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Lee Rozaklis

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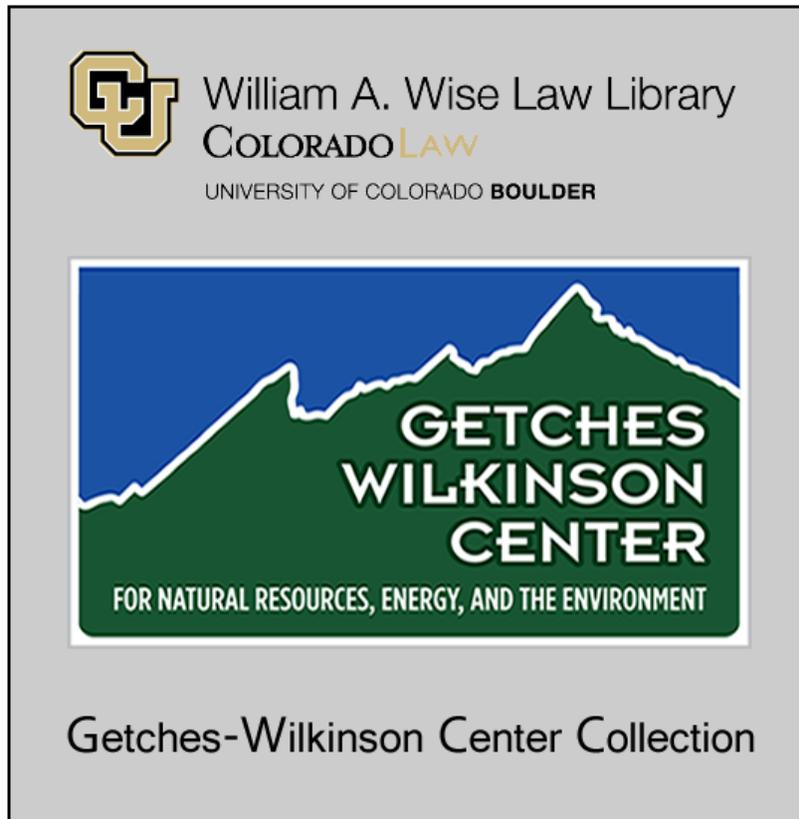
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Citation Information

Rozaklis, Lee, "Collaboration Among Municipal Water Providers: Meeting Metro Denver Water Demand" (1999). *Strategies in Western Water Law and Policy: Courts, Coercion and Collaboration (Summer Conference, June 8-11)*.

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Lee Rozaklis, *Collaboration Among Municipal Water Providers: Meeting Metro Water Demand*, in STRATEGIES IN WESTERN WATER LAW AND POLICY (Natural Res. Law Ctr., Univ. of Colo. Sch. of Law, 1999).

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**COLLABORATION AMONG MUNICIPAL WATER PROVIDERS:
MEETING METRO DENVER WATER DEMAND**

Lee Rozaklis

Principal

Hydrosphere Resource Consultants, Inc.

Boulder, CO

Strategies in Western Water Law and Policy:

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June 8-11, 1999

NATURAL RESOURCES LAW CENTER

University of Colorado

School of Law

Boulder, Colorado

Collaboration Among Municipal Water Providers: Meeting Metro Denver Water Demand

By Lee Rozaklis

I. Factual Setting

A. Hydrogeography of the South Platte Basin

1. Native South Platte Surface Flows

Native surface flows arise largely from high mountain snowmelt and average about 1,400,000 acre-feet per year at the Kersey gage. About two thirds of the annual flow normally occurs during the months of May through July. Annual flows vary by as much as 50% during wet and dry years. Additional flows of unknown magnitude, possibly 200,000 acre-feet per year, are produced by plains tributaries below Kersey.

2. Transbasin Imports

Water is imported from the Colorado, North Platte and Arkansas River Basins for irrigation, municipal and industrial purposes. Imports to the South Platte Basin currently average about 400,000 acre-feet per year.

3. Denver Basin Groundwater

The Denver Basin aquifer system, including the Dawson, Denver, Arapahoe and Laramie-Fox Hills aquifers, underlies about 6,900 square miles of the South Platte Basin. These aquifers contain about 270,000,000 acre-feet of theoretically recoverable groundwater, which is mostly nontributary in nature. About 40,000,000 acre-feet of this amount underlies Douglas County, where most of the Denver Basin groundwater use occurs. Current use of Denver Basin groundwater is estimated to be about 60,000 acre-feet per year. The natural rate of recharge to the Denver Basin aquifers is estimated to be less than 20,000 acre-feet per year.

