ArkDSS Memorandum
Final

To: Bill Tyner and Kelley Thompson, Colorado Division of Water Resources

From: Wilson Water Group

Subject: Task 2.1 – Upper Arkansas Water Conservancy District Operating Memorandum

Date: April 2019

INTRODUCTION

One of the Task 2 objectives is to:

> *Develop and document an understanding of the operations of key water use facilities in the basin in order to accurately represent the use and operations in the water rights allocation modeling. This understanding will be developed through interviews with DWR personnel, operators of large canal and reservoir systems, and representatives of federal facilities.*

Key water use facilities include diversion structures, transmountain diversions, and reservoirs.

- Diversion structures include structures in which the UAWCD owns changed water rights and "model" structures used to represent augmentation demands.
- Reservoirs include reservoirs or reservoir systems where the UAWCD store augmentation supplies. Reservoir systems are defined as a group of reservoirs on the same tributary or filled by the same diversion structure that satisfy a common demand or are operated in a similar fashion.

A number of components in the Upper Arkansas Water Conservancy District (UAWCD) have been identified as key structures for the Arkansas Decision Support System (ArkDSS) surface water modeling efforts. The purpose of this memorandum is to document the augmentation plan operations associated with well pumping and replacement.

The information provided in this memorandum was developed from publicly accessible sources and discussions with Terry Scanga, UAWCD General Manager, Chelsey Nutter, UAWCD Project Manager, and Jord Gertson, UAWCD Engineer. Information in this memorandum is believed to be accurate; however, this information should not be relied upon in any legal proceeding.

SYSTEM OVERVIEW

UAWCD was founded in 1979 “for the purpose of protecting and securing water in the upper Arkansas Valley”. The UAWCD administers augmentation plans and provides replacement supplies for residential, commercial, and municipal customers within the UAWCD service boundaries. Additionally, UAWCD seeks to protect the water supply for current and future water users in the Upper Arkansas River basin by monitoring water right development throughout the basin.

Figure 1 shows the UAWCD boundaries, key structures that are currently used to provide replacement supplies (black text), and key structures that provide supplies from storage. There are two decrees cited on the boundary map, Case No. 92CW84 and Case No. 92CW84, although the UAWCD has as many as 20 separate decrees for exchanges, storage, direct flow water rights, and augmentation that incorporate other minor geographic regions operating in conjunction with these two primary decrees.

Case No. 92CW84 created a blanket augmentation plan for the areas highlighted in purple and Case No. 94CW5 created a blanket augmentation plan for the Cottonwood Creek drainage basin highlighted in blue. Under these plans and decrees, UAWCD provides for and administers umbrella augmentation and Rule 14 replacement water supplies for well depletions and evaporation from on-stream reservoirs within their respective boundaries. Case No. 06CW32 integrated most of the decreed areas and sources of water and expanded the augmented structures covered to include surface diversions and off-stream reservoirs within the boundaries established by the previous cases. The 06CW32 case also allowed for new supplies that are already decreed for augmentation to be added to the augmentation plan. Case No. 04CW96, a companion case to 06CW3, allowed for various exchanges from the sources of the District’s supplies to or between its storage locations highlighted in **Figure 1**.

Annually, the UAWCD projects the timing and volume of depletions for its Rule 14 plan and identifies how the depletions will be replaced. The Division Office either approves the plan or requests modifications to the plan prior to approval. Under both the Rule 14 plan and the umbrella augmentation plans, the District tracks the depletions in time, amount, and location and tracks the replacement requirements for each structure included in the augmentation plan on a daily basis. The District then releases replacement supplies to the river to meet the requirements, accounting for transit losses as necessary. The UAWCD maintains, updates, and projects the depletion throughout the year to ensure augmentation supplies are sufficient to replace the total depletions. At the end of the year, participants in the augmentation plan report their metered well pumping. In additional to daily accounting and weekly reporting, UAWCD submits annual accounting forms to the Division Office.

