

ArkDSS Memorandum

Final

To: Bill Tyner, John van Oort, Kelley Thompson, Division of Water Resources
From: ParsonsWater Consulting
Subject: Task 2.1 – Pueblo West Metropolitan District
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, reservoirs, and reservoir systems. A number of components in the Pueblo West Metropolitan District system have been identified as key structures for the Arkansas Decision Support System (ArkDSS) consumptive use and surface water modeling efforts. The purpose of this Task 2 memorandum is to document physical, legal, and operational aspects of those key structures.

The information provided in this memorandum was developed from publicly accessible sources, sources provided by the Pueblo West Metropolitan District, discussions with the District 14 and 15 Water Commissioner, Steve Stratman, the District 11 Water Commissioner, Brian Sutton, and Scott Eilert with the Pueblo West Metropolitan District. Information in this memorandum is believed to be accurate. However, this information should not be relied upon in any legal proceeding.

SYSTEM OVERVIEW

The Pueblo West Metropolitan District (PWMD) supplies water to an approximately 50-square mile service area north of Pueblo Reservoir, northwest of the City of Pueblo. The service area is approximately one-half built out and includes a population of about 30,000. Uses also include several light industrial users and non-potable uses mainly for irrigation.

The PWMD was formed in 1969 and originally served its constituents using water from non-tributary wells. The PWMD purchased the Wheel Ranch Ditch in the 1970s and changed its use to irrigation on the Pueblo West Golf Course. Further acquisitions in the 1970s included shares in

Twin Lakes Reservoir and Canal Company and the Colorado Canal system. The PWMD has also changed the use of water rights historically used on the Hill Ranch, located near Nathrop. The PWMD is also a partner in the Southern Delivery System, in which it has 18 percent prorata ownership.

Historically, PWMD has had sufficient water supplies to meet its demands in all but the driest of years (e.g., 1977 and 2002). The PWMD is currently focused on development of additional storage to allow it to carry over supplies into drought years. The PWMD is also planning to install a pipeline from its wastewater treatment plant to the Arkansas River in order to reduce the losses of its reusable return flows.

Key structures identified in the Pueblo West Metropolitan District system are as follows:

1. Pueblo West Metro System
2. Changed Irrigation Rights
 - Current Use – Wheel Ranch Ditch
 - Future Use of Hill Ranch water rights – Bowen, Pike, Pioneer, and Willowdale Ditches (Chalk Creek) and Gas Creek Ditch (Gas Creek)

The location of the Pueblo West Metropolitan District and major elements of the PWMD water resources system are shown in red in Figure 1. Other elements pivotal to its Arkansas River operations are included in Figure 1.

