



Harvest time at a Boulder farm.

While the agricultural community may view the growing urban demand as a threat, it is also an opportunity.

The Ag/Urban Cooperation Strategy



The MWSI determined there could be as much as 495,000 acre-feet of agricultural water available annually for sharing with South Platte municipalities.⁴⁴ Voluntarily sharing almost any of it would require both additions to the physical infrastructure of existing supply systems in the South Platte Basin and agreements that protect the interests of parties who might wish to enter the cooperative arrangement. If systems are integrated, and agreements between irrigators and municipalities reached, it is reasonable to expect that municipalities could utilize 120,000 acre-feet of agricultural water annually by 2050 without permanently drying irrigated acreage.

Front Range Ag/Urban Cooperation

Agricultural and urban land use patterns in the South Platte Basin have changed dramatically in the last 30 years. Driven to some extent by rapid urban growth, but also other factors more directly related to agriculture, there has been a substantial reduction in irrigated acres from a high in 1976 of 1.02 million acres to approximately 840,000 acres in 2005. The CWCB projects this trend to continue.

Over the past 10 years, there have been intrabasin discussions regarding the benefits associated with sharing information on supply, demand, and system operations. In particular, the SWSI process has detailed the benefits and shortcomings of voluntary ag/urban sharing concepts, which depend, almost without exception, on planned and periodic reductions in irrigation water use. These issues are also now under discussion with some regularity in the basin roundtables and at the Interbasin Compact Committee.

The major benefit of ag/urban sharing arrangements to agricultural interests would be the opportunity to lease water at an attractive price on a schedule established well in advance of actual re-allocations of water. Innovative arrangements, such as rotational fallowing, interruptible supply agreements, water banks, crop changes, and deficit irrigation, could allow for temporary transfer of irrigation water to municipal uses without permanently drying irrigated lands.

While the agricultural community may view the growing urban demand as a threat, it is also an opportunity. As SWSI II states in the “Alternative

The opportunity for agricultural communities to generate a return on a resource that has an ever-increasing value in urban centers, while not losing control of the resource, could be beneficial.

Agricultural Water Transfer Methods” section, water sharing arrangements can “provide more stable incomes to agricultural users.” The opportunity for agricultural communities to generate a return on a resource that has a high and ever-increasing value in urban centers, while at the same time not losing control of the resource, could be beneficial.

Ag/Urban Cooperation Examples

The coupling of voluntary land fallowing and water leasing is not unprecedented. It has been utilized in Colorado on both a short-term basis, such as with the Aurora-Rocky Ford High Line lease from 2004-2005, and on a long-term basis, as in the agreement between the Fort Morgan Water Company and Xcel Energy.* From Xcel’s point of view, the Fort Morgan agreement has been so successful that it has now entered into a contract with the North Sterling Irrigation District, using a drought insurance concept

in which the power company pays the district an annual premium or option payment for the right to 3,000 acre-feet, and then pays a specified price for the water, if needed.

In the Arkansas River Basin east of Pueblo, another substantial fallowing-leasing cooperative is being established with the creation of the Super Ditch Company. The basic concept of the Super Ditch is to pool water rights from several Arkansas River ditch companies to create a centralized entity from which municipalities can lease water. **As of January 2011, more than 1,000 ditch shareholders have indicated an interest in the lease agreements proposed by Super Ditch, with some ditches capturing the interest of over 80% of their shareholders. The Super Ditch Company believes it will be in a position to lease 20,000 acre-feet of water, or more, to municipalities in the coming years.**⁴⁵



Irrigation ditch with three headgates.

Beyond Colorado, perhaps the best known example of a fallowing agreement is the Metropolitan Water District of Southern California-Palo Verde Irrigation District program. With all of these successful examples, and with Front Range utilities continuing to consider costly and problematic proposals to draw additional supplies from the Colorado River, ag/urban cooperation deserves serious attention.

