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WATER AND GROWTH IN COLORADO

A REVIEW OF LEGAL AND POLICY ISSUES

by Peter D. Nichols, Megan K. Murphy, and Douglas S. Kenney



Natural Resources Law Center
University of Colorado School of Law

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The mission of the Natural Resources Law Center is to *“promote sustainability in the rapidly changing American West by informing and influencing natural resource laws, policies, and decisions.”*

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Research for this report began in summer of 1999 when the Natural Resources Law Center decided to investigate emerging legal and policy issues shaping water management in Colorado. Such a review, we had determined, would be a useful contribution to ongoing public debates about growth and the future of our state. Our primary research method was to rely on personal interviews with about 70 of Colorado's leading water experts. (A list of interviews is provided at the end of the report.) Additional insights and factual material were also provided by the many participants associated with the Natural Resources Law Center's conference in June 2000, entitled: *Water and Growth in the West*. We are immensely grateful to these individuals for sharing their ideas with us.

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EXECUTIVE SUMMARY

OVERVIEW OF THE REPORT

Water and Growth in Colorado examines the legal and policy challenges facing the state's water managers during this period of unprecedented growth. Based largely on interviews with approximately 70 key Colorado water leaders as well as an extensive review of recent water studies and legal documents, *Water and Growth in Colorado* describes existing water problems and potential solutions. Many of the issues identified are not the direct result of growth, however, the rapid increase in municipal water demands has brought a greater sense of urgency to almost all facets of Colorado water development and management.

Recent census figures rank Colorado as the nation's third fastest growing state by percent, trailing only Nevada and Arizona. Eight of the nation's eighteen fastest growing counties are in Colorado, led by national leader Douglas County. State population projections suggest an additional 1.7 million residents (approximately a 41 percent increase) can be expected over the next two decades. While most of these new residents will locate along the Front Range, population growth on the West Slope is also expected to rise sharply, actually surpassing the growth rate of the Front Range in percentage terms.

The relationship of water and growth in the modern West is often misunderstood. Historically, it has been assumed that water development was a necessary precursor to growth and, similarly, that a lack of water development could act as a deterrent to growth. While these premises may have been true at one time, recent experience in Colorado and other western states

shows both ideas are now unsupportable. In the modern West, water policy does not appear to be a useful tool for growth management. Growth management (or a lack thereof), however, can play an important role in shaping the behavior of water providers who strive to provide nearly 100 percent reliable water supplies to meet all foreseeable demand.

In many locales, the result of population growth is increased competition for limited water supplies between the municipal, agricultural, and environmental sectors. Among Front Range municipal water providers, the nature and intensity of this competition varies greatly from city to city due to different water rights portfolios and infrastructures. Many of the associated legal and policy issues involve trans-basin diversions, environmental protection, water quality management, and interstate obligations. For the most part, these issues are representative of what is happening across the West, especially in those arid and semi-arid regions where competition among users and sectors continues to escalate.

Coping strategies generally focus on new development of surface and groundwater, reallocating supplies from agriculture to municipal use, and conservation and efficiency. Each type of solution, however, poses problems and concerns, as new management strategies must be reconciled with existing water use regimes. *Water and Growth in Colorado* provides a review of emerging water management strategies, illustrated with examples and cases.

WATER ISSUES IN COLORADO: MAJOR THEMES

In reviewing the issues that relate to meeting the water demands of population growth, several themes reoccur in different contexts. Among the most prominent of these are trans-basin diversions, environmental protection, water quality, and interstate obligations.

TRANS-BASIN DIVERSIONS

Growth along Colorado's Front Range has prompted several large water diversions from the West Slope. Many factors suggest that the Front Range will continue to look toward the West Slope for additional trans-basin diversions. These factors include the potential availability of water on the West Slope, political opposition to agricultural-to-urban water transfers along the Front Range, Denver Basin groundwater mining, and potentially, water quality and endangered species problems along the Front Range. An additional benefit to the Front Range of imported water is its legal status. Under Colorado law, diverting water over the mountains for use in other basins creates so-called "foreign" water. The developer of foreign water can generally use this supply entirely (to extinction), whereas the return flows associated with the use of native water are subject to appropriation by other users. A further advantage of foreign water is that changes in use are often possible without costly court proceedings.

Despite these benefits to the Front Range communities, new trans-basin diversions are highly problematic, as basin-of-origin issues ensure that such proposals are extremely time consuming, expensive, and uncertain. For a project to succeed in the modern era, it must normally feature a degree of East Slope/West Slope cooperation often lacking in previous diversions. A number of Front Range providers are participating in new joint use, East

Slope/West Slope, trans-basin projects. These projects share several common characteristics, but the essential element is that new water supplies are developed for both East Slope and West Slope interests. In this manner, Front Range providers can develop their trans-basin water rights to meet growth needs, and West Slope interests realize additional supplies to meet the needs of growing headwater resort communities and ski areas. Recent examples include Wolford Mountain Reservoir, Clinton Gulch Reservoir, and the Eagle Park Project.

ENVIRONMENTAL PROTECTION

Concern for the environment gained popular support in the 1960s and has since escalated to the point that environmental regulations can prevent water development or redistribution of water resources, or even demand the removal of previously constructed projects. Environmental issues are case specific, but several—such as minimum stream flows, endangered species, and public lands and wilderness areas—can almost always be expected to arise when dealing with water and growth.

One of the primary environmental needs in the West is the maintenance of instream flows for environmental, aesthetic, scenic, and recreational purposes. Colorado was one of the first states to respond by enacting a statute that allows the Colorado Water Conservation Board to appropriate minimum stream flows to "preserve the natural environment to a reasonable degree." Most instream flow rights are comparatively junior, however, and cannot maintain water levels during times of drought. These rights can also impair the ability of headwater communities to meet growing demands for resorts and recreational industries.

Some degree of environmental protection is also provided by the federal Endangered Species Act, which requires water managers to consider the

flow and habitat needs of listed species. Endangered species issues can be found in all of Colorado's major river basins. A large-scale recovery program is already in place in the Upper Colorado basin; a multi-state endangered species effort is also evolving in the Platte River basin. Water dedicated to endangered species can effectively be removed from the state's appropriation system and is not available for other uses, such as the demands of growth. This is a particular concern in the Upper Colorado River basin. The relationship between endangered species and growth, however, is not always an obvious one. For example, endangered species in the Central Platte generally benefit from the return flows associated with trans-basin diversions from the Colorado River to the South Platte system—a paradoxical and exceedingly complicated relationship in which Front Range growth can harm Upper Colorado species while benefiting Platte basin species.

WATER QUALITY

At one time, western water issues focused exclusively on issues of quantity. Today, water quality issues are often of equal prominence, and are highly intertwined with issues of supply augmentation and conservation. Growth raises water quality issues through a number of mechanisms. For example, growth can encourage improvements in efficiency to stretch existing supplies. Increased efficiency means that each user consumes less water, but that pollutants are more concentrated in the smaller return flows. Successive use (and reuse) by downstream appropriators compounds this effect, potentially contributing to increased water treatment costs or an overall decline in water quality. Additional water quality impacts can be associated with water reallocation, particularly from agricultural to municipal and industrial uses. Perhaps most importantly, land-use changes associated with growth can modify

sediment loads and flood dangers in urban streams.

The interplay of water supply and water quality issues is often problematic in Colorado. Not only are these two separate areas of law, but the former is primarily guided by state law while the latter is dominated by federal law. These two bodies of law are being reconciled slowly and incrementally, in part through mechanisms such as exchange cases involving the substitution of wastewater effluent for clean upstream water, and evolving federal water quality initiatives, including the total maximum daily load (TMDL) process.

INTERSTATE OBLIGATIONS

Interstate compacts, judicial equitable apportionments, and congressional acts create interstate obligations for Colorado. Colorado is a party to interstate compacts on the Arkansas, Colorado, Costilla Creek, La Plata, Rio Grande, Republican, South Platte, and Upper Colorado Rivers. In most of Colorado's river basins, all of the state's apportioned water has been put to beneficial use. The major exception is the Colorado River, where the state has approximately 450,000 acre-feet/year left of its entitlement. These waters, however, may not be practical to develop further due to their location or temporal occurrence, or due to environmental, economic, or political considerations.

Water decisions in Colorado are occasionally influenced by the goal of rapidly putting the state's unused Colorado River apportionment to use, largely to quell fears that downstream states—especially California—may somehow acquire this water in violation of the compact. This goal can influence water management in two ways. The first is to discourage water use efficiency reforms. Inefficiency allows the state to maximize use of its compact entitlement, presumably protecting these flows against other

possible claimants. Second, the fear of losing compact apportionments is occasionally used to bolster support for new water developments being pursued for other purposes.

RESPONSES AND STRATEGIES

The challenges facing water managers can be addressed through a variety of strategies. In most instances, the strategies selected are those that offer the least resistance and overall costs. The “transactions costs” associated with water court activities are particularly salient in shaping behavior, as evidenced by the strong preference among municipal providers for agricultural-to-urban water transfers that involve foreign, rather than native, water supplies.

Three main types of coping strategies can be identified. The first category is new development. New development relates to the construction of facilities for the greater utilization of surface water, groundwater, and/or the conjunctive use of both surface and groundwater. The second strategy is water reallocation. Most water rights reallocations (i.e., transfers) in Colorado are from the agricultural to municipal sectors, although some mining to municipal transfers are occasionally seen. Finally, the third strategy focuses on increasing efficiency through demand reduction, reuse programs, and the improved operation of water systems.

NEW DEVELOPMENT

The development of new water supplies is the traditional response to growth. Construction of major new dam and reservoir projects, however, is often impossible in the modern era due to environmental and area-of-origin considerations. Despite the challenges, some new water development is still occurring and is contemplated in Colorado. Currently viable alternatives to big dams and trans-mountain

diversions tend to involve an expanded use of small and unconventional reservoirs (e.g., gravel pits), and Front Range projects that also provide benefits to the basins-of-origin. With few exceptions, waters from the Upper Colorado, Gunnison, and South Platte systems are the targets of new development; other basins in the state are already at or near development capacity.

An increasingly important source of new supplies is groundwater reserves, especially the aquifers of the Denver Basin. Groundwater is particularly useful for serving low-density residential development, a type of growth that has been on the rise. Nowhere is this more evident than in Douglas County—the fastest growing county in the United States—which has little in the way of surface water supplies, but features thousands of individual domestic groundwater systems. The long-term reliability of this groundwater source is a growing concern as demands escalate rapidly. One option for utilizing the resource more efficiently may entail the conjunctive use of groundwater with surface water, likely involving currently unneeded trans-basin water rights held by Denver Water.

REALLOCATION

One of the most effective strategies for augmenting municipal water supplies is the reallocation (or transfer) of water from one user to another. While these transfers take on several forms, in the vast majority of cases existing transfer activities move water from the agricultural to the municipal sector. Several factors encourage these water transfers. Most important is the rapid growth of municipal water demands at a time when traditional regional economies based on agriculture, livestock, and mining are flat or declining. These traditional western enterprises use most of the water—over 90 percent of consumption in the western states—and control the most senior water rights. It is frequently argued that a reallocation of just

10 percent of agricultural water to municipal uses could augment municipal supplies West-wide by 50 percent. Other factors encouraging water transfers include the higher political, economic, and environmental costs of other options, especially new dam and reservoir projects.

Water transfers can take several forms. Under Colorado law, water rights can be sold or leased, meaning that transfers can be permanent or temporary, perhaps based on various types of contingency arrangements. This variety of tools brings great flexibility to the transfer option, further stimulating interest in water reallocations. Transfers of foreign water are generally preferred, as these transfers minimize impacts on other rights holders and thus limit the necessity of costly water court proceedings.

Many transfers create negative economic, social, and environmental impacts for the area losing water. These impacts are normally borne by “third parties,” a term used to describe any potentially affected interest to a water transfer other than the buyer or the seller. Protecting these interests is an essential responsibility of policy-makers, even though attempts to internalize costs otherwise borne by third parties is likely to increase the transactions costs associated with water transfers.

CONSERVATION AND EFFICIENCY

Existing water supplies can be stretched to serve growing populations through a variety of management strategies, including demand reduction, efficiency improvements, wastewater reuse, and improved system operations. Water conservation practices are not the sole solution to future water supply needs in Colorado, but they are an important piece of the puzzle, largely since they allow water providers to escape—or at least delay—the economic and political costs associated with new developments and reallocations.

Conservation and efficiency measures, however, are not a quick fix, and raise their own legal and policy issues. For example, strategies based on managing growth, limiting demand through pricing, or wastewater reuse all face difficult political and public relations obstacles. Additionally, legal, economic, and cultural factors often provide disincentives for water conservation and efficiency. Further problems are associated with strategies that modify the magnitude and timing of diversions and return flows. Such alterations of the hydrologic regime can cause injury to other water rights holders as well as impacting environmental resources and water quality. None of these problems is insurmountable, however, and the opportunities for conservation and efficiency remain high.

One of the most promising opportunities for meeting changing needs is through a more coordinated operation of existing water facilities and systems. Most of this infrastructure of dams, reservoirs, and pipelines was constructed decades ago, and evolved in an incremental fashion. Due to legal innovations (e.g., exchanges) and enlightened provider perspectives, it is now possible to coordinate operations of multiple systems to increase efficiency. Denver Water and other Front Range water providers are presently engaged in coordinated operations projects with several entities on both sides of the Continental Divide. Additional opportunities, however, remain to be explored.

THE CHALLENGE AHEAD

If growth projections prove to be reasonably accurate, then the next decades figure to be highly challenging for Colorado water interests. Already, Front Range municipal water providers are aggressively exploring a highly varied and complex set of strategies for acquiring and managing additional water supplies. The pace of legal and technological innovation is impressive, yet in some cases—namely the South Denver

Metro region—is only sufficient to keep pace with demand due to the cushion provided by groundwater reserves and the continuation of unusually wet years. The challenge faced by headwater communities is, arguably, even greater in some cases than that faced by Front Range cities. Rapidly growing Summit County, for example, has a physical abundance of water, but most is unavailable for local use due to senior or conditional rights held by parties outside the county. The challenge for agricultural advocates, meanwhile, primarily entails trying to retain irrigation water in the face of economically attractive alternatives. Statewide, agricultural-to-urban water transfers have not had a huge impact on agriculture yet, but in some locations, such as the Arkansas Valley, locally serious economic disruption has already occurred. More widespread are environmental impacts associated with past water developments. Environmental advocates will undoubtedly be challenged to win remedies for historic ecological impacts; holding the line on additional depletions is already a demanding agenda.

Growth in the West is not simply a matter of population increases, but is also about changes in lifestyles, land-uses, politics, economics, and values. Ultimately, it is about raised expectations—especially where our water systems are concerned. For water managers to satisfy the increasingly diverse and lofty demands that confront them, innovation must continue. Managing water in a period of sustained growth will likely require finding mechanisms for exploiting advances in engineering and management, recognizing the true economics of water development and use, adapting laws that may unnecessarily limit progress, and perhaps reconsidering how we, as westerners, value and use our limited water resources. Fortunately, recent years have produced several innovative management strategies to build upon, including cooperative/joint water developments, small-scale and off-stream water storage, market-based

water reallocations, temporary water transfers, groundwater development and conjunctive use, integration and coordinated operation of water systems, wastewater reuse, conservation and demand management, and cooperative solutions to environmental problems. These water management tools and strategies figure to play a prominent role in shaping how Colorado deals with growth pressures.

In highlighting these innovations, however, it should not be overlooked that some of the development, reuse, and efficiency strategies allowing more and more people (and uses) to be served by water systems can have the long-term effect of reducing the availability of undeveloped and unappropriated water in the state, while diminishing the excess—including the drought cushion—that currently exists in many water systems. These concerns generally do not surround strategies emphasizing reallocation and demand management; however, no strategy is without potential complications or drawbacks. Giving adequate consideration to all options can implicate issues that are outside of the normal purview of water managers, such as land-use management and the behavioral incentives provided to water users through law, policy and even culture. If these and related issues are to be seriously considered in devising future water management programs, decision processes may need to feature more political leadership, planning, and public involvement than is currently seen.

CHAPTER ONE: LIFE AFTER TWO FORKS

In the 1940s, the Denver Water Board (Denver Water) started planning to meet the water demands of the anticipated population growth that will occur in the twenty-first century. The initial plan was to build a dam and reservoir that would supply adequate water to the Denver-metropolitan area through the year 2020.¹ Two Forks was to be a major water storage project located below the confluence of the South Platte River and its North Fork. The project “was designed to deliver 98,000 acre-feet of water per year on a firm yield (sometimes called drought yield) basis to the Denver metropolitan area to meet future residential, commercial, and industrial demands.”² While Two Forks promised to provide sufficient water for anticipated population increases, the price of the project was considerable, and the potential environmental costs were, ultimately, prohibitive.

Public opposition to the project was great. However, it was the inability to secure federal environmental permits that finally killed the project.³ The scope of negative environmental impacts was foreshadowed in the 1986 draft Environmental Impact Statement (EIS) prepared by the U.S. Army Corps of Engineers (the Corps), and later in the final EIS released in March of 1988. Despite these concerns, the Corps decided to issue the necessary “404

permit” required under the Clean Water Act⁴ for dredge-and-fill activities in rivers, arguing that negative impacts could be mitigated. The Corps’ confidence was not shared by the U.S. Environmental Protection Agency (EPA), which had long been critical of the proposed project. The EPA has the statutory authority to veto 404 permits,⁵ a power exercised by the agency over Two Forks on November 23, 1990.

The EPA veto of Two Forks not only halted a project backed by an impressive political coalition of municipal water providers and \$40 million in preliminary studies, but signaled a changing focus in Colorado water management. Throughout the West, water management was moving away from the era of large dam construction toward a more tempered and environmentally-oriented era emphasizing—at least in principle—water use efficiency and reallocation. The demise of the Two Forks project signaled Colorado’s inauguration into this new course of water management.

THE NEW WEST

The Two Forks veto may have forcibly changed the *direction* of Colorado water management, but the *pace* of adaptation seen in the past decade has clearly been propelled by economic and population growth. Despite the hopes of some Two Forks opponents, the veto has done nothing to impede growth along Colorado’s Front Range.

¹ The Denver Water Board held water rights in the dam and reservoir area since 1902 and in 1931 obtained a dam construction right-of-way.

² Luecke, Daniel F., “Two Forks: The Rise and Fall of a Dam,” 14 *Natural Resources and Environment* 24, at 25 (Summer 1999).

³ Eisel, Leo and J. David Aiken, *Platte River Basin Study*, Report to the Western Water Policy Review Advisory Commission, Aug., 1997, page 43.

⁴ 33 U.S.C. § 1344 (2000).

⁵ 33 U.S.C. § 1344(c) (2000).

To the contrary, current levels of growth are unprecedented.

THE BIG BOOM

Colorado is now the nation's third fastest growing state (behind only Nevada and Arizona), and is home to eight of the eighteen fastest growing counties nationally.⁶ During the 1990s, Colorado welcomed more than 400,000 immigrants from other states (the seventh highest immigration rate in the country), as well as over 65,000 new residents from other countries.⁷ This trend is expected to continue.⁸ State population projections suggest that the state will grow from approximately 4,250,083 in 2000 to 5,973,772 in 2020, a 41 percent increase.

"Growth is going to come, no matter what. Colorado has now come open for business."
— KEN SALAZAR,
Colorado Attorney General

Numerically, most of this growth will occur along the Front Range, where a 37 percent projected increase will boost the population from 3,443,228 in 2000 to 4,704,153 in 2020. One of those Front Range towns, Superior, is already the nation's fourth fastest growing city (by percent) from 1990 to 1999.⁹ Yet, in terms of percentages, even higher levels of growth are predicted for the West Slope, where a staggering 58 percent increase is projected to raise the

⁶ Olinger, David, "West's growth still tops, census finds," *Denver Post*, Apr. 3, 2001, page 1A.

⁷ Fish, Sandra, "State's population tops 4M," *Daily Camera*, December 29, 1999, page 1A.

⁸ The following figures were obtained using a system devised by the state demographer, Colorado Department of Local Affairs, "Colorado Population Projections System," available at

<http://www.dlg.oem2.state.co.us/demog/widepro1.cfm> (visited Jun. 10, 2001) [see Figure 1].

⁹ Barge, Chris, "Superior Growing Fastest," *Daily Camera*, Oct. 20, 2000, page 1A.

population from 449,682 in 2000 to 708,762 in 2020. These, and related statistics, are shown below in Figure 1.¹⁰

The rest of the West, with few exceptions, is also in a boom period.¹¹ Since the early 1970s, the population of the western states has grown by about 32 percent, compared to the national growth rate of approximately 19 percent.¹² It is the states of the "Interior West" that are experiencing the largest amount of growth. Natural increases, i.e., birth rates as compared to death rates, contribute to the boom, but the main source of population growth stems from out-of-state immigration. People who once moved from the East Coast to the West Coast now settle in the states in the Interior West. In addition, people from the West Coast are rebounding back into the Interior West. Nowhere is this more apparent than in Las Vegas, the fastest growing metro area in the nation during the 1990s. These trends did not escape the attention of the Western Water Policy Review Advisory Commission, which called the demographics of the past 15 years "the most dramatic . . . of any region or period in the country's history," and warned that if "present trends continue, by 2020 population in the West may increase by more than 30 percent."¹³

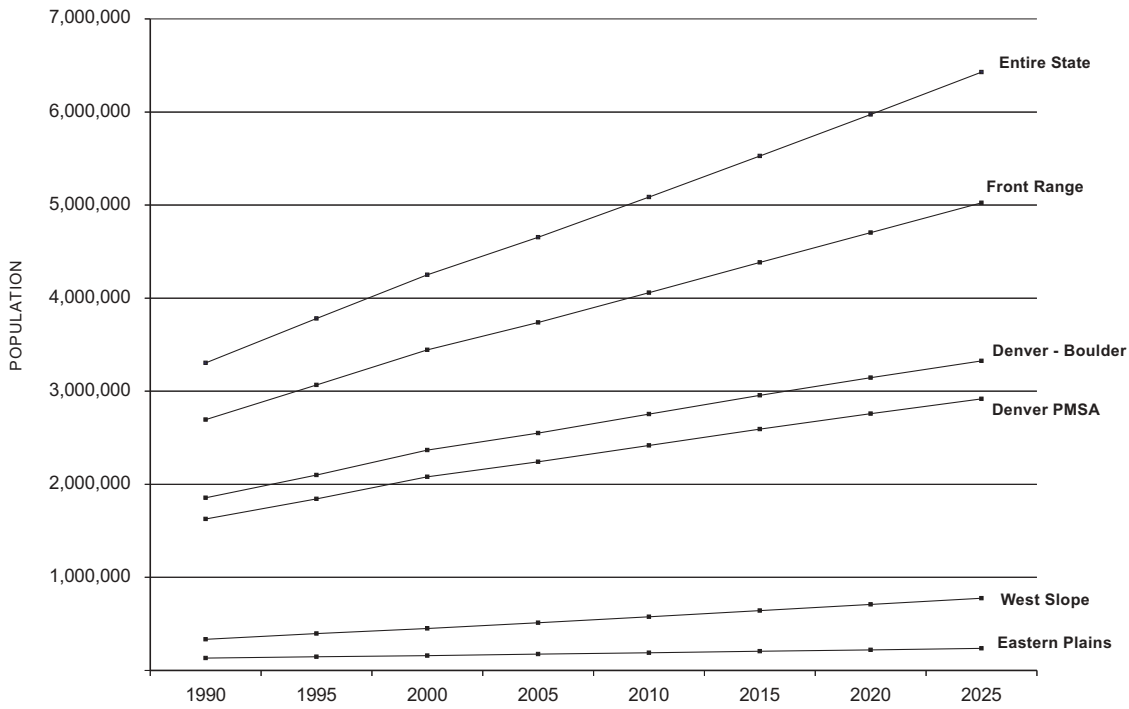
¹⁰ For more conservative estimates of population growth, see Case, Pamela and Gregory Alward, *Patterns of Demographic, Economic and Value Change in the Western United States*, Report to the Western Water Policy Review Advisory Commission, 1997, Appendix A.

¹¹ Except where otherwise noted, this discussion is based on Census Bureau, *Population Change and Distribution*, Wash. D.C.: U.S. Department of Commerce, Economics and Statistics Administration, 2001.

¹² Case, Pamela and Gregory Alward, *Patterns of Demographic, Economic and Value Change in the Western United States*, Report to the Western Water Policy Review Advisory Commission, 1997, page 7.

¹³ Tarlock, Dan, Sarah Van de Wetering, Lawrence MacDonnell, Douglas Kenney, Jo Clark, Curtis Brown, Charlene Dougherty, and Donald Glaser, *Water in the West: Challenge for the Next Century*, Report of the Western Water Policy Review Advisory Commission, Jun. 1998, page xii.

Colorado Population Projections by Region



	Entire State	Front Range	Denver-Boulder	Denver PMSA	West Slope	Eastern Plains
1990	3,303,865	2,694,141	1,854,324	1,628,302	333,615	132,870
1995	3,782,150	3,066,950	2,098,963	1,842,226	395,166	147,721
2000	4,250,083	3,443,228	2,366,236	2,079,775	449,682	159,545
2005	4,653,268	3,739,211	2,550,232	2,240,786	511,355	174,944
2010	5,085,541	4,059,773	2,754,317	2,418,182	576,230	190,239
2015	5,527,806	4,384,240	2,955,599	2,592,464	642,007	205,793
2020	5,973,772	4,704,153	3,145,090	2,757,832	708,762	221,300
2025	6,427,174	5,023,086	3,326,683	2,917,543	774,998	236,249

Regions are defined in terms of the following counties:

- Front Range:** Adams, Arapahoe, Boulder, Denver, Douglas, El Paso, Jefferson, Larimer, Pueblo, Weld.
- Denver-Boulder:** Adams, Arapahoe, Boulder, Denver, Douglas and Jefferson.
- Denver PMSA (Primary Metropolitan Statistical Area):** Adams, Arapahoe, Denver, Douglas and Jefferson.
- West Slope:** Archuleta, Delta, Dolores, Eagle, Garfield, Grand, Gunnison, Hinsdale, Jackson, La Plata, Mesa, Moffat, Montezuma, Montrose, Ouray, Pitkin, Rio Blanco, Routt, San Juan, San Miguel and Summit.
- Eastern Plains:** Baca, Bent, Cheyenne, Crowley, Elbert, Kiowa, Kit Carson, Lincoln, Logan, Morgan, Otero, Phillips, Prowers, Sedgwick, Washington and Yuma.

Tabulations are based on data provided by the Colorado state demographer, Colorado Department of Local Affairs, accessed September 2000 at www.dlg.oem2.state.co.us/demog/widepro1.cfm.

Figure 1. Colorado Population Projections.

This rapid growth in Colorado and the West is generally attributed to the strength of the economy and the high “quality of life” provided by natural vistas, wildlife, recreation opportunities, climate, and public lands.¹⁴ Time and again, cities and towns in Colorado are cited as the best places to live in the nation. For example, the July 1998 rankings in *Money Magazine* ranked Fort Collins and Boulder-Longmont as the best small and medium sized cities, respectively, in the West. Denver ranked second in the best large western city category behind Seattle. *Modern Maturity*’s rankings (May-June 2000) of “The 50 Most ALIVE Places to Live” ranks Boulder first on the “Green and Clean” chart and Fort Collins fifth on the “Small Town” roster. Similarly, *USA Today* in May of 1999 led with a headline that Fort Collins-Loveland was the best retirement community in the nation.¹⁵ A similar honor followed in the July 2000 issue of *Money Magazine*, which ranked Fort Collins as the best retirement spot in the Rocky Mountains.

A NEW NEXUS BETWEEN POPULATION AND WATER?

Human settlement has often been tied to the availability of water resources and the ability to develop regional water systems.¹⁶ In the arid and semi-arid regions of the American West, large-scale water development was often needed to facilitate the growth of both agrarian and municipal centers. These efforts were greatly facilitated by passage of the Newlands Reclamation Act¹⁷ in 1902 establishing the Reclamation Service (now known as the Bureau

¹⁴ Center of the American West, *Atlas of the New West*, New York: W.W. Norton & Company, 1997, page 96.

¹⁵ Minzesheimer, Bob, “Fort Collins reaches summit of retirement spots,” *USA Today*, May 17, 1999, page D1.

¹⁶ Worster, Donald, *Rivers of Empire*, New York: Pantheon Books, 1985.

¹⁷ Newlands Reclamation Act of Jun. 17, 1902, § 43 U.S.C. 372 (2000).

of Reclamation) as the region’s premier water development entity.

Given this historical basis, it may seem odd that there is little to suggest that limited water supplies act as a limit to growth in the modern West. In fact, a number of examples demonstrate the contrary. For example, in Colorado, water supply questions have not noticeably slowed growth in Douglas County, where a nine percent annual growth rate promises doubled populations every eight years! Even more compelling evidence can be found in other western cities, from Tucson, Arizona to Las Vegas, Nevada. An analysis of land use trends by University of Colorado geographer William Riebsame confirms that water availability is rarely a focus of municipal and industrial land use decisions.¹⁸ Similarly, there is little to suggest that an abundance of water or water development in the modern West acts as a stimulus to growth. As observed by Daniel Luecke of Environmental Defense, water availability is “neither a bottleneck to growth in arid and semi-arid areas, nor a stimulus in regions where it [is] abundant.”¹⁹

These observations suggest that the West has come full circle in its relationship between growth and water. In the modern West, water policy is not currently a useful tool for growth management. However, patterns of growth dramatically influence the activities of water

¹⁸ “Economic research in the 1960s showed that, for better or worse, water has rarely been a major factor in municipal and industrial land use decisions (e.g., compared with access to transportation, employment, or markets) and current land use trends and policy continue this tradition.” Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*, Report to Western Water Policy Review Advisory Committee, 1997, page 37. The City of Pueblo had an economic development project to attract new industries to the area using the city’s plentiful water supply as the carrot, but could find few interested parties. Interview with Roger L. “Bud” O’Hara, Jun. 30, 1999.

¹⁹ Luecke, Daniel F., “The Role of Markets in the Allocation of Water Among Agricultural and Urban Users in the Western United States,” presented at The University of Barcelona, Barcelona, Spain, Dec. 11, 1992, page 3.

providers. Rather than a facilitator of new growth, water providers are viewed in the modern era as another utility, obligated by economic, political, and even legal²⁰ necessity, to provide services to those customers willing to pay. The inherent limits of natural water resources are rarely viewed as providing an absolute limit to growth, but rather are seen only as impediments that require increasing levels of time, money, and technology to overcome. These constraints are acknowledged to often be more difficult than those faced by other utilities, such as electricity providers, given limited supplies and the costs of moving (or wheeling) water.²¹ But they are not typically viewed as real limits to continued expansion.

THE URBANIZED WEST

One implication of the current population boom is that the West is no longer predominately rural.²² With few exceptions, new residents are locating in urban settings, giving the West a higher ratio of urban to rural residents than the

²⁰ A basic principle of public utility law is that all persons who can pay for a service are entitled to that service. This makes it difficult to manage growth through utility policies. It is possible, however, to require developers to satisfy certain water supply requirements. See Tarlock, Daniel A., "Western Water Law, Global Warming and Growth Limitations," 24 *Loyola of Los Angeles Law Review* 979, (Jun. 1991). For example, Arizona law requires developers to demonstrate a 100 year water supply. Ariz. Rev. Stat. Ann. § 45-576 (West 1994, 2000 Supp.). A 300-year supply is a precondition for subdivision approval in El Paso County, Colorado. *Cherokee Water and Sanitation District v. El Paso County*, 770 P.2d 1339 (Colo. App., 1988).

²¹ Interview with Lee Rozaklis, Jul. 20, 1999.

²² Bell, D. Craig, *Water in the West Today: A States' Perspective*, Report to the Western Water Policy Review Advisory Commission, 1997, page 3.

East.²³ In most cases, many of these emerging population centers (so-called "urban archipelagos") are found along nodes of the interstate highway system.²⁴ Some examples of these new western boomtowns include Albuquerque, Boise, Colorado Springs, Denver, El Paso, Eugene, Las Vegas, Missoula, Phoenix, Sacramento, Salt Lake City, Spokane, and Tucson.

These urban centers are increasingly in competition with the agricultural sector for water and land resources. The situation in Colorado is typical of the "New West." Colorado is a major agricultural state with over a billion dollars generated

annually by agriculture.²⁵ Much of this revenue is associated with irrigation, which is the impetus behind well over 90 percent of the water diverted from streams and aquifers in Colorado.²⁶ However, agriculture takes a back seat to the "service sector" as the economic engine of the state,²⁷ and as municipal water demands increase, economic pressures encourage the retirement of irrigated lands to free up water supplies.²⁸ The

²³ Center of the American West, *Atlas of the New West*, New York: W.W. Norton & Company, 1997, page 46.

²⁴ Case, Pamela and Gregory Alward, *Patterns of Demographic, Economic and Value Change in the Western United States*, Report to the Western Water Policy Review Advisory Commission, 1997, pages 27 and 40.

²⁵ Interview with Don Ament, Jan. 27, 2000.

²⁶ Solley, Wayne B., Robert R. Pierce, and Howard A. Perlman, "Estimated Use of Water in the United States in 1995," *U.S. Geological Survey Circular 1200*, Denver: U.S. Department of the Interior, 1998.

²⁷ Demographers intend to change those items that are included in the service sector because it is felt that further division of the service sector will enhance knowledge for economic planning. Under the traditional classification, the service sector includes everyone from physicians and lawyers to cooks and maids.

²⁸ An interesting look at how market incentives manipulate water and land use is provided by Dan Tarlock and Sarah B. Van de Wetering, "Growth Management and Western Water Law From Urban Oases to Archipelagos," 5 *Hastings West-Northwest Journal of Environmental Law and Policy* 163,

"There is no place in the country where water is a limitation on growth."
 — HAMLET J. "CHIPS" BARRY, III, General Manager, Denver Water

"Water has not constrained or shaped growth, but I personally think it will become more of a limiting factor."
 — LEE ROZAKLIS, Hydrosphere Resource Consultants

economic value of water in municipal use is often many orders of magnitude greater than in agriculture.²⁹

In addition to municipal demands for agricultural water supplies, increasing real estate values, state and federal tax laws (including estate taxes), and greater employment opportunities in cities, all place further stress on agricultural lands and lifestyles.³⁰ Those farms that remain in operation increasingly face nuisance complaints from encroaching municipalities, lack of community support, and the loss of a critical mass of farming-related businesses. Additional challenges to agriculture are posed by environmental regulations. For example, irrigation-induced water quality problems—such as salinity, selenium, or pesticide/fertilizer contamination—can require the modification of farming practices or encourage the retirement of lands. Similarly, municipal impacts on water quality can also negatively impact farming operations. Farming interests can also be targeted by metropolitan demands for patterns of land and water use that protect instream values and that maintain wildlife habitat, recreation opportunities, and aesthetics.³¹

The net effect of these forces is the rapid conversion of agricultural lands to other uses.

(Winter 1999). The authors state that almost fifty percent of irrigation water is allocated to grow crops that feed livestock, e.g., alfalfa hay which absorbs more water per acre than any other crop.

²⁹ For example, irrigation water is worth as little as \$500 per acre foot of consumptive use on the lower South Platte River, near the Nebraska border. Interview with Robert E. Brogden, Sept. 8, 1999. Municipal demand has driven the price over \$20,000 per acre foot for Colorado Big-Thompson Project water farther up in the basin. (See: *Water Strategist*, Feb. 2001, at 13).

³⁰ Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*, Report to Western Water Policy Review Advisory Committee, 1997.

Some estimates suggest that agricultural conversion may consume 90,000 acres of agricultural land annually in Colorado.³² Crowley County, in southeastern Colorado, recently lost nearly 50,000 acres of irrigated land in one set of water sales.³³ This is happening across the West; approximately 1.5 million acres of farmland were lost between 1982 and 1992, mostly along Colorado's Front Range, California's Central Valley, and mountain and desert resort areas.³⁴ These trends have great implications for water availability in the West, especially in Colorado where approximately 5 percent of the state is currently irrigated—the highest proportion in the nation.³⁵

"Markets respond to price signals and move resources from lower- to higher-valued uses."

— NATIONAL RESEARCH COUNCIL, *Water Transfers in the West*

Even though municipal growth is a factor promoting the decline of some agricultural regions, Colorado's mostly urban residents, when polled by Colorado State University researchers, have consistently articulated a strong desire to preserve agrarian communities.³⁶ These polls also show a strong desire to protect environmental values, as well as recreation opportunities provided by ski resorts, golf courses, trout streams, and other developed and

³¹ Bell, D. Craig, *Water in the West Today: A States' Perspective*, Report to the Western Water Policy Review Advisory Commission, 1997.

³² Lochhead, James S., "Upper Basin vs. Lower Basin – Can We Coexist on a Shared River?" presented at the Colorado River Water User's Association, Las Vegas, Nevada, Dec. 18, 1997, page 3.

³³ Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*, Report to Western Water Policy Review Advisory Committee, 1997, page xiii.

³⁴ Lochhead, James S., "Upper Basin vs. Lower Basin – Can We Coexist on a Shared River?" presented at the Colorado River Water User's Association, Las Vegas, Nevada, Dec. 18, 1997, page 3.

³⁵ Danielson, Jeris A., State Engineer of Colorado, *A Summary of Compacts*, Jun. 1, 1990.

³⁶ Human Dimensions in Natural Resources Unit, College of Natural Resources, Colorado State University, *The Colorado Environmental Poll*, Number 6, May 1999.

natural settings. It is difficult to imagine how this spectrum of municipal, agricultural, and environmental/recreational values can be maintained given a limited water supply. Yet, that is the challenge facing Colorado's political leaders, communities and citizens as they grapple with the issue of growth.

CLIMATIC CONSIDERATIONS

Largely obscured by the demographic trends in Colorado is evidence suggesting possible changes in the state's climate. Even modest climatic changes have the potential to modify the amount and distribution of precipitation in the state, as well as influencing patterns of demand and use. The likely impacts of climate change in Colorado are poorly understood, but are undeniably important.³⁷

Precipitation varies significantly within the state from about 7 to over 50 inches annually, with a statewide average of approximately 17 inches per year.³⁸ While flooding is a concern in many regions, it is drought that is the primary climatic concern to water managers in Colorado. The state has been highly fortunate in recent decades, enjoying an unusual span of wet years without any sustained (i.e., multiple year) droughts. In fact, Colorado's last sustained drought occurred in 1951 to 1957, although shorter and regionally

isolated drought events have occurred in 1976-77, 1980-81, 1989-90, 1994, 1996, and 2000.³⁹ The South Platte basin—particularly the upper basin—has been notably immune from sustained drought in recent decades, as have the Upper Colorado watersheds that serve major population centers along the Front Range through trans-basin diversions.⁴⁰ Consequently, most of Colorado's Front Range residents have little or no familiarity with drought (as shown in Figure 2). It is not surprising, therefore, that many municipalities do not have drought plans, and those that do often focus only on seasonal shortages rather than long-term events.⁴¹

This string of unusually wet weather can be interpreted in at least two ways. One is to conclude that recent years foreshadow an emerging trend in Colorado's climate. Climate research does generally suggest a wetter and warmer future for most, if not all, of the state and, for that matter, the nation and world.⁴² A second interpretation is that the state is overdue for drought periods that would further stress water systems already struggling to accommodate ongoing growth pressures. It is reasonable to believe that both interpretations are accurate. Incorporating these findings into water management regimes is a formidable and ongoing challenge.

³⁷ The significance of climatic variability and change in the South Platte and Upper Colorado basins is the subject of the ongoing "Western Water Assessment," a joint research project of the National Oceanic and Atmospheric Administration (NOAA) and the Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado. Discussion on the Western Water Assessment is available at "NOAA-CIRES Western Water Assessment" <http://cires.colorado.edu/wwa> (visited Jun. 10, 2001). Issues of drought and climatic variability are also being examined as part of the "Colorado Water Census and Assessment" project, managed by the Colorado Department of Natural Resources and the Colorado Water Conservation Board.

³⁸ McKee, Thomas B., Nolan J. Doesken, and John Kleist, *Historical Dry and Wet Periods in Colorado*, Climatology

Report No. 99-1A, Fort Collins: Colorado Climate Center, Colorado State University, 1999.

³⁹ Colorado Department of Natural Resources and the Colorado Water Conservation Board, *Colorado Water Census and Assessment: Scope of Work*, Jul. 2001, page 2.

⁴⁰ McKee, Thomas B., Nolan J. Doesken, and John Kleist, *Historical Dry and Wet Periods in Colorado*, Climatology Report No. 99-1A, Fort Collins: Colorado Climate Center, Colorado State University, 1999, pages 19-20.

⁴¹ Colorado Water Conservation Board, *Survey of Drought Planning in Colorado (Draft)*, Feb. 2000.

⁴² Gleick, Peter H., *Water: The Potential Consequences of Climate Variability and Change*, A Report of the National Water Assessment Group for the U.S. Global Change Research Program, Oakland: Pacific Institute, Sept. 2000.

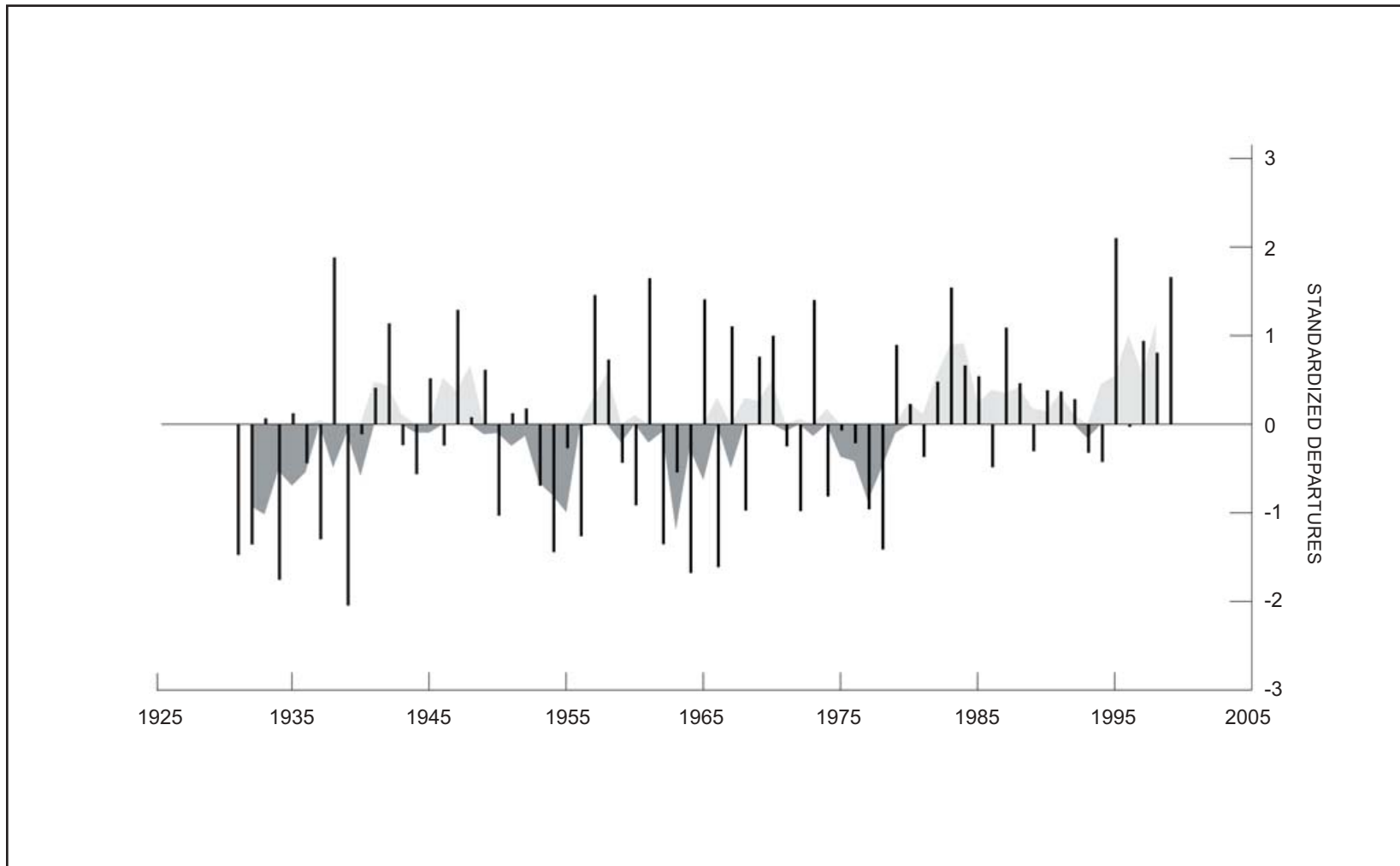


Figure 2. Precipitation Variability in the South Platte River Basin. As indicated on this graph of departures from the mean annual precipitation for the period 1931 - 1999, the South Platte basin, like much of the southwestern U.S., experienced a significantly wetter climate after about 1976. Source: U.S. COOP Station and automated SNOTEL data, selected stations in the high plains region of the S. Platte basin. Analysis and chart by Klaus Wolter and Mariya Medovaya, NOAA-CIRES Climate Diagnostics Center.

THE COLORADO WATER SUPPLY INFRASTRUCTURE⁴³

The natural supply of precipitation is not the only limitation on water use in Colorado. In fact, the water supply infrastructure that delivers water from its natural course is often a more important factor. Thus, a general knowledge of Colorado's water supply infrastructure, as provided in Figure 3, is necessary to understand the water issues facing the state.

EARLY WATER DEVELOPMENT

Colorado's aridity necessitates the development of water resources to support permanent settlement, and Native Americans led the way. Between 1100 and 1300 AD, the Anasazi first developed water in Colorado to irrigate the fields of Mesa Verde.

Early trappers and traders tapped the rivers and streams to irrigate small tracts of pasture and gardens beginning in the early 1800s. Water from the Arkansas River irrigated a forty-acre tract as early as 1832; more elaborate ditches followed in 1841 and 1847. New Mexicans, entering modern-day Colorado from the south, built the state's first *acequia* (i.e., a community ditch) in 1852, one year after founding Colorado's oldest continuous settlement: San Luis. (The *acequia* system first appeared in what is now the United States over two centuries earlier following the founding of Santa Fe in 1609.) In 1864, Benjamin Eaton dug a direct flow ditch that delivered water from the Poudre River to his farm. By the turn of the century, elaborate ditch systems supported extensive

agricultural production in the South Platte and Arkansas River basins.

With the discovery of gold and silver in 1859, water attracted new attention. Water was essential for working placer claims, and miners tapped the state's streams in their quest for the state's mineral riches. In 1880, the state's first trans-basin diversion, the Ewing Ditch, diverted water from the Eagle River to the Arkansas River watershed for mining. In the 1890s, however, silver prices crashed, and mining forever lost much of its need for Colorado's water. Agriculture, however, continued to grow, and cities joined the list of major consumers.

The "easy" water projects, particularly on the South Platte and Arkansas Rivers, came on line in Colorado's early years. Further development required increasingly elaborate, and costly, projects. But while most people reside along Colorado's Front Range and live on the East Slope, the state's water resources arise primarily on the West Slope. The East Slope naturally turned to the West Slope for additional water to meet their growth when native supplies proved unattractive.⁴⁴ Trans-basin diversions comprise the essential infrastructure to deliver West Slope water to meet the demands of the East Slope.⁴⁵

A significant example of an early trans-basin diversion is the Twin Lakes Reservoir and Canal Company. The company tapped the upper reaches of the Colorado River basin above Aspen through a tunnel to fill a 54,000 acre-foot reservoir in the Arkansas River basin. Although private investors like the Twin Lakes Reservoir and Canal Company met the state's water demands up to a point, the federal government ultimately stepped in to continue developing the state's water resources.

⁴³ Except where otherwise noted, this overview of Colorado's water infrastructure is based on the work of James N. Corbridge Jr. and Teresa A. Rice, *Vranesh's Colorado Water Law, Revised Edition*, Niwot: University Press of Colorado, 1999; as well as Gregory J. Hobbs, Jr., "Colorado Water Law: An Historical Overview," 1 *University of Denver Water Law Review* 1 (1997).

⁴⁴ Physical availability, legal constraints, and political reasons can all make municipal development of native water unattractive.

⁴⁵ Trans-basin diversions are discussed in detail in Chapter Three and Figure 7.

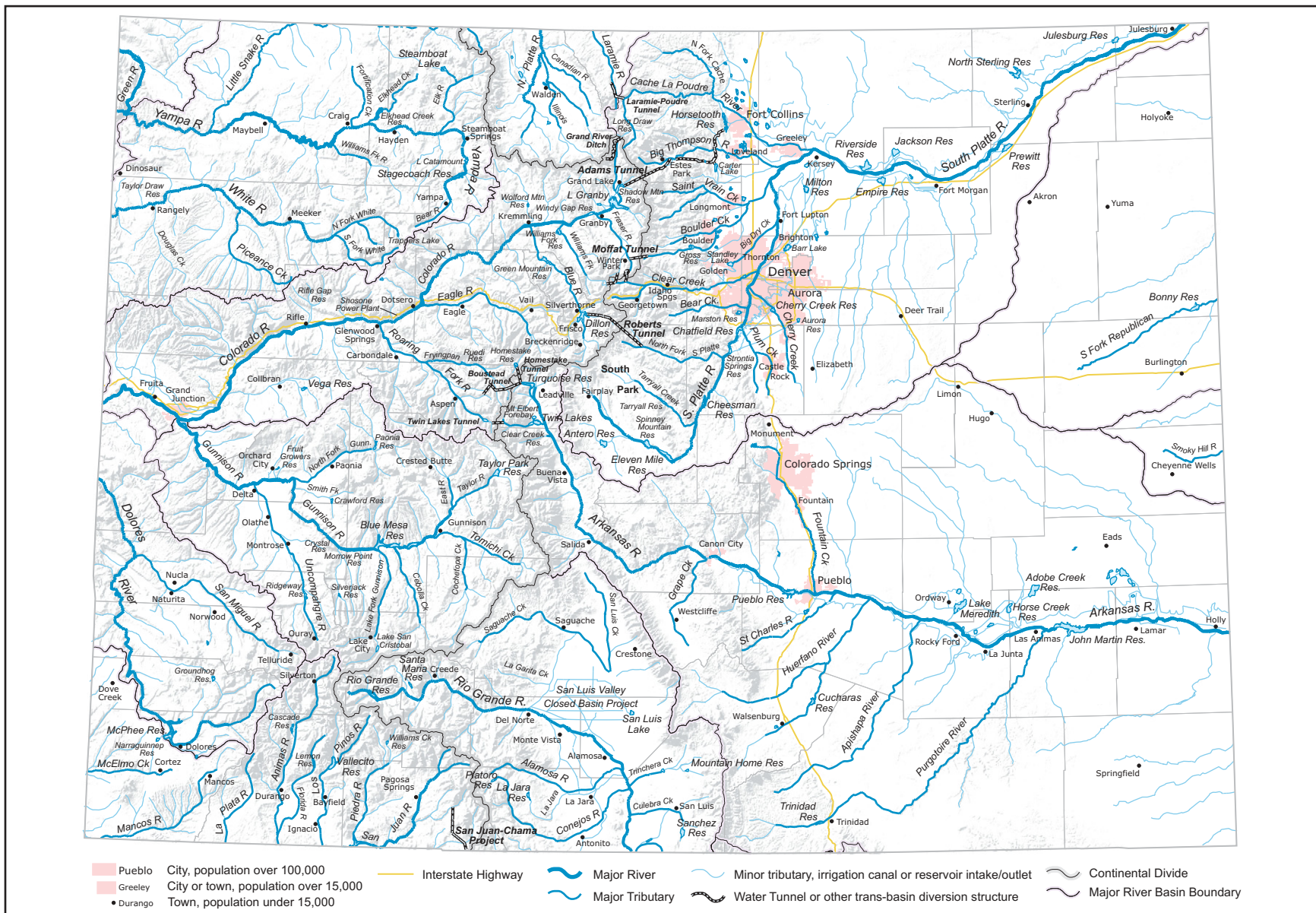


Figure 3. Colorado Water Resources.

Sources: Colorado Division of Water Resources, Office of the State Engineer; U.S. Bureau of Reclamation; U.S. Geological Survey. Map by Thomas Dickinson.

FEDERAL WATER PROJECTS

Bureau of Reclamation projects can be found throughout Colorado. An early Bureau of Reclamation project irrigated the West Slope's Grand Valley, at the confluence of the Colorado and Gunnison Rivers. Other significant West Slope agricultural projects are located at Collbran, Silt, Fruitgrowers Mesa, Uncompahgre, Dallas Creek, Smith Fork, Paonia, the Gunnison River (Aspinall or Curecanti Unit of the Colorado River Storage Project), Pine River, Dolores and Mancos; the Closed Basin Project is located in the San Luis Valley.⁴⁶

Perhaps the most significant federal undertaking was the Colorado-Big Thompson (C-BT) Project, which features the largest trans-basin diversion in the state (see Figure 4). The project, begun in 1937, delivers over 200,000 acre-feet of supplemental water annually from the Colorado River to Northeastern Colorado via the Adams tunnel from Grand Lake to Estes Park, to irrigate 600,000 acres and to supply 30 municipalities.⁴⁷ The Northern Colorado Water Conservancy District (Northern District) administers this water. The C-BT Project stores more than one million acre-feet of water in a network of eleven reservoirs, including Green Mountain Reservoir designed to serve West Slope interests, an early example of basin-of-origin compensation.⁴⁸

The Frying Pan-Arkansas Project (Fry-Ark) diverts over 50,000 acre-feet of water from the Colorado River basin to the Arkansas River basin for agricultural and municipal use. The project supplies the West Slope with compensatory

storage using Ruedi Reservoir.⁴⁹ Turquoise Lake, Mt. Elbert Forebay, Twin Lakes, and Clear Creek Reservoir store 314,461 acre-feet in the upper Arkansas basin, and Pueblo Reservoir stores 357,000 acre-feet just above its namesake city. The Southeastern Colorado Water Conservancy District sponsored the Fry-Ark Project.

TRANS-BASIN MUNICIPAL WATER PROJECTS

As municipalities grew, so did the demand for water. Denver led the way in many respects. The city not only acquired and developed water rights and reservoirs on the South Platte, it investigated importing water from the West Slope in the early 1920s. Diversions from the Fraser River began flowing through the Moffat Tunnel to the East Slope in 1936. Denver next developed water rights on the Williams Fork River, and these too ultimately flowed through the Moffat Tunnel to serve the Denver metro area. Denver built and later expanded a reservoir on the Williams Fork to store replacement water for Denver's out of priority depletions. Denver's water rights for the Fraser and Williams Fork Rivers passed judicial muster in 1939.⁵⁰

Denver's largest trans-basin project taps the Blue River system, using Dillon Reservoir to store spring runoff for delivery under the Continental Divide to the South Platte via the Roberts Tunnel. Conceived as early as 1922, construction began in 1946 and was completed in 1963. Denver's Blue River rights attracted intense West Slope opposition. As a result, the Water Court decree contained not only substantially less water than the application, with a later priority date, but also entered Denver into

⁴⁶ Bureau of Reclamation, "DataWeb, Colorado Projects," available at <http://dataweb.usbr.gov/html/colorado.html> (visited Mar. 22, 2001).

⁴⁷ Northern Colorado Water Conservancy District and U.S. Department of the Interior Bureau of Reclamation, *Northern Colorado Water Conservancy District, Colorado-Big Thompson Project*, map (1996).

⁴⁸ Northern Colorado Water Conservancy District, *Colorado Big Thompson Statistics*, fact-sheet (no date available).

⁴⁹ Compensatory storage refers to water storage constructed by East Slope water developers for the benefit of West Slope water users. The concept of compensatory storage is explained further in Chapter Three.

⁵⁰ *Denver v. Sheriff*, 96 P.2d 836 (Colo. 1939).

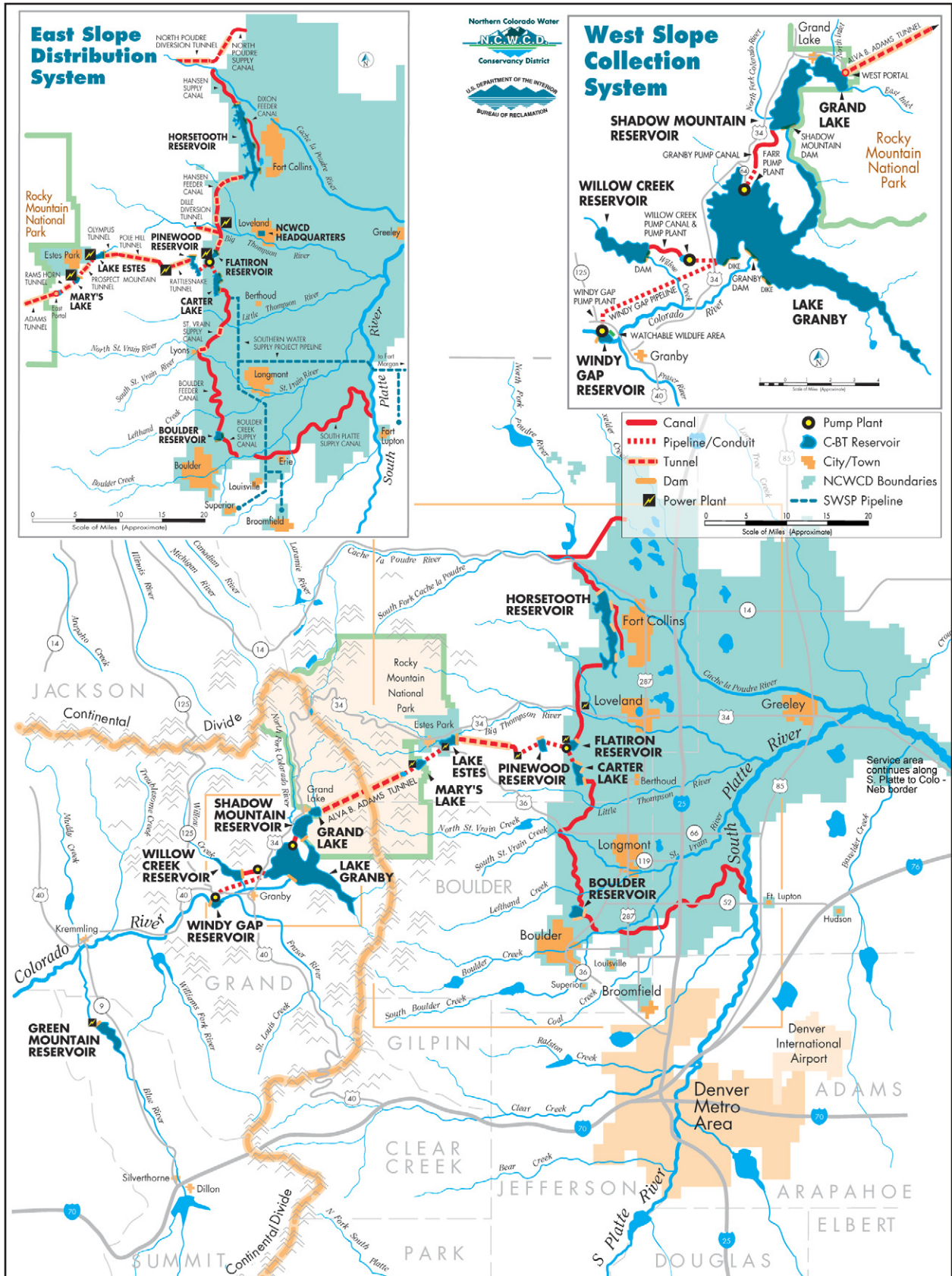


Figure 4. Colorado - Big Thompson Project.

Map by Northern Colorado Water Conservancy District.

a stipulation limiting the water to municipal purposes only and subordinating their rights to Green Mountain Reservoir. (Denver’s water collection system is shown in Figure 5.)

Colorado Springs and Aurora joined to develop the Homestake Project to supply their municipal needs with West Slope water from the Colorado River. The first phase of the project went on line in 1967, and includes the Homestake Reservoir on the West Slope. Water collected in the reservoir flows to the Arkansas basin on the East Slope through a trans-Continental Divide (i.e., trans-mountain) tunnel. After flowing down the Arkansas, some of this water is diverted and pumped via the Otero Pump Station across South Park to the South Platte River basin, where Aurora stores the water in Spinney Mountain Reservoir until needed. The rest remains in the Arkansas basin, routed to Colorado Springs through a different pipeline.

A coalition of six northern cities formed the Municipal Subdistrict of the Northern District in order to build the Windy Gap Project to satisfy growing municipal demands on the Front Range and take advantage of excess capacity in C-BT Project. Conceived in the 1970s, deliveries began in 1985 using C-BT facilities, and an additional small reservoir and pipeline on the Colorado River. The project originally supplemented the water supplies of Boulder, Estes Park, Greeley, Longmont, and Loveland, but now also serves Broomfield, Superior, Louisville, the Platte River Power Authority, and others.

Other significant, although smaller, municipal trans-basin water projects include the Hoosier Pass Tunnel (Colorado Springs), the Montgomery Pipeline (Colorado Springs), and Grand River Canal (Fort Collins).

PROPOSED WATER PROJECTS

Recent legal and political impediments to trans-basin diversions have culled the list of proposed projects from decades past. These projects are probably not abandoned, but are unlikely to proceed in the current political climate. Four recent proposals—all currently stalled—are representative.

Arapahoe County has been the principal proponent of the Union Park Project to divert water from the Gunnison basin for municipal use on the East Slope. This project proposed to capture surplus water high in the Gunnison basin for ultimate diversion under the Continental Divide to the South Platte basin. The project was the focus of extensive litigation that began over a decade ago. Adverse court decisions continue to stall the project; the Colorado Supreme Court recently held that there is insufficient unappropriated water to complete the project diligently and in a timely manner.⁵¹

Colorado Springs and Aurora planned a second phase of the Homestake Project, a major trans-basin diversion. Eagle County rejected the cities’ permit application in the early 1990s for additional diversion and storage facilities near Vail. After the courts refused to overturn the county,⁵² the cities began exploring alternatives, both independently and cooperatively with the West Slope. The latter is bearing fruit, as discussed in Chapter Three and elsewhere.

⁵¹ *Board of Commissioners of the County of Arapahoe v. Crystal Creek Homeowners’ Association*, 14 P.3d 325, at 333-34 (Colo. 2000).

⁵² *City of Colorado Springs v. Board of County Commissioners of Eagle County*, 895 P.2d 1105 (Colo. App. 1994) (certification denied Jun. 5, 1995).

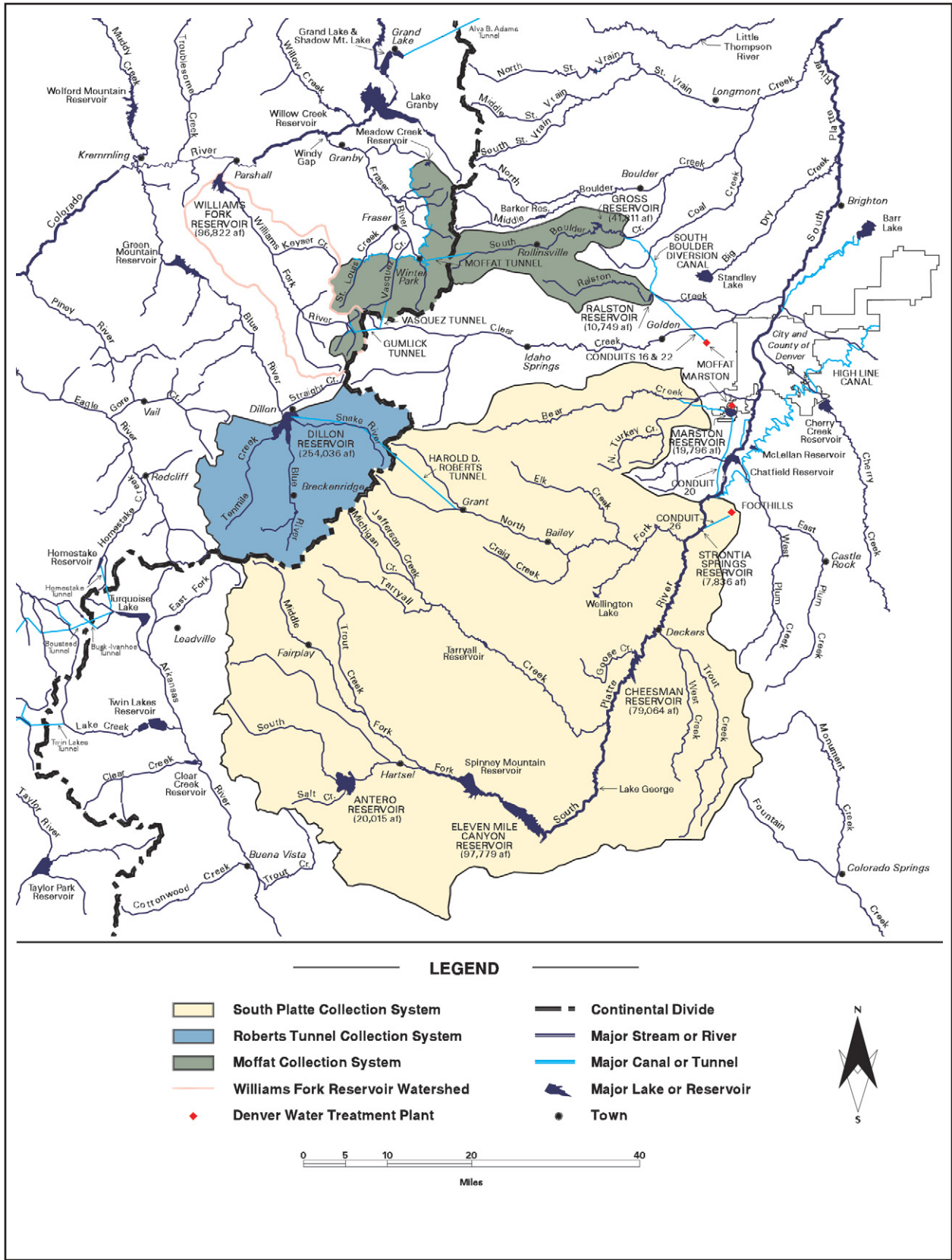


Figure 5. The Denver Water System.

