## 12.1 INTRODUCTION

The Fourth Management Plan (4MP) programs were developed within current statutory guidelines. However, as described in Chapters 8 and 10, full implementation and complete compliance with the conservation requirements outlined in Chapters 4, 5, and 6 are unlikely to reverse the groundwater overdraft currently experienced in the basin and result in the achievement of the Prescott Active Management Area (PRAMA) goal to achieve safe-yield by the year 2025. The PRAMA communities are facing water management challenges due to the lack of sufficient and multiple renewable supplies. They lack access to Central Arizona Project (CAP) supplies and locally available surface water supplies within the PRAMA are hydrologically or legally limited.

## 12.2 WATER MANAGEMENT ISSUES

Although current statutes and rules require new growth in the PRAMA to be consistent with the goal of safe-yield, many existing uses are not subject to this requirement. In addition, land subdivided prior to the adoption of the Groundwater Code (Code) is not required to be developed in a manner consistent with the PRAMA goal. Therefore, groundwater overdraft in the PRAMA may continue and could increase above current rates. Some individuals have recommended that ADWR impose greater restrictions on groundwater pumping in the PRAMA. However, the Arizona Department of Water Resources (ADWR) does not have statutory authority to do so. Imposing additional conservation measures and increasing and carefully managing underground water storage and recovery can be accomplished by local authorities and individual water users through local ordinances and self-regulation.

As previously stated, non-groundwater water supplies in the PRAMA are limited. With full allocation of PRAMA groundwater supplies, new growth becomes dependent on acquiring and utilizing renewable or augmented supplies. The PRAMA surface water supply is inconsistently available, depending on weather and climatic conditions, and is subject to the rights of downstream senior appropriators and prior agreements based on surface water claims and the pending Gila River General Stream Adjudication. The reclaimed water supply is derived from water delivered for municipal uses and collected into centralized wastewater systems and infrastructure. Thus, its availability is a function of the availability of other water supplies, interior water demand, and the proportion of the population on sewer systems. The feasibility of importing water supplies continues to be examined by PRAMA municipalities and other interested parties but, to date, these supplies are not available to PRAMA water users.

The Safe-Yield Subcommittee of the PRAMA Groundwater Users Advisory Council identified numerous impediments to achieving safe-yield in its 2006 “Final Report on Safe-yield Impediments, Opportunities, and Strategic Directive.” These included the issues described below, as well as other issues. This study also identified next steps and potential solutions. In April 2013, the Central Yavapai Highlands Water Resources Management Study (US Bureau of Reclamation, 2013), referred to as CYHWRMS, identified several options to augment water supplies in the PRAMA and other areas in the Central Yavapai Highlands. Many of the ideas for next steps and solutions described in CYHWRMS are included in this chapter.

The following section describes in detail the major water management issues facing the PRAMA during the fourth management period and beyond.

### 12.2.1 Allowable Pumping

Under existing law, several categories of water users, both existing and potential new users, may withdraw groundwater without replenishing, or replacing, that volume of water back into the aquifer. These uses contribute to overdraft and, under current regulations, may increase and continue in perpetuity.

***Agricultural Sector***

Irrigation Grandfathered Groundwater Rights (IGFRs) allowing farmers to withdraw groundwater for agricultural purposes were granted at the time the Code was adopted. No new IGFRs may be created, but existing rights may be conveyed to new owners, converted to Type 1 Non-Irrigation Grandfathered Rights (GFRs), or extinguished for credits to support demonstration of Assured Water Supply (AWS) consistency with management goal. The trend through 2012 in the PRAMA shows that many IGFRs have been inactivated from agricultural use and extinguished. IGFRs that remain represent a perpetual authority to withdraw groundwater without a replenishment requirement, though this volume is relatively small in comparison to domestic, municipal and industrial water uses.

***Industrial Sector***

The future use of Type 1 and Type 2 GFRs depends on the potential for growth in non-irrigation groundwater use. Historically, industrial demand in the PRAMA has been fairly stable and largely associated with golf course use. However, there is about 8,000 acre-feet of industrial groundwater allotment that could be used and represents additional authority to pump groundwater. As with IGFRs, there is no requirement for Type 1 and Type 2 GFRs to replenish their groundwater use.

Additionally, the Code gives the director the authority to issue several types of groundwater withdrawal permits. Many of these are short term uses, for exploratory or de-watering purpose. A longer term permit is a General Industrial Use (GIU) permit. The Code allows GIUs to be issued for up to 50 years and which may be renewed. There is no requirement for any of the users of water pursuant to these permits to replenish their groundwater use.

There are many factors that impede the ability of industrial users to use renewable water supplies, including lack of proximity to renewable supplies, reliability of supply, cost, supply ownership, infrastructure, and water quality issues. Although there are no significant water quality problems associated with using reclaimed water on turf-related facilities in the PRAMA, use of this source by other Industrial users could, depending on the industrial process, require additional treatment to remove salts, organics, and other constituents.

***Municipal Sector***

The municipal sector is the dominant water use sector in the PRAMA. Municipal demand more than tripled between 1985 and 2010, increasing from less than 4,800 to approximately 16,500 acre-feet by 2012. The degree to which municipal groundwater use must be replenished has evolved over time, as described below:

- Prior to the adoption of the statewide Water Adequacy Program in 1973, no determination or evaluation of the water supply for future development was required, and there was no requirement for new development to replenish the groundwater it would use.

