementation.

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[50] Peter W. Culp, Robert Glennon, and Gary Libecap Shopping for Water: How the Market Can Mitigate Water Shortages in the American West (Oct. 2014). *See also* Colorado Water Institute, Agricultural/Urban/Environmental Water Sharing: Innovative Strategies for the Colorado River Basin and the West (undated).

[51] The Draft Plan expresses a strong desire for the state to develop "alternative transfer mechanisms" in place of permanent transfers. Draft Plan at 189.

[52] Draft Plan at 190, Table 6.4-1.

[53] Draft Plan at 191.

[54] Id.

It is true that ATMs are not business as usual. But neither are they absolutely unknown or completely different in nature from traditional transfers. The purpose is to make water historically used under existing irrigation water rights available for other uses, just as with permanent transfers. Such transfers must be accomplished in a manner that does not unreasonably impair other existing water uses, just as with permanent transfers. The only difference is that ATMs are to be designed and implemented in a manner that avoids the permanent dry up of irrigated land, and ownership of the water right is to stay with the irrigator.

In 2013, the Colorado General Assembly enacted legislation authorizing pilot programs to test fallowing-leasing arrangements.[55] The Colorado Water Conservation Board and the Colorado Division of Water Resources adopted criteria and guidelines for such pilot projects.[56] The Super Ditch in the Lower Arkansas Valley has obtained a grant under this program and is moving ahead with a pilot project in the 2015 irrigation season.[57] Experience with this project should help determine whether this approach might prove workable and establish a model for other similar projects.

As exemplified in this pilot process, the state must continue to actively support the development of ATMs involving the most straightforward approach—making the consumptive use of water saved by temporarily fallowing lands available for other uses.[58] As enabled in the pilot legislation, special procedures are needed to facilitate such rotating transfers of consumptive use. We offer a proposed approach, similar to that set out for the pilot program, for facilitating such transfers in Appendix B.

If Colorado is serious about minimizing permanent transfers of water out of irrigated agriculture, then the state must take the steps necessary to enable such viable alternatives. Most importantly, we must remove unnecessary limitations now existing in our change of use

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[55] HB 13-1248, codified at Colo. Rev. Stat. §37-60-115 (8).

[56] Colorado Water Conservation Board, CRITERIA AND GUIDELINES FOR FALLOWING-LEASING PILOT PROJECTS, Nov. 13, 2013.

[57] Draft Plan at 194. Chris Woodka, "CWCB approves Catlin Canal lease to Fowler, Security, and Fountain for augmentation and exchange," Coyote Gulch, available online at https://coyotegulch.wordpress.com/2015/01/28/cwcb-approves-caitlin-canal-lease-to-fowler-security-and-fountain-for-augmentation-and-exchange/. It is noteworthy that the State Engineer imposed 60 conditions on this temporary transfer.

[58] We have been moving slowly but surely in the direction of defining water rights in terms of consumptive use, as well as diversion/withdrawal rates. Especially with increasingly limited water supplies, the consumption associated with a water use becomes more and more important. Environmental concerns have placed restrictions on new depletions of water in many western rivers and streams. And, of course, changes of water rights and plans for augmentation are conditioned on not causing any increased depletions of water.

laws and procedures so that alternative transfers become more attractive to new users than permanent transfers. Approaches such as the one we offer in Appendix B need to be worked out, authorized legislatively, and implemented by the Colorado Water Conservation Board and the Colorado Division of Water Resources.

Transmountain/Transbasin Diversion Projects

The IBCC reached agreement on a preliminary set of principles that should guide future discussions respecting development of additional transmountain diversions (TMDs). As outlined in the Draft Plan, the principles are:

1. The eastern slope is not looking for firm yield from a new TMD project and would accept hydrologic risk for that project.
2. A new TMD project would be used conjunctively with eastern slope interruptible supply agreements, Denver Basin Aquifer resources, carry-over storage, terminal storage, drought restriction savings, and other non-western slope water sources.
3. In order to manage when a new TMD will be able to divert, triggers are needed.
4. An insurance policy that protects against involuntary curtailment is needed for existing uses and some reasonable increment of future development in the Colorado River system, but it will not cover a new TMD.
5. Future western slope needs should be accommodated as part of a new TMD project.
6. Colorado will continue its commitment to improve conservation and reuse.
7. Environmental resiliency and recreational needs must be addressed both before, and conjunctively, with a new TMD.[59]

While concerns have been raised by some about these principles and their meaning, and all agree they require further development, these concepts represent an important step forward in finding potential common ground upon which any future TMDs might be based. It is not at all clear that any additional TMDs are necessary in the foreseeable future if steps are taken to aggressively pursue conservation, to develop effective ATMs, and to build new projects that meet the standards proposed here. In our view, that should be Colorado's goal—to meet its water needs without additional TMDs. But if all other measures prove insufficient, the framework set out above seems to us to provide a reasonable starting point for developing agreement about any new TMDs.