Map by Denver Water Department.

Aurora also proposed to create storage by withdrawing 140,000 acre-feet from the South Park Formation, a saturated aquifer.⁵³ The withdrawn water would be discharged to the South Platte River for delivery to the city. Excess stream flows would be diverted into reservoirs and ditches to recharge the reservoir. The Water Court held that recharging a cone of depletion was not storage, and dismissed the application.

Until recently, Stockmen's Water proposed to export water from the San Luis Valley to the South Platte basin. The proposal succeeded a similar, and unsuccessful, attempt to tap the Valley's extensive groundwater.⁵⁴ Stockmen's proposal seems destined to suffer a similar fate because of the authorization of the Great Sand Dunes National Park in 2000, but Stockmen's may profit from the sale of the Baca Ranch to the National Park Service.⁵⁵

RECENT WATER INVESTIGATIONS IN COLORADO: A SUMMARY

Following the veto of Two Forks, water managers began aggressively to seek solutions for meeting the anticipated water demands of the twenty-first century. Several investigations were initiated to take stock of the water that is presently available and deliverable. Among the most comprehensive studies are the Denver Basin and South Platte River Basin Technical Study (Senate Bill 96-074), the Metropolitan Water Supply Investigation, Water for Tomorrow—Integrated Resource Plan, Metro Vision 2020, the Colorado Water Development Study (the so-

⁵³ *Concerning the Application for Water Rights of: The Park County Sportsmen's Ranch, Order Dismissing Application*, 96CW14 (Dist. Court, Water Div. No. 1, 2001).

⁵⁴ *American Water Development, Inc. v. City of Alamosa*, 874 P.2d 352 (Colo. 1994).

⁵⁵ Roper, Peter, "Colorado Legislator Urges Interior Secretary to Complete Land Acquisition," *The Pueblo Chieftain*, Feb. 27, 2001.

called "Farm Bureau" report), and the SECWCD/Arkansas Basin Future Water and Storage Needs Assessment.

DENVER BASIN AND SOUTH PLATTE RIVER BASIN TECHNICAL STUDY, SENATE BILL 96-074

Senate Bill 96-074 established a Special Water Committee of legislators to investigate the Denver Basin aquifers and issues associated with the South Platte River basin. Hal Simpson, the Colorado State Engineer, and Chuck Lile, the Director of the Colorado Water Conservation Board, assisted the Special Water Committee in its investigation. The investigation attempted to plan for the population growth that will occur along the Front Range. An interactive computer model was an aspect of this investigation. Through the input of data, the computer can generate a chart that depicts "the interrelationship between population, water demands, water supply options, and resulting effects on surface water and groundwater resources within the South Platte basin of Colorado."⁵⁶

The report that resulted from this investigation, completed and presented in April 1998, found that water for the coming population could be supplied through six main sources: (1) water conservation, (2) water reuse, (3) trans-basin imports, (4) conversion of in-basin agricultural water rights, (5) non-tributary groundwater, and (6) new South Platte water development. Opportunities for additional groundwater development were also identified. Four public policy areas were identified that deserve further study: (1) "current and near term water resource development in the South Platte River Basin and Denver Basin aquifers;" (2) "consideration of the additional runoff in streams resulting from

⁵⁶ *Denver Basin and South Platte River Basin Technical Study, S.B. 96-074*, prepared by Hal D. Simpson and Chuck Lile for the Special Water Committee, Apr. 1998, page 3.

impervious surfaces created by population growth;” (3) “how to properly implement and fund the Platte River Cooperative Agreement;” (4) “the role of the State of Colorado, in particular its water resources agencies, in facilitating water planning for the South Platte River Basin.”⁵⁷

METROPOLITAN WATER SUPPLY INVESTIGATION

The origins of the Metropolitan Water Supply Investigation (MWSI) can be traced to a 1993 conference hosted by Governor Romer focusing on future water supply challenges. This prompted the Colorado General Assembly to authorize a study overseen by the Front Range Water Forum, established by Executive Order of Governor Romer. The MWSI was presented to the Colorado Water Conservation Board in January 1999, and was prepared by Hydrosphere Resource Consultants, Inc., HRS Water Consultants, Inc., Mulhern MRE, Inc., and Spronk Water Engineers, Inc.

The MWSI presents a wealth of data regarding Denver Metro and South Platte basin water supplies and demands compiled mostly from the water planning documents of the many municipal water providers in the region. The intent of the MWSI is to “encourage discussions and provide technical support for cooperative water supply initiatives in a manner that would be complementary to and compatible with the water supply planning efforts of individual water providers.”⁵⁸ The investigation focused on four primary strategies for meeting water demands: (1) conjunctive use, (2) effluent management, (3)

⁵⁷ *Denver Basin and South Platte River Basin Technical Study, S.B. 96-074*, prepared by Hal D. Simpson and Chuck Lile for the Special Water Committee, Apr. 1998, pages 3-4.

⁵⁸ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, page 1.

interruptible supply arrangements, and (4) systems integration. The MWSI has generated additional investigations focusing on these individual water supply opportunities.

WATER FOR TOMORROW, INTEGRATED RESOURCE PLAN

In July 1997, the Denver Water Board (Denver Water) published the Integrated Resource Plan (IRP). The IRP is the result of a “three-year intensive study of the capacities and potential of [Denver’s] water supply network.”⁵⁹ The IRP was designed to identify and plan strategies for attaining the water necessary to meet projected needs within the existing service area of Denver Water, which includes the city and 75 suburban contract distributors. One result of this investigation was the decision not to consider any further expansion of this service area, as the Two Forks veto and related legal and policy events have made large-scale expansion unattractive to the agency. Several potential strategies are addressed for meeting the “build-out” needs of the existing service area. Among the strategies discussed are conjunctive use, enlargement of existing facilities or construction of new storage, water reuse, and conservation techniques. The IRP and the MWSI have many overlapping ideas.

METRO VISION 2020

Metro Vision 2020 is a product of the Denver Regional Council of Governments (DRCOG).⁶⁰ Completed in 1997, Metro Vision 2020 includes a plan for the infrastructure—both water-related

⁵⁹ Denver Water Board, *Water for Tomorrow, An Integrated Water Resource Plan*, 1997, page iv.

⁶⁰ More than half the population of Colorado resides in the DRCOG planning area, which includes participation from Adams, Arapahoe, Boulder, Clear Creek, Douglas, Gilpin, and Jefferson Counties, the City and County of Denver, and 41 additional towns and cities. DRCOG is a voluntary association charged under state law with preparing plans for regional development.

and other—that will be required to support long-range population growth in the Denver metropolitan region. One element of the Metro Vision 2020 process has been the development of a Clean Water Plan designed to address both point source and non-point source pollution, as well as the needs of groundwater protection. The plan emphasizes an integrated approach, organized with respect to the nine watersheds in and around the metropolitan area. A coordinated water quality plan is seen as a critical element in Denver Metro area planning, as many streams already feature impaired water quality.⁶¹

Metro Vision 2020 is intended to serve “as a comprehensive guide for the future development of the region . . . [b]y combining previously separate plans for growth, development, transportation, and water quality management into a single integrated plan.” Through this plan, a “vision of the future” can be both conceptualized and realized through the execution of planned procedures.⁶²

COLORADO WATER DEVELOPMENT STUDY PREPARED FOR THE COLORADO FARM BUREAU

The Colorado Water Development Study, published in January 1997, was prepared for the Farm Bureau by the firm of Montgomery Watson to assess “where we are in Colorado in terms of developing our water resources and to determine what decisions, if any, should be made about how we deal with future water demands.”⁶³ The report lays the foundation by discussing the present water supply resources in the State of

⁶¹ DRCOG is advised by the Water Resources Management Advisory Committee (WRMAC). The Committee draws members from management agencies, general-purpose governments, and selected industries.

⁶² Denver Regional Council of Governments, *Metro Vision 2020*, 1997 [quotes from pages 1 and 9 respectively].

⁶³ *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, Introduction.

Colorado and then projects water needs to the year 2100. After discussing population projections and water supply availability, the report then analyzes water use and demand trends in the agricultural, municipal, and industrial sectors. This is followed by a review of currently proposed water projects and the issues that affect water use and development.

The report also features a list of general strategies that can potentially be used to address the identified supply problems. General strategies include developing unappropriated supplies, transferring water rights from agriculture to municipal and industrial uses, implementing conservation practices, developing additional groundwater supplies, improving water use efficiency, expanding wastewater reuse, upgrading existing systems, and enhancing and expanding management tools. The strategies listed specifically for the Farm Bureau include supporting the prior appropriation system and interstate compacts, encouraging long-term lease arrangements, and supporting free market pricing. The Farm Bureau is also encouraged to consider cooperative water resources planning, water education, water storage development projects, governmental action, and funding alternatives.

SECWCD/ARKANSAS BASIN FUTURE WATER AND STORAGE NEEDS ASSESSMENT

This study was commissioned in June 1997 by the Southeastern Colorado Water Storage Needs Assessment Enterprise (under the auspices of the Southeastern Colorado Water Conservancy District) “to assess the water and storage needs of District members.”⁶⁴ Prepared by GEI

⁶⁴ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page i.

Consultants, Inc., and completed on December 10, 1998, the content of the report is directed at five main areas. The report (1) reviews existing water supplies available to the District water users, (2) makes projections about future population and water demands in the municipal sector, (3) assesses historic agricultural water use, (4) determines water and storage needs, and (5) evaluates potential water supply storage and management options for the District.

The report concludes that further storage development will be required to meet municipal water demands, and that municipal demands will cause agricultural water deficits. Additionally, the report finds that improved winter water storage programs could benefit agriculture, and that the necessary studies should begin immediately in order to have these projects online when needed in the next 10 to 20 years. Cooperative efforts are also advocated.

PROJECTED MUNICIPAL WATER DEMANDS

Water demand estimates are largely based on demographic projections, which typically overstate growth.⁶⁵ Additionally, water managers often use high estimates of growth in per capita demands, and conservatively low estimates of project yields. The net result is demand projections that are likely too high. A deliberate engineering practice that provides a “factor of safety”⁶⁶ also ensures that the taps never go dry.

⁶⁵ A notable exception is Denver Water’s Integrated Resources Plan (IRP) which used topographical maps and aerial photos to adjust projected demand for “buildout,” considering undevelopable roads, parks, and topography. By limiting demand to buildable areas, the IRP reduced the projected demand in the service area 15 to 20%. Electronic-mail communication with Hamlet J. “Chips” Barry, III, Jul. 26, 2001.

⁶⁶ A “factor of safety” is an engineering term referring to a deliberately calculated conservatism in engineering calculations that is based on the range of accuracy of each of the variables in the calculation. Written comments of Carol Ellinghouse, Jul. 2001.

This risk averse practice is understandable,⁶⁷ as the political consequences of developing too much water are considerably less severe than those of running short of water. However, to the extent that these figures are used to plan and construct projects or to purchase already developed supplies, these projections can accurately reflect the activity of water providers even if demands do not materialize.

The studies reviewed above use a variety of population forecasts and, more importantly, focus on different geographic regions, water-using sectors, and time horizons. Consequently, most findings regarding projected demands are not readily comparable. Each study, however, is similar in forecasting significant demand increases, particularly for the municipal sector in response to population growth.⁶⁸ The figures presented below are for five increasingly smaller geographic regions of particular interest to most Colorado water planners: (1) the entire state, (2) Water Division 1 (Northeast Colorado), (3) the South Platte basin, (4) the Denver-metropolitan area, and (5) the service area of the Denver Water Department.⁶⁹

The Colorado Water Development Study, prepared for the Colorado Farm Bureau, made projections for each water division and Colorado overall through the year 2100.⁷⁰ The report

⁶⁷ For engineers, this is a required professional practice. Written comments of Carol Ellinghouse, Jul. 2001.

⁶⁸ Several of the studies offer figures from one of more of these basins. The summary below provides only a sampling of published projections. The reader is encouraged to consult these sources.

⁶⁹ For administrative purposes, Colorado is broken into water divisions. Division 1 essentially covers the northeastern quadrant of the state, and is dominated by the South Platte Basin. The Kansas River and Republican River are also located in Division 1. The Denver-metropolitan area is the primary source of municipal demand in Colorado, in Division 1, and in the South Platte Basin. The service area of Denver Water includes Denver and approximately 75 outlying suburbs, which collectively provide a level of demand roughly equivalent to the City of Denver.

⁷⁰ The following estimates are from Table 5 of the *Colorado Water Development Study* prepared by Montgomery Watson for the Colorado Farm Bureau, 1997. The report used three

calculated that in 2000, the necessary municipal water requirements to support Colorado’s population would be 1,005,000 acre-feet and by 2020 that total would be 1,262,000 acre-feet, a difference of 257,000 acre-feet. The report projects that overall Colorado municipal water requirements will increase to 2,241,000 acre-feet by 2100, an increase of 1,236,000 acre-feet since 2000.

The Colorado Water Development Study estimates municipal water demands in Division 1 at 689,000 acre-feet in 2000, increasing to 853,000 acre-feet by 2020, a change of 164,000 acre-feet. By 2100, municipal water demand in Division 1 is anticipated to be 1,453,000 acre-feet, a 764,000 acre-feet increase—a difference greater than the current level of use.

Municipal water demands in the South Platte basin are addressed in detail in the Metropolitan Water Supply Investigation (MWSI).⁷¹ That study calculated future water supply needs for South Platte basin municipalities by summing estimates from each city’s long-term water plans. In most cases, these

primary sources to determine present water use demands: Department of the Natural Resources, *Senate Joint Resolution 94-32 Concerning the Management, Conservation, and Preservation of the Water Resources of the State of Colorado*, Jul. 1995; Endangered Fish Flow and Colorado River Compact Water Development Workgroup, *Colorado River Compact Water Development Projection*, November 1995; and communications with the Colorado Water Conservation Board.

⁷¹ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999. The MWSI used figures from Denver-metropolitan water providers and Senate Bill 96-74, which gave information on municipal water use in the South Platte Basin, to calculate future water use. Figures cited in the text are from Table 2 (Existing Municipal Water Use in the South Platte Basin, at page 30) and Table 3 (Future Water

are “build-out” scenarios—i.e., projections of water demand associated with full development of planned service areas. The timing of build-out varies from city to city, but in some cases, could occur in just a couple decades. For most municipalities, a time frame of 30 to 50 years is likely a more realistic estimate of a build-out timeframe.⁷² At build-out, municipal water deliveries in the South Platte basin are expected to total approximately 1,124,000 acre-feet annually, compared to 638,000 acre-feet in 1996.

“What is going to happen with respect to water supplies to meet the needs of those additional one million residents [who will reside in the Denver-Metro area by 2025]?”
— KEN SALAZAR, Colorado Attorney General

In the Denver-metropolitan area, the MWSI projects future (as defined above) municipal water deliveries to total 834,000 acre-feet per year, as compared to just 444,000 acre-feet per year in 1996. When this 834,000 acre-feet number is compared with the reasonably certain future supply of 731,400 acre-feet, it shows that

102,600 acre-feet of new supplies must quickly be found to meet the anticipated needs of the Denver-metropolitan area.

Denver Water’s Integrated Resource Plan projects demands in the Denver Water service area through the year 2045, at which time a need for 415,000 acre-feet per year is forecast.⁷³ This “best estimate” is based upon the final scenario adopted by DRCOG in the Metro Vision 2020 process. Denver Water anticipates that demand in the Denver Water service area will rise from roughly 275,000 acre-feet in 2000 to 330,000 acre-feet in 2020, a difference of 55,000 acre-

Supply Plans for South Platte Basin Municipal Water Providers, at page 35).

⁷² The MWSI does not try to tabulate or compare build-out dates, in part because water providers are often hesitant to provide exact estimates. The City of Aurora—the region’s second largest municipal water provider—utilizes a planning date of 2030 rather than build-out.

⁷³ Denver Water Board, *Water for Tomorrow, An Integrated Water Resource Plan*, 1997, Figures IV-4 and IV-5.

feet. The Denver Water collection system currently yields approximately 345,000 acre-feet annually, which should be sufficient to satisfy demands until approximately 2023. Denver Water already has a strategy in place to develop an additional 66,000 to 100,000 acre-feet, which should be sufficient to meet demands at least to 2040.

SUMMARY

In short, growth is expected to increase Colorado's municipal water demands statewide by approximately 257,000 acre-feet annually by 2020. In Division 1, municipal water demands are projected to increase by 164,000 acre-feet over this period, with 55,000 acre-feet of this growth occurring within the service area of Denver Water.

The lack of exact or comparable planning horizon dates utilized by the Denver Metro and South Platte basin municipalities studied in the MWSI makes it difficult to precisely assess the *rate* of growth in these areas. However, the *magnitude* of municipal water demand growth expected in the next “several decades” of current planning horizons is clear and is significant. Municipal water demands in the South Platte basin are expected to climb by 486,000 acre-feet. Of this amount, 390,000 acre-feet of this new demand will be in the Denver Metro area—an 88 percent increase from 1996 levels and 102,600 acre-feet more than the relatively certain projected future supplies.⁷⁴ Municipalities not served by Denver Water figure to be most hard pressed to respond to these growth pressures because they began preparing for growth so much later than Denver.

⁷⁴ *Metropolitan Water Supply Investigation*. 1999. Prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. Report to the Colorado Water Conservation Board.

CHAPTER TWO: LEGAL FRAMEWORK FOR WATER MANAGEMENT: A PRIMER

The primary legal instrument for allocating water in Colorado is a product of 19th century mining camps: the prior appropriation doctrine. Prior appropriation is seen in most arid and semi-arid regions of the Western United States where users need to move water away from its natural course for uses elsewhere. A rudimentary familiarity with prior appropriation is essential to understanding the legal and policy issues raised by growth in Colorado.⁷⁵

THE BASICS OF PRIOR APPROPRIATION

The hallmark of the prior appropriations system is the concept of “first-in-time, first-in-right.”⁷⁶ This notion allows for the establishment of a priority system to determine the proper allocation of water amongst users on a stream when supplies are insufficient to satisfy all demands. Priority is based on seniority, meaning that “senior” rights holders are those who first

established a pattern of water use—as recognized in a permit or decree—as compared to more “junior” users. Seniority is important since in a water short year senior water right holders will receive all of their water before any junior water right holders. In order to obtain the water to which it is entitled, a senior water right holder may place a “call on the river,” which requires upstream junior rights holders to cease diversions until more senior users receive their full entitlements.⁷⁷ This “call” system is applicable to waters that are a natural part of the stream system. Newly “developed water”—e.g., flows originating from trans-basin diversions or supplies produced as a byproduct of subsurface mining activities—belong exclusively to the developers of those water sources in almost all cases and are subject to call only in their original basin.

Water in the West is considered a public resource that can be acquired for private uses through the

⁷⁵ In considering the basic legal principles for allocating and managing water resources in the West, it is important to always remember that this body of law resides within a larger “cultural” context in which water is viewed emotionally. While many water management decisions are based on economic reasoning, everyone involved in the water community is (or at least should be) well aware that a diversity of non-economic values are also attached to water resources, and that behavior and law often reflect these broader considerations.

⁷⁶ The seminal case cited for the prior appropriation doctrine is *Irwin v. Phillips*, 5 Cal. 140 (Cal. 1855). In *Irwin v. Phillips*, the Latin maxim *qui prior est in tempore potior est in jure* (first in time, first in right) was used to hold that a miner’s earlier in time appropriation from the stream had more seniority with regard to priority than a second miner who claimed riparian rights.

⁷⁷ This can create interesting dynamics regarding the most desirable place to locate a diversion on a stream because senior water rights are usually scattered along a stream and are not arranged in chronological order downstream. A common classroom demonstration is the case where interests One, Two, and Three (in order of seniority) are located on a stream but appear in the downstream order of Two, One, and Three. If there are 10 cubic-feet/second (cfs) in the stream and One has the senior right to appropriate 10 or more cfs; a “call on the river” will result in Two receiving nothing while Three has access to One’s return flows. For this reason, Three is located in a better position than Two in terms of water quantity. A “futile call” occurs when the senior places a call on the river and a junior appropriator is able to prove that the water the senior was calling for would not reach the senior in usable amounts and thus the junior is allowed to continue diverting.

acquisition of a water right.⁷⁸ While water rights can be bought and sold, they are originally obtained through the process of appropriation. An appropriation generally requires a demonstrated intent to divert previously unappropriated waters, actual diversion, and application of the diverted water to a beneficial use. The distinction between intent to divert and the actual diversion of water is important in calculating the seniority date, which is the date at which intent was formed rather than the date of eventual diversion assuming that “due diligence” was exercised in the development of the water.⁷⁹ The diversion requirement is based on the historic assumption that all legitimate uses are off-stream, an idea that shows up in the list of recognized “beneficial uses.” All appropriation states consider domestic, agricultural, municipal, and industrial uses to be beneficial, but the list is ever expanding. Recent additions are instream and minimum stream flows for environmental and recreational purposes. Once the diverted water is put to a beneficial use, the right becomes absolute and cannot be defeated by later uses even if they are considered more useful, more important, or more valuable.

Water rights generally arise in two contexts: direct flow rights and storage rights. Direct flow rights appropriate water from the stream and apply it to a beneficial use. Senior rights are very appealing to municipalities because of their reliability; most senior rights are direct flow rights. Storage rights are created when water is impounded in a reservoir in anticipation of future beneficial use. Storage rights can be further divided into on-stream and off-stream rights, although there is no legal distinction between the two.⁸⁰ On-stream rights are stored in a reservoir that is located on a stream and filled by

⁷⁸ Water rights are usufructuary rights, which means the right is for the *use* of the water, rather than for the water itself.

⁷⁹ This is known as the “relation back doctrine.”

⁸⁰ For legal listing, the right is based on the location of the reservoir, for either on-stream storage, or the canal or ditch for off-stream storage.

impounding natural flows. Off-stream rights are stored in a reservoir located where the water must be transported to the reservoir, e.g., via ditch or canal.

“The greatest legal innovation in the history of the arid West was the doctrine of prior appropriation, which made water as much of a commodity as land, minerals, trees, crops, and livestock.”

— DONALD J. PISANI, *To Reclaim a Divided West*

When diversion and application to a beneficial use are demonstrated, a permit or decree from either an administrative agency or court of law must be obtained to “perfect” a water right. This permit or decree shows the priority date of diversion as well as the type and place of use, and the amount of water that can be diverted, calculated in either volumetric amounts (acre-feet), rate of flow amounts (cubic-feet-per-second), or, most helpfully, both.⁸¹ The quantity of water in an appropriative right is the amount of water that is put to a beneficial use in a reasonable time with reasonable diligence. In this respect, diverting more water than reasonably necessary is not considered a beneficial use and is thus not part of the water right; water used inefficiently or wastefully is not considered part of the right.⁸² By denying rights

⁸¹ For an interesting discussion on the trouble with decreed water diversion in rate of flow rather than volumetric amounts see James N. Corbridge Jr., “Historical Water Use and the Protection of Vested Rights: A Challenge for Colorado Water Law,” 69 *University of Colorado Law Review* 503 (1998).

⁸² What is considered “efficient” evolves with the increasing scarcity of the resource, but is typically measured by community standards at the time of appropriation. One method of evaluating agricultural efficiency is through the “duty of water.” The duty of water is the amount of water that needs to be applied to certain types of land to enable specific types of crops to grow. Another standard that attempts to foster more efficient use of water is the notion of

to water used inefficiently, the legal intent is to remove the incentive for wasteful use. As a practical matter, however, this policy also discourages parties from improving efficiency, as any water salvaged is generally not available to the user for reuse or sale.⁸³

A water right may be sold, leased, or exchanged, but direct flow rights are limited to the amount that equates to historic use.⁸⁴ The designated use of a water right can change, as well as the place of use, but only as long as no other water right is injured: the so-called “no-injury” rule. Thus, juniors are afforded some protection by courts or permitting agencies empowered to disallow or require mitigation of proposed changes to senior water rights. In the modern era, most states also require some consideration of the “public interest” in water transfers.

Water rights can be lost through non-use. The “use it or lose it” principle ensures that water is perpetually put to use and is not wasted by one person to the detriment of another potential water user.⁸⁵ There are two ways to lose an appropriated water right, although both of these are not followed by every state. The first is through abandonment, a common law concept

a “reasonably efficient means of diversion.” This standard uses community comparisons, technology, and economics to distinguish a reasonable diversion from a wasteful diversion. Generally, the reasonable standard is extremely lax in practice because it is based on very general notions that are difficult to apply.

⁸³ In *Southeastern Colorado Water Conservancy Dist. v. Shelton Farms*, the Colorado Supreme Court denied Shelton Farms the right to salvaged water, and held that it was required to return the water to the stream. 529 P.2d 1321, at 1326-27 (Colo. 1974). The Court said that it was the duty of the legislature to develop schemes for salvaged water, as opposed to the courts. For a review of recent legislative discussions, see Larry Morandi, “Rethinking Western Water Policy: Assessing the Limits of Legislation,” National Conference of State Legislatures, Denver, Colorado, Jul. 1994.

⁸⁴ All states allow the transfer of water rights that are associated with the land, but some states restrict the separation of water from the land (Colorado does not).

⁸⁵ This is one of the fundamental differences between prior appropriation and the riparian doctrine common to the Midwest and East.

requiring both non-use as well as the intent not to use a water right. The second is forfeiture of a right, a statutory method that omits the intent aspect and only looks to non-use.

THE UNEASY COEXISTENCE OF STATE AND FEDERAL LAW

Implementation of the prior appropriation doctrine is greatly complicated by the influence of federal law, especially law associated with federal public lands, Bureau of Reclamation and other federal projects, interstate resources, Indian treaties and responsibilities, environmental protection, and subject matters expressly delegated in the Constitution to Congress (e.g., the regulation of interstate commerce).

The concept of “federal reserved rights” is at the core of most federal-state water conflicts. As explained by the U.S. Supreme Court, “[w]hen the Federal Government withdraws its land from the public domain and reserves it for a federal purpose, the Government, by implication, reserves appurtenant water then unappropriated to the extent needed to accomplish the purpose of the reservation. In so doing the United States acquires a reserved right in unappropriated water which vests on the date of the reservation and is superior to the rights of future appropriators.”⁸⁶ Under this doctrine, the federal government acquired reserved water rights for the national forests, national grasslands, national parks, wilderness areas, wildlife refuges, Indian reservations, military installations, and a variety of other public lands. (Federal and Native American lands in Colorado are shown in Figure 6.)

⁸⁶ *Cappaert v. United States*, 426 U.S. 128, at 138 (1976).

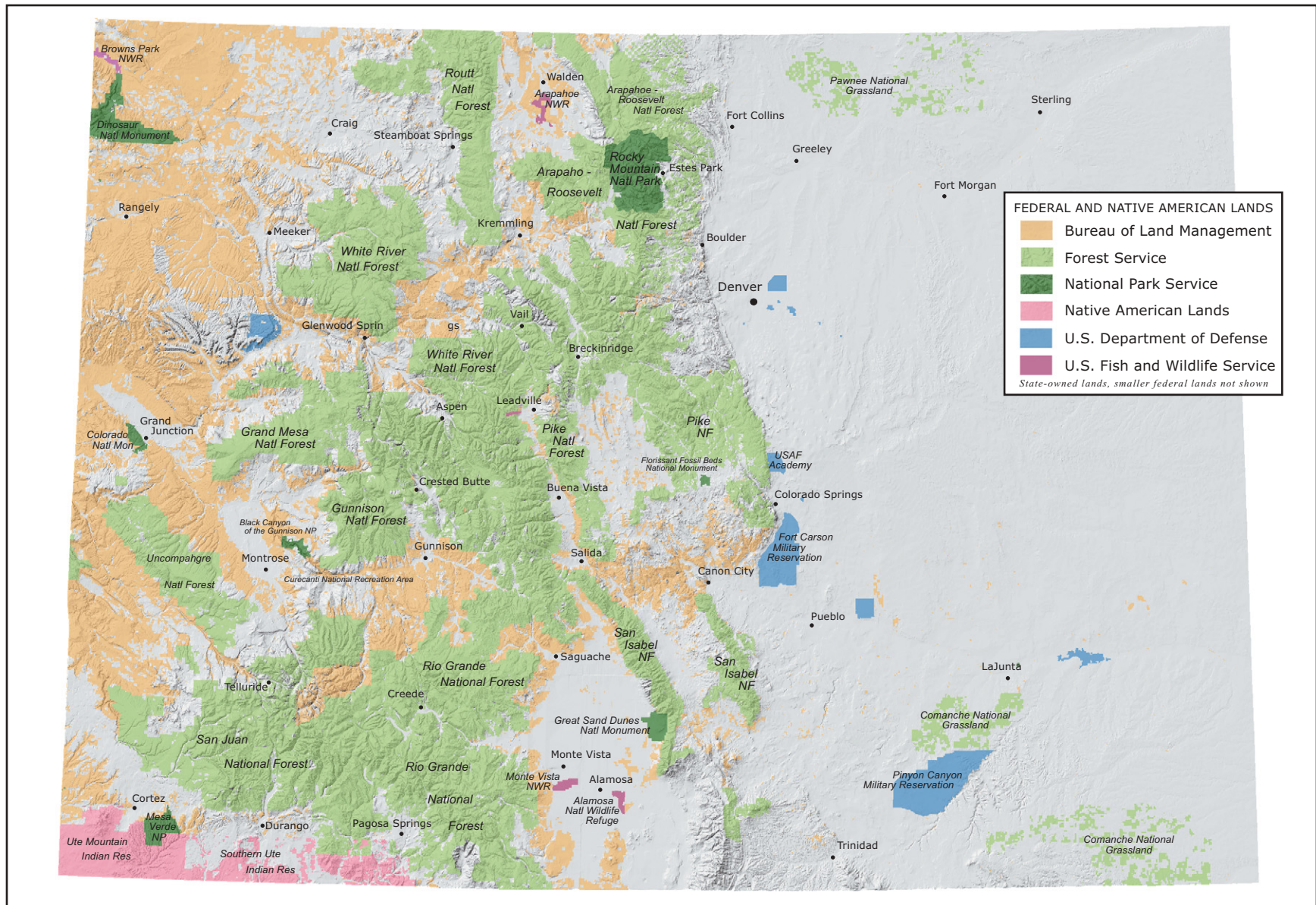


Figure 6. Federal and Native American Lands in Colorado.

Sources: U.S. Geological Survey, Colorado Division of Wildlife.
Map by Thomas Dickinson.

Few reserved water rights have been quantified, and there is great uncertainty regarding the amount of water necessary to fulfill the purposes of federal land reservations. Because reserved water rights can be quite old and may be quite large, they are difficult to incorporate into the administration of stream systems that are already fully appropriated under state law.⁸⁷ It is a longstanding federal policy to try to incorporate federal reserved water rights into state prior appropriation systems. The federal McCarran Act calls for all federal water rights to be adjudicated and quantified in state water court.⁸⁸ Nonetheless, “state law cannot prevent exercise of federal property rights or defeat federal purposes and programs,” something that “causes great concern to state water law administrators and holders of state water rights.”⁸⁹

A rich case law surrounds efforts to reconcile federal and state water law,⁹⁰ however, several important issues remain in dispute. These issues center on federal interests in securing instream flows to meet the purposes of federal land reservations, such as national forests and wilderness areas. One recent controversy involves attempts by the U.S. Forest Service to require municipalities and other water providers to provide “bypass flows” from existing water projects located within national forests. These flows can take the form of

releases from reservoirs or the routing of water around diversion facilities, typically to serve instream environmental purposes. The Forest Service may seek these bypass flows as part of right-of-way permits that water providers are required to obtain and periodically renew. Given that many western water projects are located in the national forest system, especially in Colorado, the bypass flow issue is controversial.

A federally established task force recently addressed this practice,⁹¹ which the Forest Service has followed more or less continuously since 1960.⁹² The task force was deeply divided, but a majority concluded that Congress had not delegated the necessary authority to the Forest Service to require bypass flows as a condition of renewing or reissuing authorization for existing projects, that such actions undermine the certainty provided by McCarran adjudications, and

recommended that the agency use other approaches to meet national forest purposes. The inability of the task force to reach consensus or to conclusively resolve the issue suggests continued uncertainty in this area, however.⁹³ In fact, the U.S. Department of Agriculture recently agreed

“[B]ecause federal agencies are unwilling to accept the water rights priorities that are established in McCarran Act adjudications, they are currently engaged in a concerted attempt to use the Endangered Species Act and other federal laws to control the use of water.”

— BENNETT W. RALEY, in testimony before Congress

⁸⁷ As a result, legislation creating wilderness in Colorado has typically disclaimed any reserved water rights. For example, see 16 U.S.C.A. § 460mm-4 (l)(2) (2000).

⁸⁸ 43 U.S.C. § 666 (2000).

⁸⁹ Getches, David H., *Water Law in a Nutshell*, Second Edition, St. Paul: West Publishing Company, 1990, page 316.

⁹⁰ Federal reserved water rights must be asserted in state proceedings. Weiss, Wendy, “The Federal Government’s Pursuit of Instream Flow Water Rights,” 2 *University of Denver Water Law Review* 151 (1998).

⁹¹ Federal Water Rights Task Force Created Pursuant to Section 389(d)(3) of P.L. 104-127, “Report of the Federal Water Rights Task Force Created Pursuant to Section 389(d)(3) of P.L. 104-127,” Aug. 25, 1997.

⁹² *City and County of San Francisco – Raker Act Application for Change in Location of Right-of-Way*, 67 Interior Dec. 322, at 326 (Interior Board of Land Appeals, 1960).

⁹³ Corbridge, James N., Jr. and Teresa A. Rice, *Vranesh’s Colorado Water Law, Revised Edition*, Niwot: University Press of Colorado, 1999, page 379.

to review the use of permits to impose bypass flows.⁹⁴

Even greater uncertainty and concern surrounds water rights associated with wilderness areas. In the *Potlatch* decision, the Idaho Supreme Court initially concluded “[b]ecause removing water necessarily impairs the natural state of the wilderness lands, Congress must have intended to reserve all unappropriated water.”⁹⁵ Although the Court reversed itself on rehearing, the logic behind the initial decision could have tremendous influence throughout the West, as many private water rights are junior to wilderness area designations.⁹⁶ In such cases, these rights could conceivably be reduced to zero. Wilderness water rights obviously pose a potential threat to Western growth, and further litigation appears inevitable to define the doctrine.

Colorado wilderness areas are, however, generally located in headwaters areas. Thus, any wilderness water rights pass downstream without impacting downstream water rights. Federal district court has held that while federal reserved rights in previously unappropriated waters were impliedly reserved in Colorado wilderness areas, failing to adjudicate them loses their priority.⁹⁷

The Colorado Supreme Court has not addressed federal reserved water rights in wilderness areas.⁹⁸ However, the court has found that the

⁹⁴ “Congressional Update: USFS Bypass Flows,” *Western States Water*, Editor Tony Willardson, Jun. 1, 2001, page 2.

⁹⁵ *In Re SRBA [Snake River Basin Adjudication] Case No. 39576*, 1999WL778325, at 9 (Id., 1999).

⁹⁶ On rehearing, the Idaho Supreme Court concluded that the language in the Wilderness Act of 1964, which states that “[n]othing in this Act shall constitute an express or implied claim or denial on the part of the Federal Government as to exemption from State water laws,” [16 U.S.C. § 1133(d)(6) (2000)] neither establishes nor precludes a federal reserved water right. *Potlatch Corp. v. United States of America*, 12 P.3d 1260, 1266 (Id. 2000).

⁹⁷ *Sierra Club v. Lyng*, 661 F. Supp. 1490 (Dist. Colo. 1987).

⁹⁸ In *Application for Water Rights of Cities of Aurora and Colorado Springs in Eagle, Lake and Pitkin Counties*, the court declined to address federal reserved water rights

United States does not have an instream flow claim for reserved water rights in the national forest.⁹⁹ In addition, the court has found that “to the extent that the purposes of the national forests and national parks overlap, the federal government has reserved water rights in the amount minimally necessary to effectuate the purposes of the national forest lands. . . . Reservation of water for other purposes, however, will have a priority date from the time the national park was established.”¹⁰⁰ Since wilderness areas are similarly established from previously reserved federal lands, Colorado courts might extend this notion to wilderness reserved water rights, limiting them to the purposes of the original reservation, or assigning a priority date from the time the wilderness designation was made. The Colorado Court also rejected recreational flows for Dinosaur National Monument because recreation was not one of the expressed purposes for creation of the monument.¹⁰¹ Thus, the express purposes for the creation of a wilderness may also loom large in determining wilderness reserved water rights.

Setting nationwide precedent in 2000, the State of Colorado, the United States, and water users in the San Luis Valley settled federal reserved water rights claims.¹⁰² In 1979, the U.S. Forest Service claimed instream flows on 303 stream segments in the Rio Grande and Gunnison National Forests, creating great uncertainty in the water community, including fears of demands for bypass flows. Under the settlement, the decree can be set aside if the Forest Service ever seeks bypass flows to the detriment of existing water

determined by the water court since the issue was not raised on appeal. 799 P.2d 33, at 36 (Colo., 1990).

⁹⁹ *United States v. City and County of Denver, by and through Bd. of Water Commissioners*, 656 P.2d 1, at 23 (Colo. 1982).

¹⁰⁰ *United States v. City and County of Denver*, 656 P.2d 1, at 30 (Colo. 1982).

¹⁰¹ *United States v. City and County of Denver*, 656 P.2d 1, at 26 (Colo. 1982).

¹⁰² [Colorado] Department of Law, “Historic Water Rights Settlement Reached in San Luis Valley,” press release, Mar. 15, 2000, page 1.

rights.¹⁰³ The settlement reserves the majority of the water in the Rio Grande River basin in Colorado for watershed protection.¹⁰⁴ This is the first time that the United States and state and local water users have agreed that the federal government has reserved water rights for instream flows in the national forests.¹⁰⁵

COLORADO WATER LAW

ADMINISTRATIVE ARRANGEMENTS

The Colorado system has been called the purest form of the prior appropriation system. Colorado fully adopted the prior appropriation system in 1882 through the Supreme Court decision *Coffin v. Left Hand Ditch Co.*¹⁰⁶ The Colorado system varies from other western states in its application of the prior appropriation doctrine in that it is the only state to use the judicial system and court decrees, rather than an administration agency and permit system, to record its water rights. Because Colorado does not have a permit system for surface water, users do not request the right to use water from an

“Colorado has always been the crucible for western water law and policy.”
— CHARLES WILKINSON, *Water and the American West*

agency, but instead begin to use the water and then ask the court for a decree.¹⁰⁷

The Water Right Determination and Administration Act of 1969 established seven water divisions, contiguous to the major watersheds in Colorado.¹⁰⁸ Within each division sits a water court that handles the water matters that arise within its division. A single water judge is designated in each division. In most divisions, a water referee is appointed to assist the Judge, often by handling more simple and routine matters. Water courts decide issues relating to water rights, changes in water rights, plans for augmentation, findings of reasonable diligence with regard to conditional water rights, abandonment of conditional and absolute water rights, and requests for alternate points of diversion and storage.

In addition to the seven Water Courts, the state engineer, division engineers, and the Colorado Water Conservation Board also regulate the administration of water matters. The governor appoints the state engineer.¹⁰⁹ Duties of the state engineer include supervising the water of the state, regulating the activities of division engineers, overseeing groundwater permitting and management, governing interstate water administration, and managing reservoir

¹⁰³ *Concerning the Application for Water Rights of the United States of American in Alamosa, Archeleta, Conejos, Hinsdale, Mineral, Rio Grande, Saguache, Costilla, and San Juan Counties, Colorado, Findings of Fact, Conclusions of Law, and Judgment and Decree*, 81CW183 (Consolidated) (Dist. Ct., Water Div. No. 3, 2000).

¹⁰⁴ Lazaroff, Cat, “U.S. Asserts Water Rights in National Forests,” *Environment News Service*, Mar. 16, 2000, page 2,

¹⁰⁵ [U.S.] Department of Justice, “Historic Water Rights Settlement Reached in Colorado,” press release, Mar. 15, 2000, page 1.

¹⁰⁶ 6 Colo. 443 (1882) The appropriation system was established for mining and irrigation use by the territorial government in 1874. Upon statehood in 1876, this system was incorporated into Article XVI of the Colorado Constitution and was enacted with congressional approval.

¹⁰⁷ To obtain a water right in the State of Colorado, a water user applies to the clerk of the Water Court, who then notifies the public of the application for the water right. Any party may file an objection. A water referee proceeds with an initial fact-finding investigation and either allows or denies the water right application. In a particularly complex case the water referee may choose to defer judgment to the water judge. If the referee or judge approves the water right, then the right will gain a priority date as well as a decreed water quantity. Appeals from decrees of the water judges are made directly to the Supreme Court of Colorado, by-passing the Colorado Court of Appeals.

¹⁰⁸ Colo. Rev. Stat. § 37-92-201 (2000).

¹⁰⁹ Colo. Rev. Stat. § 37-80-101 (2000).

operations.¹¹⁰ The state engineer appoints the division engineers. Division engineers are the people in charge of the actual water distribution and are required to report to the state engineer on the amount of water diverted.¹¹¹ Water commissioners are appointed to handle most day-to-day distribution matters. Division engineers are also charged with preparing biennial tabulations of priorities of water rights and conditional rights, as well as decennial abandonment lists.¹¹² Responsibilities of the Colorado Water Conservation Board (CWCB) include planning for flood control, conducting water studies, resolving intrastate water conflicts, coordinating federal and interstate water resources, conserving water and power resources, and protecting minimum stream flows.¹¹³

Colorado also empowers special districts to develop and manage water supplies. Irrigation districts¹¹⁴ were legislatively created to allow for the financing of irrigation projects when it became evident that neither individual water users nor ditch companies could afford to build such projects. The 1937 Water Conservancy Act¹¹⁵ allows landowners to band together to establish water conservancy districts to promote the development of unappropriated waters through the construction of additional water projects. This includes contracting with the federal government to operate and/or utilize water from reclamation projects, such as the role of the Northern Colorado Water Conservancy District in the Colorado-Big Thompson Project. Similar in purpose to water conservancy districts are water conservation districts, large, legislatively-created entities charged with developing and managing water resources in anticipation of population growth, and with ensuring that Colorado receives its fair share of

interstate waters. At present, only three conservation districts have been formed. These include the Colorado River Water Conservation District,¹¹⁶ the Southwestern Water Conservation District,¹¹⁷ and the Rio Grande Water Conservation District.¹¹⁸

OTHER NUANCES OF COLORADO WATER LAW

In Colorado, the most basic premise of the water law system is found within Article XVI, Section 6, of the Colorado Constitution. Here it states that “[t]he right to divert the unappropriated waters of any natural stream to beneficial uses shall never be denied.”¹¹⁹ This seemingly expansive grant of a right to divert water does have important limitations, defined through more than a century of case law and legislation. In this process, a variety of special terms and concepts have arisen that give Colorado water law its unique character. Several of the more salient concepts are reviewed below.

WATER EXCHANGES

Colorado law allows appropriators to transfer their water rights from one location to another using a court approved plan of augmentation and exchange.¹²⁰ An exchange occurs when water is taken at a time and place when it would otherwise be out of priority, but other water rights that would be injured are satisfied with replacement water from another source. In short, water is added to the stream at a downstream point to enable diversion of an equal amount of

¹¹⁰ Colo. Rev. Stat. § 37-80-102 (2000).

¹¹¹ Colo. Rev. Stat. § 37-80-105 (2000).

¹¹² Colo. Rev. Stat. § 37-92-401 (2000).

¹¹³ Colo. Rev. Stat. § 37-60-106 (2000).

¹¹⁴ Colo. Rev. Stat. §§ 37-41-101 – 160; 37-42-101 – 141; 37-43-101 – 189 (2000).

¹¹⁵ Colo. Rev. Stat. § 37-45-101 – 153 (2000).

¹¹⁶ Colo. Rev. Stat. § 37-46-101 – 151 (2000) (created in 1937).

¹¹⁷ Colo. Rev. Stat. § 37-47-101 – 151 (2000) (created in 1941).

¹¹⁸ Colo. Rev. Stat. § 37-48-101 – 195 (2000) (created in 1967).

¹¹⁹ Colo. Const. Art. XVI, § 6 (2000).

¹²⁰ Colo. Rev. Stat. §§ 37-83-101 et seq (2000).

water at an upstream location.¹²¹ Exchanges are often an efficient way for a trans-basin diverter to maximize use of imported foreign water.

THE IMPORTANCE OF FOREIGN WATER

Perhaps the most defining feature of Colorado water is the number of trans-basin diversions in the state that move water, in most cases, from the supply zones on the West Slope to demand zones on the Front Range. Colorado water law makes a distinction between waters that have been moved in such fashion, and those that remain in the original basin. “Foreign water” is water that has been introduced (imported) into a stream system from another basin; “native water” is the term given to water retained in its basin of origin.

Foreign water and native water have a different legal status, and consequently, are of different value to water providers. Most importantly, foreign water can be used to “extinction”—i.e., used in its entirety—in the introduced watershed. Additionally, few restrictions are placed on the timing and types of use of foreign water.¹²² In these regards, foreign water can be conceived more as a private ownership right as opposed to the usufructuary right of native water. This flexibility is extremely beneficial to the person who owns the imported water, and is a major consideration in Front Range water management strategies.

CONDITIONAL WATER RIGHTS

Determining how much water is available for appropriation can be a complex issue, especially since the availability of flow can fluctuate significantly on an annual basis. While the seniority system of prior appropriation accounts

¹²¹ Denver Water Board, *Water for Tomorrow, An Integrated Water Resource Plan*, 1997, page 17.

¹²² *City of Thornton v. Bijou Irrigation Company*, 926 P.2d 1 (Colo. 1996).

for this variability, developers of water projects need greater certainty. This need prompted recognition of “conditional” water rights.¹²³ A conditional water right allows a developer to establish a seniority date for a diversion that may not be fully implemented until an unspecified future date, at which time a demand for water can be reasonably anticipated. While this practice is occasionally challenged as a form of water speculation, the courts have upheld the practice as prudent water planning.¹²⁴

EXPANSION OF BENEFICIAL USE

In every prior appropriation state, the definition of beneficial use is a key focus of water rights administration and reform. In Colorado, beneficial use is a question of fact decided on a case-by-case basis. The Colorado Constitution established a priority of water uses listing

¹²³ *Taussig v. Moffat Tunnel Water and Development Co.*, 106 P.2d 363 (Colo. 1940).

¹²⁴ In *City and County of Denver v. Sheriff* the Supreme Court of Colorado evoked the “great and growing cities doctrine” as an exception to the anti-speculation rule. 96 P.2d 836 (Colo. 1939). *Sheriff* does not, however, alter the general rule against speculation outlined in *Ft. Lyon Canal Co. v. Chew*. 81 P. 37 (Colo. 1905). Rather, *Sheriff* says that “it is not speculation but the highest prudence on the part of the city to obtain appropriations of water that will satisfy the needs resulting from a normal increase in population within a reasonable period of time.” The *Sheriff* ruling allowed Denver to appropriate and bring water across the divide through the Moffat Tunnel for anticipated future demand stemming from population growth. In contrast see *Colorado River Water Conservation District v. Vidler Tunnel Water*, which held that evidence of future needs and uses of water by certain municipalities, without firm contractual commitments from any municipality to use any of the water, was insufficient to show the intent to take the water and put it to a beneficial use requisite to obtaining a conditional water decree. 592 P.2d 566, at 568 (Colo. 1979). Also in contrast to *Sheriff*, see *Rocky Mountain Power Co. v. Colorado River Water Conservation District*. 646 P.2d 383 (Colo. 1982). The *Rocky Mountain Power* ruling prompted the legislature to respond with Colo. Rev. Stat. § 37-92-305(9)(b) (2000) which states that conditional rights will not be granted unless it is demonstrated that water can and will be diverted, stored, otherwise captured, possessed, or controlled. Finally, in contrast to *Sheriff*, see *Thornton v. Bijou*, which held that projected population increases are not

domestic, agricultural, and manufacturing in order of importance. Other beneficial uses, such as municipal¹²⁵ and industrial¹²⁶ water uses, have been designated through judicial rulings. The definition of beneficial use is directly addressed in the Water Right Determination and Administration Act of 1969:

“Beneficial use” is the use of that amount of water that is reasonable and appropriate under reasonably efficient practices to accomplish without waste the purpose for which the appropriation is lawfully made and, without limiting the generality of the foregoing, includes the impoundment of water for recreational purposes, including fishery or wildlife. For the benefit and enjoyment of present and future generations, “beneficial use” shall also include the appropriation by the state of Colorado in the manner prescribed by law of such minimum flows between specific points or levels for and on natural streams and lakes as are required to preserve the natural environment to a reasonable degree.¹²⁷

Thus, the storage of water for recreational purposes has been found beneficial, as have minimum stream flows that preserve the natural environment, although by statute minimum stream flow rights can only be held by the

probative of anticipated future demand. 926 P.2d 1 (Colo. 1996).

¹²⁵ *Pulaski Irrigation Ditch Co. v. Trinidad*, 203 P. 681 (Colo. 1922).

¹²⁶ *Smith v. Industrial Commission*, 306 P.2d 254 (Colo. 1957).

¹²⁷ Colo. Rev. Stat. § 37-92-103(4) (2000).

Colorado Water Conservation Board.¹²⁸ (This issue is discussed further in Chapter Four.)

The storage of water has long been found to be beneficial.¹²⁹ The storage of water (typically spring runoff) allows for later use of that water. There are often limits to storage rights, however, as is evident from such doctrines as the “one-fill” rule.¹³⁰ The one-fill rule states that a reservoir may be filled only once per year (absent a decreed refill right), thus protecting downstream junior users from potentially unjust injury through the perpetual capture of the natural stream flow. Exceptions to the one-fill rule can occasionally be obtained by decrees that allow multiple fillings, thereby allowing a reservoir to be the subject of multiple decrees that exceed its physical storage capacity.¹³¹

THE MANY FORMS OF GROUNDWATER

The prior appropriation doctrine is applied to “all water occurring within the state of Colorado which is in or tributary to a natural surface stream.”¹³² Explicitly included in this definition is tributary groundwater—i.e., groundwater with a hydrologic connection to surface water flows.¹³³ A modified form of prior appropriation,

¹²⁸ For nuances of this principle see *City of Thornton v. City of Fort Collins*, 830 P.2d 915 (Colo. 1992) and *Board of County Commissioners of Arapahoe County v. Upper Gunnison River Water Conservancy District*, 838 P.2d 840 (Colo. 1992). These cases demonstrate that instream flow rights have been obtained by calling the appropriation something other than a minimum stream flow and meeting all the appropriation requirements.

¹²⁹ Colo. Rev. Stat. § 37-87-101 (2000) (storage has been considered a beneficial use since 1879).

¹³⁰ *Windsor Reservoir and Canal Co.*, 98 P. 729 (Colo. 1908).

¹³¹ *Orchard City Irrigation District v. Whitten*, 361 P.2d 130 (Colo. 1961); Corbridge, James N., Jr. and Teresa A. Rice, *Vranesh's Colorado Water Law, Revised Edition*, Niwot: University Press of Colorado, 1999, pages 55-57.

¹³² Colo. Rev. Stat. § 37-82-101(1) (2000).

¹³³ Tributary groundwater has a hydrologic connection to surface streams as shown from withdrawals that will, within one-hundred years, deplete the flows of a natural stream more than one-tenth of one percent of the annual rate of withdrawal. Colo. Rev. Stat. § 37-90-103(10.5) (2000). In

administered by a permit system, governs non-tributary groundwater. The exact form of administration is dependent upon whether or not this groundwater is located in a basin “designated” by the Ground Water Commission, under authorities outlined in the 1965 Colorado Ground Water Management Act.¹³⁴ Within the eight designated basins (all located in eastern Colorado), ground water management districts of locally elected members are established to manage use, and are empowered to issue appropriation permits in those situations where such use will not impair other uses or promote waste.¹³⁵ The actions of these districts are subject to oversight by the state Ground Water Commission. Outside of designated basins, the use of non-tributary groundwater requires a permit from the State Engineer, and is a privilege reserved for the owners of the overlying lands.¹³⁶

“Colorado’s groundwater resources are abundant, economically accessible and terribly important to the long-range economic development of the state.”

— CLYDE O. MARTZ, *Water and the American West*

1969, the Water Right Determination and Administration Act [Colo. Rev. Stat. § 37-92-101 – 602 (2000)] made it “the policy of this state to integrate the appropriation, use, and administration of underground water tributary to a stream with the use of surface water in such a way as to maximize the beneficial use of all the waters of this state.” Colo. Rev. Stat. § 37-92-102(1)(a) (2000). The 1969 Act provided for an integration of tributary groundwater priorities with surface decrees and also provided that tributary groundwater rights be adjudicated by division water courts. Thus, tributary groundwater is administered as if it was surface water under the prior appropriation system. There is a rebuttable presumption that all groundwater is tributary.

¹³⁴ Colo. Rev. Stat. § 37-90-101 – 143 (2000).

¹³⁵ Colo. Rev. Stat. § 37-90-118 – 135 (2000).

¹³⁶ Colo. Rev. Stat. § 37-90-137(4)(b)(II) (2000).

A further category of groundwater applies to the deep aquifers of the Denver Basin. This category has the awkward name of “not non-tributary groundwater,” and refers to “ground water located within those portions of the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers that are outside of the boundaries of any designated groundwater basin . . . the withdrawal of which will, within one hundred years, deplete the flow of a natural stream . . . at an annual rate greater than one-tenth of one percent of the annual rate of withdrawal.”¹³⁷ Before withdrawing water from these sources, an applicant must demonstrate that the aquifer life is at least one hundred years,¹³⁸ and a judicially approved plan of augmentation (of surface water flows) must be secured.¹³⁹

ABANDONMENT OF WATER RIGHTS

Water rights in Colorado can be lost through abandonment.¹⁴⁰ Claims of abandonment are considered in four settings: (1) during a change in a water right proceeding,¹⁴¹ (2) during preparation of the decennial abandonment lists,¹⁴² (3) based on an action to determine abandonment (generally brought by a junior appropriator),¹⁴³ and (4) as part of the “due diligence” hearings associated with a conditional water right.¹⁴⁴ Showing abandonment requires more than a finding of non-use, but also requires showing intent to abandon the right.¹⁴⁵

¹³⁷ Colo. Rev. Stat. § 37-90-103(10.7) (2000).

¹³⁸ Colo. Rev. Stat. § 37-90-137(4)(b)(I) (2000).

¹³⁹ Colo. Rev. Stat. § 37-90-137(9)(c)(I) (2000).

¹⁴⁰ Under certain circumstances, condemnation of water rights can also occur.

¹⁴¹ *Farmers’ Reservoir & Irrigation Co. v. Lafayette*, 24 P.2d 756 (Colo. 1933).

¹⁴² For example, *Denver v. Middle Park Water Conservancy District*, 925 P.2d 283 (Colo. 1996).

¹⁴³ *Masters Investment Co., Inc. v. Irrigationists Association*, 702 P.2d 268 (Colo. 1985).

¹⁴⁴ *Concerning Application for Water Right for Midway Ranches Property Owners’ Association*, 938 P.2d 515 (Colo. 1997).

¹⁴⁵ *Beaver Park Water, Inc. v. Victor*, 649 P.2d 300, 302 (Colo. 1982).

INTERSTATE OBLIGATIONS

One additional aspect of Colorado water law that is particularly important involves the state's interstate obligations. Colorado is a headwaters state. Rivers and streams arise in Colorado and flow through the other western states as the water makes its way to the oceans. Although the waters have their origin in Colorado, Colorado does not retain full ownership or control of these flows, as downstream states have rights recognized in federal law.¹⁴⁶

Three different mechanisms exist to apportion interstate rivers. The first is the interstate compact. A compact is an agreement negotiated between states, then ratified by the affected state legislatures and Congress. Colorado is party to nine water allocation compacts:

- The 1922 La Plata River Compact allocates water between Colorado and New Mexico.¹⁴⁷
- The 1922 Colorado River Compact divides water between the states of the Upper Basin (Colorado, Utah, New Mexico, Wyoming) and Lower Basin (Arizona, Nevada, California) with Lee Ferry, Arizona as the dividing point.¹⁴⁸
- The 1923 South Platte River Compact distributes water between Colorado and Nebraska.¹⁴⁹
- The 1938 Rio Grande River Compact allocates waters between Colorado, New Mexico, and Texas.¹⁵⁰
- The 1942 Republican River Compact allocates water among Colorado, Kansas, and Nebraska.¹⁵¹
- The 1946 Costilla Creek Compact (as amended in 1963) provides an equitable division and apportionment between Colorado and New Mexico.¹⁵²
- The 1948 Arkansas River Compact allocates water between Colorado and Kansas.¹⁵³
- The 1948 Upper Colorado River Compact between Arizona, Colorado, New Mexico, Utah, and Wyoming apportions water between the Upper Basin states.¹⁵⁴
- The 1968 Animas-La Plata Project Compact between Colorado and New Mexico describes potential operation of an Animas La-Plata Federal Reclamation Project.¹⁵⁵

The second method is known as “equitable apportionment,” a doctrine developed by the Supreme Court to resolve interstate water conflicts. Important equitable apportionment cases that affect Colorado include:

¹⁴⁶ It is also worthwhile to note that all of Colorado's great rivers arise on federal land, and flow through federal land as they journey out-of-state. Similarly, most of Colorado's wilderness areas are located in high mountain headwaters areas. This adds greater complexity to interstate water conflicts, which already are among the most contentious of all public policies in the West.

¹⁴⁷ Colo. Rev. Stat. § 37-63-101 – 102 (2000).

¹⁴⁸ Colo. Rev. Stat. § 37-61-101 – 104 (2000).

¹⁴⁹ Colo. Rev. Stat. § 37-65-101 (2000).

¹⁵⁰ Colo. Rev. Stat. § 37-66-101 – 102 (2000).

¹⁵¹ Colo. Rev. Stat. § 37-67-101 – 102 (2000).

¹⁵² Colo. Rev. Stat. § 37-68-101 – 102 (2000).

¹⁵³ Colo. Rev. Stat. § 37-69-101 – 106 (2000).

¹⁵⁴ Colo. Rev. Stat. § 37-62-101 – 106 (2000).

¹⁵⁵ Colo. Rev. Stat. § 37-64-101 (2000). Congress approved the latest in a long line of proposed projects in 2000. Pub. L. 106-554 §§ 301-303 (Dec. 21, 2000), codified at 114 Stat. 2763 (2000).

- *Kansas v. Colorado*, 206 U.S. 46 (1907) – In this, and a previous 1902 case, Kansas sued Colorado in an attempt to block Colorado’s unlimited usage of the Arkansas River, which originates in Colorado before entering Kansas. Colorado later sued Kansas (*Colorado v. Kansas*, 320 U.S. 383 (1943)) to further clarify rights to beneficial use on the River. Despite enactment of a compact in 1948, interstate litigation on the river has continued to the present day.
- *Wyoming v. Colorado*, 259 U.S. 419 (1922) – Wyoming sued Colorado and two Colorado corporations to stop a proposed diversion in Colorado from the Laramie River. A decree was entered that enjoined the diversion of more water than the excess available over existing prior appropriations in the two states.
- *Nebraska v. Wyoming*, 325 U.S. 599 (1945) – Nebraska sued Wyoming to determine the equitable shares between Nebraska, Wyoming, and Colorado of the North Platte River. A percentage formula recommended by the Special Master was adopted by the court to apportion the river’s flow during the irrigation season in the area of most intensive irrigation use near the Wyoming/Nebraska state line. The court also imposed limitations on the amount of irrigated acres, storage for irrigation, and diversions out of the basin in specific

“A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power over it.”
 — U.S. SUPREME COURT, *New Jersey v. New York*

reaches of the river upstream in Colorado and Wyoming and directed Wyoming to administer the rights of certain federal irrigation projects in order of priority. A pending settlement in more recent litigation in *Nebraska v. Wyoming* would modify and expand the decree but maintain the same general apportionment strategy.

- *Colorado v. New Mexico (I)*, 459 U.S. 176 (1982) – Colorado sued New Mexico in an attempt to claim partial use of the Vermejo River, a river that arises in Colorado before flowing into New Mexico where most of the water is consumed. In this and subsequent litigation (*Colorado v. New Mexico (II)*, 467 U.S. 310 (1984)), Colorado failed to prove that potential benefits to new Colorado appropriators would offset impacts to existing New Mexico water users. The case was thereafter dismissed.

The third method of interstate water apportionment is through a congressional act. There is only one example, and that is the Boulder Canyon Project Act.¹⁵⁶ The Boulder Canyon Project Act divided water between the Lower Basin states on the Colorado River: California, Arizona, and Nevada. This congressional act came about as a result of the Lower Basin states inability to come to an agreement on how water would be divided between them.

¹⁵⁶ 43 U.S.C. § 617 (2000).

THE FUTURE OF PRIOR APPROPRIATION

One of the many outcomes of the Two Forks veto was to give renewed vigor to critics claiming that the doctrine of water allocation has outlived its usefulness. In a mock eulogy, University of Colorado Law Professor Charles Wilkinson stated that Prior Appropriation “died this January 19th [1991] when his heart seized up after receiving a fax informing him that, on that very day, the new Director of the Denver Water Board had recommended that the water developers not file a lawsuit challenging EPA’s rejection of the dam at Two Forks.”¹⁵⁷ A similar assessment was offered by former Utah Governor Scott Matheson in his last public address, in which he concluded that the “water policies of the nineteenth century no longer meet the needs of the twentieth century and will certainly not serve us well in the twenty-first century.”¹⁵⁸

“Laws change with society. I think the Constitutional right to appropriate needs to change too.”

— DAVID C. HALLFORD, former General Counsel, Colorado River Water Conservation District

In rebuttal to Professor Wilkinson’s satirical eulogy, current Colorado Supreme Court Justice Gregory J. Hobbs, Jr., then a practicing attorney, countered that the prior appropriation system can evolve to meet the changing needs of the future.¹⁵⁹ As Justice Hobbs later explained:

¹⁵⁷ Wilkinson, Charles F., “In Memoriam: Prior Appropriation 1848-1991,” 21 *Environmental Law* v, page xvi (1991).

¹⁵⁸ Matheson, S.M., “Future Water Issues: Confrontation or Compromise?” 46 *Journal of Soil and Water Conservation* 96, at 96-97 (1991).

¹⁵⁹ Hobbs, Gregory J., Jr., “The Reluctant Marriage: The Next Generation (A Response to Charles Wilkinson),” 21 *Environmental Law* 1087, at 1090 (1991).

One conclusion you must draw about Colorado water law is that, despite some of the charges made against it, it is a very flexible, adaptable law. It takes into account the public interest and the public desires of Coloradans to integrate new uses, in priority, while protecting proprietary rights in preexisting uses.¹⁶⁰

James Lochhead, former Executive Director of the Colorado Department of Natural Resources, has similarly argued “that Western water law and institutions have evolved to meet the changing needs of society, the economy and the environment.”¹⁶¹

In many respects, both positions can be supported by the recent utilization of the prior appropriation doctrine. As Dan Tarlock and Sarah Van de Wetering have observed, “[t]he original functions of western water laws were to support mining and the settlement of the west by Jeffersonian farmers. For most of this century, however, a primary function of western water law has been to support unlimited urban growth.”¹⁶² Whether or not this new expression of prior appropriation represents an “evolved” form of the doctrine, or simply a modern symptom of an ill-conceived and outdated framework, is subject to considerable debate. What is clear is that prior

¹⁶⁰ Hobbs, Gregory J., Jr., “Colorado, Prior Appropriation, Instream Flow Pioneer,” *Colorado Water Rights*, Oct. 1996, page 9.

¹⁶¹ Lochhead, James, “Upper Basin vs. Lower Basin – Can We Coexist on a Shared River?” presented at Colorado River Water User’s Association, Las Vegas, Nevada, Dec. 18, 1997.

¹⁶² Tarlock, Dan, and Sarah B. Van de Wetering, “Growth Management and Western Water Law From Urban Oases to Archipelagos,” 5 *Hastings West-Northwest Journal of Environmental Law and Policy* 163, at 172 (1999).

appropriation remains an entrenched fixture of Colorado water law.¹⁶³

Rather than debate the merits of prior appropriation as an allocation system, perhaps a more practical way to frame this issue is to acknowledge that issues of reallocation are at the core of most water disputes. Whether “Prior” is, or should be, dead is not the issue before the water management community; the issue is how to modernize water law to deal with issues of reallocation. As University of Colorado Law Professor David Getches recently remarked, “We are living in old Prior’s house, and it’s in a historic district so rather than remodel it, lets try to get comfortable in it.”¹⁶⁴

¹⁶³ The public trust doctrine is the principal conceptual challenge to the prior appropriation doctrine. As Professor Getches observes, “[t]he public trust doctrine is a forceful common law basis for infusing public interest concerns into water decisions, even without an express state statutory or constitutional requirement.” Getches, David H., “A Metamorphosis of Western Water Policy: Have Federal and Local Decisions Eclipsed the States’ Role?” 20 *Stanford Environmental Law Journal* 3, at 34 (2001). The essence of the notion is that the state holds water in trust for the public and cannot convey it for private uses without considering the impact on public uses. Public trust was a major topic of discussion in Colorado and other western states after the Mono Lake litigation in which the California Supreme Court held that the state has the power to reconsider water allocation decisions. *National Audubon Society v. Superior Court*, 658 P.2d 709, at 729 (Cal. 1983). Although the public trust doctrine was the subject of at least one citizen initiative that failed to make the ballot in Colorado, and rumors of its reappearance abound, the doctrine has not been seriously considered in Colorado.