- From 1973 until 1980, the Water Adequacy Program was in effect statewide, requiring developers to disclose the adequacy of the water supply to new home buyers. However, a determination that the water supply was inadequate did not prevent the development from moving forward. The Water Adequacy Program does not require groundwater to be replenished.

- In 1980, the Groundwater Code established the Active Management Areas (AMAs) and required a 100-year AWS for new subdivisions within those AMAs. Alternatively, a municipal water provider may choose to prove an AWS for their entire water service area. To prove an AWS, a developer or a municipal provider must demonstrate five criteria:

    - the water supply for the new development is physically, legally and continuously available;
    - the developer has the financial capability to construct any infrastructure necessary to provide water to the new development;
    - the proposed water supply meets water quality standards;
    - the water supply is consistent with the management plan of the Active Management Area (AMA); and
    - the water supply is consistent with the management goal of the AMA.

    To prove consistency with the safe-yield water management goal, groundwater use must be limited and replenished, or renewable supplies must be used in place of groundwater.

- In 1995 AWS Rules were adopted which further defined and explained how an AWS is proven. At that time, the PRAMA was considered to be at a state of safe-yield and the consistency with goal requirement was not required for AWS applicants in the PRAMA.

- In 1999, the director declared that the PRAMA was no longer in safe-yield (this period is referred to as post-declaration). Since then, new developments applying for an AWS have been required to meet all of the AWS criteria including consistency with the AMA goal. To do this, nearly all new development in the PRAMA has been using extinguishment credits, which are generated from the permanent extinguishment of grandfathered groundwater rights, and then pledged to the new subdivision.

Under the AWS Rules, ADWR must consider the water demand associated with pre-Code plats and previously issued determinations of AWS and Adequacy as "committed demand" when determining whether there is additional physical availability of groundwater in the AMA's aquifers for new applications for AWS. In the PRAMA there are currently many lots making up committed demand that are not required to meet consistency with the AMA goal. Of the estimated 4,000 – 5,000 acre-feet of potential demand associated with platted but not yet built lots in the PRAMA, only 550 acre-feet are associated with post-declaration (issued after 1999) subdivisions which have been required to meet the consistency with goal criterion. This means that much of the current growth potential in the PRAMA can result in additional groundwater overdraft with no further review of groundwater availability by ADWR and no requirement for replenishment. This presents a large challenge to the PRAMA safe-yield goal. For a more detailed discussion of committed demand, see Appendix 12-1.

***Exempt Wells***

Unlike the larger AMAs in central Arizona, exempt wells (wells that pump less than 35 gallons per minute) are a significant factor in achievement of the management goal in the PRAMA. As of 2012, the PRAMA population that is self-supplied by exempt domestic wells was greater than the population served by Small Municipal Providers. Although Small Providers are required to report their water use annually to ADWR and have limitations on water wasting and on lost and unaccounted for water, exempt well owners are exempt from all regulatory programs. ADWR lacks the authority to impose any conservation requirements on exempt well water use, and ADWR cannot require exempt well owners to meter and report water use data. For purposes of the Assessment and the 4MP, ADWR estimated that each person self-supplied via an exempt well would use 90 gallons per capita per day. This estimate is based on the 3MP single-family interior and exterior water use models for new development. Given the absence of reporting requirement and metering, ADWR has little data on exempt well uses, but preliminary examinations have revealed that there is wide variation in the annual water use among exempt well owners.

***Groundwater Allowance***

Post the 1999 declaration, the consistency with goal provision of the AWS Rules has been in effect in the PRAMA. However, pursuant to the AWS Rules, a certain volume of groundwater is allowed to be used and not replenished or offset. These groundwater allowances are designed to help municipal providers transition from groundwater to renewable supplies and to allow legal pumping of groundwater during periods when renewable supplies are unavailable.

When a Designation of Assured Water Supply (DAWS) or Certificate of Assured Water Supply (CAWS) is issued, a groundwater allowance account is established. ADWR may credit additional allowable groundwater to these accounts under certain conditions. The AWS Rules describe under what circumstances the groundwater allowance can increase. The amount of allowable groundwater granted to new applicants for DAWS and CAWS is reduced over time, reducing to zero groundwater allowance in 2025 in the PRAMA.

The AWS Rules also allow for adding credits to the groundwater allowance of a DAWS or CAWS through extinguishing grandfathered rights (IGFRs, Type 1 and Type 2 rights) within the same AMA. The methods of calculation of these extinguishment credits described in the AWS Rules and are different for each AMA. Groundwater use reported pursuant to the water provider's or subdivision's allowable groundwater volume is considered consistent with the management goal of the AMA and is not required to be replenished, but physically contributes to overdraft.

### 12.2.2 Underground Storage and Recovery

Not all recovered water is equal under the AWS Rules. When water is stored and recovered from the same area, the stored water recharges the aquifer in the same location as the wells are withdrawing it, and the stored water is adding physical availability to the wells that recover the water from within the area of impact of storage (AOI). Historically, the majority of the recovered water in the PRAMA has not been within the AOI. The result of this strategy is water level declines in the vicinity of the recovery wells.