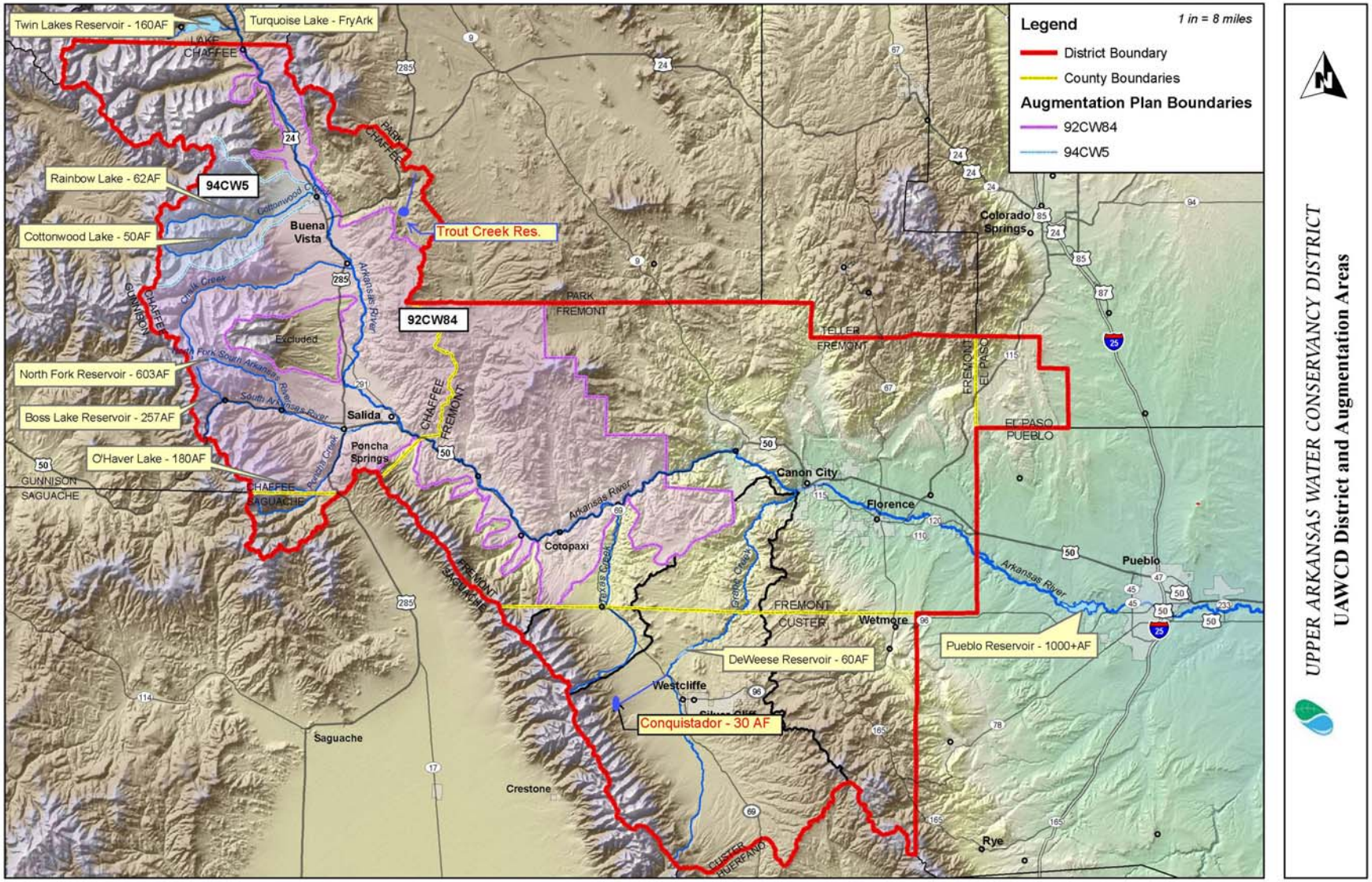

Figure 1: UAWCD District Boundary Map and Augmentation Areas

OPERATIONAL INFORMATION

Operational information is discussed in terms of augmentation demands and augmentation supplies.