¹⁶⁴ Getches, David H., “Two Decades of Water Law Policy Reform: A Retrospective and Agenda for the Future,” presented at the Natural Resources Law Center Water Conference, University of Colorado, Boulder, Colo., Jun. 15, 2001.

CHAPTER THREE: TRANS-BASIN DIVERSIONS

If water does, in fact, “flow toward money” in the West, then demography is every bit as important as topography—sometimes more so—in determining the outcome of water conflicts. Colorado is perhaps the perfect laboratory for exploring the odd relationship between demography and topography in the West. Through a marriage of law, economics, and engineering, Colorado water managers have long worked to reconcile the fact that while most of the water is in the west of the State, most of the people are in the east. Separating the “East Slope” and “West Slope” is the Rocky Mountains, punctuated by the Continental Divide. An understanding of “the divide” is a prerequisite to understanding the past, present, and future of Colorado water.

A RIVER RUNS THROUGH IT

MOVING WATER ACROSS BASINS: A BRIEF HISTORY

The movement of water from one river basin to another is known as a trans-basin diversion (see Figure 7). Despite the obvious technical challenges, trans-basin diversions of water have been common in Colorado for well over a century. In most cases, the goal of these diversions has been to move water from the basins on the West Slope (particularly the Upper Colorado River basin) to the East Slope (including the South Platte basin, home to the Denver-Metro area). As Jim Corbridge and Teresa Rice have observed:

As early as 1880, exportation of Western Slope water for Eastern

Slope needs was implemented. The Ewing Ditch diverted water from the Eagle River to the Arkansas River watershed for purposes of placer mining. This was soon followed by transmountain diversions through Cameron Pass Ditch in 1882, diverting water from [the] North Platte River into [the] Cache La Poudre watershed. In 1892, construction commenced on Skyline Ditch taking water from [the] Laramie River into the Poudre Valley drainage. The first diversion out of the Colorado River was through the Grand River Ditch in 1904. This was followed by the construction, and completion in 1944, of a thirteen-mile tunnel bringing 310,000 acre-feet of water from the Western Slope to the service area of the Northern Colorado Water Conservancy District located in northeastern Colorado.¹⁶⁵

As discussed in Chapter One, the central players in trans-basin diversions related to growth are Front Range municipalities and East Slope water conservancy districts working with the federal Bureau of Reclamation.¹⁶⁶ Most of these same entities, and others facing growth pressures, contemplate additional trans-basin diversions.

¹⁶⁵ Corbridge, James N., Jr. and Teresa A. Rice, *Vranesh's Colorado Water Law, Revised Edition*, Niwot: University Press of Colorado, 1999, page 507.

¹⁶⁶ There are, in addition, many long-established trans-basin agricultural diversions that continue in that use.

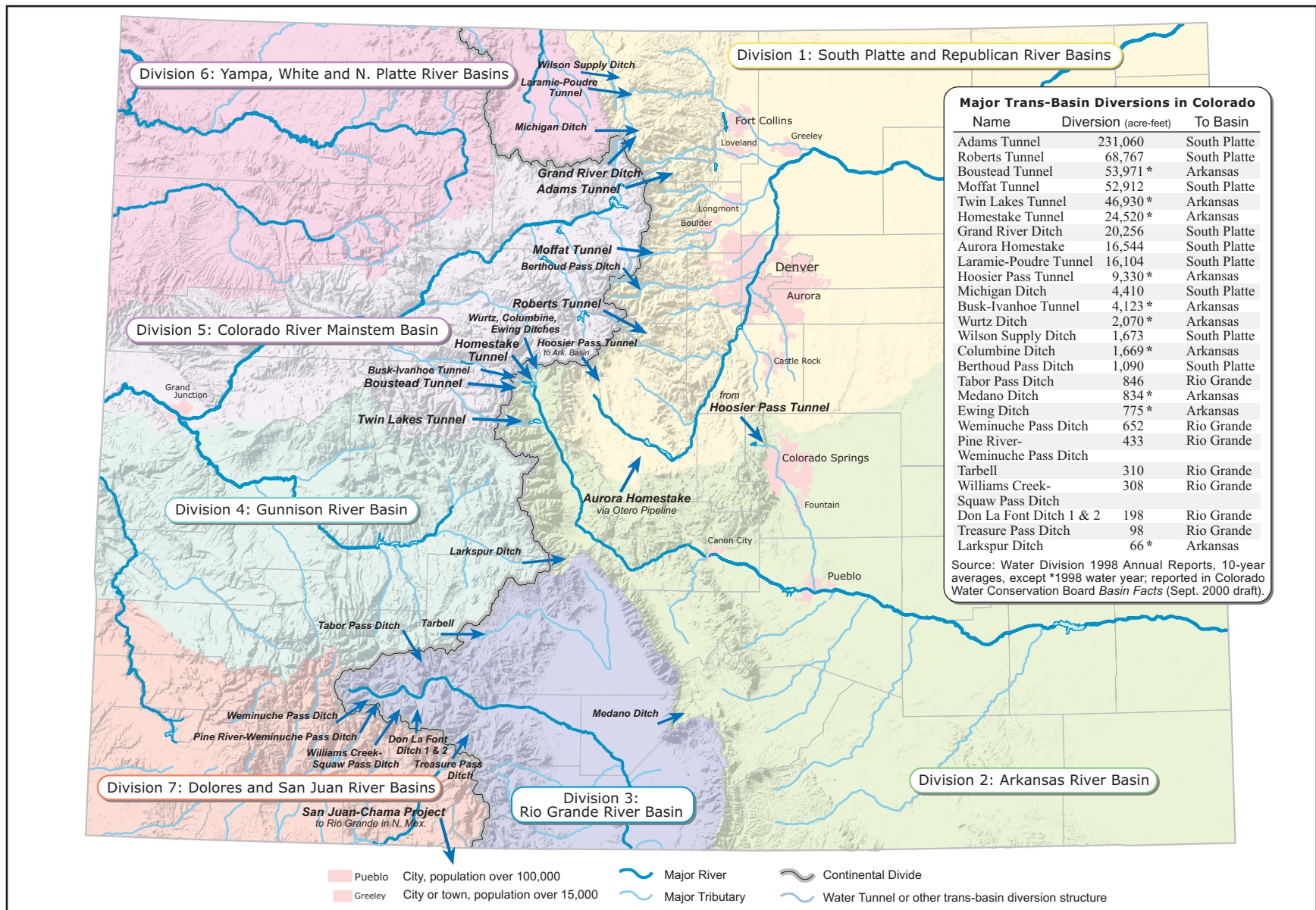


Figure 7. Major Trans-Basin Diversions

Sources: Colorado Division of Water Resources, Office of the State Engineer; Colorado Water Conservation Board; U.S. Bureau of Reclamation; U.S. Geological Survey. Map by Thomas Dickinson.

While some would merely realize the full potential of their existing West Slope water rights and trans-basin infrastructure, others contemplate new projects.

Among the recent proposals (also mentioned earlier) is Colorado Springs' and Aurora's unfinished Homestake project to export water from the Eagle River basin. These projects face a variety of legal and political obstacles. The following table lists the major proposed projects that would increase trans-basin diversions.

<u>Project</u>	<u>Source</u>	<u>Receiving Stream</u>	<u>Proponent</u>
Homestake alternatives	Colorado	Arkansas & South Platte	Co. Springs Aurora
Windy Gap Firming Project	Colorado	South Platte	Northern District
Denver Basin Conjunctive Use	Colorado	South Platte	Douglas County Water Authority Denver Water
Pueblo Reservoir Enlargement	Colorado	Arkansas	Southeastern District
Turquoise Reservoir Enlargement	Colorado	Arkansas	Southeastern District

THE LEGAL SALIENCE OF FOREIGN WATER

As discussed in Chapter Two, imported water is generally considered “foreign” water that can be used in its entirety, that is, to “extinction.” This policy not only provides tremendous flexibility to East Slope water importers, but vastly increases available supplies for municipal use, as return flows may be used repeatedly. The most notable exception to this “foreign water” policy involves the waters of the Colorado-Big Thompson (C-BT) Project, which are administered like “native” water, i.e., for single use.¹⁶⁷ Return flows accrue to the receiving stream (the South Platte system) and are available for use by others. While this policy may seem like an aberration, it really is not; it is yet another innovation of Colorado water law that was designed to gain the support of downstream users for the C-BT Project.¹⁶⁸ It also benefits upstream users located outside the Northern District, particularly municipalities.

To understand how this works, one needs to consider the interconnected nature of Front Range water supplies.¹⁶⁹ C-BT return flows help satisfy senior South Platte appropriators who would otherwise call out junior upstream rights, such as those on Clear Creek. If C-BT water were administered as foreign water, then C-BT users could completely consume the water and there would be no return flows available to help satisfy the senior native rights, prompting a call on the river. Thus, the administration of C-BT project water benefits Denver Water, for example, and other native users because C-BT return flows help satisfy senior appropriators who would otherwise call out more junior South Platte water rights.

¹⁶⁷ *Contract between the U.S. and the Northern Colorado Water Conservancy District providing for the Construction of the Colorado-Big Thompson Project*, Colorado, 5 Jul. 1938, at ¶19.

¹⁶⁸ Interview with Eric Wilkinson, Jul. 20, 1999.

¹⁶⁹ Interview with Lee Rozaklis, Jul. 20, 1999.

THE EVOLVING POLITICS OF TRANS-BASIN DIVERSIONS

A LEGACY OF BITTERNESS AND DISTRUST

Trans-basin diversions have often been a battlefield between East and West¹⁷⁰ in Colorado, largely due to real and potential negative impacts borne by the West Slope. The most obvious West Slope impacts of trans-basin diversions are associated with reduced stream flows. Since any return flows arise in the basin of use rather than the basin of origin, exported water is a complete loss to the basin of origin. Depending on the water rights involved, depletions may be either year-round or seasonal.

The result is a variety of impacts of an economic, environmental, and cultural nature.

Many policies seek to mitigate these negative impacts. Historically, the centerpiece of mitigation strategies has been “compensatory storage.” This term describes a practice in which East Slope interests, in “compensation” for trans-basin diversions, provide water projects designed to store spring runoff for use on the West Slope, typically for irrigation. This principle was incorporated into the Colorado-Big Thompson (C-BT) Project in 1937,¹⁷¹ and became a statutory

¹⁷⁰ Although the San Luis Valley is east of the Continental Divide, the valley is a periodic target for water exporters and shares many, perhaps most, of the West Slope’s attitudes towards the Front Range.

¹⁷¹ The Northern Colorado Water Conservancy District is one of the major trans-basin diverters in the state through the Colorado-Big Thompson (C-BT) project. Northern’s policy towards compensation of basins-of-origin has not changed in the 40 years since the project was completed. When the C-BT project was built, the West Slope was compensated

requirement in 1943 for all new projects undertaken by conservancy districts.¹⁷² The requirement does not extend to other trans-basin diverters, notably Denver Water, or to intra-basin transfers. This is a significant limitation.

Other protections for the West Slope are embedded in water law regimes and operational policies that minimize depletions during the irrigation season. Trans-basin rights are typically junior during the irrigation season but are relatively senior at other times. For junior water rights, depletions may only occur in average or

wet years when water can be diverted in priority and/or stored during spring run-off for later trans-basin delivery.

Although the West Slope often blames trans-basin diversions for low flows, trans-basin appropriators usually are not diverting when stream flows are the lowest.¹⁷³ Rather, it is West Slope ski areas and resort

communities that are diverting water during winter low flows.¹⁷⁴

Despite these and related efforts, trans-basin diversions remain highly controversial and

with compensatory storage at Green Mountain, and was paid for additional compensatory storage when Windy Gap was built. Northern does not perceive that it has any further compensatory responsibility. Interview with Lee Rozaklis, Jul. 20, 1999.

¹⁷² Colo. Rev. Stat. § 37-45-118(1)(b)(II) (1999).

¹⁷³ Interview with Rod Kuharich, Jun. 30, 1999. Exceptions are C-BT, and Denver Water’s Moffat and Dillon systems, which divert year round. Although these diversions rely on releases from replacement storage, they can contribute to locally significant low flows. Written comments of Lee Rozaklis, Jul. 2001.

¹⁷⁴ The growth of the West Slope recreation economy complicates the relationship with the East Slope on water matters. For example, proponents of West Slope recreational-based economies need to protect local supplies for resorts and environmental amenities, but also recognize that East Slope economic growth is key to a healthy customer base. Additionally, many trans-basin diversion facilities located on the West Slope, such as Dillon Reservoir, are themselves highly valuable recreational destinations.

unpopular on the West Slope.¹⁷⁵ Part of the reason that modern targets of trans-basin diversions view these proposals with such hostility is the legacy of bitterness and distrust arising from past trans-basin diversions in Colorado and elsewhere (e.g., California’s Owens Valley). Given the tremendous imbalance in political and economic power, West Slope interests have historically seen themselves as being at a strategic disadvantage in these intrastate water wars. Rather than participating in conceiving and designing trans-basin diversions, parties in the basin-of-origin have typically been relegated to fighting projects in water court, the primary forum in Colorado for the “determination of water rights, including the determination of the amount and priority of absolute and conditional rights, approval of changes in water rights, and plans for augmentation.”¹⁷⁶ Periodic legislative attempts to require consent to trans-basin diversions have so far faced impossible political odds in the state legislature.¹⁷⁷

“The Front Range and South Platte are the source of all of Colorado’s water supply problems.”

— JAMES S. LOCHHEAD, former Executive Director, Colorado Department of Natural Resources

“If the West Slope makes an agreement with the East Slope, we [the West Slope] are setting ourselves up to be stabbed in the back.”

— DAVID C. HALLFORD, former General Counsel, Colorado River Water Conservation District

A LEVELING OF THE PLAYING FIELD

In recent decades, opponents of trans-basin diversions have become remarkably effective in preventing new projects. Since Windy Gap came on line in 1985, no other significant trans-basin diversions have come to fruition, despite the efforts of water appropriators holding senior water rights. Several mechanisms have been used to thwart additional diversions. Two Forks, for example, was vetoed by the Environmental Protection Agency using its authority under the

Clean Water Act. Many other basin-of-origin victories have occurred in state court. One example involves Union Park Reservoir. This is an effort by Arapahoe County to divert Gunnison River flows to the South Platte Basin, a proposal stalled by litigation since 1986¹⁷⁸ and recently rejected by the Colorado Supreme Court for the second time.¹⁷⁹ A combination of public outcry and skilled litigation also derailed the plans of

AWDI (American Water Development, Inc.) to export water from aquifers underlying the Baca Ranch in the San Luis Valley to the growing cities of the Front Range and other western states.¹⁸⁰ The project died when the Colorado Supreme Court upheld the District Court’s dismissal of AWDI’s water rights application,¹⁸¹ although variations of the plan continue to

¹⁷⁵ Residents of the San Luis Valley and the Gunnison River Basin, for example, have recently attacked proposed trans-diversions as threatening local lifestyles, economies, and environmental quality.

¹⁷⁶ *FWS Land and Cattle Co. v. State Division of Wildlife*, 795 P.2d 837 (Colo. 1990).

¹⁷⁷ In 2001, for example, Senator Gigi Dennis offered an amendment to S.B. 148 that would have required county approval to move water from agriculture to urban uses outside of the county. The proposed amendment lost 27 to 8.

¹⁷⁸ *Application for Water Rights, Case No. 86CW226* (Dist. Ct., Water Div. No. 4, 1986).

¹⁷⁹ *Board of County Commissioners of Arapahoe County v. Crystal Creek Homeowner’s Association*, 14 P.3d 325 (Colo. 2000).

¹⁸⁰ Hughes, Jim, “Developers Find Water, Emotions Run Deep in Valley,” *The Denver Post*, Oct. 4, 1998, page 12H.

¹⁸¹ *American Water Development, Inc. v. City of Alamosa*, 874 P.2d 352, at 368 (Colo. 1994).

resurface.¹⁸² More recently in the Colorado Court of Appeals, Eagle County successfully defeated the Homestake II project, championed by Colorado Springs and Aurora, by denying local “1041” land use permits.¹⁸³

A NEW MODEL FOR TRANS-BASIN DIVERSIONS

Despite the changed legal and political environment, trans-basin diversions are likely to remain an important element of municipal water planning on the Colorado Front Range. As discussed later in Section III, trans-basin diversions are often the key element of proposed strategies to accommodate existing and projected growth in the Denver metropolitan area. It is likely that these future diversions will follow a somewhat different rubric than seen in the past.

One change is likely to be a renewed emphasis on modifying or more fully utilizing existing trans-basin rights and facilities, rather than initiating completely new projects. Trans-basin diversions in Colorado average more than 948,000 acre-feet per year,¹⁸⁴ yet the trans-basin

water rights legally allow annual diversions of substantially larger amounts. The return on the original investment of existing trans-basin diversions is very high when comparing project replacement costs with original project costs; similarly, the present worth of existing trans-basin diversions exceeds the project costs of new trans-basin diversions because of uncertainty whether the latter are possible.¹⁸⁵ This economic advantage encourages the full use of existing trans-basin projects.

Another likely change in the politics of trans-basin diversions is a decreased importance of compensatory storage as a deal-making currency; the transition of the West Slope from an agricultural economy to one based on recreation and environmental amenities suggests a reduced need for storage.¹⁸⁶ Many interests on the West Slope are also skeptical of additional compensatory storage because significant portions of existing compensatory reservoirs are now devoted to protecting endangered species rather than economic activities.¹⁸⁷

Several parties believe that other kinds of basin-of-origin protection or compensation must be developed to reflect the opportunity costs of losing water.¹⁸⁸ One possible alternate form of compensation is reserved water rights for future growth, an idea which was proposed in the legislature but whose time apparently has not

¹⁸² The conversion of the Great Sand Dunes National Monument into a National Park may end this controversy. The purchase of the Baca Ranch – the source of recent trans-basin diversion proposals – is a centerpiece of the legislation. P.L. 106-530, codified at 16 U.S.C.A. § 410hhh, at § 410hhh-6. Part of the ranch will be added to the new park, and the rest to the Rio Grande National Forest and Baca National Wildlife Refuge. This expansion protects the park’s watershed, and prohibits withdrawal of the valley’s groundwater for trans-basin diversions. 16 U.S.C.A. § 410hhh-7(e).

¹⁸³ *City of Colorado Springs v. Board of County Commissioners of Eagle County*, 895 P.2d 1105 (Colo. App. 1994). The Colorado and U.S. Supreme Courts subsequently denied certification of the case. *City of Colorado Springs v. Board of County Commissioners of Eagle County*, 516 U.S. 1008 (1995).

¹⁸⁴ This figure is compiled from the following fact sheets: *Gunnison River Basin Facts (Draft)*, Colorado Division of Water Resources, Jan. 2000, page 3; *Yampa and White River Basin Facts (Draft)*, Colorado Division of Water Resources, Jan. 2000, page 3; *Colorado River Mainstem Basin Facts (Draft)*, Colorado Division of Water Resources, Jan. 2000, page 3; *Dolores and San Juan River Basin Facts (Draft)*,

Colorado Division of Water Resources, Jan. 2000, page 3; *Rio Grande River Basin Facts (Draft)*, Colorado Division of Water Resources, Jan. 2000, page 3; *South Platte / Republican River Basin Facts (Draft)*, Colorado Division of Water Resources, Jan. 2000, page 3. *North Platte River Basin Facts (Draft)*, Colorado Division of Water Resources, Sept. 2000, page 3.

¹⁸⁵ Interview with Robert E. Brogden, Sept. 8, 1999.

¹⁸⁶ Interview with David C. Hallford, Jul. 1, 1999. A reduced need for storage should not be confused for a reduced need for water. To the contrary, many headwaters communities have a great need to expand water supplies, or to obtain supplies of higher seniority.

¹⁸⁷ Interview with Greg E. Walcher, Aug. 21, 1997.

¹⁸⁸ Interview with J. David Holm, Jul. 14, 1999. Comments of Mark Koleber, Aug. 27, 1997 and interview of Jul. 15, 1999.

arrived.¹⁸⁹ Another idea is the creation of a permanent trust fund to benefit basin-of-origin residents, like Alaska has created from oil and gas revenue, funded by a tax on water exports.¹⁹⁰ A process-based option is to require a NEPA-style impact analysis for trans-basin diversions.¹⁹¹ Identifying the impacts of proposed diversions could highlight the substantive issues and potential mitigation options for consideration by the decision makers, much as an environmental impact statement functions in the context of federal agency action. Providers are understandably leery of any basin-of-origin protection that is not governed by a set of rules that clearly establishes requirements up front, rather than on an ad hoc, case-by-case basis.¹⁹²

In practice, several creative strategies have already emerged that promise win-win outcomes for both the East and West slopes. Perhaps the pre-eminent example of East Slope-West Slope cooperation is Wolford Mountain Reservoir, which solved a problem facing Denver Water and allowed the Colorado River Water Conservation District to complete a storage project to serve West Slope needs.¹⁹³ Prior to the demise of Two Forks, Denver entered into a 25-year lease for water from a reservoir the River District planned to construct on Muddy Creek, the leased water to tide Denver over until Two Forks came on line. But with EPA's veto of Two Forks, that premise went out the window. Concurrently, the River District realized it could not build the reservoir it wanted with the \$10 million compensatory storage payment made by Northern for the Windy Gap Project and Denver's lease fees. In a lengthy telephone call, Chips Barry, Manager of Denver Water, and Rollie Fischer, Secretary-

Engineer of the River District, struck a deal. Denver Water agreed to help finance the reservoir. In exchange, the River District agreed to give Denver an ownership interest rather than a leasehold interest in the yield of the reservoir. After further negotiations and adding some details involving supplies for the Upper Fraser River basin, Denver won 40 percent of the reservoir's yield, and the River District was able to construct Wolford Mountain Reservoir. While not strictly a trans-basin diversion project—the water is used by exchange—many consider Wolford to be a model for future trans-basin diversions.¹⁹⁴

“There has to be something in it for the basin-of-origin, and that has to be the development of compact waters for the West Slope.”

— ROD KUCHARICH, former Government Affairs Manager, Colorado Springs Utilities

The Clinton Gulch Reservoir Project provides another example of intrastate cooperation.¹⁹⁵ The deal struck between Denver Water and West Slope interests let Denver Water obtain permanent storage capacity in Wolford Reservoir.¹⁹⁶ The project provides headwaters communities with a little needed water,¹⁹⁷ and buys the region more time to deal with larger trans-basin diversion issues.¹⁹⁸ Most interesting, the project uses an ingenious exchange that allows ski areas to use out-of-priority diversions for snowmaking. By agreement, the ski areas—Keystone, Breckenridge, and Copper Mountain—

¹⁸⁹ Interview with Justice Gregory J. Hobbs, Jr., Jun. 25, 1999.

¹⁹⁰ Interview with J. David Holm, Jul. 14, 1999. Alaska Statutes §§ 37.13.010(a), 37.13.145(b), 43.23.045, and 43.23.025(a)(1)(A) (Lexis 2000).

¹⁹¹ Written comments of David H. Getches, Jul. 2001.

¹⁹² Comments of Mark Koleber, Aug. 27, 1997.

¹⁹³ Electronic-mail communication from Hamlet J. “Chips” Barry, III, Jul. 26, 2001.

¹⁹⁴ Electronic-mail communication from Hamlet J. “Chips” Barry, III, Jul. 26, 2001. Electronic-mail communication with Richard D. MacRavey, Jul. 30, 2001.

¹⁹⁵ Except where otherwise noted, this discussion is based on an interview with Glenn E. Porzak, Aug. 30, 1999.

¹⁹⁶ Interview with Glenn E. Porzak, Aug. 30, 1999.

Electronic-mail communication from Ed Pokorney, Aug. 20, 2001.

¹⁹⁷ The arrangement provides approximately 1,200 acre-feet to Summit and Grand County communities and ski areas.

¹⁹⁸ Interview with Lee Rozaklis, Jul. 20, 1999.

take water from nearby streams that would otherwise flow into Denver Water's Dillon Reservoir, and use it for snowmaking. In the spring, the snow melts and flows to the reservoir, as it would have six months earlier. The agreement assumes 20 percent evaporation losses from snowmaking, and the ski areas repay Denver from the water stored in Clinton Gulch Reservoir.

Additional examples come from the Eagle River basin, where Eagle County successfully blocked the proposed Homestake II project. Realizing that the victory in court would not eliminate the long-term pressure for trans-basin diversions, Eagle County Commissioner Dick Gustafson took the initiative, contacted the interested parties, and found that others wanted to discuss water development in a non-adversarial setting.¹⁹⁹ The result was establishment of the Eagle River Assembly in 1993.²⁰⁰ Other significant events in the Eagle River basin include development of the Eagle River Watershed Plan by the Eagle River Watershed Committee, and the adoption of a memorandum of understanding (MOU) among four key water rights holders in the upper basin.²⁰¹

The MOU calls for the West Slope to receive water to satisfy the Colorado Water Conservation Board's senior minimum stream flows, allowing resort communities, ski areas and others to

¹⁹⁹ Interview with Douglas Kemper, Jun. 23, 1999. Mr. Kemper, Manager of Water Resources for the City of Aurora, credits the fact that news reporters and water lawyers were not allowed at the discussion table as the reason an agreement was reached.

²⁰⁰ The Assembly includes the Colorado River Water Conservation District, Eagle County, Town of Avon, Town of Eagle, Town of Gypsum, Town of Minturn, Town of Red Cliff, Town of Vail, Upper Eagle Regional Water Authority, Upper Eagle Valley Consolidated Sanitation District, Vail Associates, Inc., Vail Valley Consolidated Water District, Cyprus Climax Metals Company, City of Aurora, City of Colorado Springs, Denver Water, and the Pueblo Board of Water Works.

²⁰¹ Cities of Aurora and Colorado Springs, Colorado River Water Conservation District, Climax Molybdenum Company, and the Vail Consortium, *Memorandum of Understanding* (1997).

exercise their junior water rights.²⁰² The cities will export their share to the East Slope.²⁰³ The Eagle Park Project, a reclaimed molybdenum tailings pond, is the first of a three phase project between the Vail area, the Colorado River Water Conservation District, the City of Colorado Springs and the City of Aurora. Eagle Park Reservoir currently supplies 2,013 acre-feet to Eagle County ski areas, communities, and Eagle River minimum stream flows.²⁰⁴ The second phase will develop 2,000 to 4,000 acre-feet for the same users while the third phase will expand the water yield up to 30,000 acre-feet with the West Slope receiving up to 10,000 acre-feet.²⁰⁵ Four major alternatives are under study.

One novel approach to compensating the basins-of-origin can be seen in the City of Aurora's purchase of ranches and water rights in Lake County.²⁰⁶ There is little irrigated land in Lake County, 75 percent of which is owned by the federal government. In discussions with Aurora, Lake County identified public water needs for the local golf course, the local ski area (Ski Cooper), and supplies for future population growth. Consequently, Aurora reserved water from one ranch purchase to provide for these needs. The city also cooperated with the county, U.S. Forest

²⁰² Interview with Robert Weaver, Aug. 11, 1999. Interview with Glenn E. Porzak, Aug. 30, 1999.

²⁰³ Interview with Douglas Kemper, Jun. 23, 1999.

²⁰⁴ In this phase, the Eagle River Regional Water Authority, Colorado River Water Conservation District, Summit County, City of Aurora, and City of Colorado Springs are exchanging agricultural consumptive use credits, snowmaking return flows, and Homestake II water rights to the reservoir. The project will supply 1,100 acre-feet to the Vail consortium, with the Colorado River Water Conservation District marketing the balance. Cities of Aurora and Colorado Springs, Colorado River Water Conservation District, Climax Molybdenum Company, and the Vail Consortium, *Memorandum of Understanding* (1997). The River District's offering is almost entirely sold out due in part to its strategy to improve yields by blending Eagle Park Project water with Wolford Reservoir water. Interview with Glenn E. Porzak, Aug. 30, 1999.

²⁰⁵ Cities of Aurora and Colorado Springs, Colorado River Water Conservation District, Climax Molybdenum Company, and the Vail Consortium, *Memorandum of Understanding* (1997).

²⁰⁶ Interview with Douglas Kemper, Jun. 23, 1999.

Service, and Colorado State Parks to provide new public fishing access to 5 ½ miles of the Arkansas River, and gave the county an option to purchase that land. Thus, Lake County received compensatory water to supply its future economic growth, plus an asset (fishing access) with current economic value.

The reason arrangements such as these are attractive to West Slope interests—especially ski resorts and communities in Summit, Eagle and Grand Counties—is water rights seniority. Water rights for mining, trans-basin diversions, and minimum stream flows²⁰⁷ are often senior to those for snow-making, which was not seriously pursued at most resorts until after 1977, and recent West Slope population growth. Because of the scarcity of water physically and legally available in headwater areas, cooperative agreements involving senior trans-basin water rights often offer the most promise for meeting future headwater areas growth.

“[The rhetoric is] ‘every last drop’ versus ‘not one drop.’ The challenge is to strike a balance ... to find a way to balance needs of the Front Range and basins-of-origin.”

— DAVID C. HALLFORD, former General Counsel, Colorado River Water Conservation District

THE PROMISE OF EASTERN SLOPE EFFICIENCY

One additional strategy to limit the negative current and growth-induced impacts of trans-basin diversions on the basin-of-origin is to require diverters to use water efficiently. This not only minimizes the need for such diversions,

²⁰⁷ These rights are held by the Colorado Water Conservation Board (CWCB), as discussed in Chapter Four.

but also is an acknowledgement of the important value placed on these resources by the basin-of-origin. The goal of efficient use of trans-basin water is articulated in the Blue River decree, which requires Denver Water to “exercise due diligence” to reuse water imported from the Colorado River to meet its municipal needs, “within legal limitations and subject to economic feasibility.”²⁰⁸

In most instances, however, Colorado water law does not encourage the efficient use of trans-basin water. While appropriators have the right to use imported water to extinction, they generally have no legal obligation to do so.²⁰⁹ Additionally, since other water users cannot establish a legal right to return flows on foreign water, normal rules against waste²¹⁰ are largely inapplicable. To the extent that junior water users in the receiving basin can take advantage of return flows, this raises a troubling equity issue as these users are essentially served at the expense of appropriators (who are possibly more senior) in the basin-of-origin. Further discouraging efficient use are the rules of conditional trans-basin water rights, which become absolute—and thus more secure and valuable—as soon as they are exercised. This provides a powerful incentive for trans-basin appropriators to maximize their out-of-basin diversions and use trans-basin conditional rights in preference to local perfected rights.

Ironically, users of mainstem Colorado River flows also have incentives discouraging efficient use, as inefficient West Slope use has the effect of limiting trans-basin diversions.²¹¹ This situation arises because trans-basin diversions are junior to historic mainstem uses on the lower river, and consequently can be interrupted by a

²⁰⁸ *In the Matter of the Adjudication of Priorities of Water Rights in Water District No. 36 for Purposes of Irrigation*, Consolidated Cases, Civil No. 5016 and 5017, Stipulation of Oct. 5, paragraphs 4(e)–(f) (U.S. Dist. Ct. for Colo. 1955).

²⁰⁹ *Thornton v. Bijou*, 926 P.2d 1, at 72 (Colo. 1996).

²¹⁰ Colo. Const. Art. XVI, § 6 (2000).

²¹¹ Interview with Robert E. Brogden, Sept. 8, 1999.

call on the river. Thus, in the interest of limiting trans-basin exports, mainstem users have an incentive to use water inefficiently, thereby maximizing the calls. Any water saved through improved mainstem efficiency would only facilitate the export of water that would be lost to the basin in its entirety. Rather than facilitating so-called “water grabs” by “greedy” East Slope users, many West Slope residents prefer to see unused Colorado River water flow out of the state (inevitably for use by Southern California), at least for the time being.

Energy efficiency, more than water use efficiency, may actually provide a greater deterrent to excessive trans-basin diversions. At least that is the logic behind a strategy of the Colorado River Water Conservation District that involves steering East Slope interests toward projects that require pumping water (rather than gravity flow).²¹² Projects like Windy Gap, or the proposed Ruedi Reservoir pump-back, incur high marginal costs for additional trans-basin diversions because energy, unlike gravity, is not free. In these projects, pumping costs are an indirect mechanism for forcing trans-basin diverters to consider efficiency, and consequently to pump less water from the West Slope.²¹³

²¹² Interview with Eric Kuhn, Jul. 1, 1999.

²¹³ Interview with Eric Kuhn, Jul. 1, 1999. Interview with David C. Hallford, Jul. 1, 1999.

CHAPTER FOUR: ENVIRONMENTAL PROTECTION

The desire to protect and restore environmental resources is emerging as a core value of the New West.²¹⁴ Growth can, and does, have both positive and negative impacts on environmental protection. While it is often fair to assume that growth will further deplete streamflows, the reality is often much more complex. For example, Front Range growth reliant on trans-basin diversions will likely decrease headwater flows in the Colorado River, but increase the amount of water flowing downstream in the South Platte River as a result of increased return flows (as demonstrated by river modeling). Municipal water use can also change the pattern of return flows.²¹⁵ Similarly, increasing water use efficiency intuitively seems like an environmental plus, but may actually decrease flows in areas dependent upon return flows.²¹⁶ Furthermore, urbanization of agricultural areas may mean more water in the rivers because municipal and industrial water use is generally not as consumptive as agricultural use.²¹⁷ Generalizations about growth and water in Colorado, therefore, are difficult to support, especially as they relate to environmental protection.

²¹⁴ Bates, Sarah F. and David H. Getches, Lawrence J. MacDonnell, Charles F. Wilkinson, *Searching out the Headwaters*, Washington D.C: Island Press, 1993, pages 42 to 47.

²¹⁵ For example, stream modeling of Boulder Creek below Boulder shows a decrease from virgin flow conditions during May and June and an increase in flow rates during the remainder of the year due to Boulder's water diversion activities and return flows. Written comments of Carol Ellinghouse, Jul. 2001.

²¹⁶ Interview with Eric Wilkinson, Jul. 20, 1999. Reduced flows probably also mean lower water quality because water will be used more intensely, reducing the dilution effects of high-quality natural flows.

²¹⁷ Interview with Eric Kuhn, Jul. 1, 1999. This may also improve water quality by reducing agricultural runoff that often includes agricultural chemicals and wastes.

Water managers are under increasing pressure to protect and enhance biodiversity and recreational opportunities, goals that typically require the maintenance of instream flows. However, the protection of instream flows and the environmental restoration of systems impacted by dams, diversions, and related activities, have traditionally not been high priorities in western water law and policy. Both the fish and the fisherman, therefore, have reason to find fault with the traditional construction of Colorado water law. This situation is gradually changing. For example, in 1973, the Colorado legislature adopted a minimum stream flow program to “preserve the natural environment to a reasonable degree.”²¹⁸ Of even greater salience has been federal environmental legislation, including the Wilderness Act²¹⁹ of 1964, the National Environmental Policy Act²²⁰ of 1969, the Clean Water Act²²¹ of 1972, and of particular importance, the Endangered Species Act²²² of 1973.

While the practical impact of these statutes continues to grow, it is unlikely that they alone will lead to comprehensive stream system restoration. The focus of Colorado's minimum stream flow program is based on preserving, not restoring, the natural environment—particularly, cold water trout habitat. This is an important, but relatively narrow, mandate. Similarly, the focus of the Endangered Species Act (ESA) is preventing the extinction of the species, which may or may not involve the restoration of natural

²¹⁸ Colo. Rev. Stat. § 37-92-103(4) (2000).

²¹⁹ 16 U.S.C. § 1131 et seq (2000).

²²⁰ 42 U.S.C. § 4321 et seq (2000).

²²¹ 33 U.S.C. § 1251 et seq (2000).

²²² 16 U.S.C. § 1531 et seq (2000).

environmental conditions.²²³ At most, the ESA will address stream segments that provide critical habitat for species, but even then the ESA will only require restoration sufficient to meet the needs of the endangered species, as contrasted to the broader goal of restoring natural streams.

PROVIDING INSTREAM FLOWS UNDER COLORADO WATER LAW

It is increasingly argued that western water law needs to more fully recognize the values of instream flows, especially as they contribute to healthy riparian areas and fish stocks.²²⁴ In principle, this could take the form of a minimum flow entitlement for each stream.²²⁵ While such a program would offer tremendous protection of environmental values, it would be very difficult to implement in streams that are already fully appropriated, or in states that do not recognize such restrictions on appropriation. An approach that is more practical allows state agencies and/or individuals to obtain and devote water rights to instream environmental purposes, operating under the rules of prior appropriation.²²⁶ That is the approach taken in Colorado.

²²³ It may perversely require the preservation of non-natural conditions that are important to a species survival, e.g., gravel pits along the Colorado River that provide habitat for endangered fish. For an example review Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River* (1999).

²²⁴ Tarlock, Dan, Sarah Van de Wetering, Lawrence MacDonnell, Douglas Kenney, Jo Clark, Curtis Brown, Charlene Dougherty, and Donald Glaser, *Water in the West: Challenge for the Next Century*, Report of the Western Water Policy Review Advisory Commission, Jun. 1998.

²²⁵ This idea was presented in speeches by then-Secretary of the Interior Bruce Babbitt and author William DeBuys at an event on the University of Colorado-Boulder campus, Jun. 8, 1999.

²²⁶ Gillilan, David M. and Thomas C. Brown, *Instream Flow Protection: Seeking a Balance in Western Water Use*, Washington, D.C.: Island Press, 1997, pages 143-44.

COLORADO'S MINIMUM STREAM FLOW PROGRAM

State legislation allows the Colorado Water Conservation Board (CWCB) to acquire water for minimum stream flows to protect the natural environment.²²⁷ The CWCB can acquire rights through appropriation, purchase,²²⁸ or donation.²²⁹ This right is exclusive to the CWCB,²³⁰ and is limited to environmental protection. Recreational and piscatorial (i.e., fishing-related) uses are not yet included in CWCB's instream flow protection,²³¹ although in practice the CWCB minimum stream flows are administered almost exclusively for fisheries. These are water rights in essential respects, and are subject to the same legal and administrative rules as other water rights.²³² These rights are, however, subordinate to all undecreed uses existing at the time of appropriation, a restriction not placed on other new appropriations.²³³

²²⁷ Colo. Rev. Stat. §§ 37-92-102(3), 37-92-103(3), 37-92-305(9) (2000).

²²⁸ The CWCB has never attempted to purchase water rights for minimum stream flow. The primary reason is that the CWCB has not developed a mechanism to determine where it needs additional water. The CWCB asked the state lottery (GOCO) to fund a "needs assessment" to identify additional water needs in 2001, but the application was deferred; the CWCB may try again. While the CWCB is aware that GOCO has substantial funds available for conservation purposes, it has not looked in detail at that potential funding source, nor at alternatives. Telephone interview with Anne Janicki, Apr. 21, 2001. Colo. Const. Art. 27 § 5 (2000).

²²⁹ Colo. Rev. Stat. § 37-92-102(3) (2000).

²³⁰ *City of Thornton v. City of Fort Collins*, 830 P.2d 915, at 930 (Colo. 1992). Contrary to this see *Board of County Commissioners of County of Arapahoe v. E.C. Collard*, 827 P.2d 546 (Colo. 1992) (upholding authority of Water Court to issue private instream flow right on jurisdictional grounds prior to the 1987 statutory amendments).

²³¹ The state minimum stream flow program is broadly understood and widely reviewed. For example, see Steven J. Shupe, "The Legal Evolution of Colorado's Instream Flow Program," 17 *Colorado Lawyer* 861 (1988); Jane E. Lien, "Protection of Instream Flow: The *Aspen Wilderness Workshop* Decision," 24 *Colorado Lawyer* 2577 (1995).

²³² Colo. Rev. Stat. § 37-92-102(3) (2000).

²³³ Colo. Rev. Stat. §§ 37-92-102(3)(b) (2000). In addition, conditional rights, which are normally freely marketable,

The CWCB has acquired water rights for minimum stream flow protection on more than 8,000 miles of streams and 486 natural lakes.²³⁴ The effectiveness of these rights is case specific, and is largely influenced by the seniority of each right. In headwater areas, junior rights are often sufficient to meet instream flow goals. For downstream segments, however, only existing senior water rights may be adequate to ensure instream flows in dry years. Actual stream flows in a drought will inevitably generate public outrage stemming from disappointed expectations.²³⁵ While the CWCB can accept donations of senior water rights (except conditional rights), it is cautious about these donations because of past controversy, and the cost given other agency priorities.²³⁶ The CWCB could also purchase senior rights, but has been reluctant to ask the legislature for funding for this purpose.²³⁷

The problem of seniority, while serious, is not fatal to the program. An example of matching junior CWCB and senior rights is found on Boulder Creek. In a series of agreements and deeds, the City of Boulder conveyed the use of senior water rights to the CWCB to maintain minimum stream flows in Boulder Creek.²³⁸

Boulder agreed to use its senior rights to make up any deficiency in the yield of the CWCB's junior rights and the minimum stream flows.²³⁹ Boulder's senior rights thus guarantee the yield of the CWCB's rights.

*“Growth drives changes
in the way in which
water is allocated,
producing
consequential effects on
the environment and
economy of the state.”*
— DAVID W. ROBBINS, Hill
& Robbins

This issue of seniority can have the unintended effect of forcing water providers to race with CWCB to acquire unappropriated waters. This can be seen, for example, by events on Tennessee Creek, where the CWCB filed for minimum stream flow rights²⁴⁰ on a stream where the City of Pueblo had identified a potential (but later abandoned)

reservoir site, and had already acquired land towards this end. The CWCB filing prompted Pueblo to file immediately for storage rights to establish a priority date equal to the instream flow right.²⁴¹ Hereafter, the city will have to meet diligence requirements to maintain its rights, which will accelerate this project's development. This outcome is at odds with efficient development and use of Colorado's water resources.

cannot be transferred to instream flow use. Colo. Rev. Stat. §§ 37-92-102(3)(c.5) (2000).

²³⁴ “Instream Colorado,” *Colorado Water Conservation Board*, Vol. 2, Issue 4, Oct. 1999, page 4.

²³⁵ Interview with Fred Anderson, Jul. 19, 1999.

²³⁶ Interview with David L. Harrison, Oct. 4, 1999. In practice, the cost of donations is born by the donor, which explains why there have been so few donations under the program. Written comments of Melinda Kassen, Jul. 17, 2001.

²³⁷ Written comments of Melinda Kassen, Jul. 17, 2001.

²³⁸ *Agreement* (appears of record in the office of the Boulder County Clerk and Recorder under Reception No. 01060612) Jul. 20, 1990, *First Addendum* (appears of record in the office of the Boulder County Clerk and Recorder under Reception No. 01078866) December 14, 1990, and *Second Addendum* (appears of record in the office of the Boulder County Clerk and Recorder under Reception No. 01187397) May 26, 1992. See also: *In the Matter of the Application for*

Water Rights of the Colorado Water Conservation Board on behalf of the People of the State of Colorado in Boulder County, Case No. W-7636-74 (Dist. Ct., Water Div. No. 1. 1974).

²³⁹ Through the city, for example, Boulder Creek's minimum stream flow is 15 cfs. *In the Matter of the Application for Water Rights of the Colorado Water Conservation Board on behalf of the People of the State of Colorado in Boulder County*, Case No. W-7636-74 (Dist. Ct., Water Div. No. 1. 1974).

²⁴⁰ *In the Matter of the Application of the Colorado River Water Conservation Board for Water Rights on behalf of [the] People of the State of Colorado in Tennessee Creek, a Natural Stream, in the Watershed of the Arkansas River, in Lake County, Colorado*. Case Nos. 98CW145, 98CW146, and 98CW151, (Dist. Ct, Water Div. No. 2, 1998).

²⁴¹ Interview with Roger L. “Bud” O’Hara, Jun. 30, 1999.

OTHER STRATEGIES FOR PROVIDING INSTREAM FLOWS

In addition to appropriations, purchases, and donations, some states are considering other mechanisms for obtaining instream water rights for environmental protection. One of the more ambitious approaches is found in Oregon, where 25 percent of conserved water reverts to the state where it can potentially be used to maintain or enhance flows for fish and wildlife protection.²⁴² Washington State also has an innovative program that uses financial incentives to conserve water that is then managed by the state to maintain or enhance stream flows. No similar program exists in Colorado. In fact, Colorado does not have a saved water statute, but could adopt a similar program if it decides to reward increased efficiency by awarding the rights to the saved water (or a percentage thereof) to the appropriator. This idea, however, is generally viewed in Colorado as inconsistent with the prior appropriation doctrine and constitutional prohibitions on takings because of expanded use and injury concerns.²⁴³ “Saved” water, however, is often leakage from inefficient delivery methods that seeps back to the stream and maintains stream flows before satisfying downstream appropriators. Awarding “saved” water to the original appropriator would dry up return flows and increase the impact on downstream diverters.²⁴⁴

“We need to build some reservoirs, but we must take care of the environmental challenges first.”

— BUFORD RICE, former Executive Director, Colorado Farm Bureau

²⁴² Or. Rev. Stat. § 537.455 (1999).

²⁴³ Interview with Justice Gregory J. Hobbs, Jr., Jun. 25, 1999. This issue is revisited in Chapter Nine.

²⁴⁴ Written comments of Carol Ellinghouse, Jul. 2001.

A more established way in Colorado to ensure instream flows providing environmental benefits is through the actions of private or local governments. Several court cases in Colorado establish that instream flow rights can be granted for broader purposes and greater flows than the CWCB could appropriate using its limited authority.²⁴⁵ For example, through construction of facilities such as boat chutes or habitat improvements,²⁴⁶ parties can acquire instream flows for purposes including recreational, piscatorial, fishery, and wildlife uses.²⁴⁷ The Colorado legislature recently recognized such “recreational in-channel diversions.”²⁴⁸ However, Melinda Kassen of Trout Unlimited persuasively argues that this change is a limitation rather than an expansion because it restricted recreational appropriations to local governments, and established a special review procedure that can require the Colorado Water Conservation Board to make recommendations to water court.²⁴⁹

Reserved water rights, and bypass flows, are two mechanisms that the federal government has employed to secure instream flows for federal

²⁴⁵ *City of Thornton v. City of Fort Collins*, 830 P.2d 915 (Colo. 1992) (instream flow rights were granted for boating purposes); *Board of County Commissioners of Arapahoe County v. Upper Gunnison River Water Conservancy District*, 838 P.2d 840 (Colo. 1992) (instream flow rights were granted for the purposes of an instream fishery and recreational uses).

²⁴⁶ Under Colorado water law, appropriators must generally construct something in the stream that controls stream flow to obtain a valid water right.

²⁴⁷ *City of Thornton v. City of Fort Collins*, 830 P.2d 915 (Colo. 1992). The Water Court recently applied the *Fort Collins* case to grant the City of Golden’s application for 1,000 cfs for its white water course. *Concerning the Application of Water Rights of the City of Golden*, Case No. 98CW448 (Dist. Court, Water Div. No. 1, 2001). The CWCB, however, has appealed the decision because it “would preclude all future development upstream . . . and inhibit future water exchanges and transfers.” Colorado Water Conservation Board, “State Water Policy and Planning Board Appeals Water Use Decision,” press release, Aug. 1, 2001.

²⁴⁸ S.B. 01-216, 63rd Colo. Gen. Assembly, 1st Regular Session (2001).

²⁴⁹ Written comments of Melinda Kassen, Jul. 17, 2001.

purposes with limited success.²⁵⁰ Following extensive litigation, the federal government has resigned itself to asserting its reserved water rights claims in state court.²⁵¹ While Colorado courts have regularly rejected claims for instream flows,²⁵² a recent success is found in the Rio Grande basin where the State of Colorado, the United States, and local water users settled claims for instream flows in the national forests.²⁵³ In the early 1990s, the Forest Service attempted, largely unsuccessfully, to condition permit renewals for water facilities on federal lands to require instream flows to protect aquatic habitat.²⁵⁴ The effectiveness of such federal assertions is highly dependant upon the effective priority date of the federal right.²⁵⁵ Colorado Attorney General Ken Salazar argues that the federal Land and Water Conservation Fund should be used to acquire water for instream flow protection for federal lands.²⁵⁶

Contracts provide perhaps the most flexible means to maintain instream flows. Particularly effective are contracts to deliver stored water, which can achieve results that are indistinguishable from a CWCB minimum stream flow. There are also many forms of leases, including dry-year option agreements,

interruptible supply contracts, and lease-backs, that can be used to maintain instream flows in situations where water can be leased and delivered to the segment of interest. Forbearance agreements²⁵⁷ are another useful tool, particularly in simple situations where a senior right controls the flow. Ditch companies have broad authority to control the use of their water rights, and this authority could be used to maintain flows.

Other water law approaches are more limited, but useful in specific situations. For example, by exchanging water from one storage location to another, flows can sometimes be augmented in targeted stream segments.²⁵⁸ Additionally, subordination agreements,²⁵⁹ analogous to forbearance agreements, can yield instream flows, particularly where a large senior right is controlling and there are no intervening juniors on the target segment. More generally, irrigation return flows can provide water to support instream uses in short segments adjacent to irrigated land.

Property law concepts can provide additional options for providing instream flows. Conservation easements are the most widely used, but their enforceability on water rights is not settled. Similarly, real covenants have been employed to prevent the development of water (and thus maintain stream flows), but raise questions of enforceability because the common law disfavors negative easements in gross. Alternatively, equitable servitudes offer a way for multiple parties to use the same water rights, and could potentially be used to maintain instream flows.

²⁵⁰ Weiss, Wendy, "The Federal Government's Pursuit of Instream Flow Water Rights," 2 *University of Denver Water Law Review* 151, at 151 (1998).

²⁵¹ Weiss, Wendy, "The Federal Government's Pursuit of Instream Flow Water Rights," 2 *University of Denver Water Law Review* 151, at 155 (1998).

²⁵² For example, federal claims for instream flows in the Arapahoe, Grand Mesa, Gunnison, Manti-La Sal, Route, Uncompahgre and White River National Forests and Dinosaur National Park were rejected in *United States v. City and County of Denver*, 656 P.2d 1 (Colo. 1982).

²⁵³ The settlement is discussed in Chapter Two, The Uneasy Coexistence of State and Federal Law.

²⁵⁴ Neuman, Janet C. and Michael C. Blumm, "Water for National Forests: The Bypass Flow Report and the Great Divide in Western Water Law," 18 *Stanford Environmental Law Journal* 3, at 4 (1999).

²⁵⁵ Gillilan, David M., "Will There be Water for the National Forests," 69 *University of Colorado Law Review* 551, at 553 (1998).

²⁵⁶ Salazar, Ken, "Buying Water Rights for Instream Flows – An Opportunity to Resolve Environmental Conflicts," *Colorado Water Rights*, Spring 2001, page 1.

²⁵⁷ A forbearance agreement is one in which the holder of an otherwise senior water right agrees not to enforce that priority against a junior water right.

²⁵⁸ This is an approach used as part of the Upper Colorado River Fish Recovery Program.

²⁵⁹ A subordination agreement is one in which the holder of an otherwise senior water right consents to stand in order of priority behind another holding a junior water right.

The concept behind a water trust is to apply the tools of the land trust movement to the acquisition of water.²⁶⁰ In short, a water trust simply buys water to protect it. A broad-based group is pursuing the creation of a Colorado Water Trust.²⁶¹ The trust would augment the work of the CWCB, and enhance the water-related values of land trusts.

THE SPECIAL CHALLENGE OF RECREATIONAL DEMANDS

State agencies lack the authority to appropriate water for recreational uses.²⁶² However, agencies like the Division of Wildlife and Division of Parks can acquire existing water rights or contract with others for water for recreational purposes, such as fishing and boating.²⁶³ While arrangements such as these are valuable, they are limited. Consequently, the state remains highly dependent on wet years and the cooperation of non-state water rights owners to provide flows for recreational uses. Given the importance of

recreation to the state's economy, this may not be a sound situation for the long-term.²⁶⁴

There are at least two good examples of voluntary actions to deliver water to support recreational uses. The first is the conveyance of water from the upper Arkansas River reservoirs (Turquoise Lake, Twin Lakes, Clear Creek) downstream on the Arkansas to Pueblo Reservoir, which is managed to meet a variety of instream flow objectives.²⁶⁵ One of those objectives is rafting; the Upper Arkansas River has more commercial rafting than any other stream in the United States. While releases are governed by the overall legal constraints of water law and contractual requirements, they also follow the voluntary annual flow agreement between the Bureau of Reclamation and the Colorado Department of Natural Resources.

The second example is the flow of the South Platte River through Denver, which is enhanced by an exchange agreement between Denver Water and the Farmers Reservoir and Irrigation Company.²⁶⁶ The purpose of the exchange is to maintain flows through Denver during average and above average runoff years at or above 150 cfs (cubic feet per second) between May 16 and September 15. When Denver Water expects the flow in the South Platte to fall below 150 cfs, it may release water from upstream storage for diversion downstream at the Burlington Ditch headgate for delivery to Barr Lake. This water is

²⁶⁰ Neuman, Janet C. and Cheyenne Chapman, "Wading into the Water Market: The First Five Years of the Oregon Water Trust," 14 *Journal of Environmental Law and Litigation* 135, at 139 (1999).

²⁶¹ Written comments of Melinda Kassen, Jul. 17, 2001.

²⁶² The CWCB's authority for minimum stream flows is limited to preserving the natural environment.

²⁶³ Colo. Rev. Stat. § 33-1-105(1)(a), § 33-10-107(1)(a) (2000). For example, the Bureau of Reclamation and Southeastern Colorado Water Conservancy District implement an annual flow program recommended by the Colorado Department of Natural Resources for fisheries and rafting in the Upper Arkansas River Basin. Flow recommendations are as high as 400 cfs, and depend on spawning flows. Letter from Greg E. Walcher, Executive Director, Colo. Dept. of Natural Resources, to Brian Person, Eastern Colorado Area Office, Bureau of Reclamation, Apr. 9, 2001. In addition, the Division of Wildlife entered into a 12-year option agreement with Pueblo West for Twin Lakes water for delivery to John Martin Reservoir on the lower Arkansas River. Option Agreement dated Nov. 1, 1992 between [Colorado] Department of Natural Resources and Pueblo West Metropolitan District. The Division of Wildlife has exercised this option once, in 1993, for 1572.75 acre-feet. Interview with Grady McNeill, Apr. 6, 2001. Letter from Rich Hays, Pueblo West Metropolitan District, to Grady McNeill, Jun. 15, 1993.

²⁶⁴ It might be wise to expand the CWCB's authority for minimum stream flows to include recreational uses, perhaps limited to economically significant segments like Brown's Canyon on the Arkansas River. Expanding the CWCB's authority to include recreational and in-channel water use was considered during in 2001, although the legislation that was adopted only authorized local governments to make recreational appropriations. S.B. 01-216. 63rd Colo. Gen. Assembly, 1st Regular Session (2001).

²⁶⁵ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 2-4.

²⁶⁶ The following discussion is based on the Letter agreement between Denver Water, the Farmers Reservoir

credited to Denver Water's storage account in the lake. The water stored in Denver Water's account can then be used, by exchange, to satisfy subsequent calls against Denver's upstream rights for water at the Burlington Ditch headgate for delivery to Barr Lake. This arrangement allows valuable instream flows to be maintained on the South Platte River through Denver to the Burlington Ditch headgate without any net increase in releases from Denver Water's storage facilities.

Water storage rights often include recreational use within the reservoir. This water is also a potential source of water for downstream recreational use, but this additional beneficial use requires adjudication in water court.²⁶⁷

A different type of arrangement is emerging in western Colorado, where the Bureau of Reclamation and municipalities in the Grand Valley are negotiating agreements to deliver stored water for municipal/recreational use.²⁶⁸ The parties contemplate delivery of 28,400 acre-feet through the "15-mile reach" of the Colorado River.²⁶⁹ While the purpose of the deliveries is to provide instream flows for endangered fish pursuant to a formal species recovery program (as discussed later), the legal mechanism relies on municipal releases for recreational purposes.²⁷⁰ The water will be released from Reclamation's Green Mountain Reservoir and delivered via the Colorado River. The permanent contract may simply call for the water to flow

and Irrigation Company, and the Burlington Ditch Company, Jun. 7, 1996.

²⁶⁷ *Board of County Commissioners of Arapahoe County v. Upper Gunnison River Water Conservancy District*, 838 P.2d 840, at 847-48 (Colo. 1992).

²⁶⁸ Interview with Mark Hermundstad, Jan. 14, 2000. Cities in the Grand Valley that may participate include Grand Junction, Palisade, and Fruita.

²⁶⁹ The 15-mile reach extends upstream on the Colorado River from its confluence with the Gunnison River to the Grand Valley Irrigation Company's headgate in Palisade.

²⁷⁰ Bureau of Reclamation, Colorado-Big Thompson Project, "Temporary Agreement between the Bureau of Reclamation and the City of Grand Junction," Agreement No. 00XX6C0136, Sept. 8, 2000.

past a riverside park below the confluence of the Colorado and Gunnison Rivers.²⁷¹

The public's right to instream recreational boating is unclear.²⁷² It is also under attack. A rancher on the Lake Fork of the Gunnison River has sued to exclude a rafting company from the stretch of the river that traverses his land.²⁷³ Although the Colorado Supreme Court has held that the public does not have a right to use streams flowing through private property without the landowners consent,²⁷⁴ subsequent legislation,²⁷⁵ supported by an opinion from the Attorney General,²⁷⁶ seems to insulate boaters from criminal trespass liability if they do not touch the bed or the banks.²⁷⁷ This issue is before the Colorado courts, again, but may ultimately be resolved through a ballot initiative.²⁷⁸

THE ENDANGERED SPECIES ACT

As discussed in Section I, federal laws influence many facets of Colorado water law and policy. This is not surprising, given that the federal government owns approximately one-third of the land in Colorado. Similar to other federal landholdings in the West, many of these lands include high mountain forests that collect winter precipitation. All of Colorado's great rivers arise on federal land, and flow through federal land as they journey out-of-state.

²⁷¹ Interview with Mark Hermundstad, Jan. 14, 2000.

²⁷² Salazar, Hon. Ken, letter to Wyatt B. Angelo, John Hill, Richard Murdie, and Gerald Mallett, Jul. 22, 1999, page 2.

²⁷³ Shara Rutberg, "Boaters float their rights," *High County News*, Aug. 13, 2001, page 3. The case is *Gateview Ranch, Inc., v. Cannibal Network, Inc.*, 01CW53 (Dist. Ct., Water Div. No. 4, 2001).

²⁷⁴ *People v. Emmert*, 597 P.2d 1025, 1027-28 (Colo. 1979).

²⁷⁵ Colo. Rev. Stat. § 18-4-504.5 (2000).

²⁷⁶ Woodward, Hon. Duane, "Purpose and effect of C.R.S. 1973, 18-4-504.5, Aug. 31, 1983.

²⁷⁷ Hill, John R., Jr., "The "Right" to Float Through Private Property in Colorado: Dispelling the Myth," 4 University of Denver Water Law Review 331, at 334 (2001).

²⁷⁸ Salazar, Hon. Ken, letter to Wyatt B. Angelo, John Hill, Richard Murdie, and Gerald Mallett, Jul. 22, 1999, page 2.

Of all the federal laws that influence water management in the West, perhaps the most important is the federal Endangered Species Act of 1973.²⁷⁹ In recent years, endangered species issues have moved from being a deciding factor between alternative uses or projects, to being an important consideration in almost all uses and all projects.²⁸⁰ Endangered species issues are nearly universal, touching every river basin, as well as upstream and downstream of critical stream segments.

The purpose of the Endangered Species Act (ESA) is to “provide a means whereby ecosystems upon which endangered and threatened species depend may be conserved, and to

provide a program for the conservation of such species.”²⁸¹ Sections 9 and 7 are the heart of the act, described by one observer as “the pit bull of environmental policy.”²⁸² Section 9 prohibits the “taking” of a federally listed endangered species.²⁸³ “Take” means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.”²⁸⁴ The destruction of habitat may also be considered a taking.²⁸⁵ Section 7 of the act requires federal agencies “in consultation with the Secretary” of Interior to “utilize their authorities in furtherance of the purposes of [the ESA] . . . for the conservation of endangered . . . and threatened species.”²⁸⁶

Colorado has an analogous, although smaller, legislative act entitled Nongame, Endangered, or

Threatened Species Conservation Act.²⁸⁷ The state Wildlife Commission lists species threatened or endangered within Colorado,²⁸⁸ and the Act prohibits the taking of listed species.²⁸⁹ The Division of Wildlife (DOW) is required to conduct investigations of nongame wildlife to determine measures necessary for the species to be self-sustaining.²⁹⁰ The DOW must also establish programs necessary for the management of non-game, endangered, and threatened wildlife.²⁹¹

“The Endangered Species Act is a lot like a very bad marriage in a state with no divorce.”

— BENNETT W. RALEY, former General Counsel, Northern Colorado Water Conservancy District

Implementation of the ESA raises a host of jurisdictional issues, between federal and state government, and between federal and private interests. Of particular

concern to the western states is the judicial finding that federal agencies can withhold permits and approvals necessary for the exercise of water rights pursuant to state law if necessary to prevent a “take” of a federally listed endangered species. This issue was most directly addressed by the Tenth Circuit Court of Appeals in *Riverside Irrigation District v. Andrews*²⁹² in a case involving the U.S. Army Corps of Engineers, the Riverside Irrigation District, and endangered whooping cranes threatened by the proposed Wildcat Reservoir.²⁹³

²⁷⁹ 16 U.S.C. §§ 1531 et seq (2000).

²⁸⁰ Interview with Bennett W. Raley, Aug. 10, 1999.

²⁸¹ 16 U.S.C. § 1531(b) (2000).

²⁸² Pendley, William Perry, *War on the West*, Washington, D.C.: Regnery Publishing, Inc., 1995, page 85.

²⁸³ 16 U.S.C. § 1538(a)(1) (2000).

²⁸⁴ 16 U.S.C. § 1532(19) (2000).

²⁸⁵ 16 U.S.C. § 1538 and § 1532(19) (2000). *Babbitt v. Sweet Home Chapter of Communities for a Great Oregon*, 515 U.S. 687 (1995).

²⁸⁶ 16 U.S.C. § 1536(a)(1) (2000).

²⁸⁷ Colo. Rev. Stat. §§ 33-2-101 et seq (2000).

²⁸⁸ Colo. Rev. Stat. § 33-2-105(1) (2000).

²⁸⁹ Colo. Rev. Stat. §§ 33-2-105(3) and (4) (2000).

²⁹⁰ Colo. Rev. Stat. § 33-2-104(1) (2000).

²⁹¹ Colo. Rev. Stat. § 33-2-106(1) (2000).

²⁹² 758 F.2d 508 (10th Cir. 1985).

²⁹³ The Corps’ denial of a permit was challenged as a violation of the “Wallop Amendment” of the Clean Water Act (33 U.S.C. § 1251(g) (2000)), which prohibits federal actions that impair the rights of states to allocate water within its jurisdiction. In *Riverside Irrigation District v. Andrews*, the court found that while the “Wallop Amendment” indicates that Congress did not want to interfere any more than necessary with state water management, Congress intended an accommodation where both the state’s interest in allocating water and the federal government’s interest in protecting the environment are present. However, the Court then trumped state law when it held that the Corps did not exceed its authority in denying a

MAJOR ESA RECOVERY PROGRAMS IN COLORADO

Colorado's two most important rivers—the Upper Colorado and South Platte—are the focus of separate endangered species recovery efforts. In both cases, these are large, interstate efforts aimed at facilitating the recovery of federally listed species impacted by the modification of natural flow regimes. The outcome of these efforts promises to have a tremendous impact on future water development and use in the state.

The older of the two programs began in 1984, when the Department of Interior, Colorado, Utah, Wyoming, water users and environmental groups began discussions regarding a process to recover four endangered species on the Upper Colorado River: the Colorado pike minnow, the humpback chub, the bonytail chub, and the razorback sucker.²⁹⁴ Cooperative²⁹⁵ implementation of a species recovery program began in 1988.²⁹⁶ Over 200 section 7 consultations involving biological opinions have been conducted in development of the recovery program. In response to questions about flow needs, the importance of nonflow actions, and the need for a framework for future section 7 consultations, the Fish & Wildlife

nationwide permit based on its determination that the depletion of water would adversely affect the critical habitat of the whooping crane. (Also worthy of review with regard to this issue is *United States v. Glenn-Colusa Irrigation District*, 788 F. Supp. 1126 (E.D. Calif. 1992)).

²⁹⁴ 50 C.F.R. § 17.95 (Oct. 1, 2000).

²⁹⁵ Cooperating organizations include the Fish & Wildlife Service, the Bureau of Reclamation, Western Area Power Administration, Colorado River Energy Distributors Association, the states of Colorado, Utah and Wyoming, water users from Colorado, Utah and Wyoming, the Environmental Defense Fund, and the Nature Conservancy. Fish & Wildlife Service, *2000 Washington, D.C. Briefing Book, Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin and San Juan River Basin Recovery Implementation Program*, 2000, page 6.

²⁹⁶ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, page 2.