The location of water storage is important for hydrologic reasons as well. Work done by Doug McMillan and presented to the Coconino Plateau Water Advisory Council in January 2013 (McMillan, 2013) indicates that the ideal locations for underground storage and recovery in the PRAMA are: (1) along Granite Creek, just north of Watson and Willow Lakes and continuing linearly for some distance north

within the AMA, and (2) along the Agua Fria River near Prescott Valley. This is corroborated by ADWR's most recent calibration of the PRAMA groundwater model. Prescott Valley is already permitted to store a large volume of water near the Agua Fria, and this area has limited additional potential for storage beyond Prescott Valley's recharge permit volumes. However, there is significant hydrologic potential to store additional water along Granite Creek in addition to the projects already located in this area.

### 12.2.3 Conservation

Efficient use of all water supplies is prudent, especially in the arid southwest. While ADWR conservation programs encourage efficient use of all water supplies, conservation alone will not result in the achievement of safe-yield in the PRAMA. As described in Chapter 11 of this plan, modifying the interior and exterior models for new residential water demand resulted in less than 1,500 acre-feet of annual water savings by the year 2110 in Scenario B and about 3,000 acre-feet of annual water savings by the year 2110 in Scenario C. Annual demand increased by 73 percent (more than 40,000 acre-feet) over the year 2012 demand in all three scenarios. If the projected growth does not occur, the AMA can sustain safe-yield for longer, but for the PRAMA to grow, conservation, augmentation and multiple other water management strategies will be necessary to achieve and maintain safe-yield beyond 2025.

***Municipal Gallons Per Capita Per Day Program and the Non-Per Capita Conservation Program***

The Gallons Per Capita per Day (GPCD) conservation program is only available to large municipal water providers who hold a DAWS. Large providers without a DAWS must be regulated under the Non-Per Capita Conservation Program (NPCCP), which is a best management practices (BMP) program. Regulatory compliance in the NPCCP is based on the implementation of BMPs and reporting requirements, not on achievement of a specific reduction in water use. The Code requires that the NPCCP be designed to achieve water use *efficiency* in the service areas equivalent to the water use efficiency assumed in establishing the GPCD requirements. However, this does not necessarily mean that providers in the NPCCP will achieve the same GPCD *rate* as they would if regulated under the GPCD program. Customers within the service area of a NPCCP provider might be extremely efficient in their use of water; however, the provider's service area could be growing disproportionately between the residential and non-residential sectors. By adding more non-residential demand than residential, even if the new uses are extremely efficient, a provider's GPCD rate is likely to increase, as demand is added without adding commensurate population to keep the GPCD low.

The Code prescribes that the 4MP include, if feasible, additional conservation requirements for non-irrigation uses. The Municipal Conservation Program is included in the category of non-irrigation uses for the 4MP. In the PRAMA, the feasibility of additional conservation varies by water provider. Some providers have almost entirely new service areas, with new homes, low water using landscapes, and, low-flow plumbing fixtures compliant with the current national plumbing code. Consequently, the potential for further reductions in GPCD rates of these providers is low during the management period. Some providers may experience reductions in GPCD rates without implementing any additional conservation measures if the proportion of residential to non-residential demand shifts to be more residential. Reduction or lack of growth in commercial and industrial uses within a service area can result in lower GPCD rates without any increases in efficiency. Reductions in GPCD *rates* do not necessarily mean that a municipal water provider is increasing water use *efficiency*.

It should be noted that there are now available plumbing fixtures with flow rates lower than the national plumbing code. These products are labeled "WaterSense" *(see*

*http://www.epa.gov/watersense/about_us/what_is_ws.html).* WaterSense is a partnership program with the United States Environmental Protection Agency that seeks to protect the future of the nation's water supply. The City of Prescott is a WaterSense partner. As an example of local action, the City of Sierra Vista in Cochise County passed a water conservation ordinance in January of 2013 adopting the WaterSense program for future residential development. Sierra Vista was the first community in the nation in which all new homes will potentially be eligible for WaterSense certification. http://www.kvoa.com/news/sierra-vista-first-community-in-the-u-s-to-adopt-epa-watersense-standards/

### 12.2.4 Reclaimed Re-Use

The PRAMA has a long history of the use of reclaimed water for watering turf-related facility landscaping. However, ADWR regulatory authority and programs have not historically required the same standard of efficient water use for reclaimed water as it has for groundwater and other sources of supply. As an incentive, the Turf Program in the Industrial Sector allows for each acre-foot of reclaimed water used by a turf facility to be counted as 0.6 acre-foot of water when compliance with the turf facility's maximum annual water allotment is determined. This incentive was originally included in the management plans to encourage the replacement of groundwater with reclaimed water in the turf sector. Continuation of this incentive should be reviewed and possibly removed or reduced during this or future management plans.

Use of septic systems reduces the amount of wastewater that may be reclaimed and reused and septic system leachate cannot be directed to areas experiencing water level declines. In contrast, wastewater collected through a centralized sewer system may be treated and stored underground under an enhanced aquifer management strategy. In Chapter 11 of this plan, the projected scenarios assume that all new growth in the PRAMA will be connected to a sewer system, whether served potable water via a central distribution system or exempt wells. This results in a significant volume of reclaimed water that will be available for storage and replenishment or recovery within the area of impact of storage.

