ISSUE BRIEF

UNREPLENISHED GROUNDWATER WITHDRAWALS

ISSUE STATEMENT

In Arizona's active management areas (AMAs), unreplenished groundwater withdrawals by all water-using sectors, combined with a lack of sufficient incentives to either reduce withdrawals or mitigate the impacts, limit the State's ability to meet the AMA long-term groundwater management goals.

BACKGROUND

Unreplenished groundwater withdrawals refer to groundwater that is legally withdrawn **without requirement or obligation** to artificially replenish or replace that volume of water back into the aquifer and is not offset by incidental recharge. These withdrawals are also referred to as 'allowable groundwater'. Through Arizona's current regulatory framework, the State has sought to restrict the overall reliance on non-renewable groundwater supplies. The 1980 Groundwater Management Act (GMA or Code) was passed to specifically address issues associated with severe groundwater overdraft. The GMA established the Arizona Department of Water Resources (ADWR) to oversee the waters of the State and created AMAs where groundwater would be regulated by ADWR in order to mitigate the effects of groundwater withdrawals.

To do so, the State requires new development in the AMAs to occur on renewable water supplies and water users in all sectors are subject to mandatory conservation requirements that aim to reduce the amount of groundwater used over time. Despite these requirements, various existing and potential new groundwater users within the AMAs are permitted to continue or increase their use of unreplenished groundwater over time. Existing groundwater users' rights were originally grandfathered into the new management system, and other exceptions were made that allowed for the continued use of groundwater in all sectors. Since, by definition unreplenished groundwater withdrawals are not required to be replenished, the amount occurring in excess of natural groundwater recharge contributes to aquifer overdraft.

UNREPLENISHED GROUNDWATER WITHDRAWALS BY SECTOR

Groundwater use is authorized under various rights and permits within each water-using sector. The subsectors and the types of current and ongoing allowable groundwater withdrawals are described below:

Agricultural Sector

As part of the adoption of the Code, Irrigation Grandfathered Groundwater Rights (IGFRs) were granted that allow farmers to withdraw groundwater for irrigation use. No new IGFRs may be created and the amount of land that may be irrigated is limited to that which was historically irrigated between 1975 and 1979.[1] IGFRs represent a perpetual authority to withdraw groundwater without an artificial replenishment requirement. This type of groundwater withdrawal can be expected to continue, partly because the cost to pump and use groundwater is generally cheaper than the costs associated with delivering and using renewable supplies, when they are

[1] Phoenix Active Management Area Fourth Management Plan 11-3 (2020).

available.[2] Some irrigation districts delivering water to IGFRs serve as groundwater savings facilities (GSFs), enabling them to utilize renewable water supplies in lieu of groundwater in a given year. However, for water accounting purposes, ADWR legally considers the irrigation district's use of the renewable supply to be groundwater, because the volume of groundwater "saved" becomes a stored water credit (long-term or annual) for the entity who supplied the water; this functionally reduces the amount of groundwater in storage. This sector also includes groundwater demands associated with tribal agricultural uses.

Municipal Sector

The municipal sector is comprised of small and large undesignated and designated municipal water providers, both public- and privately-owned. Small municipal providers are those that use 250 AF or less water per year.[3] Thus, large providers are those that use more than 250 AF of water per year. In addition to these provider types, several entities are regulated as large untreated providers in the PhxAMA. These include both cities, towns, private-water companies and irrigation districts. A large untreated provider serves 100 or more AF per year or 500 or more people with untreated water for non-irrigation purposes, usually for residential or commercial flood irrigation of turf.[4]

Under both the Code and the Assured Water Supply (AWS) Program, several allowable groundwater uses were ascribed to the municipal sector because it was understood the sector would be allowed to grow and increase its overall water use through time.[5] However, some existing municipal groundwater uses were also exempt from the AWS Program. The Santa Cruz AMA was split off from the Tucson AMA around the same time that the other AMAs were adopting their AWS rules, and it has not yet adopted its own AWS Rules. Because of this, groundwater allowances and extinguishment credits are not available in the Santa Cruz AMA.

Pre-1995 Subdivisions – A number of subdivisions in the Phoenix, Pinal, Prescott, and Tucson AMAs, served by small and large undesignated water providers and platted before the 1995 adoption of the AWS Rules, are not required to replace groundwater use with renewable supplies, either directly or through membership in the Central Arizona Groundwater Replenishment District in the AMAs where it's an option. Groundwater continues to be pumped and delivered to these communities by undesignated providers across the four AMAs, without an artificial replenishment obligation.

