Volumes to assign to exempt wells in the CYHWRMS

Description: Source documents brought to the TWG in 1/2009 in order to select a volume to assign to exempt wells.

Outcome: During the January 22nd 2009 meeting, the stakeholders agreed that the wells identified with the exempt well query should have a 0.3 AF/year demand associated with them. In order to cite existing publications for exempt well use, the study team applied 0.33 AF/year to exempt well.

Supervisor Springer asked for a comparison to be done with residential use only volumes from the various providers in the study area. This was to check the 0.33 number in the event it may be too high for rural areas in the county. Please see the table in this document. Outcome was that 0.33 AF was still acceptable.

Source info for 1/22/09 TWG workshop

Previous Reports

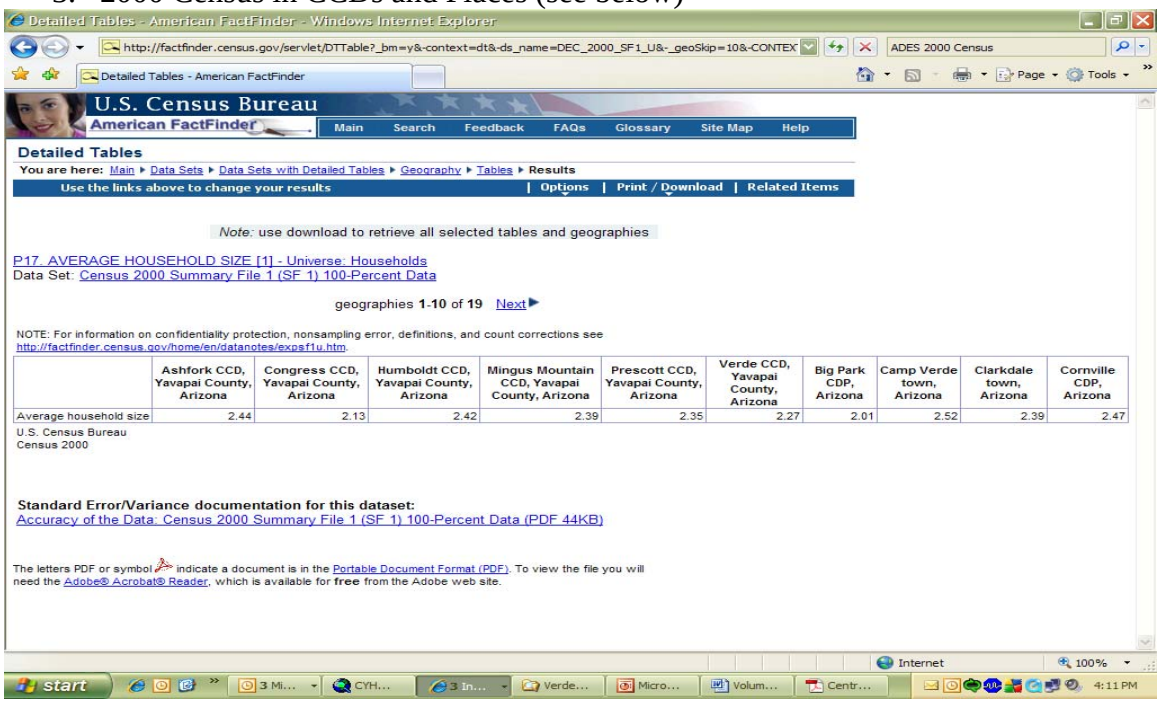
	Report	Volume	Area it was applied to:
1	Prescott AMA Model, 1995	0.5 AF/year/well	GW basin area in the Prescott AMA
2	Verde River Watershed Study, 2000	97 gpcd (0.24 AF/year *2.35 pph = **0.56 AF/yr/well)**	Upper Verde
		133 (0.33 AF/year*2.35 pph = **0.78 AF/yr/well)**	Middle Verde
3	Prescott AMA Hydrologic Monitoring Report, 2002	0.5 AF/year/well	Prescott AMA groundwater basin
		0.33 AF/year/well	Prescott AMA marginally productive areas
4	Domestic Well GPCD Rates for the Upper San Pedro Basin, 2005	.55 af/person/year	Benson Sub-Area
		.35 af/person/year	Sierra Vista Sub-Area
5	Prescott AMA Model Update, 2006	Same as report 3 in this table	Same as report 3 in this table
6	Hydrogeology of the Upper and Middle Verde, 2006	Same as report 2 in this table	Same as report 2 in this table
7	Long-Term Scenario Development #1	Same as reports 3 and 5 in this table	Same as reports 3 and 5 in this table