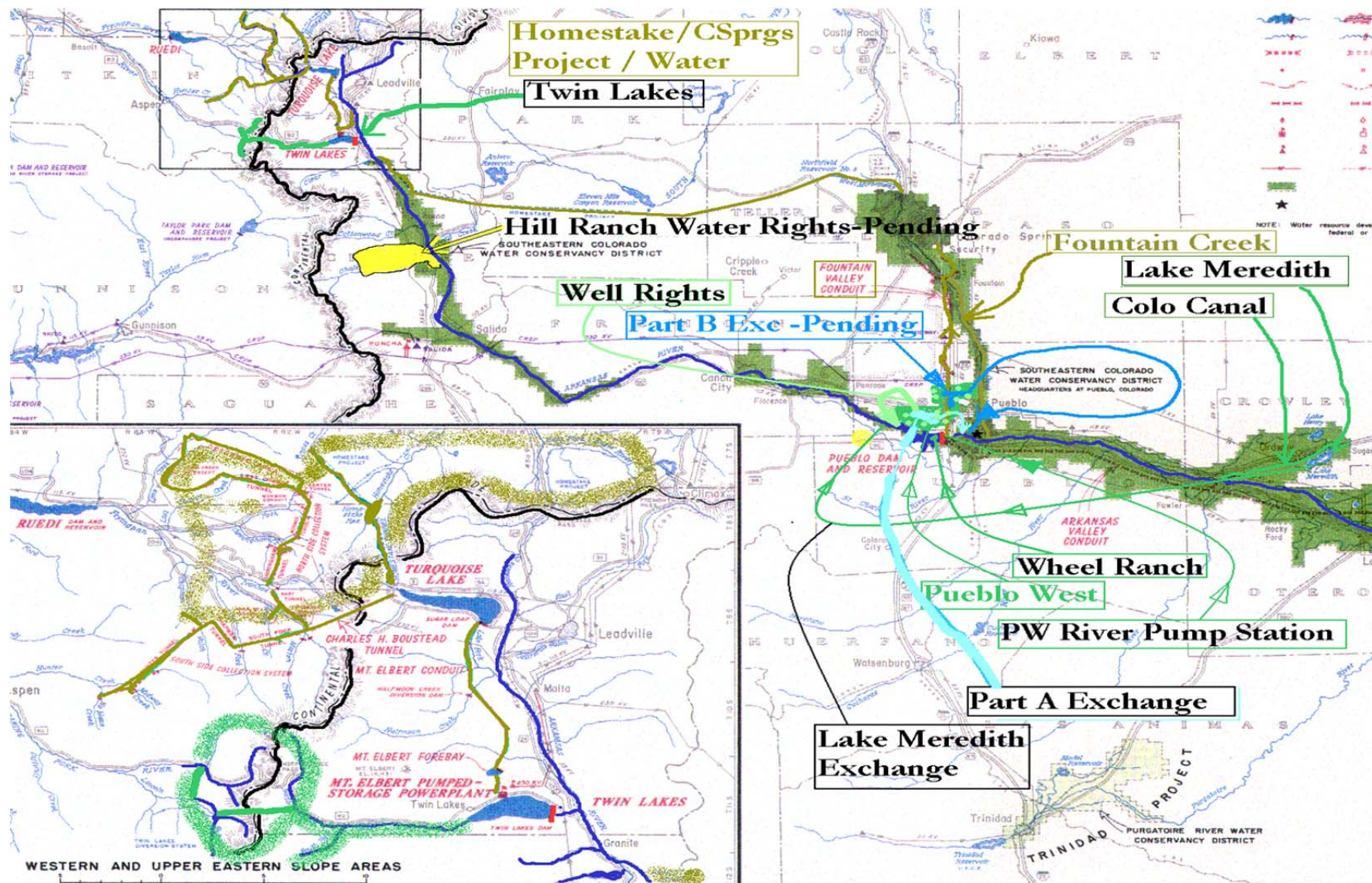


Figure 1: Pueblo West Metropolitan District Water Resources System

PHYSICAL INFORMATION

The major structural elements in the Pueblo West Metropolitan District's water resources system include Pueblo Reservoir; the Pueblo West Metro System supply pipelines that carry water to its water treatment plant; larger transbasin projects shared by multiple entities (Twin Lakes) and changed water rights (Wheel Creek Ditch and various Hill Ranch ditches). The PWMD also has 18 non-tributary deep wells that were originally used as a primary supply and currently used as a backup supply.

Additional information related to a number of the transbasin projects and their direct flow rights and storage reservoirs is listed in the *Where to find more information* section at the end of this memorandum.

The history, operations, and current specifications of the other elements of the PWMD's water resources infrastructure are summarized below.

1. Pueblo West Metro System (1400663)

The PWMD owns and operates a 24-inch pipeline out of the Pueblo Reservoir South Outlet Works, Joint Use Manifold. The pipeline was constructed in 1978 and replaced from 2016 to 2017. In 2016, PWMD started to take raw water from its 36-inch Pueblo West Connection on the Southern Delivery System (SDS) Project Pipeline. The 90-inch SDS Pipeline connects to the North Outlet Works at Pueblo Reservoir. The PWMD is supplied by a single Water Treatment Plant.