Service issued a Programmatic Biological Opinion on recovery program activities in 1999.²⁹⁷

The intent of the recovery program is to recover species while allowing present depletions to continue and to allow future water development projects to occur.²⁹⁸ At the heart of the program are efforts to augment instream flows through the so-called “15-mile reach” of the Colorado River above its confluence with the Gunnison River.²⁹⁹ Flow needs at that stretch have been calculated by the Fish & Wildlife Service, based on maximizing preferred habitat types and providing spring flushing flows “capable of moving coarse bed material and winnowing accumulated fines from the channel substrate.”³⁰⁰ Annual releases of up to 31,650 acre-feet from the Bureau of Reclamation's Ruedi Reservoir are required to augment natural flows.³⁰¹ Water users are committed to providing 10,825 acre-feet from

²⁹⁷ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, pages 4 to 5.

²⁹⁸ The program consists of five elements: (1) habitat management, i.e., water flows; (2) habitat development; (3) native fish propagation and genetic management; (4) non-native species and sport fishing management; and (5) research, monitoring and data management. Fish & Wildlife Service, *Briefing Book: Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin and San Juan River Basin Recovery Implementation Program*, 2000.

²⁹⁹ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, pages 8 to 11.

³⁰⁰ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, pages 37 to 39.

³⁰¹ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, page 8.

existing or new storage facilities, which will reduce the Bureau's obligation by a corresponding amount.³⁰² An additional 20,000 acre-feet is sought to enhance spring peak flows.³⁰³ This water will be delivered to the 15-mile reach from existing or new storage facilities above the Grand Valley, such as the existing Wolford Mountain Reservoir or a new Wolcott Reservoir.³⁰⁴ (The location of this and other Colorado River basin recovery programs is shown in Figure 8.)

Augmenting flows is also a major focus of an emerging habitat recovery effort on the Platte River, where as much as 130,000 to 150,000 acre-feet/year of new flows will be needed to recover habitat for the whooping crane, piping plover, lesser tern and pallid sturgeon.³⁰⁵ Delivering these flows, and recovering 10,000 acres of habitat in central Nebraska, is the joint responsibility of Colorado, Nebraska, and Wyoming, in cooperation with the U.S. Department of the Interior, under a cooperative agreement signed in 1997.³⁰⁶ As seen in the

³⁰² Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, page 9. If the water users fail to provide the 10,825 acre-feet, the Fish & Wildlife Service will return to individual consultations on each project. Interview with Eric Wilkinson, Jul. 20, 1999.

³⁰³ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, page 11.

³⁰⁴ Colorado Water Conservation Board, *Executive Summary: Coordinated Facilities Water Availability Study for the Endangered Fishes of the Upper Colorado River*, 1999.

³⁰⁵ Platte River EIS Office, *Platte River Endangered Species Partnership*, 1998, pages 1-4.

³⁰⁶ Governors of Wyoming, Colorado, and Nebraska, and the Secretary of the Interior, *Cooperative Agreement for Platte River Research and Other Efforts Relating to Endangered Species Habitat Along the Central Platte River, Nebraska*, signed Jul. 1, 1997, available at <http://www.platteriver.org/library/CA6.5/htm> (visited Feb. 18, 2000). Colorado will supply 10,000 acre-feet of the initial goal of reducing shortages by 70,000 acre-feet; Nebraska and Wyoming will supply the balance. A basin-wide study will identify water conservation and water

Upper Colorado, the goals of the effort are to ensure that the Central Platte habitat is not a limiting factor in the recovery of the listed species while enabling existing and new water uses to proceed without having to take actions that go beyond the program. A driving force behind the cooperative agreement was the hesitancy of individual water developers and the U.S. Fish & Wildlife Service to deal separately and repeatedly with individual permitting actions when a basinwide strategy—again, as seen in the Upper Colorado—held the promise for more integrated and streamlined ESA implementation.³⁰⁷

The Platte effort is off to a contentious start. To date, the efforts of Colorado have focused on getting the so-called Tri-State Agreement moving forward in the face of Nebraska's wavering and the Fish & Wildlife Service's expanding view of recovery program needs and alternate solutions.³⁰⁸ Adaptive management offers a process-based solution for the key issue of channel stabilization.³⁰⁹

supply options to reduce shortages an additional 60,000 acre-feet.

³⁰⁷ One example of this is the by-pass flow issue (discussed in Chapter 2). Before the agreement, the Forest Service tried to require permittees to forego the use of a portion of their water rights ("bypass flows") to provide for flows through forest lands. This requirement was to be imposed as a condition on re-permitting of all facilities and diversion structures on National Forest lands. Water users feared that this would result in an effective loss of water rights. The Forest Service took this approach to getting instream flows after its efforts to appropriate reserved water rights for stream channel maintenance purposes were thwarted in Colorado Water Court. In concluding that they could not effectively deal with federal agencies alone, the users turned to the state to assist them in coming to a basin-wide agreement.

³⁰⁸ Comments of Eric Wilkinson to the Colorado Water Congress, Jul. 20, 1999, May 30, 2001, and Aug. 22, 2001.

³⁰⁹ Comments of Eric Wilkinson to the Colorado Water Congress, Aug. 22, 2001.

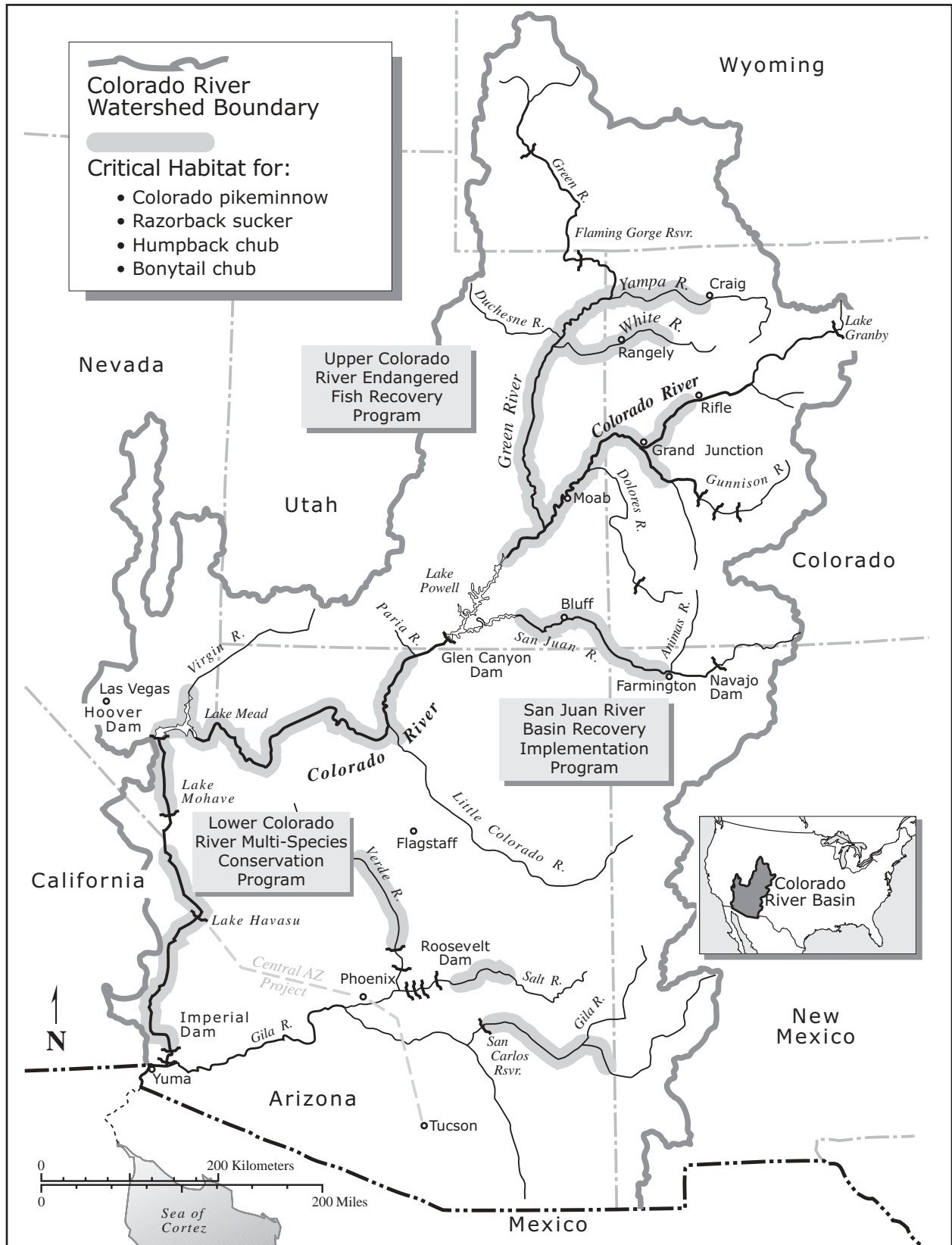


Figure 8. Colorado River Basin Endangered Fish Recovery Programs.

Source: U.S. Fish and Wildlife Service.

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 Map by Cartography Lab,
 Department of Geography,
 University of Colorado - Boulder.

Colorado is also proceeding with its commitment to re-regulate an annual average of 10,000 acre-feet above the Colorado-Nebraska border to seasonally enhance flows.³¹⁰ This is being done in the Tamarack Plan, which uses groundwater recharge to enhance river flows and to establish wetland and waterfowl habitat.³¹¹

ISSUES RAISED BY THE MAJOR ESA RECOVERY PROGRAMS IN COLORADO

BENEFITS OF PARTICIPATION

By participating in a basin-wide recovery program, proponents of specific water projects are provided with a means for demonstrating compliance with the ESA, so long as the proposal falls within the contours of the agreement. This can significantly simplify project permitting, which can have impressive advantages in time and money in providing needed water supplies.

This was perhaps best illustrated by the experience of the Ute Water Conservancy District (Ute WCD).³¹² Ute WCD supplies domestic water in the Grand Valley, one of the West Slope's principal growth areas. In 1994, Ute WCD began permitting replacement and expansion of its Plateau Creek Pipeline. Proposed water diversions totaled 28,000 acre-feet although stream depletions were only 3,500 acre-feet. A critical issue is that the point of diversion is above the 15-mile reach on the

³¹⁰ Governors of Wyoming, Colorado, and Nebraska, and the Secretary of the Interior, *Cooperative Agreement for Platte River Research and Other Efforts Relating to Endangered Species Habitat Along the Central Platte River, Nebraska*, signed Jul. 1, 1997 "Tamarack Plan, Colorado's Participation in the Platte River Basin Recovery Implementation Program," available at <http://www.platteriver.org/library/CA6.5/htm> (visited Feb. 18, 2000), Tab 3A.

³¹¹ Interview with Tom Pitts, Aug. 20, 1999 and Aug. 25, 1999.

³¹² Interview with Larry Clever, May 19, 2000.

Colorado River, whereas most return flows come in below that segment.

Although the BLM was the federal permitting agency subject to section 7 consultation, Ute WCD ultimately found itself face-to-face with local officials of the Fish & Wildlife Service, which is "[n]ot a good situation to be in," according to General Manager of the Ute Water Conservancy District Larry Clever.³¹³ The Fish & Wildlife Service initially demanded a one-for-one replacement of the project's depletions, which correlated to the Ute WCD's augmenting flows in the 15-mile reach such that its project would not result in any reduction in stream flow. Four years and \$2.5 million later, Ute WCD was able to proceed with one-third of its proposed depletions.

In 1999, the Programmatic Biological Opinion (PBO) for the Upper Colorado recovery program was issued, which allows for 120,000 acre-feet of new depletions.³¹⁴ The PBO lays out species recovery actions, which if followed by new individual projects, will allow these projects to proceed without additional biological opinions or reviews. With this new tool in hand, Ute WCD needed only two phone calls to secure approval for the remaining two-thirds of its proposed depletions.³¹⁵ This dramatically demonstrates the utility, from the standpoint of water users, of a comprehensive approach to ESA compliance.³¹⁶

³¹³ Interview with Larry Clever, May 19, 2000.

³¹⁴ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River* (PBO), 1999, page 1. The PBO also provides for the continued operation of all Bureau of Reclamation facilities in the Upper Colorado River Basin (above the confluence with the Gunnison River).

³¹⁵ Interview with Larry Clever, May 19, 2000.

³¹⁶ Interview with Larry Clever, May 19, 2000. Larry Clever observes that the lack of a regularized process, the broad discretion delegated to local biologists, and the one-on-one nature of negotiations put the district at a great disadvantage. The Fish & Wildlife Service was able to "divide and conquer" the water users because each project was processed individually. The PBO, however, changed

CONCERNS AND COMPLICATIONS

Basin-wide recovery programs in the Upper Colorado and South Platte River basins have obvious benefits for water managers. However, they also raise a variety of concerns and complications. Wading through this maze of issues presents a formidable challenge to the Colorado water management community.

FEDERAL-STATE RELATIONS: DUAL SOVEREIGNTY REVISITED

One of the most controversial elements of the recovery programs is that they involve federal actions that limit or impair the future exercise of private water rights. Bennett Raley, former counsel to the Northern Colorado Water Conservancy District, is among those who argued that “any water needed for ESA purposes must be acquired in priority and be subject to previously established water rights, contractual rights to the use of water, and allocations of water by interstate compact or equitable apportionment decree.”³¹⁷ He suggests that the proper mechanism for acquiring water for ESA purposes is through federal agencies appropriating water under state water law systems. A fundamental legal problem with that approach, as Melinda Kassen, an attorney with Trout Unlimited, points out, is that the federal government cannot legally appropriate instream flows in Colorado.³¹⁸

The practical reality of the Endangered Species Act is that the needs of endangered species, under a recovery plan or otherwise, must be met

this by creating a regularized process and establishing the recovery program as the reasonable and prudent alternative for depletions. It is worth noting that the PBO came about because the water users united and demanded that the Fish & Wildlife Service deal with them as a group to define ESA requirements.

³¹⁷ Raley, Bennett W., written testimony before the United States House of Representatives Committee on Resources, Oversight Hearing on Implementation of Endangered Species Act, Greeley, Colorado, Jul. 24, 1999, page 2.

³¹⁸ Written comments of Melinda Kassen, Jul. 17, 2001.

“Can federal agencies simply take water from irrigated agriculture or municipalities in the West because the Endangered Species Act is so powerful?”

— BENNETT W. RALEY, former General Counsel, Northern Colorado Water Conservancy District, in testimony before Congress

if there is to be any new water development. As a result, water providers with growing demands have an overwhelming incentive to provide water from existing facilities to recover the fish. For example, in the Upper Colorado, 30,825 acre-feet of water for the recovery program is coming from existing water rights or being provided by existing water users.³¹⁹ No water is being appropriated by federal agencies specifically for the purposes of the recovery program, although the CWCB previously appropriated some minimum stream flows for the program.

THE RACE TO DEVELOP WATER UNDER THE PBO

The PBO for the Upper Colorado recovery program allows 120,000 acre-feet of new depletions, as long as proposed projects fall within the scope of the opinion and the terms of the recovery program.³²⁰ This creates an incentive for accelerated development of these resources. For example, Windy Gap participants

³¹⁹ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation’s Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, pages 8 and 11.

³²⁰ Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation’s Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, page 1.

understand the long-term benefits of using their Windy Gap water supplies under both the existing, and future, depletions covered by the PBO.³²¹ By using their water rights now, Windy Gap participants can ensure that their depletions are covered by the PBO, and avoid any further requirements to provide additional flows to mitigate depletions.³²²

THE UNMET CHALLENGE OF FISH RECOVERY

A more fundamental concern about the Upper Colorado program is that it does not appear to be accomplishing much. Some observers suggest that the program is concerned more with research and political posturing than with species recovery. Of the more than \$91 million spent over 12 years, less than half has been for activities directly related to fish recovery; the majority of funds have gone to scientific research and program expenses.³²³ Efforts to purchase senior water rights for fish were abandoned early in the process due to West Slope opposition,³²⁴ and a subsequent focus on appropriating minimum stream flows was recently deferred

³²¹ Windy Gap participants have also looked at the economic benefits of the second use of project water that can accrue to first-use allottees. However, no incentive program has been adopted. In addition, the District encourages the use of Windy Gap water to reduce market pressure on C-BT shares. Interviews with Eric Wilkinson, Jun. 26, 2000.

³²² Interview with Eric Wilkinson, Jun. 26, 2000.

³²³ Upper Colorado River Endangered Fish Recovery Program and San Juan River Basin Recovery Implementation Program, *Program Highlights 2000-2001*, 2001, page 12.

³²⁴ Interview with Tom Pitts, Jun. 15, 2000. The initial \$15 million budget included \$5 million to purchase senior water rights. The Recovery Program solicited proposals, but received no attractive offers. The West Slope opposed buying senior water rights since they did not want to see water removed from productive land. Also, it made little sense to end the use of senior rights to allow the use of junior rights in the future. Further, the use of senior rights was counter to the goal of protecting water development under the Compact. The CWCB ultimately decided that the purchase of senior rights was too expensive and should be the last option pursued to meet the needs of the fish.

until at least 2005.³²⁵ Plus, the program is only now beginning began substantial restocking.³²⁶ The federal government, however, is set to publish draft recovery goals.³²⁷ Greg Walcher, Executive Director of the Department of Natural Resources, says this is “the most important accomplishment in the 15-year program.”³²⁸ Colorado has indicated it will not renew its support for the program, which expires January 31, 2002, unless recovery goals are in place.³²⁹ Program renewal is a condition of Congressional funding legislation; failure to renew the program would thus jeopardize the program.³³⁰

IMPACT ON COLORADO RIVER COMPACT ENTITLEMENTS

Many parties believe that the Upper Colorado recovery program is a barrier to Colorado utilizing its full share of its Colorado River entitlement. This reasoning is based on the accurate observation that there is little opportunity to use water below the 15-mile reach before it leaves the state; thus, the water provided for endangered fish recovery in the Upper Colorado recovery program is essentially lost to Colorado. The situation, however, is considerably more complicated.

For starters, Colorado users do not currently have demands for all the Colorado River water to which the state is entitled, although certain

Electronic-mail communication from Randy Seaholm, Jun. 18, 2001.

³²⁵ Interview with Tom Pitts, Jun. 15, 2000.

³²⁶ Bureau of Reclamation, *Part Two: Recovery Implementation Program Recovery Action Plan (RIPRAP)*, available at <http://www.r6.fws.gov/crrp/riprap/part2.pdf> (last visited Sept. 6, 2001), page 8.

³²⁷ “Colorado River Recovery Goals a ‘Giant Step’ Forward,” press release, Colorado Department of Natural Resources, Sept. 5, 2001, page 1.

³²⁸ “Colorado River Recovery Goals a ‘Giant Step’ Forward,” press release, Colorado Department of Natural Resources, Sept. 5, 2001, page 1.

³²⁹ Comments of Tom Pitts to the Colorado Water Congress Summer Convention, Aug. 24, 2001.

segments of the river are fully developed under some hydrologic conditions.³³¹ With or without a recovery program, the excess is destined, at least for the time being, to flow out of the state. Additionally, at a future time if demands exist for these flows, the goal of species recovery may have been met, and the 15-mile reach obligation may cease or be modified in a way that facilitates additional water development. It is thus possible to conclude that the ESA requirements may have no long-term effect on Colorado's use of its Colorado River entitlement, as long as recovery occurs before demands materialize. Of course, this assumes that species recovery is possible, a questionable assumption. Even without full species recovery, however, the PBO clearly anticipates the development of at least an additional 120,000 acre-feet of Colorado's compact entitlement.³³²

“Some people want to use the Upper Colorado fish recovery program to control growth and prevent development.”

— GREG E. WALCHER, Executive Director, Colorado Department of Natural Resources

Another complication is the relationship between trans-basin diversions (of Colorado River water) and the South Platte recovery program. If not for the approximately 412,000 acre-feet of trans-

basin flows imported in the South Platte,³³³ no water would theoretically be available at the Nebraska line to support species recovery efforts or to satisfy the terms of the South Platte River Compact of 1923. Consumption exceeds the natural flow of the river. Moving additional water from the Upper Colorado to the South Platte, therefore, is not only consistent with the goal of using compact entitlements, but also with species recovery in the South Platte.³³⁴ Although counter-intuitive, most professionals believe that population growth along the Front Range will increase flows in the South Platte River.³³⁵ As discussed elsewhere, this assumption is based on the reasoning that Front Range growth will be supplied by increased trans-basin diversions, non-tributary groundwater supplies, and agriculture to municipal transfers. Foreign (trans-basin) water will not be completely consumed, and more than offset depletions caused by the new development or reallocation of tributary (native) water.³³⁶

SUPPLIES AND DEMANDS DOWNSTREAM ON THE PLATTE

Several other factors influence the water balance on the South Platte. Some parties in Colorado suspect that the Platte controversy is motivated not by a concern over endangered species, but by a desire by downstream interests, primarily

³³⁰ Comments of Tom Pitts to the Colorado Water Congress, Aug. 22, 2001.

³³¹ A good example of this is the 15-mile reach. Although there is water available in the reach at certain times of the year, there is no additional water available in the reach at the times when the Fish & Wildlife Service believes water is necessary for the fish. While a lot of water flows through the reach and out of the state, there are inadequate flows during the spring peak (when reservoirs are filling) and in the fall (when natural flows are low). Thus, the problem is one of timing.

³³² Fish & Wildlife Service, *Final Programmatic Biological Opinion for Bureau of Reclamation's Operations and Depletions, Other Depletions, and Funding and Implementation of Recovery Program Actions In the Upper Colorado River Above the Gunnison River*, 1999, page 2.

³³³ Colorado Water Conservation Board, *South Platte/Republican River Basin Facts (Draft)*, 2000, pages 2-4.

³³⁴ The South Platte recovery program is relying on these increased flows to meet some of the flow needs on the Central Platte.

³³⁵ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, pages 135-136.

³³⁶ Don Carlson, Senior Engineer, Environmental Affairs, Northern District, points out that recovery efforts are not relying on increased flows from trans-basin water to meet the flow needs of the Central Platte. Written comments of Don Carlson, Jul. 2001. While recovery efforts may not rely on this trans-basin water, the water necessary to meet the target flows is expected to partly result from increased trans-basin imports.

Nebraska, to augment flows for other purposes.³³⁷ While agriculture is steady or declining in Colorado, it is expanding in Nebraska.³³⁸ As the major consumptive user of water in the basin, expansion of agriculture offers a tremendous challenge to habitat recovery. Colorado is leery of the competing forces at work in the basin, and fearful that these forces may cause the recovery program to fail. To protect its financial stake, the state is insisting on an equity interest in all property acquired by the recovery program so that it can salvage its investment if the program breaks down.³³⁹

Flows on the South Platte may also be modified by programs along the Front Range designed to more efficiently and completely use imported Colorado River water. One interesting finding identified in the Metropolitan Water Supply Investigation (MWSI) was that 60,000 to 73,000 acre-feet of potential yield could be realized by conjunctive use of Denver Basin groundwater.³⁴⁰ The project would call for using excess foreign (trans-basin) water to recharge East Slope aquifers (or offset pumping) in wet years. Denver Water, the Douglas County Water Authority, and the Colorado River District have begun a collaborative planning effort to further investigate the concept.³⁴¹ The recharged water would be 100 percent consumptive; there would be no return flows. If this is done without an increase in trans-basin diversions, the flow of the South Platte River would likely decline, since the use of foreign water would more closely approach extinction. Other types of efficiency programs, including water re-use, would likely

³³⁷ Interview with Eric Wilkinson, Jul. 20, 1999.

³³⁸ Interview with Lee Rozaklis, Jul. 20, 1999.

³³⁹ Interview with Eric Wilkinson, Jul. 20, 1999.

³⁴⁰ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, page 55.

³⁴¹ Douglas County Water Resource Authority, Resolution No. R-998-02 (Sept. 1998); Colorado River Water Conservation District/Denver Board of Water Commissioners, Joint Resolution (Nov. 17, 1998).

have a similarly negative impact on South Platte flows.

The national forest system may be a source of needed flows. The Coalition for Sustainable Resources boldly suggested that vegetation management could increase yields of the Platte basin by 249,000 acre-feet per year over current levels.³⁴² This potential compares favorably to the 238,000 acre-feet deficit identified for Central Platte endangered species by a Fish & Wildlife Service study in 1994.³⁴³ Research conducted for the Platte River EIS Office offers a more modest estimate of 50,000 to 55,000 acre-feet per year.³⁴⁴ The Coalition for Sustainable Resources brought litigation asking whether the Forest Service is required, under the Endangered Species Act, to implement water enhancement programs to provide additional water necessary to recover the threatened and endangered species on the Platte River, as determined by the Fish & Wildlife Service. The federal District Court for Wyoming dismissed the case on the grounds that the ESA issues were not ripe for review.³⁴⁵ Thus, the court did not address the substantive issues raised by the Coalition.

³⁴² *Coalition for Sustainable Resources v. United States Forest Service*, 48 F. Supp. 1303, at 1312 (U.S. Dist. Ct. for Wyo. 1999). The Coalition for Sustainable Resources is composed of ranchers, farmers, and other water users in Colorado and Wyoming whose water use has been subject to restrictions and bypass flow conditions by the federal government in order to aid listed species.

³⁴³ Fish & Wildlife Service, Mountain-Prairie Region, Oct. 17, 1994, at 4, attachment No. 2 to Bennett W. Raley and James S. Witwer, Letter to Daniel Glickman, Secretary of Agriculture, and Bruce Babbitt, Secretary of the Interior, Re: Notice of Violation of 16 U.S.C. § 1535 (a)(1), Jun. 7, 1996.

³⁴⁴ *Estimating Additional Water Yield from Changes in Management of National Forests in the North Platte Basin*, (Final Report), prepared by Charles A. Troendle and James M. Nankervis for the Platte River EIS Office, U.S. Department of the Interior, 2000.

³⁴⁵ *Coalition for Sustainable Resources v. United States Forest Service*, 48 F. Supp. 1303, at 1314 (Dist. Wyo. 1999). Ripeness is a legal doctrine requiring that the federal courts have an actual, present controversy to act, and that they cannot act when the issue is hypothetical or the controversy merely speculative. *Abbott Laboratories v. Gardner*, 387 U.S. 136 (1967).

ADDITIONAL COSTS OF ENDANGERED SPECIES ACT COMPLIANCE

ESA compliance (particularly sections 7 and 9) imposes a variety of costs on water managers and users. The most obvious costs of ESA compliance are from defeated (or delayed) projects and in the modified operation of existing projects, actions that can reduce yields to existing and/or potential water users. Virtually every major water project in the West implicates, in some way, the ESA; the situations in the Upper Colorado and South Platte are not unusual.³⁴⁶ However, beyond these obvious concerns are a host of other impacts or costs of ESA compliance.

One of the most important impacts of ESA compliance can be to modify patterns of growth, land-use, and thus, water use. Along the Front Range, the habitat of several endangered (and potentially endangered) species extend across prime developable land.³⁴⁷ One example is the Preble's jumping mouse, which occupies habitat adjacent to streams and waterways along the Front Range of Colorado and Southeastern Wyoming.³⁴⁸ In 2001, the Fish & Wildlife Service published a special "4(d) Rule" that removes section 9 prohibitions on take for rodent control, ongoing agricultural activities, maintenance and replacement of existing landscaping, and existing uses of perfected water rights under state law and interstate compacts and decrees.³⁴⁹ While the proposed rule would not

³⁴⁶ Well-known examples include the Columbia River Basin (endangered salmon runs), the San Francisco Bay-Delta (striped bass, etc.), and the Lower Colorado River (razorback sucker, etc.). Getches, David H., "The Metamorphosis of Western Water Policy: Have Federal Laws and Local Decisions Eclipsed the States' Role?" 20 *Stanford Environment Law Journal* 3, at 53 (2001).

³⁴⁷ Interview with Eric Wilkinson, Jul. 20, 1999.

³⁴⁸ Fish & Wildlife Service, *Environmental Assessment for a Proposed 4(D) Rule on the Preble's Jumping Mouse*, at 1, available at <http://www.r6.fws.gov/preble/> (last modified Aug. 2000).

³⁴⁹ 66 F.R. 28125 (May 22, 2001).

affect most existing uses, new development activity remains subject to the requirements of the Endangered Species Act.³⁵⁰ Other prairie species that may impact Front Range growth include the black-tailed prairie dog (which has been proposed for listing), and the Mountain Plover, a migratory bird found in Mexico and the western and southwestern United States.

"If you even say you like one kind of development you're labeled a devil."

— JAMES R. SULLIVAN, Douglas County Commissioner

Compliance with the ESA also can raise issues relating to project maintenance. The habitat of presently and potentially listed endangered species encompasses many, perhaps most, irrigation delivery systems on the Front Range.

Phreatophytes thrive along irrigation ditches, and indeed, may have been introduced to stabilize ditch banks. The traditional maintenance activity to control these water-loving plants is

annual burning. Burning, however, may be precluded if it could result in the taking of endangered species, like the Preble's jumping mouse.³⁵¹ Ditch owners argue that the Preble's jumping mouse has survived and thrived near ditches in the presence of a century or more of

³⁵⁰ Fish & Wildlife Service, "Questions and Answers about the Final Special Rule for the Preble's Jumping Mouse," at 3, available at

http://www.r6.fws.gov/preble/q&a_finalspecialrule.htm (last visited Jun. 5, 2001). Individuals wishing to undertake a non-exempt activity on non-federal lands that may result in the taking of a Preble's Jumping Mouse would be required to obtain a Section 10 permit consistent with an accompanying habitat conservation plan (HCP). Fish & Wildlife Service, *Environmental Assessment for a Proposed 4(D) Rule on the Preble's Jumping Mouse*, at 6, available at <http://www.r6.fws.gov/preble/> (last visited Mar. 23, 2001). An HCP details what precautions will be taken to protect the species as well as what effects any taking will have on the species and how such effects will be mitigated. An HCP must be approved by the Fish & Wildlife Service before issuance of a Section 10 permit that authorizes the take of a listed species. A Section 10 permit only authorizes a take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. "Habitat Conservation Plans and the Incidental Take Permitting Process," available at <http://endangered.fws.gov/hcp/HCPs-and-Incidental-20%Take.pdf> (visited Sept. 1, 2001). Endangered Species Act, 16 U.S.C. § 1536(a)(2) (2000).

³⁵¹ Interview with James R. "Jay" Montgomery, Oct. 25, 1999.

ditch burning practices and that discontinuing ditch burning could harm mouse habitat and mice.³⁵² The proliferation of phreatophytes decreases ditch efficiency, and increases the consumptive use of water.

Another example showing the link between ESA compliance and project maintenance comes from Boulder County, where a prairie dog colony is located within 300 feet of a dam.³⁵³ The dam is in a floodway and its integrity could be compromised if the prairie dogs colonize the dam. Yet, control of the destructive activity of the prairie dogs could be precluded by section 9 of the ESA if the prairie dog were listed. Safety may ultimately require that the reservoir be emptied. This result would require replacement storage elsewhere, creating associated environmental impacts.

The ESA can also be an issue in efforts to transfer federal water projects to local ownership. The rationale behind such proposals is to increase local control, operational flexibility, and operational efficiency. But, an ownership transfer is a major federal action that triggers section 7 consultation under the ESA. This issue arose in 1993-1994, when the Northern Colorado Water Conservancy District explored the transfer of the C-BT project from the Bureau of Reclamation.³⁵⁴ Northern has a “perpetual right” to C-BT water under their 1937 contract with the federal government.³⁵⁵ However, a transfer in ownership could prompt a revision to the contract to reflect the water needs of the Colorado River endangered fishes, perhaps reducing yields by as much as 50,000 acre-feet/year.³⁵⁶

³⁵² Written comments of Carol Ellinghouse, Jul. 2001.

³⁵³ Interview with Eric Wilkinson, Jul. 20, 1999

³⁵⁴ Interview with Eric Wilkinson, Jul. 20, 1999.

³⁵⁵ Contract between the U.S. and the Northern Colorado Water Conservancy District providing for the Construction of the Colorado-Big Thompson Project, Colorado, Jul. 5, 1938, at ¶ 16.

³⁵⁶ Interview with Eric Wilkinson, Jul. 20, 1999.

THE BENEFITS OF BEING PROACTIVE

In light of these and related considerations, perhaps the best way to minimize the costs of ESA compliance is to be proactive in identifying and assisting potentially endangered species.³⁵⁷

This is the philosophy of 1997 legislation authorizing the CWCB to fund efforts to mitigate the effects of water development projects on declining native species and federally listed threatened and endangered species.³⁵⁸ This program grew out of discussions between members and staff of the CWCB, the Wildlife Commission, and the Water Quality Control Commission who were concerned with the high cost of species recovery. Greg Walcher, Director of the Colorado Department of Natural Resources, has identified the development of species recovery programs as a priority.³⁵⁹

“We have strong state policy already in place that seeks to avoid the listing of new species by the federal government.”

— GREG E. WALCHER, Executive Director, Colorado Department of Natural Resources

³⁵⁷ The boreal toad provides a successful example of proactive efforts to recover and manage a species to avoid listing under the Endangered Species Act. Boreal Toad Recovery Team and Technical Advisory Group, Colorado Division of Wildlife, *Conservation Plan and Agreement*, Feb. 2001.

³⁵⁸ 1997 Colo. Sess. Laws ch. 272, codified at Colo. Rev. Stat. § 37-60-122.2(2)(e) (2000).

³⁵⁹ Walcher, Greg E., “Water—Lifeblood of the West,” *Colorado Water Rights*, Vol. 18, No. 1, Spring 1999, pages 1 and 9.

CHAPTER FIVE: WATER QUALITY

In the arid west, concerns with water first revolved around transporting water from where it was found to where it was needed, often from the mountains to the drier valleys and plains. The water that was appropriated was of the highest quality. Now, with water being used and reused as it flows from the mountains to the oceans, quality issues have gained prominence, if not parity.

WATER QUALITY MANAGEMENT IN COLORADO: THE BASIC REGULATORY FRAMEWORK

The Clean Water Act³⁶⁰—which is actually a series of amendments and acts centered around legislation passed in 1972—is the basis for water quality management in all states, including Colorado. Colorado, like most states, has its own body of water quality law prompted by, and tied to, the Clean Water Act. The centerpiece of this state legislation is the Colorado Water Quality Control Act (1973).³⁶¹ While the U.S. Environmental Protection Agency has the final responsibility for assuring compliance with the Clean Water Act, implementation of the federal and state water quality statutes in Colorado is primarily the role of the Water Quality Control Commission of the Colorado Department of Public Health and Environment, as provided by the Colorado Water Quality Control Act.³⁶² The Division administers the Act pursuant to rules and policies adopted by the Commission and with respect to federal requirements associated

with the state assuming primacy for Clean Water Act implementation.

Section 404 of the Clean Water Act requires approval prior to discharging dredged or fill material into the waters of the United States.³⁶³ The purpose of the program is to insure that physical, biological, and chemical water quality is protected from unregulated discharges of dredged or fill material that could permanently degrade waters or wetlands. Section 404 permits, issued by the Army Corps of Engineers under EPA oversight, are required for virtually every water diversion or storage project. As demonstrated by EPA's veto of Two Forks, a 404 permit is crucial to water development (as well as most economic activity) in Colorado. While most diversion projects, such as irrigation headgates, are permitted under general provisions (so-called "nation-wide permits"),³⁶⁴ major projects, such as reservoirs, require individual permits following an environmental assessment and state 401 Certification.

Section 401 of the Clean Water Act, the State Water Quality Certification Program, requires that states certify compliance of federal permits or licenses, such as 404 permits, with state water quality requirements and other applicable laws.³⁶⁵ Under Section 401 and state law, Colorado has authority to review any federal permit or license that may result in a discharge to wetlands or other waters to ensure that the actions would be consistent with the state's water quality

³⁶⁰ 33 U.S.C. § 1251 et seq (2000).

³⁶¹ Colo. Rev. Stat. § 25-8-101 et seq (2000).

³⁶² Colo. Rev. Stat. § 25-8-202(k)(6) (2000).

³⁶³ 33 U.S.C. § 1344 (2000). As a practical matter, waters of the United States include essentially all surface waters and wetlands, including intermittent streams.

³⁶⁴ 33 U.S.C. § 1344(e) (2000).

³⁶⁵ 33 U.S.C. § 1341 (2000).

requirements.³⁶⁶ Federal permits that do not meet these requirements may not receive a State Water Quality Certification, and thus cannot be issued.

The key regulatory program established in the Clean Water Act for protecting water quality is the National Pollution Discharge Elimination System (NPDES). The NPDES permit system requires each discharger from a discrete “point source”—e.g., a factory or wastewater plant—to meet technology-based effluent standards nationally promulgated by EPA for each category of discharge. Tighter standards are imposed on discharges to waters that do not meet the water quality standards for their designated uses. In Colorado, it is the responsibility of the Water Quality Control Commission to classify water based on current and potential uses.³⁶⁷ Principal classifications include recreation, agriculture, aquatic life, domestic water supply, and wetlands.³⁶⁸ Discharges that reduce the quality below the water quality standards are prohibited.³⁶⁹

Streams that do not meet water quality standards must be identified under Section 303(d) of the Clean Water Act, and are subject to preparation of a Total Maximum Daily Load (TMDL) plan (see Figure 9). Preparation of a TMDL requires a calculation of all existing pollutants (including pollutants from non-point sources, such as forests, farms, and roads), and an assessment of the assimilative capacity of the stream segment. More importantly from a political and economic standpoint, this work is used to design a pollutant allocation plan that authorizes certain parties to

make specific levels of discharges consistent with the assimilative capacity of the water body.³⁷⁰ Although the TMDL requirement has been a part of the Clean Water Act for many years, the process is relatively new and uncertain, as the Environmental Protection Agency has only

recently offered rules of implementation.³⁷¹ However, Congress stayed EPA’s controversial new regulations in 2000, and the Bush Administration has proposed to delay the effective date of the rule 18 months to review the rule and make it more workable to its critics.³⁷²

Special rules also apply to waters with quality *better* than that required by water quality standards. The Environmental Protection Agency interprets the Clean

Water Act as prohibiting the degradation of water better than necessary to protect designated uses.³⁷³ The agency further suggests that this “anti-degradation requirement” is not technology based (like NPDES permits), but is based on actual water quality on a parameter-by-parameter basis.³⁷⁴ Thus, most waters in Colorado are subject to anti-degradation requirements because the quality of at least one parameter is better than required for the stream’s use designation.³⁷⁵

“Clearly the EPA is getting very, very serious about anti-degradation.”
— J. DAVID HOLM,
Director, Colorado
Water Quality
Control Division

³⁷⁰ The TMDL requirement is focused on pollutants introduced into a stream, and does not address water quality impacts of hydrologic modifications or flow alterations, such as dams and diversions. Bruce Zander, EPA Region VIII TMDL Coordinator, quoted in “Water Quality, Montana/Big Creek/Clean Water Act/TMDL,” *Western States Water*, Editor Tony Willardson, Aug. 17, 2001, page 2. Given state legislative preference for protecting valid water rights, TMDLs are an improbable mechanism to address hydrologic modifications, except in instances where there are water quality parameters like temperature or sediment that must be addressed in the TMDL process.

³⁷¹ 40 C.F.R. § 130.7 (Jul. 1, 2000). For a discussion of the recent controversy, see Mowrey, Robert D., “TMDL Implementation Issues and Trends,” 15 *Natural Resources and Environment* 112 (2000).

³⁷² 66 F.R. 41817 (Aug. 9, 2001).

³⁷³ 40 C.F.R. § 131.12 (Jul. 1, 2000).

³⁷⁴ 40 C.F.R. § 131.12 (Jul. 1, 2000).

³⁷⁵ Interview with J. David Holm, Jul. 14, 1999. Colorado’s process for anti-degradation can be located at 5 Colo. Code Regs. § 1002-31.8(3) (2000).

³⁶⁶ Colo. Rev. Stat. § 25-8-302(1)(f) (2000).

³⁶⁷ Colo. Rev. Stat. § 25-8-203 (1999). 5 Colo. Code Regs. § 1002-21 et seq (2000).

³⁶⁸ 5 Colo. Code Regs. § 1002-31.13 (2000).

³⁶⁹ 5 Colo. Code Regs. § 1002-61.8(c)(iii) (2000).

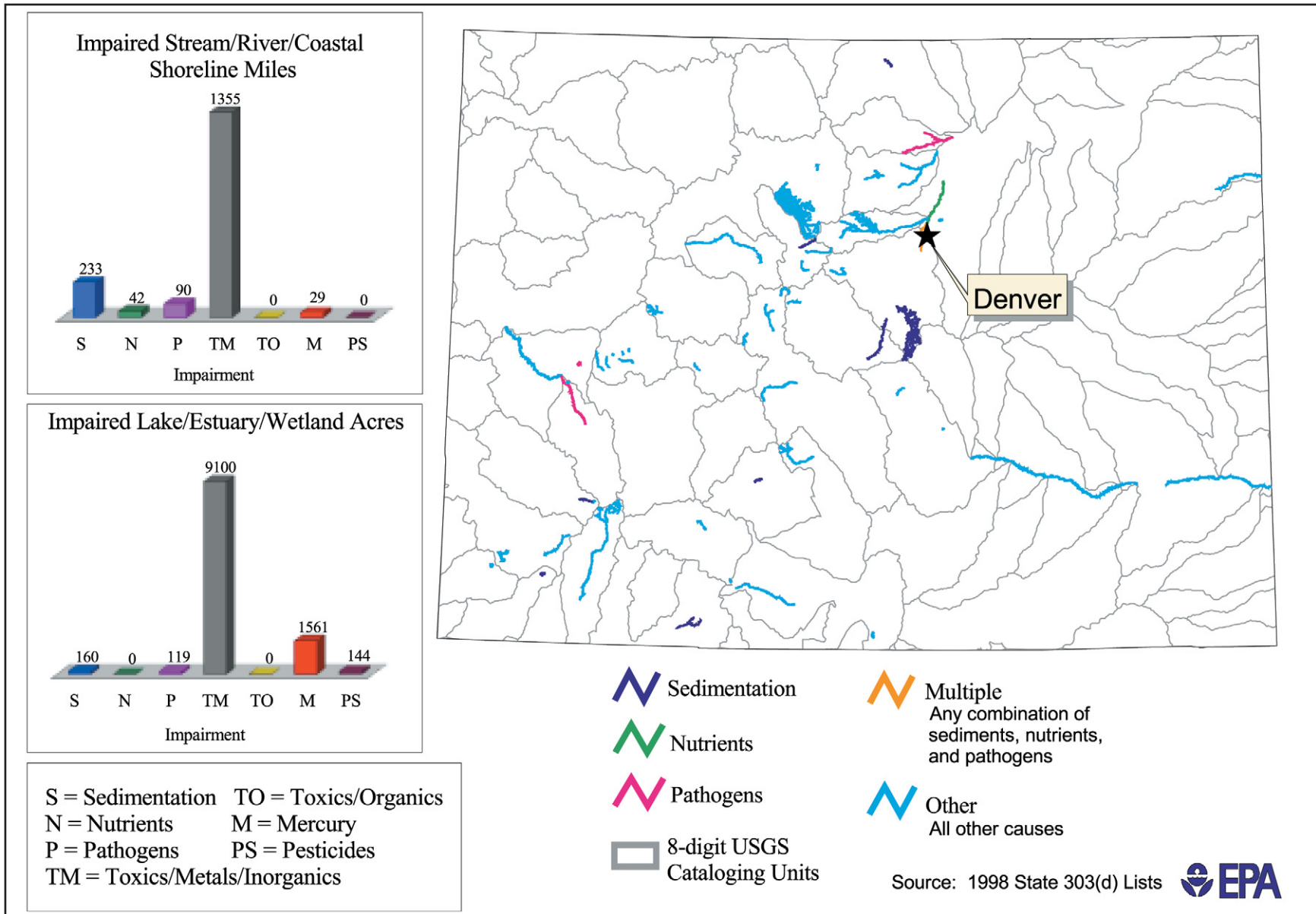


Figure 9. Polluted Waters in Colorado, 1998.

Map by U.S. Environmental Protection Agency, Office of Water.

SUBSERVIENCE TO WATER SUPPLY: THEORY AND PRACTICE

Integrating the law of water quality management with the rules of water supply is frequently problematic. In Colorado, water quality has traditionally been treated separately from, and subordinate to, the right to appropriate water. This is partly explained by the time lag between the initial development of water and the later concern for water quality protection.³⁷⁶ Colorado first adopted legislation addressing the appropriation and use of water as a territory in 1861;³⁷⁷ its first water quality legislation was not passed until 1966,³⁷⁸ and comprehensive water quality provisions were not added to Colorado statute until 1973³⁷⁹ in response to Congressional enactment of the federal Clean Water Act of 1972.³⁸⁰ By that time, a long-standing system of usufructuary property rights had been established in law and in western culture.

Both Congress and the Colorado legislature have articulated a policy suggesting that water quality management will not interfere with the exercise of water rights, which in some cases can extend back to territorial days. For example, Section 101(g) of the Clean Water Act provides that “the authority of each State to allocate quantities of water within its jurisdiction shall not be superseded, abrogated or otherwise impaired by this chapter.”³⁸¹ Similarly, Section 510(2) provides that nothing in the Act shall “be

³⁷⁶ *San Miguel Consolidated Gold Mining Company v. Suffolk Gold Mining and Milling Company*, 52 P. 1027 (Colo. 1898).

³⁷⁷ Colo. Territorial Laws 67-68 (1861).

³⁷⁸ 1966 Colo. Sessions Laws Ch. 44.

³⁷⁹ 1973 Colo. Sessions Laws Ch. 210.

³⁸⁰ 33 U.S.C. §§ 1251 et seq (2000).

³⁸¹ 33 U.S.C. § 1251(g) (2000). The courts have interpreted this provision as a “specific indication . . . that Congress did not want to interfere any more than necessary with state water management.” *Riverside Irrigation District v. Andrews*, 758 F.2d 508, at 513 (10th Cir. 1985), citing *National Wildlife Federation v. Gorsuch*, 693 F.2d 156, at 178 (D.C. Cir. 1982). See also *United States v. Akers*, 785 F.2d 814, at 821 (9th Cir. 1986).

construed as impairing or in any manner affecting any right or jurisdiction of the States with respect to the water. . . .”³⁸² However, the authority of the state under the Clean Water Act to allocate water quantity between users does not effectively limit the scope of water pollution controls or requirements that may be imposed on users who have obtained water allocations under state law.³⁸³ This authority is effectively quashed by Section 104 of Colorado’s Water Quality Control Act, which specifies that water quality regulation shall not “supersede, abrogate or impair rights to divert water and apply water to beneficial uses.”³⁸⁴ As the Colorado Supreme Court observed, “[f]or better or worse, this dual system limits the ability of both the water court and the water control agencies to address certain water quality issues.”³⁸⁵

Addressing water quality and water quantity issues “*needs to be a joint effort, and needs to be Colorado style, not Washington style.*”
— DON AMENT, Colorado Commissioner of Agriculture

The reality is that the Clean Water Act influences the supply and use of water and the exercise of water rights—something aptly illustrated by EPA’s Two Forks veto. The EPA believes that many present water quality problems are caused by “sedimentation and flow alterations within surface waters,” and that potential remedies include “optimum flow guidance, criteria, management targets or other measures” to protect

³⁸² 33 U.S.C. § 1370 (2000).

³⁸³ *PUD No. 1 of Jefferson County and City of Tacoma v. Washington Department of Ecology*, 141 S. Ct. 1900, at 1913 (Wash. 1994).

³⁸⁴ Colo. Rev. Stat. § 25-8-104 (2000).

³⁸⁵ *City of Thornton v. Bijou Irrigation Co.*, 926 P.2d 1, at 92 (Colo. 1996).

against both “excessive flows . . . and lack of base flows due to excessive water usages.”³⁸⁶

In Colorado, this relationship between water supply and quality often influences the demands placed on headwaters, as these relatively clean sources are favored by municipal providers for drinking water simply because less treatment is required. The difference is significant enough that new conveyance facilities have recently been constructed on the East Slope to deliver higher quality water for municipal purposes to Fort Morgan even though the region has a ready supply of plentiful, but lower quality, groundwater.³⁸⁷

“Water quantity and water quality are intertwined; it is kind of strange thinking to believe we can modify water quantity without impacting water quality.”

— JOHN WOODLING, Colorado Division of Wildlife

Despite the obvious relationship between water quantity and quality, many factors discourage thinking about these issues jointly. Perhaps most importantly, water rights are historically thought of as property rights, while water quality issues are historically thought of as public regulatory questions. The legal notions that apply to water rights primarily arose in the state’s common law, through the courts. The state’s water quality requirements are primarily a reaction to, and reflection of, the federal Clean Water Act, and thus came through more distant federal and state legislation. Additionally, the cadre of water professionals—attorneys, engineers, scientists,

³⁸⁶ *Water Quality Criteria and Standards Plan – Priorities for the Future*, Standards Plan, Jun. 1998, EPA 822-R-98-0003, at 41 and 43. 63 F.R. 47024 (1998).

³⁸⁷ The groundwater is contaminated as a result of agricultural pollution. No attempt is being made to clean up the groundwater, a project that would take decades. Interview with John Woodling, Sept. 9, 1999.

and consultants—that practice in the water rights area are generally different from those who practice in the water quality area.

Many large water users and water professionals believe that water quality concerns ultimately pose a potential limit to the exercise of their water rights. Since limits will diminish the value of affected water rights, many professionals believe it is best to delay such limits as long as possible. However, the assumption that water quality limits will decrease the value of all water rights may not be true. To the extent that water quality concerns limit the exercise of some water rights in the future, this factor will increase the value of other water rights that can be used. In the face of this uncertainty, many water users suggest that the integration of water quality and water quantity, if necessary, should move forward cautiously.

WATER QUALITY, WATER SUPPLY, AND GROWTH

Economic growth is a perennial concern in a state with a history of boom and bust cycles.³⁸⁸ Despite many recent examples to the contrary, water availability is often assumed to pose an existing or potential limit on economic activity in the state generally, as well as in individual watersheds.³⁸⁹ Water quality issues can be viewed as a limit on the use of available water, and consequently, as a potential impediment to growth. The relationship between water quality, water supply, and growth, however, suggests a

³⁸⁸ Lamm, Richard D. and Michael McCarthy, *The Angry West*, Boston: Houghton Mifflin, 1983.

³⁸⁹ For example, this assumption is implicit in the Colorado Farm Bureau’s call for the development of an additional 500,000 to 1,000,000 acre-feet of water to meet the demands of municipal and industrial growth in Colorado by the year 2100 to protect agricultural interests and avoid agricultural to municipal transfers. *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, pages 5-11.

much more complex and case-specific relationship.

Water diversions in Colorado harm water quality in several ways. One common mechanism entails the use of relatively pristine water, thereby decreasing flows and water quality below the point of diversion. A highly visible recent controversy involves Arapahoe Basin's snowmaking project that will withdraw relatively clean water from the North Fork of the Snake River, reducing the dilution of acid mine drainage present in the mainstem of the Snake River.³⁹⁰ Communities supplied with Windy Gap water are similarly concerned about water quality drawn from the Fraser River because of increased development from Winter Park to Granby.³⁹¹ Another situation involves the discharge of wastewater to streams with insufficient assimilative capacity. The South Platte River through and below Metro Denver is the obvious Colorado example.

“The effects of pollution from multiple streamflow depletions or uses usually are cumulative; successive use and reuse of water progressively deteriorate water quality.”

— DAVID H. GETCHES et al., *Controlling Water Use*

Similarly, agricultural return flows to receiving bodies with insufficient volume to assimilate the pollutants result in degraded surface and ground water. The Arkansas River below Pueblo, for example, is not an appropriate source for drinking water supplies because it is too salty; TDS (total dissolved solids) averages 2,500 ppm (parts per million) at the town of Lamar, located downstream of Pueblo.³⁹² Still other water quality problems can be traced to the importation of supplies of dubious quality.³⁹³ In each situation, a vast geographic separation can exist between the water quality problems and the

location of the user responsible for these problems. Additionally, the cause of one water quality problem may actually help solve another. For example, trans-basin diversions to the South Platte system dramatically increase the quantity of clean water flowing into municipal areas, although these same diversions may also allow new growth that further increases wastewater discharges received further downstream.

WATER QUALITY ISSUES RAISED BY CURRENT WATER MANAGEMENT TRENDS

A variety of demographic trends and emerging water management strategies influence, and are influenced by, water quality considerations. Activities such as water exchanges, efficiency improvements, groundwater use, changes in land and water uses, and improved wastewater management raise a host of complex issues all

³⁹⁰ The Water Quality Control Division issued a 401 Certification that the project complied with applicable state water quality standards, and the Water Quality Control Commission subsequently dismissed an appeal, finding it had no jurisdiction because the water quality impacts resulted from a withdrawal of water. The appellants then sued in District Court. *Colorado Wild, Inc. and Trout Unlimited v. Colo. Dept. of Public Health and Environment*, Complaint, Case No. 2001CV66 (Dist. Ct., Summit County, 2001). Ensuing settlement discussions led to an agreement whereby A-Basin will amend its proposed snowmaking to include improvements to water quality in the Cinnamon Gulch and Snake River drainages. At the request of the parties, the case was remanded to the Water Quality Control Commission. The Water Quality Control Division will issue a new 401 Certification, and the parties will then move to dismiss the case. Memorandum from David Holm to Doug Benevento, Aug. 2, 2001, and written comments of Melinda Kassen, Aug. 27, 2001. “This negotiated settlement avoids (some would say it only postpones) a legal confrontation concerning possible limits on the exercise of water rights in accordance with Colorado law to the detriment of existing and classified aquatic life uses that are to be protected under the Federal Clean Water Act.” Memorandum from David Holm to Doug Benevento, Aug. 2, 2001

³⁹¹ Interview with Eric Wilkinson, Jul. 20, 1999.

³⁹² Interview with David W. Robbins, Aug. 28, 1999.

³⁹³ For example, the Vidler Tunnel imports mineralized water from Peru Creek to the headwaters of the South Fork of Clear Creek. Electronic-mail communication from J. David Holm, Apr. 19, 2001.

likely to be further exacerbated by growth pressures.

THE IMPACT OF WATER EXCHANGES ON WATER QUALITY

Colorado law allows appropriators to transfer their water rights from one location to another using a court approved plan of augmentation or exchange.³⁹⁴ An exchange occurs when water is taken at a time and place when it would otherwise be out of priority, but other water rights that otherwise would be injured are satisfied with a like amount of replacement water from another source.³⁹⁵ In short, water is added to the stream at a downstream point to enable diversion of an equal amount of water at an upstream location.³⁹⁶ Exchanges are often an efficient way for a trans-basin diverter to maximize use of imported foreign water or to use fully consumable in-basin supplies, as well as the quality of the raw water fed to drinking water plants. A growing issue in exchanges, particularly in the South Platte basin, is the quality of water available after the exchange to in-priority appropriators.³⁹⁷ Often, municipalities exchange downstream effluent discharges for the withdrawal of cleaner, upstream water supplies.

By statute, Colorado requires that substituted water under an exchange “shall be of a quality ... so as to meet the requirements for which the water of the senior appropriator has normally been used.”³⁹⁸ Exactly what the statutes require is the subject of on-going litigation between the City of Thornton and Denver Water.³⁹⁹ Denver Water is seeking approval to exchange effluent

discharged from the Bi-Cities Wastewater Treatment Plant into the South Platte for (upstream) river water present at Denver Water’s Strontia Springs outfall and the Denver-Platte Canyon intake. While the effluent would meet the quantity of Thornton’s rights to South Platte water, Thornton argues that the quality of the exchange water does not meet the requirements for its normal use of the water, i.e., raw drinking water supply.⁴⁰⁰

Judge Hays, Water Division 1, has made several preliminary rulings in the case.⁴⁰¹ These rulings suggest that the water court can require that the water provided in the exchange exceed the minimum quality established by the Water Quality Control Act (WQCA). However, such an action is contingent upon the objecting party demonstrating that they have a need for the higher quality water, and that the standard provided in the WQCA is insufficient to meet that party’s normal requirements. This issue will undoubtedly reach the Colorado Supreme Court for resolution, a process that will likely take three to five years.

“Water courts, consultants, engineers, and attorneys have enough trouble with water rights. If we ever add water quality, we’ll have a mess.”
— ROBERT E. BROGDEN, Bishop-Brogden Associates

³⁹⁴ Colo. Rev. Stat. § 37-83-101 et seq (2000).

³⁹⁵ Colorado has shown a lot of leadership in the area of water exchanges. Exchanges are discussed in several places in this report, including Chapters Two and Nine.

³⁹⁶ Denver Water Board, *Water for Tomorrow, an Integrated Water Resource Plan*, 1997, page 17.

³⁹⁷ Interview with Ray Liesman, Sept. 15, 1999.

³⁹⁸ Colo. Rev. Stat. § 37-92-305(5) and § 37-80-120(3) (2000).

³⁹⁹ Case No. 96CW145 (Dist. Ct., Water Div. No. 1, 1996).

⁴⁰⁰ *Order Denying Applicant’s Motion For Partial Summary Judgment, And Order Granting In Part, And Denying In Part, The City Of Thornton’s Motion For Determination Of Questions Of Law*, Case No. 96CW145 (Dist. Ct., Water Div. No. 1, Dec. 17, 1997) page 4.

⁴⁰¹ The following discussion is primarily based on the *Order Re: Water Quality Standards, In The Matter Of The Application Of The City And County Of Denver [For Findings Of Due Diligence]*, Case No. 96CW 145 (Dist. Ct., Water Div. No. 1, Apr. 9, 1999).

EFFICIENCY

Increasing the efficiency of water use affects water quality in both negative and positive ways. The water quality of a fully appropriated stream can be degraded, for example, when senior water users make efficiency improvements that allow more juniors to divert because more water is available. Although the same amount of water is diverted overall, there is an increase in the number of users and an increased concentration of pollutants in the return flows from the increased use. This is the expected future scenario on the South Platte River.⁴⁰²

In agricultural regions, issues of efficiency and water quality are often closely associated with issues of soil fertility. In the Northern District, for example, inefficient irrigation practices may increase the amount of nitrogen fertilizer that is required, although the district combats this with its Irrigation Management Program which trains farmers in efficient irrigation practices. Some of this fertilizer invariably finds its way into streams and groundwater. Meanwhile in the lower Arkansas River basin, it is a common belief of farmers that if they irrigate more efficiently, salts that are present in the soil will come up and make the land unsuitable.⁴⁰³ Salts have in fact made some land unsuitable for growing corn, but irrigation inefficiency arguably accelerated the process rather than delaying it.

Whatever the cause, farmers feel the economic pinch of poor water quality. A pinto bean farmer, for example, may lose 20 percent of his yield because of increased salinity levels.⁴⁰⁴ The farmer may have to change crops, lose income, or purchase expensive new machinery. To the extent that these water quality problems are associated with lawful water uses, Colorado law

⁴⁰² Note that this mechanism only applies to a fully appropriated stream, the typical situation in Colorado and the West. If the stream is not fully appropriated, then efficiency improvements are likely to improve water quality.

⁴⁰³ Interview with John Woodling, Sept. 9, 1999.

⁴⁰⁴ Interview with Eric Wilkinson, Jul. 20, 1999.

makes no provision for collecting damages associated with poor water quality.

Colorado statute limits water use to “that amount of water that is reasonable and appropriate under reasonably efficient practices to accomplish *without waste* the purpose for which the appropriation is lawfully made.”⁴⁰⁵ A junior can take legal action against the wasteful use of water; what constitutes waste is, however, quite limited under current Colorado jurisprudence.⁴⁰⁶ It is theoretically possible that other non-injured parties, including the state, could also challenge wasteful practices.⁴⁰⁷ While Colorado courts have never confronted this issue in this manner, a court could find waste in the use of a water right, and could issue an injunction against further waste.⁴⁰⁸ Such a decision inherently raises water quality implications.

GROUNDWATER USE

Colorado is rich in groundwater resources. The availability of groundwater makes it the primary source of drinking water for many Colorado residents, through both public water supply systems and individual wells. Groundwater reliance is most prominent on the eastern plains, including fast growing areas in Douglas and Elbert Counties.⁴⁰⁹ This reliance on groundwater is expected to increase as the state continues to grow and people move outside municipal service boundaries. Many of these areas currently have groundwater that is better than the minimum water quality standards, however, the resource is vulnerable to pollution. Once the quality of the groundwater falls below standards, it is often too

⁴⁰⁵ Colo. Rev. Stat. § 37-92-103(4) (2000) (emphasis added).

⁴⁰⁶ Written comments of Melinda Kassen, Jul. 17, 2001.

⁴⁰⁷ Kassen, Melinda, “A Critical Analysis of Colorado’s Water Right Determination and Administration Act of 1969,” 3 *University of Denver Water Law Review* 58, at 67 (1999).

⁴⁰⁸ Interview with James N. Corbridge Jr., May 6, 2001.

⁴⁰⁹ Water Quality Control Commission, (*Preliminary Draft*) *Colorado Ground Water Quality Policy Discussion Paper*, No. 2, Jul. 7, 1999.

late for economically viable measures to prevent further degradation, or clean up the contamination.

Colorado has a groundwater protection program for drinking water supplies.⁴¹⁰ Forty groundwater protection areas have designated by the Water Quality Control Commission (WQCC).⁴¹¹ Many of these protective regulations were adopted in 1993-94 following an initiative by the state to locate and protect municipal groundwater supplies.⁴¹² This program, however, focuses on municipal supplies, and only incidentally offers protection for individual groundwater drinking water supplies. The WQCC is considering a number of options to further regulate groundwater quality,⁴¹³ however, several unresolved problems complicate efforts to protect groundwater supplies. First, there is no comprehensive database of aquifers that are used for drinking water supplies. Second, it is not entirely clear how groundwater quality can be protected without curtailing desirable economic activity, such as agricultural production. And third, it is not clear how protective standards can be enforced once adopted. The impact of conjunctive use projects on water quality is also a common source of uncertainty.⁴¹⁴

THE CHANGING LANDSCAPE

Population growth foretells an increasingly urbanized state with escalating levels of construction, residential development, commercial activity, streets and highways, parking lots, and other urban vestiges. These

changes impact water quality. Construction disturbs the land surface. Urbanization results in an increase in impervious land surfaces (e.g., streets, parking lots, and buildings).

Urbanization also means an increase in water contaminants from urban activities like transportation (oil, grease), green space chemicals (pesticides, fertilizers), and human waste. The major contaminants of concern are sediment, oil and grease, and total organic carbon.⁴¹⁵ Occasionally, these pollutants can enter streams suddenly, such as when storm sewers are flushed after a heavy rain. An event of this type caused fish kills on Boulder Creek.⁴¹⁶

Municipal population growth uses water differently than does the agricultural activities it supplants. When water is reallocated from irrigation to urban uses, the timing of its use changes as well as the location and character of use. Irrigation return flows occur during and immediately after the irrigation season, whereas municipal and industrial (M&I) uses occur year round, and so do the associated return flows. The flow regime of a stream where irrigation water is converted to M&I uses is more constant on a year round basis, but declines in the fall and early winter as compared to pre-urban flows. The consequence of these reduced irrigation return flows in the fall is a rise in late season stream temperatures, and associated decreases in water quality.

This is not to imply, of course, that the water quality impacts of agriculture are insignificant. To the contrary, agriculture has tremendous water quality impacts, and is largely unregulated since most agricultural pollution occurs as a result of exempt storm water discharges, or non-point source discharges such as return flows from irrigation.⁴¹⁷ For example, the U.S. Geological

⁴¹⁰ Colo. Rev. Stat. § 25-8-202-204 (2000).

⁴¹¹ 5 Colo. Code Regs. § 1002-42 (2000).

⁴¹² 5 Colo. Code Regs. § 1002-42.12 and 14 (2000).

⁴¹³ Water Quality Control Commission, (*Preliminary Draft*) *Colorado Ground Water Quality Policy Discussion Paper*, No. 2, Jul. 7, 1999, pages 4 – 9.

⁴¹⁴ Groundwater recharge is regulated by the State Engineer pursuant to authority delegated by S.B. 181 (Colo. Rev. Stat. § 25-8-202(7) (2000)).

⁴¹⁵ Water Quality Control Commission, (*Preliminary Draft*) *Colorado Ground Water Quality Policy Discussion Paper*, No. 2, Jul. 7, 1999.

⁴¹⁶ Interview with John Woodling, Sept. 9, 1999.

⁴¹⁷ 33 U.S.C. § 1362(14) (2000).

Survey estimates that about 300,000 tons of nitrogen enters the South Platte River basin each year.⁴¹⁸ Agricultural activity accounts for over three-quarters of the total, while effluent from municipal wastewater treatment plants contains about 2 percent of the total.⁴¹⁹ To put this in perspective, Denver Metro Wastewater's influent (not discharges) from a population of 1.4 to 1.5 million people totaled 6,226 tons in 2000.⁴²⁰ It is worth noting that agricultures' essentially unregulated discharges of nitrogen to the South Platte River basin *alone* are roughly equivalent to the wastewater of 47 million people, more than 11 times Colorado's total population!

Water quality can also be impacted by recreational activities that modify flow regimes. For example, snowmaking draws water from flowing streams when they are near their lowest flows, in the late fall and winter, and returns the water during the times of maximum flow, spring runoff. These changes adversely affect winter water quality because they reduce the amount of high-quality water in the streams.⁴²¹

WASTEWATER MANAGEMENT

Population growth means more water use, and in turn, more municipal wastewater production. Increased water use may also mean reduced

⁴¹⁸ United States Geological Survey, National Water Quality Assessment Program, "South Platte NAWQA Fact Sheet, Nutrients in the South Platte River, 1993-95," available at <http://co.water.usgs.gov/nawqa/splt/factsheets/FSLITKE.html> (visited Sept. 1, 2001). The South Platte River Basin includes small portions of southeast Wyoming and southwest Nebraska upstream of North Platte, Nebraska in addition to Colorado.