In particular, we believe it would be necessary for the proponent of any new TMD to demonstrate that the demands sought to be addressed had been managed aggressively through implementation of all conservation best management practices, including those

[59] Draft Plan at 280.

related to land use. In addition, there would need to be agreement on measures taken to ensure that the watershed(s) from which water would be removed would remain in at least the same or better condition once the project was in operation. Climate change reductions in flows threaten many existing post-Colorado River Compact diverters, including numerous Front Range cities. Under the principles it is not clear how these diverters would be protected from a compact curtailment. Finally there would need to be agreement on the nature of the additional benefits the proponent would make available to the area of origin.

Funding for Projects Adopted in Basin Plans

At present, the CWCB has several funds of money available to support water-related projects. We favor pursuing options for creation of a substantial additional fund that would be used to support new projects and activities, for meeting both new consumptive uses and for nonconsumptive uses, determined to be consistent with state and basin interests and with the review criteria used by basin roundtables and approved by the state. We support investigation of imposing a modest surcharge on all water uses that would vary dependent on the value of the water use. [60]

The Draft Plan offered the following list of factors to determine whether proposed water supply projects would be consistent with the intention of the plan (and presumably would be given direct state support):

- Addresses an identified gap through one of the following:
  - -Is identified in a BIP,
  - -Meets a defined need in a basin needs assessment,
  - -Meets a defined need in the Statewide Water Supply Initiative, or
  - -Is identified as being needed as part of the "no and low regrets" strategy
- Demonstrates sustainability
  - -Provides a conservation plan or plans aimed at reducing demands
  - -Includes environmental mitigation and enhancements in the planning phase,
  - -Mitigates or avoids impacts to or enhance water quality, and
  - -Mitigates or avoids impacts on agricultural and rural community
- Involves local government consultation
- Includes a stakeholder and public input process

[60] For a discussion of employing a public goods charge to help pay for water-related improvements, *see* Kim Quesnel and Newsha Ajami, Funding Water in Times of Financial Uncertainty: The Case for a Public Goods Charge in California, Water in the West (Jan. 2015).

- Establishes fiscal and technical feasibility[61]

These considerations are similar to those we suggest be used by the basin roundtables in their screening process, though they lack sufficient specificity for objective application. Nevertheless, they represent a good starting point for the final development of state review criteria by the CWCB that would ultimately determine the availability of state funding.

Facilitating Review and Permitting of Projects Included in Basin Plans

The Draft Plan, following the direction of Governor Hickenlooper, gives considerable attention to the proposal that permitting processes for new water development projects should be "streamlined."[62] The Draft Report states: "One of the main purposes of the Colorado's Water Plan is to find ways to support the implementation of the BIPs."[63] It adds: "Increased efficiency in the permitting process, while not predetermining the outcome and supporting the statutory and regulatory requirements of each permitting agency, is a significant way to assist project proponents."[64] It proposes several ways that this objective might be met:

1. Improve coordination
2. Increase early involvement
3. Coordinate technical methods
4. Increase state and other resources
5. Increase clarity
6. Improve the quality of Draft EIS documents
7. Encourage multi-purpose projects[65]

Ultimately it suggests the state would endorse projects that meet specific requirements, thus somehow facilitating the permitting review processes.[66] The difficulty is that the

[61] Draft Plan at 317.
[62] As set out in the Draft Plan, the Governor's Executive Order stated: "The CWCB is directed to align the state's role in water project permitting and review processes with the water values and to streamline the state role in the approval and regulatory processes regarding water projects." Draft Plan at 1.
[63] Draft Plan at 318.
[64] Id.
[65] Draft Plan at 315-16.
[66] The factors are those listed above at note 61.

state has little direct responsibility for environmental permitting, virtually all of which is managed by federal agencies.

We believe our proposal would more effectively accomplish the objective of facilitating the regulatory processes. By putting proposed projects through the review process at the basin level, most issues that will be considered in the various permitting processes will have already been addressed. Endorsement of the project by the basin roundtables, with approval of the CWCB, will mean the project satisfies a broadly agreed-to set of considerations. Presumably the project would have the support of the array of interests represented by the basin roundtables, potentially including affected counties, local governments, water users, and environmentalists. Much of the information needed to satisfy local, state, and federal permitting processes would have already been reviewed. With such a foundation, the permitting processes should be greatly facilitated and the likelihood of active opposition greatly reduced.