Augmentation Demands

The primary depletions, or augmentation demands, under the UAWCD blanket augmentation plans are associated with well pumping for small residential and commercial purposes and for evaporative losses from small reservoirs or ponds. **Table 1** provides a summary of the structures by customer category included in the plan as of 2015.

Table 1: UAWCD Summary of Customers and Structures (2015)

Customers Category by Structure	Number
Wells	
Residential	1,061
Commercial	134
Industrial	5
Institutional (e.g., CDPW, schools)	4
Municipal	5
Trusts (wetlands, etc.)	27
Total	**1,236**
Ponds	
Residential	8
Commercial	2
Institutional (e.g., CDPW)	1
Trusts (wetlands, etc.)	1
Total	**12**

The UAWCD offers different augmentation options for different types of depletions. Depletions for typical residential users (i.e. "standard users") are generally augmented at a rate of 1/10 of an acre-foot per home based on an engineering analysis that determined that 10 percent of pumped water is consumed through normal in-house uses. The remaining 90 percent of pumped supplies are assumed to return to the river. Additional depletions are assessed for outdoor uses based on the size and elevation of the irrigated lawn[1]. Depletions covered under the augmentation plan for other uses are quantified in the UAWCD's decrees, including open surface structure evaporation, livestock watering, motels, and office buildings. For uses that are not explicitly quantified in the decrees, the user must provide an engineering analysis of the

[1] Refer to Case No. 06CW32 for the unit irrigation water requirement of bluegrass in various elevation zones throughout the UAWCD area; range from 1.90 feet to 2.62 feet

depletion for the UAWCD's review. Standard users are anticipated to be a permanent demand for the District, and new standard users are added to the augmentation plan every month. Standard user depletions were approximately 500 acre-feet in 2017.

The UAWCD users augmented pursuant to the various District decrees follow the monthly depletion schedule established in those decrees (92CW84, 94CW05, and 06CW32). There are two basic types of use agreements operated pursuant to the District's umbrella decrees, Standard and Annual. Standard uses have essentially a guaranteed supply, with the only exception being emergency conditions beyond the UAWCD's control, including natural conditions resulting in physical and legal unavailability. Annual users do not have this guarantee and are subject to annual availability of supplies. Structures eligible for Annual use must be curtailable uses (e.g. ponds that can be drained, temporary commercial uses). The UAWCD also provides annual water leases, which are subject to availability of supplies. Leased supplies are included in the lessees' augmentation plans, and submitted by the lessee to Division 2 for approval.

The UAWCD augmentation decrees divided the district boundaries into three zones based on elevation for purposes of defining irrigation requirements for bluegrass lawn irrigation. The UAWCD projects the augmentation demand based on the monthly depletion schedules, assuming that their water users are pumping the maximum allowable annual volumes. The UAWCD indicated that this assumption usually results in an over-estimate of depletions for two reasons:

- Most water users do not pump their maximum allowable annual volume. The UAWCD fine users that over-pump, which generally results in the user purchasing additional augmentation water for the next year, since purchasing water ahead of time is much more cost-efficient than paying the fines. The UAWCD estimates that only about 1 percent of their users over-pump.
- Once a well permit has been issued, the UAWCD assumes that the well is active and will start providing replacement water - even if the well has not been constructed. Well permits are only issued by the Division Office with proof that the well will be included in an augmentation plan.

The UAWCD would rather err on the side of providing augmentation supplies in excess of demands, which protects existing water rights throughout the Arkansas River basin. However, they are considering refining replacement calculations in the future by determining actual usage in lieu of assuming total use of the pumping allowance by its users.

UAWCD accounts for their users and associated depletions by Management Areas, which generally correlate with the tributary boundaries. These Management Areas, reflected in

Table 1, are defined in UAWCD decrees and serve to regionalize their depletions and supplies that can be used to meet the augmentation requirements.