⁴¹⁹ United States Geological Survey, National Water Quality Assessment Program, "South Platte NAWQA Fact Sheet, Nutrients in the South Platte River, 1993-95," available at <http://co.water.usgs.gov/nawqa/splt/factsheets/FSLITKE.html> (visited Sept. 1, 2001).

⁴²⁰ Interview with John Van Royen, May 24, 2001.

⁴²¹ The U.S. District Court for Colorado recently dismissed an analogous suit involving the Arapahoe Basin Ski Area. Civil Action No. 00-WY-697-CB (U.S. Dist. Ct. Colo. 2000).

dilution flows in streams receiving increased wastewater discharge. While many existing facilities can accommodate some additional wastewater, additional treatment plants will likely be needed in several urban and rural areas. In the most rural areas, individual sewage disposal systems (e.g., septic systems) are also expected to proliferate in locales not served by regional wastewater systems.

In the next few decades, most population growth will occur in and around current urban areas along Colorado's Front Range. While these areas have elaborate regional wastewater infrastructures, their capacity is ultimately limited by economic and technical realities, and by the flow of receiving streams. In many cases, growth along the Front Range is likely to result in increased discharges into streams that already fail to meet existing water quality standards for their classified uses. These issues will likely be central to TMDL processes.

Dealing with increases in wastewater can be particularly difficult in more rural areas, as small wastewater treatment plants in general are less effective than larger facilities.⁴²² This is a function of several factors, the most important of which are the use of more limited, less effective treatment processes, overall lower levels of plant maintenance, and less sophisticated plant operation. The effluent from these small plants, while able to meet water quality requirements when installed, tends to decline in quality over time. Funding is often inadequate to ensure proper maintenance, and capital is not available to replace the plants when they reach the end of their useful lives. Developers are tempted to install the minimum necessary to meet legal requirements to sell their subdivisions, leaving an under-funded homeowners association or small special district without the resources to maintain and replace the systems over the long run.

⁴²² This is evidenced by a much greater rate of permit violations. Electronic-mail communication from J. David Holm, Apr. 19, 2001.

General wastewater treatment plant failures are not unheard of, and overall compliance by small plants is less than that of larger systems.⁴²³ These problems are expected to increase as Colorado continues to grow.

Despite the environmental and economic logic of regionally integrated wastewater systems, it is difficult to devise such systems in regions undergoing incremental and poorly planned growth. Even if a coordinated plan for “build-out” exists in a region, it can be difficult to finance development of a large wastewater infrastructure that will only be economically viable once all subdivisions have been built, tied in, and assessed their proportionate share of facilities.

An even greater challenge is regions served by individual sewage disposal systems (i.e., septic systems or ISDS units) (see Figure 10). Research for the Colorado Water Quality Control Commission suggests that in 1988, about 725,000 people in Colorado used individual sewage disposal systems, a figure that is expected to jump by 112,000 by 2020.⁴²⁴ At that time, the volume of wastewater flowing through septic tanks in Colorado is projected to exceed 100 mgd (million gallons per day)—roughly the average flow of the South Platte River through Denver.

While the majority of these systems in Colorado function properly, they still do not approximate

⁴²³ Smaller wastewater plants experience equipment failures due to limitations in maintenance procedures that lead to this result. Electronic-mail communication from J. David Holm, Apr. 19, 2001.

⁴²⁴ ISDS Issues Work Group, Water Quality Control Commission, State Board of Health, *(Draft White Paper) Individual Sewage Disposal Systems – Risk Assessment*, Aug. 25, 1999, page 1.

the effectiveness of a municipal wastewater treatment plant. Wastewater treatment by a properly sited septic system is approximately equivalent to that achieved by secondary treatment processes, whereas most municipal treatment plants are required to employ tertiary treatment.⁴²⁵ In some cases, this treatment to a secondary level is problematic due to the location of the systems. For example, most development in mountain communities occurs first along

“[S]ome local planning and zoning ordinances may require additional increments in water and wastewater systems with each development, though the idea that the developer must pay up-front for these infrastructural enlargements . . . is still controversial...”
— WILLIAM RIEBSAME, *Western Land Use Trends and Policy*

scenic alluvial valleys where groundwater is readily available, but is easily contaminated due to the physical proximity of septic systems to water sources. In other cases, the pollution threat of septic systems is one of cumulative impacts. The 20,000 individual sewage disposal systems in Douglas County, for example, discharge six million gallons of effluent per day.⁴²⁶

The water quality threat posed by septic systems is not effectively addressed by Colorado law, which instead regulates individual sewage disposal systems based only on very localized public health considerations.⁴²⁷ Set back requirements are based on the limited movement of bacteria through the soil, rather than the much greater distances associated with the movement of chemicals found in septic system effluents.

⁴²⁵ Interview with J. David Holm, Jul. 14, 1999. Secondary treatment employs microorganisms to take organic matter out of solution, forming a sludge, which can be settled out and removed. There are several forms of tertiary treatment to reduce the organic matter further. For more info, see *Sewage Treatment*, at <http://kola.dcu.ie/~enfo/bs/bs28.htm> (last visited Mar. 23, 2001).

⁴²⁶ Interview with J. David Holm, Jul. 14, 1999.

⁴²⁷ ISDS Issues Work Group, Water Quality Control Commission, State Board of Health, *Preliminary Summary of Individual Sewage Disposal System Issues*, Jun. 1999, page 2.

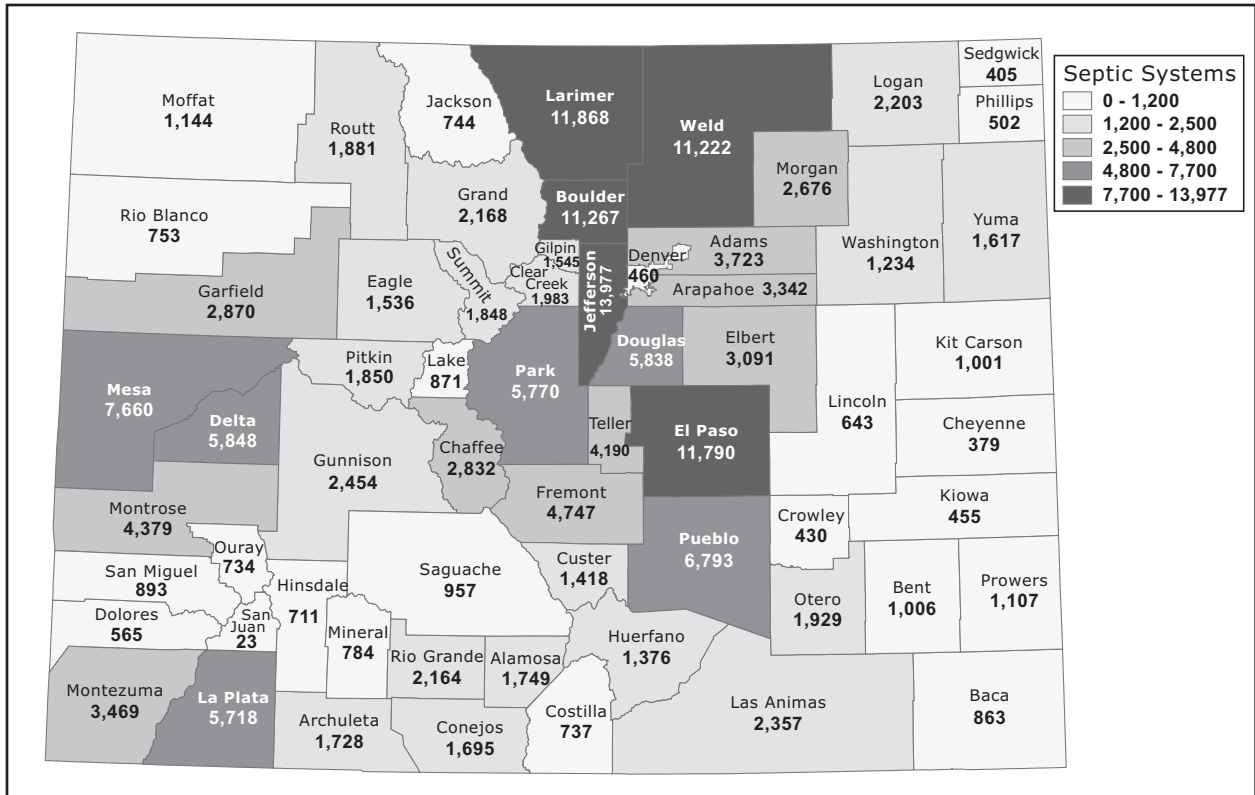


Figure 10a. Number of Septic Systems by County in Colorado, 1990.

Source: U.S. Census Bureau, 1990 Census.

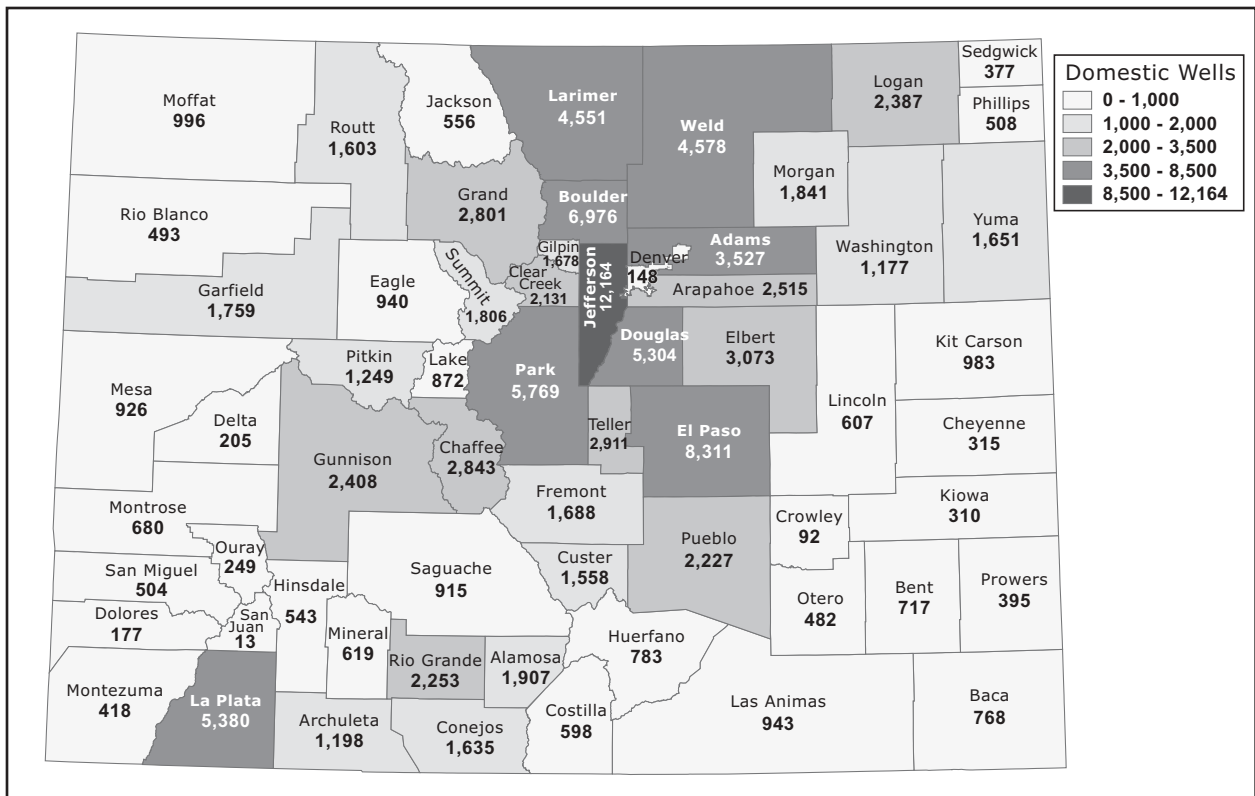


Figure 10b. Number of Domestic Water Wells by County, 1990.

Source: U.S. Census Bureau, 1990 Census.

Septic systems, for example, typically remove only 20 to 50 percent of nitrogen, which is a major source of water quality degradation in many Colorado lakes and streams (eutrophication in this situation). A variety of household chemicals (e.g., used motor oil, pesticides, antifreeze, detergents, solvents, and paints) also pass through these systems and ultimately into drinking water supplies.

Rules for the design and operation of individual sewage disposal systems are developed by the Colorado Department of Public Health and Environment, adopted by the State Board of Health, and, in most cases, are implemented by county and district boards of health.⁴²⁸ Systems with a design capacity of greater than 2,000 gallons per day capacity that discharge into state waters are required to obtain site approval and a discharge permit. Given the prominent role of local governments in program implementation and the chronic under-funding of these programs, the regulation of sewage systems in Colorado has been very inconsistent, ranging from highly technical, complex permit review and inspection programs to permit issuance by relatively untrained public officials or private contractors. Often, unregulated private engineers and/or building departments oversee the design of these systems, frequently without technical assistance. The Water Quality Control Division devotes only a 1/10th of a full-time equivalent employee to assist local governments with these issues.⁴²⁹

⁴²⁸ ISDS Issues Work Group, Water Quality Control Commission, State Board of Health, (*Draft White Paper*) *Individual Sewage Disposal Systems – Risk Assessment*, Aug. 25, 1999, page 3.

⁴²⁹ ISDS Issues Work Group, Water Quality Control Commission, State Board of Health, (*Draft White Paper*) *Individual Sewage Disposal Systems – Risk Assessment*, Aug. 25, 1999, pages 3 – 4.

GROWING LINKAGES BETWEEN WATER SUPPLY AND WATER QUALITY: THE ROLE OF EPA

Despite statutory language mandating a clear separation between water quality management and water supply issues, several current trends, as shown above, suggest growing conflict between these two spheres of activity. Perhaps the strongest proponent of greater integration is the U.S. Environmental Protection Agency (EPA).

Of particular note are intensifying EPA efforts to deal with problems associated with non-point source pollution. The TMDL process is not only emerging as the “hook” the agency needs to address non-point source pollution, but perhaps will also become a vehicle for the agency to involve itself in issues of instream flows and hydrologic modifications.⁴³⁰ The agency considers hydrologic modifications, such as the diversion and storage structures that manipulate flow regimes, as a significant source of water quality impairment. Consequently, many Colorado water users worry that the TMDL process may be used to limit otherwise lawful diversions and storage of water. This fear has been exacerbated by language in the federal Clean Water Action Plan suggesting that the authorized uses of water storage facilities located on federal lands (a common situation) be amended to protect or enhance watersheds.⁴³¹ Colorado’s TMDL program, however, shows no signs of moving to limit hydrologic modifications.⁴³²

⁴³⁰ This discussion is primarily based on an interview with Mark T. Pifher, Jun. 24, 1999.

⁴³¹ U.S. Environmental Protection Agency and the U.S. Department of Agriculture, *Clean Water Action Plan: Restoring and Protecting America’s Rivers*, EPA-840-R-98-001, Wash., D.C.: Government Printing Office, 1998.

⁴³² Colorado Water Quality Control Division, Colorado Department of Public Health and Environment, *Total Maximum Daily Load Process*, http://www.cdphe.state.co.us/wq/tmdl_status.htm, (last modified Jul. 10, 2001).

Along similar lines, the EPA has also expressed a desire to address “hydrologic imbalances created by various industries and land operations,” perhaps through tools such as minimum instream flow standards, groundwater recharge criteria, and the regulation of peak flow discharges.⁴³³ Such concerns may also play a role in ongoing debates about dam removal in the West.⁴³⁴ Certainly, any effort to remove or modify diversion structures raises a host of complex and highly contentious issues, e.g., What are the Fifth Amendment takings implications of decisions to remove structures? How will authorized uses be satisfied after the removal of structures? Where will any necessary replacement water supplies be found, and what will be the environmental impacts associated with its use or development? How will the modification or removal of projects for environmental purposes impact the working of the overall network of reservoirs and conveyance facilities? How will interstate compact delivery obligations be affected?”⁴³⁵

Several additional federal agencies, laws, and programs promise to force still greater integration between water quality and quantity. One obvious example is the Endangered Species Act. A recent Memorandum of Agreement between the U.S. Fish & Wildlife Service and EPA outlines procedures for increased agency coordination in species recovery efforts, including a process for reviewing state water quality standards and, potentially, the regulation of flow regimes.⁴³⁶ Similarly, the regulation of wetlands under Section 404 of the Clean Water Act offers a mechanism for EPA to involve the U.S. Army Corps of Engineers in efforts to inject water

quality concerns into issues of growth and water development. Lands that are most desirable for development are often adjacent to water bodies. Additionally, forthcoming rules associated with implementation of the Safe Drinking Water Act amendments of 1996 will likely impact many state water systems, particularly with respect to radiologic contaminants (i.e., uranium and radon).⁴³⁷ Colorado River salinity is also a growing concern. The Bureau of Reclamation suggests that by 2015, salinity levels will exceed the numeric standards and damages could rise from \$500 to \$750 million per year to \$1.5 billion annually.⁴³⁸

⁴³³ *Advanced Notice of Proposed Rulemaking*, (ANPR) 63 F.R. 36741, at 36774 (1998).

⁴³⁴ 40 C.F.R. § 131.10(g)(4) (Jul. 1, 2000).

⁴³⁵ Mark T. Pifher, “*Old Battles, New Weapons – The Impact of Flow Criteria*,” presentation to the 24th Annual Colorado Workshop, Gunnison, Colorado, Jul. 28-30, 1999, page 7.

⁴³⁶ 64 F.R. 2742 (1999); Mark T. Pifher, “*Old Battles, New Weapons – The Impact of Flow Criteria*,” presentation to the 24th Annual Colorado Workshop, Gunnison, Colorado, Jul. 28-30, 1999, page 8.

⁴³⁷ Colorado Municipal League, *Colorado Municipalities*, Mar. – Apr. 1999, page 7.

⁴³⁸ Bureau of Reclamation, “Colorado River Basin Salinity Control Program Overview,” available at <http://dataweb.usbr.gov/html/crwq.html> (visited Aug. 24, 2001).

CHAPTER SIX: INTERSTATE OBLIGATIONS

Colorado is the ultimate headwaters state. Four of the country's great rivers—the Colorado, Platte, Arkansas and Rio Grande—arise here. Smaller rivers and streams also have their headwaters in Colorado, including the La Plata, Animas, and Republican Rivers, and Costilla and Pot creeks. All of these rivers and streams originate in Colorado; all flow out of the state.

COMPACTS AND LEGAL ENTITLEMENTS

Colorado is not legally entitled to use all of the water found in the state. The state's rivers and streams are apportioned between Colorado and downstream states. The state's entitlements are described in compacts and in equitable apportionment decrees adopted by the U.S. Supreme Court.

Colorado is a party to nine interstate compacts that allocate water resources in specific river basins, i.e., the Colorado River, La Plata River, South Platte River, Rio Grande, Republican River, Costilla Creek, Upper Colorado River, Arkansas River, and Animas-La Plata.⁴³⁹ While a compact is a binding agreement among states, congressional consent is required before negotiations can occur and also for final ratification following passage by the affected state legislatures. Congressional ratification confers the status of federal law on compacts. The same process may amend a compact, although Congress may be able to unilaterally

amend a compact by exercising its enumerated powers.⁴⁴⁰

Several Supreme Court decisions also help to define the state's entitlement to its interstate rivers, through equitable apportionment decrees, compact interpretations, and rulings on the states' compliance with interstate obligations. Decisions of particular importance include *Nebraska v. Wyoming*,⁴⁴¹ *Wyoming v. Colorado*,⁴⁴² *Texas and New Mexico v. Colorado*,⁴⁴³ and *Kansas v. Colorado*.⁴⁴⁴

FULLY DEVELOPED BASINS

Colorado's compact entitlements limit the amount of water that can be consumed within the state. In some basins and sub-basins, these interstate obligations can conceivably limit opportunities for growth—particularly those forms of growth that are water intensive. Colorado estimates that seven of nine major river basins are currently at or near their depletion limits on the basis of in-state use.⁴⁴⁵

- Arkansas River Basin
- Rio Grande River Basin
- La Plata River Basin

⁴⁴⁰ *Pennsylvania v. Wheeling & Belmont Bridge Company*, 59 U.S. 421 (1855). Also see Corbridge, James N., Jr., and Teresa A. Rice, *Vranesh's Colorado Water Law, Revised Edition*, Niwot: University Press of Colorado, 1999, page 538.

⁴⁴¹ 325 U.S. 589 (1945).

⁴⁴² 353 U.S. 953 (1957).

⁴⁴³ 391 U.S. 901 (1968).

⁴⁴⁴ 185 U.S. 125 (1902).

⁴⁴⁵ *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, page 4-3.

⁴³⁹ Chapter 2 includes a complete listing of these compacts and their associated citations.

- Republican River Basin
- Costilla Creek Basin
- North Platte River Basin
- Laramie River Basin

In these basins, any new development will have to be supplied by reallocating water from existing uses.

“Colorado, as a headwaters state, has plenty to worry about with its neighbors’ water needs.”

— WILLIAM A. PADDOCK, Carlson, Hammond and Paddock

DISPUTE OVER THE ARKANSAS RIVER

One example of a fully utilized river is the Arkansas River, which flows out of southeastern Colorado into Kansas. Recent litigation has determined that Colorado has consumed more water than allowed under its equitable apportionment with Kansas.⁴⁴⁶ As a result, some irrigated land has been permanently taken out of production to meet the state’s interstate obligations.⁴⁴⁷

Compensating for past violations was the recent focus of the case. After reviewing the recommendations of the Special Master, the Supreme Court awarded cash damages, including interest from the date the suit was filed, to Kansas.⁴⁴⁸ Colorado may owe Kansas over \$20 million in compensation.

⁴⁴⁶In *Kansas v. Colorado*, the Supreme Court held that Colorado had exceeded its equitable apportionment under its compact with Kansas (Colo. Rev. Stat. § 37-69-101–106, 2000) between 1950 and 1996. 121 S.Ct. 2023, at 2027 (U.S. 2001).

⁴⁴⁷ Interview with David W. Robbins, Jun. 26, 2000. In addition, appropriators have purchased unused trans-basin return flows from the cities of Colorado Springs and Pueblo and the SECWCD to replace their depletions.

⁴⁴⁸ *Kansas v. Colorado*, 121 S.Ct. 2023, at 2029, 2030, 2032 (U.S. 2001).

Conflict is brewing over Arkansas River water quality as well. Kansas adopted a sulfate standard of 250 mg/l to protect the quality of the High Plains Aquifer, perhaps less than a fifth of ambient river levels at the state line (Colorado’s comparable standard is 2000 mg/l).⁴⁴⁹ Kansas proposes that Colorado meet its standard by delivering water from John Martin Reservoir by pipeline directly to Kansas, water that is now used for irrigation in Colorado and flows out-of-state in the river channel. EPA approved both standards, but acknowledged in writing that it lacks the authority to control flow regimes or non-point sources to meet interstate standards.⁴⁵⁰

ROOM TO GROW? THE COLORADO AND SOUTH PLATTE SYSTEMS

The major river systems supplying the Denver Metro area—the Colorado and South Platte Rivers—both have the potential for additional depletions. As discussed later in this chapter, Colorado is entitled to at least 3.079 million acre-feet per year from the Colorado River. Existing development within Colorado has a maximum consumptive use of 2.6 million acre-feet.⁴⁵¹ Therefore, the state likely has about 480,000 acre-feet of additional depletions theoretically available on the Colorado River.

The South Platte situation is similar. The South Platte River Compact limits Colorado’s diversions of water rights junior to June 14, 1897 during the irrigation season (April 1 to October 15) when flows at the Julesburg gauge (near the Colorado-Nebraska state line) fall below 120 cubic feet per second.⁴⁵² The South Platte River at Julesburg has an annual average flow of 1.441

⁴⁴⁹ Interview with J. David Holm, Aug. 23, 2001.

⁴⁵⁰ Interview with Mark T. Pifer, Aug. 24, 2001.

⁴⁵¹ *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, page 4-3.

⁴⁵² Colo. Rev. Stat. § 37-65-101 (2000).

million acre-feet, compared to present depletions of 1.472 million acre-feet within Colorado.⁴⁵³ This imbalance is only possible because of Colorado River imports into the basin of approximately 336,000 acre-feet per year.⁴⁵⁴ Theoretically, the cushion provided by these imports should allow additional depletions in the South Platte in Colorado of about 250,000 acre-feet per year while still satisfying the state-line flow standard.⁴⁵⁵

COLORADO RIVER ISSUES

NAVIGATING THE LAW OF THE RIVER

The Colorado River is governed by a complex body of statutes and court decisions collectively known as the “law of the river.” The centerpiece of this framework is the Colorado River Compact, which divided the river into an upper basin and a lower basin at Lee Ferry, Arizona⁴⁵⁶ (see Figure 11). In the compact, the upper basin states—Colorado, Wyoming, Utah, New Mexico, and part of Arizona—agreed to deliver to the lower basin 75 million acre-feet in each consecutive 10-year period.⁴⁵⁷ In effect, the upper basin states guaranteed the lower basin states an average annual flow of 7.5 million acre-feet per year, an arrangement that was believed to represent an equal division among the upper and

lower basins.⁴⁵⁸ Unfortunately, the compact was negotiated in 1922 after an exceptionally wet period, causing negotiators to believe the river carried as much 16.4 million acre-feet per year.⁴⁵⁹ It is now generally accepted that the average yield is less than 14 million acre-feet per year.⁴⁶⁰ Given the structure of the compact, this shortfall is born by the upper basin states.

A further complication is provided by the Mexican Water Treaty of 1944,⁴⁶¹ which calls for 1.5 million acre-feet of Colorado River water to be delivered annually to Mexico. This eventuality was anticipated in the Colorado River Compact, which suggests that these flows should be provided from surplus or, if surplus flows are insufficient, from equal contributions from the upper and lower basins.⁴⁶² The responsibility of the federal government in such situations is a source of some confusion and controversy, partially since the federal government is responsible for determining if surplus conditions exist.

“South Platte issues are solved on the back of the Western Slope.”

— LEE ROZAKLIS, Hydrosphere Resource Consultants

⁴⁵³ The statistics used in this discussion are taken from *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, Table 3b.

⁴⁵⁴ Different estimates are provided by other sources. For example, the Colorado Division of Water Resources estimates imports at 413,000 acre-feet/annually (*South Platte/Republican River Basin Facts (Draft)*, September 2000, page 3). Estimates reflect different accounting customs and different time periods.

⁴⁵⁵ Calculated from present basin outflow of 304,000 acre-feet per year, less maximum required compact deliveries of 47,045 acre-feet per year.

⁴⁵⁶ Colo. River Compact, Art. II(g) (1922) [Colo. Rev. Stat. § 37-61-101 (2000)].

⁴⁵⁷ Colo. River Compact, Art. III(d) (1922) [Colo. Rev. Stat. § 37-61-101 (2000)].

⁴⁵⁸ Colo. River Compact, Art. III(a) (1922) [Colo. Rev. Stat. § 37-61-101 (2000)].

⁴⁵⁹ Lindgren, David E., “Colorado River: Are new approaches possible now that the reality of overallocation is here?” 38 *Rocky Mountain Mineral Law Institute* 25, at 25-29 (1992).

⁴⁶⁰ Cook, Wayne, Executive Director, Upper Colorado River Commission, “75th Anniversary Colorado River Compact Symposium Proceedings,” Water Education Foundation, 1997, pages 37-38.

⁴⁶¹ 59 Stat. 1219; T.S. 994, 3. U.N.T.S. 313 (1944).

⁴⁶² Colo. River Compact, Art. III(c) (1922) [Colo. Rev. Stat. § 37-61-101 (2000)].



Figure 11. Colorado River Basin.

Map by Cartography Lab,
 Department of Geography,
 University of Colorado - Boulder.

The states of the upper basin adopted an Upper Colorado River Compact in 1948.⁴⁶³ This Compact allocates water among the upper basin states based on percentages of available flows, rather than specifying exact fixed quantities. Colorado is entitled to 51.75 percent of the upper basin's apportionment.⁴⁶⁴ This share computes to 3.0 to 3.8 million acre-feet per year (depending on how one views flow and how the Mexican water obligation will be allocated). Most of the state's water professionals subscribe to the 3 million acre-foot figure, at least for planning purposes.

A variety of highly complex and potentially salient issues permeate through the law of the river.⁴⁶⁵

However, none of the basin states appear anxious to address those issues until absolutely necessary, as the process will inevitably be highly contentious. Additionally, the existing ambiguity in the law allows each state to maintain its own, presumably favorable, interpretation.⁴⁶⁶ Several of the areas of ambiguity could have a significant influence on the quantity of Colorado's apportionment. Many of these issues involve the Mexican treaty obligation, the upper basin delivery requirement, the use of tributary waters in the lower basin (particularly from the Gila River in Arizona), and fulfillment of the Article III (b) provision allowing the lower basin to increase consumptive

uses by one million acre-feet given available supplies. Additionally, should a need arise to curtail some upper basin uses in order to satisfy the delivery obligation at Lee Ferry, it is somewhat unclear if the upper basin states would individually be liable for providing supplies at a level proportional to the allocations specified in the Upper Colorado River Compact, or if some other mechanism would be employed.⁴⁶⁷ These issues have gone unresolved only because the

upper basin states have not used their full entitlements, thereby providing sufficient slack in the system to prevent these issues from ripening. Continued growth, perhaps married with a severe drought, is likely to eventually force resolution.⁴⁶⁸

“How are we going to give less water to more people?”

— WILLIAM A. PADDOCK,
Carlson, Hammond and
Paddock

Another source of confusion in the law of the river can be traced to Supreme Court's 1908 ruling in *United States v. Winters*,⁴⁶⁹ in which the court held that when the government created Indian reservations, it reserved “for them the waters without which their lands would have been useless.”⁴⁷⁰ Up to 25 Indian tribes have claims on the Colorado River.⁴⁷¹ Existing case law suggests that these water claims are of an amount sufficient to serve the practicably irrigable acreage on the reservations.⁴⁷² This is potentially a huge amount of water, possibly enough to consume the entire flow of the

⁴⁶³ 63 Stat. 21 (1949). Colo. Rev. Stat. §§ 37-62-101–106 (2000).

⁴⁶⁴ Colo. River Compact, Art. III (1922) [Colo. Rev. Stat. § 37-61-101 (2000)].

⁴⁶⁵ These issues are explored in detail in several sources, including: Lawrence J. MacDonnell, David H. Getches, and William C. Hugenberg Jr., “The Law of the Colorado River: Coping with Severe Sustained Drought,” 31(5) *Water Resources Bulletin* 825-836 (1995); David H. Getches, *Water Law in a Nutshell*, St. Paul: West Publishing Company, 1997; and David E. Lindgren, “Colorado River: Are new approaches possible now that the reality of overallocation is here?” 38 *Rocky Mountain Mineral Law Institute* 25 (1992).

⁴⁶⁶ Getches, David H., *Water Law in a Nutshell*, St. Paul: West Publishing Company, 1997, page 5.

⁴⁶⁷ Note that the Upper Colorado River Compact is administered by a compact commission, whereas the Colorado River Compact has no such administrative vehicle.

⁴⁶⁸ Lindgren, David E., “Colorado River: Are new approaches possible now that the reality of overallocation is here?” 38 *Rocky Mountain Mineral Law Institute* 25, at 29 (1992).

⁴⁶⁹ 207 U.S. 564 (1908).

⁴⁷⁰ *Arizona v. California*, 373 U.S. 546, at 600 (1963) discussing *United States v. Winters*, 207 U.S. 564 (1908).

⁴⁷¹ Getches, David H., “Colorado River Governance: Sharing Federal Authority as an Incentive to Create a New Institution.” 68 *University of Colorado Law Review* 573, at 593 (1997).

⁴⁷² *Arizona v. California*, 373 U.S. 546, at 600-01 (1963).

Colorado River.⁴⁷³ Additionally, these rights generally have a priority date corresponding to the date at which the reservations were established.⁴⁷⁴ Thus, these claims predate most other water appropriations on the river, and predate the Colorado River Compact. Primarily due to chronic poverty on the reservations and the difficulty in raising either public or private investment capital, the vast majority of these rights have never been exercised.

This wealth of legal (and political) uncertainties surrounding the true allocation of the Colorado River has been the basis of countless studies and speculation. Any plan to further exploit Colorado's unused entitlement to the river must be conditioned on assumptions about the outcome of these issues.

DEMANDS ON THE AVAILABLE WATER

LOWER BASIN THIRST

The Colorado River Compact is a “beneficial use” compact. Therefore, until water is used by the upper basin states, it is available for use by the lower basin states.⁴⁷⁵ To date, the upper basin states have never used their full entitlements, with the “unused” water flowing downstream for storage primarily in Lakes Powell and Mead. Given the high level of water in storage, the Department of the Interior customarily declares the system to be in “surplus,” which allows lower basin states—historically California—to regularly withdraw more than the 4.4 million acre-feet allocated to the state by the compact

⁴⁷³ For example, estimates of the claims of the Navajo Nation are as great as five million acre-feet annually. Water Education Foundation, *Western Water*, Sept./Oct. 1997, page 13.

⁴⁷⁴ *United States v. Adair*, 723 F.2d 1394 (9th Cir. 1983), certification denied, 460 U.S. 1015 (1983).

⁴⁷⁵ Interview with Justice Gregory Hobbs, Jr., Jun. 25, 1999.

and the Supreme Court.⁴⁷⁶ California has regularly drawn over 5 million acre-feet a year⁴⁷⁷ from the Colorado River, and has developed a dependence on unused upper basin entitlements.

Under pressure from the other basin states⁴⁷⁸ and the Department of Interior,⁴⁷⁹ California began planning in the 1990s to reduce its use of the Colorado River. After many fits and starts, California adopted the so-called “4.4 Plan,” which calls for California to reduce its withdrawals to its 4.4 million acre-feet apportionment over a 15-year period.⁴⁸⁰ Secretary of Interior Babbitt signed the Record of Decision implementing Colorado River Interim Surplus Criteria⁴⁸¹ that contains both incentives and sanctions if California fails to make specified progress to reduce its use of the Colorado River to its entitlement by 2016.⁴⁸² Achieving this goal would undoubtedly require greater efficiency and conservation measures within California, particularly within the agricultural sector. The Imperial Irrigation District alone utilizes over 3 million acre-feet annually of Colorado River water—approximately the same amount of water allocated to the state of Colorado. California population growth, of course, poses its own challenge; the state estimates that counties served with Colorado River water will grow by 4,585,000 new residents by 2015, from just over 20 million to nearly 25 million souls, a 23 percent growth rate in 15 years.⁴⁸³

⁴⁷⁶ *Arizona v. California*, 84 S.Ct. 755 (1964).

⁴⁷⁷ California's use totaled 5,322,652 acre-feet in 1996, 5,250,119 acre-feet in 1997, and 5,045,228 acre-feet in 1998. *Water Strategist*, Oct. 15, 1999.

⁴⁷⁸ Letter from the States of Arizona, Colorado, New Mexico, Utah and Wyoming Governors' Representatives on Colorado River Operations to Bruce Babbitt, Secretary of Interior (May 27, 1998).

⁴⁷⁹ Babbitt, Bruce, then Secretary of Interior, address to the Colorado River Water Users Association, Dec. 18, 1997.

⁴⁸⁰ McClurg, Sue, “A Colorado River Compromise,” *Western Water*, Water Education Foundation, Nov./Dec. 2000, page 4.

⁴⁸¹ 66 F.R. 7772 (Jan. 25, 2001).

⁴⁸² *Water Strategist*, January 2001, page 11.

⁴⁸³ Data from State of California, Department of Finance, *Interim County Population Projections*, Jun. 2001, available at www.dof.ca.gov (visited Jun. 10, 2001).

INTRA-STATE DEMANDS

Demands for Colorado River water continue to increase within Colorado. Where and how this entitlement is used is within the discretion of the state. Much of the current and anticipated new demand is for municipal use along the Front Range. Trans-basin diversions from the Colorado River mainstem to eastern Colorado presently average about 419,000 acre-feet per year;⁴⁸⁴ additional trans-basin diversions are potentially a major source to meet future growth demands. Given current economic trends, it seems likely that East Slope demands will continue to escalate at a pace faster than those on the West Slope.

Several factors (as discussed earlier) are likely to at least temper further trans-basin diversions of Colorado River water to the Front Range. One of those factors is environmental protection. As home to several endangered species, there is a strong ecological imperative for maintaining West Slope flows at certain minimum levels. For example, efforts to augment flows at the 15-mile reach may ultimately constrain trans-basin diversions to the East Slope, even though those diversions would likely have analogous ecological benefits for endangered species habitat downstream on the South Platte system. The continued growth of recreation-oriented towns on the West Slope is likely to provide a further stimulus for limiting Colorado River exports to the East. Finally, a resurgence of natural resources development on the West Slope could conceivably keep Colorado's remaining Colorado River entitlement on the West Slope,⁴⁸⁵ although this is considered unlikely. The political, legal, and infrastructure costs of such diversions are also real impediments. To the extent that these factors

⁴⁸⁴ Colorado Water Conservation Board, *Colorado River Mainstem Basin Facts (Draft)*, Jan. 2000, page 3.

⁴⁸⁵ Interview with Eric Kuhn, Jul. 1, 1999.

keep water on the West Slope, the state may never consume its full compact entitlement.

USE IT OR LOSE IT . . . OR SELL IT?

Many Coloradans argue that the state must move aggressively to develop 100 percent of its Colorado River entitlement or risk permanently losing rights to these waters.⁴⁸⁶ There is a fear that downstream states, principally California, that have historically relied on surplus flows not used by Colorado under the compact, will assert

“[There’s] going to be tremendous pressure on the Colorado River from both slopes.”

— FRED ANDERSON, former President, Colorado Senate

a legal claim (for a prescriptive right) to this water.⁴⁸⁷ Advocates of this position fear that when Colorado is ready to use its compact entitlement, the superior Congressional power of the downstream states will result in an interstate reallocation that reduces

Colorado's share. However, not only is this argument undermined by questionable political assumptions, but it also suffers from the fact that Colorado currently has no use for its entire compact entitlement. Building water projects to divert this water for future demands does not use any water now and ultimately does nothing to change the amount of surplus water flowing out of state once the new reservoirs are filled.

One potential way to “use” the entitlement is to lease or sell these resources to those downstream states that have already come to depend upon these resources. Interstate marketing may be a means to institutionalize this process to provide greater certainty for the lower basin and compensation to the upper basin.⁴⁸⁸ The prospect

⁴⁸⁶ Interview with Don Ament, Feb. 1, 2000.

⁴⁸⁷ However, the United States Supreme Court has repeatedly stated that the courts have no power to substitute judicial notions for the express terms of a compact. Interview with David W. Robbins, Jun. 28, 1999. *New Jersey v. New York*, 523 U.S. 767, at 810-11 (1999).

⁴⁸⁸ Under the right circumstances, interstate water marketing may also be a consideration for the Rio Grande. Unlike the Colorado River, Colorado utilizes its full compact entitlement of River Grande water. However, strong

of interstate water marketing is extremely controversial in Colorado, but is an idea that will not likely dissipate given existing regional patterns of water demand and economic growth.⁴⁸⁹ Investors are already contacting Colorado water professionals to identify attractive water rights for investment purposes.⁴⁹⁰

Several other factors encourage arrangements of this nature. For example, there are few opportunities in Colorado to consumptively use those waters already devoted to maintaining instream flows at the 15-mile reach. By selling water used for this and related environmental purposes to downstream interests, the economic value of this water is at least partially recouped.⁴⁹¹ Similar situations may also exist regarding compliance with water quality regulations.⁴⁹² Additionally, the location of some senior users near the Colorado-Utah state line ensures that some entitlements may never be fully captured in state. For example, the water system of the Grand Valley Irrigation Company (GVIC) requires large diversions to deliver water to shareholders. Since the company has a senior right, it can command water from upstream diverters to meet its call at Cameo. Over 100,000 acre-feet of the water can be saved at the headgate of GVIC and left in the river by increasing the efficiency of the system.⁴⁹³ This

municipal growth in the lower basin (i.e., below Albuquerque) potentially provides an economic incentive for reallocating water from irrigation use in Colorado.

Paddock, William A., address to the Colorado Water Congress Summer Convention, Aug. 27, 1999.

⁴⁸⁹ Interview with David C. Hallford, Aug. 27, 1999.

⁴⁹⁰ Interview with Robert E. Brogden, Sept. 8, 1999.

⁴⁹¹ There may be exceptions where the environmental needs are fully within Colorado and sufficiently upstream from the state line that the water dedicated to environmental purposes can be used before flowing out of state. However, no obvious examples of this situation come to mind, while many examples that reduce the state's interstate use are apparent, e.g., the Upper Colorado River Endangered Fish Recover Program.

⁴⁹² Interview with David C. Hallford, Aug. 27, 1999.

⁴⁹³ Interview with Robert E. Brogden, Sept. 8, 1999.

Planned irrigation system improvements in the Grand Valley Irrigation District will save 19,400 acre-feet per year, which will be released from Green Mountain Reservoir to meet the

water currently flows unused out of the state, thereby benefiting lower basin users at the expense of junior Colorado appropriators. Interstate marketing could potentially allow Coloradans to receive compensation from these lower basin beneficiaries.

Despite some theoretical benefits, state officials have typically demonstrated the belief that interstate marketing is not in the best interest of Colorado, and is likely a violation of Colorado water law. Of particular concern to the state are efforts by private individuals to market Colorado River water to downstream states.⁴⁹⁴ These activities are prohibited by a Colorado water export statute⁴⁹⁵ enacted after the Supreme Court decision in *Sporhase v. Nebraska*.⁴⁹⁶ That case, dealing with Nebraska groundwater, indicates that in order for a state to ban water exports, the prohibition must be closely tailored to a legitimate state purpose, such as protecting the state in times of shortage, legal obligations such as compacts, and a claim to public ownership of the resource.⁴⁹⁷ Language in Colorado's water export statute limits exports to instances that "will not deprive the citizens of this state of the beneficial use of waters apportioned to Colorado by interstate compact or judicial decree."⁴⁹⁸ This provision appears to place Colorado's entitlements off-limits to private marketing projects, but has not been litigated and may be unconstitutional under *Sporhase*.⁴⁹⁹

instream flow needs of the fish. Bureau of Reclamation, *Grand Valley Water Management, Final Environmental Assessment*, Sept. 1998, page 3.

⁴⁹⁴ Letter from James S. Lochhead, Colorado Special Commissioner on Colorado River Matters, to Jack F. Ross and Anthony W. Williams, Attorneys for Roan Creek Proposal [for interstate marketing of Colorado River water to Nevada], Apr. 29, 1993.

⁴⁹⁵ Colo. Rev. Stat. §§ 37-81-101-104 (2000).

⁴⁹⁶ 458 U.S. 941 (1982).

⁴⁹⁷ Corbridge, James N., Jr. and Teresa A. Rice, *Vranesh's Colorado Water Law, Revised Edition*, Niwot: University Press of Colorado, 1999, pages 405-406.

⁴⁹⁸ Colo. Rev. Stat. § 37-81-101(3)(c) (2000).

⁴⁹⁹ Written comments of David H. Getches, Jul. 2001.

The potential interstate marketing of tribal water rights offers another set of legal uncertainties. In a few cases, Congress has authorized the lease of Indian reserved water rights for off-reservation use as part of the settlement of Indian water rights litigation.⁵⁰⁰ In 1998, the Chemehuevi Indian Tribe in California entered into a 25-year agreement with the Southeastern Nevada Water Company to lease 5,000 acre-feet per year for off-reservation use in Nevada. Potentially, a similar authority could be granted to tribes in Colorado, including perhaps the Southern Ute and Ute Mountain Ute Tribes scheduled to be served by the proposed Animas-La Plata water project. It is undetermined if off-reservation leasing of tribal water rights can occur without express congressional authorization. Colorado River Indian Tribes are intensely interested in water marketing.⁵⁰¹ Should such arrangements ever come to fruition, the nature of Colorado's interstate obligations could be modified in a variety of ways.

⁵⁰⁰ *Water Intelligence Monthly*, Jul./Aug. 1998, page 8. P.L. 106-285, 114 Stat. 878 (2000), P.L. 106-163, 113 Stat. 1778 (2000).

⁵⁰¹ Hansen, Gary, Attorney, Colorado River Indian Tribes, "75th Anniversary Colorado River Compact Symposium Proceedings," *Western Water*, Water Education Foundation, 1997, pages 102-04.

CHAPTER SEVEN: NEW DEVELOPMENT

The traditional solution to growing water demands has been the development of new supplies. In the South Platte basin where most of Colorado's new growth is occurring, very few opportunities exist for increased diversions. The river is already over-appropriated, and what water remains is so junior that it will only yield water during exceptionally wet years, and then only for a limited time. Even the exercise of remaining conditional water rights, some more than 50 years old, may not be of much real value in most years, given the presence of more senior users on the South Platte.

The key to transforming junior water rights into useable water supplies is often the development of new storage that allows water providers to take advantage of wet years and seasonal differences between natural flows and demands. Colorado, like many other western states, has plenty of water to meet current and future human needs, but only to the extent that spring runoff can be captured for use year-round.⁵⁰² New storage, at least until recently, has meant new reservoirs. Storage sites are generally located in the mountains where water can be stored for gravity release to urban areas. Most of the good reservoir sites in Colorado were identified long ago, and most were filed upon, often by more than one entity. These conditional water storage rights—which total an enormous amount of water—could meet any foreseeable needs from growth if they were developed.

Public attitudes towards reservoirs, however, have changed. While many Coloradans support the storage of water for times of the year when water is not available and during droughts,

reservoirs are no longer universally viewed as an economic boon, or necessarily as a recreational amenity. Instead, reservoirs have come to be seen by many as environmentally destructive, and as impeding recreational uses, such as fly fishing, rafting and kayaking. Additionally in Colorado, reservoir construction has typically meant the export of water from the West Slope to the Front Range. Over time, many disgruntled West Slope residents have concluded that it is preferable to let water flow unused out-of-state than to send it over the divide to service the Front Range.

Most agree that the era of big on-stream reservoir development is over, or at least has entered a dormant period of indeterminate length. Although construction of a large off-stream reservoir would also face many hurdles, many water managers believe this type of project is still feasible.⁵⁰³ In Colorado, the culminating event marking the change in public values toward large on-stream reservoir projects was EPA's final veto of the Two Forks Reservoir Project in Waterton Canyon on the South Platte.⁵⁰⁴ This reservoir would have met the water needs of many different entities in the Denver metro area into the future. Eagle County's refusal to permit Colorado Springs' and Aurora's Homestake II project quickly followed.⁵⁰⁵ This "triumph of local control" by Eagle County over the right to develop conditional water rights may have come

⁵⁰² Interview with Hal D. Simpson, Jun. 27, 1999.

⁵⁰³ Written comments of Carol Ellinghouse, Jul. 2001.

⁵⁰⁴ Klein, Christine A., "On Dams and Democracy," 78 *Oregon Law Review* 641, at 703 (1999).

⁵⁰⁵ *City of Colorado Springs v. Board of County Commissioners of Eagle County*, 895 P.2d 1105 (Colo. App. 1994), certification denied *City of Colorado Springs v.*

as an even bigger shock to the “water buffaloes” than the demise of Two Forks. At least the veto of Two Forks could be blamed on “environmental bureaucrats” cloistered in Washington, D.C.,⁵⁰⁶ whereas Colorado’s own Supreme Court refused to review Eagle County’s authority to block the crown jewel of the Colorado Springs’ and Aurora’s water systems.⁵⁰⁷ A similar mix of environmental and local control interests have since derailed Arapahoe County’s efforts to develop water in the Gunnison basin (the Union Park Project),⁵⁰⁸ and appear to have ended efforts to export groundwater from the San Luis Valley.

The current political climate has prompted many water providers to look toward other strategies, namely water reallocation and conservation, to meet future demands.

“We’ve developed enough water resources in the West.”
— BRUCE BABBITT, former Secretary of the Interior

However, while these alternatives are part of the solution, most water professionals believe that new water development will ultimately also be needed to meet the demands from Colorado’s population growth. Economic and political forces will necessitate new developments of some kind; the questions to be answered regard the terms under which development will occur, the mechanisms that will be employed, and the order in which development occurs.⁵⁰⁹ Currently viable alternatives to big dams and trans-

mountain diversions appear to involve an expanded use of small and unconventional reservoirs (e.g., gravel pits, off-stream reservoirs), trans-basin diversions to the Front Range that also provide benefits to the basin-of-origin, and proposals reliant on the use of groundwater and the conjunctive use of groundwater and surface water.

FINDING WATER FOR SURFACE WATER DEVELOPMENT

THE SIGNIFICANCE OF CONDITIONAL WATER RIGHTS

Most of Colorado’s current and anticipated population growth is occurring in the Denver Metro area. Denver Water has amassed a wealth of senior water rights and has developed an impressive water storage and delivery infrastructure to serve current and projected residents within its service area. Many surrounding communities, however, are not so fortunate. The extent to which Denver Water could further expand its service area to assist its neighbors is somewhat unclear, as this raises difficult policy issues for the agency, as well as legal uncertainties regarding the city’s Blue River imports. The Blue River Decree⁵¹⁰ governing Denver’s use of its Colorado River supplies restricts these waters for use in the “metropolitan area,” a requirement that can be interpreted in several ways.⁵¹¹

The most farsighted communities long ago filed for conditional water rights in anticipation of future growth. As of 1990, conditional direct flow rights totaled 250,600 cfs (cubic feet per

Board of County Commissioners of Eagle County, 516 U.S. 1008 (1995).

⁵⁰⁶ EPA had ample support for the veto in Colorado within the environmental community and general public to sustain its decision.

⁵⁰⁷ *City of Colorado Springs v. Board of County Commissioners of Eagle County*, 895 P.2d 1105 (Colo. App. 1994), certification denied Jun. 5, 1995.

⁵⁰⁸ *Board of County Commissioners of Arapahoe County v. Crystal Creek Homeowner’s Association*, 14 P.3d 325 (Colo. 2000).

⁵⁰⁹ Interview with Charles B. “Barney” White, Oct. 7, 1999.

⁵¹⁰ *In the Matter of the Adjudication of Priorities of Water Rights in Water District No. 36 for Purposes of Irrigation, Stipulation of October 5, 1955, Consolidated Cases, Civil No. 5016 and 5017*, Paragraph 4(g), U.S. Dist. Ct. for Colo. 1955)

⁵¹¹ Interview with Charles B. “Barney” White, Oct. 7, 1999.

second), compared to absolute rights of 310,300 cfs. Conditional storage rights totaled 21,754,000 acre-feet as of 1990, nearly three times the total quantity of absolute storage rights, 8,748,000 acre feet. This compares to a statewide available supply of 15,600,000 acre-feet.⁵¹² What these figures illustrate is that there is little or no water left to appropriate if one assumes that even a portion of the conditional rights is developed.⁵¹³ Nowhere is this more evident than on the mainstem of the Colorado River where the Colorado River Conservation District, local conservancy districts, oil shale companies, and Front Range providers all hold large conditional direct flow and storage rights on the river.

Many of the newer communities in the metro area do not have senior conditional water rights, and have instead settled for junior direct-flow water rights on the South Platte and on the headwaters of the Colorado River. The reliability of these rights is limited and will likely deteriorate further as more senior conditional rights are developed. This provides a disincentive for full development and utilization of these junior rights, which arguably is contrary to the notion of maximum utilization of the state's water.⁵¹⁴ Further, if senior conditional rights preclude the development of junior rights, they may also prevent full development of the state's compact entitlements. These impacts of extensive conditional water rights are serious and unintended, and are particularly troubling given

⁵¹² *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, page 4-6.

⁵¹³ The only stream systems that were not over-appropriated as of 1995 were some portions of the Gunnison River, some portions of the Yampa River, a very small area of the Colorado mainstem below Grand Junction, and very limited areas in Southwestern Colorado. Colorado Division of Water Resources, "Water Rights in Colorado," page 1, no date available.

⁵¹⁴ *Fellhauer v. People*, 447 P.2d 986, at 994 (Colo. 1969).

the age—50 to 75 years—of the conditional rights that may never be fully developed.⁵¹⁵

Colorado law attempts to minimize the abuse of conditional water rights. Legal diligence requirements⁵¹⁶ are intended "to prevent the hoarding of priorities 'to the detriment of those seeking to apply the state's water beneficially.'"⁵¹⁷ As part of diligence proceedings, Colorado's "can and will" test and the "anti-speculation doctrine" are applicable.⁵¹⁸ These requirements may resolve the status of some conditional rights, although few conditional rights fail to pass muster.⁵¹⁹ One strategy to resolve old conditional rights is for the Water Court to impose conditions when granting diligence. If the conditions are not met, the right could potentially be declared abandoned.⁵²⁰ Abandonment could also potentially be argued in

⁵¹⁵ Interview with Justice Gregory J. Hobbs, Jr., Jun. 25, 1999.

⁵¹⁶ "The measure of diligence is the steady application of effort to complete the appropriation in a reasonably expedient and efficient manner under all the facts and circumstances." Colo. Rev. Stat. § 37-92-301(4)(b) (2000).

⁵¹⁷ *Dallas Creek Water Co. v. Huey*, 933 P.2d 27, at 35 (Colo. 1997).

⁵¹⁸ *Dallas Creek Water Co. v. Huey*, 933 P.2d 27, at 37 (Colo. 1997). *Northern Water Conservancy District v. Chevron*, 986 P.2d 918, at 923 (Colo. 1999). *Northern Colorado Water Conservancy District v. Oxy*, 990 P.2d 701, at 708-709 (Colo. 2000).

⁵¹⁹ For example, the Uncompahgre Water Users Association recently filed a diligence application for a 1901 water right. *Application for Finding of Due Diligence: Gunnison Tunnel and South Canal*, Case No. 01CW82 (Dist. Ct., Water Div. No. 4, 2001). In addition, Colorado law provides that "neither *current economic conditions* beyond the control of the applicant which adversely affect the feasibility of perfecting a conditional water right or the proposed use of water from a conditional water right nor the fact that one or more *governmental permits or approvals have not been obtained* shall be sufficient to deny a diligence application, so long as other facts and circumstances show diligence are present." Colo. Rev. Stat. § 37-92-301(c) (2000) (emphasis added). Thus, the court upheld 1966 and 1970 conditional water rights adversely affected by economic conditions in the oil shale industry that may not warrant development before 2085. *Northern Colorado Water Conservancy District v. Chevron*, 986 P.2d 918, at 922 (Colo. 2000).

⁵²⁰ *City of Thornton v. Bijou Irrigation Co.*, 926 P.2d 1, at 51 (Colo. 1996). The Water Courts' authority in this area is not clear. Interview with Judge Jonathan W. Hays, Sept. 24, 1999.

situations where a conditional right is put to a fundamentally different purpose or location than originally intended, an issue that has not been litigated.⁵²¹ Environmental constraints that may limit development could also be considered in the diligence process.⁵²² A related question is whether the Water Court should consider conditional rights when ruling on water available for appropriation. In *Arapahoe County v. Crystal Creek Homeowner's Association*, the Colorado Supreme Court held that “courts may not consider conditional water rights under which no diversions have been made” when applying the “can and will” doctrine to determine whether the applicant has proved that the river contains sufficient unappropriated water.⁵²³

It is difficult to identify and remove conditional rights that are unlikely to be exercised since these rights are highly valuable, and holders of these rights have a strong economic incentive to maintain the perception that these rights are part of future water supply plans. Thus, some suggest that legal requirements for diligence should be tougher.⁵²⁴ Alternatively, incentives may be necessary to reduce the roadblock on new developments caused by excessive holdings of conditional water rights. Denver Water, for example, has suggested that it might give up some of its conditional rights in exchange for gaining certainty with respect to other rights.⁵²⁵ Another inducement might be to legislatively allow owners of conditional rights owners to trade a percentage of their rights for the grant of a finding of due diligence. This could reduce unnecessary expenditures made merely to

demonstrate diligence, while increasing the amount of unappropriated water. While someone can only appropriate the water they need,⁵²⁶ there is reason to believe that appropriators maximize their original filings to hedge against future uncertainties. Thus a trade may be an attractive option.

REGIONAL AVAILABILITY OF WATER

Despite current levels of appropriation and outstanding conditional rights, additional diversions are potentially possible on both the South Platte and Colorado Rivers. In contrast, the Arkansas River basin, La Plata River basin, Republican River basin, Laramie River basin, Rio Grande River basin, Costilla Creek basin, and North Platte River basin are currently near the limits of development under the compacts.⁵²⁷

The availability of additional water in the South Platte River Compact is governed by two factors: compliance with the South Platte River Compact, and the availability of additional trans-mountain diversions (of Colorado River water) to serve new growth. In the lower reaches of the South Platte (in northeastern Colorado), diversions junior to June 14, 1887 are limited during the irrigation season (April 1 to October 15) when the flow at the Julesburg gauging station is less than 120 cfs. Whether or not this constraint precludes additional diversions is the subject of some debate.⁵²⁸ Thornton has filed for junior rights in anticipation of water being available for municipal use, as have the Northern District, the

⁵²¹ Interview with Justice Gregory J. Hobbs, Jr., Jun. 25, 1999. The right to change a conditional storage right to a different location has been litigated, but the issue of abandonment was not raised. *City of Thornton v. Clear Creek Water Users Alliance*, 859 P.2d 1348 (Colo., 1993).

⁵²² Written comments of Melinda Kassen, Jul. 17, 2001.

⁵²³ *Board of County Commissioners of Arapahoe County v. Crystal Creek Homeowner's Association*, 14 P.3d 325, at 333 (Colo. 2000).

⁵²⁴ Written comments of David H. Getches, Jul. 2001.

⁵²⁵ Interview with Hamlet J. “Chips” Barry, III, Jun. 29, 1999.

⁵²⁶ *City of Thornton v. Bijou Irrigation Co.*, 926 P.2d 1, at 37-40 (Colo. 1996).

⁵²⁷ *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, page 1.

⁵²⁸ One major study concludes that additional water is likely available for use in months other than Jul. and August.

Colorado Water Development Study, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, pages 4-4 to 4-5. Other observers express skepticism about the availability of any additional diversions. Interview with David W. Robbins, Jun. 28, 1999.

Central Water Conservancy District, and Brighton.⁵²⁹

In the Colorado River basin, approximately 450,000 acre-feet of water available under the compact remains to be developed.⁵³⁰ Existing trans-basin diversion projects in the Colorado River headwaters could divert some of this water to meet current and expected demands on the Front Range if South Platte storage existed.⁵³¹ One obvious mechanism for this would be the proposed Two Forks Dam because of its location upstream of most municipal growth. The existence of available Colorado River water, combined with growing Denver Metro area demands, suggests that this proposal may reappear at some later date.⁵³²

Another source of water to serve Front Range growth would involve diversions from the Gunnison River,⁵³³ a Colorado River tributary.⁵³⁴ From an engineering standpoint, diversions from the Gunnison to the Front Range are relatively easy compared to some other potential West Slope water sources; however, these diversions are complicated by the presence of endangered species, and by the political and legal issues associated with conditional water rights and

trans-basin diversions.⁵³⁵ Before its legal demise, the Union Park project championed by Arapahoe County promised to store 900,000 acre-feet of water to make 100,000 acre-feet available annually for trans-basin diversions. Trans-basin diversions originating in Blue Mesa Reservoir could theoretically accomplish similar goals as the Union Park project, although reductions in federal hydropower production would need to be addressed.⁵³⁶ In the Union Park case, the court noted that the Bureau of Reclamation could contract 240,000 acre-feet of water in the marketable pool for in-basin or trans-basin consumptive use.⁵³⁷ The Colorado Water Partnership, supported by Arapahoe County and Parker Water and Sanitation District and others, has jumped on this statement to promote trans-basin diversion to the Front Range.⁵³⁸

A NEW ERA IN WATER STORAGE DEVELOPMENT

Developing new storage is exceedingly difficult in the modern era of environmental regulations, reduced federal water development subsidies, the exhaustion of good dam sites, and increased competition for limited water supplies.⁵³⁹ This has many implications for water providers. For example, one key legal implication is the increased challenge of proving economic feasibility in due diligence hearings concerning

⁵²⁹ Interview with Mark Koleber, Jul. 15, 1999.

⁵³⁰ *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, page 4-3.

⁵³¹ Interview with Eric Wilkinson, Jul. 20, 1999.

⁵³² Interview with Fred Anderson, Jul. 19, 1999.

⁵³³ The availability of water in the Gunnison River Basin for trans-basin diversion is a subject of considerable controversy and litigation. *Board of County Commissioners of Arapahoe County v. Crystal Creek Homeowner's Association*, 14 P.3d 325, at 340 (Colo. 2000). The availability of Gunnison River water may, however, be affected by federal reserved rights for the Black Canyon of the Gunnison National Park, and endangered Colorado River fishes. Address to the Colorado Water Congress Summer Convention of John H. McClow, Aug. 24, 2001. See also Colorado River Water Conservation District, letter to Hon. Gale Norton, Aug. 2, 2001. *Concerning the Application for Water Rights of: The United States of America*, Case No. W-437 (Dist. Ct., Water Div. No. 4. 2001). See discussion of *The Unmet Challenge of Fish Recovery* in Chapter Four.

⁵³⁴ Interview with J. David Holm, Jul. 14, 1999.

⁵³⁵ Interview with Eric Wilkinson, Jul. 20, 1999.

⁵³⁶ Interview with David W. Robbins, Jun. 28, 1999.

Interview with Charles B. "Barney" White, Oct. 7, 1999.

⁵³⁷ *Arapahoe County Commissioners v. Crystal Creek Homeowner's Association*, 14 P.3d 325, at 342 (Colo. 2000). The statement is arguably not binding law, but merely dicta since it was not essential for the court's holding the case. Comments of John H. McClow to the Colorado Water Congress Summer Convention, Aug. 24, 2001.

⁵³⁸ Interview with Fred Anderson, Aug. 9, 2001. Interview with Richard D. MacRavey, Aug. 23, 2001.

⁵³⁹ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992.

conditional storage rights.⁵⁴⁰ A project that is not economically feasible may not meet the “can and will” statute.⁵⁴¹ A related policy implication is that the rising costs of new storage increases the relative viability of other water supply options, namely agricultural-to-urban water transfers and other conversions of senior rights.⁵⁴² While these strategies can provide municipal interests with the expanded supplies and drought buffers they desire, these reallocations can shift the risk of water shortages to rural communities. New storage, in contrast, can theoretically provide additional supplies and certainty for all water users—with the possible exception of environmental needs.

This mix of legal, economic, political, and environmental considerations has fundamentally changed the nature of new storage projects, causing water providers to focus on smaller projects that have fewer socio-economic and environmental impacts, on joint-use facilities that enlist the support, rather than the opposition, of affected residents, and on underground storage. Compared to large projects, small projects such as Eagle Park Reservoir present more manageable challenges in terms of regulatory compliance and area-of-origin controversies. They also reduce risks, as a municipality’s water supply future is not tied to a highly complex, expensive and controversial project, but rather is linked to a suite of smaller projects that is likely to yield at least some wet water.⁵⁴³

⁵⁴⁰ Interview with Attorney General Kenneth Salazar, Jul. 15, 1999.

⁵⁴¹ Colo. Rev. Stat. § 37-92-305(9)(b) (2000). *Matter of Board of County Commissioners of Arapahoe County*, 891 P.2d 952, at 960-61 (Colo. 1995). However, Colo. Rev. Stat. § 37-92-301(4)(c) (2000) states that “current economic conditions beyond the control of the applicant which adversely affect the feasibility of a conditional water right or the proposed use of water from a conditional water right . . . shall [not] be considered sufficient to deny a diligence application.” *Northern Water Conservancy District v. Chevron*, 986 P.2d 918 (Colo. 1999).

⁵⁴² Interview with Steve Arveschoug, Jun. 30, 1999.

⁵⁴³ Interview with Douglas Kemper, Jun. 23, 1999.

THE NEEDS OF HEADWATER COMMUNITIES

Finding water for headwater communities can be a particularly vexing challenge, as many local towns and resorts possess water rights that are junior to distant Front Range cities.⁵⁴⁴ Compared to major Front Range water users, mountain resort towns and ski areas developed much later. Thus, despite being located in regions where physical supplies are abundant, many headwaters communities know they face future water shortages.⁵⁴⁵ This state of affairs is evidenced, in part, by the cost of water in some areas. Some of the most expensive water in Colorado is in Summit County, headwaters of the Blue River, a major tributary of the Colorado River, and site of Denver Water’s Dillon Reservoir. Yet with all this prevalent water, water costs \$20,000 to \$25,000 per acre-foot,⁵⁴⁶ up to 25 times more than lower on the Colorado River, although comparable to other basins (e.g., Clear Creek) where competition for existing supplies is intense.⁵⁴⁷ This anomalous situation can be traced to several factors.

One set of factors is associated with the economic tradition of the county. Summit County does not have much of an agricultural history, given its predominately mountainous terrain and high elevation. It also had a relatively brief period of mining development. For these reasons, few senior water rights exist to support local water uses. The appropriation of water to support the skiing industry also occurred comparatively late in Summit County than in other resort areas, in part because the county’s

⁵⁴⁴ Even among relatively old Front Range cities, agricultural and mining interests often preceded municipal interests in securing direct flow rights to local streams. This drove many Front Range cities across the mountains to the West Slope as early as the 1920s to appropriate supplies to meet growth, primarily from the headwaters of the Colorado River.

⁵⁴⁵ Interview with Glenn E. Porzak, Aug. 30, 1999.

⁵⁴⁶ Interview with Glenn E. Porzak, Jun. 22, 2001.