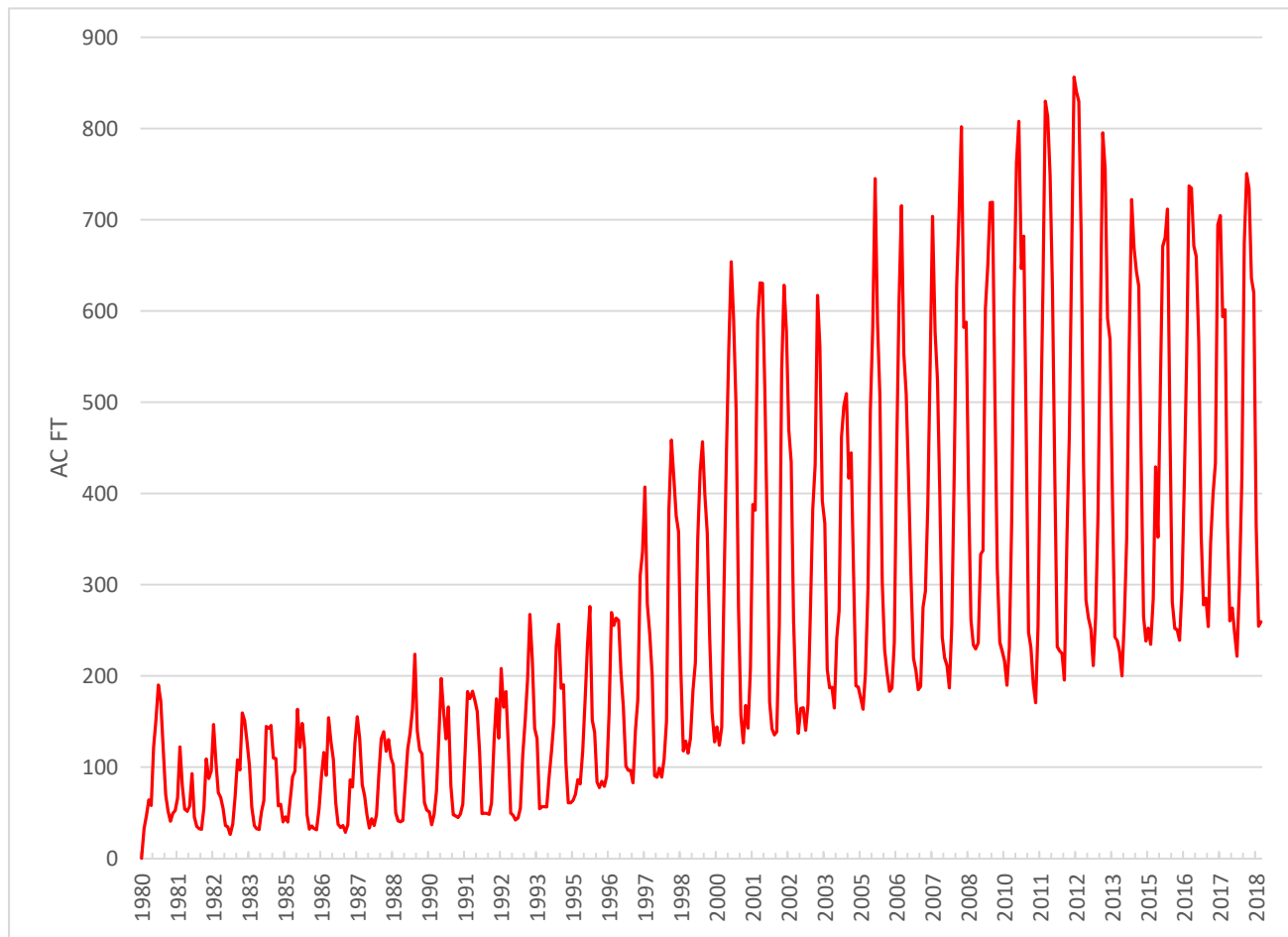
Specifics of the PWMD Water Treatment Plant are as follows:

- A pump station with 2 suction and 2 discharge pipelines (24-inch and 36-inch) pumps water up from Pueblo Reservoir to a storage tank at the Water Treatment Plant (WTP).
- The current maximum capacity of the WTP is 21 million gallons per day (mgd) or 32 cfs.
- Diversions are measured from the pipelines and at the WTP via MAG meters.
- Diversion of raw water to the golf course occurs via raw water pipeline valving.

Diversion Data

There is a complete daily record in HydroBase starting when PWMD became active 1980 through the current year; however, data is included as “infrequent” from 1986 through 1998 with only monthly or annual data reported. Monthly records from 1980 to 2018 were provided by PWMD (see Figure 2). Based on the data provided by PWMD, it appears that some of the HydroBase data may be incorrect. The PWMD data set is believed to be accurate and is recommended for use in the ArkDSS Surface Water model.

