


Date: April 26, 2021

To: Governance Committee (GC), Water Advisory Committee (WAC) and Executive Director's Office (EDO) of the Platte River Recovery Implementation Program (PRRIP)

From: Jon Altenhofen, P.E., Colorado Water User Member, WAC 

Memo Subject: Colorado's Annual Depletion Report for 2020 in the South Platte River Basin

Colorado's Plan for Future Depletions (CPFD)—Annual Review 2020

BASIS: Mitigate the adverse impacts of new water related activities in Colorado on FWS Target Flows and on Program Water Projects by replacing monthly net depletions in river flow caused by population growth since July 1, 1997 on an average annual basis. Artificial groundwater recharge captures and retimes monthly net river accretions resulting from population growth into months of net river depletions (May and June) to offset such depletions. The Table below shows that adequate mitigation has occurred.

The following basic assumptions used for 2020 accounting. These assumptions have been updated for 2020 with the PRRIP requirement that updates occur every 5 years with the last update in 2015. A Questionnaire was sent to municipal members of SPWRAP in 2020. Appendix A to this Report summarizes the 2020 Questionnaire analysis which is the basis of the updated assumptions below. These assumptions will be used for the first five years (2020-2024) of the PRRIP Extension.

- (1) Process still based on South Platte Basin in Colorado divided into North, Central, and South Regions based on counties and data collected and analyzed by Region.
- (2) Population Increase by Region since July 1, 1997 (baseline) via Colorado State Demographer (SDO) reports. The current SDO April 20, 2021 report provided by the State to the WAC and is also attached to this report shows a population for January 1, 2020 in the South Platte River Basin of 4,062,090, an increase of about 2.2% per year since 1997. Also, from this current SDO Report, the percent distribution of population by region is now 27%, 62% and 11% for the North, Central and South Regions respectively where this distribution was 29%, 49% and 22% for the Regions, respectively.
- (3) GPCD--Gross Water Use ac-ft/person/year at 0.1771 (down from 0.2504 due to conservation).
- (4) % Water Source Mix by Region of 6 sources; 4 basic sources of transbasin imports, nontributary groundwater, agricultural conversion and new native South Platte flow development plus a 5th source of reuse mainly through exchange and a 6th source of water conservation. Each source has a monthly accretive and/or depletive effect. See attached Figure 1 for graph of depletive and accretive effects and resulting net effect at the Stateline at Julesburg.
- (5) Monthly effects are routed to the Colorado-Nebraska Stateline using the same administrative routing loss factors.

CPFD Operations through 2020

SPWRAP, Inc.--South Platte Water Related Activities Program is a non-profit group of mainly municipal Colorado water users collecting assessments (\$1.14 per tap in 2020) to pay for Colorado's water obligations for PRRIP in

partnership with the State of Colorado where the State covers other Program costs. SPWRAP obtains creditable river accretions for use in Colorado's Plan for Future Depletions from (1) dedicated groundwater recharge projects collaboratively developed and operated by SPWRAP, Inc. and (2) by paying for creditable accretions not used by existing recharge plans.

Colorado's Plan for Future Depletions also states in Section I.H.1., that new water related activities would not be covered by this plan after the average annual water supply to serve Colorado's population increase from the subgroups of "Wastewater Exchange/Reuse" and "Native South Platte Flows" (first used post-1997) exceeds 98,010 acre-feet on an average annual basis during the February-July period. For 2020, these water supply subgroups for the February-July period total 18,650 acre-feet with an average annual since start of program of 33,950 acre-feet so less than the limit of 98,010 acre-feet.

May and June Depletions (acre-feet) at Stateline from population growth:

2007	1,410
2008	1,552
2009	1,679
2010	1,807
2011	1,949
2012	2,055
2013	2,281
2014	2,420
2015	2,568
2016	2,728
2017	2,858
2018	2,983
2019	3,098
<u>2020</u>	<u>2,264</u>
Avg	2,261

Managed groundwater recharge retimed accretions (ac-ft) into May and June at Stateline for replacement supplies:

2007	3,277
2008	1,470
2009	4,220
2010	5,790
2011	6,545
2012	2,219
2013	1,845
2014	6,827
2015	7,653
2016	7,918
2017	5,714
2018	6,802
2019	5,789
<u>2020</u>	<u>4,811</u>
Avg	5,063

On the average annual basis, adequate retimed accretions (5,063 ac-ft) available to replace depletions (2,261 ac-ft).