⁵⁴⁷ Written comments of Carol Ellinghouse, Jul. 2001.

ski areas initially served “day skiers” from the Front Range. Extensive real estate development and population growth came later when the area became a destination resort. Similarly, the demand for snowmaking water did not emerge until Summit County became a destination area. In the meantime, Colorado adopted a minimum stream flow program, and the Colorado Water Conservation Board began filing for water rights under state-granted authority. These minimum streamflow rights are, in many instances, senior to headwater communities’ appropriations for growth and snowmaking.⁵⁴⁸

Another set of factors relates to the geography of Summit County. One important consideration is the location of Green Mountain Reservoir, part of the West Slope’s “compensatory storage” provided as part of the Colorado Big-Thompson Project. Many senior water rights on the West Slope are satisfied by releases from the reservoir, which lies just downstream of Summit County. The location and priority of the reservoir’s water rights draw water through Summit County communities and resorts. Another important geographical influence is the location of the county line, which follows the drainage divide between the Colorado River and South Platte River basins. This positioning makes Summit County one of the easiest places to physically initiate trans-basin diversions to serve the Denver Metro area. Denver and Colorado Springs both have major diversion projects that originate in Summit County. The water rights of these two municipalities predate the advent of the ski and resort economy and thus are senior.

Headwater communities often need to employ highly creative strategies to find water. One

⁵⁴⁸ Where the minimum stream flow rights are junior, such as Keystone, senior snowmaking appropriations limit the CWCB’s appropriations to levels that are insufficient to support the fishery. Written comments of Melinda Kassen, Jul. 17, 2001.

*“Water, water every where,
nor any drop to drink.”*
 — SAMUEL T. COLERIDGE, *The Rime of the Ancient Mariner*

example is the Clinton Gulch Agreement, which is based on a revised operation of the Clinton Gulch Reservoir originally built by Climax Molybdenum to protect its tailings ponds.⁵⁴⁹ In the 1990s, the towns of Breckenridge, Dillon, Fraser, Frisco, Granby, Silverthorne and Winter Park, Summit and Grand Counties, the ski areas of Breckenridge, Copper Mountain, Keystone and Winter Park, and Denver Water entered an agreement to purchase and cooperatively use the 4,250 acre-foot storage capacity of the reservoir.⁵⁵⁰ The reservoir helps headwaters resorts and the ski areas meet their physical water supply needs, particularly during the winter. Denver Water benefits because the Agreement helps the provider optimize the yield of its West Slope water rights.⁵⁵¹

Most ski areas and mountain resort communities on the Upper Colorado River mainstem relied on water from Green Mountain Reservoir through the early 1980s.⁵⁵² Green Mountain Water is delivered under 35-year contracts with the Bureau of Reclamation. While these contracts are renewable, delivery costs escalate and are subject to changing federal policies and priorities, such as environmental requirements. The water supply for the ski areas and ski towns is accordingly less reliable than the trans-basin water rights held by Front Range providers. This situation creates an incentive for headwaters areas to find more reliable sources, and an opportunity for trans-basin diverters who can

⁵⁴⁹ Interview with Glenn E. Porzak, Aug. 30, 1999.
⁵⁵⁰ Towns of Breckenridge, Dillon, Fraser, Frisco, Granby, Silverthorne and Winter Park, Summit and Grand Counties, Breckenridge, Copper Mountain, Keystone and Winter Park ski areas, Denver Board of Water Commissioners, Northern Colorado Water Conservancy District, Colorado River Water Conservation District, and Middle Park Water Conservancy District, *Clinton Reservoir – Fraser River Water Agreement*, Jul. 21, 1992. *Clinton Gulch-Fraser River Purchasers’ Agreement*, Jul. 21, 1992; and *Clinton Gulch Purchase Agreement*, Jul. 21, 1992.
⁵⁵¹ Interview with Glenn E. Porzak, Jun. 27, 2000.
⁵⁵² Interviews with Glenn E. Porzak, Aug. 30, 1999 and Jun. 22, 2001.

supply more reliable water to these headwaters areas in exchange for their acquiescence to other water projects. The Eagle Park Project is an example of this symbiosis between the ski resorts and trans-basin diverters.⁵⁵³ Similar to the Clinton Gulch Reservoir, the Eagle Park Reservoir is a reclaimed mining pond now devoted to serving the needs of headwaters communities. The project was completed in 1999, and provides approximately 3,000 acre-feet of storage useful for augmenting low flows.⁵⁵⁴

GRAVEL PITS ALONG THE SOUTH PLATTE RIVER

An increasingly popular water storage option in the South Platte basin is the conversion of former sand and gravel pits to small reservoirs.⁵⁵⁵ A string of pits along and downstream of the Denver Metro region provide water providers with increased flexibility in the use of South Platte water. The pits are particularly useful for implementing water exchanges and out-of-priority diversions, as water that is diverted upstream on the South Platte can often be replaced downstream with water from these former quarry sites. Many of these pits are downstream of major municipal users, and store water of relatively low quality.⁵⁵⁶ Nonetheless, these releases are normally of sufficient quality to satisfy downstream obligations, especially since many of those users are agricultural.

Gravel pits are attractive projects because they are simple, pose no major regulatory obstacles, generate virtually no public opposition, and are easier to permit than conventional reservoir

⁵⁵³ See discussion of the Eagle River in Chapter Three.

⁵⁵⁴ Eagle Park River and Sanitation District, "Eagle Park Reservoir Project Completed," *District News*, Jun. 29, 1999.

⁵⁵⁵ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, pages 8-36 to 8-37.

⁵⁵⁶ Interview with Mark Koleber, Jul. 15, 1999.

projects.⁵⁵⁷ The environmental damage has already occurred, and redevelopment of the pits may provide environmental benefits, like reduced erosion. Not surprisingly, these qualities have prompted a race among municipal water providers to acquire existing pits along the South Platte.⁵⁵⁸

On the downside, these pits can be expensive. Estimates for 12 gravel pits for the City of Thornton, for example, range between \$2,675 and \$4,000 per acre-foot for 38,100 acre-feet of storage, a \$100 to \$150 million project.⁵⁵⁹ An arrangement between Denver Water and South Adams County Water and Sanitation District will result in over 12,000 acre-feet of storage, at a cost of \$2,500 per acre-foot.⁵⁶⁰ Translated into firm annual yield, the cost is on the order of \$7,500 per acre-foot since Denver needs about three acre-feet of storage for each acre-foot of yield.⁵⁶¹ Gravel pits also require pumping to access stored water, a significant cost not associated with conventional on-stream storage.⁵⁶² Additionally, pits typically require liners to ensure that these reservoirs are not fed by seepage from alluvial aquifers. Liners are often constructed of clay found at the site. In other cases, a trench filled with an impermeable slurry of cement/bentonite or bentonite forms a "wall" around the pit that controls seepage. Despite these costs, development of gravel pit storage is often cheaper than other water development options.

⁵⁵⁷ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-37.

⁵⁵⁸ Interview with Mark Koleber, Jul. 15, 1999.

⁵⁵⁹ *Application of the City of Thornton*, Dist. Ct., Water Division 1, Case No. 91CW126 (1991).

⁵⁶⁰ Electronic-mail communication from Ed Pokorney, Aug. 20, 2001.

⁵⁶¹ Electronic-mail communication from Ed Pokorney, Aug. 20, 2001.

⁵⁶² *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-37.

TRIBAL WATER DEVELOPMENT IN SOUTHWESTERN COLORADO

An additional strategy for pursuing new water development and storage is to link projects to tribal water rights settlements. In the San Juan basin of southwestern Colorado, significant reserved water rights are held by two tribes: the Ute Mountain Utes and Southern Utes. These rights relate back to their 1868 treaty with the United States. Not only are these rights senior, they also are believed to be large, defined by law as sufficient for the reservation's "practicable irrigable acreage."⁵⁶³ Additionally, Indians are not restricted in their use of water even though the quantification is based on irrigation use.⁵⁶⁴ While off-reservation use normally requires congressional authorization, the Utes are exempt from this requirement.⁵⁶⁵ Recognizing the havoc that could result if the tribes exercised their rights, the tribes negotiated a settlement in a desire to be good neighbors.⁵⁶⁶ The agreement was embodied in the Colorado Ute Indian Water Rights Settlement Act of 1988,⁵⁶⁷ which provided for water for the tribes from the Animas-La Plata and Dolores.⁵⁶⁸

The Animas-La Plata project has a tortured history. The Bureau of Reclamation project, initially approved in the 1960s, shrank as the big dam era ended. Opponents have roundly criticized the economics, environmental impacts, and politics of the project.⁵⁶⁹ On the other hand, the need to honor treaty commitments provides a powerful justification for moving forward, despite a price tag in excess of \$700 million.⁵⁷⁰

As a result of opposition, Animas-La Plata was repeatedly scaled back. The so-called Animas-La Plata Lite Project, a compromise developed through a gubernatorial-sponsored process in the 1990s, proposed substantial cuts to the Congressionally authorized depletions of 145,920 acre-feet.⁵⁷¹ Secretary of Interior Babbitt balked, and made a counter proposal, but facilities to deliver irrigation water, or to deliver water from the Animas River basin to the La Plata River basin, were lacking.⁵⁷² Opposition continued, and the ultimate incarnation of the project, known as Animas-La Plata Ultra-Lite, provides just 57,100 acre-feet for municipal and industrial purposes only,⁵⁷³ which is the amount that can be depleted without causing jeopardy to endangered fishes.⁵⁷⁴ Each tribe will receive 16,525 acre-feet. In addition, the Navajo Nation will receive 2,340 acre-feet, cities in New Mexico 10,400 acre-feet, the Animas-La Plata Conservancy District 2,600 acre-feet, the State of Colorado 5,230 acre-feet, and the La Plata Conservancy District of New Mexico 780 acre-feet.⁵⁷⁵ In this form, Congress approved the project in the waning days of 2000.⁵⁷⁶

The centerpiece of the project is the 120,000 acre-foot off-stream Ridges Reservoir, fed by a pumping pipeline from the Animas River near Durango. The Ute Mountain Ute and Southern Ute tribes will tap Tribal Resources Funds to protect, acquire, enhance, or develop natural resources for the benefit of the Tribes and their members. Water stored in the reservoir will be released back to the Animas River for municipal and industrial use, while another pipeline will

⁵⁶³ *Arizona v. California*, 373 U.S. 546, at 600 (1963).

⁵⁶⁴ *Arizona v. California*, 440 U.S. 919, at 422 (1979).

⁵⁶⁵ 102 Stat. 2973 § 5 (1988).

⁵⁶⁶ Telephone interview with Frank E. "Sam" Maynes, Jun. 25, 1999.

⁵⁶⁷ P.L. 100-585, 102 Stat. 2973 (1988).

⁵⁶⁸ 102 Stat. 2973 § 4(a) (1988).

⁵⁶⁹ Hinchman, Steve, "Animas-La Plata: The last big dam in the West," *High Country News*, Mar. 22, 1993.

⁵⁷⁰ Marston, Ed, "Cease-fire Called on the Animas-La Plata Front," *High Country News*, Nov. 11, 1996.

⁵⁷¹ P.L. 90-537 § 501(c) (1968). Bureau of Reclamation, *Animas-La Plata Project, Final Environmental Impact Statement*, App. H, Vol. 2, page 5 (1996).

⁵⁷² Telephone interview with Frank E. "Sam" Maynes, Jun. 25, 1999.

⁵⁷³ P.L. 106-554 § 302(a)(1)(A) (2000).

⁵⁷⁴ Telephone interview with Frank E. "Sam" Maynes, Jun. 25, 1999.

⁵⁷⁵ P.L. 106-554 § 302(a)(1)(A) (2000).

⁵⁷⁶ P.L. 106-554 (2000).

carry water to the Navajo Nation.⁵⁷⁷ None of the water will be used for irrigation.⁵⁷⁸

RESERVOIR EXPANSION AND OFF-STREAM STORAGE

Several other strategies can be employed to develop storage. A number of examples are in the Arkansas River basin. One option is to expand the storage capacity of existing reservoirs. The SECWCD is moving forward with a plan to enlarge Pueblo Reservoir by 54,000 acre-feet, and Turquoise Reservoir by 19,000 acre-feet.⁵⁷⁹ The relatively large volumes of additional storage that could be developed with relatively modest physical changes to the dam suggest its cost effectiveness.⁵⁸⁰ Expansion could allow for additional imports of West Slope water that have not been delivered due to storage limitations.⁵⁸¹ Enlargement of nearby Lake Meredith is also being investigated by Colorado Springs Utilities. Preliminary estimates suggest that the “unit cost of additional storage stays relatively constant (\$350 to \$450/acre-foot) in the capacity enlargement range of 55,900 to 172,100” acre-feet.⁵⁸²

⁵⁷⁷ Bureau of Reclamation, Upper Colorado Region, “Animas-La Plata Project,” available at <http://www.uc.usbr.gov/progact/animas/factsheet.html> (visited Aug. 5, 2001).

⁵⁷⁸ Ute Mountain Ute Tribe and Southern Ute Tribe, “Animas-La Plata Environmental Commitments,” available at http://www.animaslp.com/environmental_comm.htm (visited Aug. 5, 2001).

⁵⁷⁹ “SECWCD Moves Forward on Enlargement of Pueblo Reservoir,” *Water Intelligence Report*, Colorado Water Congress, Editor Richard D. MacRavey, Oct. 20, 2000, page 2.

⁵⁸⁰ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-12.

⁵⁸¹ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-12.

⁵⁸² *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-32.

A somewhat related approach might include tapping the dead storage in Twin Lakes. Completed in 1981, the Twin Lakes Dam project inundated the two natural lakes and the original dam constructed in the 1930s. Since the enlarged facility came on line, “storage in the original natural lakes cannot be accessed and is considered to be dead storage.”⁵⁸³ Up to 70,000 acre feet of dead storage and ground water accretion can be tapped in Twin Lakes.

Storing water in reservoirs located off-stream—i.e., not in the stream channel—is an increasingly popular option due to environmental considerations. Water planners in Colorado Springs, for example, have found that proposed storage projects on the Arkansas River generated substantially more public opposition than off-stream options.⁵⁸⁴ Perhaps the best-known proposal for off-stream storage in Colorado is Ruder-Hess Reservoir in Douglas County, a project of Parker Water and Sanitation District.⁵⁸⁵ The proposed reservoir would capture floodwater from Cherry Creek, but is oversized for that purpose. New trans-basin diversions, from the Gunnison River basin, are targeted to fill the reservoir. Another proposal for new off-stream storage in Colorado is found on the West Slope, and involves Colorado-Big Thompson water contracted by the Northern District. The proposed Jasper Reservoir project is an 82,000 acre-foot project that would store Colorado River water used in the operation of the Windy Gap project. Eric Wilkinson, District Manager, suggests that this project “can easily be built.”⁵⁸⁶

⁵⁸³ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-31.

⁵⁸⁴ Black & Veatch, *Water Resource Plan for Colorado Springs Utilities*, 1996, VII-29 to 36.

⁵⁸⁵ Address of Frank P. Jaeger to the Colorado Water Congress Summer Convention, Aug. 23, 2001.

⁵⁸⁶ Interview with Eric Wilkinson, Jul. 20, 1999.

GROUNDWATER DEVELOPMENT

Groundwater has historically been an alternate source of supply when surface supplies are not readily available. Statewide, groundwater is not a major water supply source, accounting for only 16 percent of total water withdrawals in 1995.⁵⁸⁷ In some locales and circumstances, however, groundwater is used extensively (as shown earlier in Figure 10, Chapter 5). One of those situations is low-density residential development, a type of development that has been on the rise. Nowhere is this more evident than in Douglas County—the fastest growing county in the United States—which has little in the way of surface water supplies, but features thousands of individual and small domestic groundwater systems. This reliance on groundwater is possible because of the presence of the Denver Basin aquifers, which underlie Douglas, Denver, Arapahoe and El Paso Counties. The long-term reliability of this water source is a growing concern as demand escalates rapidly.

“What worries me is that the heaviest growth pressure is where we have the poorest surface water rights . . . where we are mining four aquifers along the I-25 corridor to El Paso County.”

— FRED ANDERSON, former President, Colorado Senate

⁵⁸⁷ Solley, Wayne B., Robert R. Pierce, and Howard A. Perlman, “Estimated Use of Water in the United States in 1995,” *U.S. Geological Survey Circular 1200*, Denver: U.S. Department of the Interior, 1998, page 9.

THE LEGAL STATUS OF GROUNDWATER IN COLORADO

Colorado classifies groundwater as tributary, non-tributary, designated, and not non-tributary.⁵⁸⁸ Tributary groundwater—i.e., groundwater that will deplete the flow of a natural stream within 100 years to the extent of 0.1 percent of the annual rate of pumping allowed—is treated like surface waters under the prior appropriation doctrine.⁵⁸⁹ Groundwater not demonstrating this hydrologic connection to surface waters is “non-tributary,” and is treated under a modified prior appropriation system.⁵⁹⁰ Some of these waters—known as “designated groundwater”—are administered by local groundwater management districts or the State Engineer pursuant to rules promulgated by the Colorado Ground Water Commission.⁵⁹¹ Finally, the bizarre appellation of “not non-tributary” groundwater⁵⁹² applies to much but not all groundwater of the Denver Basin.⁵⁹³

The different classifications of groundwater primarily are used to determine ownership and to establish administrative rules. Ownership of tributary groundwater parallels the rules for surface water, meaning that appropriators hold rights recognized in the priority system.⁵⁹⁴ In many cases, parties wishing to develop tributary groundwater threaten more senior surface water users, as most watersheds are fully appropriated. New groundwater development requires a court-approved plan of augmentation in such situations.⁵⁹⁵ Augmentation water is water that

⁵⁸⁸ Colo. Rev. Stat. §§ 37-90-101 – 143 (2000). For a more detailed outline of Colorado ground water law, see Veronica A. Sperling and David M. Brown, “Outline of Colorado Ground Water Law,” 1 *University of Denver Water Law Review* 275 (1998).

⁵⁸⁹ Colo. Rev. Stat. § 37-90-103(10.5) (2000).

⁵⁹⁰ Colo. Rev. Stat. § 37-90-103(10.7) (2000).

⁵⁹¹ Colo. Rev. Stat. § 37-90-101 – 143 (2000).

⁵⁹² Colo. Rev. Stat. § 37-90-103(10.7) (2000).

⁵⁹³ Colo. Rev. Stat. § 37-90-137(9) (2000).

⁵⁹⁴ Colo. Rev. Stat. §§ 37-92-101 – 602 (2000).

⁵⁹⁵ *Fox v. Division of Engineer for Water Division 5*, 810 P.2d 644, at 645 (Colo. 1991).

satisfies the out-of-priority depletions of well pumping. Many water conservancy districts and private entrepreneurs store water in reservoirs that they sell or lease for well augmentation. This facilitates the convenient location of wells near the place of use, while protecting senior surface appropriators from injury by augmenting stream flows.

In contrast, development of non-tributary groundwater is essentially controlled by overlying landowners.⁵⁹⁶ Any loss of hydrostatic pressure caused by pumping is not treated as an injury, and no augmentation is thus required. However, in some areas of high use, the state Ground Water Commission can designate groundwater basins.⁵⁹⁷ The State Engineer has adopted rules for the permitting of wells in designated groundwater basins.⁵⁹⁸ The rules establish a three-mile circle around a proposed well. The total amount of water available and claimed within the circle is then determined. The rate of withdrawal is limited to 40 percent over 100 years. If the rate of withdrawal exceeds the 40 percent depletion rate, no new wells are permitted.

Not non-tributary groundwater—i.e., some Denver Basin groundwater— may also be tapped by overlying landowners.⁵⁹⁹ The basin includes those portions of the Dawson, Denver, Arapahoe, and Laramie-Fox Hill aquifers not included in designated groundwater basins. The state statute assumes these waters have some hydrologic connection to surface waters, thus withdrawals are required to replace actual out of priority

⁵⁹⁶ Colo. Rev. Stat. § 37-90-137(4)(b)(II) (2000). The amount of water available for withdrawal is that underlying the property owner, or the land of another who has consented to the withdrawal.

⁵⁹⁷ Colo. Rev. Stat. § 37-90-106 (2000).

⁵⁹⁸ *Fundingsland v. Colorado Ground Water Commission*, 468 P.2d 835 (Colo. 1970).

⁵⁹⁹ Colo. Rev. Stat. § 37-90-137(4)(b)(II) (2000).

stream depletions through an augmentation plan.⁶⁰⁰ The statute allows withdrawals of not non-tributary groundwater from the Denver Basin based on a 100-year aquifer life.⁶⁰¹

Groundwater is designated by the Ground Water Commission, or classified at the time of appropriation. In the Denver Basin, much of the

groundwater was appropriated prior to the current classification system. The result is that some portions of the basin come under prior appropriation rules, some portions are non-tributary groundwater, while other portions come under the more recent not non-tributary special rules. This situation makes it difficult to plan for the use of the resource. In

addition, many landowners with private wells do not understand these designations and their associated rules, and many unauthorized depletions occur.⁶⁰²

The availability of relatively inexpensive groundwater supplies in Douglas and Arapahoe Counties has facilitated much of the growth in those regions.⁶⁰³ Many residents in these areas have wells that are exempt. Individuals can develop an “exempt” well to serve a single family dwelling (1) if their lot was created before June 1, 1972; (2) if their lot is exempt from the county subdivision process; or (3) if their lot is 35 acres or larger.⁶⁰⁴ Much of the fast-growing areas south of Denver fall within one of these

*“The problem with
controlling growth is
Senate Bill 5” [the
exempt well
provision].
— SARA DUNCAN, Denver
Water*

⁶⁰⁰ Colo. Rev. Stat. §§ 37-90-103(10.7) and 37-90-137(9) (2000). Wells in the Denver, Arapahoe, and Laramie-Fox Hill aquifers located more than one mile from a stream must provide augmentation water equal to four percent of annual withdrawals.

⁶⁰¹ Colo. Rev. Stat. § 37-90-137(4)(b)(I) (2000).

⁶⁰² Interview with Dan McAuliffe, Jun. 27, 1999.

⁶⁰³ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, page 27.

⁶⁰⁴ Colo. Rev. Stat. § 37-92-602 (2000). These are the three primary exemptions, although there are others in the statute.

three exemptions. There are at least 90,000 exempt wells in the South Platte River basin.⁶⁰⁵ Assuming withdrawals of 200 gallons per day from each well—a very conservative estimate—then these wells may deplete available supplies by 20,000 acre-feet annually. William A. Paddock, a Denver water attorney, among others, believes that exempt wells abuse the water rights process, and many exempt permits are issued where augmentation plans would be feasible.⁶⁰⁶ While there is concern about the level of uncontrolled depletions, Russell George, former Speaker of the Colorado House and water lawyer, argues that exempt wells are one of the most important property rights in the state because they allow anyone to live in a rural area, not just the rich.⁶⁰⁷

Municipalities and special districts authorized to provide water service often require landowners to transfer groundwater rights as a condition of service or annexation. Colorado Springs, for example, requires the rights of Denver Basin groundwater to be transferred to the city as a condition of annexation or receiving water service.⁶⁰⁸ Under some circumstances in the Denver Basin, landowners are presumed to consent to withdrawal of underlying groundwater by public water suppliers.⁶⁰⁹

⁶⁰⁵ Kuhn, Eric, address to the Colorado Water Congress Summer Convention, Aug. 27, 1999.

⁶⁰⁶ Paddock, William A., address to the Colorado Water Congress Summer Convention, Aug. 27, 1999.

⁶⁰⁷ George, Hon. Russell, address to the Colorado Water Congress Summer Convention, Aug. 27, 1999.

⁶⁰⁸ Interview with Rod Kuharich, Jun. 30, 1999.

⁶⁰⁹ Landowners may be deemed to have given consent to municipal or quasi-municipal water suppliers who have adopted an appropriate ordinance or resolution. Colo. Rev. Stat. § 37-90-137(8) (2000).

DEVELOPMENT OF TRIBUTARY GROUNDWATER

Development of tributary groundwater in a given region does not “create” new water, but is merely an option for diverting water at a point other than a stream channel. In many cases, taking water from a well is more convenient than a surface water diversion, and in some cases, can yield better water quality. Only if tributary groundwater is exported to a new hydrologic region does this action actually affect the overall water balance.

LARGE-SCALE GROUNDWATER EXPORTS FROM THE SAN LUIS VALLEY

One water development option reliant on tributary groundwater involves the export of groundwater from the San Luis Valley to Front Range cities or other distant municipalities—perhaps as far away as Southern California. The extent to which these groundwater reserves in the Upper Rio Grande basin are tributary is subject to considerable expert debate and litigation. Most valley residents, including surface and groundwater appropriators and users, believe that all of the valley’s water is hydrologically connected, and that water exports would harm current users as well as the natural features of the authorized Sand Dunes National Park. Many other valley residents have a more general fear that water exports may erode local economies and cultural identities.⁶¹⁰ For these reasons, valley residents have consistently and aggressively fought proposals for exporting San Luis Valley groundwater.

Several organizations over time have pursued large-scale groundwater development in the region. The most infamous of these efforts was led by American Water Development Incorporated (AWDI), which proposed to tap and

⁶¹⁰ Interview with Robert E. Brodgen, Sept. 8, 1999.

export 200,000 acre-feet of groundwater underlying land held by AWDI.⁶¹¹ This proposal was derailed by a firestorm of political opposition and litigation leading to a court judgment rejecting AWDI's claim that the water involved was actually non-tributary, and thus not governed by normal rules of appropriation and transfer.⁶¹² Recently, former AWDI opponent and San Luis entrepreneur Gary Boyce, backed by California investors, pursued an only slightly less ambitious plan to export 100,000 acre-feet to Front Range cities.⁶¹³ Some observers have also expressed concern about possible exports to users in the lower Rio Grande basin, perhaps originating from large landholdings of the Enron energy company.⁶¹⁴

“Some people are truly concerned about their water rights, but most don't want their way of life disrupted.”

— ROBERT E. BROGDEN, Bishop-Brogden Associates

The prospects for San Luis Valley groundwater exports appear diminished by recent federal legislation authorizing the Great Sand Dunes National Park, which will essentially absorb Boyce's project and will severely limit the potential for future out-of-basin water transfers.⁶¹⁵ Even without environmental restrictions, however, many parties, including Chips Barry, Manager of Denver Water, believe that exports to the Front Range are economically prohibitive.⁶¹⁶ Other observers, such as Rod

⁶¹¹ *American Water Development, Inc. v. City of Alamosa*, 874 P.2d 352, at 358 (Colo. 1994).

⁶¹² *American Water Development, Inc. v. City of Alamosa*, 874 P.2d 352 (Colo. 1994).

⁶¹³ Gerhardt, Gary, “Written in Sand adjacent to Big Dunes and astride Aquifer, Baca Ranch faces conflict, uncertainty,” *Denver Rocky Mountain News*, Oct. 15, 2000.

⁶¹⁴ Interview with David W. Robbins, Oct. 21, 1999.

⁶¹⁵ P.L. 106-530 (2000).

⁶¹⁶ Interview with Hamlet J. “Chips” Barry, III Jun. 29, 1999.

Kuharich, formerly of Colorado Springs Utilities, counter that the growing water demands of 3 million Front Range residents make future exports likely, and that the needs of the 15,000 valley residents can be accommodated by a “sensitive sharing” of the abundant groundwater resources.⁶¹⁷ Rather than a single large export project, Kuharich expects transfers to occur incrementally from the gradual purchase and transfer of agricultural water rights.

GROUNDWATER MANAGEMENT AND THE ARKANSAS RIVER DISPUTE

Colorado's longstanding dispute with Kansas over Arkansas River flows is closely tied to use of groundwater in the region. The valley-fill alluvial aquifer provided an average of 100,000 acre-feet of tributary groundwater, primarily for irrigation between 1974 and 1985.⁶¹⁸ In 1985, the State Engineer amended the rules governing the diversion and the use of tributary groundwater in the basin to require well owners to replace their out-of-priority depletions and to provide usable flow at the state line. In 1996, the state engineer also began to administer depletions from the Dakota and Cheyenne Formations east of Canon City as tributary groundwater. This attempt to protect already over-appropriated surface water flows from groundwater pumping resulted in a dramatically increased demand for water in the region, as an additional 100,000 acre-feet of water was needed to augment surface water flows depleted by groundwater-based irrigation. This situation illustrates the necessity of treating tributary groundwater and surface water as one water supply, where gains of one water type are offset by losses to the other.

⁶¹⁷ Interview with Rod Kuharich, Jun. 30, 1999.

⁶¹⁸ This history is based on the description in the *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 2-5.

DEVELOPMENT OF NON-TRIBUTARY AND DESIGNATED GROUNDWATER

In contrast to tributary groundwater, the development of non-tributary groundwater by landowners can increase the amount of water available for use in a basin. In some cases, however, this increase in supply is temporary. In areas experiencing growth, an increase in wells and pumping can lead to the withdrawal of water at a rate exceeding natural recharge. When this occurs, water tables drop, and shallow wells go dry. This necessitates a periodic deepening of wells, thereby raising pumping costs; water quality may also decrease. Eventually, further withdrawals become economically prohibitive.

Non-tributary groundwater can be a permanent source of supply only if withdrawals are limited to the recharge rate. This is a condition known as “safe yield,” and is achievable in many areas. However, by statute, non-tributary groundwater can be depleted at a rate as rapid as 100 years.⁶¹⁹ A different schedule of depletion can be established in regions that have been “designated.” These typically are regions where aquifers are acknowledged to have a finite life, and the administrative challenge is to ensure an orderly and “full economic development” of those supplies.⁶²⁰ Designated groundwater in the Northern High Plains aquifer, for example, is managed to limit depletions to 40 percent of the aquifer in 100 years.⁶²¹

Portions of urbanized Colorado are already over 100 years old, and this proportion is increasing annually. Some areas currently supplied by non-tributary groundwater are likely to outlive the

aquifers upon which they depend, forcing them to look to other water sources and other water providers. Presumably, an alternative source of supply is to be developed while non-tributary and designated groundwater is depleted. Options, however, are often very limited. In some cases, old municipalities faced with a dwindling groundwater supply may turn to adjacent younger municipalities, creating operational and political pressures that could overwhelm these water systems.

NOT NON-TRIBUTARY GROUNDWATER: DENVER BASIN GROUNDWATER

Groundwater from the Dawson, Denver, Arapahoe, and Laramie-Fox Hills aquifers that was not part of a designated basin before 1985 is commonly known as Denver Basin groundwater (shown in Figure 12).⁶²² Withdrawals are allowed based on an assumed 100-year aquifer life, with replacement water required to protect surface appropriators.⁶²³ As a practical matter, not all Denver Basin pumpers can expect a 100-year supply, as the basin is not uniform in shape, and rates of aquifer decline vary significantly. Some areas are already experiencing shortages, in part because net pumping locally exceeds recharge by a two-to-one ratio.⁶²⁴ As groundwater levels drop, existing wells lose their hydrostatic head and must be deepened, replaced, or abandoned.

⁶¹⁹ Colo. Rev. Stat. § 37-90-137(4)(b)(I) (2000).

⁶²⁰ Colo. Rev. Stat. § 37-90-102(1) (2000).

⁶²¹ 2 Colo. Code Reg. 410-1, Rule 5.2.2.2. (2000). In the other seven designated basins, new appropriations are generally allowed if they will not “unreasonably impair” existing water rights, although in some basins new appropriations are not allowed “unless accompanied by an approved replacement plan.” 2 Colo. Code Reg. 410-1, Rule 5.2.3 – 9 (2000).





⁶²² Colo. Rev. Stat. § 37-90-103(10.7) (2000).

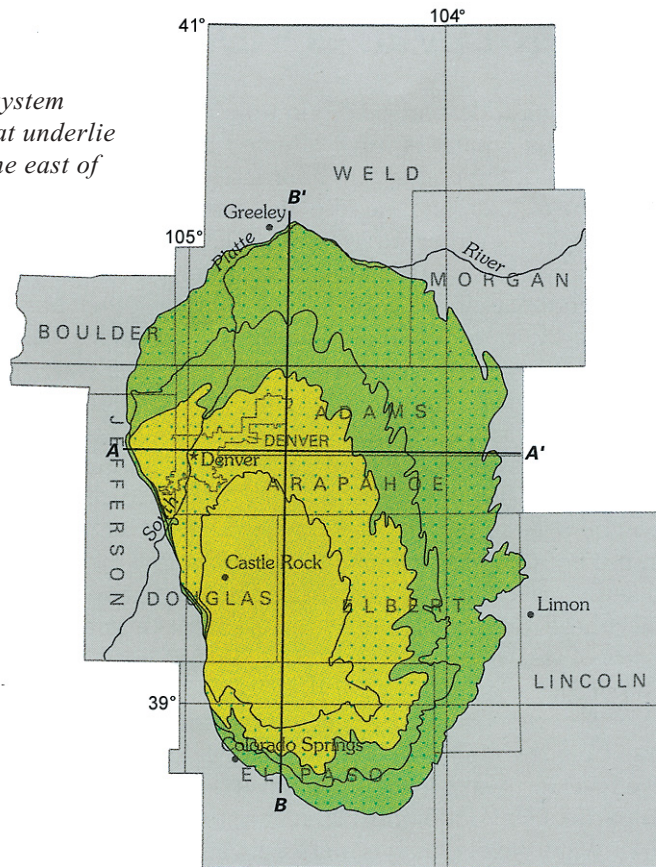
⁶²³ Colo. Rev. Stat. 37-90-137(4)(b)(I) (2000).

⁶²⁴ Interview with Lee Rozaklis, Jul. 20, 1999.

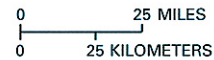
The Denver Basin aquifer system consists of four aquifers that underlie the plains of Colorado to the east of the Rocky Mountains.

Denver Basin aquifer system

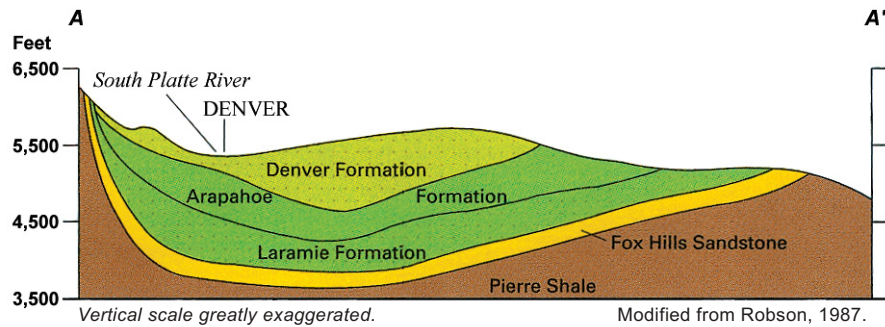
-  Dawson aquifer
-  Denver aquifer
-  Arapahoe aquifer
-  Laramie-Fox Hills aquifer



Base modified from U.S. Geological Survey digital data, 1:2,000,000, 1972



Denver Basin aquifer system cross-section



Formations containing the Denver Basin aquifers occupy the upper part of an asymmetrical bowl-shaped basin. The line of Section A - A' is shown in the figure at top of page.

Figure 12. Denver Basin Aquifers.

Source: U.S. Geological Survey, Ground Water Atlas of the United States.

Denver Basin groundwater has become a significant water source within the past twenty years, particularly for rural residential development in Douglas and northern El Paso Counties.⁶²⁵ This use is expanding as additional private wells are drilled and water districts tap the aquifer to serve new subdivisions. If future growth follows its recent pattern, there could be 500,000 people dependent on Denver Basin groundwater in the next few years.⁶²⁶ To date, few municipalities have tapped the basin, although this is within their legal rights. The possibility of extensive future municipal use of Denver Basin groundwater could accelerate the rate of depletion and could dramatically reduce the useful life of the resource. On the other hand, expanded municipal use of Denver Basin groundwater could ease pressures on trans-basin diversions, agricultural water transfers, and other water sources targeted by growing Front Range municipalities. Another alternative is to limit groundwater withdrawals to drought years, offsetting the need to build large safety factors into municipal surface water supply systems.

Current withdrawals from the Denver Basin are difficult to determine with precision, but are estimated by the State Engineer to be approximately 50,000 acre-feet annually.⁶²⁷ This is a tiny fraction of the amount theoretically available. As much as 467 million acre-feet of groundwater exist in the Denver Basin aquifers, of which about 300 million acre-feet is recoverable, including 150 million acre-feet in the five county metro area—40 million in

⁶²⁵ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, page 27.

⁶²⁶ Interview with Lee Rozaklis, Jul. 20, 1999.

⁶²⁷ Interview with Hal D. Simpson Jun. 27, 1999. Although state statute allows the withdrawal of not non-tributary groundwater based on a 100-year aquifer life, it does not require that the resource be managed accordingly. In addition, tributary, non-tributary, and designated groundwater withdrawals also occur in the basin and are subject to different production limitations.

Douglas County alone.⁶²⁸ Actual depletions may be substantially lower. If so, there should be adequate time available to address aquifer depletion before major problems arise. In the short term, the most prudent course of action may be to increase research on aquifer functioning, to explore a wide range of water management options, and to investigate technological innovations.⁶²⁹

On the other hand, it might be best to act swiftly, perhaps establishing a cooperative arrangement or special groundwater district to strategically manage the remaining water on a regional basis.⁶³⁰ Lee Rozaklis of Hydrosphere, for example, argues that the life of Denver Basin groundwater supplies could be extended if the water under Douglas and Elbert Counties were purchased by existing water districts and municipalities, and managed in a cooperative manner. This type of central administration could also be useful for ensuring adequate augmentation water to address post-pumping depletions.⁶³¹ Several local districts are currently charging a fee for each acre-foot of groundwater pumped out of the basin.⁶³² This mechanism might be a useful model to apply basin-wide to secure funds for broad-based long-term solutions.

CONJUNCTIVE USE

Coordinated use of surface and groundwater supplies is termed conjunctive use. In a conjunctive use system, an aquifer can be both a

⁶²⁸ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, page 48.

⁶²⁹ Interview with Eric Kuhn, Jul. 1, 1999.

⁶³⁰ Interview with Justice Gregory J. Hobbs, Jr., Jun. 25, 1999.

⁶³¹ Because there is a time lag between groundwater withdrawal and surface water impacts, augmentation water is required after pumping ceases to prevent injury to surface water rights.

⁶³² Interview with Rod Kuharich, Jun. 30, 1999.

water source and a storage reservoir.⁶³³ For example, the aquifer serves as a supply source when naturally occurring groundwater is tapped and put to use; it serves as a reservoir when it is artificially recharged with surface water stored for later withdrawal—much like a conventional surface reservoir. Conjunctive use can offer “better utilization of existing systems and potentially significant synergistic benefits through enhanced yield.”⁶³⁴

Conjunctive use in the United States is primarily utilized as a drought strategy that allows excess surface water to be stored for use in times of shortage. Several projects can be found in the Los Angeles basin, where recharge is facilitated by highly permeable formations that allow recharge by simply placing water into “spreading” ponds where it gradually seeps into the aquifer.⁶³⁵

Aquifer storage has many of the same benefits of surface storage, such as the ability to utilize seasonal flows, to be decreed as an alternate storage location, and to be exchanged. The primary advantages of aquifer storage over surface reservoirs are that it avoids the permitting, the public opposition, and the costs associated with construction of surface reservoirs. In addition, there are no evaporation losses when water is stored underground. The primary drawback for conjunctive use in Colorado is operating costs

“Conjunctive use of surface and groundwater supply systems is a classic example of an opportunity for the integration of water supply systems ...”

— HYDROSPHERE RESOURCE CONSULTANTS ET AL., *Metropolitan Water Supply Investigation*

because few opportunities exist for recharge using natural seepage from spreading ponds.⁶³⁶

Instead, the process in Colorado calls for importing water to an area with available aquifer storage, treating these supplies to water quality standards, distributing the water to multiple recharge points, and then injecting it into the ground.⁶³⁷ When needed, stored water is pumped out of the aquifer, although it is frequently impossible to recover all the water stored.

Additionally, the water recovered may be of lower quality than that stored as a result of

contact with natural rock formations, existing groundwater, and groundwater pollution.⁶³⁸ These and other factors may make conjunctive use projects dramatically more expensive than surface storage.⁶³⁹ “Available data from pilot projects in the Denver and Colorado Springs areas and elsewhere in the western U.S. indicate that costs will be in the range of \$3,000 to \$4,000 per acre-foot,”⁶⁴⁰ although Aurora’s project in South Park carried a capital cost of over \$7,000 per

acre-foot.⁶⁴¹

A few conjunctive use projects already exist in Colorado, but generally operate on a small

⁶³³ Colo. Rev. Stat. § 37-92-103(10.5) (2000).

⁶³⁴ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, page 127.

⁶³⁵ The Water Replenishment District of Southern California “Replenishing, Spreading, Injecting... What Does it all Mean?”, *Groundwater*, Winter 1995, available at <http://www.wrd.org/womter95.htm> (visited Sept. 12, 1999).

⁶³⁶ In fact, Judge Hays has ruled that Colorado’s water storage statute, Colo. Rev. Stat. § 37-92-103(10.5) (2000), requires the introduction of water by other than natural means to support a claim for underground storage. *Order Granting in Part and Denying in Part Motion for Summary Judgment and Granting Alternative Motion for Summary Judgment, Concerning the Application for Water Rights of Park County Sportsmen’s Ranch*, Case No. 96CW014, at 3 (Dist. Ct., Water Div. No. 1, Feb. 14, 2001).

⁶³⁷ Interview with Lee Rozaklis, Jul. 20, 1999.

⁶³⁸ Interview with Robert E. Brogden, Sept. 8, 1999.

⁶³⁹ Interview with Robert E. Brogden, Sept. 8, 1999.

⁶⁴⁰ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-37.

scale.⁶⁴² For example, the Centennial Water and Sanitation District uses its surface supplies, augmentation water, contract water, and spot purchases to meet its demands while recharging its Denver Basin wells using excess surface water supplies. The district met over 90 percent of its demand this way in 1996, plus recharged 500 acre-feet into its wells. Additionally, the Willows Water and Sanitation District and Denver Water have conducted pilot scale groundwater recharge studies in the Denver Basin.

There is little practical experience with large-scale public conjunctive use in Colorado. Much of the current attention is focused on the technical hydrological challenges posed by potential and proposed projects. Several legal issues, however, also need to be addressed before any proponent invests in a large conjunctive use project.⁶⁴³ Many of the legal issues surround allocation of an aquifer's storage space. As discussed earlier, Colorado law has elaborate rules for classifying types of groundwater, but ownership of an aquifer's storage capacity has not been determined.⁶⁴⁴ Additionally, adequate rules generally do not exist for fairly tracking the complex accounting of injection versus withdrawals, or for limiting access to the newly stored water to operators of the conjunctive use project.⁶⁴⁵ Impacts on landowners or other water users may also be a problem.

⁶⁴¹ *Water Strategist*, Jul./August 2001, page 21.

⁶⁴² *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, page 40.

⁶⁴³ Most of this discussion of legal and policy issues is taken from Charles B. "Barney" White, "Sustainable Use of the Denver Basin," presented at the Natural Resources Law Center's Water Conference on Sustainable Use of the West's Water, University of Colorado, Boulder, Colorado, Jun. 13, 1995.

⁶⁴⁴ Charles B. "Barney" White describes this issue as offering "marvelous litigation waiting to happen." Interview of Oct. 7, 1999.

⁶⁴⁵ Interview with Charles B. "Barney" White, Oct. 7, 1999. Interview with Judge Jonathan W. Hays, Sept. 24, 1999. Interview with Richard Stenzel, Oct. 15, 1999.

Moving forward with large-scale conjunctive use projects in Colorado may also require devising new institutional arrangements for financing projects, allocating costs and benefits, and for project administration, perhaps on a regional basis (e.g., special groundwater districts). Policy-makers will also need to consider impacts on water systems, sectors, and specific regions in the state likely to be impacted by projects encouraging additional water movement (including new trans-basin diversions) and modified patterns of withdrawal, storage, and use.

Despite formidable technical, economic, legal, and institutional challenges associated with conjunctive use, this water management strategy is receiving increased attention in Colorado. The difficulty in developing conventional storage projects and growing concern about the lifespan of the Denver Basin aquifers has fueled this recent interest. Also contributing to this focus on conjunctive use are the results of several recent and ongoing studies, including work conducted for the Metropolitan Water Supply Investigation, and the Denver Basin and South Platte River Basin Technical Study.

THE TRI-PARTY ALLIANCE

The so-called Tri-Party Alliance is an ongoing conjunctive use investigation between the Douglas County Water Authority, Denver Water, and the Colorado River Water Conservation District.⁶⁴⁶ Efforts have also been made to involve Arapahoe County.⁶⁴⁷ Working with an idea largely inspired by the Metropolitan Water Supply Investigation, these parties are currently investigating the potential use of the Denver

⁶⁴⁶ Douglas County Water Authority, *Resolution No. R-998-02*, Sept. 1998. Colorado River Conservation District/Denver Board of Water Commissioners, *Joint Resolution*, Nov. 17, 1998.

⁶⁴⁷ Interview with Attorney General Ken Salazar, Jul. 15, 1999.

Basin aquifers in a conjunctive use project using under-utilized native and foreign (i.e., trans-basin) Denver Water rights to minimize long-term aquifer depletion.⁶⁴⁸ Water users throughout the South Metro area, particularly in Douglas County and the unincorporated portion of Arapahoe County, would be the obvious beneficiaries of the project. Denver Water could benefit by selling water to the project in wet years, and using the stored water for drought protection in dry years.⁶⁴⁹ Benefits to the Colorado River Water Conservation District are more difficult to determine. By participating in planning activities, the West Slope hopes to encourage a technical rather than a political response, better management of groundwater supplies, greater use of South Platte supplies, and water reuse.⁶⁵⁰

The MWSI analysis suggested that a conjunctive use project could yield up to 60,000 acre-feet per year if Denver’s unused divertible supplies from its Blue River and South Platte water rights are made available.⁶⁵¹ Other supply sources were also considered, including Aurora’s unused divertible supplies, Colorado-Big Thompson Project water, Windy Gap Project water, Cherry and Plum Creeks, and South Platte River flows below Denver. Of these additional water sources, however, only the latter represents a major potential surface supply available for conjunctive use, but high conveyance and water treatment expenses discourage this option. Nonetheless, limiting the effort to just Denver

*“Two Forks
has come back
and it’s called
conjunctive
use.”*
— ERIC KUHN,
Manager,
Colorado River
Water
Conservation
District

Water’s South Platte and Blue River rights would allow the project to yield approximately 60 percent as much as the vetoed Two Forks Dam proposal intended to utilize these same water sources.

Some of the concerns surrounding this idea are reminiscent of those associated with Two Forks, which is not surprising given that both projects tap the same water supplies. The similarities are particularly strong from the West Slope perspective, as increased diversions from the Blue River system have the same depletive impacts whether this water is then stored on the

East Slope in a conventional reservoir or in an aquifer. Overall, the timing of stream depletions would vary and would have far reaching impacts.⁶⁵² For example, the conjunctive use project would deplete the Blue and South Platte Rivers during the months of May through July but stream flows would increase in stretches conveying Blue River water and “borrowed” water from Denver reservoirs. South Platte River flows would increase below Cheesman Dam from August through April in most years, while stream flows in the North Fork of

the South Platte River below Grant would increase year round. Water levels in Dillon, Cheesman and 11 Mile Reservoirs would be lower year round. These potential changes raise a host of complex issues that would likely require an equally complex suite of mitigation measures.

Among the remaining issues to work out include clarification of Denver Water’s rights regarding the use of Blue River supplies for a use and in an area not explicitly recognized in the Blue River Decree.⁶⁵³ When the decree was developed in the

⁶⁴⁸ Sullivan, James R., Hamlet J. “Chips” Barry, III, and Eric Kuhn, “The South Metro Water Study,” *Colorado Water Rights*, Fall 2000, page 1.

⁶⁴⁹ Interview with Hamlet J. “Chips” Barry, III, Jun. 29, 1999.

⁶⁵⁰ Interview with Eric Kuhn, Jun. 6, 2001.

⁶⁵¹ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, pages 44-46 and 127.

⁶⁵² *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, pages 59 to 63.

⁶⁵³ Interview with David C. Hallford, Aug. 27, 1999. Interview with Charles B. “Barney” White, Oct. 7, 1999.

1950s, conjunctive use was not a common water management tool, and Douglas County was certainly not within the Denver Metro area. While conjunctive use is not mentioned in the decree, “storage” is among the authorized uses, along with domestic, industrial, yard, ground and park care, fire, sewage, military and governmental purposes.⁶⁵⁴ Using flows for purposes such as instream flows or maintaining groundwater levels are not so easily inferred.

United States v. Northern Colorado Water Conservancy District, Consolidated Civil Cases Nos. 2782, 5016 and 5017 (U.S. Dist. Ct. for the Dist. of Colo., 1955).

⁶⁵⁴ *United States v. Northern Colorado Water Conservancy District*, Consolidated Civil Cases Nos. 2782, 5016 and 5017, at 30 (U.S. Dist. Ct. for Colo. 1955).

CHAPTER EIGHT: REALLOCATION OF EXISTING SUPPLIES

One of the most effective strategies for augmenting municipal water supplies is the reallocation (or transfer) of water from one user to another. While these transfers take several forms, existing transfers move water from the agricultural to the municipal sector in the vast majority of cases. Several factors encourage these water transfers.⁶⁵⁵ Most important is the rapid growth of municipal water demands at a time when traditional regional economies based on agriculture, livestock, and mining are flat or declining. These traditional western livelihoods use the most water—over 90 percent of total consumption in the western states—and are the focus of most senior water rights. Water use in agriculture is particularly high in Colorado, accounting for 92 percent of total withdrawals.⁶⁵⁶ It is commonly argued that reallocating just 10 percent of agricultural water to municipal uses could boost municipal supplies by 50 percent West-wide.⁶⁵⁷

Other factors encouraging water transfers reflect the comparably higher costs of other water supply options. Development of new water supplies has become increasingly expensive and controversial due to the desire to protect, and even augment, stream flows for environmental purposes. Reallocations of water can often avoid

many of the environmental criticisms of water development, and as private transactions, are immune from many of the delays and costs associated with public policy-making.⁶⁵⁸ Additionally, the economic value of water in municipal use is often several times that of agricultural use. For example, native irrigation water is worth \$500 to \$1,000 per acre-foot in the Northern District (depending on location), while the asking price for municipal water from Windy Gap is 10 to 24 times more, \$10,000 to \$12,000 per acre-foot.⁶⁵⁹ In addition to larger economic trends, some of these disparities in value are a result of past subsidies designed to stimulate and aid agriculture.⁶⁶⁰ The high value placed on agricultural rights also reflects their seniority, a quality that is highly desired by risk-averse municipal water providers.

Several elements of water transfers can be problematic and controversial. Many concerns involve issues of economics and equity. While farmers selling rights can realize great economic profits (sometimes inflated by past irrigation subsidies), local communities and other “third parties” can bear costs associated with decreased economic activity, reduced or modified stream flows, water system inefficiencies, and other impacts. Managing these impacts is a significant legal and policy challenge.

⁶⁵⁵ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, pages 23-27.

⁶⁵⁶ Solley, Wayne B., Robert R. Pierce, and Howard A. Perlman, “Estimated Use of Water in the United States in 1995,” *U.S. Geological Survey Circular 1200*, Denver: U.S. Department of the Interior, 1998, page 11.

⁶⁵⁷ Babbitt, Bruce, then Secretary of the U.S. Department of the Interior, address to the Natural Resources Law Center Water Conference on Strategies in Western Water Law and Policy: Courts, Coercion and Collaboration, University of Colorado, Boulder, Colorado, Jun. 8, 1999.

⁶⁵⁸ Interview with Mark T. Pifher, Jun. 24, 1999.

⁶⁵⁹ Interview with Eric Wilkinson, Jun. 16, 2000.

⁶⁶⁰ Interview with J. David Holm Jul. 14, 1999.

TRANSFER ACTIVITY IN COLORADO

Agricultural-to-urban water transfers along the Front Range have been occurring in a “slow but steady” fashion for several decades. In these transactions, “municipalities buy, or acquire through trade, enough senior agricultural water rights to meet their needs on an average annual basis, and then build reservoirs for carryover to provide supplies during drought periods.”⁶⁶¹ In some areas, these transfers can be a major force behind the conversion of agricultural lands to other purposes. The Colorado Task Force on Agricultural Lands (1996) estimates the state annually loses 90,000 acres of farmland.⁶⁶² (Water transfer activity in Colorado is shown in Figure 13.)

One of the hardest hit areas is southeastern Colorado. Irrigated acreage in the Arkansas basin declined from a high of over 252,000 acres in 1953 to less than 195,000 acres by 1991 primarily as a result of the purchase and conversion of irrigation water by municipalities.⁶⁶³ A few irrigation projects were the focus of municipal attention, including the Colorado Canal Company (Colorado Springs and Aurora), Booth-Orchard (Pueblo) and Rocky Ford (Aurora).⁶⁶⁴

Agricultural-to-urban water transfers are also

“Continued transfers from agriculture to municipal use are expected as a water development strategy.”

— MONTGOMERY
WATSON, *Colorado
Water Development
Study*

common along the state’s northern Front Range, in most if not all ditch companies, such as the Burlington Ditch and FRICO’s Marshall Ditch,⁶⁶⁵ Thornton’s purchase of irrigation shares in the Poudre River drainage is the most infamous example. Largely due to water transfers, irrigated acreage in the Northern District peaked at 720,000 acres in the 1950s before steadily declining to less than 600,000 acres by 1997.⁶⁶⁶ Other areas of the state are facing similar pressures. One of the few areas where agriculture is holding its own is the Dolores area because of cheap water (from the Dolores Project), good climate, high dollar crops, and innovative irrigation.⁶⁶⁷

In western Colorado, mining water rights are an additional source of transfers. Like agricultural rights, mining rights tend to be very senior, and

thus, highly valued by municipal water providers. Most of these rights are concentrated in a “mining belt” that runs in a northeastern direction from southwestern Colorado towards Boulder. Many of these mining rights are located at high elevations in headwaters areas, and are well suited to the needs of growing mountain resort towns and ski areas, and for trans-basin diversions to the Front Range.

Notable recent transfers of mining rights to mountain resorts and to the Front Range include the Clinton Gulch Reservoir agreement and Eagle Park Project, both of which involve collaborations among East and West Slope interests.⁶⁶⁸

⁶⁶¹ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-46.

⁶⁶² Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*, Report to Western Water Policy Review Advisory Committee, 1997, page 65.

⁶⁶³ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 4-5.

⁶⁶⁴ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the

Southeastern Colorado Water Conservancy District, 1998, page 4-7.

⁶⁶⁵ Electronic-mail communication with Mark Koleber, Jul. 17, 2001.

⁶⁶⁶ Figures supplied Northern Colorado Water Conservancy District (1999). Notably, 111 of 113 reported transactions in Colorado in 2000 were purchases of irrigation water for municipal purposes. *Water Strategist*, Feb. 2001, page 11.

⁶⁶⁷ Interview with Dan McAuliffe, Jun. 27, 1999.

⁶⁶⁸ These projects were discussed earlier in Section II.

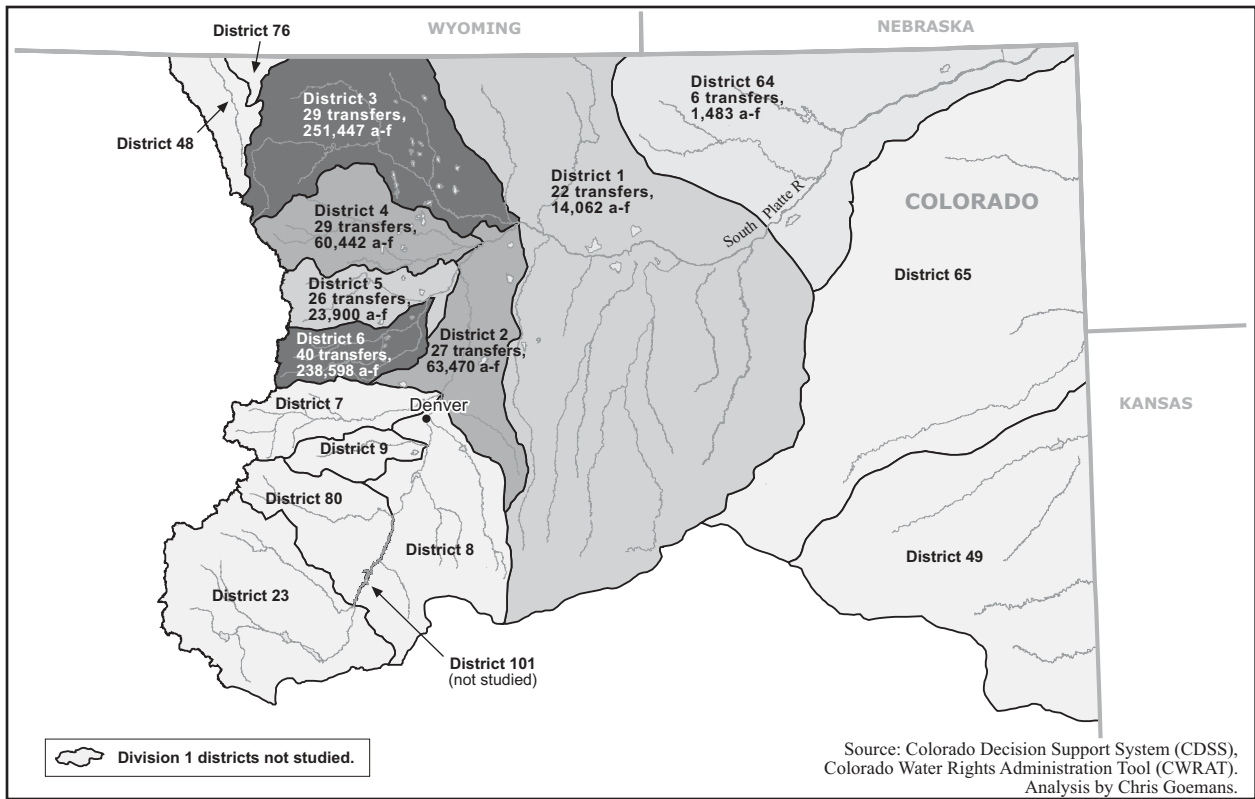


Figure 13a. Water transfers involving a shift between agricultural and municipal and industrial (M&I) uses, 1979 - 1995, shown for selected districts in Division 1.

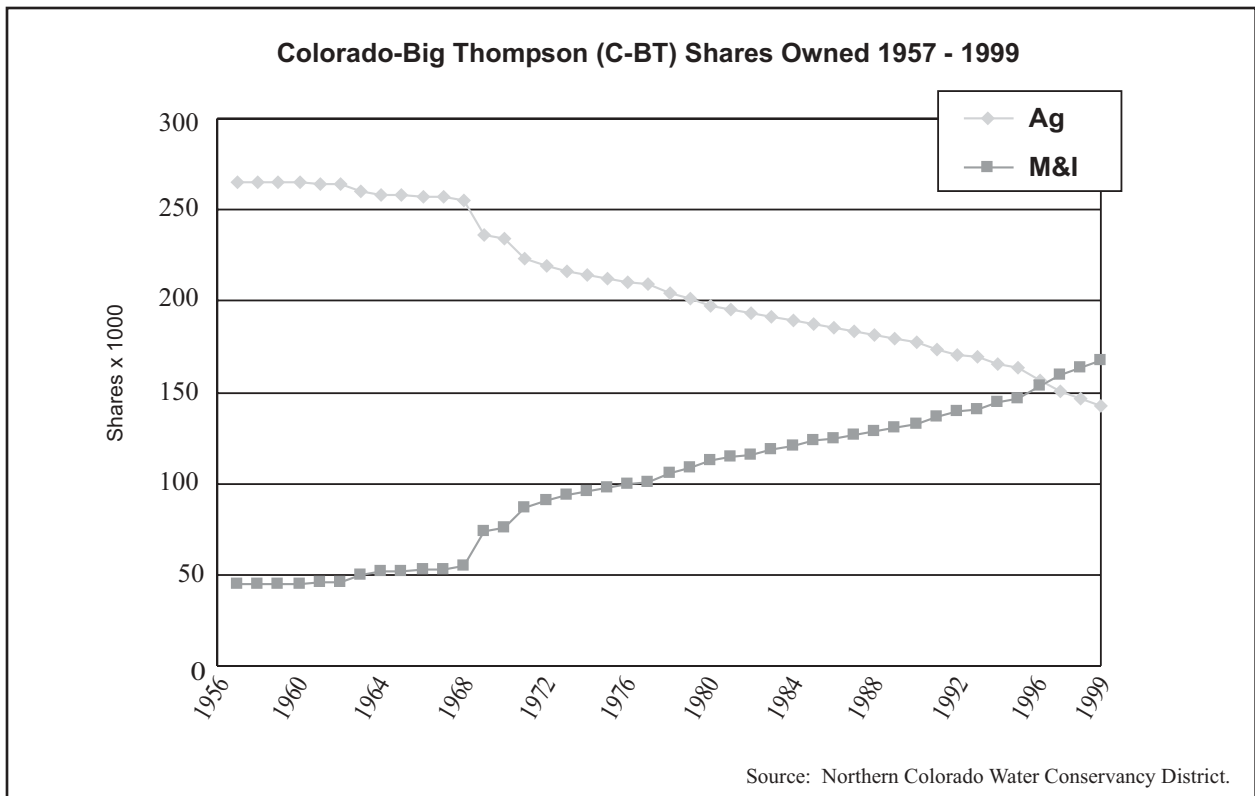


Figure 13b. Agricultural and M&I shares owned in the Colorado - Big Thompson Project, 1957 - 1999.

FORMS OF WATER TRANSFERS

Water transfers can take several forms. Under Colorado law, water rights can be sold or leased, and transfers can be permanent or temporary. Further, various types of contingency arrangements can control temporary transfers. This variety of tools brings great flexibility to the transfer option, further stimulating interest in water reallocations.

PERMANENT TRANSFERS

URBAN ABSORPTION

Many agricultural-to-urban water transfers occur simply as urbanization consumes surrounding agricultural lands and irrigation rights are converted to serve the new municipal activities. This process is extremely common for the simple reason that agricultural lands typically surround major growth centers on both the Front Range and in West Slope mountain valleys. Most municipalities acquire water rights for use on land at the time of annexation. Some also acquire water rights when extending water service. Boulder, for example, requires the owner of the land to offer water and ditch rights associated with the land for purchase by the city as a condition of annexation or water service.⁶⁶⁹ In this way, growth extending into agricultural regions can, to some extent, develop its own water supply. Additionally, urban absorption often provides a way for a city to acquire rights that are senior to the other elements of its water supply system.⁶⁷⁰

Whether the urbanization of former agricultural lands and conversion of associated water rights is sufficient to fully offset the demands of growth depends on the extent and seniority of the agricultural rights and the amount of the new

⁶⁶⁹ Boulder [Colo.] Rev. Code § 11-1-19(a) (1999).

⁶⁷⁰ Interview with Lee Rozaklis, Jul. 20, 1999.

municipal demand. Along the Front Range, these water right conversions are normally sufficient to serve new municipal residents where the land was intensively irrigated. However, not all converted lands have a history of irrigation. For example, in the past 25 years, only eight percent of Greeley's growth has been on formerly irrigated land.⁶⁷¹ When growth does not occur on irrigated land, or is especially dense, additional sources of supply are needed to meet the demands. In addition, even if transferring the agricultural rights provides sufficient legal quantities to meet the new uses, new storage may be required to deliver water on a year-round basis that was previously used seasonally.

DIRECT PURCHASE OF WATER RIGHTS

A more deliberate way to permanently acquire new water rights is simply to seek out willing sellers in desirable locations and to negotiate a transaction.⁶⁷² A recent example is the City of Aurora's purchase of agricultural water rights in Lake County. In the late 1990s, Aurora purchased the Spurlin-Shaw ranch water rights with an approximate transferable yield of 200 to 400 acre-feet for \$525,000.⁶⁷³ The City then changed the type and place of use to Aurora for delivery through its existing trans-basin system.

Increasingly, buyers and sellers are connecting through water markets. Water markets provide a central mechanism for buyers and sellers to exchange information about water demands, supplies, and transfer opportunities, and help to establish prices. Active and well-functioning markets tend to drive up the price of water, an obvious benefit to those looking to sell.⁶⁷⁴

⁶⁷¹ Interview with Eric Wilkinson, Jul. 20, 1999.

⁶⁷² A desirable location is one that can be easily connected—either physically or through a water exchange (explained in Chapter Nine)—to an existing supply system.

⁶⁷³ Interview with Douglas Kemper, Jun. 23, 1999.

⁶⁷⁴ Note that prices are likely to go up due to reduced transactions costs. To the extent that transactions costs paid by the buyer are lowered (e.g., the cost of finding willing

Colorado has long had one of the most developed water markets in the country within the Northern

Colorado Water Conservancy District. Colorado-Big Thompson (C-BT) project shares are freely transferable within the district, and a lively market for this water has grown up over the years. This is possible because water is not appurtenant to land in the Northern District, and no user has a right to rely on return flows from C-BT project water. This policy is a local board decision, and one that runs contrary to Bureau of

Reclamation tradition.⁶⁷⁵ As a result, this is a unique situation that cannot be replicated elsewhere in Colorado. This exceptional structure, however, facilitates both permanent and temporary transfers within the district. The price of C-BT units has risen steadily in recent years, indicating that demand continues to grow, a trend that is likely to follow continued population growth on the Front Range.⁶⁷⁶ Almost all of the recent transactions are for municipal use.