Table 1: UAWCD Management Areas

UAWCD Management Area and Description	
AREA "A"	Area between confluence of S. Fork of Arkansas & Northern boundary of Chaffee County
AREA "B"	Area between confluence of S. Fork of Arkansas & Eastern boundary of the UAWCD
AREA "C"	Areas of the South Fork of the Arkansas River and the tributaries of the South Fork of the Arkansas
"COT"	Area west of Buena Vista from Confluence of Cottonwood Creek and Arkansas to headwater of Cottonwood Creek and its tributaries
"CHA"	Area from Confluence of Chalk Creek and Arkansas River to headwaters of Chalk Creek.

UAWCD also provides water to "annual users". These are generally short-term commitments; UAWCD does not guarantee augmentation supplies every year for annual users. Annual user demands are typically for pond or gravel pit evaporation or short-term industrial operations, and totaled approximately 70 acre-feet for 2017. UAWCD also offers leasing agreements for augmentation supplies, with depletions ranging in amount and length. Depletions under lease agreements were approximately 290 acre-feet in 2017. UAWCD also provides augmentation to municipal users; examples of lease agreements include:

- Augmentation of well depletions for irrigation and out-of-priority surface water diversions during the winter for the Town of Buena Vista.
- Augmentation supplies for irrigation of athletic fields in the Salida and Cotopaxi school districts.
- Augmentation of municipal well depletions for the Town of Poncha Springs.

Finally, UAWCD operates a Rule 14 plan for twenty-three wells[2] with depletions totaling approximately 125 acre-feet of water in 2017. In total, UAWCD's augmentation demand totals approximately 1,000 acre-feet annual. Currently, UAWCD estimates they are serving 80 percent

[2] Out-of-priority stream depletions to senior surface water rights caused by pumping wells permitted prior to 1986 which do not require augmentation plans are replaced under Rule 14 based on the UAWCD Replacement Plan approved each year by the State Engineer

of the non-exempt wells within the District boundaries. UAWCD anticipates that percentage will increase as other augmentation plans have difficulty they never constructed storage. UAWCD has also noticed a trend of exempt domestic in-house only well users purchasing augmentation water for their outdoor water use.

Augmentation Supplies

The UAWCD uses a variety of augmentation supplies to meet their augmentation demand, primarily by making releases from reservoirs located high up in the UAWCD area to the calling right. The UAWCD Management Areas are used to match augmentation sources of supply with augmentation demand impacts, determine irrigation evapotranspiration factors, and to manage augmentation supplies. Specific supplies are used in specific areas based on the location of the calling right, availability of exchange potential, and availability of supply (i.e. water in storage). For example, during spring runoff and during short periods in exceptionally dry years, the calling right is typically below Pueblo Reservoir; therefore the UAWCD may opt to release directly from Pueblo Reservoir for the full augmentation requirement, including to meet impacts from augmentation demands on the Arkansas River tributaries (e.g. South Arkansas River, Cottonwood Creek). Typically after the runoff, these tributaries have local administrative calls and the impacts must be augmented within each tributary from storage or senior direct flow water rights in the UAWCD's portfolio.

One of the most demanding areas to provide augmentation is the Cottonwood Creek drainage area. When homes are connected to the Buena Vista Sanitation District's central sewer system, which discharges to the Arkansas River below the confluence with Cottonwood Creek, well pumping for in-house uses is 100 percent depletive to Cottonwood Creek. Cottonwood Creek is a tributary with senior water rights relative to the Arkansas River water rights and there is a local call for much of the irrigation season. Therefore, it is necessary to augment the depletions directly from local Cottonwood Creek sources.

As shown in **Figure 1** above, the UAWCD maintains storage supplies in reservoirs located throughout the District to supply water to different management areas. UAWCD owns and operates some of the reservoirs, and the District owns shares and/or leases supplies from other reservoirs. **Table 3Error! Reference source not found.** lists the reservoirs, their location, and the amount of storage dedicated to the UAWCD.