FIGURE 1

Based on **Population Increase** from July 1, 1997 to:

July 1, 2020

Based on GPCD (ac-ft/person/year):

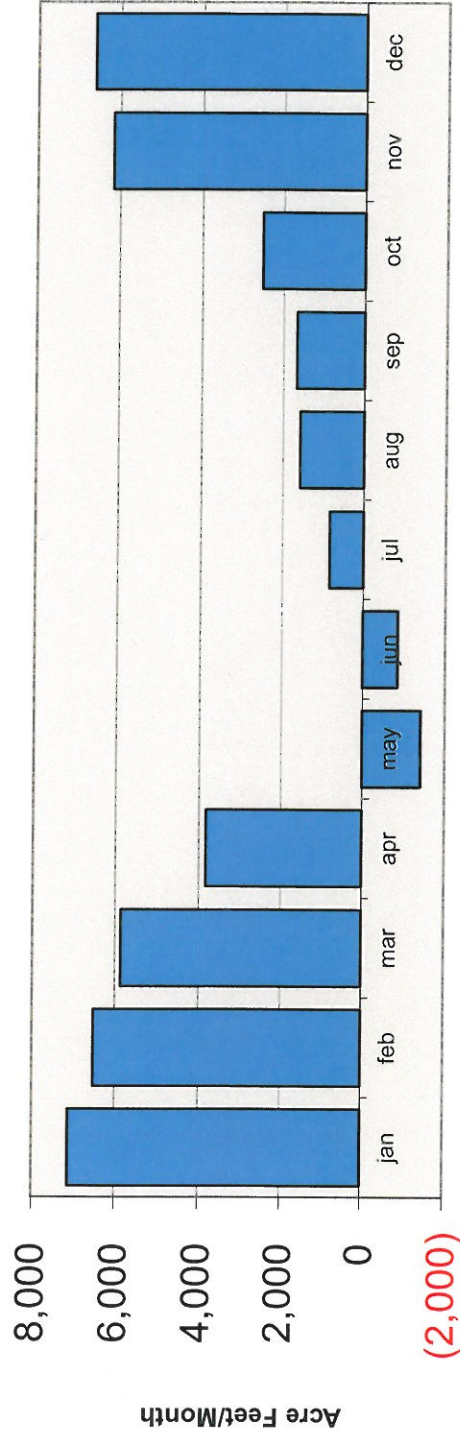
0.1771

1,436,818

Based on average % water supply sources (see table below)

Based on original Transit Loss Assumptions, Paragraph C of CPFD

Cumulative Accretions/Depletions Effects at Julesburg



Month

(Acre--Feet Per Month); Negative values in ()

Seasonal Accretions/Depletions	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec	total
Transbasin Imports	5,190	4,879	4,281	3,519	2,166	1,595	1,237	1,524	1,275	1,865	4,393	4,642	36,567
Nontributary Groundwater	388	386	388	513	423	240	201	202	161	263	479	484	4,127
In-basin Agricultural Conservation	70	70	66	151	303	168	123	123	123	67	61	70	1,392
Water Reuse	(23)	(23)	(47)	(268)	(857)	(340)	(618)	(556)	(232)	(145)	(20)	(23)	(3,153)
New Native South Platte Flow Development	1,505	1,213	1,176	(91)	(3,449)	(2,513)	(116)	279	333	458	1,250	1,434	1,478
Total Accretions/Depletions	7,130	6,525	5,863	3,824	(1,414)	(851)	827	1,572	1,659	2,508	6,162	6,606	40,411
Total Accretion/Depletion, cfs	116	117	95	64	(23)	(14)	13	26	28	41	104	107	

(2,264)

May+Jun
Total

Depletion

Regional % Water Supply "Mix" for new population for 2020-2024

	Northern	Central	Southern
Transbasin Imports	49.8%	38.2%	4.8%
Nontributary Groundwater	0%	0.2%	44.4%
In-basin Agric. Conservation	23.6%	12.4%	0%
Conservation	19.9%	29.7%	30.5%
Water Reuse	0.4%	12.8%	12.2%
Native S. Platte Flow Development (first use after July 1, 1997)	6.3%	6.7%	8.1%
Total	100.0%	100.0%	100.0%



COLORADO
Department of Local Affairs
Office of the Executive Director

April 20, 2021

Jojo La
Endangered Species Policy Specialist
Colorado Department of Natural Resources
1313 Sherman St. Room 718

Dear Ms. La:

According to the Platte River Recovery Implementation Program the State Demography Office shall report annually population changes in each of the three regions and in Jackson County.

