Central Yavapai Highlands Water Resources Management Study
Phase I - Demand Analysis
Data Sources and Documentation

The Central Yavapai Highlands Water Resources Management Study (CHYWRMS) area encompasses a part of central Yavapai County that includes the Prescott Active Management Area (e.g., Chino Valley, Dewey-Humboldt, Prescott, Prescott Valley, and county lands), the Big Chino area (e.g., Williamson Valley area, Paulden area, and potential ranch developments) and the Verde Valley area (e.g., Camp Verde, Clarkdale, Cottonwood, Jerome, Sedona, and unincorporated areas). The area represents regions of high potential growth and commensurate water demands.

This document is organized by column headings in the Demand Analysis Summary Table (*filename: CYHWRMS_m_Demand Analysis Summary Table_4-1-10)* from left to right. Supporting work that documents the data in the table are listed below each section. The documents will be attached to this paper under Attachment 1 (*to be attached*). A brief bibliography will be included as Attachment 2 (*to be attached*).

Water Planning Areas

The study area has been divided into 20 water planning areas (WPAs) as described below:

Municipal WPAs are defined by the municipal boundary and any portion of the water service area that originates inside the municipal boundary and extend outside of it. (Camp Verde, Dewey-Humboldt, Clarkdale, Cottonwood, Jerome, Prescott Valley, Chino Valley, Prescott, and Sedona)

WPA boundaries for Census Designated Places (CDPs), as identified by the United States Census Bureau and used in the Yavapai County Water Advisory Committee – Long-term Development Scenarios – Scenario #1 Report, 2008 (2008 H3J report), were like-wise used for this analysis. (Paulden, Big Park, Cornville, Lake Montezuma, Ctn-Verde Villages, and Williamson)

The larger Census County Divisions (CCDs) as identified in the 2008 H3J report were clipped to include only those portions of the CCD that is within the CYHWRMS study area. (Verde, Prescott, Mingus Mtn, Humboldt, and Ashfork) Also recognized in the CCDs are three ranches expected to be developed for residential use: CVCF Ranch; Yavapai Ranch; and Las Vegas Ranch.)

Documentation:
Study Map titled "Central Yavapai Highlands Water Resources Management Study (filename: CYHWRMS_m_Study Area Map_4-1-10);
*Individual WPA maps (filenames: CYHWRMS_s_* **by name of the WPA***_4-1-10).*

Population

Population was developed based on previous studies and assessments, past trends, and/or GIS analysis. All population values were finalized in consultation with technical and political representatives from each planning area.

Present population (2006) for most WPAs used DES estimates; modified DES estimates based on town/water provider input, or modified DES based on the difference between water service area boundaries and city/town boundaries. For example, City of Cottonwood modified their DES estimate because their service lines extend to the Ctn-Verde Village CDP. Where they extended into the CDP, that population was added to Cottonwood WPA and subtracted from Ctn-Verde Village CDP.

Present population (2006) for CCDs is based on 2006 Yavapai County Parcel Data (i.e. single and multi family) times the average DES persons per household by census designated areas.

Future population (2050) in most WPAs referenced 2008 H3J report with slight modifications as mentioned previously for 2006 populations. The CCDs were not whole due to the study area boundary excluding some portions. Ultimately, 2050 populations in the CCDs were developed with a 2.25% compounded growth rate. The 2.25% rate for CCDs was based on analysis of past trends (e.g. last 10 years) and discussions with the County Supervisors. The Ashfork CCD had an additional 35,000 people added to the 2050 total in order to represent a planning population that includes residential growth in the Yavapai and CVCF ranches. (Note: this was reduced from the 65,000 value used in the H3J report because 65,000 was thought to be too high due to lack of any current development and discussions with County Supervisor Carol Springer which indicate knowledge that Yavapai Ranch may not develop as quickly, or densely as previously assumed).

Documentation: CYHWRMS_s_DES 2006 and 2050_4-1-10;
CHYWRMS_s_Population Comparison_4-1-10;
CHYWRMS_s_PopulationUsingYCparcels_4-1-10;
CHYWRMS_s_Populations2050CCDs_4-1-10 (To be added)

Water Providers and 2006 Water Demand

Water Provider Use

A list of water providers and their present use within the study area was developed from several existing documents as well as data from Arizona Corporation Commission (ACC) and Arizona Department of Water Resources (ADWR) records.
Documentation: CYHWRMS_s_ComprehensiveWaterProviderList_4-1-10;
CYHWRMS_s_2006DemandsFor PramaCommunities_4-1-10

2006 Water Use

Water use for 2006 was calculated for each WPA by summing water provider uses, exempt domestic well uses, non-exempt well uses (not previously reported by water providers), and estimates of agricultural uses. These uses were then grouped into Muni/Dom Demand (Municipal/Domestic), Com/Ind Demand (Commercial/Industrial – not served by provider), and AG Demand (Agriculture).
Documentation: CHYWRMS_m_Planning Area Water Use Summary Table_4-1-10

Municipal/Domestic was a sum, by WPA, of the volumes associated with the Water Provider Total, Exempt wells and Non-Exempt Wells. Water use for exempt wells was calculated based on the number of wells identified in the ADWR Wells55 database with a domestic use and based on a defined query structure. The assumed usage amount per well was determined to be 0.33 AF/yr. (Note: Exempt commercial wells (not captured by the query – having a sole water use listed as commercial) were also queried at the request of Chino Valley. The number of exempt commercial wells in Chino Valley and throughout the study area was less than 1% of the overall exempt wells and, therefore, the study's Technical Working Group opted not to include them in the 2006 demand calculations.)