Figure 2: Pueblo West Metropolitan District Total Monthly Diversions



Return Flow Location

The PWMD has one municipal wastewater treatment plant (1400662). The wastewater treatment plant (WWTP) is located in the Northwest Quarter of Section 16, Township 20 South, Range 65 West of the 6th Principal Meridian. The WWTP has been located at this site since it was constructed in 1996. The plant currently has a maximum capacity of 1.8 mgd and serves about one-half of the population in the PWMD. The WWTP currently discharges an average of about 1.4 mgd to Wildhorse Creek, an ephemeral tributary on the north side of the Arkansas River.

PWMD can reuse return flows from diversion of transmountain supplies and changed Hill Ranch water rights. The Wildhorse (Dry) Creek exchange to Pueblo Reservoir is a decreed exchange to the trifurcation point (raw water pipeline connection). Clarified backwash water from the water treatment plant filters may be piped to the WTP or to the Golf Course.

2. Changed Irrigation Rights

The PWMD is the sole owner of the Wheel Ranch irrigation ditch, which was inundated by Pueblo Reservoir. The PWMD owns the water in multiple ditches historically used to irrigate a ranch property south of Nathrop, Colorado.

The Wheel Ranch Ditch was changed to irrigation use at the Pueblo West Golf Course. The Hill Ranch water rights have been changed to municipal, commercial and other uses, including storage and reuse. The purchase dates for the various ditch systems and amount of ownership is summarized below.

- Wheel Ranch Ditch (1400574) – purchased in 1984
- Hill Ranch, purchased in 2008, includes the following ditch water rights historically used on the property:
 - Bowen Ditch (1100691)
 - Pike Ditch (1100683)
 - Pioneer Ditch (1100623)
 - Princeton Ditch (1100693)
 - Willowdale Ditch (1100684)
 - Gas Creek Ditch (1100712)

WATER RIGHTS

The PWMD has acquired various ditches and obtained reservoir storage accounts during their planning efforts focused on ensuring adequate future water supply. The combination of the reservoir storage, ditch transfers, and transmountain water has generally provided ample supplies to meet the PWMD water demands. The PWMD's ownership in and use of these water rights are described below.

Colorado Canal shares are paired shares, meaning they come with storage in Lake Meredith. PWMD currently has a water rights exchange agreement with a farmer in Crowley County. The irrigator farms the property associated with the paired Colorado Canal shares and PWMD uses some of the Twin Lakes shares.

Direct Flow Rights

Arkansas River direct flow rights from Civil Action Numbers 1127, 2120, 2382, 2528, 2535, 3053, 3824, 3907, 4075, and 5141 and Case Nos. 80CW04, 81CW56, 01CW152, 09CW20, and 11CW83 are summarized in Table 1.

Table 1: Direct Flow Rights

Ditch Name	Approp. Date	Adjud. Date	Admin. No.	Decreed Rate (cfs)		Ownership
				Total	PWMD	
Wheel Ranch Ditch	3/31/1891	3/23/1896	15065.0	1.5	1.5	100
Bowen Ditch	9/24/1888	6/19/1890	14147.0	50.9	6.36	12.5
Pike Ditch	5/31/1867	6/19/1890	6360.0	3.0	3.0	100
	3/1/1889		14305.0	1.5	1.5	
	7/15/1907	6/9/1911	22407.21014	1.0	1.0	
			TOTAL	5.5	5.5	
Pioneer Ditch	5/17/1866	6/19/1890	5981.0	6.58	4.39	67
	5/31/1868		6726.0	1.31	0	0
	12/31/1866	7/9/1969	33797.06209	23.14	15.43	67
			TOTAL	40.03	19.82	49.5
Princeton Ditch	7/29/1911	7/14/1914	23394.22489	20.0	5.0	25
Willowdale Ditch	3/30/1881	6/19/1890	11412.0	3.3	3.3	100
	12/1/1885		13119.0	2.54	2.54	
	7/15/1887	7/12/1904	14305.0	6.0333	6.0333	
	5/1/1892	7/13/1907	17358.15462	3.2	3.2	
	7/15/1907	6/9/1911	22407.21014	2.0	2.0	
	3/30/1881	1/18/1932	28435.11412	1.5	1.5	
			TOTAL	18.3733	18.3733	
Gas Creek Ditch	4/1/1872	7/13/1909	8127.0	2.5	2.5	100

Source: Colorado Water Rights Tabulation

Notes: Princeton Ditch – No records available to estimate historical consumptive use; therefore, PWMD ¼ interest abandoned

Diversion limits and other conditions associated with these changed water rights are shown in Table 2. Monthly and annual limits are based on the average of 20-year total volumetrics.

