

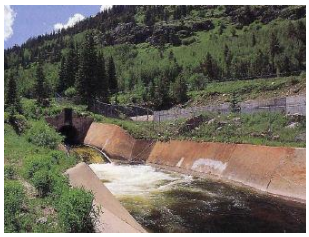

South Platte Basin Implementation Plan

DRAFT - Technical Memorandum: Agricultural Needs and Alternative Transfer Methods

South Platte Basin Roundtable

Metro Basin Roundtable

Project Number 225388

February 28, 2014

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Contents

Tables

Figures

1 Executive Summary

This memorandum presents information to support updating the 2050 agricultural supply gap and to refine the location and timing for additional projects and methods, such as Alternative Transfer Methods (ATMs). Much of the material for this memorandum is from the following primary information sources:

1. SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments, June 2011, CDM
2. SWSI 2010 Metro Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments, June 2011, CDM
3. Alternative Agricultural Water Transfer Methods Grant Program Summary and Status Update, November 2012, CWCB

Additional source citations are provided as footnotes.

Agriculture plays a vital role in the South Platte Basin's economy. However, the transfer of agricultural water rights for M&I use threatens to dry up a significant portion of irrigated acreage. The population within the areas represented by the South Platte and Metro Roundtables is estimated to nearly double in size by the year 2050. The potential impact of this population growth and other impacts on the irrigated acreage was developed in SWSI 2010 and summarized in Table 1-1. Other factors expected to decrease irrigated acres in the South Platte River basin include irrigated acres being taken out of production due to a shortage of augmentation water and the transfer of land into conservation programs[1].

Table 1-1. Future Irrigated Acres by River Basin

Basin	Current Irrigated Acres	Decrease in Irrigated Acres Due to Urbanization		Decreases in Irrigated Acres Due to Other Reasons	Decrease in Irrigated Acres Due to Agricultural to Municipal Transfers	Decreases in Irrigated Acres Due to Ag Transfers to Meet Gap		2050 Irrigated Acres	
		Low	High			Low	High	Low	High
Republican	550,000	300	600	109,000	-	-	-	440,400	440,700
South Platte	831,000	47,000	58,000	14,000	19,000	100,000	176,000	564,000	651,000
Total	**1,381,000**	**47,300**	**58,600**	**123,000**	**19,000**	**100,000**	**176,000**	**1,004,400**	**1,091,700**

Source: Table 4-9 SWSI 2010 South Platte Basin Report Basinwide Consumptive and Non-consumptive Water Supply Needs

[1] CWCB 2011. Colorado's Water Supply Future, SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments. CDM Smith, Denver, Colorado. June 2011

Table 1-2 summarizes current and future agricultural water demands. The irrigation water requirements (IWR) represent the volume of water required to completely satisfy the consumptive use (CU) of a specified crop. Typically in Colorado, water supply is only adequate to satisfy the IWR during the early part of the growing season. Later in the season, the available water supply generally decreases and CU (and crop yield) is limited by supply. The difference between the IWR and the water supply limited CU represents the shortage in both current and future agricultural supply. Non-irrigation demand refers to consumptive water used in livestock production, water lost due to stockpond evaporation, and water lost during the delivery of irrigation water.

Table 1-2. Summary of Current and Future Agricultural Water Demands

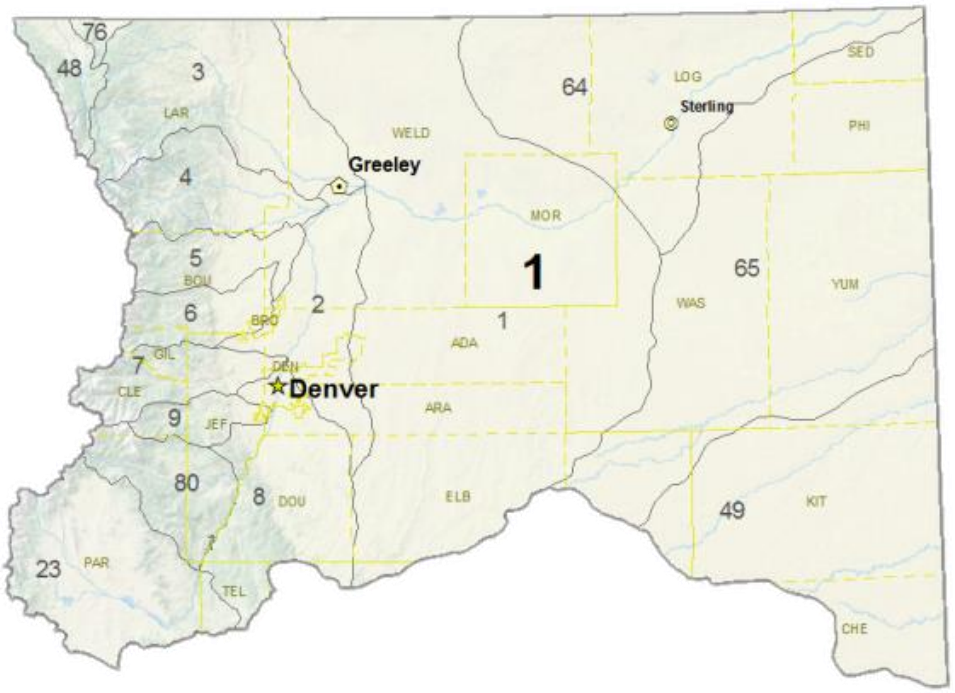
	Irrigated Acres	Irrigation Water Requirements (AFY)	Water Supply Limited Consumptive Use (AFY)	Shortage (AFY)	Non-Irrigation Demand (AFY)
Current	831,000	1,496,000	1,117,000	379,000	115,000
2050	607,000	1,094,000	820,000	274,000	84,000

Source: Table 4-10 SWSI 2010 South Platte Basin Report Consumptive and Non-consumptive Water Supply Needs Assessment & 4-11 SWSI 2010 South Platte Basin Report Consumptive and Non-Consumptive Water Supply Needs Assessment

As outlined in the SWSI 2010 reports, the future agricultural supply gap or shortage as shown in Table 1-2 decreases due to the anticipated decrease in irrigated acres. Identified projects and processes (IPPs) include mostly traditional agricultural water transfer processes to meet M&I gaps. Although these transfers are unavoidable as irrigated land is urbanized, they should be minimized where possible to avoid adverse socioeconomic impacts to agricultural production, food security and third-party impacts while respecting the property rights of the agricultural water right holders.

For this reason, the State of Colorado has enacted an ATM grant program. To date, there have been ten grants awarded to projects in the South Platte Basin. These projects hope to identify alternative transfer methods in order to help reduce the M&I gap while minimizing negative impacts to the agricultural economy. Figure 1-1 defines the water district locations in the South Platte River Basin. There have been two water districts (1 and 64) identified as feasible locations for ATMs due to their location and low probability of urbanization.

Figure 1-1. Colorado Water Districts in the South Platte River Basin



Source: Colorado Division of Water Resources

Approximately 90,000 to 160,000 acre-feet per year (AFY) have been identified by current ATM grant projects as possible additional water supplies available through ATMs[2]. Additionally, ATM grant projects have identified solutions to some of the barriers to implementation. The flexibility to move water within the basin for M&I uses during dry years would be very beneficial to the South Platte Basin. Development of additional regulating reservoirs, especially strategically-placed off-channel reservoirs designed to provide ecosystem benefits, could facilitate the implementation of ATMs and could be examined in both future grant projects.

One approach for providing more flexibility is currently being discussed by the Colorado legislature. Proposed House Bill 14-1026[3] would help create a more flexible change-in-use system by allowing an applicant who seeks to implement rotational fallowing, regulated deficit irrigation, reduced consumptive use cropping, or other alternatives to the permanent dry-up of irrigated lands to apply for a change in use, without designating the specific beneficial use to which the water will be applied. As outlined in the FLEX Market Model Completion Report by the CWCB[4], the "FLEX Market" system facilitates a voluntary agreement between one or more M&I water users, one or more agricultural water users, and one or more environmental/conservation (EC) water users to change the use of a senior irrigation right to include multiple end uses in addition to irrigation, and to establish a trading platform facilitating uses by the participants. The goal of the FLEX market approach is to

[2] CWCB. (2012). Alternative Agricultural Water Transfer Methods Grant Program Summary and Status Update. CDM Smith. Denver, Colorado.