* The Fort Morgan-Excel agreement is a “take or pay” contract for up to 2,500 acre-feet of augmentation water for Xcel’s Pawnee wells, which supply cooling water to the Pawnee Power Plant. If available, Xcel purchases augmentation credits; otherwise, Jackson Lake Reservoir water owned by participating Fort Morgan shareholders is delivered via canal to Xcel’s Pawnee Power Plant. The delivery period is April through November, and the monthly amount is between 200 and 500 acre-feet.

Systems Integration

The concept of systems integration involves the cooperative use or enhancement of several water supply systems in a manner designed to increase total yield. In mature river basins like the South Platte, with a large number of urban and agricultural water users that are linked but not completely combined, systems integration would enhance the opportunities for conjunctive use of surface and groundwater, return flow management and reuse, and ag/urban cooperative arrangements. All of these measures could increase the firm yield of participating urban users.

Systems Integration Examples

Implementing a cooperative ag/urban water supply agreement will likely require conveyance and storage infrastructure; using existing infrastructure would minimize economic and environmental costs associated with developing new facilities.[†] For example, some water planners view existing Colorado-Big Thompson (C-BT) facilities as a possible system for conveying water to the metro Denver area. While it is the position of the Northern Colorado Water Conservancy District (Northern Water) that the facilities of the C-BT and Windy Gap Projects are legally dedicated to the sole use of water users within its boundaries and may not be used for the benefit of the Denver metro area without a new federal law, a conceptual analysis is warranted.

Consider, for example, an ag/urban agreement between a ditch system or systems (A) located within Northern Water's boundaries and a municipal water user (B) located in the metro Denver area, in which A agrees to make water available to B via an interruptible supply and substitution agreement. Under the agreement, some irrigators in A (call them participants) deliver some of the water from their native (non-C-BT Project) water rights to other irrigators in A (call them non-participants) at a time when the non-participants would otherwise be taking delivery of their C-BT Project water. This "substitute delivery" reduces the non-participants' demand for their C-BT Project water. In essence, the participants' native water is exchanged into the C-BT Project system (say at Carter Lake), from which point it would be delivered to B in the Denver metro area from Carter Lake via a new pipeline.

This operational scheme would have to be developed so as to avoid impacts to C-BT and Windy Gap Project deliveries, and there are a number of

[†] As an example, delivering an additional 40,000 acre-feet of irrigation water annually to the Denver metro area might require in the neighborhood of 80,000 acre-feet of storage and additional pipelines to move water north to south.

operational issues that would have to be addressed and resolved. Furthermore, any such use of C-BT Project facilities would likely require legal and institutional changes and require the consent of Northern Water and the U.S. Bureau of Reclamation. Nevertheless, it is an option worthy of further consideration.*

There are other opportunities as well. Metropolitan water utilities like Aurora Water and East Cherry Creek Valley WSD are building their own projects that will tap agricultural water and other useable or reuseable water to the north. East Cherry Creek completed the first phase of its Northern Pipeline in 2006 and Aurora recently completed its Prairie Waters Project, another pipeline that will bring water south into the Denver metro area. These systems are linked, either directly or by proximity, with the irrigation systems farther downstream in the South Platte. Of course, to the extent that sharing scenarios involve water systems that have transbasin infrastructure, such as that of Denver Water, Aurora, or Northern Water, it would be imperative that arrangements be structured to prevent those systems from being used to increase transbasin diversions.

Issues Associated with Ag/Urban Cooperation

Potential hurdles to voluntary ag/urban cooperation include agricultural community concerns and instream flow issues. These concerns are legitimate and will require effort to resolve. However, ag/urban cooperation remains an integral and viable water supply option for the Front Range.