There is currently no cut to the aquifer applied to the storage of reclaimed water at a constructed underground storage facility as there is for storage at a managed facility, or storage of CAP water in AMAs with access to CAP water (Phoenix, Pinal, and Tucson AMAs). This means that 100 percent of the water sent to underground storage, minus evaporative losses and other debits, is recoverable. The merits of the general benefit to the AMA of applying a cut to the aquifer vs. all effluent credits residing with individual storing parties requires further examination and debate in PRAMA.

### 12.2.5 Limits on Use of Surface Water Supplies

In 1998, the City of Prescott (City) and the Chino Valley Irrigation District (CVID) entered into an agreement whereby the City would make recovered reclaimed water available to CVID and, through a sever and transfer, obtain the surface water rights of the district. In years prior to the agreement, the CVID managed Watson and Willow Lakes to meet the needs of agricultural water users. The City has been recharging water from the lakes; however, this is complicated and restricted by a court ordered stipulation between CVID and SRP that precludes recharge from the lakes prior to April 1 or after November 30, leaving only a 90 day window for recharge. In addition, City residents have expressed a desire to maintain a sufficient volume of water in the lakes for recreation. These recharge restrictions and recreational priorities limit the utility of this supply to support the City's DAWS. For more information see http://www.cityofprescott.net/_d/water_mgmt_policy.pdf and http://www.cityofprescott.net/_d/annual_report_bw_waterresources2.pdf.

The City of Prescott also has surface water rights for Banning Creek (Goldwater Lake), the Hassayampa River, and Del Rio Springs for more than 3,000 acre-feet per year. However the City does not have plans to use those rights to support its DAWS in the foreseeable future. This source could be used to replace groundwater pumping which would move the AMA closer to safe-yield. It should be noted that inclusion of these locally available supplies in a DAWS is not a prerequisite for their use. Shifting existing demand from groundwater to surface water supplies would serve to advance the PRAMA toward safe yield and/or reserve the groundwater for future use.

### 12.2.6 Timing, Cost and Impacts of Imported Supplies

Currently water users in the PRAMA have the authority to import groundwater from the Big Chino Sub-basin outside of the PRAMA. Although a pipeline is planned, there are several issues surrounding the importation of this supply, including potential costs and whether other water users could be affected. In addition, the timing of the construction of the pipeline may be an issue if new development is dependent on that supply to proceed.

### 12.2.7 Rainwater Harvesting

The idea of rainwater harvesting is supported by some local interests as a possible source of water supply for the PRAMA. Rainwater harvesting would require increased administration and monitoring by ADWR. In addition, it has not yet been shown that capture of rainwater can be conducted in a manner that renders downstream senior water right holders unharmed. Further examination of this issue is warranted and is under review at the legislature. Local pilot projects examining the feasibility of this alternative are planned. None have been constructed to date.

## 12.3 POSSIBLE SOLUTIONS

During the fourth management period, ADWR will continue to develop long-term water management solutions to the issues described in section 12.2. ADWR will work with the regulated community as well as others within the PRAMA, to identify issues and develop and implement solutions to water management problems as well as craft a cohesive water management strategy for the entire PRAMA. Such a strategy is anticipated to include the following components:

- Construction of additional regional underground storage facilities along Granite Creek, with recovery wells located within the area of impact of storage.
- Adoption of a seasonal/annual pumping regime to withdraw water from wells when water levels have recovered, and shift pumping to other wells when water levels are declining.
- An increase in the proportion of the PRAMA population on central sewer, including exempt wells; an increase in the capacity and/or number of wastewater treatment plants to treat the additional wastewater; and an increase in the volume of reclaimed water stored. Develop strategically located facilities to recharge and recover these newly developed local supplies.
- Importation of groundwater from the Big Chino Sub-basin, or some other alternative supply
- Use of more water from Watson and Willow Lakes to meet M&I water demand and less for recreational purposes, and evaluation of surface water available from the South System from Lynx and Goldwater Lakes.
- Pursuing an allocation of CAP water, or another source of supply, which may be able to be either imported or used as a water exchange vehicle, allowing more use from local, natural streams to which downstream users have senior rights/claims.

- Adoption of more stringent conservation requirements, such as an ordinance at the municipal or county level requiring WaterSense fixtures.

ADWR has developed additional water demand and supply scenarios extending beyond 2025 which show that the PRAMA can achieve safe-yield and maintain it for some years beyond 2025. Assumptions included in those scenarios are outlined in Chapter 11 of this plan.

In addition, possible solutions related to each issue section described in section 12.2 are discussed in further detail below.

### 12.3.1 Allowable pumping

***Agricultural Solutions***
Agricultural pumping is likely to decline to a small proportion of total AMA water demand. Until the year 2025, IGFRs can be extinguished to create credits to help meet the AWS criterion of consistency with the management goal. By the year 2025, it is possible that the agricultural demand sector will be relatively small, as will its contribution to overdraft.

ADWR will continue to provide technical and conservation planning assistance to the members of the agricultural sector in an effort to increase efficiencies and further reduce groundwater reliance. ADWR will continue to encourage and evaluate incentives for the increased use of reclaimed water by the agricultural sector. Additional infrastructure will be needed for agricultural users to utilize reclaimed water directly in the PRAMA.

To completely eliminate overdraft in the agricultural sector, agricultural users would need to rely on 100 percent renewable supplies (minus incidental recharge) or be required to replenish groundwater pumping. Further reductions in agricultural groundwater use and increased use of renewable water supplies, combined with enhanced on-farm irrigation water management practices would move the PRAMA closer to safe-yield.