Three – Maintaining and Enhancing Watershed Health

Conclusion No. 3: Watershed health, including environmental resiliency, is included as an objective of the Draft Water Plan, and the planning process has begun identifying areas of special environmental interest that warrant protection, but the mechanisms by which the current condition of Colorado's watersheds will be assessed and actions needed to improve and maintain watershed health will be identified and taken are not adequately defined, nor are the effects of a changing climate much considered.

Recommendation No. 3: *The CWCB and the Basin Roundtables should implement procedures under which watershed plans, developed at the level at which water rights are administered (water management districts), will be prepared. These watershed plans should assess the condition of the land and water within watershed boundaries and, where those conditions are not acceptable or where improvements are desired, define actions needed to achieve desired conditions. Plans should incorporate climate change risk management using the best available science, data, and impact monitoring. Plans should be developed first in watersheds in which new or additional water development is planned to help identify ways such new development can occur consistent with the maintenance of desired watershed health. Watershed plans should also identify opportunities for improved water management that would provide additional benefits.*

Discussion: The Draft Plan chapter, "Water resource management & protection," [67] has the feeling of an appendage to the main body. It is not addressed to solving the "gap" but clearly arose out of the discussions that led to preparation of the Draft Plan. As indeed it should have. As we suggested earlier, the health of Colorado's watersheds and their water is the foundation upon which all uses depend. In our view, all discussions about water use in Colorado should begin with the recognition of the fundamental importance of watershed health.

Although overly-narrowly limited to mountain watersheds, the Draft Plan explains the importance of watershed health: "Healthy watersheds provide ecosystem services that benefit ecological processes, local and state economies, and social stability. Ecosystem services include flow regulation, flood attenuation, water purification, erosion control, and habitat protection."[68] The Draft Plan suggests a role for stakeholder-based, collaborative watershed planning and management. It highlights concerns about forest

[67] Draft Plan, Chapter 7.
[68] Draft Plan at 245.

health, especially related to fire and erosion, concerns that have motivated watershed management actions in forested areas serving as major sources of drinking water.[69]

But watershed management is much broader than forest management. In theory, it is intended to comprehensively consider land and water conditions within the identified watershed, to assess whether these conditions are adequately supporting the desired uses of these resources, to identify factors that are preventing achievement of these desired conditions, and to develop plans and implement actions that will restore and maintain these conditions. Often, these processes are motivated originally by particular concerns: sedimentation; mine drainage; impaired fisheries. But they can be (and have been) used to take a more comprehensive view, engage a wide range of people interested in the health of the watershed, build support for actions, and help find funding for their implementation. Colorado already has an active network of watershed groups at work around the state.[70]

The use of watershed planning is now well established as an essential step in determining local land and water conditions and identifying actions necessary to improve and maintain those conditions. Our experience with the recovery programs for the Platte and Colorado rivers, developed under the Endangered Species Act, demonstrates the value of working proactively to achieve the conditions necessary to sustain populations of threatened and endangered species. Our work with classifications and standards, impaired waters, and nonpoint source management under the Clean Water Act demonstrates ways to take actions needed to restore and maintain the water quality of our rivers and lakes. Work related to development of this water plan has helped identify so-called "focus areas."[71] These areas were identified, based on a list of attributes that included the presence of threatened and endangered species, special riparian and wetland plant communities, and decreed instream flows.

Watershed management plans can help guide the actions determined to be necessary to meet future water needs, both consumptive and nonconsumptive. Their characterization of existing conditions can help to establish a baseline. These conditions

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[69] Draft Plan at 248, 249-50.
[70] For a listing of watershed groups, *see* *http://www.coloradowater.org/Watershed%20Group%20Directory*.
[71] Draft Plan at 221.

can be evaluated to determine whether they are satisfactory. Are water quality standards being met? If not, what actions should be taken to achieve established standards? Are flows adequate to support and maintain desired aquatic conditions? If not, what actions should be taken to improve and maintain those conditions? Can existing consumptive water uses be better managed to achieve desired watershed conditions? How can additional consumptive water uses be accommodated consistent with maintaining desired conditions?

Each watershed is distinctive. Land and water management needs vary widely across Colorado's watersheds. Historically there has been no mechanism available to enable coordinated consideration of management actions necessary to effectively address the conditions existing in our watersheds and to work toward taking actions needed to bring those conditions to desired levels. Rather our actions have been decentralized, uncoordinated, often in opposition, without any clear vision of a desired future.