On the second page you will find a table with the defined regions and the State Demography Office (SDO) estimates for January 2020 and forecast for January 1, 2021 and population increase for the period. The population is expected to increase by 41,703 in the whole South Platte River Basin between January 1, 2020 and January 1, 2021.

You have also asked for the population estimates and forecasts for Jackson County for the same time period. Their estimates and forecasts are January 1, 2020 = 1,376 and January 1, 2021 = 1,363, and the expected decline to be 13 people. With changes these small and margins of error, the population is considered to be flat.

Please be aware the estimates and forecasts are produced as vintages and will be revised annually. The data for these estimates and forecasts are based on vintage 2019 work and released November 2020. The estimates will change based on updates to administrative records. The forecast will change dependent upon economic and social conditions within the state and nationally. These data are available on our webpage at: demography.dola.colorado.gov.

Please contact me with any questions regarding the estimates and forecasts.

Regards,

**Elizabeth
Garner**

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Elizabeth Garner
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Elizabeth Garner
State Demographer
Colorado Department of Local Affairs





COLORADO
Department of Local Affairs
 Office of the Executive Director

Colorado Population Estimates and Forecasts - Platte River Recovery Implementation Program
 Source: State Demography Office, Department of Local Affairs April 2021.

% Dist.
 Jan 2020
 27%

62%

11%

Counties	SDO Jan 2020	SDO Jan 2021 Forecast	Pop. Change 2020-21
Boulder	327,758	328,883	1,125
Broomfield 55%	39,226	39,893	667
Larimer	359,128	363,352	4,224
Logan	21,999	22,137	138
Morgan	28,957	29,021	64
Phillips	4,265	4,243	-22
Sedgwick	2,224	2,210	-14
Washington	4,734	4,717	-17
Weld	327,829	335,218	7,389
Total Northern Region	1,116,120	1,129,674	13,554
Arapahoe 90%	593,497	598,632	5,135
Adams	521,073	527,186	6,114
Broomfield 45%	32,094	32,640	546
Clear Creek	9,750	9,758	8
Denver	732,919	740,532	7,614
Gilpin	6,204	6,186	-18
Jefferson	584,211	586,479	2,268
Park	18,921	19,062	141
Total Central Region	2,498,668	2,520,474	21,806
Arapahoe 10%	65,944	66,515	571
Douglas	354,358	359,541	5,184
Elbert	27,001	27,590	589
Total Southern Region	447,302	453,646	6,343
South Platte River Basin Total	4,062,090	4,103,793	41,703

SDO - State Demography Office, November 2020



Appendix A for Colorado's Plan for Future Depletions (CPFD) 2020 Annual Report

Colorado and SPWRAP have done a review in 2020 of the current mixes of water sources supplying the new population growth in the South Platte River Basin in Colorado. New population growth is that occurring after the baseline of July 1, 1997. This review collected data from municipalities for the last 5-year reporting period (2015-2019) of the first increment of the PRRIP and the results of this review will be used for the first 5 years (2020-2024) of the PRRIP Extension period.

A 2020 Questionnaire (attached to this Appendix A) was supplied to municipal SPWRAP members. Due to Covid closures, delayed responses were received throughout 2020 but at the end the response represented about 75% of the overall population in the Colorado South Platte River Basin. The results are summarized based on the three regions of Northern, Central and Southern defined by counties as shown in Figure 1. The Northern Region major cities are Fort Collins, Boulder, Loveland, Greeley, Fort Morgan and Sterling, the Central Region major cities are Denver, Aurora, Thornton and Westminster and the Southern Region major cities are Parker and Castle Rock. All these cities and others returned the Questionnaire.

There are four basic sources of water coming to South Platte Basin municipalities for meeting demand and those are (1) native South Platte flows, (2) transbasin mainly from Colorado river basin, (3) nontributary from mainly Denver basin aquifers and (4) in-basin agricultural conversions. A 5th supply is reuse mainly by exchange of the basic supplies and a 6th supply comes from conservation of the basic supplies. Reduced per capita use of the basic supplies from conservation results in a new supply of water to meet population growth. The PRRIP approved CPFD computation process assumes that native South Platte supplies first used after the July 1, 1997 baseline supply new population growth after July 1, 1997 while native South Platte supplies with priorities and utilization before July 1, 1997 are for populations existing before July 1, 1997.