Agricultural Community Concerns

Ag/urban sharing agreements must meet the needs of the agricultural community. Leasing cooperatives and leasing agreements that involve a number of ditch companies and irrigation districts (e.g., the Super Ditch Company) will help to address agricultural needs. There are no fixed rules for how such contracts must be structured, but at a minimum, they will have to address the following issues, some of which were discussed in SWSI Phase II:

- All transfers of water from agriculture to the municipal sector must be based on a willing buyer/willing seller model.

* Use of C-BT facilities to deliver water from sources along the foothills would eliminate the need for reverse osmosis as a water treatment unit process to reduce total dissolved solids to acceptable levels (400 mg/l). However, for large urban systems like Denver Water, capturing water east of the foothills (downstream) of major wastewater treatment plants might still not require reverse osmosis, because of the large systems' capacity to blend this water with existing supplies to reach limits for total dissolved solids. Personal communication with David Little (Denver Water), August 7, 2010.

- Temporary transfers must be protected against claims of forfeiture for non-use or loss of priority.
- A balance must be struck between farmers' preference for short-term arrangements and municipal utilities' interest in long-term arrangements.
- Transfers should be shareable among multiple participating farmers in order to provide flexibility.
- Transfers must not affect the water supplies of non-participating farmers or ditch companies.
- Market tiers and associated prices must be established to allow participation by entities with water of varying reliability.
- The structure, if not the details, of agreements must be standardized to reduce time and administrative commitments necessary for both their negotiation and implementation.

TABLE N° 5 ESTIMATE OF GROSS SUPPLY POTENTIAL FOR AG/URBAN COOPERATION IN THE SOUTH PLATTE BASIN (ACRE-FEET PER YEAR).

Sub-Basin	Average Dry-Year Supplies Owned by Agriculture with Diversions Above Greeley*	Average Clean Dry-Year Supplies† with Diversions Above Greeley*
South Platte above Chatfield‡	8,000	8,000
Bear Creek	~0§	~0§
Cherry Creek	~0§	~0§
Clear Creek	13,000#	4,000#
South Platte (Chatfield to Metro)	54,000	~0
South Platte (Metro to Big Thompson)	151,000	~0
Boulder Creek	49,000	24,000
St. Vrain / Left Hand	49,000	24,000
Big Thompson	73,000	47,000
Cache La Poudre	111,000	74,000
TOTAL	495,000	190,000

* These numbers are estimates; only major ditches have been considered. Numbers listed may include ditch diversions that serve areas within a municipality's planning area. Annual dry-year diversions based on data from 1954, 1955, 1963, 1964, 1966, 1977, and 1981.

† "Clean" means diversion does not occur downstream of a major WWTP.

‡ "South Platte above Chatfield" includes South Park ditches (including North Fork South Platte), which are expressed as depletions, not diversions.

§ ~0 = insignificant.

Average annual for period of record (dry-year numbers not readily available; values not included in total).

Instream Flow Issues

The most likely ag/urban sharing arrangements for the Front Range would involve irrigators north of Denver and urban suppliers in the Denver metro region. To the degree that ag/urban agreements result in increased diversions at upstream locations, flows in intervening stream reaches would be diminished. This could affect water quality, environmental, and recreational interests. However, agreements can be structured in ways that minimize and mitigate these impacts.

Estimate of Water Available via Ag/Urban Cooperation

Geographically, the majority of available water supply for ag/urban sharing lies to the north of the Denver metro area. Native flows of the major tributaries to the South Platte between Denver and Greeley (Poudre River, Big Thompson River, St. Vrain River, and Boulder Creek) average almost 700,000 acre-feet per year (Figure 9). Not all of this water is used by agriculture, but a substantial portion is, and some fraction could be made available for cooperative agreements between cities and irrigators.

FIGURE N° 8 ESTIMATE OF FRONT RANGE WATER NEEDS INCLUDING THE ACCEPTABLE PLANNED PROJECTS, CONSERVATION, REUSE, AND AG/URBAN COOPERATION STRATEGIES.