We have begun the process of organizing ourselves into more manageable units, beginning with basin roundtables, and have brought together the wide array of people concerned about the future of their communities within these basins. In some locations we have already started the work of developing more localized watershed planning processes, often led by local watershed groups. Now is the time to begin building on this work to move toward creation of coherent, coordinated, broadly based, manageable basin subunits that can help guide our future efforts to manage our watersheds and their water resources.

Four – Real Water Management

Conclusion No. 4: The Draft Plan pays only limited attention to existing water uses and management, focusing instead primarily on ways to meet future consumptive use water demands.

Recommendation No. 4: *The CWCB should direct the Basin Roundtables to develop strategies under which existing water uses and supporting stream flows can be managed to more effectively achieve greater benefits from the use of Colorado water, taking into account the changes that are resulting from climate change.*

Improved watershed management opportunities should be explored in the watershed planning process, and actions should be taken for their implementation.

Discussion: The Draft Plan focuses almost entirely on ways to provide water to meet the "gap," neglecting the matter of management of existing water uses except in so far as it would reduce demands or provide more water for new uses. In its section on agricultural conservation, efficiency, and reuse, the Draft Plan does a good job of explaining how water is used in irrigated agriculture and why improving efficiency, measured as the difference between the amount of water diverted or withdrawn and the amount of water evapotranspired by crops,[72] does not normally produce water for new consumptive uses.[73]

But the purpose of water management is to improve the benefits associated with all uses of water, not just to free up water for additional consumptive uses.

There are many reasons to promote water use efficiency in irrigated agriculture. Most obviously, it can improve crop yields by ensuring that the water actually needed by crops is available in the amounts and at the times most beneficial for growth.[74] Second, it can improve water quality in streams and aquifers by reducing the amount of water that returns to these sources after passing through soils in which it picks up salts, fertilizers, pesticides, selenium, and other pollutants.[75] Third, reduced diversions may, in some locations, enable improved stream flows necessary to facilitate fish passage and improve

[72] Draft Plan at 173

[73] Draft Plan at 171-77. "While there are numerous reasons and methods to improve irrigation efficiency there are limited opportunities for true agricultural water conservation for the purpose of creating new supplies." At 176.

[74] As noted in the Draft Plan, the result can actually be an increase in the consumptive use of water.

[75] Perhaps the best example of such a program in the state is the one in the Uncompahgre that is referenced in the Draft Plan at 175-76.

water quality.[76] Improved head gates can make it possible to divert only the amount of water actually required, leaving more water in the stream. Diversion dams can be redesigned to enable fish passage while still ensuring that sufficient water can be diverted. Removal of undesirable phreatophytes along stream banks may also reduce the consumption associated with these "water-loving" plants, thus improving stream flows.[77]

Except for improved crop yields, these are all general improvements that don't have individual beneficiaries. But there are constituencies potentially interested in such improvements. Urban or industrial water users downstream from agricultural areas may be willing to invest to improve stream water quality. Conservation groups such as The Nature Conservancy, the Colorado Water Trust, and Trout Unlimited are engaged in working with the agricultural community to make improvements where there can be measurable benefits to the instream values important to such groups. The Natural Resources Conservation Service has an active program providing assistance to irrigators wanting to improve the efficiency of their water diversion and use facilities. The CWCB provides financial support for such actions.[78] In addition, we believe that properly structured "alternative transfer mechanisms" (ATMs) can provide funding for irrigators to make improvements in their irrigation facilities that will help increase the productivity with which agriculture uses water.[79]

Stream flows around the state have been altered, sometimes radically, to meet the needs and interests of those with water rights. Yet we have learned that there often is flexibility in the way water is stored, diverted, and used that can improve stream flows for instream benefits. The quantities of water diverted can sometimes be reduced in low flow periods to maintain viable stream conditions. Direct flow diversions can sometimes be replaced with groundwater withdrawals to protect a critical stream reach. Substantial progress in implementing such changes has been made; much more can be done.