Native South Platte Flow Development: Restating the above, old established native South Platte water rights of municipalities are assumed to be the water supply for population levels before July 1, 1997 while supplies first in use after July 1, 1997 are the native South Platte supplies for the new growth. Contrast this to the other basic supplies of transbasin imports, nontributary groundwater and in-basin agricultural conversion which are used to meet water needs for both old and new populations. The amount of new native South Platte supplies available after July 1, 1997 is controlled by whether such post 1997 water rights and use are in-priority and available because the river call is junior to July 1, 1997. Table 1 shows the river calls by month and year over the first increment of PRRIP and shows a comparison of the average percent of time this junior water right is in-priority between the first and last part of the first increment. For the last 5 years (2015-2019), a junior July 1, 1997 water right was in-priority 1.4 times more often than at the start of the first increment for the period 2010-2014. This 1.4 factor is multiplied by the percent of new native South Platte flows for each region that has been used in the CPFD accounting to obtain the percent to be used now for the next 5 years.

Conservation: Over the past decade, municipalities have instituted extensive water conservation plans as part of their future growth planning along with concerns over recurring droughts and longer-term climate change issues effecting water supplies. In review of municipal conservation plans, water providers initiated significant programs including replacing toilets, shower heads, and clothes washers with lower use fixtures; turf replacement programs; tiered conservation-oriented seasonal rate fees; restrictive covenants to save water on new growth; expanded targeted industry outreach to improve efficiency and conservation kit

giveaways. Cities state that gradual declines in water use at existing homes have more than offset the increase in demand from new residents and businesses over the past decade.

As listed in Table 2 the overall M&I water use per capita per year from the Questionnaire for the three regions weighted by population in each region is 0.1581 ac-ft/person/year (141 gpcd; gallons per capita per day). The Table 2 values for acre-feet of treated water use comes from the SPWRAP assessment forms used to collect SPWRAP dollar fees and were submitted with the 2020 Questionnaires. Along with homes, this per person value includes commercial and industrial use supplied by cities. This value compares with the region weighted value of 0.1573 determined for 2015 and 2019 from the Colorado Water Conservation Board (CWCB) State Water Plan Update (July 15, 2019) and CWCB Water Efficiency reports. These State reports also included a value for self-supplied industries (SSI) where that value weighted by population in the three regions is 0.0190 ac-ft/person/year. The SSI's are large commercial/industries such as mega-feedlots/dairies, thermoelectric power generation from eight facilities, large self-sustained industrial (i.e., brewery) and oil and gas exploration/production. Therefore, the total weighted value for water use for M&I plus SSI is 0.1771 ac-ft/person/year ($0.1581+0.0190$) or 158 gpcd. The value used by Colorado for the past decade during the first increment of PRRIP has been 0.2504 (224 gpcd) and now at 0.1771 is a savings through conservation practices of 29% [$(0.2504-0.1771)/0.2504$].

Results: Table 2 and Figure 2 are the summary of the processing of the 2020 Questionnaires with results normalized to 100% and show the % of each water source by Region to be used for the next 5 years (2020-2024) of Colorado's CPFD accounting. Also shown are the prior values used for 2009-2019 for contrast. The bar chart of Figure 2 graphically contrasts these changes. A few observations on the new % mixes: (1) conservation had a major impact has shown in the % mix for the Southern region (30.5% currently versus 18.8% previously) but for the Northern and Central regions due to normalization to 100%, changed the % conservation very little because for the Northern and Central regions the % transbasin increased greatly for current and (2) water reuse dropped some in all regions because reuse by exchange mainly occurs when there is a river call but as shown in Table 1, there has been less river calls recently meaning more native South Platte flow use and less exchange reuse.

South Platte Water Related Activities Program, Inc. (SPWRAP)

2020 Questionnaire on Sources of Water Supply - Required for Colorado 3-States PRRIP reporting.

Have questions? Contact Jon Altenhofen PE at jaltenhofen@northernwater.org ; phone 970-622-2236; fax 970-532-2517; Address: Jon Altenhofen, Northern Water, 220 Water Avenue, Berthoud, CO 80513

Please return with 2020 Reporting Form & Assessment Invoice and Payment

Reporting Entity:	
Mailing Address:	County:
Email Address:	
Phone Number:	
Submitted By:	Date:
Title:	

Please fill in following blanks:

Years are calendar years (January-December) and Percentages estimated within 5%.