TEMPORARY OPTIONS

Often, municipalities have adequate water rights for average to wet years even with growth, but lack reliable supplies in dry years or for periods of extended drought. This is because municipal water rights are often relatively junior and subject to call in dry years. Thus, a mechanism to assure an adequate supply for dry years is

sellers), the buyer can now offer a slightly higher purchase price for the water since this added expense is offset (or perhaps more than offset) by the reduced transactions costs. National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 34.

⁶⁷⁵ Interview with Bennett W. Raley, Oct. 14, 1999.

⁶⁷⁶ *Water Strategist*, Jul./Aug. 1999, page 9.

sometimes all a municipality needs. In other cases, a municipality may simply need an interim

water source to act as a bridge until a permanent supply comes on line. There are several alternatives to the outright purchase of additional water rights that allow municipalities to meet their temporary water needs.

LEASES

A water lease is an agreement between a rights holder and a new user providing for a temporary water transfer of a pre-determined quantity and duration. Parties leasing water

are often those with excess supplies (at least in the short term) in need of a beneficial place to “park” them, while lessees may be parties needing interim supplies while permanent supplies are sought or may be responding to a drought crisis.⁶⁷⁷ For example, Aurora leases 5,000 acre-feet per year from Pueblo for a term of 15 years (with a 10 year option).⁶⁷⁸ Other communities, such as Commerce City, have declined lease offers from Pueblo, due to a strong bias for permanent supplies.⁶⁷⁹ This reluctance is evidence of general municipal fear of anything less than total control over their water supplies. The basis for this fear is the enormous potential for future problems if permanent development is allowed based on temporary water supplies.⁶⁸⁰

SUBORDINATION AGREEMENTS

One way for a municipality to increase the reliability of its water supply is to enter into a contract with more senior rights holders in which

⁶⁷⁷ The “great and growing cities doctrine” allows municipalities to acquire water for future needs. *Denver v. Sheriff*, 96 P.2d 836 (Colo. 1939).

⁶⁷⁸ Interview with Douglas Kemper, Jun. 23, 1999.

Interview with Roger L. “Bud” O’Hara, Jun. 30, 1999.

⁶⁷⁹ Interview with Roger L. “Bud” O’Hara, Jun. 30, 1999.

⁶⁸⁰ Written comments of Carol Ellinghouse, Jul. 2001.

the senior pledges not to call out the junior municipality. This is called a subordination agreement.⁶⁸¹ For example, Denver Water and Public Service Company⁶⁸² entered into a subordination agreement for the Shoshone Power Plant, a senior water right that controls the mainstem of the Colorado River during the winter.⁶⁸³ The agreement allows Denver Water to divert Colorado River water out-of-priority upstream of the Shoshone Power Plant when the plant has placed a call on the river (primarily during the winter months). In return, Denver Water agreed to reimburse costs associated with any power interruptions. Denver Water has never tried to implement the Agreement, which was conceived as a replacement for Two Forks.⁶⁸⁴ The Bureau of Reclamation recently freed 60,000 acre-feet of water for new uses in the Upper Gunnison River basin when it signed a subordination agreement covering the Aspinall Unit.⁶⁸⁵

The crucial question raised by a subordination agreement is whether all juniors benefit when the Division Engineer administers the agreement. Orlyn Bell, former Division Engineer, believed that it was not practical to administer a subordination agreement selectively in favor of a single water right.⁶⁸⁶ If a subordination agreement is not selectively administered, all juniors will benefit from removing the call, not just the contracting party. As a practical consequence, this eliminates any benefit from a subordination agreement if there are any

“The last alternative should be drying-up of agricultural lands.”
— STEVE ARVESCHOU, General Manager, Southeastern Colorado Water Conservation District

significant upstream juniors who could first benefit and take the subordinated water.

DRY YEAR OPTIONS

An additional strategy for increasing the reliability of a municipal water supply is a dry year option agreement (also known as an interruptible supply contract). A dry year option allows temporary water transfers during specified hydrologic conditions. As the name implies, dry-year options normally “allow the senior rights holders to continue to use the water (in most cases for farming) in normal years and give the option holder (often a municipal user) a cost-effective way to make its supply more reliable during dry years.”⁶⁸⁷ In exchange for the option

arrangement, the municipality pays a fee to the irrigator for entering into the agreement, which is in addition to any fees paid for the actual transfer of water should the option be exercised.

Dry year options can theoretically provide a win-win situation for both the agricultural and municipal sectors. Dry year options allow farmers to retain ownership of water rights, to augment their income (through fees collected when entering into the agreement), and

to receive compensation for monetary losses experienced when water is transferred in dry years. For the municipality, a dry year option provides a means of drought protection which can be much more cost-effective than the purchase of new water rights and, perhaps more importantly, the construction or expansion of storage facilities,⁶⁸⁸ although storage may still be

⁶⁸¹ Subordination agreements are common provisions in water rights settlements.

⁶⁸² Public Service Co. of Colorado now operates as Xcel Energy.

⁶⁸³ Colorado Division of Water Resources, *(Draft) Colorado River Mainstem Basin Facts*, Jan. 2000, page 2.

⁶⁸⁴ Interview with Sara Duncan, Jun. 16, 2000.

⁶⁸⁵ Colorado Division of Water Resources, “Signing of the Aspinall Subordination Agreement,” *Colorado Stream Lines*, Editor Marta Ahrens, Nov. 2000, page 1.

⁶⁸⁶ Interview with Orlyn J. Bell, May 15, 2000.

⁶⁸⁷ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 32.

⁶⁸⁸ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-46.

required to implement a successful dry-year leasing program.⁶⁸⁹

Dry year options are not common in Colorado, but are seen in greater frequency in some other regions, particularly California.⁶⁹⁰ Legal complications and uncertainties explain the limited use of dry year options in Colorado. Most issues stem from the fact that exercising the option entails a “change of water right” for which judicial approval is required to permit the right to be used for additional purposes (e.g., municipal use), to be diverted at a different point, and to be used at a different place than originally decreed.⁶⁹¹

A so-called “temporary substitute supply plan” might be legally sufficient to implement a dry year option agreement immediately if there was a drought and the need pressing,⁶⁹² such transfers are often allowed on an interim basis with conditions to prevent injury while change cases are adjudicated.⁶⁹³

To the extent that such legal maneuvers prove to be expensive and time-consuming, they discourage dry year options and similar temporary measures and encourage more permanent transfers.⁶⁹⁴ Transactions costs also are likely to discourage dry year options that involve relatively small quantities of water, or that involve multiple rights holders. Additionally, agricultural interests may resist dry

year options that they perceive as impeding the outright future sale of their water rights to another provider who needs an annual supply.

To succeed, an agreement must adequately address the interests of both parties. The municipality needs assurance that the water will be available when needed. The owner needs compensation for losses caused by the exercise of the option, plus some incentive to enter into the agreement. It will also probably be necessary to create a schedule of compensation based on the date when the option exercised. For example, if exercised before planting, the farmer will have avoided some costs and compensation should correspond. However, if exercised at a later date, the farmer will have unrecoverable costs that require greater compensation. There may also be concerns about how to value lost productivity, and possible third-party effects, like other ditch users who would have greater difficulty delivering their water.

LEASE-BACK ARRANGEMENTS

Leaseback arrangements are the mirror image of dry-year option agreements. In a leaseback arrangement, the municipality acquires ownership of the water right, makes the appropriate changes in water court, and then leases the rights back to the seller. There are two principal variations of this scenario.

The first is most analogous to a dry-year option agreement and occurs when a provider only needs the water rights in case of drought. In average or wet years, municipal needs are met with other water rights, and the water is leased back to the original seller. This leaseback approach allows for the possibility of retaining long-term agricultural use.⁶⁹⁵ Examples abound

⁶⁸⁹ Electronic-mail communication with Mark Koleber, Jul. 17, 2001.

⁶⁹⁰ The Metropolitan Water District of Southern California, for example, recently initiated a state-wide competitive bidding process to purchase options on up to 100,000 acre-feet of water for transfer to its service area during dry years and supply interruptions. Water Education Foundation, *Western Water*, Mar./Apr. 2001, page 5.

⁶⁹¹ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 8-48.

⁶⁹² Colo. Rev. Stat. §§ 37-83-101 – 106 (2000).

⁶⁹³ Interview with Justice Gregory J. Hobbs, Jr., Jun. 25, 1999.

⁶⁹⁴ Interview with Eric Wilkinson, Jul. 20, 1999.

⁶⁹⁵ These agreements are analogous to a common plan of augmentation wherein a single entity creates dry-year options using water rights it owns. For example, Boulder uses some of its water rights to maintain agricultural land in

in the Northern District where municipalities have purchased some water rights solely for use during drought. In average or wet years, they rent the water back to farmers through annual agreements. This essentially is a form of water banking (described later) nested within the context of a leaseback arrangement.⁶⁹⁶

The second situation may be more typical in Colorado. Here, a municipality acquires the agricultural water rights it needs to meet future growth. It then leases the water back to the seller for continued agricultural use until the growth materializes. Pueblo, for example, annually leases excess water to irrigators;⁶⁹⁷ in 1999, the city leased 13,000 acre-feet for \$3 to \$7 per acre-foot.⁶⁹⁸ Colorado Springs is pursuing a similar course following its acquisition of Colorado Canal Company shares on the Arkansas River.⁶⁹⁹ These leasebacks defer the impacts of agricultural transfers until municipal needs occur annually.

The potential for leaseback arrangements is high given the efforts of municipal water providers to drought-proof their water systems. Many municipalities plan to meet a 30 to 50 year drought without cutbacks, and try to always stay 20 to 50 years ahead of projected population demands.⁷⁰⁰ This ensures that in average or wet years, most municipalities have excess supplies that could be made available to agriculture or other users. One potential complication is that some agricultural lands do not respond well to periodic cycles of irrigation and fallow. For example, lands irrigated by the Rocky Ford ditch

normal or wet years, but these rights are also decreed for municipal purposes to meet the city's needs in dry years. Interview with James R. "Jay" Montgomery, Oct. 25, 1999.
⁶⁹⁶ Interview with Bennett W. Raley, Oct. 14, 1999.
⁶⁹⁷ Interview with Roger L. "Bud" O'Hara, Jun. 30, 1999.
⁶⁹⁸ *Water Strategist*, Jun. 1999, pages 7 – 8.
⁶⁹⁹ Interview with Rod Kuharich, Jun. 16, 2000. The City is using part of the water to reestablish vegetation on the lands dried up by its purchase. The City leases the remaining rights to others who can use the water. The City's primary objective is to minimize its holding costs while municipal demand develops.

that were purchased by Aurora cannot be returned to productivity within a single irrigation season following several years of being dry.⁷⁰¹

WATER BANKING

Water banks are analogous to water markets, with the exception that water banks seek to coordinate temporary, rather than permanent, water transfers. A water bank is a formal mechanism to pool surplus water rights for rental to other water users.⁷⁰² The Colorado legislature recently enacted a pilot water banking bill for the Arkansas basin.⁷⁰³ The purpose of the legislation is to test the concept of a water bank to simplify and improve the approval of water leases, loans, and exchanges, including interruptible supply agreements, and to reduce the costs of such transactions. The State Engineer is to promulgate rules for the operation of the bank by July 1, 2002, and report on its effectiveness by November 1, 2005. It is too early to tell how well the bank will function, but unrealistic expectations of profits by Arkansas Valley irrigators may be an impediment.

The Northern Colorado Water Conservancy District's water allocation system has both a marketing and banking component, as transfers can be either permanent or temporary.⁷⁰⁴ Another example of an active water bank is found in Idaho, where farmers with surplus federal entitlements rent more than 100,000 acre-feet annually.⁷⁰⁵ Temporary exchanges (i.e., annual rentals) are a highly flexible means for water providers to adjust to annual fluctuations in demand.

⁷⁰⁰ Interview with Eric Kuhn, Jul. 1, 1999.
⁷⁰¹ Interview with Douglas Kemper, Jun. 23, 1999.
⁷⁰² National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 31.
⁷⁰³ 2001 Colo. Session Laws Ch. 284.
⁷⁰⁴ Interview with Bennett W. Raley, Oct. 14, 1999.
⁷⁰⁵ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 31.

Water banks have also been used in some states, particularly California, as a temporary means of modifying water allocations during water shortages. The California Drought Water Bank program is an example of an innovative and successful mitigation action. This program was created in 1991 after 5 years of drought. It allows the Department of Water Resources to acquire water in three ways: 1) purchases from farmers who chose not to irrigate; 2) purchases of surplus water from local water districts; and 3) payments to farmers or water districts to use groundwater instead of surface water. Water in the bank is then made available to municipalities as needed to address drought-related shortfalls.

THIRD PARTY IMPACTS

Water transfers provide a mechanism for efficiently moving water to more highly valued uses. The efficiency benefits of water reallocations, however, are only fully realized in a free market. Several factors prevent achieving this ideal. One concern is the transactions costs associated with exchanges. Actions that require judicial or administrative review can be particularly expensive. Also problematic is the fact that while market exchanges are excellent mechanisms for addressing the economic value of water, they do not recognize water's social, cultural, environmental, and other non-market values. The interests of various "third parties" are not considered in unregulated market exchanges. Protecting these interests is thus an essential responsibility of policy-makers, even though attempts to internalize costs otherwise borne by third parties is likely to increase transactions costs.

The term "third party" can be used to describe any potentially affected interest to a water

transfer other than the buyer or the seller. Typically, the term is used only to describe interests that are harmed by water transfers. These negative impacts can be associated with "changes in the quality and quantity of water available for other uses, changes in the rate and timing of surface flows, and changes in ground water levels and recharge processes."⁷⁰⁶ Exactly who the third parties are varies on a case-by-case basis, and somewhat reflects judgments about which interests and impacts are worthy of attention.

The most commonly identified class of third parties are economic and community interests in the areas losing water that in some way are dependent upon historic water-using practices. The classic example is businesses that provide support services to farmers. While a farmer can expect a sizeable payday from selling a water right and idling (or disposing of) a farm, no such compensation is provided for supporting businesses indirectly dependent on farm-generated revenues.

"The last crop I can grow is getting a developer to take the farm off my hands, and that's my retirement program."

— FRED ANDERSON, former President, Colorado Senate

Another major class of third parties is environmental interests and concerns. Water transfers, much like other water development activities, can negatively impact instream flows, riparian habitat protection, and water quality. This deterioration of public values can have widespread economic and non-

economic impacts, as well as more localized, private impacts.

The range of potential impacts is sufficiently broad to include almost all people as potential third parties. For example, the fiscal implications of water transfers and land conversions might impact a broad spectrum of taxpayers. Similarly,

⁷⁰⁶ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 5.

people across the world may be impacted by food security issues associated with the loss of productive farmlands in agricultural-to-urban water transfers.⁷⁰⁷ Identifying and quantifying the full spectrum of third party impacts is a difficult undertaking, but is an important policy consideration.

RURAL COMMUNITIES

ECONOMIC AND CULTURAL IMPACTS

The economic impacts of agricultural-to-urban water transfers occur at several levels.⁷⁰⁸ Direct impacts include loss of farm jobs, farming incomes, and crop production. Indirect impacts include economic losses associated with declines to agricultural support services, such as seed suppliers and tractor dealers. Additional concerns are the so-called “induced impacts” associated with a general community-wide decline in economic vitality. These are impacts that affect all businesses dependent upon the local economy in general, including restaurants and furniture stores. Community services based on tax revenues from these businesses are also likely to be diminished, thereby spreading the community impacts still further. Negative economic impacts of water transfers are small in relation to the state’s overall economy, but are highly significant in those areas where these impacts are concentrated, such as the lower Arkansas River basin in Colorado.

Water transfers can also affect the cultural integrity of communities strongly tied to irrigation economies, including the Hispanic towns of northern New Mexico and Colorado’s adjacent San Luis Valley. To the extent that poor

⁷⁰⁷ Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*. Report to Western Water Policy Review Advisory Committee, 1997, page 68.

⁷⁰⁸ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 51.

or traditionally disenfranchised ethnic groups populate affected communities, water transfers can be viewed as an environmental justice issue demanding special attention. The National Research Council, for example, suggests that Indian and Hispanic communities present a strong case for special protection, as these communities are often deeply rooted to a specific place and resource base, have been deprived of resources in the past, and are particularly vulnerable to the impacts of water transfers.⁷⁰⁹

“Local economic consequences of water transfers are felt at several different times. Some occur when land and water rights are purchased; others when the land is retired from irrigation; still others when the water is actually transported to a new area.”

— NATIONAL RESEARCH COUNCIL,
Water Transfers in the West

WATER SYSTEM IMPACTS

The no injury doctrine protects most water rights holders from possible water shortages or disruptions associated with water transfers. Consequently, other rights holders are often not considered third parties of special concern. However, water transfers can disrupt the functioning of water systems, resulting in impacts borne by others.

Many of the observed impacts are due to the different demand curves associated with agricultural and municipal uses. Irrigation water rights are associated with the historic irrigation season whereas municipal demands occur year-

⁷⁰⁹ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 261.

round. Transfers challenge conservancy districts to rebalance their system constantly to meet changing needs, including the need to develop additional storage to allow agricultural rights to be used outside the irrigation season. A transformation of this type has been occurring in the Northern District, where agricultural use has declined from 95.0 percent in 1956 to 70.4 percent in 1998, while municipal and industrial use has increased from 4.93 percent to 29.60 percent over the same period.⁷¹⁰ System facility and operational changes are necessary to meet the changing demands on the system originally designed around agricultural needs.⁷¹¹

Many of the water system impacts can be attributed to the incremental fashion in which urban areas absorb agricultural lands. Urban sprawl usually does not engulf all agricultural land served by an irrigation system at one time. Instead, urbanization proceeds in a step-wise or leapfrog fashion. Agricultural land remains on the outskirts, or as islands within urban development. The irrigation water that serves the remaining agricultural land still must traverse the same distance from its source, but the irrigation ditches and other conveyance structures are engulfed in urbanized areas. Conveyance structures are designed and built to carry specific amounts of water and may function poorly when fed smaller amounts of water, or when they experience greater rates of flow from either urban stormwater runoff or changes in delivery patterns due to municipal use. These changes create numerous problems:

Ditches must often be buried in urban areas, canal crossings protected, and open conveyance structures fenced to prevent accidental drowning. . . . Urban landowners are often oblivious to ditch rights, and assume they

⁷¹⁰ Statistics provided by the Northern Colorado Water Conservancy District (*C-BT Water Deliveries*) (1999).

⁷¹¹ Interview with Eric Wilkinson, Jul. 20, 1999.

have paramount rights simply because the ditch traverses their property. Protection of right-of-way becomes a problem. Right-of-way violations are common by adjacent urban landowners who landscape, bridge or otherwise unlawfully encroach on rights-of-way. . . . Ditch maintenance becomes more difficult and expensive because urban landowners resist traditional procedures that may damage their own—unauthorized—improvements. Annual ditch maintenance can become a battle between ditch owners and adjacent landowners.⁷¹²

As a result, total operating costs of irrigation districts located in urbanizing areas tend to be about 50 percent higher than in predominately rural areas.⁷¹³ Some, but not all, of the increased costs reflect higher employee salaries. These costs, of course, are passed on to shareholders, further increasing the cost of irrigation water and the pressure to sell out to developers. An additional incentive to sell may come from costs associated with increased vandalism of irrigation structures.

⁷¹² Wilkins-Wells, John, "Issues Affecting Irrigation Districts and Mutual Canal Companies," Colorado Water Congress' *Water Research News*, Sept. 1999, pages 2 – 3.

⁷¹³ The material in this paragraph is from John Wilkins-Wells, "Issues Affecting Irrigation Districts and Mutual Canal Companies," Colorado Water Congress' *Water Research News*, Sept. 1999, pages 2 – 3.

ENVIRONMENTAL AND WATER QUALITY CONSIDERATIONS

Agricultural-to-urban water transfers can affect nearly all aspects of hydrologic regimes, including the quantity, quality, temperature, and timing of flows. Even an urban absorption which does not result in a geographic transfer of water can significantly alter return flow regimes, often leaving more water in the stream overall (since municipal uses tend to be less consumptive than agricultural uses), but with flows that are lower around the irrigation season and higher at other times. Modifications of flow regimes have a variety of complex ecological impacts, benefiting some species at the expense of others.⁷¹⁴ For example, the construction of Taylor Reservoir and the Aspinall (Curecanti) Unit (Blue Mesa, Morrow Point and Crystal Reservoirs) on the Gunnison River has decreased the river's water temperature. As a result, trout populations are increasing while native flannelmouth sucker, bluehead sucker, and roundtail chub numbers are declining.⁷¹⁵

“Transfers of surface or ground water can have significant impacts on water-dependent flora and fauna within western riverine, riparian, and wetland ecosystems.”⁷¹⁶ For example, plains streams historically had water holes that did not dry up, but human activities have changed river channels and the holes no longer exist. Now, when agricultural water is transferred, the streams may dry up completely, and with them the habitat needed for indigenous species.

Water quality impacts are rarely considered as part of a water transfer proceeding, although

these impacts are frequently significant.⁷¹⁷ Western water rights are based on quantity only; water quality management is the purview of a different set of laws, agencies, and requirements.⁷¹⁸ This legal separation between quality and quantity makes all human and non-human water users vulnerable to the impacts of water transfers. As seen with flow regime issues, these impacts can be both positive and negative.

As a practical matter, negative water quality impacts such as those associated with agricultural-to-urban transfers normally are distributed to natural environments and downstream diverters who lack legal protection. Municipal water providers, due to the high costs of drinking water treatment, disproportionately favor high quality water, and target these supplies in transfer activities. For example, relatively clean agricultural waters in the mountains, such as in South Park and the headwaters of the Arkansas River, are favored by Front Range municipalities over lower quality agricultural rights downstream in a watershed.⁷¹⁹ Similarly, water quality considerations recently prompted Fort Morgan to supplement municipal supplies with a water line carrying high quality water from Carter Lake rather than serve the city with lower quality water available in the river locally.⁷²⁰ Thornton's Northern Project is another example.

CONTROVERSY AND MITIGATION

One of the major reasons why water transfers are frequently controversial is that they are often veiled in secrecy. Unlike the public process municipalities can (but rarely) use to condemn existing water rights for public purposes, water

⁷¹⁴ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 53.

⁷¹⁵ Interview with John Woodling, Jun. 4, 2001.

⁷¹⁶ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 53.

⁷¹⁷ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 86.

⁷¹⁸ This issue is discussed in more detail in Chapter Five.

⁷¹⁹ Interview with Douglas Kemper, Jun. 23, 1999.

⁷²⁰ Interview with David W. Robbins, Jun. 28, 1999.

transfers are private transactions often negotiated outside of the public's view.⁷²¹ The secrecy that can surround these deals reminds many people of the tactics Los Angeles used in its notorious water grab from the Owens Valley.⁷²² This viewpoint was reinforced when Thornton purchased a number of Poudre River basin ranches and a half-interest in the Water Supply and Storage Company through an agent. When Thornton's identity as the buyer was later revealed, local outcry was voiced.⁷²³

Agricultural interests generally think some sort of regulation or oversight is needed to protect sellers, often unskilled and inexperienced in real estate transactions, from unscrupulous practices. This could be accomplished in several ways. One approach would be to prohibit the transfer of agricultural water rights to municipal uses unless the seller knew the buyer's municipal identity at the time of sale. This requirement could likely be circumvented through the use of middlemen. A more elaborate approach would be to create a state agency analogous to the consumer protection office of the Public Utilities Commission to protect agricultural owners during municipal purchases and transfers.⁷²⁴ Municipalities argue that disclosure of their identity can create market resistance and inflate prices, unnecessarily increasing the costs their customers pay.⁷²⁵

“There ought to be full disclosure when offers are made to purchase water rights.”

— J. DAVID HOLM,
Director, Colorado Water
Quality Control Division

Disclosure rules regarding water transfers would likely influence prices and activity, but would likely not be among the more important public policies influencing the reallocation of water from the agricultural to urban sectors. For example, existing government regulations promoting agriculture are thought to already constrain water transfers.⁷²⁶ Federal support programs including low-interest loans, disaster relief, and direct payments encourage water to stay in irrigated agriculture long after a strict economic analysis suggests that transfers should occur.⁷²⁷ On the other hand, current inheritance tax policies can encourage water transfers and the breakup and sale of agricultural lands.

Any change in these laws would likely have a greater influence on water transfers than provisions requiring full disclosure.

At the state level, new regulations regarding compensation or mitigation are likely to also influence water transfers. Increasingly, many parties are arguing that buyers should be required to mitigate impacts on local communities associated with water transfers. Some arguments suggest that, at the least, buyers should pay for local public services no longer supported by tax revenues from formerly irrigated lands.⁷²⁸ Other arguments focus on the more direct impacts associated with the retirement of irrigated land. For example, when Aurora acquired and transferred 58 percent of the water shares in the Rocky Ford Ditch, it originally had no plans to address the environmental and nuisance problems (e.g., dust) that can accompany the complete dry-

⁷²¹ Colo. Rev. Stat. § 38-6-201 – 216 (2000). *City of Thornton v. Farmers Reservoir and Irrigation Co.*, 575 P.2d 382 (Colo. 1978) (condemnation powers of home rule cities, citing Colo. Const. Art. XX § 1).

⁷²² Reisner, Marc, *Cadillac Desert*, New York: Penguin Books, 1993, pages 59-96.

⁷²³ Interview with Mark Koleber, Jul. 15, 1999.

⁷²⁴ Interview with Justice Gregory J. Hobbs, Jr., Jun. 25, 1999.

⁷²⁵ The obvious response to this argument is that raw water is a very small portion of the cost of delivered tap water, and increased prices would have little effect. For example, increasing the price of an acre-foot for firm yield of raw water by \$1,000 equals 0.31 cents per gallon, an amount that

can essentially be amortized forever because once acquired the city's rights are perpetual.

⁷²⁶ Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*, Report to Western Water Policy Review Advisory Committee, 1997, page 69.

⁷²⁷ Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*, Report to Western Water Policy Review Advisory Committee, 1997, page 70.

⁷²⁸ Interview with David W. Robbins, Jun. 28, 1999.

up of previously irrigated land.⁷²⁹ A lawsuit by local interests led to a negotiated settlement requiring Aurora to establish a permanent vegetative cover on the retired farmland at a cost of \$5 to \$6 million—more than the irrigated land was worth.⁷³⁰ The Colorado Legislature subsequently adopted Senate Bill 92-92, empowering the water court to impose re-vegetation requirements on municipal transfers of irrigation water.⁷³¹

Concerns of this nature have prompted some cities to modify how they use water transfers. For example, in Thornton’s “Northern Project,” the original plan was to pipe irrigation water purchased from more than 14,500 acres north of Fort Collins to Thornton.⁷³² However, after losing to intense local opposition in water court and reevaluating the costs of building a pipeline, which might be increased by further local opposition, Thornton devised a new phased strategy based initially on an exchange of water down the Poudre River to the South Platte River and then upstream to Thornton.⁷³³ Meanwhile in Colorado Springs, area-of-origin opposition to past water purchases has prompted the city to

⁷²⁹ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 2-28.

⁷³⁰ National Research Council, *Water Transfers in the West: Efficiency, Equity, and the Environment*, Wash. D.C.: National Academy Press, 1992, page 49. Interview with Douglas Kemper, Jun. 23, 1999.

⁷³¹ Colo. Rev. Stat. §§ 37-92-103(10.4), 37-92-305(4.5) (2000).

⁷³² The city also planned to export shares of water in an irrigation ditch purchased by the city. That water was to be moved in the second phase of the project, replaced with lower-quality water piped up from the South Platte. Interview with Mark Koleber, Jul. 15, 1999. Rocky Mountain Consultants, Inc., *(Draft Report) City of Thornton, Northern Water Supply Project, Project Competition Study Report*, Mar. 1990 and *Addendum*, Jul. 1991.

⁷³³ Exchanges are described in Chapter Nine. The limited exchange capacity remaining on the Platte prevents Thornton from using all of the water it acquired. In the future, the city intends to pipe the water directly to Thornton so that it will still use all of its rights on the Poudre. Interview with Mark Koleber, Jul. 15, 1999.

abandon plans for future agricultural-to-urban water transfers.⁷³⁴

Despite the legal, political, and economic costs associated with water transfers and, specifically, the need to have changes of use approved in water court, the reallocation of water is still usually more cost effective than other water supply augmentation options.⁷³⁵ For interests served by the Northern District, purchasing Colorado-Big Thompson shares is normally preferred over simple agricultural transfers. But transaction costs are probably not significant enough to tip the scale between agricultural transfers and new developments (including trans-basin diversions) or efficiency measures that require the construction of additional infrastructure. For the foreseeable future, reallocation of water from agriculture to municipal use will be a core element of strategies to accommodate municipal growth.

“Water . . . symbolizes such values as opportunity, security, and self-determination. . . . Strong communities are able to hold onto their water and put it to work. Communities that lose control over water probably will fail in trying to control much else of importance.”
— HELEN INGRAM, *Water Politics: Continuity and Change*

⁷³⁴ Interview with Rod Kuharich, Jun. 30, 1999.

⁷³⁵ Rice, Teresa and Lawrence MacDonnell, *Agricultural to Urban Water Transfers in Colorado: An Assessment of the Issues and Options*, Boulder: Natural Resources Law Center, University of Colorado School of Law, 1993.

CHAPTER NINE: CONSERVATION AND EFFICIENCY

Existing water supplies can be stretched to serve growing populations through a variety of management strategies, including demand reduction, efficiency improvements, wastewater reuse, and improved system operations. Water conservation practices are not expected to satisfy future water supply needs alone,⁷³⁶ but are an important piece of the puzzle, largely since they allow water providers to escape—or at least delay—the economic and political costs associated with new development and with reallocations. Conservation and efficiency measures, however, are not a quick fix, and raise their own legal and policy issues.⁷³⁷

DEMAND MANAGEMENT

The most obvious strategy for balancing regional water budgets has historically been among the most ignored: reducing demand. Demand is generally calculated as the product of two variables: the number of people served and the amount of water those people use on a per capita basis. Theoretically, both of these factors can be managed to some extent, however, water managers characteristically do not see this as their responsibility, and political leaders normally have insufficient incentives to champion policies that may limit growth or that may impede the use of water through stringent regulations or price mechanisms.

⁷³⁶ *Colorado Water Development Study – 1999 Update*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1999, page 3.

⁷³⁷ DeBuys, William, address to the Natural Resources Law Center Water Conference, University of Colorado, Boulder, Colorado, Jun. 8, 1999. Interview with Mark Koleber, Jul. 15, 1999.

CONTROLLING AND MANAGING GROWTH

Perhaps the most obvious way to limit growing water demands is to limit population increases. In the United States, however, policies designed to discourage new births or to significantly curtail immigration are rarely considered at any level of government. Even in the rapidly growing Interior West, growth control proposals rarely are given serious attention due to a host of ideological and practical concerns. Much greater political viability surrounds efforts in growth *management*—i.e., efforts to guide the direction, rate, and type of growth. In the November 2000 elections, the West led the nation in growth-related ballot measures (197), with over 62 percent succeeding. The overwhelming majority of these measures were offered at the local level. Colorado voters were presented with 67 measures (65 local, 2 statewide), accounting for 12 percent of all growth-related measures nationally, and trailing only California (78) and Ohio (69)!⁷³⁸

At the state level, Colorado has done virtually nothing to pursue growth management. However, Colorado is not completely silent on the subject. For example, growth management was the focus of the Smart Growth and Development Initiative, established in 1994 by former Governor Roy Romer. Participating state agencies include the Colorado Departments of Agriculture, Local Affairs, Natural Resources, Public Health and Environment, and Transportation, along with the Governor's Office of Energy Conservation, Great

⁷³⁸ Myers, Phyllis and Robert Puentes, the Brookings Institution Center on Urban and Metropolitan Policy, "Growth at the Ballot Box," Feb. 2001, available at www.brook.edu/urban (visited Jun. 10, 2001).

Outdoors Colorado, and Office of Business Development.⁷³⁹ Growth management was also the subject of an ambitious, but ultimately unsuccessful, statewide ballot initiative in 2000 (Amendment 24) requiring local and regional planning. Despite being supported by approximately 78 percent of Colorado voters as late as June 2000, a \$6 million media blitz by opponents reduced support to 30 percent on Election Day.⁷⁴⁰

In the western states, the greatest progress in managing population is found in municipal programs, including well-known efforts in San Diego, La Jolla, and Davis, California; Portland, Oregon; and Boulder, Colorado. In these and many related examples, however, controlling growth has meant pushing growth to surrounding areas. While this may limit an increase in water demands in the city with the growth control/management program, it may do nothing to control demands on a regional scale.

One Colorado example is the so-called “Blue Line” policy adopted by Denver Water in the early 1950s. This policy temporarily restricted the ability of neighboring suburbs to gain access to Denver’s water supply system, either by being annexed by the city or by contracting with Denver Water.⁷⁴¹ For many suburbs, this action prompted the development of independent water supply systems. For example, Aurora turned to trans-mountain supplies provided through the

⁷³⁹ *Smart Growth and Development: Resource Directory of Services Regarding Smart Growth and Development Offered by the State of Colorado*, prepared by the Colorado Smart Growth and Development Initiative, March 13, 1995. Water-related services coordinated under this program address concerns such as water project financing, floodplain designation and awareness, instream flow protection, and promotion of conservation technologies.

⁷⁴⁰ Myers, Phyllis and Robert Puentes, the Brookings Institution Center on Urban and Metropolitan Policy, “Growth at the Ballot Box,” Feb. 2001, available at www.brook.edu/urban (visited Jun. 10, 2001), page 37.

⁷⁴¹ *Relationship of Water Supply and Urban Growth in the Denver Region*, prepared by Llewelyn-Davies Carson Ltd. for the Army Corp. of Engineers, Missouri River Division, Aug. 1978, pages 38 – 42.

Homestake Project, developed by the city in conjunction with the City of Colorado Springs. In 1974, the Poundstone Amendment formally restricted any future land annexations by the City of Denver, further isolating the outlying suburbs from Denver’s abundant water rights and sophisticated water delivery system.⁷⁴² While this action has helped to cap expected water demands in the Denver Water service area at a manageable level, it has done nothing to restrict growing water demands in the suburbs.

A somewhat similar outcome has resulted from Boulder’s “blue line,” a charter amendment adopted in 1958 that limited municipal water service to areas below a certain elevation in order to protect Boulder’s mountain backdrop from over building.⁷⁴³ The concept developed into a comprehensive growth management program in the 1970s featuring an extensive network of greenbelts⁷⁴⁴ (the “green line”) combined with building permit limitations.⁷⁴⁵ While this program has helped to protect the natural resources and social environment of the city, it has also contributed to explosive growth in several satellite cities: i.e., Longmont, Broomfield, Lafayette, Louisville, and Superior, although each of these cities has adopted its own growth control measures in the last decade.

“Land use is not our charge; it’s not our charter under state law. Northern’s Board knowingly and diligently stays away from land use.”

— ERIC WILKINSON, General Manager,
Northern Colorado Water Conservancy
District

⁷⁴² Colo. Const. Art. XIV § 3 (2000).

⁷⁴³ Boulder [Colo.] City Charter § 128A (2001).

⁷⁴⁴ City of Boulder, Colorado, “Boulder’s Open Space & Mountain Parks: A History,” available at www.ci.boulder.co.us/openspace/about/OSMP-history (visited Jun. 10, 2001), page 2.

⁷⁴⁵ Boulder [Colo.] Rev. Code § 9-6-1 et seq. (2000).

CURBING PER CAPITA WATER USE

In comparison to controlling population growth, curbing per capita water consumption is a more practical strategy for limiting demands. The statistics on water use suggest that there is considerable room for improvement. Per capita water use in the United States is three times that of the average European country, and astronomically more than most developing nations.⁷⁴⁶ According to the U.S. Geological Survey, per capita water use in the United States (as of 1995) for “public supply”⁷⁴⁷ purposes averages 179 gallons/day nationally, ranging from a low of 130 gallons/day in Massachusetts and Rhode Island to a high of 325 gallons/day in Nevada. Colorado’s rate of 208 gallons/day is far above the national average, a trend seen throughout the arid and semi-arid western states.⁷⁴⁸ Colorado’s status as a water loving state is even more evident when considering total offstream uses, which, in addition to public supply withdrawals, also includes water use in the irrigation, livestock, and mining sectors. Total per capita offstream water use in Colorado is 3,690 gallons/day, a figure exceeded by only four other states (Idaho, Montana, Nebraska, and Wyoming), and nearly three times the national average of 1,280 gallons/day.⁷⁴⁹

High rates of per capita water use, when combined with rapid growth, have resulted in dramatic increases in water demands in many parts of Colorado and the West. Further

⁷⁴⁶ Graves, William, “When the Well’s Dry, We Know the Worth of Water,” *National Geographic Special Edition*, Nov. 1993, page 1.

⁷⁴⁷ The public supply category is primarily domestic uses, but also includes commercial and industrial purposes, including thermoelectric power production.

⁷⁴⁸ Solley, Wayne B., Robert R. Pierce, and Howard A. Perlman, “Estimated Use of Water in the United States in 1995,” *U.S. Geological Survey Circular 1200*, Denver: U.S. Department of the Interior, 1988, page 23.

⁷⁴⁹ Solley, Wayne B., Robert R. Pierce, and Howard A. Perlman, “Estimated Use of Water in the United States in 1995,” *U.S. Geological Survey Circular 1200*, Denver: U.S. Department of the Interior, 1998, page 9.

exacerbating the growth in water demands is an overall increase in per capita consumption. Total water consumption in the West more than doubled between 1960 and 1990, despite a population increase of “only” 75 percent.⁷⁵⁰ In many western cities, much of this water is used to irrigate lawns associated with suburban sprawl. Studies of Phoenix and Las Vegas, for example, identify lawn watering as an important element in per capita water demands exceeding 300 gallons per day.⁷⁵¹ Similarly, approximately 54 percent of water used within the Denver Metro service area is for landscaping.⁷⁵² Because of this, winter water demands are roughly half those of summertime, when the approximately 1 million people served by Denver Water can demand 500 million gallons per day.⁷⁵³

The fact that a majority of municipal water is devoted to landscaping irrigation can largely be blamed on Kentucky bluegrass, a species evolved for the more humid conditions of the East. Many Front Range communities, such as Highlands Ranch in the southern Denver Metro area, have covenants that require the use of water-loving bluegrass, rather than Buffalo grass or other drought tolerant species.⁷⁵⁴ A few Front Range cities, including Denver and Aurora, have taken steps to encourage xeriscaping, a type of landscaping that utilizes plants native to the

⁷⁵⁰ Tarlock, Dan and Sarah B. Van de Wetering, “Growth Management and Western Water Law From Urban Oases to Archipelagos,” *5 Hastings West-Northwest Journal of Environmental Law and Policy* 163, at 169 (1999).

⁷⁵¹ Maddock, Thomas S. and Walter G. Hines, “Meeting Future Public Water Supply Needs: A Southwest Perspective,” *31(2) Water Resources Bulletin* 317, at 319 and 325 (1995).

⁷⁵² Denver Water Board, *Water for Tomorrow, An Integrated Water Resource Plan*, 1997, Technical Appendix page 17.

⁷⁵³ Electronic-mail communication from Ed Pokorney, Aug. 20, 2001.

⁷⁵⁴ Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*, Report to Western Water Policy Review Advisory Committee, 1997, page 56.

climate of the region.⁷⁵⁵ However, xeriscaping remains unpopular with most homeowners out of fears that any deviation from bluegrass may lower property values or may create problems with neighbors. One such example was recently reported by a resident of the Aloha Beach subdivision who ran into trouble with his homeowners' association due to his "failure to conform to the conventional bluegrass template."⁷⁵⁶ Instead of bluegrass, this homeowner chose to plant a front-yard of flowers utilizing xeriscape techniques. This action was contrary to the provisions of the covenant-controlled community and the resident has been threatened with fines and legal action. Clearly, Coloradans are serious about their bluegrass.

“Cities are confident they can shout down environmentalists who raise concerns about increased diversions by responding that if environmentalists prevail, metro dwellers would have to give up their lawns.”
— MELINDA KASSEN, Trout Unlimited

PRICING MECHANISMS AS A DEMAND MANAGEMENT STRATEGY

Most western cities now have some form of price-based demand management strategy. The first component of such strategies is to meter individual uses, thereby allowing water bills to reflect actual rates of usage. Among Colorado municipalities, Colorado Springs was a leader in this effort, with the city being fully metered in the 1940s.⁷⁵⁷ Denver Water, on the other hand, did not invest heavily in metering until the late

1980s, but was quickly rewarded with immediate and on-going savings of 12,000 acre feet per year, nearly 6 percent of demand.⁷⁵⁸ The

Colorado Water Metering Act mandates that water providers use metered water delivery and billing on all new construction through 2009.⁷⁵⁹ Significant water conservation is expected to result from statewide metering.

Metering allows water providers to not only link rates to levels of use, but also provides the information needed to financially

discourage the most extravagant water users. Most utilities use one of four rate structures: (1) uniform rates, (2) declining rates (i.e., the greater the quantity used, the lower the rate), (3) inclining rates (i.e., per unit price increases as total quantity used increases), or (4) seasonal rates (rates vary based on the season). Declining and inclining are tiered or "block rate" systems, as prices change at certain quantity thresholds. In the name of conservation, public utilities have been quickly moving away from declining rate structures. In 1986, approximately 61 percent of utilities used this system; this number dropped to approximately 39 percent by 1994. Denver Water, for example, made the switch from declining to inclining in the early 1990s as did many of the state's other municipalities.

Tools such as metering and inclining rate structures have allowed water providers to provide economic incentives for water conservation. In some areas, these strategies appear to be working, especially when linked

⁷⁵⁵ For more information on xeriscape in Colorado visit these web sites: <http://www.xeriscape.org> and <http://www.csu.org/xeri/>.

⁷⁵⁶ Cox, Jack, "Blades vs. Blossoms, Homeowner's perennials fly in the face of covenants," *The Denver Post*, May 9, 2000, page E1. (Also see: "A Response to 'Blades vs. Blossoms,'" *The Denver Post*, May 15, 2000, page B7.)

⁷⁵⁷ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 5-5.

⁷⁵⁸ Interview with Hamlet J. "Chips" Barry, III, Jun. 29, 1999. Of course, to the extent that revenues rely on usage, any reduction in consumption can have negative revenue consequences for the utility.

⁷⁵⁹ Colo. Rev. Stat. § 37-97-101 et seq. (2000).

with non-price conservation programs, such as public information efforts, retrofit programs, and permanent ordinances (e.g., building code revisions).⁷⁶⁰ The City of Denver, for example, reports that their residential customers have reduced their use by about 20 percent since 1982-83.⁷⁶¹

The effectiveness of pricing mechanisms as a water conservation tool is ultimately limited, however, by the fact that water in the West is generally quite inexpensive.⁷⁶² Despite the rhetoric that water is “priceless,” water is more accurately described as “without a price”—i.e., it is free to appropriators. Water assumes an economic cost only when it must be purchased from an existing rights holder, and when the capital and operational expenses of water storage, diversion, treatment, and delivery are considered. Because of the low cost of water, very large price increases are often needed to trigger substantial changes in water-using behavior.

Economists describe the degree to which demand for a good or service is responsive to price changes using the term “elasticity.” Elasticity can be reduced by several factors, including the degree to which the good or service is essential (and cannot be replaced with substitute products), and the overall price of the good. In part due to the low cost of water, a recent study of water conservation in the West suggests that price is only a modestly effective tool for managing demand:

⁷⁶⁰ Michelsen, Ari M., J. Thomas McGuckin, and Donna M. Stumpf, *Effectiveness of Residential Water Conservation Price and Nonprice Programs*, Denver: American Water Works Association Research Foundation 1998. .

⁷⁶¹ Interview with Hamlet J. “Chips” Barry, III, Jun. 29, 1999. Although there are now 15 to 20 percent more customers than in 1985-86, the provider’s highest daily use occurred in 1982-83.

⁷⁶² “Survey of water rates shows cost of water varies widely across the U.S.,” *U.S. Water News*, March 2000, page 1. In 1999, the cost of 220,200 gallons of water was \$302.81 in Denver and \$154.89 in Salt Lake City, while the national average was \$404.09, and residents of eastern cities like Pittsburgh and Boston paid twice as much as westerners.

Water price has a significant and negative impact on water use, but water demand is very price inelastic, more so than has been suggested in most other studies. The highest elasticity estimate was for summer use (approximately -0.20). At this degree of consumer responsiveness, water utilities could double their water rates and expect, at a maximum, only a 20 percent decrease in water use during the peak season. More likely, utilities should expect a water elasticity of -0.10 on an annual basis; a hefty 50 percent increase in rates will reduce use by 5 percent.⁷⁶³

Most other studies are somewhat more encouraging, suggesting a price elasticity of -0.25 to -0.70 . However, even if these higher elasticity estimates are accurate, the fact remains that raising residential water rates to encourage conservation is politically difficult. Since water service is a basic human need, equity and public health considerations provide a compelling rationale for making water available at the lowest possible cost.

EFFICIENCY

A demand for water is, in reality, a demand for a service or function that water provides. The amount of water needed to satisfy that demand can often be reduced through the use of new technologies or water-using practices. Such efforts are normally described as efficiency measures, as they allow water users to stretch each gallon further.

⁷⁶³ Michelsen, Ari M., J. Thomas McGuckin, and Donna M. Stumpf, *Effectiveness of Residential Water Conservation Price and Nonprice Programs*, Denver: American Water Works Association Research Foundation, 1998, page xxii.

AGRICULTURAL WATER USE EFFICIENCY

In Colorado, like most semi-arid and arid western states, over 90 percent of all human water consumption occurs in the agricultural sector.⁷⁶⁴ Consequently, the greatest potential for efficiency improvements lies in the agricultural sector. The legal, political, and economic impacts of inefficient agricultural water use are varied. To the extent that excessive water consumption discourages other economic activities or harms environmental values, then these practices are clearly inefficient. A similar set of impacts can be associated with excessive levels of diversions, even if these activities appear to be offset by higher return flows. For example, excessive diversions can have a negative economic impact on upstream junior water users deprived of water due to the excessive water demands of a senior located downstream or one exporting water to a different basin. On the other hand, excessive agricultural use may arguably be of value to the state in those interstate basins—namely the Colorado—where the state cannot currently consume its full entitlement. Some water interests in Colorado “fear that reducing consumptive use will result in more water being left in stream and lost to downstream states.”⁷⁶⁵

A certain degree of water use efficiency is required by the legal concept of “water duty,” which is defined by the Colorado Supreme Court as:

that measure of water, which, by careful management and use, without wastage, is reasonably

required to be applied to any given tract of land for such period of time as may be adequate to produce therefrom a maximum amount of such crops as ordinarily grown thereon. It is not a hard and fast unit of measurement, but is variable according to conditions.⁷⁶⁶

West-wide, water use efficiency has not been enforced.⁷⁶⁷ Western legislatures are generally hesitant to enact agricultural water efficiency requirements beyond those required by the water duty concept, which in Colorado, is usually only applied in individual adjudications.⁷⁶⁸ In part, this is due to a desire to minimize additional burdens on agriculture, but also reflects entrenched legal and economic disincentives for conservation found in the prior appropriation system. To the extent that water users can reduce consumption through investments in water-saving technologies, such as reduced evaporation from drip irrigation, they risk having the size of their water rights reduced. This loss in value, when combined with the costs of the new water-saving equipment, can easily outstrip any pumping or operational savings associated with the conservation program.

Despite legal and economic disincentives for improving agricultural water use efficiency, significant progress is being made. Although the amount of irrigated acreage in Colorado has remained fairly constant since the mid-1970s, irrigation water use has “declined by about 15

⁷⁶⁴ Solley, Wayne B., Robert R. Pierce, and Howard A. Perlman, “Estimated Use of Water in the United States in 1995,” *U.S. Geological Survey Circular 1200*, Denver: U.S. Department of the Interior, 1998, page 11.

⁷⁶⁵ Morandi, Larry, *Rethinking Western Water Policy: Assessing the Limits of Legislation*, Denver: National Conference of State Legislatures, Jul. 1994, page 22.

⁷⁶⁶ *Farmers Highline Canal & Reservoir Co. v. John’s Flood Ditch Co.*, 210 P.2d 982, at 984-85 (Colo. 1949). Some of the variable conditions that affect the legal use of water are crops, adequate flow to assure delivery of water to where it is needed, and seasonal, annual and regional climate.

⁷⁶⁷ Neuman, Janet C., “Beneficial Use, Waste, and Forfeiture: The Inefficient Search for Efficiency in Western Water Use,” 28 *Environmental Law Journal* 919, at 995 (1998).

percent over the past 15 years.”⁷⁶⁹ While part of this decline is attributable to favorable climatic conditions, it also reflects more efficient irrigation practices. Statewide, agricultural water use is not expected to increase through the year 2100;⁷⁷⁰ in fact, it is likely to continue its decline due to agricultural-to-urban water transfers and to on-farm efficiency improvements.⁷⁷¹

MUNICIPAL WATER USE EFFICIENCY

Many Colorado municipal water providers actively pursue water conservation. Various approaches have been taken to reduce municipal demand in Colorado, including rate structures, mandated fixture efficiency, incentives for state aid, and provider policies. The potential benefits of municipal and industrial conservation may not be as substantial as agricultural conservation, but are still significant. For example, Denver Water estimates that 27 percent (approximately 72,000 acre-feet) of current system use could be saved through conservation, particularly through the adoption of xeriscaping programs.⁷⁷² Reducing outdoor water use is also central to the conservation plans of Colorado Springs, which has developed an “award-winning” Xeriscape Demonstration Garden, and which provides residents with evapotranspiration (ET) lawn watering guidelines based on its own weather station on Pikes Peak.⁷⁷³ The city also has a pilot

seasonal rate structure targeted at large users, and a home water-auditing program.

Reducing water consumption associated with lawn-watering is a difficult challenge given the prevalence and cultural acceptance of bluegrass, and given rules such as the Highlands Ranch covenant that not only requires a minimum size lawn, but also requires it be kept green; a homeowner can be fined for letting the grass brown-up during the height of summer.⁷⁷⁴ It could be argued that growing bluegrass is not a beneficial use and thus is wasteful under state law.⁷⁷⁵ Determining what is wasteful normally entails a “comparison of the wastefulness of the particular use compared to other possible uses for the water and compared to other means of accomplishing the purpose for which the water is used.”⁷⁷⁶ In practice, this comparison is usually based on community standards.⁷⁷⁷ Given the prevalence of bluegrass in residential development, this is a difficult case to make.

Colorado House Bill 91-1154 (enacted) requires the annual submission of a water conservation plan by providers supplying 2,000 acre feet or more per year.⁷⁷⁸ Under this legislation, providers must develop a conservation implementation plan based on the feasibility of nine measures: (1) water efficient features and appliances; (2) low-water-use landscaping and irrigation efficiency improvements; (3) water-efficient industrial and commercial water-using processes; (4) water reuse systems; (5) distribution system leak detection and repair; (6) water efficiency measures: e.g., public education, customer water use audits and water-savings

⁷⁶⁸ Corbridge, James N., Jr. and Teresa A. Rice, *Vranesh's Colorado Water Law, Revised Edition*, Niwot: University Press of Colorado, 1999, page 51.

⁷⁶⁹ *Colorado Water Development Study – 1999 Update*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1999, page 2.

⁷⁷⁰ *Colorado Water Development Study – 1999 Update*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1999, page 2.

⁷⁷¹ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, pages iii-iv and 6-1.

⁷⁷² Denver Water Board, *Water for Tomorrow, An Integrated Water Resource Plan*, 1997, page 45.

⁷⁷³ Black & Veatch, *Water Resource Plan for Colorado Springs Utilities*, 1996, at III-3 to 4.

⁷⁷⁴ Riebsame, William, *Western Land Use Trends and Policy: Implications for Water Resources*, Report to Western Water Policy Review Advisory Committee, 1997, page 56.

⁷⁷⁵ Interview with Melinda Kassen, Sept. 7, 1999.

⁷⁷⁶ Corbridge, James N., Jr. and Teresa A. Rice, *Vranesh's Colorado Water Law, Revised Edition*, Niwot: University Press of Colorado, 1999, page 45.

⁷⁷⁷ *Farmers Highline Canal Co. v. John's Flood Ditch Co.*, 210 P.2d 982 (Colo. 1949).

⁷⁷⁸ Colo. Rev. Stat. § 37-60-126 (2000).

demonstrations; (7) tiered rate structures; (8) water efficiency ordinances; and (9) water efficiency incentives, e.g., rebates.⁷⁷⁹ The statute requires providers to submit conservation plans to the Colorado Water Conservation Board by 1996.⁷⁸⁰ Approximately 80 percent of the providers are in compliance.⁷⁸¹ The legislation encourages compliance by making plans a condition of eligibility for state assistance.⁷⁸²

WASTEWATER REUSE

Municipalities across the West are increasingly looking to wastewater as a water supply source for both non-potable and potable (i.e., drinking water) uses. Part of the appeal of water “recycling” is that it can solve two problems at once: “it reduces the need to develop new sources to meet growing demands and it helps reduce the level of effluent discharges into surface water and groundwater.”⁷⁸³ Reuse also often provides a highly competitive and cost-effective means of supply augmentation.

The most common examples of reuse are for non-potable purposes. Compared to potable reuse, non-potable reuse poses a considerably smaller public relations challenge, as well as a reduced economic cost since it does not require treating water to drinking water standards. Non-potable reuse is commonly used for agricultural, industrial, and municipal landscape irrigation purposes. For example, Colorado Springs supplies approximately 2,500 acre-feet per year of non-potable water from Monument Creek and a wastewater treatment plant to provide irrigation water to golf courses, cemeteries, city and county properties, and sports facilities.⁷⁸⁴ The City’s

Water Resource Plan contains additional non-potable reuse projects judged to be economically superior to alternative supply sources. This system is expected to grow in proportion to the city’s overall water demand, expanding to serve the irrigation needs of Woodmen Valley and the Broadmoor (about 600 acre-feet per year) at a cost of between \$500 and \$850 per acre-foot. Non-potable reuse requires the construction of distribution systems isolated from potable water systems. This is an important cost consideration, and militates the use of reclaimed water in places with large non-potable demands.

“Recycling water represents a way by which a community can exploit its own resources more efficiently, the hydrological equivalent of ‘Buy American.’”
— *Water Strategist*

Potable reuse is an intriguing, albeit controversial, idea. One form of potable reuse occurs when municipal wastewater is reused as raw water in a municipal water system. This occurs when effluent is piped directly into a drinking water system where it is treated and distributed—a rare but technically feasible activity.⁷⁸⁵ This can also occur when treated wastewater is mixed into a municipality’s raw water supply. Because of geography, this latter situation already exists in any locality where an upstream municipality’s wastewater discharge point is above the downstream city’s drinking water diversion point. For example, Thornton in effect provides treated effluent to customers by diverting water from the South Platte River downstream from the Bi-cities Wastewater

⁷⁷⁹ Colo. Rev. Stat. § 37-60-126(2-4) (2000).

⁷⁸⁰ Colo. Rev. Stat. § 37-60-126(2) (2000).

⁷⁸¹ Interview with Peter H. Evans, Jun. 28, 1999.

⁷⁸² Colo. Rev. Stat. § 37-60-126(9) (2000).

⁷⁸³ *Water Strategist*, summer 1997, page 8.

⁷⁸⁴ This discussion is drawn from Black & Veatch, *Water Resource Plan for Colorado Springs Utilities*, 1996, pages VI-7 to 10 and IX-4.

⁷⁸⁵ For example, during a 1956 drought in the small town of Chanute, Kansas, wastewater was recycled through its “rapid-sand-filtration plant directly into the intake point of its drinking water system with no ill effects.” *Water Strategist*, summer 1997, page 7.

Plant.⁷⁸⁶ Such arrangements are not normally labeled as reuse, however, unless a municipality discharges its own wastewater into its own raw water source for the explicit purpose of reuse.

Colorado Springs recently investigated the possibility of indirect potable reuse while planning for future demands.⁷⁸⁷ The plans consist of releasing treated wastewater effluent from the city's existing wastewater treatment plants into Fountain Creek. Water would then be diverted from Fountain Creek for treatment at a new water reclamation plant before being added to the city's potable water distribution system. The city concluded that the concept was feasible and cost competitive with other alternatives.

Any management approach sounding like potable reuse is a tough sell, although effluent can be treated to meet drinking water standards. There are major psychological barriers to potable reuse, especially where effluent is fed directly into a drinking water treatment plant. Customers must be convinced that the water is "safe, and that there are no hidden liabilities and problems associated with its use."⁷⁸⁸ There is also an equity concern with people not wanting to be the only ones, or the first ones, drinking reclaimed water.⁷⁸⁹ For these reasons, only parties without clean and abundant surface water supplies normally pursue direct potable reuse.⁷⁹⁰

"We have potable reuse now—just don't tell anyone."
— JAMES R. "JAY" MONTGOMERY, Moses, Wittemyer, Harrison & Woodruff

⁷⁸⁶ Electronic-mail communication with Mark Koleber, Jul. 17, 2001.

⁷⁸⁷ Black & Veatch, *Water Resource Plan for Colorado Springs Utilities*, 1996, pages VI-22 to 24.

⁷⁸⁸ *Water Strategist*, Vol. 11, No. 2, summer 1997, page 2.

⁷⁸⁹ Interview with Lee Rozaklis, Jul. 20, 1999.

⁷⁹⁰ Interview with Lee Rozaklis, Jul. 20, 1999.

LAW AND POLICY OF REUSE

Under Colorado law, foreign (i.e., trans-basin) water is the primary candidate for reuse,⁷⁹¹ as the appropriator is entitled to use this water to extinction without regard for downstream users dependent upon return flows.⁷⁹² Return flows of native water, on the other hand, are subject to legal claims by downstream users, thereby limiting (or prohibiting altogether) the prospects for direct reuse by the original diverter. In effect, the reuse rights of native water belong to downstream appropriators. Since municipal use is often only 35-40 percent consumptive,⁷⁹³ the difference in permissible consumptive use between foreign water and native water is roughly two to one. Reuse, therefore, provides a potential windfall in terms of water supply in cities with extensive trans-basin diversions; for example, if Denver fully reused its effluent, its supplies could theoretically increase by approximately 50 percent.⁷⁹⁴

Reuse is also attractive when physical supplies limit diversions but the owner has consumptive use rights. For example, a municipality may have the right to divert 100 acre-feet and consume 40 acre-feet, but the amount of water physically available for diversion may only be 50 acre-feet. The municipality can still consume 40-acre feet if it can increase the efficiency of its use; one way to do this is through reuse. This advantageous situation is not as prevalent as foreign water⁷⁹⁵ because most Front Range water providers' portfolios of rights contain relatively more imported water than reallocated water with consumptive use rights. The benefit from this water maximization typically arises when native water is transferred from agricultural to municipal uses.

⁷⁹¹ Non-tributary groundwater may also be reused, and is in many cases on the Front Range.

⁷⁹² One notable exception is Colorado-Big Thompson imports.

⁷⁹³ Interview with Eric Wilkinson, Jul. 20, 1999.

⁷⁹⁴ Interview with Lee Rozaklis, Jul. 20, 1999.

⁷⁹⁵ Interview with Lee Rozaklis, Jul. 20, 1999.

REUSE IN DENVER

The 1955 Blue River decree⁷⁹⁶ suggests that Denver has a legal obligation to reuse its trans-mountain diversions in order to minimize the need for, and size of, such diversions.⁷⁹⁷ The amount of reuse required is not specified; rather, the decree calls only for due diligence in reusing trans-basin water and for reuse to be pursued within legal and economic limits. How the city is to meet its obligation is quite ambiguous, and has not been litigated—yet.⁷⁹⁸

Denver Water presently has no water reuse plant, although it reuses water by exchange. The agency described three cost-effective effluent reuse opportunities in its Integrated Resource Plan.⁷⁹⁹ The first opportunity, a two-phase non-potable program, may yield 17,000 acre-feet/year for public and private use.⁸⁰⁰ Phase I of the Denver Water Recycling Program is currently underway for completion in late 2003 or early 2004. Up to 8,300 acre-feet/year will supply the Park Hill Golf Course, Xcel Energy's Cherokee Power Station, city parks and other potential industrial customers at a cost of almost \$64 million. Phase II (8,700 acre-feet) will serve the Stapleton and Lowry Redevelopment areas, the Gateway area, and Denver International Airport after 2008 at a cost of \$75 million.

The second and third opportunities involve potable uses. The second opportunity is an indirect potable program. This program would treat effluent to drinking water standards and blend it with raw water at the Ralston Reservoir.

⁷⁹⁶ *Decree in Consolidated Cases 2782, 5016, and 5017*, (U.S. Dist. Ct. for Colo., Oct. 12, 1955).

⁷⁹⁷ Interview with Michael D. "Sandy" White, Jul. 12, 1999. Interview with Charles B. "Barney" White, Oct. 7, 1999.

⁷⁹⁸ This opinion is shared by Charles B. "Barney" White (interview of Oct. 7, 1999) and David C. Hallford (address to the Colorado Water Congress Summer Convention, Aug. 27, 1999).

⁷⁹⁹ Denver Water Board, *Water for Tomorrow, An Integrated Water Resource Plan*, 1997, page 34.

⁸⁰⁰ The balance of this paragraph is from a telephone interview with Myron Nealey, Jun. 6, 2001.

The blended water would then undergo conventional treatment and be distributed via Denver Water's potable system. An alternate approach would blend effluent with Barr Lake water. The blended water would then undergo advanced water treatment to potable quality and would then be injected into the treated water system. No such "blending" is involved in the third opportunity, which entails directly injecting effluent treated to drinking water standards into the water system.

The total potential yield from the two potable reuse opportunities could ultimately exceed 35,000 acre-feet per year if potable reuse proves economically and publicly acceptable. Coupled with the non-potable program, Denver Water could reuse over 50,000 acre-feet per year at city build out.⁸⁰¹ This compares to Denver Water's total annual use of 265,000 acre-feet.⁸⁰²

IMPROVED OPERATION OF WATER SYSTEMS

The physical components that make up a water system are its facilities. The systems are an amalgam of many different facilities of different vintage, each representing a snap shot of what the system designers thought was most appropriate, or most affordable, at the time of installation. Some facilities are inevitable bottlenecks, i.e., operate at a lower capacity than the rest of the system. This may be a function of facilities not operating as designed, or the conscious result of design limits, e.g., sizing a facility for optimum operation in spite of other system capacities or cost constraints. These are the typical facility efficiency questions that arise in day-to-day operations as well as long-range planning. In general, providers are aware of these limits and

⁸⁰¹ Denver Water Board, *Water for Tomorrow, An Integrated Water Resource Plan*, 1997, page 34.

⁸⁰² Denver Water Board, *Water for Tomorrow, An Integrated Water Resource Plan*, 1997, page 13.

work to address them in their planning efforts. Nevertheless, there are opportunities to improve facility utilization, particularly through cooperation between providers.

RE-OPERATION OF STORAGE FACILITIES

One strategy for increasing yields of existing systems is to re-operate reservoirs in a manner that allows for greater water storage. An early example of creative reservoir management to increase the basin-wide yield of water is the Southeast Colorado Water Conservation District's (SECWCD) winter water program.⁸⁰³ Envisioned as an integral part of the Fryingpan-Arkansas (Fry-Ark) Project, the program allows users to temporarily store water in reservoirs during the winter months and to call for the stored water at times when the user needs the water. Prior to the adoption of the winter storage program, most users diverted water for irrigation during the winter months to maintain soil moisture levels. Frequent problems with winter operation of canals and lateral systems occurred. Winter water is distributed according to a formula that allocates water between participating direct flow and off-channel storage ditches/projects.

Recently, the Bureau of Reclamation and the City of Colorado Springs explored the potential of further re-operations of the Fry-Ark Project to suit municipal needs.⁸⁰⁴ This research suggested that the project had an unused storage capacity of at least 70,000 acre-feet that could, through reservoir re-operations, be used to store non-project water. In 2000, the SECWCD decided in

⁸⁰³ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, page 4-8 *et seq.*

⁸⁰⁴ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, pages 7-12 to 7-17.

principle to allow municipal providers to store as much as 49,000 acre-feet of water they own in unused Fry-Ark space.⁸⁰⁵ Such re-operation could meet Colorado Springs' need for 45,000 acre-feet of additional storage capacity by 2040. However, the proposal would require the consent of the Bureau, which has opined that federal law⁸⁰⁶ prohibits the storage of non-project municipal water in project facilities.⁸⁰⁷ An additional problem identified by the SECWCD is that this proposed re-operation could reduce trans-basin diversions from the West Slope by as much as 200,000 to 300,000 acre-feet over nine years. Such interference with normal project operations would not be permitted.⁸⁰⁸

Coordinated reservoir operations have also emerged as a useful tool for environmental purposes. On the Colorado River, 63,000 acre-feet of water supported 1999 flows in the 15-mile reach as a result of coordinated reservoir operations.⁸⁰⁹

A substantially different form of nonstructural re-operation involves conjunctive use of groundwater to re-time stream flows. This strategy involves using diverted surface water to recharge alluvial aquifers that ultimately discharge this water back into the river. Because it takes time for the return flows to reach the stream, this technique can change the timing of

⁸⁰⁵ "SECWCD Moves Forward on Enlargement of Pueblo Reservoir," *Water Intelligence Report*, Colorado Water Congress, Editor Richard D. MacRavey, Oct. 20, 2000, page 2.

⁸⁰⁶ 43 U.S.C. § 523 (2000).