Stream management, especially in the heavily developed Front Range of Colorado, has become increasingly complex because of the growing use of plans for augmentation, exchanges, and other forms of substituted water supplies to enable new,

[76] The Draft Plan references the opportunities for agricultural needs and noncunsumptive needs to be mutually supportive. At 179.
[77] See Draft Plan at 177.
[78] Draft Plan at 179.
[79] See discussion in Part 2 and Appendix B.

out-of-priority, and changed water uses. Each of these plans has been decreed individually, establishing a procedure under which sources of replacement water are to be used to ensure that the new, out-of-priority use does not increase stream depletions or alter the timing of flows, with responsibility given to the Division Engineers to ensure they are operated properly. Yet there is virtually no coordination among these plans, no modeling to determine whether the stream flows necessary to protect water rights can be met more effectively through coordinated management of the numerous sources of replacement water.[80]

Still another need emerging for more active stream management is the change in stream hydrographs resulting from warmer temperatures. Spring runoff already is occurring earlier and is likely to get even earlier. We will need to adjust historical patterns for storing water in reservoirs to better match the changes in runoff. In addition, the timing of calls on the rivers by senior users is likely to change, creating a shorter window for some appropriators to be in priority. Later irrigation season flows are likely to be lower, leaving only those with the most senior rights able to divert water during this period. Diversions of these low flows are likely to further impair the in-stream conditions relied on by resident aquatic life. Under such conditions, there will be an increasing need to more actively manage flows and make adjustments as necessary to protect the array of interests dependent on this use of water.

It is time for Colorado to move beyond water rights administration and develop the means to manage storage, releases, diversions, and replacement water to enhance other water-related values while continuing to meet authorized water uses. Otherwise, the full promise watershed management cannot be fulfilled. We believe the most effective way to accomplish this important set of objectives is, initially, through the watershed planning process in which opportunities can be identified and then, through specific actions, to implement better ways to manage water to provide an enhanced set of benefits while still serving uses established under the appropriation system.

[80] *See, e.g.*, Reagan M. Waskom, ***Report to the Colorado Legislature*** *Concerning:* HB12-1278 *Study of the South Platte River Alluvial Aquifer*, Colorado Water Institute, December 31, 2013.

Five – Climate Change Risk Management

Conclusion No. 5: The Draft Plan summarizes the current state of the science regarding the effects of climate change on Colorado's water resources but considers the consequences of these effects primarily in relation to the water supply-demand gap. It offers little guidance about actions the state, water suppliers, and water users should take in response to these effects.

Recommendation No. 5: *The CWCB, using the best available science, should make explicit the increased risk associated with climate change to the array of interests in the uses of Colorado water and put in place the actions necessary to respond to and manage these risks. Climate change considerations should be built into the criteria to be used by the basin roundtables and the CWCB for including projects and activities in the Colorado Water Plan.*

The basin roundtables, together with the CWCB, should establish processes for monitoring climate-related conditions in the state's water basins and should develop responses as necessary to manage the adverse effects of climate change.

The Governor should establish a task force of climate scientists, water suppliers, water users, and other representative interests to identify those aspects of water use in the state that are most at risk because of climate change and to develop guidance for the basin roundtables and water suppliers and managers for managing these risks.

Discussion: A changing climate poses substantial risk to almost all aspects of current water management, including supply, demand, the operation of prior appropriation, water quality, reservoir operations, interstate compact deliveries, and environmental and recreational flows. These impacts will need to be monitored, and water management will need to be adjusted as the century proceeds. Despite uncertainties and large ranges of predictions, we already know enough to understand that climate change will significantly affect water supplies, and we should manage to minimize that risk.

Such risk management would include not overusing water supplies in a manner that would create compact liabilities, managing diversions and uses to keep reservoirs as full as possible, responding rapidly to the onset of drought, and monitoring all aspects of water use and supplies. The CWCB and other state agencies should take the lead on supporting data collection and developing climate impact and risk management models. These tools should be made available to water providers throughout the state.

The most important climate change impacts in Colorado will derive from changes in the water cycle. In essence, climate change is water change. These physical impacts are well known and include more rain and less snow, earlier runoff, higher

evapotranspiration, more frequent, longer, and more severe droughts, earlier date of maximum snow pack, longer and more vigorous fire seasons, lower flows in late summer, reduced water quality from late season flow reductions, higher stream temperatures, less dissolved oxygen, more invasive species, increased dust on snow, and changes in groundwater recharge. It is also likely that in some years we will have floods of a magnitude not previously experienced even as drought in many parts of the state becomes more common and of higher intensity.

These physical impacts will then manifest as legal, managerial, and social impacts. Many of the established 20th century norms around water management will change. Indeed, it has been said that, with respect to water management, "stationarity is dead," meaning that past records of climate variability will no longer be able to reliably guide 21st century water management.