Table 3: UAWCD Storage Supplies

Reservoir Name (WDID)	Reservoir Location	UAWCD Storage (AF)
Turquoise Lake (1103500)	Lake Fork Creek	Transmountain Supplies, Variable Storage
Twin Lakes Reservoir (1103503)	Lake Creek	Transmountain Supplies, Variable Storage
Pueblo Reservoir	Arkansas River	Variable Storage
Rainbow Lake (1103535)	Middle Cottonwood Creek	62
Cottonwood Reservoir (1104005)	South Cottonwood Creek	50
North Fork Reservoir (1103300)	North Fork South Arkansas River	603
Boss Lake (aka Donnell Reservoir No. 1, 1103920)	Headwaters of Middle Fork South Arkansas River	257
O'Haver Reservoir (1103921)	Grays Creek	180
DeWeese Reservoir (1303613)	Grape Creek	60
Conquistador Reservoir (1303535)	Off-channel, filled with diversions from Middle Taylor Creek	107

The UAWCD primary source of supply is Twin Lakes Reservoir. The UAWCD generally releases water from Twin Lakes Reservoir and exchanges the water to store in upstream reservoirs. There are different "colors" of water stored by the UAWCD in Twin Lakes Reservoir as follows:

- Twin Lakes Canal Company (TLCC) supplies: The UAWCD owns or leases as much as 332 of TLCC shares, which translates into about 362 acre-feet of storage.
    - TLCC Native supplies: Water stored under the native Arkansas basin water right. Terms and conditions for the use of this water are outlined in the Twin Lakes decrees (Case No. CA 2346 & W-3965).
    - TLCC Transmountain supplies: Water imported from Colorado River basin by TLCC (CA 3082 & W-1901)
- Project supplies: Water that is part of the Fryingpan-Arkansas Project. The UAWCD requests an allocation from Southeastern Colorado Water Conservancy District (SECWCD) each year, generally based on the population in the district boundary. This water can only be used for augmentation inside of the SECWCD boundaries. In 2017, UAWCD requested 1,000 acre-feet of Project water. This water is stored by exchange in Twin Lakes Reservoir.

Water that is released from Twin Lakes is charged a transit loss of 0.07 percent per mile, which translates into a 10 percent total loss from Twin Lakes to Pueblo Reservoir.

The UAWCD stores water in Pueblo Reservoir under a 1,000 acre-foot excess capacity contract. Division 2 charges transit loss from the location of depletion to Pueblo Reservoir for UAWCD's plans when water is replaced from upstream sources.

Where to find more information:

- Additional information on the Fry-Ark Project and operations of Twin Lakes and Pueblo Reservoirs is included in the ArkDSS Fryingpan-Arkansas Facilities and Related Operations memorandum.
- Additional information on the Twin Lakes System is included in the ArkDSS Colorado Canal Operations memorandum.

In addition to reservoir storage, UAWCD also has changed ditch shares from the Thompson Ditch on Cottonwood Creek, the White Ditch on the South Arkansas River, and the A. Katzenstein No 1 Ditch on Middle Taylor Creek. The changed water rights can be used as a direct augmentation supply, or can be exchanged for storage in the UAWCD reservoirs.

The UAWCD's procedure to determine the best supply to meet the augmentation demands is generally as follows:

- Determine the area of the augmentation demand and the associated location of impact. In any given month, the demand may impact a single or multiple reaches and call locations.
- Depending on the location of the impact, the most beneficial supply is selected. In general, local calls will require the use of local sources. For example, for impacts to Cottonwood Creek, the UAWCD first tries to cover the depletions with Thompson Ditch, then from releases from either Cottonwood Reservoir or Rainbow Lake. At times when there is no local call and the impact reach is on the main stem of the Arkansas upstream of Pueblo Reservoir, UAWCD prefers to release water from Twin Lakes. For calling rights on the main stem of the Arkansas downstream of Pueblo Reservoir, UAWCD prefers to release from Pueblo Reservoir.
- Determine the type of water that can be used to satisfy the demand. Specifically Project water can only be used inside the SECWCD boundaries, therefore TLCC or native supplies must be used to meet demands outside of SECWCD boundaries.