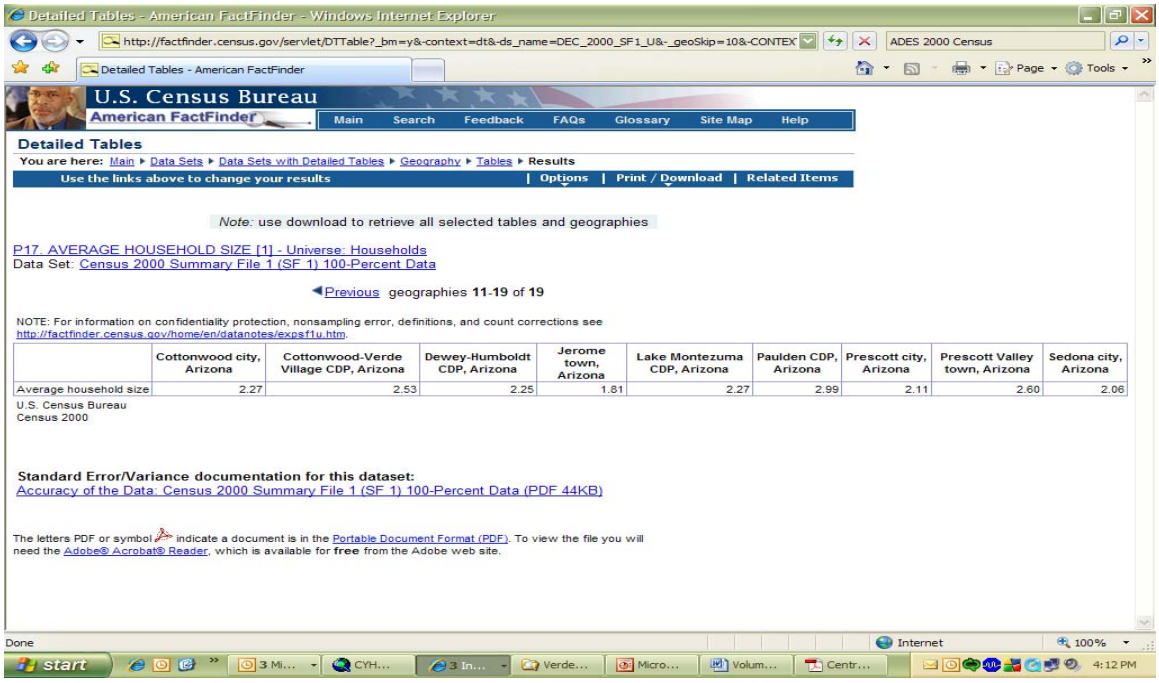
1. Corkhill and Mason, 1995, PrAMA Modeling Report pg 77. Pumpage for exempt wells is estimated to average about **0.5 AF/year/well/year** (Foster, 1993b)

2. ADWR, 2000, Verde River Watershed Study, pgs. 3-6 to 3-8. The average residential GPCD for the Upper Verde and Middle Verde water providers that delivered in excess of 20 AF of water in 1997 is 97 (0.24 AF/year *2.35 pph = **0.56 AF/yr/well in Upper Verde**) and 133 (0.33 AF/year*2.35 pph = **0.78 AF/yr/well in Middle Verde**) respectively. The residential GPCDs are also used to calculate the annual volume of water pumped by the active domestic wells in both the Upper Verde and Middle Verde regions.
3. ADWR, 2002, pg. 17. Average annual pumpage for exempt wells located within the **groundwater basin area** of the AMA has been estimated at **.5 AF/year per well**. Pumpage for exempt wells located in the **marginally productive area** that surround the groundwater basin portion of the AMA has been estimated by Remick (2002) to be about **.33 AF/year per well.**
4. ADWR, 2005, Calculation of Domestic Well GPCD Rates for the Upper San Pedro Basin Active Management Area Review Report.
   Benson sub-area's total domestic well use = .12 + .435 = **.55 af/person/year**
   Sierra Vista sub-area's total domestic well use = .12 + .23 = **.35 af/person/year**
   A **New Mexico** study estimated domestic well use at **.35 acre-feet per residence per year** assuming 114 GPCD and 2.74 pphu.[1]
5. Timmons, 2006, PrAMA model update, pg 17. Followed ADWR, 2002, see item 3.
6. Blasch, 2006, Hydrogeology of Upper and Middle Verde, pg. 87. Followed ADWR, 2000, see item 2.
7. H3J Consulting, 2008, Long Term Scenario Development #1, pg 30. Same as items 3 and 5.