[3] House Bill 14-1026, 69th Gen. Assem., Reg. Sess. (Version Date: 5 Feb. 2014). Accessed on: 24 Feb 2014.

[4] CWCB. (2013). FLEX Market Model Project Completion Report. Brown and Caldwell.

permit a portion of the senior right to be used for M&I and EC uses pursuant to voluntary contractual arrangements, to maintain the economic benefit of the senior water right in its region of origin, and to retain sufficient agricultural water supply to sustain commercially viable farming activities. House Bill 14-1026[5] was introduced in January 2014. The Colorado Water Congress State Affairs Committee has unanimously supported this proposed bill.

The Roundtables support streamlining the water court process to encourage water sharing practices while protecting the vested rights of water right holders[6]. The Roundtables have recognized the need for political support for:

1. Continued state funding of practical research and pilot projects for water sharing partnerships between cities and agriculture including alternative water transfer methods.
2. Solutions for streamlining the water court process for water sharing partnerships that continue to protect vested rights.
3. Incentives to encourage water sharing methods without interference with free market transactions.
4. Agricultural conservation easements coupled with municipal water lease options[6].

Based upon HDR's review of the existing information for the Basin Implementation Plan, no modifications are currently proposed to the agricultural supply shortage summarized in Table 1-2. To the extent that new information is received regarding agricultural-related IPPs, the agricultural water supply gap will be updated within the draft Basin Implementation Plan.

[5] House Bill 14-1026, 69th Gen. Assem., Reg. Sess. (Version Date: 5 Feb. 2014). Accessed on: 24 Feb 2014.

[6] CWCB. (2013). Filling the East Slope Municipal Water Supply Gap.

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2 Overview of Agricultural Production in the South Platte Basin

Agriculture plays a key role in the economy and water use of the South Platte and Republican River basins. There are approximately 831,000 irrigated acres in the South Platte Basin with an additional 550,000 irrigated acres in the Republican Basin. In 2007, seven of the top ten agriculture producing counties were located in the South Platte Basin. These counties, in order, are Weld, Yuma, Morgan, Logan, Kit Carson, Adams, Phillips, Washington, and Larimer. The agricultural sales in the South Platte Basin were $4.4 billion, representing 73 percent to the statewide total. Weld County generates over 25 percent of the statewide agricultural sales[7].

Sales of agricultural products from the South Platte Basin generated nearly $3.2 billion in 2002, representing 72 percent of the statewide total. In 2007, sales increased to more than $4.4 billion, representing 73 percent of total sales of agricultural products[7].

Groundwater use in the South Platte Basin is prevalent. In 2002, it was estimated that 600,000 AFY was pumped from 8200 high capacity wells, with the majority being used for agriculture (500,000 AFY). In recent years, the amount of groundwater being pumped from the South Platte Basin has decreased because of the abandonment of wells due to a shortage of augmentation water. Currently it is estimated that 450,000 AFY is being pumped from 6500 high capacity wells in the South Platte Basin with 400,000 AFY being used for agricultural purposes[8].

2.1 Irrigated Acreage

This section describes methods used to estimate the water needed to support Colorado's agriculture, both currently and in 2050. The estimates used describe only CU water, rather than larger volumes of water being pumped or diverted, both for the irrigation of crops and livestock production. Consumptive use water includes water being incorporated into crops, lost through evapotranspiration, and water being lost to soil evaporation or deep percolation into groundwater aquifers. The CU does not include water that is diverted and then returned to the system through return flows.

Reference Documents

The following description was extracted from SWSI 2010 South Platte Basin Report Basinwide Consumptive and Noncomsumptive Water Supply Needs Assessments- Section 4.3 Agricultural Consumptive Needs

In addition to crop consumptive use, the South Platte Basin's agricultural demand also included three other types of agricultural CU:

- Livestock CU

[7] USDA. (2009). 2007 Census of Agriculture. National Agricultural Statistics Service.

[8] CWI. (2013). Study of the South Platte River Alluvial Aquifer. Fort Collins, Colorado.

- Stockpond Evaporation
- Losses incidental to delivering irrigation water

Water needs for irrigation were characterized in this analysis by the Irrigation Water Requirement (IWR), Water Supply Limited Consumptive Use (WSL CU), and the difference between these two numbers. The IWR refers to the irrigation demand, or the volume of water required to completely satisfy the CU for a specified crop. This irrigation water requirement is produced from a mathematical model that reflects weather, the growing season, and crop physiology. Typically in Colorado, water supply is only adequate to satisfy the IWR during part of the growing season. The actual consumptive use, WSL CU, is smaller than the IWR and reflects the water supply deficit condition that exists throughout most of the South Platte Basin. The difference between these two values is referred to as the shortage.

CU modeling was executed using a recent decade of climate and water supply information. The objective of the study was to estimate the IWR and WSL CU for today's agricultural conditions and a plausible sample of climate and hydrology, exemplified by the recent decade. The future irrigation demand was examined by assuming that historical climate conditions will continue.

2.1.1 Current Irrigated Acreage Methodology

The CDSS program has produced irrigated lands mapping and crop CU models in the South Platte Basin. The maps are available as spatial databases, and include crop types, irrigation practices, and association with diversion structures or wells. The structure identifier associated with the irrigated land indicates the location of the headgate that serves the land. Irrigated acres are assigned to the water district where the diversion is located, which may not be where the irrigated acreage lies. Dates of the irrigated lands information varied with the basins including the number of years information as collected.

Reference Documents

The following description of methodology was extracted from SWSI 2010 South Platte Basin Report Basinwide Consumptive and Noncomsumptive Water Supply Needs Assessments- Section 4.3.1.1 Current Irrigated Acres Methodology.

CDSS has not been implemented in the Republican Basin so information had to be gathered from other sources or developed within this project. Groundwater irrigated acreage for the Republican River Basin was obtained from the Republican River Compact Administration accounting spreadsheets for 2007. Precise information on surface water irrigated lands in the Republican River Basin is not available, but according to the State Engineer's Office, the total amount is believed to be no more than 1,000 acres.

2.1.2 Current Irrigated Acreage Results

The current number of irrigated acres for each basin is shown in Table 2-1. Colorado currently has approximately 3,466,000 acres of irrigated land. Of that, 831,000 acres of irrigated land are in the South Platte Basin with an additional 550,000 acres in the Republican Basin. The South Platte Basin has the highest number of acres of irrigated land of any basin in Colorado.

Table 2-1. Current Irrigated Acres by River Basin

Basin	Irrigated Acres	Percentage of Colorado's Irrigated Acres
Republican	550,000	16%
South Platte	831,000	24%
Total	**1,381,000**	**40%**

Source: Table 4-8 SWSI 2010 South Platte Basin Report Basinwide Consumptive and Non consumptive Water Supply Needs Assessments

2.1.3 2050 Irrigated Acreage Methodology

Using the most current irrigated acres for the South Platte Basin, estimates of the 2050 irrigated acres were based on the following factors:

- Urbanization of existing irrigated lands
- Agricultural to municipal water transfers
- Water management decisions
- Demographic factors
- Biofuels production
- Climate change
- Farm programs
- Subdivision of agricultural lands and lifestyle farms
- Yield and productivity
- Open space and conservation easements
- Economics of agriculture

Reference Documents

The following description of methodology was extracted from SWSI 2010 South Platte Basin Report Basinwide Consumptive and Noncomsumptive Water Supply Needs Assessments- Section 4.3.1.2 2050 Irrigate Acres Methodology

The first three factors (urbanization of existing irrigated lands, agricultural to municipal water transfers, water management decisions) were quantified based on future growth estimates, municipal water demand gaps that will be met by 2050, and interviews with water management agencies across the state. The remaining factors were based on information provided by the CWCB and the Colorado Department of Agriculture.