***Industrial Solutions***
ADWR requires submittal of information on water demand, supply, and acreage information from all turf-related facilities in the PRAMA, and can work cooperatively with golf course superintendents to help courses improve their water use efficiency. ADWR can modify or eliminate the reclaimed use incentive in the turf program, resulting in more efficient use of this renewable supply.

To completely eliminate overdraft in the industrial sector, industrial users would need to rely on 100 percent renewable supplies (minus incidental recharge), or be required to replenish groundwater pumping. Alternatively, an incentive could be created for non-turf industrial facilities in the PRAMA to switch from using groundwater to use of reclaimed water, or to store and recover reclaimed water in the area of impact of where the water was stored. Golf courses represent one of the best opportunities in which reclaimed water or other renewable supplies could be directly used. Four of the six golf courses in the PRAMA currently use reclaimed water for turf-related watering needs.

The unused Type 1 and Type 2 GFRs in the PRAMA may never be fully utilized, and could be extinguished to generate credits for meeting the AWS consistency with goal criterion. Encouraging

Industrial users to maximize use of reclaimed water, as well as improve water use efficiency, could help reduce Industrial users' dependency on GFR groundwater pumping.

General Industrial Use (GIU) groundwater withdrawal permits are a permit type that the director issues if certain requirements are met. One of these requirements states that "the management plan for the active management area can be adjusted to accommodate the intended general industrial use consistent with the achievement of the management goal for the active management area." A.R.S. 45-515(A)(5). ADWR has not historically considered that issuance of a GIU permit would require the management plan for any AMA to be adjusted. However, this provision could be further explored during the fourth management period.

***Municipal Solutions***

The AWS Rules require new subdivision development to be consistent with achievement of the goal of safe-yield. For the municipal sector to eliminate its contribution to overdraft, nearly all current, committed and future demand in the PRAMA would need to offset its groundwater use and/or use renewable supplies. Careful management of stored and recovered reclaimed water could stretch the ability of the PRAMA to achieve and maintain safe-yield through projected growth in the year 2070. Use of imported groundwater from the Big Chino Sub-basin, increased reclaimed water storage and recovery, and increased use of surface water supplies, coupled with reduced demand, depending on net natural recharge conditions can help to reduce groundwater dependency. Water could also be stored and declared to be non-recoverable to offset the groundwater use associated with committed demand that to date has not been required to meet consistency with the management goal criterion of the AWS Rules. However, such an endeavor is not likely to be implemented on a voluntary basis and as such would likely require statutory changes.

***Exempt Well Solutions***

As outlined previously in this chapter, while unmetered, exempt well usage is estimated to have accounted for approximately 12 percent of municipal water use in the PRAMA in 2012. Previous attempts in the PRAMA to address the exempt well issue have been unsuccessful; however, obtaining additional data on uses of water via exempt wells would help frame the issue and determine its magnitude and spatial impacts. Statutory changes would be required in order to obtain annual water use information regarding exempt wells.

***Groundwater Allowance Solutions***

The formulas for calculation of water providers' groundwater allowance were not developed with strict adherence to the physical availability of groundwater in the AMAs. The AWS Rules do not specify when a designated provider's groundwater allowance may be used. Most water providers use their groundwater allowance sparingly, implementing a strategy of saving it for times of renewable supply shortage when they must increase their pumping to meet demand. Perhaps the most prudent strategy is to avoid use of the groundwater allowance altogether. Although use of the groundwater allowance is permitted under the AWS Rules and not regulated, this use has an impact on the aquifer.

### 12.3.2 Underground Storage and Recovery Solutions

The location of recharge should be encouraged in areas with the greatest potential for aquifer replenishment. A commitment by the PRAMA's water users to regional storage and recovery is needed to help address supply concerns.

Considering the location water is recovered is another important component of water management strategy in the PRAMA, as groundwater levels continue to decline due to groundwater demand exceeding the volume of water that naturally or artificially recharges the aquifer each year.

### 12.3.3 Conservation

In the PRAMA, conservation alone will not achieve safe-yield. However, efficient use of all water supplies is prudent and allows for more water management flexibility. Conserved water can be stored for future use, or used to extend economic growth into the future. Conservation includes low water use landscaping and low flow plumbing fixtures. EPA "WaterSense" programs and plumbing fixtures can be adopted for new subdivisions to increase water use efficiency. High exterior demand represents a use of water that cannot be recovered in sewer systems, and thus reduces the volume of reclaimed water that could be stored and recovered as a future supply, and should be avoided.

Conservation is different from curtailment. Conservation is a habitual and long-term commitment to using less water for various purposes than has historically been used for those purposes. Curtailment is a water management strategy usually employed during short-term droughts. Curtailment includes limiting landscape water use and other exterior uses of water, such as car washing. Curtailment measures can also include interior use rate changes, such as limiting the length of time and number of cycles that water is used for washing, laundry, and dish cleaning. Extreme conservation and curtailment, while achievable, affects quality of life for many people and may be difficult to maintain over the long-term. Therefore, conservation is perhaps best considered one of several water management approaches and tools, rather than the end-all solution.

### 12.3.4 Reclaimed Re-Use Solutions

Maximizing the availability and control the AMA water users have over reclaimed water can greatly enhance achieving and maintaining safe-yield. Approaches that may be considered include modifying or eliminating the reclaimed water incentive in the turf program, the municipal program or both; connecting more of the AMA's residents to central sewer systems to increase the supply of reclaimed water; and potentially, adopting a cut to the aquifer for reclaimed water stored at constructed Underground Storage Facilities (USFs).