Table 2: Volumetric Limitations (ac-ft) on Changed Direct Flow Water Rights

Ditch Name		Apr	May	Jun	Jul	Aug	Sep	Oct	Annual Total
Wheel Ranch Ditch	3/31/1891								14.6
Bowen Ditch	9/24/1888								369
Pike Ditch	5/31/1867	35	128	156	155	104	88	65	731
Pike Ditch	3/1/1889								97
Pike Ditch	7/15/1907								28
Pioneer Ditch	5/17/1866	21	118	235	227	187	126	79	991
Pioneer Ditch	5/31/1868								n/a
Pioneer Ditch	12/31/1866								14
Princeton Ditch	7/29/1911								n/a
Willowdale Ditch	3/30/1881	45	163	186	184	148	136	100	961
Willowdale Ditch	12/1/1885	15	87	126	118	74	58	46	522
Willowdale Ditch	7/15/1887								641
Willowdale Ditch	5/1/1892								131
Willowdale Ditch	7/15/1907								49
Willowdale Ditch	3/30/1881								n/a
Gas Creek Ditch	4/1/1872								42

Source: Colorado Water Court decrees (available at <http://dwrweblink.state.co.us/>)

Notes: All rights limited to April 1 – October 31 season of use

Wheel Ranch Ditch – One-time use at Pueblo West Golf Course only

Princeton Ditch – No records available to estimate historical consumptive use; therefore, PWMD ¼ interest abandoned

Gas Creek Ditch – Changed water right not to be used for municipal uses

Diversions for changed uses limited to the following periods:

Wheel Ranch Ditch, Apr 1 - Oct 31

Bowen Ditch, May 1 - Oct 15

Pike Ditch, 5/31/1867 right Apr 1 - Oct 31; 3/1/1889 right Apr 15 - Sep 30; 7/15/1907 right May 1 - Sep 30

Pioneer Ditch, 5/17/1866 right Apr 15 - Oct 31; 12/31/1866 right Jun 1 - Aug 31

Princeton Ditch, water right abandoned

Willowdale Ditch, 3/30/1881 right Apr 1 - Oct 31; 12/1/1885, 7/15/1887, and 5/1/1892 rights Apr 15 - Oct 31;

7/15/1907 and 3/30/1881 rights May 1- Sept 30; Use of 1.5 cfs 3/30/1881 right not changed in

01CW152

Gas Creek Ditch, 4/1/1872 right Apr 1 - Oct 31

Storage Rights

Reservoir storage available for use by the PWMD is summarized in Table 3.

- Storage space available in various Fryingpan-Arkansas Project reservoirs pursuant to ownership of Twin Lakes Reservoir and Canal Company and contracts with Bureau of Reclamation for storage space in Pueblo Reservoir. Additional information regarding the upper basin reservoirs and associated transbasin projects are described in the ArkDSS Fryingpan-Arkansas Facilities and Related Operations memorandum.
- The PWMD's ownership of Colorado Canal shares includes storage space in Lake Meredith associated with the paired shares.

Table 3: Reservoir Storage

Pueblo Reservoir	10,000 ac-ft	Long Term Excess Capacity Contract
	6,000 ac-ft	SECWCD Long Term Excess Capacity Master Contract
TOTAL	16,000 ac-ft	

Source: Pueblo West Metropolitan District

Notes: Portion of Pueblo Reservoir storage space and Twin Lakes Reservoir storage space pursuant to share ownership in Twin Lakes Canal Company – 5,901 of 49,589 shares

Transbasin Water

The PWMD obtains water from the transbasin ditches described above along with its prorata ownership in the Twin Lakes Canal Company (11.9 percent). The average annual yield from this source is 5,606 ac-ft based on 0.95 ac-ft per share. During "dry-year" conditions, the firm yield from this source is 2,104 ac-ft, or 0.37 ac-ft per share.