⁸⁰⁷ A. Jack Garner, Area Manager, Bureau of Reclamation, Eastern Colorado Area Office, Letter to Steve Arveschoug, General Manger, SECWCD, from, Nov. 3, 1998. A number of parties are working to amend federal law on this matter. The Family Farm Coalition, and perhaps Colorado interests including the SECWCD, is pursuing congressional action to change the law. Telephone interview with Steve Arveschoug, Jun. 28, 2000. "Administration Update/Water Resources, Bureau of Reclamation/Water Transfers," *Western States Water*, Editor Tony Willardson, May 5, 2000, page 1.

⁸⁰⁸ Interview with Roger L. "Bud" O'Hara, Jun. 30, 1999.

⁸⁰⁹ Comments of Tom Pitts to the Colorado Water Congress Summer Convention, Aug. 23, 2001.

river flows. By adjusting the place of recharge, it is possible to fine-tune the timing of return flows; for example, high spring flows can be recharged to an aquifer to increase late-season stream flows. This is being done on the Tamarack Project on the South Platte River, where groundwater recharge and river re-regulation are being used to match river flows to the needs of endangered species in the Central Platte.⁸¹⁰

REGIONAL COORDINATION

Another strategy for increasing yields and efficiency is to operate otherwise separate water

systems in an integrated fashion. Coordination among Front Range water providers was identified in the Metropolitan Water Supply Investigation (MWSI) as one of the Front Range's most promising future water management options.⁸¹¹

Unfortunately, the history of Colorado water is one of competition, suspicion, and controversy among the largest water providers.

Additionally, many past efforts at cooperative water

development have been unsuccessful, as evidenced by the Two Forks and Homestake II proposals, and by the initial incarnations of the Union Park project. This history leaves many water providers leery of big cooperative projects.⁸¹²

⁸¹⁰ Platte River EIS Office, *Platte River Endangered Species Partnership*, 1998, page 4.

⁸¹¹ *Metropolitan Water Supply Investigation*, prepared by Hydrosphere Resource Consultants, Inc.; HRS Water Consultants, Inc.; Mulhern MRE, Inc.; and Spronk Water Engineers, Inc. for the Colorado Water Conservation Board, 1999, page 129.

⁸¹² Interview with Douglas Kemper, Jun. 23, 1999.

The cooperation of a few key players is probably essential to any meaningful progress regarding coordinated system operations. In the Denver Metro area, Denver Water must necessarily be at the center of any significant cooperative arrangements, simply because it has the region's most extensive infrastructure.⁸¹³ Denver Water has adopted a policy that invites cooperative proposals from other entities.⁸¹⁴ Likely partners would include Aurora, Arapahoe County, Douglas County, and Thornton. Further down the South Platte, the influence of the Northern District is key, as it already occupies a coordinating position within the boundaries of its district. The SEWCD is in a somewhat

analogous situation to Denver Water and the Northern District in the Arkansas River basin, with water providers Colorado Springs and Pueblo having their own major rights and facilities.

An early success involves Denver Water and the City of Boulder. The two municipalities recently completed negotiations that allow Boulder to use storage space in Denver Water's Gross Reservoir

when the space is not needed for Denver's municipal demands. The agreement lets Boulder store up to 2,500 acre-feet in the reservoir.⁸¹⁵

The MWSI process has been a stimulus for conversations regarding improved system coordination and operations. Already, two promising progeny have resulted from MWSI—

⁸¹³ Interview with Charles B. "Barney" White, Oct. 7, 1999.

⁸¹⁴ Denver Board of Water Commissioners, "Cooperative Actions with Metropolitan Water Suppliers Outside the Board's Service Area," Oct. 15, 1996.

⁸¹⁵ Colorado Water Conservation Board, *Instream Colorado*, Jul. 2001, page 3. Boulder will use the water to maintain minimum stream flows in South Boulder Creek.

the Southern Cooperative Action Proposal and the Northwest Cooperative Investigation.⁸¹⁶ These initiatives are considered promising largely because they are voluntary undertakings that involve the principal players on all sides of the issues, although it is too early to tell if they will yield any real improvements in water efficiency in the Denver metro area.

Like the discussions among the providers in the Denver metro area, regional discussions elsewhere are a mixed bag. The Upper Colorado River Basin Study is a positive development because it is attempting to determine the West Slope's interests with specificity. SECWCD's Arkansas Basin Future Water and Storage Needs Assessment is another promising effort that could form the basis of coordinated operations in the Arkansas River basin. Unfortunately, Northern seems content to confine its operating interests to matters within the district's boundaries on the lower South Platte.

WATER EXCHANGES

One of the most highly utilized strategies for improving water system efficiency and yield is the use of "exchanges," which are a legal and engineering strategy for minimizing capital, transmission, and/or treatment costs to water providers. In an exchange, a water rights holder is allowed to take water from a new location or source, but only if it is replaced elsewhere and in a manner sufficient to ensure no injury to other rights holders. Exchanges can be highly complex, and can generate years of litigation.

⁸¹⁶ The so-called Tri-Party Alliance is discussed in detail in Chapter Seven. Providers in the northwest Denver metro area are generally short on storage needed in a critical drought. Changes in operations and/or modification of arrangements between Denver Water and the providers could address much of this shortfall, and is the subject of the Northwest Cooperative Investigation. Hydrosphere Resource Consultants, *Northwest Cooperative Investigation, Final Reports for Task 1: Mutual Education, Task 2: Future Baseline Representation, Task 3: Estimate of Future Unused Supply*, Feb. 9, 1999.

In some exchanges, municipalities have been allowed to use return flows from lawn watering as the replacement for water diverted elsewhere.⁸¹⁷ Exchanges of this nature are particularly useful for taking full advantage of the right to use foreign water to extinction. These exchanges can be a significant source of water to meet the demands of growth. In Colorado Springs, for example, irrigation return flows currently total about 2,800 acre-feet per year, rising to 12,000 acre-feet annually by 2040.⁸¹⁸

The South Platte River is subject to so many exchanges that few opportunities remain.⁸¹⁹ Denver Water, in particular, has aggressively utilized this strategy.⁸²⁰ The "3635 agreement," facetiously known as "the mother of all exchanges," generally allows Denver Water to use any water as a substitute supply for the water it diverts from the South Platte River,⁸²¹ and Denver Water anticipates getting as much water as it can through the use of exchanges.⁸²² One pending case highlights the complexities of these arrangements. The case involves the desire of Denver Water to divert relatively clean water from the South Platte River upstream of Chatfield Reservoir in exchange for treated effluent discharged from the Bi-Cities (Littleton-Englewood) Waste Water Treatment Plant at a point upstream of the Burlington Ditch, a Thornton water supply pipeline. While this exchange would not reduce the amount of water available to downstream users, it would reduce the water quality of Thornton's raw water supply, prompting the city to challenge the exchange in court.⁸²³

⁸¹⁷ Interview with Rod Kuharich, Jun. 30, 1999.

⁸¹⁸ Black & Veatch, *Water Resource Plan for Colorado Springs Utilities*, 1996, page IV-13.

⁸¹⁹ Interview with Hamlet J. "Chips" Barry, III, Jun. 29, 1999.

⁸²⁰ Interview with David W. Robbins, Jun. 28, 1999.

⁸²¹ Interview with Michael D. "Sandy" White, Jul. 12, 1999.

⁸²² Interview with Lee Rozaklis, Jul. 20, 1999.

⁸²³ *Order Re: Water Quality Standards, In The Matter Of The Application Of The City And County Of Denver, For*

The case raises a potential conflict between two legislative provisions. First is the Colorado law requiring that exchanges must not result in a downstream user receiving water of a quality insufficient to meet the requirements of its normal use—in this case, as input to a drinking water plant.⁸²⁴ Second is the notion that discharge requirements are to be based on water quality standards set by the Colorado Water Quality Control Act (WQCA). The first provision appears to support Thornton's position; the second supports Denver Water. Initial rulings of Division 1 Water Court suggest that the law of water exchanges can, theoretically, be used as a justification for setting a discharge standard higher than the WQCA standards, but proving the necessity of this judicial action falls to the party demanding the higher standard (Thornton).⁸²⁵

This issue has been further complicated by suggestions that the U.S. Fish & Wildlife Service, under its Section 7 responsibilities of the Clean Water Act, believes it may have the authority to review EPA certifications of state actions concerning effluent exchanges.⁸²⁶ However, in the Thornton-Denver Water case, there is no obvious state regulatory decision for EPA to review and certify, since in Colorado, water quality management is subservient to the right to use water.⁸²⁷ The state's water quality program does not provide any authority for the state to review the water quality implications of

effluent exchanges. Thus, to have authority over exchanges, EPA would have to assert its independent jurisdiction. If the EPA did this, it would be exerting oversight authority on the state's Water Courts when approving exchanges. This quickly leads to constitutional law questions that would not be easily resolved.

This dispute between Denver Water and Thornton is ongoing, and is being closely watched by water interests throughout the state. A victory by Denver Water would cause concern among other water suppliers worried about negative water quality consequences of upstream exchanges. A victory by Thornton would ease those concerns, but might limit the availability of exchanges in other situations, and would create doubt among wastewater dischargers about the standards they are expected to meet. Statewide, the outcome of this case is also significant, as this issue is not confined to the South Platte River basin. For example, agricultural interests in the Arkansas River basin have expressed concerns about the potential impacts on water quality associated with increased exchanges involving Lake Meredith.⁸²⁸ More importantly, exchanges directly affect trans-basin diversions. For example, Denver Water's exchanges reduce West Slope diversions by 20,000 acre-feet per year.⁸²⁹

FUNDAMENTAL CHANGES IN SYSTEM DESIGN AND OPERATION

In addition to benefits promised from reservoir re-operations, regional coordination, and exchanges are other, more ambitious and fundamental reforms that could transform water systems. Reforms, for example, could address the inherently risk-averse nature of water systems. Modern water systems often contain

Findings Of Due Diligence, Case No. 96CW145 (Dist. Ct., Water Div. No. 1, Apr. 9, 1999) page 8.

⁸²⁴ Colo. Rev. Stat. § 37-92-305(5) (2000) provides “[a]ny substituted water shall be of a quality and quantity so as to meet the requirements for which the water of the senior appropriator has normally been used.”

⁸²⁵ *Order Denying Applicant's Motion For Partial Summary Judgment, And Order Granting In Part, And Denying In Part, The City Of Thornton's Motion For Determination Of Questions Of Law*, Case No. 96CW145 (Dist. Ct., Water Div. No. 1, Dec. 17, 1997).

⁸²⁶ Interview with Mark T. Pifher, Jun. 24, 1999.

⁸²⁷ Colo. Rev. Stat. § 25-8-104 (2000): “No provision of this article shall be interpreted so as to supercede, abrogate, or impair rights to divert water and apply water to beneficial uses Nothing in this article shall be construed, enforced, or applied so as to cause or result in material injury to water rights.”

⁸²⁸ *Arkansas Basin Future Water and Storage Needs Assessment*, prepared by GEI Consultants, Inc. for the Southeastern Colorado Water Conservancy District, 1998, pages 8-8 to 8-9.

⁸²⁹ Written comments of Ed Pokorney, Aug. 20, 2001.

intentionally parallel and redundant components that help to minimize threats and delays associated with unexpected climatic events and equipment failures, as well as routine maintenance. These are understandable goals, and have resulted in impressively resilient water systems. In reducing risks, however, these practices can sacrifice economic efficiency, result in over-development of rivers, and fuel excessive agricultural-to-urban water transfers.

The best example of this risk-averse behavior is the perception that municipal water shortages must be avoided at any cost. In the United States, water outages are rare⁸³⁰ and are generally treated as emergencies. While there are some public health justifications for this viewpoint, short outages—similar to those typical of electrical, telephone, and television utilities—do not pose such problems. A short outage is really a temporary customer inconvenience that could be managed if accepted by the public as a normal part of water utility service. Temporary reductions in lawn watering would, in many cases, be all that is needed to bridge short-term municipal water supply shortfalls. A reduced reliability factor that anticipated periodic outages would allow water systems to be smaller, providing a host of economic and environmental benefits.

Another form of “over development” is, arguably, the notion that every drop of municipal water delivered needs to be treated to drinking water standards, although only a fraction of one percent of this water is actually ingested.⁸³¹ Water treatment is one of the most expensive aspects of a water system, in terms of both construction and operation costs. In part for this

reason, many countries do not deliver fully potable drinking water to the tap. Instead, purification takes place at the faucet, or consumers purchase bottled water.⁸³² If adopted in the United States, such approaches could not only yield potential economic gains, but would likely increase the practicality of other water sources—such as wastewater or low quality

groundwater—in place of high quality streamflows. Some Colorado municipalities have long-used a variation of this idea. The West Slope Town of Parachute, for example, supplies potable water for indoors use, and untreated water for outdoor irrigation.

The short-term viability of these, and other, “fundamental reforms” is likely quite low, as they raise many complex legal, economic, social, and public relations issues. Nonetheless, growth may provide a compelling reason to consider grand innovations in water system design and operation. After all, population projections suggest that the Denver Metro area will attract 1.7 million new residents over the next twenty years.⁸³³ Rather than viewing this population growth as a threat to existing water systems, it may prove useful to consider this an opportunity for reforms that better reconcile our cities to the reality of life in an arid region. Reforming the design and operation of water systems could be one component of a larger, long-term coping strategy.

“For change to occur, there either has to be a crisis or an initiative, but there is a vested interest to resist change.”

— JIM MARTIN,
Environmental Defense

⁸³² Despite municipal supply of drinking water, Americans increasingly prefer to consume bottled water and other beverages. For example, bottled water consumption reached 6.9% of “share of stomach” in 1997. Bottled Water Web, “Statistics,” available at www.bottledwaterweb.com/statistics.html (visited Sept. 2, 2001). It is notable that EPA assumes adults consume only 2 liters of drinking water a day, and children drink 1 liter. Environmental Protection Agency, “Methodology for Deriving Ambient Water Quality Criteria for the Protection of Human Health,” Oct. 2000, page 4-2.

⁸³⁰ Boulder, for example, expects and prepares for a significant outage every 20 years. Written comments of Carol Ellinghouse, Jul. 2001.

⁸³¹ Interview with Lee Rozaklis, Jul. 20, 1999.

DISINCENTIVES AND CONSTRAINTS TO CONSERVATION AND EFFICIENCY

While a variety of conservation and efficiency strategies offer obvious economic and environmental benefits, their implementation can be problematic for many reasons. Several impediments have already been discussed. Some of the most important constraints are revisited below in greater detail.

LEGAL STATUS OF “SALVAGED” WATER IN COLORADO

As noted earlier, Colorado law generally does not provide a legal incentive for conservation. Improving the efficient use of water does not create any right to the salvaged water unless the appropriator reduces consumptive use equal to the water transferred; it properly belongs to the stream for use by other appropriators. If the appropriator is really just saving wasted water, or taking part of historic return flows, the appropriator has no right to that water.⁸³⁴ Salvaged water is treated differently in some other states, most notably California where salvaged water can be used as part of water sale strategies.⁸³⁵ The most famous example involves a deal between the Metropolitan Water District of Southern California (MWD) and the Imperial Irrigation District (IID). In that situation, MWD finances agricultural water conservation practices (primarily canal lining) in exchange for the conserved water.⁸³⁶ This incentive does not exist in Colorado since the size of a water right is

limited to the amount of water reasonably required.⁸³⁷

Another innovative program is found in Oregon, where salvagers can retain up to 75 percent of the water saved.⁸³⁸ A salvager can use, sell, or lease conserved water or just keep it in the stream for future use without worry of claims from juniors.⁸³⁹ The remainder of the water goes to the state for in-stream flows or subsequent appropriation.⁸⁴⁰ Very few users, however, have taken advantage of this, and similar, programs. There are several possible reasons for such reluctance. First, adopting conservation methods can be difficult and costly. The easy choice is to continue using water in an older, wasteful manner. Second, the procedure of applying for rights under the new statutes is often difficult. Recently, Oregon amended their statute for the express purpose of simplifying the application process. And lastly, there can be considerable expense and difficulty in calculating actual water savings. The costs involved with water studies and hydrological experts can be prohibitive.

“In Colorado water law there is a paradox—an internal conflict about efficiency. If you increase agricultural efficiency, you are prohibited basically from expanding your use of water.”

— ERIC WILKINSON, General Manager,
Northern Colorado Water Conservancy
District

⁸³³ Based on estimates available from the Colorado State Demographer, Colorado Department of Local Affairs.

⁸³⁴ Interview with Justice Gregory J. Hobbs, Jr., Jun. 25, 1999.

⁸³⁵ Cal. Water Code § 1011 (West 1971, 2001 Supp.).

⁸³⁶ Reisner, Marc and Sarah Bates, *Overtapped Oasis: Reform or Revolution for Western Water*, Wash. D.C.: Island Press, 1990, Appendix A.

⁸³⁷ *Farmers Highline Canal & Reservoir Co. v. City of Golden*, 272 P.2d 629, at 634 (Colo. 1954).

⁸³⁸ Or. Rev. Stat. Ann. § 537.455 (1999).

⁸³⁹ Or. Rev. Stat. § 537.490 (1999).

⁸⁴⁰ Or. Rev. Stat. § 537.470(3) (1999, effective Jul. 1, 2003).

Removing this legal disincentive to conservation in Colorado would require the courts to consider salvaged water as “developed” or new water, a legal interpretation inconsistent with existing case law,⁸⁴¹ that may be neither necessary nor desirable since it would exempt such water from the priority system.⁸⁴² In 1992, 1993, and 2001 the Colorado Legislature considered changing the legal status of salvaged water, but these bills⁸⁴³ were defeated for several reasons. First, agricultural communities on the South Platte and Arkansas Rivers feared that return flows might be jeopardized to the detriment of juniors.⁸⁴⁴ Second, some juniors challenged the equity of reforms that would reward wasteful water users who presumably have been in violation of Colorado law and have been depriving some junior users of water. Finally, the proposed reforms called for measuring conserved water based on diversion rates, not historic consumption rates. Not only was this approach inconsistent with most Colorado water law, but also promised to increase dramatically the water rights of the most inefficient water users.⁸⁴⁵ Irrigation in the Grand Valley (the origin of the proposed legislation) is exceptionally inefficient, perhaps wasting more

“Legislation may be necessary to encourage conservation and permit the transfer of water to other uses.”
— LARRY MORANDI,
Water Conservation and Transfers in the Western States

than 100,000 acre-feet per year.⁸⁴⁶ To claim this water now seemed to most to be an enormous and unprecedented expansion of rights.⁸⁴⁷

DOWNSTREAM IMPACTS

This debate regarding the legal status of salvaged water highlights one of the chief weaknesses of water conservation strategies; namely, the difficulty in promoting conservation without modifying (reducing) the regime of return flows upon which other users are dependent. To the extent that a transfer of salvaged water deprives a junior user from exercising a recognized right, then that action could be blocked under Colorado’s “no injury” rule. If the junior user objected, the water court reviewing the size and location of the proposed water transfer would be compelled to protect the junior from injury, thereby blocking an otherwise beneficial improvement in system efficiency.

The impacts of conservation and efficiency are somewhat dependent upon the unique qualities of the particular river basin. For example, consider the impacts of conservation and efficiency in the South Platte basin. To the extent that these reforms reduce trans-mountain imports, or result in those imports being used to extinction, then downstream flows could be reduced, and water quality could be degraded due to the lack of high-quality water imports.⁸⁴⁸ This lack of downstream flows could make it more difficult for Colorado to meet its compact obligations and

⁸⁴¹ *Southeastern Colo. Water Conservancy Dist. v. Shelton Farms* 529 P.2d 1321 (Colo. 1974).

⁸⁴² Written comments of David H. Getches, Jul. 2001.

⁸⁴³ H.B. 1188, 58th Colo. Gen. Assembly, 2nd Regular Session (1992), H.B. 1158, 59th Colo. Gen. Assembly, 1st Regular Session (1993), and H.B. 01-1111, 63rd Colo. Gen. Assembly, 1st Regular Session (2001).

⁸⁴⁴ Morandi, Larry, *Rethinking Western Water Policy: Assessing the Limits of Legislation*, Denver: National Conference of State Legislatures, Jul. 1994, page 19.

⁸⁴⁵ Morandi, Larry, *Rethinking Western Water Policy: Assessing the Limits of Legislation*, Denver: National Conference of State Legislatures, Jul. 1994.

⁸⁴⁶ Interview with Robert E. Brogden, Sept. 8, 1999.

⁸⁴⁷ Ironically, junior appropriators are now supporting a similar scheme for the endangered Colorado River fishes. Irrigation system improvements in the Grand Valley Irrigation District will save 19,400 acre-feet per year, which will be released from Green Mountain Reservoir to meet the instream flow needs of the fish. Bureau of Reclamation, *Grand Valley Water Management, Final Environmental Assessment*, Sept. 1998, page 3.

⁸⁴⁸ Interview with Eric Wilkinson, Jul. 20, 1999.

its commitments under the Three-State Cooperative Agreement on endangered species in central Nebraska. However, in other basins, such as the Rio Grande or Arkansas, conservation would likely increase the state's ability to stay within compact consumption limits.

The situation in the Colorado River basin is particularly confounding. In this basin, many water managers view conservation as contrary to the state interest of putting its full apportionment to use, an action some parties view as strengthening the state's hand in any future interstate water disputes. At the level of individual appropriators, however, this logic is less compelling, as conservation could potentially increase water to junior rights holders currently deprived of water. The classic example on the Colorado involves the Cameo and Shoshone rights; both call out upstream junior rights during much of the year although Colorado is entitled to an additional 400,000 acre feet a year under the Compact.⁸⁴⁹ Therefore, while conventional wisdom encourages Coloradans to use as much of the state's compact entitlement as possible, this bias shorts juniors who would receive water if senior appropriators maximized their efficiency rather than their use.

CONSERVATION AND DROUGHT MANAGEMENT

Another difficult issue surrounding conservation programs involves drought management. Conservation can be approached in two ways. First, conservation can be thought of as an integral element of a provider's usual supply strategy, where savings can be realized immediately and continuously. In this manner, little additional savings are possible during drought because conservation is already built into

the system. Alternately, conservation can be an element of a provider's drought strategy, where potential savings are identified but not realized. In this situation, substantial savings are possible because over supply is built into the system with the expectation of curtailing it when necessary. No provider follows either approach fully. Operational strategies are generally a mix of many approaches to conservation.

⁸⁴⁹ *Colorado Water Development Study*, prepared by Montgomery Watson for the Colorado Farm Bureau, 1997, page 4-3.

CHAPTER TEN: EFFICIENCY, EQUITY AND THE SALIENCE OF TRANSACTIONS COSTS

Water management, much like land use, is primarily—although not exclusively—a local or private endeavor in Colorado. Few decision-makers are charged with thinking about the statewide impact of their decisions. Similarly, larger public interests are notably absent from many legal and policy debates regarding water, growth, and the intersection of these two issues. Yet, as discussed in earlier chapters, a wide variety of these “larger” issues demand resolution in coming decades. The substantive decisions that will be reached are likely to reflect the processes used to make these decisions.

Opinions about what decision-making processes are appropriate are largely a matter of ideology. Advocates of private property rights typically argue for a decision-making environment confined to water rights holders and narrow issues of injury (to other rights holders). Others counter that public interest and equity considerations demand processes that are more inclusive and broadly focused. Of these two perspectives, Colorado’s system of prior appropriation most closely resembles the first. However, reforms in recent decades—particularly environmental laws—have substantially moved the decision-making environment toward the second perspective.⁸⁵⁰ Whether this trend should, or will, continue is a subject of considerable debate.

⁸⁵⁰ Kenney, Douglas S., *Two Decades of Water Law and Policy Reform: Conference Report*, Boulder: Natural Resources Law Center, University of Colorado School of Law, 2001.

TRANSACTIONS COSTS

As a practical matter, water managers often view the various administrative costs associated with buying, selling, modifying, or exercising water rights as transactions costs. Transactions costs play a key role in shaping the behavior of Colorado’s water providers,⁸⁵¹ a trend that undoubtedly will continue.

Many of the most significant transactions costs are associated with water court. In Colorado, the determination of water rights is a judicial function under the adjudication statutes.⁸⁵² Not only must an appropriator go to water court to adjudicate her water right or change it, she must also go to water court to protect it, and in the case of a conditional right, to maintain it. It makes no difference if the right is for 1 or 100,000 acre feet; the process is identical. The water court process is neither simple nor expedient. A simple unopposed change of water right and augmentation plan for a domestic well can take over a year, with legal costs far exceeding the value of the water involved.⁸⁵³ Large cases can stretch over years. Appeals consume many more.

An attempt is made to minimize court expenses through the use of water referees. Most water divisions have established a water referee who is

⁸⁵¹ Howe, Charles W., Carolyn S. Boggs, and Peter Butler, “Transaction Costs as Determinants of Water Transfers,” 61 *University of Colorado Law Review* 393 (1990).

⁸⁵² *Santa Fe Trail Ranches Property Owners Assoc. v. Simpson*, 990 P.2d 46, at 58 (Colo. 1999).

⁸⁵³ For example, our experience is that legal costs for a simple domestic well augmentation plan can easily exceed \$1,000 for water worth just \$75.

the first to consider each case, often to completion. In Division 1, for example, the referee handles 90 to 95 percent of all cases to completion.⁸⁵⁴ If all the parties agree, the referee enters a ruling. The Water Judge reviews the ruling before entering it as a decree. Sometimes parties will partially agree and then ask the referee to enter a ruling that represents the extent of their agreement. The parties will then protest final entry of the ruling within the statutory period⁸⁵⁵ and a trial will be held on the questions of law that remain in dispute.⁸⁵⁶ This focuses the issues and minimizes the costs of a trial. Full court proceedings and their attendant costs are reserved for the most contested cases.

Transactions costs are further reduced in areas where water is readily available. For example in Division 6—the Yampa and White River basins—only one in five cases is filed by an attorney; most applications are made with the assistance of the Division Engineer.⁸⁵⁷ The last contested case was in 1990. Appropriations for export to other basins, however, are often more complex. The disputes in the San Luis Valley, for example, have been exceedingly expensive, not only for proponents of trans-basin exports but also for local farmers mobilized to prevent their water from being “stolen.” A similar situation surrounded the proposed Union Park project in the Gunnison basin.

Another source of transactions costs can be traced to the lack of good information about water rights, a precursor to an efficient water market. For example, water right decrees typically specify a diversion rate, whereas the

⁸⁵⁴ The discussion in this paragraph is drawn from an interview and telephone interview with Ray Liesman, Sept. 15, 1999 and Jun. 26, 2000 respectively, except as noted.

⁸⁵⁵ Colo. Rev. Stat. § 37-92-303(2) (2000).

⁸⁵⁶ Occasionally, parties will protest the entry of the referee’s ruling just to increase the costs to the other party. This action has apparently increased since the water courts began to award attorney’s fees, although requests for fees are infrequent and are seldom granted.

⁸⁵⁷ Sharp, Tom, address to the Colorado Water Congress Summer Convention, Aug. 27, 1999.

measure of a water right is its consumptive use.⁸⁵⁸ Consumptive use is often not determined until a change of water right application is filed and decided in water court. Thus, purchasers do not know in advance the yield of the rights they are purchasing for transfer. The junior protection rule guarantees in most situations that not all of a water right can be transferred, and it is not apparent at the time of filing which junior appropriators will be injured and what will be necessary to keep them whole. The unknown level of risk is reflected in the transaction costs; water that has gone through a previous change case usually carries a higher value than water of a type that has never gone through a water court challenge.⁸⁵⁹

Transactions costs associated with water management are lowest in those regions where property rights in water are well defined and where conveyance facilities exist to easily move water. Perhaps the best Colorado example—on both points—is the waters of the Colorado-Big Thompson Project (C-BT). However, even the active market for C-BT water raises difficult issues about the equity of sending water to the highest bidder (which means moving water out of agriculture) and the potential transfer of federal irrigation subsidies to sellers.

“The challenge for water regulators and providers is to devise processes that encourage transfers with real benefits and restrain or condition those that impose high costs on legitimate third party interests.”
— NATIONAL RESEARCH COUNCIL, *Water Transfers in the West*

⁸⁵⁸ *Santa Fe Trail Ranches Property Owners Assoc. v. Simpson*, 990 P.2d 46, at 52 (1999).

⁸⁵⁹ Written comments of Carol Ellinghouse, Jul. 2001.

THE INFLUENCE OF TRANSACTIONS COSTS ON MUNICIPAL WATER DECISIONS

There is substantial evidence—much of it already presented in earlier chapters—that water court transaction costs significantly influence the decisions of municipal water providers. One strong trend is to purchase and convert foreign water from agricultural uses to municipal uses. For example, water from the Twin Lakes project, a trans-basin project originally designed to serve irrigation interests, is now almost entirely owned by municipalities including Colorado Springs, Pueblo, Pueblo West, and Aurora.⁸⁶⁰ Shares sell for \$10,000 to \$15,000, a price dramatically higher than the cost of native Arkansas River water.⁸⁶¹ Yet, buying shares of foreign water makes better economic sense than buying native water since changing the use does not require water court approval.⁸⁶²

A similar trend is seen in the market for C-BT shares. Municipal water providers concerned about the water court costs of converting native water dramatically bid up the price of C-BT units.⁸⁶³ Weighted C-BT prices rose steadily from around \$3,400 per acre-foot in January 1996 to peak at nearly \$26,000 per acre-foot in April 2000.⁸⁶⁴ In contrast, native irrigation water in the Northern District sells for \$500 to \$1,000 per acre-foot, depending on location.⁸⁶⁵ C-BT water is preferred since it is readily available, and

the right to use the water for municipal purposes has already been adjudicated. Plus, the purchaser of C-BT water effectively acquires storage rights ensuring dry-year yield. Another benefit of C-BT water is that these are private transactions, and difficult public issues like endangered species are left to the Northern District and not the buyer, as would be the case with the purchase of agricultural rights.⁸⁶⁶

The minimal transactions costs of existing trans-basin diversions are a mirror image of the extreme costs associated with newly proposed trans-basin diversions. For example, the American Water Development, Inc. (AWDI) proposal to export water from the San Luis Valley to the Denver Metro area consumed nine years and several million dollars in attorney's fees, not including engineering fees associated with expert testimony presented in court. The Colorado Supreme Court ended AWDI's plans when it upheld the District Court's dismissal of AWDI's water rights application.⁸⁶⁷ Another example is Homestake II, which wound itself all the way to the United States Supreme Court in the course of its agonizing demise.⁸⁶⁸ Aurora, a Homestake II proponent, has since abandoned all of its large trans-basin projects in favor of smaller, more certain projects.⁸⁶⁹ One of those abandoned projects was the recently defeated Union Park proposal designed to export Gunnison River water to Arapahoe County.⁸⁷⁰

⁸⁶⁰ MacDonnell, Lawrence J., *From Reclamation to Sustainability*, Niwot: University Press of Colorado, 1999, pages 52-53.

⁸⁶¹ Interview with Roger L. "Bud" O'Hara, Jun. 30, 1999.

⁸⁶² Nonetheless, many attorneys still recommend going through the change of use procedure for transfers of foreign water. Interview with Roger L. "Bud" O'Hara, Jun. 30, 1999 (and follow-up interview of Aug. 2, 2001).

⁸⁶³ Interview with Eric Wilkinson, Jul. 20, 1999.

⁸⁶⁴ *Water Strategist*, Jun. 2000, page 6. Calculated based on 0.5 acre-feet per unit firm yield. Interview with Eric Wilkinson, Jul. 20, 1999. Prices remain above \$20,000, with one sale for \$23,000 in May 2001.

⁸⁶⁵ Interview with Eric Wilkinson, Jun. 15, 2000.

⁸⁶⁶ Still other factors that may encourage the purchase of trans-basin water over native supplies may include its higher water quality (especially if diversions are piped directly to the purchaser from the West Slope), the right to use foreign water to extinction, and a low price sensitivity among some high-valued municipal uses.

⁸⁶⁷ *American Water Development, Inc. v. City of Alamosa*, 874 P.2d 352, at 368 (Colo. 1994).

⁸⁶⁸ *City of Colorado Springs v. Board of County Commissioners of Eagle County*, 895 P.2d 1105 (Colo. App. 1994), certification denied Jun. 5, 1995, certification denied *City of Colorado Springs v. Board of County Commissioners of Eagle County*, 516 U.S. 1008 (1995).

⁸⁶⁹ Interview with Douglas Kemper, Jun. 23, 1999.

Officials from El Paso County, Colorado Springs, Douglas County, Arapahoe County, Aurora, Adams County, Northglenn, Elbert County and Lafayette recently joined together to form the Colorado Water Partnership.⁸⁷¹ Members represent growing urban areas along the Front Range that generally need additional water supplies to meet the demands of growth. In the 2000 legislative session, the Partnership sponsored a bill to require the Colorado Water Conservation Board to solicit proposals and recommend development of a new water supply project to deliver a minimum of 120,000 acre-feet annually from the West Slope to the East Slope.⁸⁷² Since many proponents of Union Park supported the legislation, some concluded that the bill was a veiled attempt to promote that project.⁸⁷³ This perception is reinforced by a Partnership-promoted letter to Secretary of Interior Norton asking the Bureau of Reclamation “to look at opportunities to use . . .for the benefit of the entire state” the 240,000 acre-feet in the marketable pool of the Aspinall Unit noted in the Colorado Supreme Court’s opinion rejecting Union Park.⁸⁷⁴ The important point is that these efforts reflect frustration with the current environment for developing new trans-basin diversion projects, and an attempt to forge an independent path to reach that goal. As such, Senate Bill 00-215 is an example of the increasing frustration of some local elected officials with Colorado’s system of water courts and permitting, and a willingness to ignore more

“There’s a lot of brain damage doing water rights conversions.”

— ERIC WILKINSON,
General Manager,
Northern Colorado
Water Conservancy
District

than a century of precedent in the effort to secure additional water supplies to meet the demands of Front Range growth.⁸⁷⁵

Maintaining and eventually exercising conditional trans-basin water rights also entails extremely high transactions costs. These costs have made it enormously expensive to implement

large-scale projects in phases, as each step in the process provides a new opportunity for opponents to impose delays and new conditions, as the Homestake project demonstrates. For conditional rights, a trip to water court is required every six years to prove due diligence. New court proceedings can also be required each time a change is made to a proposed project, as the impact on

juniors must be reconsidered.⁸⁷⁶ Some of these repetitive costs can, in theory, be prevented through trans-basin decrees that outline terms and conditions. However, vague language or unforeseen circumstances in these decrees may invite further litigation. The Blue River decree, for example, requires Denver Water to “exercise due diligence” to reuse water imported from the Colorado River to meet its municipal needs, “within legal limitations and subject to economic feasibility.”⁸⁷⁷ This requirement is obviously couched in ambiguous terms that mean different things to Denver Water and to the West Slope.⁸⁷⁸

⁸⁷⁰ *Board of County Commissioners of Arapahoe County v. Crystal Creek Homeowner’s Association*, 14 P.3d 325 (Colo. 2000).

⁸⁷¹ Colorado Water Partnership, “Memo,” Mar. 13, 2000.

⁸⁷² S.B. 00-215, 62nd Colo. Gen. Assembly, 2nd Regular Session (2000).

⁸⁷³ Telephone interview with Richard D. MacRavey, Jun. 28, 2000.

⁸⁷⁴ Hefley, Joel, Bob Schaffer, and Thomas G. Tancredo, letter to The Hon. Gale Norton, Jul. 18, 2001. *See also* Arapahoe County Water and Wastewater Authority, letter to Brent Uilenberg, Jul. 19, 2001.

⁸⁷⁵ Interview with Sara Duncan, Jun. 16, 2000.

⁸⁷⁶ In many cases, parties have been enticed to give up a percentage of their rights in order to settle a dispute with their opponents, largely out of fear of the costs of litigation. Interview with Richard Stenzel, Oct. 15, 1999. Interview with Eric Wilkinson, Jul. 20, 1999. Interview with James R. “Jay” Montgomery, Oct. 25, 1999.

⁸⁷⁷ *In the Matter of the Adjudication of Priorities of Water Rights in Water District No. 36 for Purposes of Irrigation, Consolidated Cases, Civil No. 5016 and 5017, Stipulation of October 5*, paragraphs 4(e) – (f) (Colo. Dist. 1955).

⁸⁷⁸ This has yet to be litigated, although it seems inevitable that it will be. Hallford, David C., address to the Colorado Water Congress Summer Convention, Aug. 27, 1999.

Agricultural-to-urban water transfers raise a variety of issues that can require attention from water court. These change cases often involve changes in use, place of use, place of diversion, time of use, and care of formerly irrigated land. An agricultural transfer can potentially affect all other downstream users on the stream. The larger the right and more significant the change, the more potential there is for injury, with a corresponding incentive for other appropriators to oppose the change. Because of these transactions costs, developers of formerly agricultural lands often import foreign water rather than simply converting the irrigation water associated with the land's previous use.⁸⁷⁹ Most are unwilling or unable to defer their development and incur the land carrying costs necessary to complete a water court change case; it is cheaper for them to acquire a supply that is already adjudicated for domestic use, such as C-BT or Twin Lakes water. However, when open space in the subdivision needs irrigation water, it can be supplied by the associated agricultural rights without court approval since there is no change in place or type of use.

A NEED FOR ADMINISTRATIVE REFORM?

The existence of high transactions costs in water management may suggest a need for fundamental administrative reforms. The water court system, for example, is clearly a source of considerable frustration among many water managers. Legal fees are just one component of transactions costs. Other significant costs include engineering analyses, hydrological studies, and water monitoring. This is particularly true for projects involving groundwater resources, since data collection can entail the construction of wells and the use of special instrumentation.⁸⁸⁰ While the

⁸⁷⁹ Interview with Eric Wilkinson, Jul. 20, 1999

⁸⁸⁰ Brogden, Robert E., "Challenges in Developing and Presenting Data to Support a Ground Water Rights Case,"

water court may require this information, these costs could not be avoided by moving to a different system.

One of the most serious problems with the high costs of water court is that it discourages the involvement of some interests and the oversight of some issues. The costs of participating in water court proceedings can be prohibitive for many small interests, especially farmers. In some cases, businesses reliant on agricultural products will intervene to protect the interests of the farmers.⁸⁸¹ In other situations, irrigators can take their concerns directly to the water referee (or water judge) without participating in a more formal proceeding. These mechanisms help to mitigate some of the problems of under-representation, but do not wholly address the problem. Additionally, these mechanisms do not speak to the fact that many parties find it cost-prohibitive to object to every proposed action, such as an exchange, that may affect their rights, even if the cumulative effect of such actions is significant.

Shifting some of the water court's responsibilities to the division engineers might alleviate some problems, but would likely elevate others. Already, division engineers participate in every case filed in water court, regardless of size.⁸⁸² They review and comment upon the validity of statements made in applications for new water rights, plans of augmentation, and changes in

presented to the Colorado Section of the American Institute of Professional Geologists 32nd Annual Meeting, Oct. 1995, page 1.

⁸⁸¹ For example, the sugar beet farmers historically relied on Great Western Sugar to watch out for their rights, which the company did because the refinery needed the production. Similarly, barley farmers in the San Luis Valley rely on Coors, who contracts for their production. Now, the ditch companies are becoming more active in water court on behalf of their shareholders. Irrigators primarily rely on the conservancy districts, like the Southeastern Colorado Water Conservancy District in the Arkansas River Basin, and the Rio Grande Water Conservation District in the San Luis Valley, to protect their water rights. Interview with Fred Anderson, Sept. 19, 1999.

⁸⁸² Colo. Rev. Stat. § 37-92-302(4) (2000).

water rights, as well as the statements filed by opponents.⁸⁸³ Arguably, it is a short jump from this role to one of actual decision-making; after all, other prior appropriation states steer decisions through the State Engineer's office, using permits in place of decrees and court decisions. Yet, this may not actually reduce transactions costs, but would merely shift them to a different branch of government.

In those situations where division engineers already exercise some decision-making discretion, it is not without controversy. For example, some attorneys are concerned about the "looseness" associated with division engineer administration of temporary exchanges and loans,⁸⁸⁴ although this *ad hoc* process offers some efficiencies impossible to achieve through a formal court proceeding. Additionally, some professionals suspect that the division engineers may unduly target owners of small rights when the engineer wants to change or establish judicial support for the engineer's administration of the water rights, knowing that the costs of being in water court favor settlement.⁸⁸⁵ Armed with several similar precedents thus established, the division engineer then tackles the same issue in cases involving the major water entities.

There is also some sentiment that Colorado's form of water administration may be counterproductive in that it polarizes parties, preventing them from finding common ground.⁸⁸⁶ However, a different perspective suggests that the threat of litigation is a needed stimulus for compromise and settlement.

Undoubtedly, administrative costs associated with activities such as water use transfers and complex exchanges are high and could likely be reduced. However, parties truly concerned with

improving the efficiency of Colorado water law and administration should probably focus their attention on more glaring deficiencies. Several examples have been identified in earlier chapters. For example, the reluctance of courts and legislators to address waste and saved/salvaged water creates a strong incentive for inefficient use, and ensures that significant water remains in under-valued uses. Similarly, abuses of the conditional water right concept are increasingly difficult to ignore. Steering significant reforms through the legislature, however, is a formidable challenge.

"We have been hard pressed to find a rational explanation for the anti-State Engineer syndrome that seems peculiar to this state."
— CLYDE O. MARTZ and BENNETT W. RALEY, *Tradition, Innovation and Conflict: Perspectives on Colorado Water Law*

BALANCING EQUITY AND EFFICIENCY IN DECISION-MAKING STRUCTURES

Regardless of the administrative structure employed, transactions costs are likely an unavoidable feature of developing and moving water. Whether or not the expenses associated with water court proceedings are justified is difficult to determine, largely since the system involves trade-offs between efficiency and equity. Clearly, excluding non-rights holders and public interests from decision processes minimizes direct administrative costs for water managers;⁸⁸⁷ however, this approach shifts costs (of various types) to underrepresented third

⁸⁸³ Colo. Rev. Stat. § 37-92-302(4) (2000).

⁸⁸⁴ Telephone interview with John Akolt, Jan. 3, 2000.

⁸⁸⁵ While this sentiment is not uncommon, the authors did not talk to anyone willing to be quoted.

⁸⁸⁶ Trampe, William, address to the Colorado Water Congress Summer Convention, Aug. 21, 1999.

⁸⁸⁷ Note that this approach invites expensive collateral attacks that employ other mechanisms, such as the Endangered Species Act or the Clean Water Act; the classic example is Two Forks.

parties. Conversely, administrative systems that provide many avenues for participation and that explicitly consider public interests can be extremely expensive and time-consuming, but are likely to minimize some third party impacts while providing the opportunity to consider larger-scale public policy issues. Third party impacts may deserve more attention in an era when growth-related water decisions are likely to have far reaching impacts.⁸⁸⁸ Arguably, largely unregulated markets can provide maximum efficiency while protecting equity considerations if all rights to water, public and private, were more explicitly defined in law. However, defining those rights is a massive and ongoing challenge implicating many forums of decision-making, including the existing water court system.

for decision processes that promote a more thoughtful line of reasoning.

Devising mechanisms of decision-making that balance equity and efficiency, and that simultaneously respect both public interests and private rights, is inherently difficult. Few parties are completely satisfied with the existing system, but that is not to suggest that there is uniform agreement on the need for, or desired direction of, reform in how water decisions are made. Nonetheless, it is troubling to many to think that critical water decisions in Colorado are largely based on a “path of least resistance” analysis, with various levels of transactions costs being used to evaluate options and guide behavior. In some instances, transactions costs may provide an accurate reflection of societal values and preferences regarding water management choices, but in other situations, that linkage is hard to establish. It is difficult, for example, to find any compelling public interest in decision processes that encourage agricultural-to-urban transfers of foreign (trans-basin) water over domestic (native) supplies; yet, that is often the observed effect of existing rules. Given the importance of water in Colorado, one would hope

⁸⁸⁸ Written comments of David H. Getches, Jul. 2001.

CHAPTER ELEVEN: SUMMARY AND CONCLUSIONS

This report identifies an extremely diverse and complex set of water law and policy issues associated with water and growth in Colorado. These issues range from highly specific issues of legal significance to broad concerns about the appropriate relationship of people to their environment. While many of the issues identified are not the direct result of growth, the rapid increase in municipal water demands has brought a greater sense of urgency to almost all facets of Colorado water development and management. Interviewees also identified a wide variety of water management strategies that may, at least in part, provide solutions to the challenges raised by population growth.

A SUMMARY OF MAJOR ISSUES AND QUESTIONS

Several of the larger themes and questions identified in this report are summarized below, organized by the chapter in which they were primarily discussed. In part, this summary is simply to remind the reader of the breadth of the issues. An additional purpose is to demonstrate the magnitude of the political challenge before us as we attempt to manage water and growth in Colorado. The issues and questions raised below should at least be of tangential interest to all Coloradans interested in the future of the state, its resources, and its people. Moreover, these issues and questions should encourage public dialogue involving legal scholars, public policy analysts, researchers, journalists, water managers, and elected officials.

CHAPTER ONE: LIFE AFTER TWO FORKS

By most accounts, the veto of the Two Forks project in 1990 signaled a new era in Colorado water development and management. Coincident with this “new era” has been a decade of unprecedented growth. This combination of factors has made the modern era particularly challenging for water managers. Chapter One explores this situation, introducing the central question permeating through the entire study:

- Are Colorado water providers prepared to meet future water demands?

CHAPTER TWO: LEGAL FRAMEWORK FOR WATER MANAGEMENT: A PRIMER

The extent to which Colorado can handle the water-related challenges of growth are largely tied to the opportunities and constraints provided by state water law. The overview of Colorado’s version of the prior appropriation doctrine raises two primary questions:

- Is Colorado’s form of water law and administration ready to meet the modern challenge of growth?
- How will longstanding conflicts between state and federal law be resolved?

CHAPTER THREE: TRANS-BASIN DIVERSIONS

Trans-basin diversions have been a distinguishing characteristic of Colorado water management for a century. The future role of trans-basin diversions, however, is somewhat uncertain. Major issues include:

- To what extent would future trans-basin diversions affect West Slope water supplies (particularly in headwater communities), environmental resources, and interstate obligations? Are Front Range water needs sufficient to justify these impacts? Can Front Range demands be met without Gunnison River water?
- Will future trans-basin diversions be possible without explicit West Slope consent? What will the West Slope be looking for in future deals? Is some form of compensation needed?
- Will trans-basin diversions be required to be used more efficiently? If so, how will this impact water supplies/demands on the Front Range and on the West Slope?

“Can the state starting with a nineteenth century water law handle the twenty-first century? I believe Colorado can and will. Its people will make it so. Its water law will continue to adapt to the values and needs of Coloradans and the United States, as throughout the twentieth century.”

— JUSTICE GREGORY J. HOBBS, JR., *Colorado Water Rights*

- Are existing water laws and programs sufficient to protect and restore water-related environmental resources in Colorado, or are fundamental reforms needed? For example, should (and will) Colorado’s minimum stream flow program evolve over time to include more senior water rights and/or water dedicated to recreational purposes? To what extent would these changes limit the ability of Front Range municipalities and headwater communities to meet future demands?

- What is the future of the Endangered Species Act in Colorado? How will compliance with the

Endangered Species Act influence land-use patterns, water project maintenance activities, and/or the privatization of federal projects? What are the water yield implications?

- Will the Upper Colorado recovery program succeed, thereby making more water available for development than envisioned in the Programmatic Biological Opinion (PBO)? How will the Upper Colorado and Platte recovery programs reconcile their competition for the same water supplies?

CHAPTER FOUR: ENVIRONMENTAL PROTECTION

Environmental concerns are a part of nearly all water issues. Of particular concern in Colorado are instream flows and federal Endangered Species Act rules and their impact on water development and supplies on the Colorado mainstem and South Platte systems. Key legal and policy issues include:

- Will the maturation of Colorado’s minimum stream flow program and the Upper Colorado PBO unduly accelerate water development?
- Where will the water come from for the Upper Colorado and Platte recovery

programs? Will these environmental water needs come from existing rights holders? Will the ability of the state to develop remaining compact entitlements be impaired?

- How will the major water quality impacts of pollution from non-point sources, primarily agriculture and abandoned mines, be addressed?

CHAPTER FIVE: WATER QUALITY

Water quality has the potential to influence (and be influenced by) water system operations and yields. Complex issues characterize this relationship, including:

- How will the courts reconcile state water allocation law with federal and state water quality law? To what extent are water management strategies and tools—such as trans-basin diversions, water exchanges, conservation, and water reuse—shaped by the failure to consider water quantity and quality in a coordinated framework?
- Will the Endangered Species Act (e.g., Section 9 Takings) and/or the Clean Water Act (e.g., 401 Certification) ultimately control hydrological modifications and force a re-regulation of flow regimes?
- How will growing municipal and ISDS (e.g., septic system) wastewater streams, changing land use patterns, rising water reuse, and increasing efficiency impact the quality and quantity of surface water and groundwater supplies?
- How will water quality management goals influence efforts to expand water supplies? How will TMDL implementation influence water supplies? How will the non-degradation policy influence future water development and use?

CHAPTER SIX: INTERSTATE OBLIGATIONS

Interstate obligations specified in compacts and court decisions will shape future water availability and land use in Colorado. This impact is particularly important on the Colorado River system, the state's primary source of available surface water. Some key issues include:

- How much of the state's Colorado River entitlement will ultimately be available for development in the state given errors in the compact's projected yield estimates, evolving federal environmental regulations, the needs of California and Nevada, unquantified Indian water rights, and senior rights holders near the Utah state line?
- How will eventual interpretations of vague language and omissions in the Colorado River Compact influence Colorado water users? In what context will these issues be addressed? Do similar uncertainties surround other compacts to which Colorado is a party?
- Can (and should) Colorado sell (or lease) its unused Colorado River entitlements to downstream interests? Will the Indians sell or otherwise market their water?

“The Western Slope is caught between two Californias.”

— ERIC KUHN, Manager, Colorado River Water Conservation District

CHAPTER SEVEN: NEW DEVELOPMENT

The traditional solution to water supply shortages has been the construction of new dam and reservoir projects. While these actions are increasingly controversial and expensive, new storage will be needed to take full advantage of natural supplies. Groundwater resources will also see increased development. Some major legal and policy issues include:

- Does the existence of vast senior conditional water rights unduly prevent the full utilization of active junior rights or the full utilization of compact entitlements? Similarly, will environmental restrictions and West Slope opposition block full development of the remaining Colorado River entitlement, or will the needs of headwater communities prompt an era of win-win water development deals between the East and West Slopes?
- Will non-traditional storage mechanisms on the South Platte (e.g., gravel pits, conjunctive use) be sufficient to offset Two Forks? Will the Two Forks project be revived?
- What role will groundwater development and conjunctive use play in meeting future water demands, particularly in the Denver Basin? Do legal uncertainties limit the potential for groundwater storage and large-scale conjunctive use projects?

CHAPTER EIGHT: REALLOCATION OF EXISTING SUPPLIES

Moving water from the agricultural to the urban sector has the potential to solve projected municipal water shortages. However, these actions frequently raise a host of difficult legal and policy issues associated with the concentration of impacts among “third parties.” Some of the key issues include:

- Are water transfers the most promising and acceptable means for augmenting municipal water supplies? Do legal and political obstacles to new water developments and trans-basin diversions unduly promote agricultural-to-urban water transfers? Do transaction costs favor water transfers?
- Can temporary transfer mechanisms—such as leases, subordination agreements, dry year options, lease-back arrangements, and water banking—provide municipalities with drought protection while maintaining rural agricultural economies? Will these arrangements become popular, or will municipalities continue to buy agricultural rights outright?
- Are legal reforms needed to protect rural agricultural communities and water systems from the negative consequences of water transfers? To what extent do water transfers threaten environmental resources and water quality?

CHAPTER NINE: CONSERVATION AND EFFICIENCY

Water conservation and efficiency are expected to be an important part of strategies for meeting future water demands. These measures,

however, are not a quick fix, and raise a host of difficult issues, including:

- To what extent can demand management strategies, such as growth management and water pricing mechanisms, be utilized to minimize municipal water demands?
- How can the full potential of agricultural water efficiency be realized given existing legal and economic disincentives? What are the effects of increased efficiency on water users?
- How can the municipal use of bluegrass landscaping be discouraged given its strong cultural preference?
- Can wastewater reuse provide a significant water source given issues of cost and public acceptance?
- How can improved water system operations—including the re-operation of storage facilities, regional coordination, and water exchanges by and between providers—be used to stretch existing supplies further? How will improvements impact other water users?

CHAPTER TEN: EFFICIENCY, EQUITY AND THE SALIENCE OF TRANSACTIONS COSTS

Legal and procedural requirements that influence efforts to buy, sell, modify, or exercise water rights can be viewed as transactions costs. The substantive decisions made by water managers are largely influenced by the desire to minimize their exposure to the transactions costs associated with competing water management and development options. This raises several issues, including:

- Are transactions costs—especially those associated with water court—unduly high, reflecting inefficiency and waste in decision systems, or are they simply a reflection of necessary equity considerations in water decisions? Can administrative reforms increase efficiency and accommodate public input and interests in water decisions?
- Does the desire to avoid transactions costs discourage water managers from pursuing more reasonable or publicly responsible management strategies?

EMBARKING ON THE FUTURE: A REVIEW OF PROMISING STRATEGIES

In reviewing the literature, interviews, and case studies featured in this study, some tools and management strategies are apparent that, collectively, may hold answers to dealing with the water demands of continued growth. At the heart of these strategies are increased cooperation, an attempt to minimize adverse impacts of water development and use, and a commitment to stretch existing supplies further. In some cases, Colorado water managers are already actively employing the strategies listed; in others, significant endeavors have only begun. Several of the most frequently mentioned strategies are described in detail in Section III (Chapters Seven through Nine), and are revisited below.

- **Cooperative/Joint Water Developments.** To the extent that new water development is pursued, the most promising alternatives appear to be those that evolve in a cooperative framework sensitive to the distribution of costs and benefits among different interests and geographic locales. Projects serving

multiple interests often enjoy greater political viability than would otherwise be possible. Promising examples include Woford Mountain Reservoir, the Eagle River MOU, Clinton Gulch, Pueblo Reservoir enlargement, Aurora’s irrigation conversions in Lake County, and the Tri-Party Alliance’s investigation of Denver Basin conjunctive use.⁸⁸⁹

- **Small-Scale and Off-Stream Water Storage.**

Many of the liabilities of traditional storage projects can be effectively avoided by limiting development to small-scale projects, especially those featuring off-stream storage. The conversion of gravel pits into small storage reservoirs in the South Platte basin

“There is nothing more fundamentally altering to a river’s health than on-stream storage reservoirs.”
— LEE ROZAKLIS,
Hydrosphere Resource Consultants

is a prominent example. Others are Clinton Gulch and Eagle Park Reservoirs. Expansion of existing facilities (as planned for the Pueblo and Turquoise reservoirs) is another option that limits negative impacts. Off-stream reservoirs under consideration include Jasper and Ruder-Hess.⁸⁹⁰

- **Market-Based Water Reallocation.**

The reallocation of some water from agricultural to municipal uses is generally acknowledged as the inevitable result of changing demographics and economics of Colorado. While many of

these efforts have negative third-party impacts and entail significant transactions costs, systems with clearly defined rights, willing buyers and sellers, and an adequate water conveyance infrastructure efficiently reallocate water to higher-value uses. Undoubtedly the best example in the United States is the active market associated with the Colorado-Big Thompson Project, although Twin Lakes provides another simple illustration.⁸⁹¹

- **Temporary Water Transfers.**

Arrangements that provide for temporary water transfers—e.g., only during dry years—are a particularly promising way to accommodate municipal demands while minimizing the disruption to other sectors and regions (e.g., third party impacts). Mechanisms such as leases, subordination agreements, dry year options, lease-back arrangements, and water banking hold great promise if transactions costs can be contained. The pilot water bank for the Arkansas River provides an opportunity to test the concept to simplify and to improve the approval of water leases, loans, and exchanges, including interruptible supply agreements, and to reduce the costs of such transactions.⁸⁹²

- **Groundwater Development and Conjunctive Use.**

Several parts of Colorado, including the Denver Metro area, feature vast groundwater reserves that will be further tapped to serve expanding populations. Using these reserves conjunctively with available surface water resources can allow water managers to extend aquifer life (perhaps indefinitely), allow full utilization of surface water rights, manage drought,

⁸⁸⁹ See Chapters Three and Seven for a discussion of these projects.

⁸⁹⁰ See Chapter Seven.

⁸⁹¹ See Chapter Eight.

and minimize the need for new traditional storage reservoirs. The South Metro area is the focus of a few small-scale conjunctive use projects (e.g., the Centennial Water and Sanitation District program). The so-called Tri-Party Alliance is exploring a much more ambitious project for the Denver Basin.⁸⁹³

- **Integration and Coordinated Operation of Water Systems.**

Cooperative operation and/or planning arrangements among water providers can potentially enhance the yield and/or reliability of individual water systems. Examples include the Denver-Boulder agreement regarding the use of Gross Reservoir, efforts to accommodate Colorado Springs’ storage needs using excess Fry-Ark reservoir capacity, and ongoing discussions associated with the Northwest Cooperative Agreement and the Tri-Party Alliance. Denver Water’s invitation for cooperative proposals is an approach that could lead the way this century, much as the agency led the way with bricks and mortar projects last century.⁸⁹⁴

- **Efficiency and Wastewater Reuse.** The efficient use of existing supplies is a spreading mantra that is epitomized in several ways, including exchanges—another area where Colorado is a leader—and wastewater reuse. Municipal wastewater is increasingly viewed as a valuable resource that can be

utilized to meet additional water demands. While legal, political, and economic constraints typically limit full reuse of municipal wastewater streams, significant potential remains. Colorado Springs has a long-standing program that uses wastewater to irrigate public green space. Aurora has an established reuse program for green space irrigation, and Denver Water recently broke ground on the first phase of a substantial reuse program.⁸⁹⁵

- **Conservation and Demand Management.** Instead of focusing

exclusively on supply-side solutions to balance water budgets, several opportunities exist to limit demands and consumption. Agriculture is leading the way in Colorado. Irrigated acreage has remained fairly constant since the mid-1970s while irrigation use has declined by about 15 percent, a trend expected to continue throughout this century. Some of the tools available to municipal providers include new technologies, metering and pricing mechanisms, modified lifestyle choices, and public education. Xeriscape programs in Denver and Aurora are among the most visible examples of conservation programs.⁸⁹⁶

- **Cooperative Solutions to Environmental Problems and Endangered Species.** Water development and management can have significant negative impacts on environmental resources, particularly wildlife. Similarly, regulations intended

“For the past 20 years, we have been living on the slop, the excess, in the system. As long as we have that excess, we can play the accommodation game.”
— LARRY MACDONNELL,
Lawrence MacDonnell,
P.C.

⁸⁹² See Chapter Eight for specific examples.

⁸⁹³ See Chapter Seven.

⁸⁹⁴ See Chapters Nine and Seven.

⁸⁹⁵ See Chapter Nine.

to protect environmental values can constrain water development and management. Increasingly, water managers are working proactively with governmental and environmental interests to avoid problems, and to address threatened and endangered species through cooperative and integrated programs. Proactive successes include the boreal toad, and, hopefully, the Preble's jumping mouse. Cooperative mitigation programs include the Colorado River endangered fishes recovery program, coordinated reservoir releases for 15-mile reach fish flows, and the Tri-Party Agreement for central Platte River habitat. Formal state programs foster a proactive approach. Colorado's minimum stream flow program to preserve the natural environment continues to grow with substantial support from others, such as the City of Boulder. State funding to support species of concern is another example of proactive legislation to accommodate environmental values within the prior appropriation doctrine.⁸⁹⁷

- **Accommodating Recreational Flows.** Coloradans increasingly value and recognize instream recreational flows. The state's water law has accommodated this movement, at least to a point. The *Fort Collins* case established that stream flows could be appropriated for recreational uses, although some believe the recent *Golden* case may have pushed the doctrine too far. The *Gunnison* case similarly established that reservoir releases could be used for piscatorial purposes. Recreational flows are now legislatively recognized uses, although the new review process may hamper

rather than foster new appropriations. Cooperative agreements involving water providers do an impressive job of maintaining rafting flows through Brown's Canyon on the Arkansas River, and on the South Platte through Metro Denver.⁸⁹⁸

- **Water Quality and Quantity Integration.** Water development inevitably affects water quality. For most of its history, however, Colorado has steadfastly maintained that water quality issues are independent of, and therefore properly subservient to, the right to use the waters of the state. This myth is being challenged on several fronts, most notably in the context of exchanges. EPA and environmentalists also continue to challenge the bifurcation as fundamentally inconsistent with the Clean Water Act.⁸⁹⁹
- **Reserved Rights Settlements.** Colorado was blessed with the patience and magnanimity of the Ute Mountain Ute and Southern Ute Tribes in the settlement of their Indian reserved water rights claims. Similarly, the willingness of the Forest Supervisor of the Rio Grande National Forest to work with other interests led to the first and only global settlement of national forest reserved water rights in the United States.⁹⁰⁰
- **Controlling Interstate Demands.** California's 4.4 plan to reduce its use to its legal entitlement is a hopeful sign that other states will be able to meet their future needs without exacerbating

⁸⁹⁶ See Chapter Nine

⁸⁹⁷ Environmental issues are primarily reviewed in Chapter Four.

⁸⁹⁸ Recreational flows are discussed in Chapter Four.

⁸⁹⁹ Water quality issues are covered in Chapter Five.

⁹⁰⁰ Indian reserved rights are discussed in Chapters Six and Seven. Federal reserved rights are discussed in Chapters Two and Four.

demands for Colorado’s water resources.⁹⁰¹

CONCLUDING THOUGHTS

These water management tools and strategies figure to play a prominent role in shaping how Colorado deals with growth pressures. In highlighting these innovations, however, it should not be overlooked that some of the development, reuse, and efficiency strategies allowing more and more people (and uses) to be served by water systems can have the long-term effect of reducing the availability of undeveloped and unappropriated water in the state, while diminishing the excess—including the drought cushion—that currently exists in many water systems. These concerns generally do not surround strategies emphasizing reallocation and demand management; however, no strategy is without potential complications or drawbacks. Giving adequate consideration to all options can implicate issues that are outside of the normal purview of water managers, such as land-use management and the behavioral incentives provided to water users through law, policy, and even culture. If these and related issues are to be seriously considered in devising future water management programs, decision processes may need to feature more political leadership, planning, and public involvement than is currently seen.

“The very nature of the fact that you have more people means that there are more people to pay for a way to bring in renewable water.”

— JAMES R. SULLIVAN, Douglas County Commissioner

The influence of rapid population growth on water resources is often profound, but remains largely unappreciated by parties debating the merits and patterns of growth in Colorado. If growth projections prove to be even remotely accurate, then the next decades figure to be highly challenging for Colorado water interests. Front Range municipal water providers aggressively continue to explore a highly varied and complex set of strategies for acquiring and managing additional water supplies. The pace of legal and technological innovation is accelerating, yet in some cases—namely the South Denver Metro region—may only be sufficient to keep pace with demand due to the cushion provided by groundwater reserves and the continuation of unusually wet years. The challenge faced by headwater communities is, arguably, even greater than that faced by Front Range cities in some cases. Rapidly growing Summit County, for example, has a physical abundance of water, but most is unavailable for local use due to senior or conditional rights held by parties outside the county. The challenge for agricultural advocates, meanwhile, primarily entails trying to retain water for irrigation in the face of more economically attractive uses. Statewide, agricultural-to-urban water transfers have not had a huge impact on agriculture yet, but in some locations, such as the lower Arkansas Valley, serious economic disruption has already occurred. More widespread are environmental impacts associated with past water developments. Environmental advocates will undoubtedly be challenged to win remedies for historic ecological effects; just holding the line on additional depletions is already a demanding agenda.

For the approximately 81 percent of Coloradans living along the Front Range, real water shortages do not seem likely in the foreseeable future. This grand conclusion is not based on any sophisticated regional “water accounting”

⁹⁰¹ California’s 4.4 Plan is discussed in Chapter Six.

comparing supplies and demands; by that standard, relatively few Front Range water providers—notably Denver Water and its contractors—have a water system already in place to ensure a balanced future water budget. Rather, this conclusion is based on other considerations. First and foremost is the western truism that *water flows to money*. While wealth and political power are insufficient to pull water from the sky (notwithstanding modern cloud seeding techniques), they are more than adequate when married to technical expertise to move existing precipitation between regions, seasons, uses, and users. Additionally, by mining water deep below the ground, water can effectively be moved between years, decades, and even millennia. The ability of engineers, lawyers, politicians, and business leaders to keep water in the taps of Front Range cities should not be underestimated.

For Front Range municipalities, the issue is probably not future shortages, but rather future costs. As a general rule, every new water source is more expensive to develop than the previous one. This is predictable and indisputably logical; the least expensive options are pursued first. This general rule becomes complex when distributional issues are considered, as the distribution of costs are often not closely linked to the distribution of benefits. Rural agricultural communities and environmental resources, for example, tend to bear much of costs associated with water transfers and new developments, respectively, with benefits concentrated in the cities. What is best (i.e., lowest cost) for a particular water provider, therefore, is not necessarily what is best for other water users, or for society as a whole. This problem, typical of mobile resources like water, prompts a steady stream of legal and policy responses that further modify costs and their distribution. With each change, the suite of possible water management tools is reshuffled, yielding a new order of management priorities, tied to a new set of costs, and, ideally, reflecting an evolving set of public

values. The declining viability of trans-mountain diversions as the solution to Front Range water needs is just one of several important trends. The future of Colorado’s water resources is closely tied to these larger trends in law and policy.

“We can’t stop people from coming here, but we can be prepared for it.”

— STEVE ARVESCHOUG, General Manager,
Southeastern Colorado Water Conservation
District

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