The urbanization of existing irrigated lands was established using 2050 population projections, estimation of future urban area size, and the current irrigated acres as described in the previous section. As discussed above, current irrigated acres in each administrative water district were determined from geographic information system (GIS) data sources. However, certain types of data (e.g., future population forecasts) were only available on a county basis. Therefore, future losses of irrigated acres were calculated first for each county,

and then re-distributed by water district. The methodology is described in detail in Appendix I of the SWSI 2010 Report.

The M&I gap analysis in SWSI 2010 Section 5 was used as the basis for the analysis of irrigated acreage changes associated with agricultural to municipal water transfers. For each of Colorado's major river basins, the amount of the M&I gap was summarized in AFY on a low, medium, and high basis. For the purposes of predicting future irrigated acres, it was assumed that 70 percent of M&I gap would be met from agricultural to municipal transfers. This percentage is a conservative estimate based on the assumption of 100 percent yield success rate for IPPs (see SWSI 2010 Section 5). Therefore, it does not take into account the projects or methods that may not be successful in meeting Colorado's future M&I demands; if IPPs are unsuccessful, it is likely that M&I water providers will turn to increased agricultural transfers to meet future demands. The following equation was used to estimate irrigated acres that would be needed for agricultural to municipal transfers to address M&I gaps:

$$Irrigated\ Acres\ Transferred = \frac{M\&I\ Gap}{Transferrable\ Consumptive\ Used} \times (1 - Safety\ factor)$$

A safety factor of 25 percent was applied to account for the additional amount of irrigated acres that may be needed to provide the transferred water on a firm yield basis.

CWCB interviewed entities within the South Platte, Rio Grande, and Republican River Basins to estimate what changes may occur in irrigated acres due to water management decisions affected by compact compliance or maintaining groundwater levels. For the remaining factors (demographic factors, biofuels production, climate change, farm programs, subdivision of agricultural lands and lifestyle farms, yield and productivity, open space and conservation easements, economics of agriculture), CWCB identified trends that are expected to occur within each area over the next 40 years and then developed a qualitative assessment on whether each factor would cause a negative or positive impact on irrigated agriculture by 2050. A detailed description of this qualitative assessment is available in Appendix I of the SWSI 2010 Report.

2.1.4 2050 Irrigated Acreage Results

Table 2-2 shows the future irrigated acreage results. The total irrigated acres in the South Platte Basin may decrease by 180,000 – 267,000 acres, under low and high population growth projections, respectively. The biggest impact on the South Platte basin in terms of irrigated acres lost is the transfer from agricultural to municipal uses of water to meet the M&I gap.

Potential losses of irrigated land are due to a variety of factors. These include:

- For the South Platte Basin, significant irrigated acres have been taken out of production because of a shortage of augmentation water led to numerous wells being shut down in the central South Platte Basin in 2006. This reduction of irrigated acres is expected to be more or less permanent since the cost of acquiring augmentation water in the central South

Reference Documents

The following bullet points were extracted from SWSI 2010 South Platte Basin Report Basinwide Consumptive and Noncomsumptive Water Supply Needs Assessments- Section 4.3.2.2 Future Irrigated Results

Platte River Basin can be prohibitive for the agricultural community. This reduction in acreage is not reflected in the current irrigated acreage.

- In the Republican River Basin, a total of about 35,000 acres were removed from irrigation through conservation programs by 2009. An additional 64,000 acres are estimated to be removed from irrigation due to the declining saturated thickness of the Ogallala aquifer, and another 10,000 acres are to be dried up in District 65 in association with the construction of a pipeline for compact compliance reasons.

Table 2-2. Future Irrigated Acreage by River Basin

Basin	Current Irrigated Acres	Decrease in Irrigated Acres Due to Urbanization		Decreases in Irrigated Acres Due to Other Reasons	Decrease in Irrigated Acres Due to Agricultural to Municipal Transfers	Decreases in Irrigated Acres Due to Ag Transfers to Meet Gap		2050 Irrigated Acres	
		Low	High			Low	High	Low	High
Republican	550,000	300	600	109,000	-	-	-	440,400	440,700
South Platte	831,000	47,000	58,000	14,000	19,000	100,000	176,000	564,000	651,000
Total	**1,381,000**	**50,000**	**58,600**	**123,000**	**19,000**	**100,000**	**176,000**	**1,004,400**	**1,091,700**

Source: Table 4-9 SWSI 2010 South Platte Basin Report Basinwide Consumptive and Non-consumptive Water Supply Needs Assessment

2.2 Agricultural Water Demand

2.2.1 Current Agricultural Water Demand Methodology

Reference Documents

The following description of methodology was extracted from SWSI 2010 South Platte Basin Report Basinwide Consumptive and Noncomsumptive Water Supply Needs Assessments- Section 4.3.1.3 Current Agricultural Demand Methodology

Current irrigation demand for water in Colorado can be defined as the average amount of water consumptively used by crops on land currently under irrigation. Typically, water supply is plentiful early in the irrigation year, crop CU is not limited and is equal to the crop IWR. As the irrigation season continues, the available water supply generally decreases, becoming less than the crops' uptake capacity, and CU is limited by supply. In order to quantify crop CU, one must have credible estimates or measurements of the crops' average capacity to use irrigation water, referred to as IWR, as well as the average water supply. The minima of these two values over a series of time increments (typically months) is the WSL CU.

For this analysis, both average IWR and average WSL CU are reported. The latter may be considered to be the current agricultural demand; that is, the water required to sustain current levels of farming. IWR provides perspective on the amount of water that would be used, if it was physically and legally available. It is an upper limit on consumption by current agriculture, and a reminder that Colorado is a dry state with over-appropriated streams.

IWR estimation requires time series of climate information, particularly precipitation and temperature, over the study period; WSL CU estimation requires information about the time-varying water supply available to the crop. For this analysis, a recent 10-year study period was used. The 10-year period allowed for estimation of average conditions with respect to both climate and hydrology. IWR and WSL CU were calculated assuming that the most current estimate of number of irrigated acres, and most recent information on crop types, prevailed during each year of the study period. The results show demand for 2010 agricultural conditions in Colorado, based on a 10-year sample of climate and hydrology.

Where applicable, CDSS methodologies were applied to estimate non-irrigation agricultural consumptive demands (e.g., livestock and stockpond evaporation) as well. Livestock CU was estimated by multiplying the number of cattle, sheep, and hogs located within a basin by their corresponding per capita use. Stockpond evaporation is based on net evaporation rates and stock pond surface area estimates. Details differ among the basins, but in general, the method estimates net reservoir evaporation by subtracting average monthly effective precipitation from the estimated gross monthly free water surface evaporation.

Lastly, incidental losses may include, but are not limited to, vegetative CU that occurs along canals and in tailwater areas. The CDSS program, in preparing Consumptive Uses and Losses (CU&L) Reports for the state, has adopted 10 percent as the factor for computing incidental losses associated with irrigation CU. The value is in the middle of the range of factors (5 percent to 29 percent) used by the Bureau of Reclamation in their parallel CU&L accounting throughout the upper basin states.

2.2.2 Current Agricultural Demand Results

Table 2-3 summarizes the results of the average annual current agricultural demand within the South Platte and Republican River Basins. It shows irrigated acres, IWR, WSL CU, and shortage (difference between IWR and WSL CU). The table also shows the non-irrigated demand. The current shortage in the South Platte Basin is approximately 379,000 AFY with an additional shortage of 200,000 AFY in the Republican Basin.

Table 2-3. Estimated Current Agricultural Demands

Basin	Irrigated Acres	Irrigation Water Requirements (AFY)	Water Supply Consumptive Use (AFY)	Shortage (AFY)	Non-Irrigation Demand (AFY)
Republican	550,000	802,000	602,000	200,000	67,000
South Platte	831,000	1,496,000	1,117,000	379,000	115,000
Total	**1,381,000**	**2,298,000**	**1,719,000**	**579,000**	**182,000**

Source: Table 4-10 SWSI 2010 South Platte Basin Report Basinwide Consumptive and Non-consumptive Water Supply Needs Assessment

2.2.3 2050 Agricultural Water Demand Methodology

Reference Documents

The following description of methodology was extracted from SWSI 2010 South Platte Basin Report Basinwide Consumptive and Noncomsumptive Water Supply Needs Assessments- Section 4.3.1.4 2050 Agricultural Demand Methodology

Following the techniques described in the 2050 Irrigated Acres Methodology, changes in numbers of acres irrigated have been developed for each water district. Since this study intentionally avoids identifying specific water rights or ditches for change of use, there is no basis for calculating the structure-specific CU by which a water district's irrigation demand will change. CU per irrigated acre varies from structure to structure, and depends on available supply, seniority of a water right, and system efficiency. The variability of these factors makes it impossible to predict future losses of irrigated land on a structure-by-structure basis. Consequently, simplifying assumptions were made such that irrigation demand was considered directly proportional to number of acres irrigated. To derive future irrigation demand, current irrigation demand for each water district was scaled by the ratio of future irrigated acreage to current irrigated acreage.