To track operations, the UAWCD uses an Access database. The database tracks the location of the calling water right and the amount of depletions in a Management Area owed at the calling water right location. The calling water right is set by the Water Commissioners. As noted above, the UAWCD views the river as a series of impact reaches defined by Management Areas

based on the location of calling rights and the potential supplies available to satisfy demands in different impact reaches.

The UAWCD tries to optimize their supplies by exchanging water up to the reservoirs located on tributaries. As mentioned above, the Cottonwood Creek area can be one of the most difficult locations to supply augmentation water. Therefore, keeping Cottonwood Creek Reservoir and Rainbow Lake as full as possible is the first priority. If there is exchange potential, UAWCD will exchange water up to North Fork Reservoir, O'Haver Lake, and finally Boss Reservoir. Occasionally, the UAWCD will exchange water from DeWeese Reservoir up to Conquistador Reservoir.

The supplies for augmentation have proven to be robust. The UAWCD has never run out of supply or needed to use emergency supplies, however new supplies are continually sought to meet the increasing needs of new users under the plan. The UAWCD has two future plans for additional augmentation supplies:

- The UAWCD is preparing to expand its blanket augmentation plan coverage area to the Eastern District boundary. The two reservoirs in this area are the DeWeese Reservoir and the Conquistador Reservoir and the UAWCD owns storage capacity in both reservoirs. Conquistador Reservoir is the UAWCD's newest reservoir supply; this off-channel reservoir is filled via the A. Katzenstein No 1 Ditch (1300860) on Middle Taylor Creek.
- The UAWCD is pursuing an alluvial storage project in Trout Creek Park near Buena Vista. The idea is to infiltrate water to the alluvial aquifer using a series of ponds to provide augmentation water to the Arkansas River. UAWCD has constructed one infiltration pond in the area and are currently working on a second pond. The goal is to construct infiltration (i.e. recharge) ponds that will return water to the river when it is most needed for augmentation and build up a steady augmentation supply over time. The ponds will be filled with excess fully consumable water when possible, as the UAWCD runs out of storage space in wet years. The UAWCD is looking into participating with other parties, such as the Pueblo Board of Water Works and SECWCD. The idea is to develop a wet water bank. The distant future could include pumping from the alluvium and discharging directly into the Arkansas River for immediate augmentation supplies.

Modeling Considerations

Water usage and resulting depletions covered by the UAWCD blanket augmentation plan will be represented in the ArkDSS surface water allocation (StateMod) model as aggregated unincorporated municipal demands served by ground water supplies for each Management Area. Although the UAWCD represents the depletive amount in its accounting, the surface

water allocation model must represent the total well pumping, the depletion, and the return flow. It is recommended the municipal pumping be estimated based on unincorporated population in Chaffee and Freemont Counties multiplied by an average 120 GPCD value[3]. It is noted that the UAWCD only provides augmentation supplies for approximately 80 percent of the unincorporated residential users in these counties. However, for modeling purposes, it is reasonable to assign the depletions from the unincorporated population in these two counties to the UAWCD augmentation plans.

The annual municipal pumping will be disaggregated to a monthly time-step using a 50/50 split between indoor and outdoor uses. Indoor pumping will be evenly distributed monthly; outdoor pumping will be distributed based on the average monthly irrigation water requirement provided in the UAWCD decrees[4]. The resulting distribution pattern for the annual unincorporated municipal pumping is shown in **Table 4**.

Table 4: Monthly Distribution of Unincorporated Municipal Pumping

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
% of Municipal Annual Pumping	6%	6%	6%	8%	10%	11%	12%	11%	10%	8%	6%	6%

Depletions vary based on the use type; indoor uses are 10 depletive and outdoor uses are estimated to be 80 percent depletive. As such, the Table 5 reflects the combined depletive percentage, or consumptive use rate, of the pumping monthly. On average, approximately 25 percent of the pumping will be consumed, the remainder will return to the river.