Exchange Rights

In addition to the changes of use decreed for its changed ditch water rights, the PWMD adjudicated exchanges in Case No. 01CW152 for the consumptive use generated from the water rights subject to that case. The exchanges include the Hill Ranch water up to the Clear Creek Reservoir, Twin Lakes Reservoir, and Turquoise Reservoir; and from Lake Meredith up to Pueblo Reservoir. The PWMD has not yet operated these exchanges. The adjudicated exchanges available for use by the PWMD are summarized in Table 4.

Table 4: Exchange Water Rights

Source	Destination	Approp. Date	Adjud. Date	Admin. No.	Decreed Amount (cfs)
Arkansas River – Chalk Creek confluence	Clear Creek, Twin Lakes, and Turquoise Reservoirs	12/20/2000	1/4/2008	55133.0	27.4 cfs
Arkansas River – Browns Creek confluence					8.7 cfs
Arkansas River – Lake Meredith Outlet confluence	Pueblo Reservoir				100 cfs

Ground Water Rights

The PWMD has 18 non-tributary wells, including WDIDs 1406320 through 1406335 and 1406386 ((W-2165, 80CW160) that have been used to supply its service area. The wells are available for backup use but PWMD does not currently use these ground water supplies in its potable system. The PWMD is studying the cost and effects of using well water to supplement surface water for potable use in the future.

OPERATIONAL INFORMATION

Water Demands

The PWMD's annual demand averaged approximately 5,400 ac-ft over the 2009 to 2015 period, corresponding with a population of about 30,000 within the PWMD service area, industrial use, and non-potable water use at the Pueblo West Golf Course. The total demand based on the population served is approximately 163 gallons per capita per day (gpcd). The PWMD's current demand level is approximately 96 percent of the per capita demand prior to the early-2000s drought. The currently anticipated water demand over the PWMD's 20-year planning horizon is about 8,073 ac-ft per year for a population of about 41,200, which includes about 888 ac-ft of annual industrial demand.

Water Supply

The acquisition of direct flow rights and transmountain supplies has well positioned the PWMD to address their growing municipal needs. The order of operations for the PWMD's water resources is generally as follows:

1. Divert transbasin and native water from Twin Lakes Canal Company through Pueblo Reservoir for municipal use
2. Divert Wheel Ranch Ditch to Pueblo West Golf Course
3. Release transbasin and native water from Twin Lakes Canal Company from Twin Lakes or Pueblo Reservoir

4. Store and/or take Hill Ranch rights directly (future use)

The PWMD's transbasin water rights are currently sufficient to meet 100 percent of the potable water demands during the summer (April through October) with the winter demands met by Twin Lakes native supplies stored in Twin Lakes and Pueblo Reservoir during previous summers or years.

Where to find more information:

- Additional information on Twin Lakes, Colorado Canal and Lake Meredith operations is presented in the ArkDSS Colorado Canal Operations memorandum.
- Additional information on Pueblo Reservoir and Twin Lakes operations is presented in the ArkDSS Fryingpan-Arkansas Facilities and Related Operations memorandum.
- Additional information on ditch and reservoir operations in and around the PWMD service area is presented in the ArkDSS Water District 14 memorandum.
- Additional information on ditch and reservoir operations in and around the Hill Ranch is presented in the ArkDSS Water District 12 memorandum.

REFERENCES

- Meeting with Water Division 2, Water District 11 Commissioner Brian Sutton (brian.sutton@state.co.us, 719.221.0367).
- Meeting with Water Division 2, Water Districts 14 and 15 Commissioner Steve Stratman (steve.stratman@state.co.us, 719.250.1657).
- Communication with Former Pueblo West Metropolitan District Director of Utilities Scott Eilert.
- Description of Water-Systems and Operations in the Aransas River Basin, Colorado. USGS Water Resources Investigations Report 85-4092. P.O. Abbot. 1985.
- Water Conservation Plan for the Pueblo West Metropolitan District. JVA, Inc. August 1, 2012.
- Water Master Plan for the Pueblo West Metropolitan District. JVA, Inc. May 25, 2017.
- Wastewater Master Plan for the Pueblo West Metropolitan District. JVA, Inc. May 25, 2017.
- Decrees, engineering reports, and associated water court material available at <http://dwrweblink.state.co.us/>
- State of Colorado, Division of Water Resources, HydroBase database.
- Communication with Pueblo West Metropolitan District Technical Operations Manager Dan Higgins (dhiggins@pwmd-co.us, 719.547.5042).