### 12.3.5 Limits on Use of Surface Water Supplies Solutions

Policies related to the use of surface water from Watson and Willow Lakes could be re-evaluated to maximize the use of the available supply. Entering into a new agreement with SRP, or possibly a water exchange, could allow increased use of the water in the lakes by the City of Prescott. An additional 17,333 acre-feet of CAP allocation will become available for re-allocation to areas outside the three county CAP Service Area after the year 2020.

The City could explore use of their additional surface water supplies, and/or seek to modify or amend the agreement on the use and storage of water from Watson and Willow Lakes.

### 12.3.6 Timing, Cost, and Impacts of Imported Supplies Solutions

Regional cooperation and coordination is needed to pool all available resources to identify and pay for future imported water supplies. Identifying the supply and the cost of importation needs to be done well in advance. It can take many years, even decades, to realize the magnitude of a project needed to meet the needs of growing communities throughout Arizona. Partnerships with other communities, different water

interests, and State and Federal entities can help with these efforts and can also help meet multiple water management objectives (e.g., water for people and water for the environment).

Identifying the potential impacts of utilizing an imported water supply is outside the scope of this management plan. However, the process of identifying potential impacts associated with supply importation and considering ways to address potential impacts is an important water management objective where appropriate.

### 12.3.7 Rainwater Harvesting Solutions

Before rainwater harvesting can be pursued as a water management solution in the PRAMA, the feasibility of this alternative must be demonstrated through successful completion of a pilot study is needed as well as a thorough evaluation of the potential legal ramifications and administrative and monitoring costs that would be associated with implementing a rainwater harvesting program.

## 12.4 SUMMARY

The water community of the PRAMA has shown interest in the development of a regional water management strategy, both in terms of supply and demand. Decisions regarding planned per-capita demand, sources of supply used, and locations and types of water supply infrastructure affect the degree to which supplies are available for additional growth or during times of drought. ADWR staff will continue to be available to provide explanation of statutory provisions and water management options to aid in the creation of the community's vision for the future, including geographic information, data analyses, and review of various water demand and supply scenarios using ADWR's hydrologic groundwater model. Continuing in the fourth management period, ADWR will work in tandem with PRAMA community representatives to develop additional monitoring and planning tools and to help manage water supplies and demands in order to ensure a viable economic future. Analysis and examination of local regulations and individual decisions by water users, as well as possible additional statutory authority, must be further explored during the fourth management period if the PRAMA is to make achieve and maintain its water management goal.

Achievement of the management goal in the PRAMA will require future growth to depend on imported water supplies or water stored and recovered within the area of impact to meet the increased demand. Maximizing the use of treated reclaimed water can defer the costs associated with importing a water supply from outside the PRAMA for a long period of time, and must continue and be expanded during the fourth management period. Maintaining and continuing to strive for a high water use efficiency (a low per-capita use rate) can also partially reduce the amount of any future imported water needed on an annual basis. However, the fluctuating nature of surface water availability must be taken into consideration in future water supply planning in the PRAMA. The volume of water that might need to be imported could increase during years where there is little or no local surface water available. Earlier focus on using more renewable supplies and less groundwater will increase the viability of AMA groundwater serving as a back-up supply in times of renewable supply shortage.

Ultimately, the challenge for water planners in the PRAMA will be to put available alternative water supplies to efficient beneficial use. Although some water users within the AMA are currently able to put alternative or imported water supplies to beneficial use, others lack either access or sufficient infrastructure to effectively use alternative supplies that are available from within the PRAMA, or imported groundwater from the adjacent Big Chino Sub-basin. In order to achieve and maintain safe-yield

in the PRAMA, the various water users will need to work together to retrieve and distribute alternative water supplies.

## 12.5 CONCLUSION

In order for ADWR to close these "holes in the bucket," - uses of groundwater that can persist or increase without replenishing the aquifer - additional statutory authority and rule changes are required. However, ADWR is not the sole authority that could enact changes that could move the PRAMA to achieving safe-yield. Counties and cities, as well as individual choices, can help reduce groundwater reliance in the PRAMA. It is possible for the PRAMA to achieve safe-yield by 2025, and safe-yield can be maintained in PRAMA as far into the future as about 2070 (at projected growth rates), but it will require importation and use of groundwater from the Big Chino Sub-basin, or some other alternative supply; a diligent commitment to increasing the proportion of the population on central sewer; increasing the efficient use of all water supplies; and careful management of the storage and recovery of reclaimed water as well as direct or indirect use of locally available surface water.

## Bibliography

McMillan, D. (2013, January 25). *Macro-Rainwater Harvesting Evaporation Interception*. Flagstaff, Arizona.

US Bureau of Reclamation. (2013, April 18). *Central Yavapai Highlands Water Resources Management Study, Phase III - Water Supply Alternatives*.