Similarly, non-irrigation demand was estimated as being in proportion to irrigated acres. The relationship between losses incidental to irrigation and number of acres irrigated is proportional. With respect to stockponds and stock watering, it is assumed that predicted changes in irrigated acreage will be accompanied by similar changes in stock raising activities. To derive future non-irrigation demand, current non-irrigation demand was scaled by the ratio of future irrigated acreage to current irrigated acreage.

2.2.4 2050 Agricultural Water Demand Results

Table 2-4 summarizes the average annual agricultural demand in each basin by the year 2050, assuming that historical climate and hydrology continues into the future. It shows irrigated acres, IWR, WSL CU, and shortage (difference between IWR and WSL CU). The table also shows the non-irrigated demand. The predicted shortage for 2050 in the South Platte Basin is 274,000 AFY, a reduction from the current shortage. The predicted shortage for 2050 in the

Republican River Basin is 160,000 AFY, also a reduction from the current shortage. This is primarily due to urbanization decreasing the amount of irrigated acres in the basin.

Table 2-4. Estimated 2050 Agricultural Water Demand by Basin

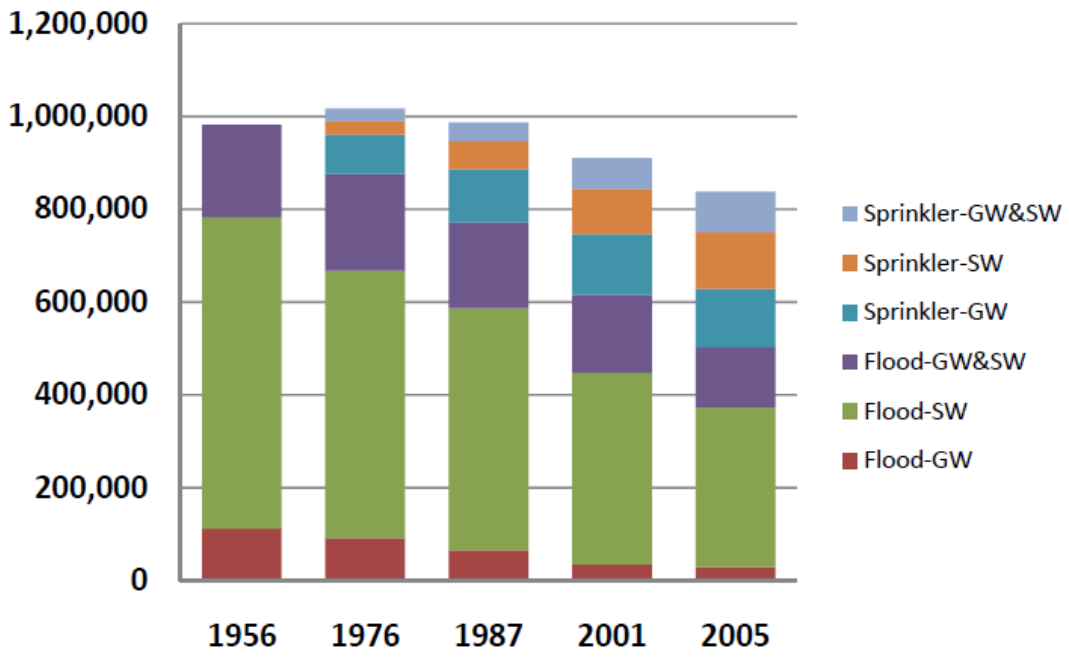
Basin	Irrigated Acres	Irrigation Water Requirements (AFY)	Water Supply Consumptive Use (AFY)	Shortage (AFY)	Non-Irrigation Demand (AFY)
Republican	441,000	640,000	480,000	160,000	5,000
South Platte	607,000	1,094,000	820,000	274,000	84,000
Total	**1,048,000**	**1,734,000**	**1,300,000**	**434,000**	**89,000**

Source: Table 4-11 SWSI 2010 South Platte Basin Report Basinwide consumptive and Non-consumptive Water Supply Needs Assessment

Irrigators are continuing to update irrigation systems to center pivot sprinklers and lined ditches and laterals. New systems will increase agricultural irrigation efficiencies, but will impact future river flows that historically benefitted from return flows associated with flood irrigation. Figure 2-1 illustrates the decrease in the amount of flood irrigation and the transfer to center pivot sprinklers. The transfer may have a significant impact to lower reaches of the river and future river calls. This could further impact winter storage rights and recharge projects that benefit from lagged return flows from flood irrigation. The impact to recharge projects may also limit their ability to divert water sufficient to meet the augmentation needs of wells[9]. When considering water supply, amount of available return flows should be taken into account.

[9] SWSI 2010 South Platte Basin Report Basinwide consumptive and Non-consumptive Water Supply Needs Assessment

Figure 2-1. Water Division 1, Irrigated Acreage by Irrigation Type and Water Source



Souce: Figure 6-17 SWSI 2010 South Platte Basin Report Basinwide Consumptive and Non-consumptive Water Supply Needs Assessment

3 Existing IPPs, ATMs and Opportunities

3.1 Identified Agricultural Transfers

Table 3-1 summarizes the IPPs as specified by the Basin Needs Decision Support System (BNDSS). Information on water providers was obtained from the following sources, as outlined in SWSI 2010:

- CWCB interviews and data collected from water providers throughout the state in 2009-2010
- Section 6 of the SWSI 1 report (published 2004, data based on projections to 2030)
- Basin roundtable updates (e.g. Arkansas 2008 report, June 2010 presentation by Applegate)

CWCB staff conducted outreach interviews in 2010 with most municipal water providers delivering 2,000 AFY or more, including the top three water providers in each basin, where possible. Not every water provider responded. HDR will be distributing IPP data sheets to each provider with the goal of collecting updated information. Any changes to IPPs (i.e., firm yield, project timing) and additional IPPs will be added to the current list.

Current IPPs in both the Metro and South Platte Basin focus on the traditional agricultural water rights transfer method. This is due to the high probability that urban areas will expand into currently irrigated land. There are less than 16,000 total irrigated acres within and upstream of the Denver Metro area (Water districts 7, 8, 9, 23, and 80). As a result, many Metro and South Platte M&I providers are actively negotiating with the owners of irrigation water rights along the South Platte and its tributaries in Water Districts 1, 2, and 64 for the purchase of agricultural water rights.

Table 3-1 lists the identified agricultural projects and processes located in the South Platte Basin. These IPPs consist mainly of agricultural water rights transfers. They exist to help close the identified gap.