Table 5: Monthly Consumptive Use of Unincorporated Municipal Pumping

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Monthly Consumptive Use	10%	10%	10%	27%	35%	41%	41%	38%	34%	25%	10%	10%

The total unincorporated municipal pumping and depletions in Fremont and Chaffee Counties will be partitioned into five primary areas, generally reflecting the UAWCD Management Areas. **Table 6** shows the UAWCD Management Area, distribution of the unincorporated municipal pumping across the management areas, and the recommended location for the ground water structure for modeling purposes.

[3] GPCD rate was estimated using decreed depletion values from Case No. 06CW32. Domestic with Septic depletes 0.031 AF per household with 10 percent efficiency; Lawn and Garden Irrigation depletes an average of 0.076 AF per 1500' square foot lawn with an estimated 80 efficiency; estimated as 3 people per household.

[4] Source: Refer to Paragraph 14.a. in Case No. 06CW32 for the unit irrigation water requirement (IWR) for lawns. The IWR across Zones A, B, and C were averaged for the purposes of this effort.

Table 6: UAWCD Management Areas

UAWCD Management Area and Description		Model Location	% of Pumping
AREA "A"	Area between confluence of S. Fork of Arkansas & Northern boundary of Chaffee County	Arkansas River near Salida	55% of Chaffee County
AREA "B"	Area between confluence of S. Fork of Arkansas & Eastern boundary of the UAWCD	Arkansas River near Texas Creek	100% of Fremont County
AREA "C"	Areas of the South Fork of the Arkansas River and the tributaries of the South Fork of the Arkansas	South Fork Arkansas River near Salida	25% of Chaffee County
"COT"	Area west of Buena Vista from Confluence of Cottonwood Creek and Arkansas to headwater of Cottonwood Creek and its tributaries	Cottonwood Creek near Buena Vista	15% of Chaffee County
"CHA"	Area from Confluence of Chalk Creek and Arkansas River to headwaters of Chalk Creek.	Chalk Creek near Nathrop	5% of Chaffee County

The surface water allocation model, StateMod, is able to estimate augmentation requirements based on the amount of pumping, depletions, return flows, and the call on the river. As indicated by the UAWCD, there is almost always a senior call on the river, requiring full replacement of well depletions (i.e. rarely are well depletions in-priority and thus not required to be augmented). For modeling purposes, the "priority" of the aggregated unincorporated municipal demands will be set to a current, junior priority.

Where to find more information:

- More information on the return flow patterns used to represent lagged well depletions is included in the ArkDSS Task 2.7 – Develop Transmissivity and Unit Response Function Estimates memorandum.

The UAWCD relies heavily on their native and transmountain supplies stored in Twin Lakes Reservoir, Turquoise Reservoir, and Pueblo Reservoir. Therefore, the recommended representation of these reservoirs in the model includes an account explicitly for the UAWCD's augmentation supplies. Storage of native and transmountain supplies in these reservoirs will be represented in accordance with the water rights and operations recommended in the ArkDSS Fryingpan-Arkansas Facilities and Related Operations memorandum. As indicated above, the UAWCD is currently in the process of extending its blanket augmentation plan areas to include all the Eastern District area to the Pueblo-Fremont county line, including the Grape Creek basin. As this filing has not been decreed to date, it is recommended augmentation supplies not be represented in DeWeese Dye Reservoir or Conquistador Reservoir in this current effort.

Due to size of the remaining storage supplies, it is recommended the smaller reservoirs generally be aggregated by tributary in the model. The following outlines recommendations for representing these aggregated reservoir systems in the model.