The shifting hydrograph will pose particular problems to diverters by providing more early runoff and then less flow in the longer and hotter peak periods of summer. Some junior storage rights may gain at the expense of senior direct flow diverters. Some seniors historically able to divert in late summer may not find enough flow to divert. Senior agricultural diverters in priority may be able to legally expand use of their water rights to get additional yield from forage and alfalfa crops. Cities desiring firm yield in dry years will continue to seek out only the most senior water rights to acquire. Exchanges that operate in late summer may be impaired by low flow reductions and decreases in water quality. Reservoirs will store earlier and release flows later.

The changing hydrograph also raises questions of effects on instream values. There will be a premium on storing peak flows, reducing that part of the cycle essential for many critical riverine functions. Increased diversions will further reduce flows during the irrigation season, leading to warmer streams and more limited habitat for aquatic life. Stream flows seem especially at risk in the later portion of the irrigation season when natural flows already are at their lowest level. Environmental needs may require additional storage releases in late summer to improve water quality, reduce stream temperatures, and provide adequate minimum flows. Maintenance of sufficient environmental flows will be challenging.

Colorado's interstate compacts raise special considerations respecting effects of climate change. The Colorado River Compact burdens Colorado and other Upper Basin states with fixed deliveries, even in the event of large flow reductions. Climate models indicate the possibility for a north-south water gradient, with less water in the south and more in the north. In the Colorado River Basin, this gradient may mean physical shortages in the Lower Basin and legal shortages in the Upper Basin, despite the physical presence of water in the North. The Lower Colorado Basin is nearing a first-ever shortage declaration, in large part due to a 20% decline in flows over the last fifteen years. This is likely to place pressure on Upper Basin water management, despite the bifurcated basin structure under the Colorado River Compact. We believe it is time for the basin states to commit to a "no net depletion" policy in the basin to avoid becoming even more overcommitted.[81] In the Rio Grande, Colorado may be faced with declining flows, further straining Compact deliveries. Changes in supply and demand may impact other compacts and decrees.

Federal permitting requirements are likely to respond to account for the environmental effects of climate change. EIS documents under NEPA, permitting under the Clean Water Act, and ESA compliance actions all will be affected.

The Draft Plan discusses the likely consequences of increased warming on both the supply and demand of water:

> In recent decades, Colorado has warmed and will likely continue to do so in the future. Average yearly temperature has increased 2˚F in the last 30 years, and 2.5°F in the last 50 years across the state. This has affected the timing of snowmelt and peak runoff, which occur earlier, and there has been an increase in heat waves and wildfires. Climate projections show Colorado warming an additional 2.5°F to 5°F by mid-century, with summer temperatures increasing more than winter. While projections are less clear whether precipitation will increase or decrease, warming temperatures that drive physical processes, such as evapotranspiration, are projected to result in an earlier run-off, longer irrigation season, and a decrease in annual stream flow, especially in the state's southern basins. Even moderate increases in precipitation will not be sufficient to overcome the drying signal. All of these changes are likely to affect water available for beneficial use in Colorado in the coming decades.[82]

[81] For a proposal to this effect, *see* Lawrence J. MacDonnell, The Disappearing Colorado River, *Western Economics Forum*, Fall 2010.
[82] Draft Plan at 58.

The Draft foresees the possibility of increased demands associated with warming as well.[83] It suggests the overall effect of warming will be to increase the gap and attempts to account for these effects in its scenario planning process.[84] But the Draft does little to provide a framework for managing this risk. The Draft states that "[i]n partnership with the Climate Change Technical Advisory Group, the CWCB will monitor the potential impacts of climate change to Colorado's water needs."[85] While necessary, these actions do not provide a meaningful risk management framework.

Climate change science is unlikely to change much in the next ten years despite some refinements in modeling. Despite uncertainties and large ranges of predictions, we already know enough to understand that climate change will significantly affect water supplies, and we should manage to minimize that risk through efficient use of storage, improved management of existing uses, and aggressive management of new demands. The state should take the lead on supporting data collection and developing climate impact and risk management models. These tools should be made available to water providers throughout the state. The basin roundtables should identify specific risk concerns within their basins, put in place monitoring to track these risks, and develop actions that will be implemented at the basin and watershed levels to manage these risks as necessary. The Governor, through the CWCB should empanel a group of climate scientists, water leaders, and representatives of key interests to help develop guidance for the basin authorities and watershed management authorities.

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[83] Municipal demands are projected to increase as much as eight percent. Draft Plan at 72. Agricultural demands could increase by as much as 26 percent. Draft Plan at 79. Warming is also likely to affect instream values. For example, warming water would reduce the habitat available for cold-water fisheries. Draft Report at 83.