**APPENDIX 12-1**
**MUNICIPAL GROWTH AND SAFE-YIELD**
**PRAMA**

Water use by the Agricultural sector in the PRAMA continues to decline, and although it may reach a point of stabilization with a few farms remaining in production through the year 2025, the Agricultural sector no longer has a major impact on groundwater pumping within the PRAMA. The Industrial sector in PRAMA, while it has the potential and ability to grow, has not grown much during the historical period of 1985 through 2010. It also does not seem likely to increase much between today and 2025, and Industrial allotments, like those in the agricultural sector, are capped and do not increase. The Municipal sector, in contrast, can continue to grow and expand provided new subdivision growth can meet the requirements of the AWS Rules. Therefore, the Municipal sector is the key factor affecting water demand and supply in the PRAMA, and will continue to be so through 2025 and beyond.

***Physical Availability of Water Supplies for AWS Purposes***
The management plans are only one water management tool provided to ADWR in statute. In addition to the management plans, ADWR's implementation of the AWS Rules impacts future municipal demand where new subdivisions must prove that the water supply is physically available, among other criteria that must also be proven. At some point, depending on the new subdivision growth rate, all the available groundwater that can be allocated for AWS purposes within the PRAMA will be assigned, and any new subdivision demand will need to be based on physical availability of another source of supply, such as water stored and recovered within the area of impact of storage, surface water with appropriate back up supplies as needed, and/or imported water supplies.

The Assessment included a scenario where Big Chino groundwater is imported into the PRAMA beginning in the year 2020. To date, construction of the necessary infrastructure has not begun and additional issues must be resolved before this source of supply can be put to use. Another suggestion that has been made is to harvest water. SB1236 was adopted in April 2012 and includes provisions for a pilot water harvesting program. However, the bill did not include any provision for funding. In addition, HB2363 established a 29-member Joint Legislative Study Committee on Macro-Harvested Water to analyze and evaluate issues arising from the collection and recovery of large scale harvested water. To date, this committee has not yet met. Water harvesting is complicated by surface water law and the adjudication process and may be administratively burdensome to manage. The need remains to find, finance and bring to the tap an alternative water supply to allow long-term, secure continued growth in the PRAMA Municipal sector.

***Consistency with the AMA Goal for PRAMA Groundwater Supply***
For many years, local water users and ADWR estimated that the PRAMA was in a state of safe-yield. However, with additional data and the development of a detailed hydrologic model, it became apparent that this was not the situation. On January 12, 1999 the director of ADWR declared that the PRAMA was no longer in a state of safe-yield. Legislation adopted during the 1998 session established interim guidelines for applicants for AWS during the public process period required before the director could issue a Final Decision and Order regarding the PRAMA's safe-yield status. The interim guidelines expired on March 5, 1999. Since then, new development has been required to demonstrate consistency with the AWS Rule criteria for consistency with the safe-yield goal. Thus far, this has been accomplished primarily through the pledging of extinguishment credits, created when agricultural and non-agricultural

grandfathered groundwater rights are extinguished and a groundwater credit is subsequently created for use by future development under the AWS Rules. Some developers and municipal water providers have also pledged long-term storage credits, associated with the artificial recharge of reclaimed water, to offset a portion of the groundwater pumping by new development. Further discussion of the impacts of the Declaration is contained in the 3MP for the PRAMA.

Non-groundwater supplies are consistent with the achievement of the PRAMA goal, but only a limited volume of additional groundwater pumping from within the PRAMA could be made consistent with the PRAMA goal using extinguishment credits because the maximum potential volume of extinguishment credits is finite based on the number of remaining GFRs and the number or years remaining between today and 2025, when extinguishment credits can no longer be issued in the PRAMA. A significant amount of extinguishment credits in the PRAMA have not been pledged to new subdivisions and could still be used for new AWS determinations provided the groundwater can be proven to be physically available at the proposed location of withdrawal.

There are hundreds of platted lots within the PRAMA that pre-date the AWS Rules. These lots, located in subdivisions approved prior to the date of Declaration, prior to the AWS Rules, prior to the Code and even prior to the Water Adequacy Program, are not required to be consistent with the PRAMA goal; nor were they required to prove physical availability of the groundwater supply at the time the subdivision plats were recorded. ADWR has no authority to retroactively require these lots to be consistent with the safe-yield goal. ADWR estimated that as of 2010, there were more than 7,000 pre-1973 vacant lots in the PRAMA. In addition to these, ADWR estimates more than 4,000 additional lots that were required to prove physical availability of groundwater but were not required to prove consistency with the AMA goal. After the Declaration, ADWR issued CAWS for 1,440 more lots, of which about half are yet to be built. Table 12A summarizes this information. Figure 12A shows the approximate location of these lots.