- **Cottonwood Creek Reservoir System.** Represent Cottonwood Lake and Rainbow Lake as an on-channel reservoir system located on Cottonwood Creek just below the confluence of the Middle and South Forks of Cottonwood Creek. The aggregated capacity of the reservoir system will be set to 165 acre-feet based on the absolute water rights in the reservoirs. Agreements with the reservoir owners allow for a total of 112 acre-feet of storage for UAWCD purposes, therefore the reservoir will include one 112 acre-foot account for UAWCD and another 53 acre-foot account for fishing/stock purposes. The reservoir system will store water under junior 1936 and 1964 absolute storage rights, as well as a maximum of 23.45 acre-feet of transferred Thompson Ditch (1100645) shares[5]. There is limited information available in HydroBase regarding reservoir contents and area/capacity tables; therefore historical records will be filled using standard CDSS techniques and an assumed depth of 10 feet will be used to develop an area/capacity relationship for evaporative loss estimates.
- **South Arkansas River Reservoir System**. Represent North Fork Reservoir, Boss Lake, and O'Haver Reservoir as an on-channel reservoir system located on the South Arkansas River upstream of the primary irrigation structures on the tributary. Represent the aggregated capacity as 1,040 acre-feet based on the UAWCD storage amounts in the reservoirs. The reservoir will store water under its junior 1981 and 1982 absolute storage rights; a maximum of 26.1 acre-feet of transferred White Ditch (1100560) shares[6]; and exchanged Fryingpan-Arkansas River and UAWCD supplies. Note that North Fork Reservoir is also used by the Town of Salida; additional operations will be included to represent the municipal system. There is limited information available in HydroBase regarding reservoir contents and area/capacity tables; therefore historical records will be filled using standard CDSS techniques and an assumed depth of 10 feet will be used to develop an area/capacity relationship for evaporative loss estimates.

The following order of operations during each model time-step is recommended to meet the augmentation demands reflected at the modeled locations listed in **Table 6** above:

[5] Case No. 94CW5 indicates of the originally decreed 4.0 cfs at Thompson Ditch, 2.0 cfs was transferred to the City of Buena Vista, and .595 cfs of the remaining amount was transferred for use by UAWCD. The historical consumptive use associated with .595 of Thompson Ditch is 23.45 acre-feet. Although a simplified approach, recommend reflecting the yield as a storage right in the reservoir.

[6] Case No. 92CW84 indicates 0.148 cfs of the White Ditch represents 31.9 ac-feet of water, the yield of which is 26.08 acre-feet decreed for storage in North Fork Reservoir. Although a simplified approach, recommend reflecting the yield as a storage right in the reservoir.

1. Use available changed Thompson Ditch shares to meet Cottonwood Creek (COT) augmentation demand.
2. Store remaining Thompson Ditch shares (up to 23.45 acre-feet per year) in Cottonwood Creek Reservoir System.
3. Use available changed White Ditch shares to meet Area "C" augmentation demand.
4. Store remaining White Ditch shares (up to 26.1 acre-feet per year) in South Arkansas River Reservoir System.
5. Release storage supplies in Pueblo Reservoir to meet all augmentation demands via exchange (will only operate if exchange potential exists).
6. Release storage supplies in Twin Lakes to meet all augmentation demands.
7. Release storage supplies in Turquoise Lake[7] to meet all augmentation demands.
8. Release storage supplies in Cottonwood Creek Reservoir System to meet Cottonwood Creek (COT) augmentation demand.
9. Release storage supplies in South Arkansas River Reservoir System to meet Area "C" augmentation demand.
10. If there are remaining storage supplies in Twin Lakes after meeting augmentation demands, exchange water first to Cottonwood Creek Reservoir System and then to South Arkansas River Reservoir System.

Note that recommendations provided herein may be refined and revised due to modeling constraints or during calibration efforts. Refer to the final ArkDSS Water Resources Planning Model User's Manual documentation for final representation of these demands.

Where to find more information:

- The final model representation of the UAWCD operations will be documented in the Arkansas River Surface Water Model User's Manual.

[7] UAWCD supplies can be stored in an excess capacity account in Turquoise Lake under Preferred Storage Option Plan Agreement.