[84] "As discussed throughout this plan, warming temperatures can affect water supply, water availability, and demands. Should average annual temperature continue to increase at projected levels (2.5-5° F), by mid-century, it is reasonable to expect that the existing gap would increase." Draft Report at 102.

[85] Draft Report at 102.

Appendix A – Acknowledgements

We would like to thank the Gates Family Foundation, and especially Tom Gougeon and Beth Conover, for their support of this project. We benefited from discussions with many people who have been directly involved in this process. Included in our formal interviews were Carlyle Currier, James Eklund, Joe Frank, Tom Gougeon, Taylor Hawes, Torie Jarvis, Melinda Kassen, Eric Kuhn, Jim Lochhead, Bart Miller, Peter Nichols, and Travis Smith. They shared their insights and experience generously. Mr. Eklund joined the Colorado Water Working Group for a portion of a day-long session on April 7, 2015 offering his views on the planning process, the draft plan, and in response to some preliminary ideas proposed by the work group. Thanks also to David Gillilan for his editing assistance.

Appendix B – A Proposed Process for ATMs

The key to making alternative transfers a viable option to permanent transfers is to establish procedures that make ATMs faster, easier, and cheaper to complete than permanent transfers. We offer here one possible way this outcome might be accomplished.

We suggest focusing on fallowing of irrigated land under which a predetermined amount of consumptive use associated with particular acres of irrigated land would be potentially available for other use whenever that land is temporarily removed from irrigation.[86] The CWCB and the Colorado Division of Water Resources have already developed criteria to govern such fallowing arrangements.[87] We envision the development of a consumptive-use credit system[88] under which the Division of Water Resources would determine and assign such credits[89] to each irrigated acre of land the owner would like to be potentially available for temporary transfer. Credits then offered for temporary transfer would be assembled, either by the irrigators themselves (such as through a Super Ditch), by the potential purchasers, or by some entity such as a water bank[90] created especially for this purpose.

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[86] This is the approach taken by the Super Ditch Company. Draft Plan at 189. We recognize there are other possible ways of freeing up some irrigation water for other uses such as deficit or seasonal irrigation. A helpful discussion of these options is provided in Brad Udall, *The Colorado River Critical Conservation Program: Recommendations and Considerations for a Successful NRCS Regional Conservation Partnership Program*, November 2014.

[87] *Criteria and Guidelines for Fallowing-Leasing Pilot Projects*, Nov. 19, 2013 (Criteria and Guidelines).

[88] For a discussion of using consumptive use credits, *see* Mark Squillace, Water Transfers for a Changing Climate, 53 NAT. RESOURCES J. 55, 102-03 (2013). *See also* Lawrence J. MacDonnell, Public Water—Private Water: Anti-Speculation, Water Reallocation, and High Plains A&M, LLC v. Southeastern Colorado Water Conservancy District, 10 U. DENV. WATER L. REV. 1, 15 (2006); *Protecting Local Economies*, Report to the Legislature – State of Washington 57 (2008).

[89] As part of the fallowing-leasing pilot project, these agencies have developed the Lease Fallowing Tool:

> The Lease Fallowing Tool ("LFT") is another computational model and predictive tool developed by DWR and the Colorado Water Conservation Board with a technical committee consisting of approximately 20 water engineers. The LFT is used to implement ag-municipal water sharing pursuant to HB 13-1248. It employs a number of conservative assumptions, e.g., irrigation efficiency, surface runoff and deep percolation, specific aquifer yield, that together underestimate historical consumptive use (HCU) and overestimate return flows by at least 5% to 10% or more according to the consulting water engineers involved in its development.

Getches-Wilkinson Center, A Roundtable Discussion on Colorado's No-Injury Rule (undated), at 5, fn. 3 (Roundtable).

[90] A useful discussion of water banking is provided in O'Donnell & Colby, *Water Banks: A Tool for Enhancing Water Supply Reliability* (January 2010). The water bank established in 2001 was extremely restricted (e.g., only storage water) and thus unused. *See* Colorado Water Conservation Board, Brief History of Ark Basin Water Bank, Feb. 21, 2012, available online at http://cwcb.state.co.us/LoansGrants/alternative-agricultural-water-transfer-methods-grants/Pages/main.aspx.