Groundwater Allowances – Another type of municipal unreplenished groundwater withdrawal is the 'groundwater allowance' granted upon issuance of a Certificate or Designation of Assured Water Supply (CAWS or DAWS). Under the AWS Rules, a set volume of groundwater can be withdrawn by the CAWS-holder or DAWS provider and not be replenished or offset. These groundwater allowances, also referred to as 'Phase-in Credits' in some Designations, were initially designed to help municipal providers transition from groundwater to renewable supplies.[6,7] However, unless the credits are exhausted quickly, groundwater allowances have long-term availability and therefore can be expected to continue to contribute to overdraft. The AWS Rules in the Phoenix, Pinal, and Tucson AMAs also allow for an annual addition to the groundwater allowance equal to 4% of total demand, based on the assumption that this volume is being "returned to the aquifer" via incidental recharge and thus would not

[2] *Ibid*.
[3] *Id.* at 5-3.
[4] *Id*. at 3-10.
[5] Phoenix Active Management Area Third Management Plan 12-2 (1999).
[6] Prescott Active Management Area Fourth Management Plan 10-8 (2019).
[7] Phoenix Active Management Area Fourth Management Plan 11-4 (2020).

require replenishment.[8] In recent years, groundwater allowances have been utilized by designated and undesignated providers in the four AMAs where they are available.

Extinguishment Credits – Existing agricultural IGFRs, Type 1 retired IGFRs, or Type 2 non-irrigation grandfathered rights may be extinguished until the year 2025 for credits, known as 'extinguishment credits', and pledged to a municipal water provider or CAWS located in the same AMA. Credits pledged to a municipal provider are added to the groundwater allowance associated with that provider's DAWS or with a CAWS. The method of calculating extinguishment credits varies by AMA, as described in the AWS Rules.[5,9] Since pledged extinguishment credits are added to the groundwater allowance of a CAWS or DAWS per the AWS Rules, any volume withdrawn by municipal water providers would be embedded in the volume pumped against their groundwater allowances.[10]

Exempt Wells – Domestic exempt wells, those equipped to pump not more than 35 gallons per minute, are not regulated by ADWR nor subject to conservation requirements. The volume of pumping associated with these small wells is unmeasured and therefore contributes to the overall amount of unreplenished groundwater in all AMAs. ADWR creates estimates for these withdrawals each year based on the number of people in that AMA that are not served by municipal water providers.

Remediated Groundwater – Pumping of 'remediated groundwater' is incentivized in order to facilitate the treatment of contaminated groundwater, and it may also be deemed consistent with an AMA's management goal.[11] Although ADWR accounts for remediated groundwater differently than other groundwater in determining compliance with Management Plan conservation requirements, remediated groundwater retains its legal character as groundwater, and therefore contributes to overdraft in the two AMAs where it is permitted. In each of the Phoenix and Tucson AMAs, the amount of remediated groundwater pumping has averaged over 6,000 acre-feet per year. No remediated groundwater pumping has been reported in the Prescott, Pinal, or Santa Cruz AMAs to date.

Industrial Sector

The Code defines industrial use as a non-irrigation use of water, not supplied by a city, town or private-water company, including animal industry use such as dairies and feedlots, and expansions of those uses.[12] The industrial sector has no renewable water resource requirements, yet it is expected to grow along with municipal growth as it is largely dependent on population growth and the economy.[13,14] It includes electric power plants, sand and gravel facilities, turf facilities[15], mining, dairy, cattle feedlots, and other industrial uses. Industrial users withdraw water from their own wells and may acquire new groundwater withdrawal permits, called General Industrial Use Permits, from ADWR. They also may purchase or lease non-irrigation GFRs, which are an authority to pump groundwater for non-irrigation use (e.g., Type 1 retired IGFRs and Type 2 non-irrigation GFRs). Many of the industrial subsectors utilize a combination of these authorities. There is no regulatory or statutory authority at this time to require industrial water users to convert to renewable supplies.[16]

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[8] Arizona Administrative Code, Title 12, Chapter 15, Sections 724(A)(4), 725(3), and 727(A)(4).
[9] Arizona Administrative Code, Title 12, Chapter 15, Sections 724, 725.01, 726 and 727.
[10] Arizona Administrative Code, Title 12, Chapter 15, Section 723.
[11] Arizona Administrative Code, Title 12, Chapter 15, Section 729.
[12] Phoenix Active Management Area Fourth Management Plan 3-10 (2020).
[13] Phoenix Active Management Area Third Management Plan 12-2 (1999).
[14] Phoenix Active Management Area Fourth Management Plan 3-10 (2020).
[15] "A turf-related facility is any facility, including schools, parks, cemeteries, golf courses, or common areas within a housing subdivision, with ten or more acres of water-intensive landscaped area." Phoenix Active Management Area Fourth Management Plan 6-2 (2020).
[16] *Id*. at 11-3.