Table 3-1. Identified Agricultural Projects and Processes in the South Platte Basin

Basin	Project	Provider	BNDSS IPP ID	BNDSS Yield, AFY
Metro	Clear Creek Ag Transfer	City of Arvada	ArvadaAgCCTrans	1,000
Metro	Ag Transfer	City of Northglenn	NorthGlennAgTrans	500
Metro	Adams County Unspecified IPP Agricultural Transfer		Adams_UIPP_AT	13,664
Metro	Arapahoe County Unspecified IPP Agricultural Transfers		Arapahoe_UIPP_AT	6,862
Metro	Douglas County Unspecified IPP Agricultural Transfers		Douglas_UIPP_AT	272
Metro	TellerMetro County Unspecified IPP Agricultural Transfers		TellerMetro_UIPP_AT	689
Metro	Consolidated Mutual Unspecified IPP Agricultural Transfers	Consolidated Mutual Water Company	ConMutualWS_UIPP_AT	Not Available
Metro	Westminster Unspecified IPP Agricultural Transfers	City of Westminster	Westminster_UIPP_AT	Not Available
Metro	South Platte and Beebe Draw Well Project - Agricultural Transfer	City of Brighton	SP&BBDrawWellProjectAT	3,500
South Platte	Ag Transfer Water Rights Dedication Policy	City of Longmont	LongmontAT1 - LongmontAgTrans1	1,700
South Platte	Boulder County Unspecified IPP Agricultural Transfers		Boulder_UIPP_AT	2,055
South Platte	Larimer County Unspecified IPP Agricultural Transfers		Larimer_UIPP_AT	4,384
South Platte	CBT, Ag Water Rights Acquisition, & Annexation Dedication Policy	Town of Berthoud	BerthoudAgTrans	Not Available

Table 3-1. Identified Agricultural Projects and Processes in the South Platte Basin

Basin	Project	Provider	BNDSS IPP ID	BNDSS Yield, AFY
South Platte	CBT, Ag Water Rights Acquisition, & Annexation Dedication Policy	Central Weld County Water District (Johnstown, Kersey, LaSalle, Gilcrest, Frederick, Firestone, Dacono, Milliken, Platteville)	CWCWDAgTrans	Not Available
South Platte	CBT, Ag Water Rights Acquisition, & Annexation Dedication Policy	Fort Collins-Loveland Water District	FCLWDAgTrans	Not Available
South Platte	CBT, Ag Water Rights Acquisition, & Annexation Dedication Policy	North Weld County Water District	NWCWDAgTrans	Not Available
South Platte	CBT, Ag Water Rights Acquisition, & Annexation Dedication Policy	East Larimer County Water District	ELCOWDAgTrans	Not Available
South Platte	CBT, Ag Water Rights Acquisition, & Annexation Dedication Policy	Town of Erie	ErieAgTrans	Not Available
South Platte	CBT Transfer	Town of Estes Park	EstesParkAgTrans	Not Available
South Platte	CBT, Ag Water Rights Acquisition, & Annexation Dedication Policy	City of Fort Collins	FtCollinsAgTrans	Not Available
South Platte	CBT & Ag Water Rights Acquisition	City of Fort Lupton	FtLuptonAgTrans	Not Available
South Platte	Water Rights Acquisition	City of Greeley	GreeleyAgTrans	Not Available
South Platte	CBT & Ag Water Rights Acquisition	City of Lafayette	LafayetteAgTrans	Not Available
South Platte	CBT & Ag Water Rights Acquisition	Lefthand Water District	LHWDAgTrans	Not Available
South Platte	Ag Transfer Water Rights Dedication Policy	City of Longmont	LongmontAT	1,700
South Platte	CBT & Ag Water Rights Acquisition	City of Louisville	LouisvilleAgTrans	Not Available
South Platte	Ag Transfer Water Rights Dedication Policy	City of Loveland	LovelandAT	3,150
South Platte	CBT & Ag Water Rights Acquisition	Town of Superior	SuperiorAgTrans	Not Available
South Platte	CBT & Ag Water Rights Acquisition	City of Loveland	LovelandAgTrans	Not Available

Source: BNDSS IPP ID 2013_04_04. Provided by Craig Godbout on 01/24/2014.

3.1.1 Alternative Transfer Methods

M&I providers in the South Platte and Metro Basins have historically met their water demand through the acquisition and transfer of agricultural rights and will continue to pursue these rights. Traditionally, M&I providers in the basin have acquired agricultural rights through agricultural transfers resulting in the dry-up of irrigated land. As this method may play a role in addressing the M&I water supply gap, there are negative economic and environmental impacts associated with the "buy and dry" method. It is understood some level of traditional agricultural transfers will take place as urban areas expand into irrigated agricultural land. However, due to agriculture being a large contributor to the South Platte Basin's economic value, these types of agricultural transfers should be minimized.

Reference Documents

The following discussion was extracted from:

- SWSI 2010 Metro Platte Basin Report Basinwide Consumptive and Noncomsumptive Water Supply Needs Assessments- Section 7.3 Agricultural Transfers
- SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments- Section 8.2 Alternative Transfer Methods

According to the SWSI 2010 report, ATMs are meant to "minimize the impact on the local economy, provide other funding sources to the agricultural user, and optimize both the agricultural and nonagricultural benefits of the remaining lands. While any transfer method is likely to reduce the yield or number of irrigated acres, exploration and implementation of alternative transfer methods may lessen the effect of the transfer within a defined geographic location and may help sustain agriculture by providing additional revenue sources to the agricultural user."

Some of these alternative transfer methods could include rotational fallowing, interruptible supply agreements (ISAs), water banks, purchase and leasebacks, deficit irrigation, and changing crop types. Through the implementation of ATMs, the agricultural producer can view their water rights as a "crop" and cities may view the cornfields as "reservoirs" holding water supplies for times of shortage. Some key benefits from ATMs include:

- Relationships between irrigators and municipalities—water sharing
- Provides irrigators with needed capital to upgrade farm or irrigation system equipment or infrastructure
- Provides irrigators with a temporary increased income that may be used for payment of debts or increased disposable income
- Helps to optimize the use of limited water resource
- Sustain rural agricultural communities and economies
- Preserve productive agriculture open spaces
- Provide for greater food security
- Provides wildlife habitat

Brief summaries of each ATM identified in the SWSI 2010 reports are provided in the following sections.

3.1.2 South Platte Co-op

The Lower South Platte Co-op concept is being studied by the Colorado Corn Growers Association (CCGA) and is exploring the ability to exchange water from the lower South Platte reach to growing municipalities upstream. Augmentation plans in this reach often generate excess credits that accrue to the river and leave the state. This alternative transfer proposal would facilitate the exchange of excess recharge credits, alternative transfer, senior rights, etc. to upstream M&I and agricultural supplies. Currently, users of the Lower South Platte Co-op to date are located in District 1 and 64. Investment in infrastructure would need to be made in order to market water to Denver-area water providers. However, the pilot project showed significant potential to exchange water from the downstream end of District 1 to the mouth of the Poudre River, where it could be potentially marketed to several water providers.

No legislative or regulatory changes are needed to implement the Lower South Platte Co-op. Colorado law would allow an entity of this sort to enter into contracts with end users for the delivery of water via exchange as exchanges are recognized by the 1969 Water Rights Determination and Administration Act.

CCGA study confirmed there is water available to exchange via the Co-op and that exchange capacity is available. The Co-op is investigating the different types and reliability of the supplies, such as excess recharge credits, water provided through alternative transfer methods, and senior irrigation rights. With the appropriate infrastructure and management, it is possible that the downstream surpluses could be stored or retimed and provided to upstream agricultural and M&I users on a relatively stable basis. Further study is needed to determine how reliable various water sources might be and whether the contemplated exchanges could be established and operated at a cost that is attractive to other water users.

3.1.3 Pure Cycle Agricultural Transfer System

The Fort Lyon Canal Company is one of the largest irrigation systems in Colorado with annual deliveries ranging from 250,000 to 360,000, diverting 933 cubic feet per second (cfs) of water from the lower Arkansas River. It is uniquely positioned to work cooperatively with the other six major canal systems situated between Pueblo Reservoir and John Martin Reservoir to develop alternate agricultural transfer projects. By not requiring exchanges of water up the river, water quality and quantity protection to existing water users is maintained. Cooperative alternative transfer projects, such as rotational fallowing, will provide additional income opportunities for agricultural water owners as well as new water supplies for Front Range communities and can benefit both Arkansas Valley and Front Range interests.

3.1.4 The Lower Arkansas Valley Super Ditch Company

Creation of the Super Ditch established an organization that can negotiate on behalf of irrigators to make water available to other water users through long-term leases, ISAs, and water banking. Shareholders of the Rocky Ford High Line Canal, Oxford Farmer Ditch, Otero Canal, Catlin Canal, Holbrook Canal, and the Fort Lyon Canal.