**Table 12-1: PRAMA Historical Water Use Trend by Three Water Use Sectors**

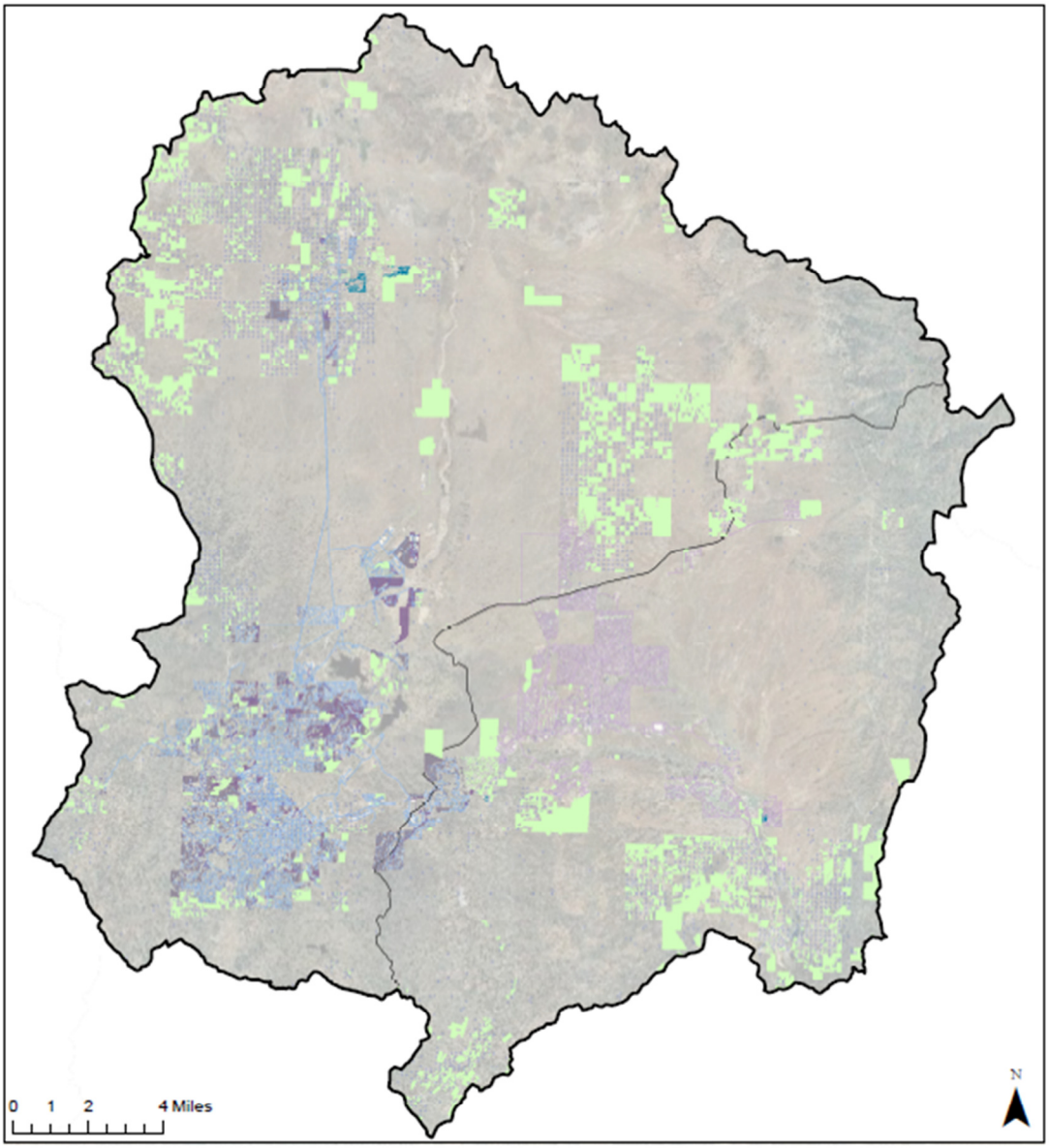
| Category | ADWR Estimated Un-Built Lots | ADWR # of Lots Issued on CAWS | GW Allowance Granted | Extinguishment Credits Pledged | Estimated Lots Built |
|---|---|---|---|---|---|
| Non-CAWS vacant parcels | 11,537 | - | - | - | Not quantified |
| 1973 to Declaration (1999) Subdivisions | 3,049 | 15,089 | - | - | 12,040 |
| Post-Declaration (1999) Subdivisions | 642 | 1,440 | 3,832 | 26,762 | 798 |
| Total | 15,228 | 16,529 | 3,832 | 26,762 | Not Quantified |

***NOTE: In 2010 the City of Prescott reported 3,398 platted but un-built lots within the City's water service area. These lots count as committed demand according to the AWS Rules. These lots are shown in the table above in the Non-CAWS vacant parcel row.***
***NOTE: The GW Allowance Granted does not include the City of Prescott's groundwater allowance associated with its DAWS.***

At some point, the need for imported supplies in PRAMA will be necessary for new AWS determinations to be issued. The cost of importation and who will pay for it, the length of time for construction to be completed, and the rate of future growth will need to be addressed. Climate change is another uncertainty that may affect water supply in the PRAMA. Currently, surface water is a small component of the overall AMA water supply; however, its absence due to drought conditions or long-term climate change could

significantly affect its user, the City of Prescott. The City would need to rely on its other sources such as groundwater, recovered reclaimed water, and direct use reclaimed water should surface water supply in the future be reduced. The City has a large volume of groundwater allowance granted under the AWS Rules and has proven more than 10,000 acre-feet per year of groundwater for 100 years to be physically available, so growth could continue in the City based on groundwater for some time into the future.

**FIGURE 12-1**
**APPROXIMATE LOCATION OF UN-BUILT LOTS**
**PRESCOTT AMA**




**Prescott AMA**

**Legend**
- Pre-1973 Approximate Location of Unbuilt Lots
- City of Prescott Approximate Location of Unbuilt Lots
- Post Declaration CAWS Approximate Location of Unbuilt Lots
- Post 1973 to Date of Declaration CAWS Approximate Location of Unbuilt Lots
- Approximate Location of Exempt Wells

Large Municipal Water Provider Water Lines
- City of Prescott
- Town of Prescott Valley