<u>Population Served with Treated Water</u>	<u>% of Treated Water for Industrial Uses</u>
2015-2019 Average	2015-2019 Average
_____	_____ %

For the Treated Water Use on your 2020 Reporting Form list the following % sources (should add to 100%):

2015-2019 Average

<u>% Transbasin Imports (All sources)</u>	_____ %	
<u>% Native South Platte Flow Development</u> (Surface Water and Tributary Groundwater)	_____ %	(% of this source first used after July 1, 1997 _____ %)
<u>% Nontributary Groundwater</u>	_____ %	
<u>% In Basin Agricultural Conversion (change cases)</u> (All acquired agriculture water rights)	_____ %	
	Total	<u>100</u> %

Water Conservation Question: Reduction in water use due to residential conservation will be computed from total gpcd for residential deliveries (gallons per capita per day):

5 year Average	5 year Average
2010-2014	2015-2019
_____ gpcd	_____ gpcd

Wastewater - Reuse/Exchange Question: % reuse of all sources actually reused after wastewater treatment (Directly after treatment--by pipeline or flow downriver for redistribution and indirectly by exchange/augmentation; Do not include reuse/exchange of wastewater fully consumable excess credits from change cases):

5 year Average	5 year Average
2010-2014	2015-2019
_____ %	_____ %

Please also provide by email, mail to above address or weblink, recent copies of your Municipal Water Supply Report and Water Conservation Report if publicly available. Weblink is _____

Figure 1: Populations for 3 Regions Based on Counties

CPFD computations based on population increases since July 1, 1997 for the 3 regions