B. Water Uses/Water Budget

Agricultural irrigation is the predominant water use in the basin followed by publicly supplied municipal and industrial use. An overall water budget for the South Platte basin under current conditions is shown in the table below.

South Platte Basin Water Budget, Current Conditions

Supplies, acre-feet/year		
Native surface supply	1,600,000	78%
Transbasin imports	400,000	19%
Nontributary groundwater pumping	60,000	3%
Total supplies	2,060,000	100%

Uses, acre-feet/year	Diversions	% of Diversions	Consumptive use	% of CU
Irrigation	2,850,000	78%	1,282,500	82%
Publicly supplied M&I	650,000	18%	227,500	15%
Other: power, mining, etc.	140,000	4%	50,000	3%
Total uses	3,640,000	100%	1,560,000	100%

Basin outflow	500,000
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C. M&I Water Supply Service Area Regions

When considering the M&I water needs of the South Platte Basin of Colorado, it is useful to think in terms of three service area regions, each characterized by its geography, its history and its unique set of water supply circumstances and opportunities.

1. Northern Region:

This region includes Boulder, Larimer, Logan, Morgan, Sedgwick, Washington and Weld Counties. This region contains more than 50 municipal water providers and rural domestic water districts including Fort Collins, Boulder, Longmont, Loveland, Greeley, Lafayette, Louisville, Superior, Broomfield and Fort Morgan. Water providers within this region utilize surface supplies from Boulder Creek, the St. Vrain River, the Big Thompson River and the Cache la

Poudre River. They also have access to the Colorado-Big Thompson (CBT) and Windy Gap projects and rely on water from these projects.

Agriculture accounts for the vast majority of water use in this region. Because of the availability of CBT and Windy Gap water and the large amount and proximity of agricultural water, municipal water supplies are relatively plentiful in this region.

2. Central Region

This region consists of Adams, Clear Creek, Denver, Gilpin, Jefferson and Park Counties, and portions of Arapahoe County. The region includes most of the water providers in the metropolitan Denver area including Denver Water, Aurora, Thornton, Westminster and Arvada. The region relies primarily on surface water supplies from the South Platte River and Clear Creek. A portion of the region's water supplies come from transbasin imports, primarily from the Colorado River Basin via Denver's and Aurora's water systems. Municipal water supply in the region is heavily influenced by the Denver Water system, which serves the City and County of Denver and provides full or partial water supply to over 90 other providers.

Although much of this region is situated over a portion of the Denver Basin aquifers, the region relies almost completely on surface water supplies. There is relatively little agricultural water use remaining in the region.

3. Southern Region

This region consists of Douglas County and that part of Arapahoe County not served by Aurora. The region includes sixteen water providers who are members of the Douglas County Water Resource Authority (DCWRA), formed by Douglas County for the purpose of facilitating cooperative regional water supply planning for the region. The region is situated directly over the most productive portion of the Denver Basin aquifer system. Conversely, the region is characterized by relatively little surface water availability.

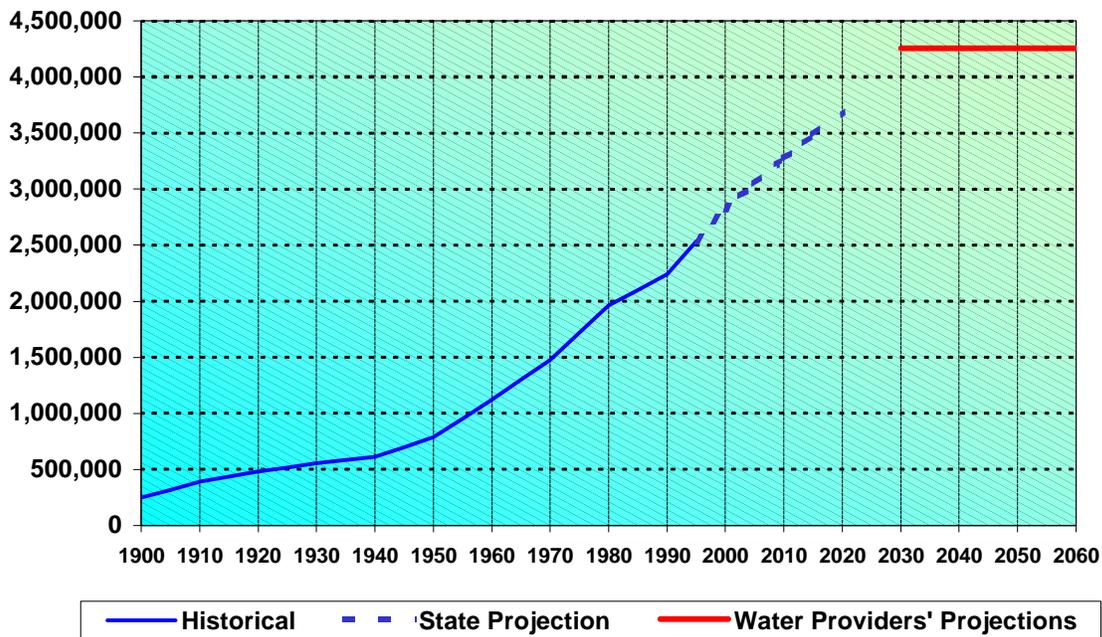
Significant urban development in this region began approximately 20 years ago. By that time virtually all readily available surface supplies had already been appropriated. Consequently most