Farmers with 125,000 acres of irrigated land and 165,000 AFY of water rights are backing the Super Ditch, which expects to lease up to 24,000 acre-feet (AF) in a dry year, 50,000 AF in an average year, and 80,000 AF in a wet year. And, in an exceptionally dry year like

2002—when there wasn't enough water to farm—the Super Ditch could also lease 80,000 AF. The basis for leases will be AF of transferable consumptive use, in the form of stock in ditch and reservoir companies. The Super Ditch plans to deliver water into Pueblo Reservoir via an adjudicated exchange (Case No. 10CW4 pending in Div. 2 Water Court). Lessees will be responsible for transporting the water for their use from Pueblo Reservoir.

Although the Super Ditch will negotiate uniform terms and conditions with each new user, leases will be signed by individual farmers to avoid double taxation of lease payments. It will be up to individual farmers to decide whether, and to what extent, they want to participate. And if there is more interest in leasing than demand for some leases, the amounts will be prorated proportionately. An irrigator will be able to transfer his lease to another irrigator, so long as the municipal lessee receives the same amount of water. Leases will constitute a legal encumbrance upon the ditch company shares leased by the irrigators to the Super Ditch Company, and constitute a continuing obligation of the owner, assignor, or successor of the ditch company shares. In this manner, lessees will have certainty of supply.

Irrigators may fallow land in rotation or on some other basis, but will be responsible for weed and erosion control on their fallowed land. Super Ditch leases that transfer more than 1000 AF of water from agricultural to municipal use will trigger 1041 permitting requirements in Bent, Otero, Prowers, and Pueblo counties, which will be handled by the Super Ditch Company. Shareholders of some ditch companies will need to amend their articles of incorporation or bylaws to permit leasing. To avoid undermining the Super Ditch, a condition of leasing water is expected to be a voluntary agreement not to transfer irrigation water rights out of the Lower Valley while someone is leasing water. And while lessees would not be expected to forgo purchasing additional water rights, they would be expected to make those water rights available for lease just like any other water right owner.

3.1.5 Republican River Water Conservation District

The Republican River Water Conservation District (RRWCD) is obtaining funds through the United States Department of Agriculture (USDA), Natural Resource Conservation Service (NRCS) to encourage farmers in the Republican River basin to enroll in a voluntary Agricultural Water Enhancement Program (AWEP). The program provides incentives and cost-sharing to those farmers who enter their land in AWEP and voluntarily remove irrigation water from enrolled acres permanently. The program aims to address water quantity issues through the reduction of ground water irrigated cropland and mitigating economic impacts to the agriculture dependent communities.

3.1.6 CWCB Alternative Agricultural Water Transfer Methods Grant Program

One of the outcomes of SWSI 2007 was the recognition that the State of Colorado might be able to provide incentives for M&I providers to consider alternative methods for their water supply options. The Legislature passed Senate Bill 07-122 authorizing the CSCB to develop a grant program that facilitated the development and implementation of ATMs.

In 2009-2010, the CWCB's Alternative Agricultural Water Transfer Methods Grant Program awarded $1.5 million to various water providers, ditch companies, and university groups in the first round of the ATM grant project. There were six ATM grants awarded in the first round by the CWCB. Of these six, three of the projects are located in the South Platte Basin.

In September 2010, the CWCB Board of Directors approved revised criteria and guidelines for the ATM grant programs. The second round of ATM grants aimed to fund projects that addressed the barriers to implementation identified in the first round of ATM grant studies. A second round of ATM grants has been awarded in 2011 and 2012 to 10 projects. Of the ten projects, five are located in the South Platte Basin. Additionally, the CWCB has awarded a third round of ATM grants to six projects, with four projects being located in the South Platte Basin. The projects located within the South Platte Basin are discussed in the following sections.

Reference Documents

The following discussion of ATMs was extracted from CWCB's

- Alternative Agricultural Water Transfer Methods Grant Program Summary and Status Update
- CWCB's ATM Grant Recipient Projects
- SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessment

3.1.6.1 Parker Water & Sanitation District and Colorado State University

Parker Water & Sanitation District (PWSD) and Colorado State University (CSU) have combined for the Lower South Platte Irrigation Research and Demonstration Project (LSPIRDP).The purpose of the LSPIRDP was to quantify potential consumptive water use savings resulting from the use of deficit irrigation practices. Phase 1 of the project identified cropping systems with potential to reduce consumptive use by at least 20 percent compared to continuous corn with full irrigation. Phase 2 set out to test the alternative irrigation practices identified in phase 1, which included limited irrigation, rotational cropping, and partial season irrigation. It was found that both limited irrigation and rotational cropping systems are effective at reducing crop CU, with average reductions of 30 to 40 percent compared to continuous corn. Phase 3 studied the likelihood for farmers to adopt deficit irrigation practices by surveying farmers in the South Platte Basin. More than 60 percent of were willing to lease their water as an alternative to selling their water rights, which would equate to approximately 50,000 – 60,000 AFY of potentially transferrable water. Phase 4 identified practical means of documenting water savings from rotational fallowing or limited irrigation cropping systems. Satellite imaging methods were identified as a potential means of documenting irrigation water use and water savings.

3.1.6.2 Colorado Corn Growers Association (CCGA)

CCGA partnered with Duck Unlimited, Aurora Water, and the Lower South Platte Water Cooperative. The project published its completion report in May 2011 titled *Development of Practical Alternative Agricultural Water Transfer Measures for Preservation of Colorado Irrigated Agriculture*. The project had three objectives: to identify barriers to implementation of ATMs and to describe potential strategies for overcoming barriers, to develop tools for agricultural producers to evaluate the viability of potential ATMs, and to further actual ATMs by evaluating three demonstration projects that include owners of agricultural water rights and potential end users of the temporarily transferred water. The barriers identified include high transaction cost, risk and uncertainty, lack of delivery capability, need for permanent supply/reluctance to commit, and power imbalance. Solutions identified to address these barriers were education and decision making support, technical analysis of delivery potential, joint ownership (FLEX market contract), collective organizations, and local partnerships.

3.1.6.3 Farmers Reservoir & Irrigation Company (FRICO)

FRICO submitted a final report titled *An Evaluation of Alternative Water Transfer Methods in the South Platte River Basin*. The focus was on the FRICO Barr Lake Division and various ATM opportunities for irrigated lands in this division. The purpose of the study was to evaluate opportunities for FRICO Barr Division shareholders to realize economic value from their water rights and water assets from ATMs rather than traditional buy-and-dry water transfers. FRICO also conducted a classroom water marketing experiment to evaluate temporary water leasing and permanent water transfer markets as they impact rural communities. The survey conducted revealed that 74 percent of M&I water providers intend to acquire and change the use of agricultural water rights. The survey also indicated that none of the possible ATMs are likely to be used as part of future water supply planning, showing that the most important factors to M&I providers were the need for permanent supply, ownership of water rights, need for certainty and reliable yield, and the unwillingness to develop water supplies that may not be permanent at the end of the agreement period. FRICO also evaluated shared a water bank as a possible ATM. The study showed that a shared water bank concept could be a viable ATM for both FRICO and the City of Thornton. The City of Thornton has excess M&I supplies on non-drought years which could be stored and used to meet both M&I and agricultural needs. Currently, water made available is limited to the capacity of FRICO's United Reservoir No. 3.While this reservoir cannot hold a significant amount of water, the study shows this may be a viable option in other parts of the South Platte River Basin if storage capacity and infrastructure exists.

3.1.6.4 Colorado Water Innovation Cluster

The project seeks to provide a demonstration of techniques and technologies useful in addressing the municipal, industrial, and environmental water supply gap. Willing shareholders of the Lake Canal will implement fallowing, deficit irrigation, and/or other alternative agricultural practices. The saved CU portion of their direct flow will then be leased for instream flows in the Cache La Poudre between the Lake Canal diversion and the Greeley No. 3 diversion, west of Greeley[7]. The transfer will be facilitated by an Interruptible Water Supply Agreement (IWSA) between the Lake Canal Company, The Nature Conservancy (TNC), and the Fort Collins Natural Areas program. As specified by the IWSA statutory rules, the term of agreement will be 10 years with the ability to exercise the option during 3 years of the term. Lake Canal will implement a packaged software/field instrumentation solution, developed by Regenesis Management Group, with research and development agreements with CSU and the USDA. The study will explore how software and field instrumentation can help in administering and verifying that alternative agricultural practices deliver proportional CU water outside the ditch service area while maintaining return flows to prevent injury. It will also explore the use of an IWSA, a temporary water transfer mechanism allowable under Colorado Statute. Because of below normal snowpack and below average spring precipitation in April of 2012, Lake Canal river decree could only be used for initial start up and flushing of canal systems in May of 2012. There was no direct water available for irrigating under the Lake Canal System or operation of the IWSA.