Summary of Unreplenished Demand by Sector

Table 1 provides a breakout of 2012 through 2016 average annual groundwater demand pursuant to the unreplenished groundwater types described in this brief, by sector and AMA. These values include groundwater demands such as pumping and GSF demand, but do not include the recovery of water stored underground that is not legally classified as groundwater, such as effluent that had been stored for long-term storage credits. All values are shown to illustrate the extent to which allowable groundwater rights are exercised in each AMA. The table also includes the offsets to those demands that can be attributed to a given sector. Groundwater withdrawals, in combination with the use of other water supplies, may contribute to incidental recharge. CAGRD replenishment is also accounted for under the municipal sector. Overall, certain artificial recharge offsets are provided by sector in order to demonstrate the final average unreplenished groundwater demand by sector and AMA.

IMPACTS OF UNREPLENISHED GROUNDWATER WITHDRAWALS

One of the most difficult challenges for the State is that for the past 40 years, each water use sector has become accustomed to utilizing the various types of allowable groundwater withdrawals. Water users have made investments and economic decisions based upon these groundwater rights and their associated costs under the current framework. At the same time, rigorous groundwater management goals have been established in the AMAs. The State has recognized that unreplenished or "residual" groundwater withdrawals create a hurdle for AMAs to reach their respective management goals. In regard to the Phoenix AMA, ADWR acknowledged in its Third Management Plan that the authorization of continued groundwater use under the Code "was not made with a full understanding of its relationship to the attainment of safe-yield."[17] In addition, the continued and further development of these groundwater rights and withdrawal exemptions will exacerbate water management challenges, including overdraft and physical availability of groundwater, no matter what the management goals may be beyond 2025.[18]

In looking forward to the next 40 years, it is critical to assess the relationships between these types of groundwater withdrawals and their impact on the ability to achieve AMA management goals. Based on the perpetual nature and volume of these rights and exemptions alone, the State will need to determine whether additional conservation requirements, reductions in groundwater withdrawals, or other mitigating actions would provide a counterbalance to the amount of legally permitted groundwater withdrawals. Natural, incidental, and artificial recharge in each AMA has been and will most likely continue to be less than the volume of allowable groundwater withdrawals.[19] ADWR and other entities have proposed several programs and authorities that might better align groundwater demand with the AMA goals and reduce the instances of groundwater declines, but none of those proposals have been substantially implemented.

[17] Phoenix Active Management Area Third Management Plan 12-5 (1999).
[18] DRAFT Pinal Active Management Area Fourth Management Plan 11-4 (2020).
[19] *See* ADWR Phoenix Active Management Area Fourth Management Plan (2020); ADWR Phoenix Active Management Area Third Management Plan 12-6. (1999); ADWR AMA Annual Supply and Demand Dashboard. Online Dataset. Accessed April 1, 2020. https://new.azwater.gov/ama/ama-data.

Table 1: 2012-2016 Average Unreplenished Groundwater Demand by AMA and Sector (AF/yr)

	Active Management Area				
Sector and Type	**Prescott**	**Phoenix**	**Pinal**	**Tucson**	**Santa Cruz**
GROUNDWATER DEMAND 5-Year Average (2012-2016)					
Agricultural Sector	**1,939**	**623,307**	**611,059**	**101,784**	**10,134**
Groundwater	1,939	350,586	422,694	76,666	10,134
GSF Accounting	-	179,935	124,841	24,909	-
Tribal	-	92,786	63,524	209	-
Municipal Sector	**12,970**	**226,061**	**30,996**	**36,345**	**6,448**
Large Designated Providers	4,584	54,040	9,671	12,290	3,121
Large Undesignated Providers	5,098	89,468	16,290	16,560	2,845
Small Providers	1,062	3,688	1,521	4,046	313
Large Untreated Providers/Urban Irrigation	-	68,690	21	-	-
Domestic Exempt Well Demand	2,227	10,175	3,494	3,450	170
Industrial Sector	**1,592**	**107,024**	**18,273**	**57,107**	**1,161**
Sand & Gravel	316	11,311	570	3,855	150
Mining	-	30	-	35,995	-
Turf	976	58,972	4,016	10,773	886
Electric Power	-	11,617	-	1,591	-
Dairy	-	11,216	9,414	131	-
Cattle Feedlots	-	85	1,755	-	-
Other	300	13,793	2,518	4,762	125
OFFSETS TO GROUNDWATER DEMAND 5-Year Average (2012-2016)					
Agricultural Sector					
Incidental Recharge	1,419	467,183	250,668	22,036	2,375
Municipal Sector					
Replenishment (CAGRD)	-	35,942	394	2,796	-
Incidental Recharge	-	67,968	1,461	6,401	-
Industrial Sector					
Incidental Recharge	238	9,149	786	5,322	148
UNREPLENISHED GROUNDWATER DEMAND* 5-Year Average (2012-2016)					
Agricultural Sector	520	156,125	360,391	79,748	7,758
Municipal Sector	12,970	122,151	29,142	27,148	6,448
Industrial Sector	1,354	97,875	17,487	51,785	1,013

*Average Unreplenished Demands are not the same as average Overdraft because they do not include natural recharge components.