

POPULATION AND WATER DEMAND
PROJECTIONS
FOR
WESTCAPS MEMBER LANDS



A STUDY ON THE EFFECTS OF FUTURE
POPULATION GROWTH WITH RESPECT TO WATER
SUPPLY FOR THE WEST SALT RIVER VALLEY



May 11, 2006

WESTCAPS

A Study on the Effects of Future Population Growth with Respect to Water Supply for the West Salt River Valley from 2010 to 2035

May 11, 2006





West Maricopa Combine



ARIZONA WATER COMPANY

Executive Summary

The overall growth rate in Arizona for a half-century between 1950 and 2000 was "fairly consistent and steady." Changes in the growth rate began in the late 1970's and into the 1980's, but were not noticeable until well after the early 1990's (a slow down occurred in the housing market due to the real estate recession of 1991). Since then, the post 2000 growth rate has been striking. Up until 2003 it was still possible in Maricopa County to seek out a new development, select an undeveloped lot from the developer, and then proceed on choosing a style of home. By 2005, new developments were overwhelmed by the migrating population into Arizona seeking housing as developers switched to a "chance" lottery system for distributing new homes to buyers. Prior to the year 2000, Arizona's existing residential real estate commonly took 2 to 8 weeks to sell, and almost always for below the asking price. Between 2000 and 2005, it was not uncommon for existing homes to be on the market for somewhere between 1-hour and 3-days before being sold, and sometimes for above asking price, or being sold to the highest bidder.

This spike in growth and sudden urban sprawl has municipalities and water providers anxious about what the future holds, and whether future water demands can be met. Municipalities and water providers in the Phoenix west valley are particularly anxious since population projections indicate the highest growth sector in Phoenix for the next 30-years is the west Phoenix metropolitan area. The purpose of this report is to determine if sufficient water is available in the future for west valley cities, and if not, to expose the shortfall based on when it could be expected, and by how much.

WESTCAPS, a coalition of 5 municipalities and 3 private water companies in the West Phoenix Salt River Valley, published a strategic plan which was completed in 2001. The plan was a strategy on how best to utilize existing Central Arizona Project water allocations, and where the location of water infrastructure made the most sense. The strategy was based on understanding the water demands of the future. The recent challenge is that the strategic plan for WESTCAPS member entities was based on more conservative growth forecasts in that half-century span of "fairly consistent and steady growth." In 2003 the Maricopa Association of Governments collaborated with the Central Arizona Water Conservation District to begin a new assessment of growth combined with water demands. Those projections are provided below in Table ES-1.

Table ES-1. Population Projections for West Phoenix Cities and Water Companies Published in CAWCD's Outlook 2003 and Compiled by MAG.

City	2010	2015	2020	2025	2030	2035
Buckeye	32,596	63,294	93,946	170,970	237,491	324,338
Peoria	144,400	165,829	188,095	212,044	232,649	234,616
Avondale	75,299	93,032	110,753	128,195	146,422	146,740
Surprise	41,832	62,493	83,119	157,149	217,755	331,212
Goodyear	41,490	85,190	128,878	209,003	286,381	301,781
WMC ¹	13,483	20,022	26,540	40,700	52,510	73,490
AZ-Amer. ²	80,606	114,066	147,487	199,731	245,212	257,346
AZ-Water ³	9,983	15,713	21,430	25,600	29,352	31,133
Totals	439,689	619,639	800,248	1,143,392	1,447,772	1,700,656

¹ – West Maricopa Combine (Valencia Water Company, Water Utility of Greater Buckeye, Water Utility of Greater Tonopah)

² – Arizona-American Agua Fria Division

³ – Arizona Water Company White Tanks Division

After reviewing the MAC/CAWCD population projections, the population projections differed from what the entities themselves could foresee. WESTCAPS' projections have been developed by the land use planning departments of the individual cities and private water companies.