Census Person Per Household (pph)

1. 1990 Census in Yavapai County = 2.35 pph
2. 2000 Census in Yavapai County = 2.33 pph?
3. 2000 Census in CCDs and Places (see below)





Comparison using residential volumes from water provider for Supervisor Springer.

Discussion: On 6/3/09, John and Leslie G. met with Supervisor Springer to discuss the basics of the study and the current draft documents (Four - Phase I products). In that meeting Sup. Springer ask for a comparison of the 0.33 AF/year, which was chosen for exempt well demand by the TWG in 01/09 (TWG workshop), to water providers who serve residential customers. The following looks at this question in two ways:

1. Single Family Connections and the Quantity Delivered in AF/year

WPA	*System*	*Data Source*	*Single Family (residential) Connections*	*Quantity Delivered (AF/year)*	*AF/connection*
Camp Verde	Camp Verde Water System	ADWR CWS AR, 2007	1190	250	0.2
Clarkdale	Clarkdale Public Water System	ADWR CWS AR, 2007	1432	361	0.3
Cottonwood	Verde Santa Fe	ADWR CWS AR, 2007	890	177	0.2
Jerome	Jerome	ADWR CWS AR, 2007	230	64	0.3
Prescott Valley	Prescott Valley Municipal Water System	ADWR AMA AR, 2007	1937	462	0.2

Chino Valley	Town of Chino Valley	ADWR AMA AR, 2007	392	69	0.2
Prescott	City of Prescott	ADWR AMA AR, 2007	17605	4251	0.2
Sedona	Az Water Co. - Sedona	ADWR CWS AR, 2007	4449	1835	0.4
Sedona	Oak Creek Water No. 1	ADWR CWS AR, 2007	586	168	0.3
Paulden	Abra Water Co.`	ADWR CWS AR, 2007	633	152	0.2
Big Park CDP	Big Park Water Co.	ADWR CWS AR, 2007	2749	630	0.2
Big Park CDP	Az Water Co. - Valley Vista	ADWR CWS AR, 2007	665	266	0.4
Cornville	Oak Creek Valley	ADWR CWS AR, 2007	185	567	3.1
Lake Montezuma CDP	Az Water Co. - Rimrock	ADWR CWS AR, 2007	1098	261	0.2
Verde CCD	Little Park Water Co.	ADWR CWS AR, 2007	69	44	0.6
Verde CCD	Cup of Gold Water Co.	ADWR CWS AR, 2007	26	20	0.8
Prescott CCD	American Ranch DWID	ADWR CWS AR, 2007	43	16	0.4
Average:					0.5
Average (if Cornville is removed from the set):					0.3
Mode:					0.2

2. Converting 0.33 acrefeet to gpcd (0.33 = 128 GPCD):

0.33 acft * 325,851 gallons per acft = 107,531 gallons per year per well
107,531 divided by 365 = 294.61 gallons per day per well
294.61 divided by **2.3 people per household** = 128 gallons per person per day (GPCD)

Residential Use by Providers:

Prescott Valley = 102 GPCD
Clarkdale = 83 GPCD

(Reported to John Ras by Town Reps (JM, DvG) with note that 0.33 is appropriate for wells for the study)

NOTE: Also See Column I in "Draft TWG Table" (1st on this file)

Column I is a similar calculation based on municipal residential use (removal of agriculature and commercial/industrial from total)
Column I includes miscellaneous restaurant and business use that is not included in industrial/commercial. Thus PV, for instance, shows 136 instead of 102.