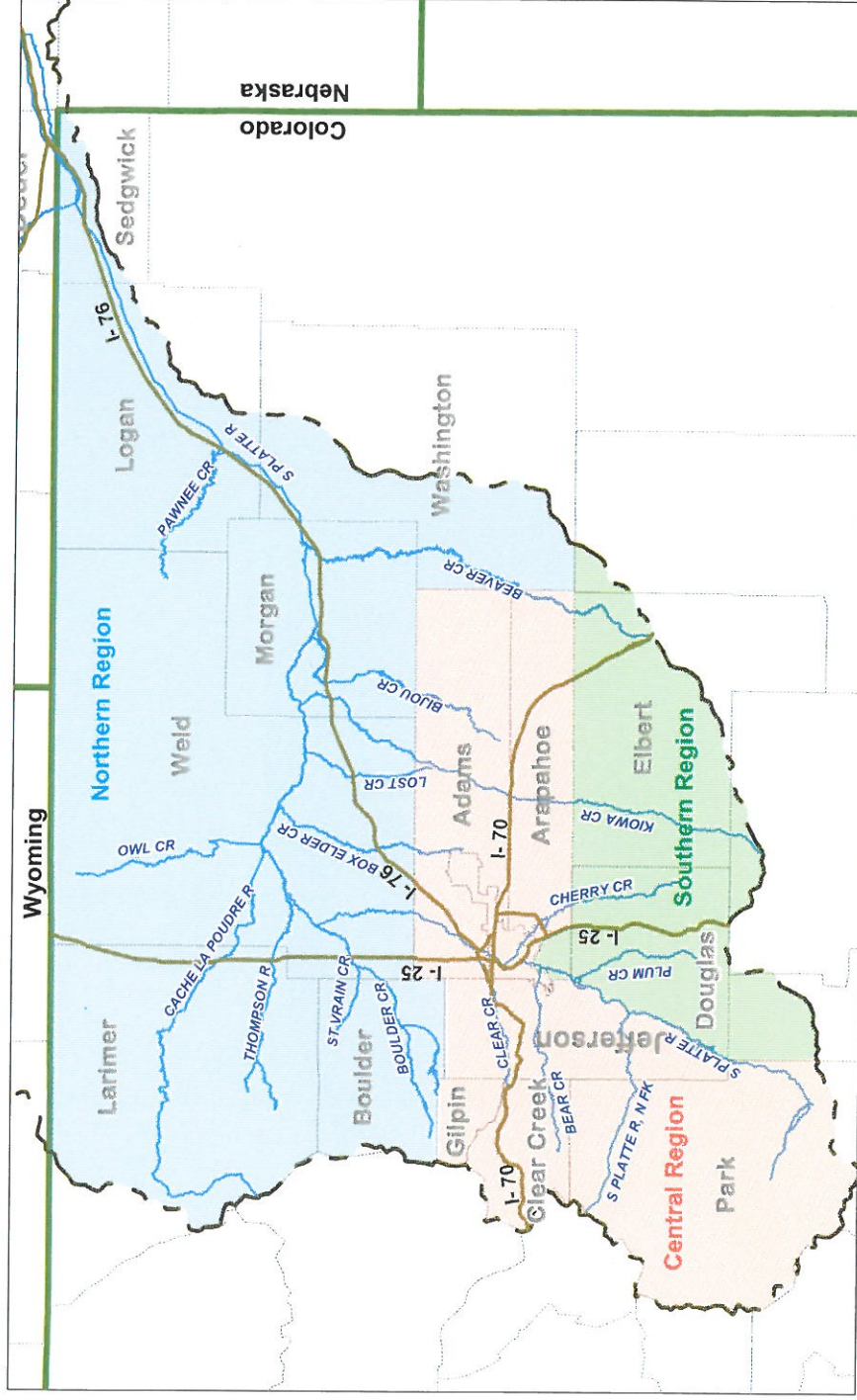


Table 1:

River Call Analysis for Characterizing New South Platte Native Water Supply after July 1, 1997 Baselineas Post 1997 baseline

% of days in a month that a July 1, 1997 priority is Out of Priority (OP) at Kersey (Analysis of daily calls)

Year	At Kersey River Gage			
	Apr	May	Jun	Jul
2010	10%	0%	9%	100%
2011	100%	50%	0%	0%
2012	100%	100%	100%	100%
2013	100%	100%	100%	100%
2014	28%	37%	0%	81%
2015	27%	0%	0%	0%
2016	0%	0%	12%	100%
2017	73%	46%	36%	100%
2018	72%	33%	68%	100%
2019	29%	69%	23%	60%
2020	12%	100%	100%	100%
Avg 2010-2014	68%	57%	42%	76%
Avg 2015-2019	40%	30%	28%	72%

Average In-Priority % (IP) for a July 1, 1997 priority date (1 minus OP)

	Apr	May	Jun	Jul
	32%	43%	58%	24%
Avg 2010-2014	60%	70%	72%	28%
Avg 2015-2019				

Diversion Pattern (DP) in Colorado Future Depletion Model for July 1, 1997 priority

Apr	May	Jun	Jul
5%	40%	50%	5%

Weighted In-Priority % for April thru July period weighted by monthly diversion pattern [Sum of (DP,mthly times IP,mthly)]

Avg 2010-2014	A	49.0%	Ratio B / A	
Avg 2015-2019	B	68.5%	1.40	July 1, 1997 right/use in priority 1.4 times more at end of first increment than at start

Table 2: Averages for 2015-2019 from 2020 Questionnaires and Comparison to Prior Values

Weighted by Population and Normalized to 100% for 2015-2019 AND USED FOR 2020-2024												
Region	AVG Populations from Questionnaire	AVG Acre-feet Treated Water Use/year	Ac-ft/person/yr	% Transbasin	% Nontributary Groundwater	% In-Basin Agric Conversion	% NEW Native South Platte	% Reuse	% Conservation	% Total		
	A	B	C=B/A	D	E	F	G	H	I	J=SUM(D:I)		
North	632,620	113,545	0.1795	49.8	0.0	23.6	6.3	0.4	19.9	100		
Central	2,225,952	340,976	0.1532	38.2	0.2	12.4	6.7	12.8	29.7	100		
South	160,101	22,817	0.1425	4.8	44.4	0.0	8.1	12.2	30.5	100		
Total		3,018,673										
Population Weighted Averages												
			M&I	0.1581	38.9	2.5	14.1	6.7	10.2	27.7	100	
			Self Supplied Industry, SSI	0.0190	Used in CPFD spreadsheet for 2020-2024							
			Total M&I+SSI	0.1771								
Prior values used for 2007-2019												
North				32.0	0.0	33.4	4.6	11.1	18.9	100		
Central				23.3	9.8	3.9	5.0	28.7	29.4	100		
South				21.1	40.7	0.2	5.6	13.7	18.8	100		

Figure 2: Comparison of % Water Mixes in 2009 versus 2020; (Normalized to 100%)