The major hurdle in change-of-use cases is the no injury rule. [91] To satisfy this requirement, the applicant for the change must demonstrate that there will be no change in stream conditions associated with the proposed change of use, i.e., in quantity of flows, their location, or their timing. This requirement may sound simple but, in water court proceedings, is enormously complicated to meet in practice.[92] As noted in a recent report: "As currently implemented, any type of impact, no matter how small or distant in the future, is deemed to be 'injurious'."[93] This report added:

> Proving lack of "injury" can lead to costly engineering and expensive and lengthy litigation, and can result in the imposition of burdensome terms and conditions. In many cases, the risk of these negative effects can deter applicants from even attempting to change the use of a water right, and in other cases changes that would foster maximum utilization of the state's water resources do not proceed because the costs required are simply too high.[94]

In addition, the Colorado Supreme Court has applied the anti-speculation doctrine to permanent changes of water rights, requiring applicants to specifically identify the new uses to which the changed right(s) will be placed and their locations.[95] Moreover, the Court has limited the historic consumptive use associated with a water right in a change case to the use(s) and on the lands authorized under the decreed water right and has upheld the requantification of a water right based on contemporary and legally authorized use.[96] Legislative provisions intended to mitigate some of the local adverse effects of permanent transfers of water out of irrigation add still another set of requirements that must be met.[97]

We suggest that proposals for alternative transfers be eligible for use of special procedures that simplify and streamline the change of use process. First, we would handle

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[91] This limitation is expressed in statute as follows: "A change of water right, implementation of a rotational crop management contract, or plan for augmentation, including water exchange project, shall be approved if such change, contract, or plan will not injuriously affect the owner of or persons entitled to use water under a vested water right or a decreed conditional water right." Colo. Rev. Stat. §37-92-305(3)(a).

[92] First, it is necessary to document the historic rates of diversion over some substantial period of time that includes a range of water supply variability. Then it is necessary to determine the amounts of beneficial consumption (including delivery efficiency and crop evapotranspiration) and losses (such as ditch and field seepage) associated with the use during that time period. The analysis of consumption can be complex, depending on the nature of the use. Return flows to the water source, both on the surface and underground, must be determined both in amount and timing.

[93] Roundtable at 2.

[94] Roundtable at 2-3.

[95] High Plains A&M, LLC v. Southeastern Colo. Water Cons. Dist., 120 P.3d 710 (2005).

[96] Santa Fe Trail Ranches Property Owners Ass'n v. Simpson, 990 P.2d 46 (1999). *See also* Concerning the Application for Water Rights of Central Colo. Water Cons. Dist., 147 P.3d 9 (2006).

[97] Colo. Rev. Stat. §§37-92-305(4.5)(a), (b).

such transactions administratively, similar to the process now authorized for pilot transfers projects. Second, we propose that such procedures apply a standard of no unreasonable harm to other water rights.[98] Third, we favor placing the burden of proving unreasonable injury on opposers.[99] Fourth, we believe the anti-speculation requirements applied by the Colorado Supreme Court in the High Plains A&M case should be waived for ATMs.[100] Fifth, we suggest that the only requirement for determining consumptive use credits for ATMS should be that the water has been beneficially used on identified irrigated lands for the preceding ten years, without regard to whether that use was strictly in accord with associated water right decrees.

Irrigators interested in participating in a fallowing-leasing arrangement would offer certified credits associated with specific lands to an entity serving as the transfer facilitator. Based on demands for use of credit water, the facilitator would have the responsibility of putting together suitable packages of consumptive-use credits and to do so in a manner that avoids unreasonable harm. These arrangements could be for different periods of time, depending on purchaser needs and interests and irrigator willingness. Thus, a water user with a high aversion to reductions of use that might be necessitated by extreme but short-term droughts could enter into an interruptible supply agreement, in effect acquiring an insurance policy against drought risks. Another user might only need short-term use of water and would be satisfied with use of water for that specific period of time. Still another user might need a long-term, reliable supply of water; such a user would probably want a long-term arrangement that offered the kind of supply security needed for the purpose of use. The facilitator would work with the irrigators and their water supply organizations to rotate fallowed lands as necessary to provide sufficient water while ensuring their periodic return to irrigation use. [101]

[98] For a discussion of this standard, *see* Lawrence J. MacDonnell, Prior Appropriation: A Reassessment, U. DENV. WATER L. REV. (forthcoming 2015).
[99] This shift in the burden of proof also was proposed in the Roundtable report.
[100] High Plains A&M, LLC v. Southeastern Colo. Water Cons. Dist.,120 P.3d 710 (2005).
[101] The fallowing criteria provide that no acre of irrigated land could be fallowed more than three years in ten, and no more than thirty percent of a single irrigated farm could be fallowed during a ten-year period. Criteria and Guidelines at 6.