We assume 120,000 acre-feet of water could be made available annually through voluntary, cooperative ag/urban agreements without permanently drying irrigated lands.

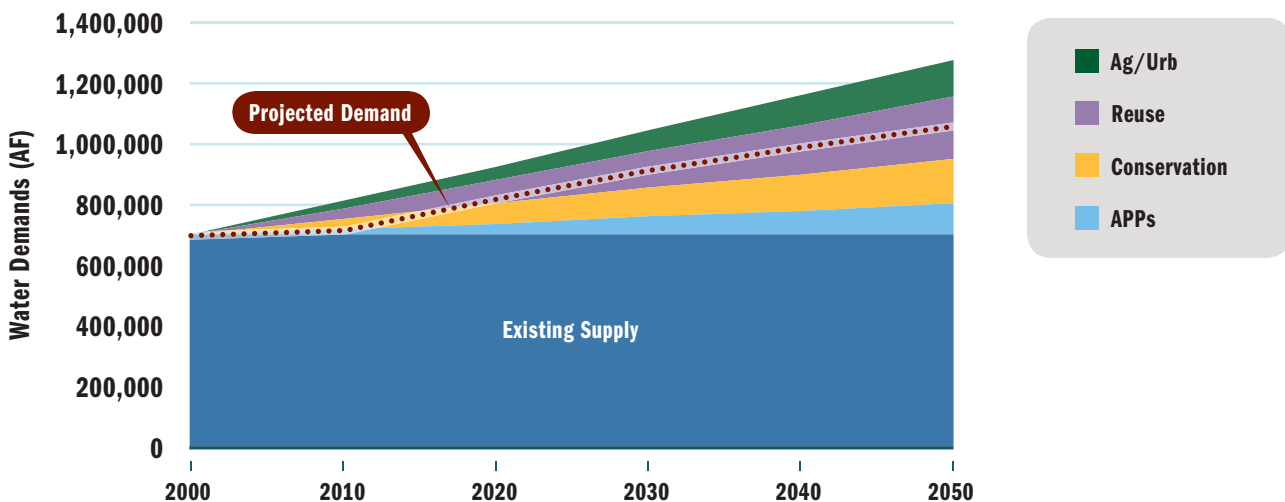
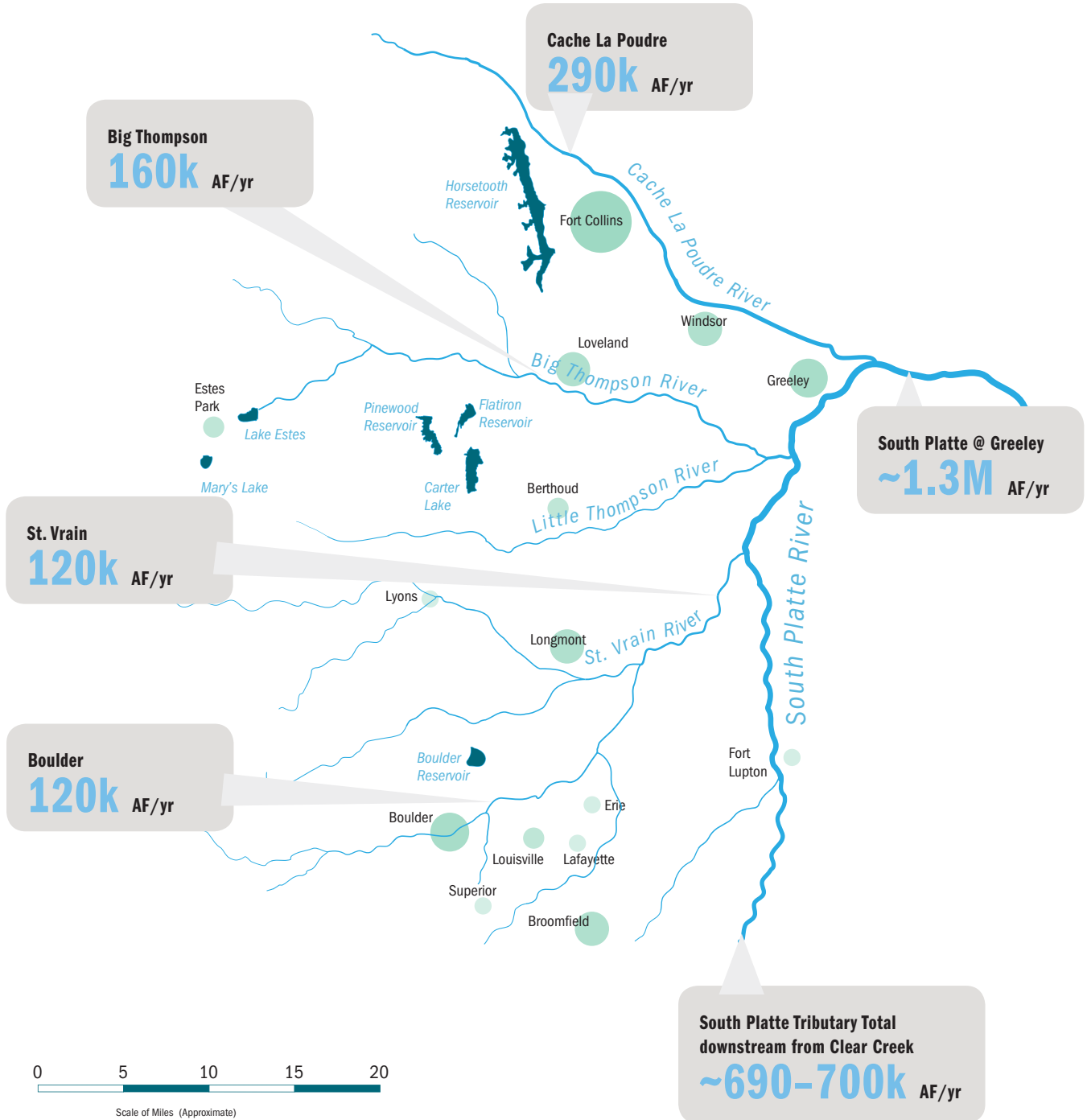