Therefore it was agreed upon that the transfer of water would be postponed until 2013 since there was no water available to operationally transfer in 2012.

3.1.6.5 East Cherry Creek Valley Water and Sanitation (ECCV)

The ECCV is exploring the opportunities to maintain some levels of agricultural productivity on lands that are the subject of a water court transfer to M&I. The primary alternatives being explored in this project are dryland farming and limited irrigation. The crop rotationals being emphasized for dryland or limited irrigation cropping are winter wheat-summer fallow, winter wheat-corn-summer fallow, and winter wheat-annual forage crop- summer fallow. Several crop cover options were evaluated to provide crop cover recommendations for farmers who need to temporarily fallow irrigated land such as under a rotational fallowing or an IWSA. Crop covering was successful at reducing weed pressure, providing soil cover and residue, and reducing excess soil nutrients. Some important information found during the study was that cover crops reduce available soil moisture (essential for drought years), weed control is critical to successful revegetation, and revegetation can take up to three to five years. Several economic issues of converting irrigated land to dryland or limited irrigation were identified. They are being examined and will be included into the final report. Issues associated with water court transfer have been identified and will be examined in the final report. The comparative cost to M&I users under a standard dry-up agreement versus dryland cropping or limited irrigation are being examined. Preliminary conclusions are that there are benefits to water providers when transferring agricultural water if the land can remain in some form of agricultural production, thus eliminating revegetation requirements and follow up monitoring.

3.1.6.6 Parker Water & Sanitation District

Research on this site, in the Lower Platte Basin located near Iliff, Colorado, is a continuation of the ATM grant awarded in round one and has been conducted since 2008. The study is focusing on limited irrigation, rotational cropping, and partial season irrigation approaches to reduce CU while avoiding dry up land. The project is working to develop a practical means of calculating and verifying consumptive water use in order to verify limited irrigation and cropping rotation methods as a viable water savings method. Currently, PWSD is developing, testing, and validating three different approaches to calculate CU and water savings of limited irrigation cropping practices that include using the Penman-Monteith equation (the standardized ET calculation approach) to calculate ET; independent measurements of ET based on in-field soil moisture sensors, infrared radiometry, and a land surface energy balance; and remote sensing to calculate the ET. The study is also working toward a water allocation approach to simplify the administrative burden to maintain return flows. PWSD and its partners have proposed a water allocation approach that meets 100 percent of the historic return flows through a secondary method (i.e., constructed wetlands or recharge ponds). In this method, the historic return flows are kept separate from the historic CU changed to municipal use and the historic CU that is still being used for irrigation, simplifying the administrative process.

3.1.6.7 Lower South Platte Water Conservancy District

The Lower South Platte Water Conservancy District (LSPWCD) is aimed at developing a future organizational structure and operational plan for a potential organization to facilitate a more efficient use of water in the South Platte Basin. Many entities have expressed interest in the formation of this organization and provided matching funds and letters of support for the grant application. This project is also funded through a WSRA grant. The ATM portion of this project includes identifying the technical, legal, and economic issues that may be associated with new water supplies. The objective is to develop an operational plan and strategy for the potential organization. As of October 2012, significant progress on the project had been made. Unused recharge credits and senior rights firming supplies made available through alternative transfer methods have been identified as potential supplies. The amount of recharge credits varied annually. Through research and assumptions, it was determined that 30,000 to 40,000 AFY may be available through rotational fallowing programs. In identifying potential demands for water that could be made available through the cooperative, the water needs have varied, with high needs identified during drought years. The team determined that existing infrastructure could potentially be useful for storing or retiming supplies if agreements can be established with owners. An operational planning tool was developed. The tool assesses supplies, demands, and deliveries and conducts a water balance in five reaches of the South Platte River in Districts 1 and 64. A study conducted assessed how similar organizations operate and finance their operations. It was found that many water banks are run by government entities, effective data management tools are essential, and most organizations tend to rely wholly or in part on per-acre-foot- transaction fees to finance themselves. The economic analysis will consider price and yield risks as they are associated with producer profits under various cropping systems with conserved water. A set of budgets has been created by expert analysis and farmer input for traditional and alternative cropping systems that conserve water. The preferred alternative cropping system was identified as corn-dryland wheat rotation.

The LSPWCD was approved for a third round ATM grant in which they would create a mechanism for moving augmentation credits from plans with unused credits into plans that need additional credits. Initial quantification and analysis of periodically occurring unused augmentation credits and exchange potential were completed as part of previous work conducted under a previous ATM grant. In this effort, the preliminary quantification of unused augmentation credits and exchange capacity was favorable. The steering committee was also awarded two other grants to research organizational and operational aspects of water cooperative. An ATM grant was awarded to research operational aspects of the cooperative. The goal of the project is to implement the water cooperative in 2014.

3.1.6.8 Colorado Corn Growers Association Second Grant

The CCGA's second round ATM grant is a continuation of their first round grant. The focus of this project is the development of Flex Water Market Template agreements and the decree terms and conditions. The FLEX Partnership Model is the establishment of a long term, sustainable contractual partnership between agricultural water users, M&I users, and environmental interests. M&I or environmental users could purchase a small percentage of overall CU from agricultural senior water rights holders. In addition, it facilitates an agreement regarding intermittent leasing of the remaining CU. Two demonstration projects

involving the Lower Latham Ditch Company and the Platte Valley Irrigation Company were developed to explore the technical and practical aspects of potential FLEX Market implementation. The demonstration projects examined the overall diversions, estimated consumptive use and return flows, infrastructure, potential end users for consumptive uses, and delivery mechanisms. It was concluded that substantial amounts of transferrable consumptive use was potentially available under the systems using a FLEX approach.

3.1.6.9 Colorado Water Institute-CSU

The Poudre Water Sharing Working Group is an association of individuals representing organizations with interests in sharing water between agricultural and municipal users in the Poudre Basin. The Working Group was formed after the Larimer County Agricultural Advisory Board (LCAAB) initiated discussions with multiple entities about water sharing and subsequent meetings between LCAAB, City of Fort Collins Water Board, and Water Utility. Fort Collins has been direct to explore water sharing with agriculture as part of their updated Water Supply and Demand Management Policy. The proposal seeks funding assistance to convene domestic water providers and agricultural water organizations/stakeholders in the Poudre Basin to provide stability and security for water providers, provide security for agricultural water supply and access to that supply on normal years, lead the reduction of "buy and dry" and out-of-basin transfers, and lead regional cooperation and reduction of conflict. The tasks will include:

5. the development of a database that describes the water portfolios and demographics of the participating water providers and other data needed to inform the description and feasibility of water sharing,
6. investigate the most promising site-specific water sharing mechanisms,
7. conduct a survey to determine the perceptions of water shareholders,
8. refine the most appropriate water sharing mechanism based on surveys,
9. draft a prototype agreements between water providers and agricultural water organizations/stakeholders,
10. and identify interested parties and encourage them in the execution of one or more agreements.

The focus will be primarily on drought year firming for water providers through IWSAs. Other water sharing mechanisms that will be discussed include optimum shared use of infrastructure and modification of water management and delivery and water banking. Finally, the practice of asking developers to purchase water shares and turn them over to water providers will be discussed.