of the region’s water providers rely on nontributary Denver Basin groundwater as their sole or principal supply.

D. Population Projections

Over the past fifty years, the population of the South Platte Basin has grown fairly steadily at an average rate of 2.6% per year. The State of Colorado projects that the basin’s population will increase from its current level of 2.7 million to 3.7 million people by the year 2020. This growth is projected to occur in all regions of the Basin. In comparison, water providers’ service area population projections add up to about 4.3 million people, indicating that municipal water supply planning is being done in anticipation of needs beyond the year 2030.

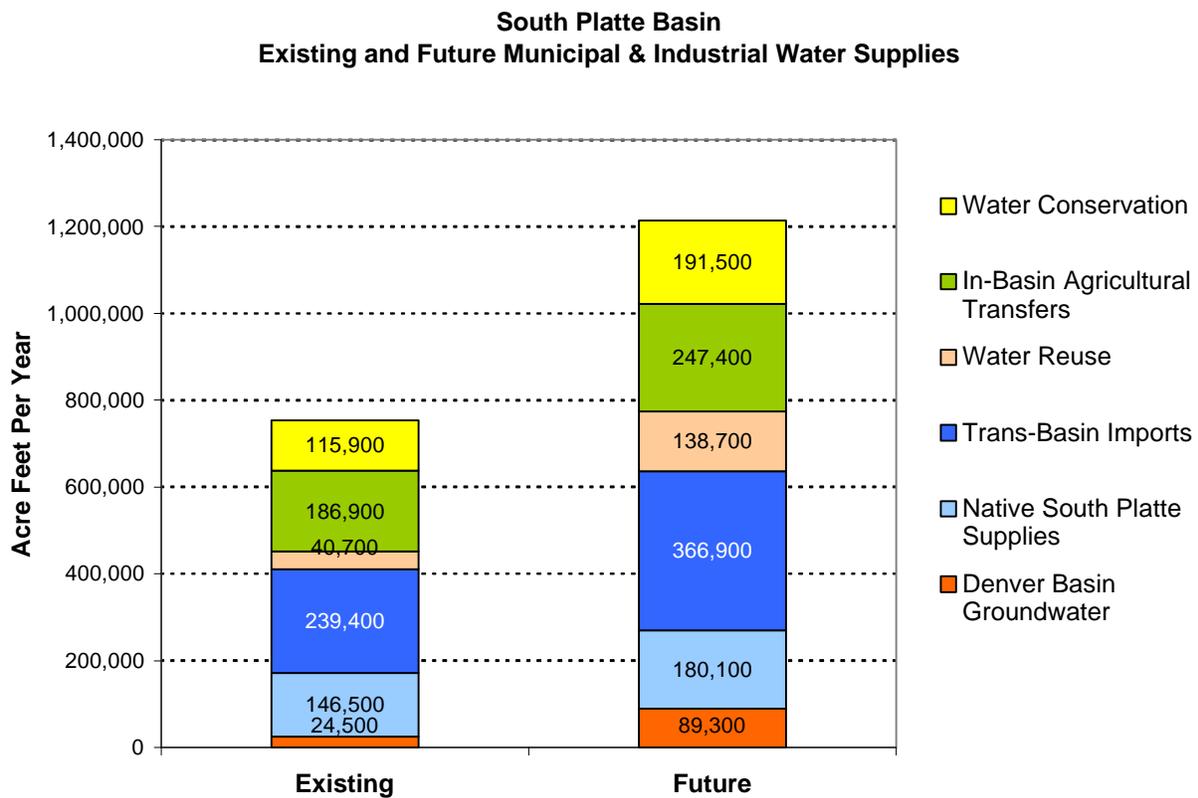
South Platte Basin Population



E. Municipal Water Supplies.

South Platte Basin water providers rely on six basic water management strategies to meet their needs: development of native South Platte surface supplies, acquisition and transfer of in-basin agricultural supplies, trans-basin imports, water reuse, Denver Basin (nontributary) groundwater,

and water conservation. Individual water providers utilize these strategies to varying degrees according to their individual circumstances and opportunities. All of these strategies can be implemented through cooperative actions as well as through individual efforts. Based on a compilation of water providers' existing water supply portfolios and future plans, the relative roles of these strategies in meeting existing and future M&I water needs of the South Platte Basin are shown in the figure below.



It should be noted that, with respect to downstream South Platte river flows, development of native South Platte supplies and water reuse are depletive in nature; trans-basin imports, in-basin agricultural transfers and use of Denver Basin groundwater are accretive in nature; and water conservation is neutral.

The implementation of providers' future water supply plans will primarily involve more intensive use of existing water rights and projects already in hand. While some changes in water rights and development of minor storage facilities will be involved, construction of major new water development projects is not currently reflected in providers' plans.

F. Future Unmet M&I Needs

Future unmet M&I needs are defined as projected M&I water demands in excess of reasonably certain future supplies. From a regional perspective, future unmet M&I needs exist primarily in the Central Region. In the Northern Region, future unmet M&I needs are unlikely due to relatively plentiful agricultural supplies and the availability of CBT and Windy Gap water. No unmet needs are currently projected for the Southern Region assuming increased pumping of Denver Basin groundwater. However, this water supply strategy may not be sustainable over a long-term planning horizon. The future unmet needs of the Central Region are shown below.