Additional domestic use was calculated as the sum of the Non-exempt wells that were identified in the ADWR Wells55 database and based on a defined query structure. Each planning area was reviewed by the CYHWRMS Technical Working Group. Volumes that were deemed to be significant and not already identified as a water provider were added to the overall usage amount for the WPA. (Non-exempt wells with a primary domestic use were assigned a value of 0.50 AF/yr, with domestic as an "other" use were assigned 1 AF/yr, and with a stock use assigned 0.3 AF/yr.)

Documentation: CYHWRMS_s_ExemptWellQuery_4-1-10;
CYHWRMS_s_VolumeForExemptWells_4-1-10;
CYHWRMS_s_NonExemptWellQuery_4-1-10;
CYHWRMS_s_NonExemptWellCount_4-1-10

Commercial/Industrial
Non-exempt wells located within the Prescott Active Management Area with active Grandfathered Groundwater Rights (GFRs, and Type I or Type II non-irrigation) and Groundwater Withdrawal Permits (e.g., general industrial use and mineral extraction permits) were identified and assigned to the appropriate WPAs. Additionally, commercial and industrial uses for golf courses, sand and gravel operations, and others, not already identified by water providers, outside of the PrAMA were collected for 2006. The data for communities outside of the PrAMA was developed from ADWR Annual Reports, the Verde 2000 Report, and the YCWAC Verde Valley Projections.

Documentation: CYHWRMS_s_Golf Course 2006 ComInd Use_4-1-10;
CYHWRMS_s_PrAMA Type I Type II 59s_4-1-10

Agricultural water use throughout the study area was estimated based on total irrigated acres. Areas outside of the AMA used a method that included year appropriate aerial

photography with present and historical irrigation mapping. Within the AMA, annual reports for Irrigation Grandfather Rights provided the volume used in 2006. Agriculture associated with surface water was also verified and use was estimated.
Documentation: CYHWRMS_s_AG Demand Method_4-1-10;
CYHWRMS_s_AG Summary_4-1-10;
CYHWRMS_s_PrAMA AG Demand with SW_4-1-10

2006 Gallons per Person per Day (GPPD)

GPPD is a value that may be calculated to establish the amount of water used per person per day. These values were determined for each WPA. GPPD was used to attempt to verify the validity of assumptions made with respect to 2006 data. GPPD was calculated by dividing 2006 Muni/Dom demand by the 2006 population; unit conversion required.

Estimated Available Water Supply

Over time, water resources for communities within the AMA have been evaluated more closely than those outside because of the 1980 Groundwater Management Act and associated rules. There is much more data available for these communities and this offers more opportunity for evaluating and comparing methodologies. To date, three methods have been considered to evaluate and compare estimates for available water supplies within the study area.

1. Using data developed for the Arizona Water Atlas, to identify Assured and Adequate Water Supply determinations that "locked up" water for a provider or entity within a WPA (Designations – AMAs and non-AMAs, Certificates – AMA only, Water Adequacy reports – non-AMAs*, and Analysis – AMAs and non-AMAs). Assume present demand equal present supply for all water users who are not required to comply with ADWR and ADRE subdivision statutes and rules (e.g., exempt wells, some non-exempt wells, agriculture, etc.)
   *Some Water Adequacy reports are still in effect in the AMA due to determinations issued prior to the AMA being declared out of safe-yield.

2. Determine a time, demand level, or natural recharge volume where we may be able to sustain (indefinitely) pumping and live with the environmental affects. Any water needs above this amount will need to be met through reuse, recharge, augmentation and/or conservation.

3. Assume that 2006 pumping levels were at a "status quo" and designate 2006 water demand as 2006 available supply.

The TWG agreed to use the status quo (item 3. above) and the use components from existing water budgets (item 2. above). The affect of these numbers can be seen in the Demand Analysis Summary Tables, tabs 1 and 2.
Documentation: CYHWRMS_s_Components from Existing Water Budgets_4-1-10;
CYHWRMS_s_Budget Reference Docs_11-18-09;
CYHWRMS_s_Estimated Available Supplies_AAWSmethod_4-1-10

2050 Water Demand

Representatives of each WPA provided their 2050 GPPD and estimates were made for commercial/industrial (not served by a provider), and agriculture volumes for a total 2050 water use value.

Municipal/Domestic was calculated by multiplying the 2050 GPPD by the 2050 population.

Commercial/Industrial (not served by a provider) was determined in consultation with representatives of the Water Provider Areas. Some areas chose to use the status quo from 2006 for the 2050 value, and others justified changing the value. *More details on non-status quo….*
Documentation: CYHWRMS_s_2050 ComInd Assumptions for PrAMA_4-1-10;
CYHWRMS_s_2050 ComInd Assumptions for PrAMA Table_4-1-10;
CHYWRMS_s_AsphaltPavingAndSupply SW use_11-18-09;
CYHWRMS_s_2050 ComInd Assumptions outside PrAMA_4-1-10 (to be added)

Agriculture was determined based on discussion between members of the Technical Working Group and WPA representatives. The year 2050 agricultural water use in the Verde Valley planning areas is set at two-thirds (66%) of the 2006 value (reduced by 1/3). The 2050 agriculture water use in the Big Chino sub basin is half (50%) of the 2006 value. The 2050 agricultural use in the Little Chino sub basin (Prescott AMA) is calculated based on ADWR records and assumptions by PrAMA staff for the assessment (2025 projections).
Documentation: CYHWRMS_s_2050 AG in PrAMA_11-18-09

2050 Water Supply

The 2050 water supply is the difference between the estimated available supply and the 2050 total demand. If the number is negative there is a projected unmet demand for the WPA in planning year 2050.