FIGURE Nº 9 SOUTH PLATTE TRIBUTARY AVERAGE ANNUAL NATIVE FLOWS.

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The MWSI estimated gross quantities of *dry-year water*—a more conservative estimate than the annual average—that might be available for ag/urban transfer on a sub-basin level. The report presents two sets of estimates: dry-year supplies of 495,000 acre-feet and “clean water” dry-year supplies of 190,000 acre-feet—“clean water” referring to diversions that are upstream of a major wastewater treatment plant (Table 5). Some fraction of this water could be moved to municipal uses via voluntary, alternative agricultural transfer arrangements, such as rotational fallowing, crop shifting, or interruptible supply contracts that do not require permanent drying of irrigated acres.

If the necessary infrastructure and agreements were in place, we assume that roughly 25% of the average dry-year supplies (495,000 acre-feet) could be made available annually for ag/urban cooperation, without permanently drying irrigated lands. This would be 120,000 acre-feet per year by 2050, as shown by the ag/urban wedge in Figure 8. According to the CWCB’s recent study of IPPs, immediate plans for agricultural transfers in the Front Range total between 40,000 and 53,000 acre-feet.⁴⁶

Energy Implications of Ag-Urban Sharing

The location and configuration of ag/urban sharing agreements will determine their energy requirements. Agreements that divert water high in the basin (i.e., above the Denver metro area and most farming operations) will generally be less energy-intensive because source water is of higher quality, requires less treatment, and could be delivered via gravity. By contrast, arrangements that use water from lower in the basin would involve higher treatment and pumping requirements, and would thus be much more energy-intensive.



Afternoon light on the Front Range.