<i>Sub-Region</i>	<i>Future Unmet Needs, AF</i>	<i>Notes</i>
Denver Water	14,000 to 44,000 (build-out)	Based on the expected range of Denver's safety factor.
City of Aurora	30,000 (year 2030)	Includes Aurora's 10,000 AF planning reserve.
Northeast Metro Sub-Region	25,000 to 64,000 (build-out)	Depending on the degree of implementation of Thornton's Northern Project
Northwest Metro Sub-Region	10,000 to 20,000 (build-out)	Depending on the size of Arvada's Jefferson Center
Total	79,000 to 158,000	

II. Cooperative Opportunities Identified in MWSI

The Metropolitan Water Supply Investigation (MWSI) identified and evaluated cooperative water supply options in four primary categories: conjunctive use, effluent management, interruptible supply arrangements and other system integration opportunities. The table below summarizes the MWSI's findings regarding these opportunities.

Cooperative Supply Category	Supply or Yield Potential	Actions Items/Unresolved Issues
Conjunctive Use	up to 60,000 acre-feet of surface water yield under example project analyzed	South Platte and Blue River stream depletions Water right constraints Feasibility of long-term, large scale recharge IGA's among participants Balancing groundwater depletions against increased use of surface waters
Effluent Management Management	up to 120,000 acre-feet of excess reusable return flows; specific project yields were not investigated	Relatively high costs Public acceptance of potable reuse Effects of exchanges on water quality Effects on instream flows
Interruptible Supply	up to 190,000 acre-feet of interruptible supply; specific project yields were not investigated	Would require major institutional changes Impacts to agricultural communities Geographic/cost considerations
Other System Integration Opportunities	up to 20,000 acre-feet of yield under example projects analyzed	Water right constraints IGA's among participants Federal action (Chatfield storage reallocation)

III. Current Collaborative Efforts

A. Collaboration in the Northern Region

Collaboration has been an historical keystone to water development in the Northern region, from the formation of large mutual irrigation companies in the 19th century to the successful development of the Colorado-Big Thompson and Windy Gap trans-basin diversion projects. It should be noted that both the Colorado-Big Thompson and Windy Gap projects involved collaboration and political settlement with West Slope water interests in the form of compensatory storage projects.