3.1.6.10 Ducks Unlimited and Aurora

The applicants for this grant were recipients of previous ATM grants that explored the FLEX Water Market. The proposed pilot project will be built upon previous grant studies by implementing a FLEX Water Market. The sponsors of the FLEX Market are becoming more aware of the potentially high demand for more information and assistance in implementing the FLEX market concept. The goal of this project will be to successfully implement the FLEX market concept through education, facilitation, and consultation throughout the state,

with specific focus on developing FLEX markets in Water Division 1 with municipal, industrial, agricultural and environmental conservation partners. Also, the project will seek to address concerns raised about the FLEX Water Market. The overall goal of the project is to provide education, facilitation, and consultation to parties seeking to implement FLEX Market concept; evaluate ways to adjust water pricing based on the increasing value of water and volatile market for agricultural commodities; and explore the large-scale implementation of the FLEX Market with large water providers.

3.1.6.11 South Platte Basin ATM Grant Summary

During the first two rounds of ATM grants, there have been eight grant programs funded in the South Platte Basin. Through the conclusions of these projects, there have been approximately 90,000 AFY to 160,000 AFY identified as possible additional water supplies available through ATMs. This is assuming that ATMs are 100 percent successful. Additionally, ATM grant projects have identified solutions to some of the barriers to implementation.

3.2 Potential Opportunities

3.2.1 Identified Areas of Possible ATMs

The South Platte Basin is facing the largest threat to agricultural dry-ups in the State. Water is needed by municipalities for both drought supply and average year supply. It would be beneficial in the basin to promote ATM programs that focus on the flexibility to move water around the basin. The following areas have been identified as possible locations for ATM programs:

Water District 64

There were two ATM grant funded projects in this area that provide useful information on various ATM concepts. These projects include PWSD and CSU's LSPIRDP and the CCGA, Ducks Unlimited, and City of Aurora Project. However, the inability to exchange water from this reach to municipal growth areas upstream may limit the effectiveness of ATMs. Significant infrastructure would be required to deliver agricultural water. Prewitt Reservoir has been identified as a potential storage facility for pump back or exchange to the metro area. ATM projects in the area have identified the inability to exchange water at this reach and are investigating ways to overcome these limitations.

Water District 1

The land in water district 1 is not desirable for subdivision development. There is a high probability for implementing rotational fallowing because of the low likelihood of facing urbanization or other development. District 1 also has several large reservoirs that may be feasible for storage of water from rotational fallowing. The reservoirs include Riverside Reservoir that serves the Riverside Canal, Jackson Reservoir that serves the Ft. Morgan Canal, and possibly Empire Reservoir that serves the Bijou Canal.

3.2.2 FLEX Market

One approach for providing the needed flexibility of water exchange is currently being discussed by the Colorado legislature. Proposed House Bill 14-1026[10] would help create a more flexible change-in-use system by allowing an applicant who seeks to implement fallowing, regulated deficit irrigation, reduced consumptive use cropping, or other alternatives to the permanent dry-up of irrigated lands to apply for a change in use to any beneficial use, without designating the specific beneficial use to which the water will be applied. As outlined in the FLEX Market Model Completion Report by the CWCB[11], the "FLEX Market" system is the voluntary agreement between one or more M&I water users, one or more agricultural water users, and one or more environmental/conservation (EC) water users to change the use of a senior irrigation right to include multiple end uses in addition to irrigation, and to establish a trading platform facilitating uses by all participants. The goal of the flex market approach is to permit a portion of the senior right to be used for M&I and EC uses pursuant to voluntary contractual arrangements, to maintain the economic benefit of the senior water right in its region or origin, and to retain sufficient agricultural water supply to sustain commercially viable farming activities[11]. House Bill 14-1026 was introduced in January 2013. The Colorado Water Congress State Affairs Committee has unanimously supported this proposed bill.

4 Conclusions

This memorandum presents information to support updating the 2050 agricultural supply gap and to refine the location and timing for additional projects and methods, such as Alternative Transfer Methods (ATMs). Much of the material for this memorandum is from the SWSI 2010 South Platte Basin Report, SWSI 2010 Metro Basin Report, and the Alternative Agricultural Water Transfer Methods Grant Program Summary and Status Update.

The CWI's Study of the South Platte River Alluvial Aquifer[12] submitted to the Colorado Legislature on December 2013 provided updated information regarding groundwater usage in the South Platte Basin. Information about the FLEX Market was also updated from newly released documents such as House Bill 14-1026[10]. Other updates include the addition second and third round ATM grant projects and the update of progress and completion of all ATM grant projects.

As a result of the predicted urbanization of irrigated agricultural lands in the South Platte Basin, the agricultural water demand decreases due to the anticipated reductions in irrigated acreage. The loss of irrigated acreage may have a detrimental impact on the economy of the agricultural community if agricultural producers have limited water sharing options. Currently planned agricultural IPPs for the area include mainly traditional agricultural transfer methods that would result in a "buy-and-dry" process. This could have considerable economic effects on agricultural communities in the South Platte and Republican River basins.

[10] House Bill 14-1026, 69th Gen. Assem., Reg. Sess. (Version Date: 5 Feb. 2014). Accessed on: 24 Feb 2014.

[11] CWCB. (2013). FLEX Market Model Project Completion Report. Brown and Caldwell

[12] CWI. (2013). Study of the South Platte River Alluvial Aquifer. Fort Collins, Colorado.

The State of Colorado has enacted an ATM grant program. To date, there have been ten grants awarded to projects in the South Platte Basin. These projects hope to identify alternative transfer methods to help reduce the M&I gap while minimizing negative impacts to the agricultural economy. There have been two water districts (1 and 64) identified as potentially feasible locations for ATMs due low probability of urbanization. Approximately 90,000 AFY to 160,000 AFY have been identified by current ATM grant projects as possible additional water supplies available through ATMs[13]. Additionally, ATM grant projects have identified solutions to some of the barriers to implementation. The flexibility to move water within the basin for M&I uses during dry years would be very beneficial to the South Platte Basin. Development of additional regulating reservoirs, especially strategically-placed off-channel reservoirs designed to provide ecosystem benefits, could facilitate the implementation of ATMs and could be examined in both current and future grant projects. Additionally, the Roundtables have indicated that holders of agricultural water rights should not be prevented from selling their property rights. Arrangements between municipal and agricultural water users should remain free market transactions. State-sponsored incentives could be used to encourage ATMs, however the roundtables have indicated that the State should not seeks to regulate these transactions[14].

One approach for providing the needed flexibility is currently being discussed by the Colorado legislature. Proposed House Bill 14-1026 would help create a more flexible change-in-use system by allowing an applicant who seeks to implement fallowing, regulated deficit irrigation, reduced consumptive use cropping, or other alternatives to the permanent dry-up of irrigated lands to apply for a change- in-use, without designating the specific beneficial use to which the water will be applied. The goal of the FLEX market approach is to permit a portion of the senior right to be used for M&I and EC uses pursuant to voluntary contractual arrangements, to maintain the economic benefit of the senior water right in its region or origin, and to retain sufficient agricultural water supply to sustain commercially viable farming activities. House Bill 14-1026 was introduced in January 2013. The Colorado Water Congress State Affairs Committee has unanimously supported this proposed bill. Additional water rights legislation may be required to address other difficulties associated with this type of ATM. The Roundtables support streamlining the water court process to encourage water sharing practices while protecting the vested rights of water right holders[14]. Political support is needed for:

1. Continued State funding of practical research and pilot projects for water sharing partnerships between cities and agriculture including alternative water transfer methods.
2. Solutions for streamlining the water court process for water sharing partnerships that continue to protect vested rights.
3. Incentives to encourage water sharing methods without interference with free market transactions.
4. Agricultural conservation easements coupled with municipal water lease options[14]

[13] CWCB. (2012). Alternative Agricultural Water Transfer Methods Grant Program Summary and Status Update. CDM Smith. Denver, Colorado.

[14] CWCB. (2013). Filling the East Slope Municipal Water Supply Gap.

Based upon HDR's initial review of existing information, no modifications are currently proposed to the agricultural supply shortage as identified in the SWSI 2010 South Platte Basin Report. To the extent that new information is received from South Platte/Metro providers regarding agricultural-related IPPs, the agricultural water supply gap will be updated in the draft Basin Implementation Plan.

To reduce the negative impacts associated with urban expansion and the dry-up of irrigated lands, further ATM projects should be explored.

5 References

CWCB 2011. Colorado's Water Supply Future, SWSI 2010 Metro Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments. CDM Smith, Denver, Colorado. June 2011.

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