Recent collaborative efforts among municipal water providers have focused on regional raw water delivery pipelines, joint operations of mountain storage facilities to meet instream flow objectives, and firming of Windy Gap supplies through CBT borrowing programs and investigations of new off-channel storage opportunities. This latter effort has also involved West Slope and Denver Water interests. Municipal providers have also formed a Northern Regional Water Coalition for regional planning purposes.

B. Collaboration in the Central Region

Several collaborative efforts are underway in the Central region. In the Northwest metro area, Denver Water is working with Arvada, Broomfield, Consolidated Mutual and Westminster to define the potential yield that could be developed using water rights, storage, conveyance and delivery facilities currently or potentially available to these entities in conjunction with Denver's existing water supply system. Opportunities for coordinated reservoir operations, interconnections, nonpotable reuse and development of new off-channel storage are being examined.

In the Northeast metro area, Denver Water, Aurora, South Adams County Water & Sanitation District, Brighton, Thornton and FRICO have been examining ways to develop exchange opportunities, optimize delivery of nonpotable water reuse water and develop a new regional potable municipal supply project diverting from the South Platte River at or below the Burlington Ditch. Opportunities for integrating participants' downstream storage needs and of "pooling" participants' reusable return flows in order to reduce the need for downstream storage is of particular interest. The potential role of the FRICO/Burlington system in providing storage and conveyance capacity in each of these options is also of particular interest.

Denver and Aurora are discussing possible arrangements to more effectively utilize their respective Upper South Platte storage facilities including Antero, Eleven-Mile, Spinney Mountain and Cheesman Reservoirs. Opportunities under investigation include enlargement of Antero Reservoir wherein Aurora could store water imported from the Colorado and Arkansas Rivers in Antero. This additional storage would enhance the yield of Aurora's collection systems and more effectively utilize storage at Antero, where the water supply yield to Denver is limited by Denver's junior storage rights and the relatively small physical yield of the watershed tributary to Antero.

C. Collaboration in the Southern Region

Several water providers in the Cherry Creek basin have been examining ways to integrate the operation of their individual augmentation plans for their alluvial wells.

Through the Douglas County Water Resource Authority, southern area water providers worked with Denver Water and West Slope water interests to further examine conjunctive use concepts

initially identified in the MWSI for the purpose of reducing their reliance on Denver Basin aquifer sources. During this process the West Slope raised several legal and policy concerns regarding the availability of Blue River water for a conjunctive use project and questioned Douglas County's need for such water given the immense amounts of Denver basin groundwater available to Douglas County providers. However, all parties recognized the importance of sustainable water supplies for Douglas County. Further study of water supply strategies to meet the long-term needs of Authority members while minimizing the need for additional diversions from the Colorado River Basin is underway.

D. Collaboration With the West Slope

Several entities are participating in the Upper Colorado River Basin Study to collaboratively explore and seek to design solutions to water quantity and quality issues affecting the Upper Colorado River Basin that are related to existing water use, land management activities, and expected growth and related water use and land management activities in the Front Range and the West Slope. These entities include Grand County, Summit County, the Colorado River Water Conservation District, the Middle Park Water Conservancy District, Denver Water, the Northern Colorado Water Conservancy District, and the Water Quality/Quantity Committee.

IV. Barriers to Collaboration

While numerous collaborative efforts are underway and notable progress has been achieved, several thematic barriers to successful collaboration have been encountered. These include:

- Poor communication, misunderstanding and mistrust between parties.
- Concerns that metro Denver area water needs will take precedence over other legitimate water supply, environmental, recreational and agricultural interests, including Colorado River endangered species needs.
- Conflicting attitudes towards growth.
- Differing perceptions on adequacy of water supplies, particularly with respect to water quality ("downstream" supplies) and sustainability (nontributary groundwater).
- Fear that regional and cooperative efforts will lead to loss of local decision making.

V. A Framework for Successful Collaboration

Lessons learned from recent collaborative efforts suggest that successful collaboration will require consideration of the following elements:

- Cooperative study sponsorship and scoping efforts so that no single party drives the agenda.
- Mutual education and information development to eliminate misperceptions, increase understanding and trust.
- Recognition of individual needs and constraints.
- Equivalency in terms of water conservation efforts.
- Collaborative efforts should lead toward high quality, sustainable supplies for all involved parties.
- Preservation of local decision making.
- The State of Colorado has a natural role as facilitator and a voice for large-scale issues.
- Don't get hung up on institutional constraints at the outset.