Table ES-2. Population Based on WESTCAPS' Member Data from 2010 to 2035

City	2010	2015	2020	2025	2030	2035
Buckeye ¹	100,000	182,500	265,000	345,000	468,750	670,350
Peoria ²	160,800	183,700	206,600	249,000	263,000	269,250
Avondale ³	79,174	100,835	122,496	144,157	153,968	160,816
Surprise ⁴	124,537	167,193	213,950	264,560	315,170	365,780
Goodyear ⁵	58,839	153,793	248,746	343,700	366,600	389,500
WMC ⁶	13,896	25,634	39,858	56,612	75,997	98,303
AZ-Amer. ⁷	102,547	159,327	225,980	273,417	312,797	339,150
AZ-Water ¹	9,983	15,713	21,430	25,600	29,352	31,133
Totals	649,776	988,695	1,344,060	1,702,046	1,984,884	2,324,282

¹ – Buckeye and Arizona-Water Company have not developed a population outlook. Data for Buckeye is from Buckeye Valley Chamber of Commerce and ADWR's Assured Water Supply report, assuming 3.02 persons per lot per ADWR recommendations. Arizona Water Company's projections are from MAG/CAWCD's Outlook 2003.

² – Data available for 2003, 2010, and 2020 from Peoria's Planning and Zoning Division – Demographics for Peoria. All other years are interpolated. Additionally, a graph is provided in the same report showing population trends.

³ – Years 2030 and 2035 were interpolated from data which runs to 2040 from Avondale's Water Resources Master Plan.

⁴ – Years 2025, 2030, and 2035 were interpolated based on prior years data and the build-out population expected from Surprise's Water Resources Master Plan.

⁵ – Years 2015, 2020, and 2030 were interpolated from the data Goodyear's city planning staff developed.

⁶ – WMC is West Maricopa Combine. Data is available from 2005 to 2014, from WMC. Years 2015, 2020, 2025, 2030, and 2035 are interpolated.

⁷ – Arizona-American projects 1.95 dwelling units per acre at build out (2040), and an Agua Fria Service member land area of 93.71 square miles.

By determining supplies and demands for the region, an outlook can be formulated to determine whether supplies can meet future demands. The water demands in the table below are derived from the population projections from the previous table. The values for the demands were either provided by the members themselves, or calculated using populations and water demand ratios (Chapter 3).

Table ES-3. Water Demand Projections from WESTCAPS' Member Data in Acre-Feet per Year.

City	2010	2015	2020	2025	2030	2035
Buckeye ¹	19,267	34,753	50,166	64,537	86,636	121,662
Peoria ²	33,800	38,706	43,613	53,635	57,176	58,670
Avondale ³	17,737	22,585	27,440	32,295	34,494	36,029
Surprise ⁴	10,730	14,999	21,354	28,308	35,929	44,259
Goodyear ⁵	10,359	31,450	51,092	72,864	78,306	83,470
WMC ⁶	5,609	10,254	15,744	22,079	29,259	36,864
AZ-Amer. ⁷	19,713	30,628	43,441	52,560	60,130	65,196
AZ-Water ⁸	2,804	3,670	4,524	5,136	5,694	5,961
Totals	120,019	187,045	257,374	331,414	387,624	452,111

¹ – Derived from ADWR's Certificate of Assured Water Report.

² – Peoria's water demand is calculated from their population (Table 5-1) multiplied by their demand ratios in ac-ft/person per year (Table 3-2) for Peoria.

³ – Years 2006, 2011, 2026, and 2040 are provided in Avondale's Water Resources Master Plan. The years needed in this table are interpolated (see appendix for derivation).

⁴ – Years 2010 through 2020 are from Surprise's Water Resources Master Plan. Years 2025 through 2035 are derived based on build-out population (see appendix for derivation).

⁵ – Year 2010 is from Goodyear's Water Resources Master Plan. All other years require a derivation. Years 2015 through 2035 are calculated as population multiplied by their demand ratios in ac-ft/person per year (Table 3-2) for Goodyear.

⁶ – Years 2010 and 2014 are provided by WMC. Subsequent years are interpolated (see appendix for derivations).

⁷ – Arizona-American's projection provides for data in years 2010, 2015, 2020, and 2040. Years 2025, 2030, and 2035 were interpolated (see appendix for derivation).

⁸ – Arizona Water Co. has not developed an outlook. Demand is calculated as population (Table 5-1) multiplied by the demand ratio (Table 3-2) for Arizona Water.

Water sources for the west valley entities include ground water pumping, and a combined mix of CAP subcontracts, SRP surface water and ground water allocations, projected reclaimed water use and additional supplies available from the groundwater replenishment district, CAGR. These volumes are provided in Table ES-4.

Table ES-4. Anticipated Water Allocations for the Overall WESTCAPS Member Entities in Acre-Feet per Year. Data Provided By SRP, Bureau of Reclamation, CAGRD, and WESTCAPS Members.

Water Source	2010	2015	2020	2025	2030	2035
SRP GW ¹	30,927	32,683	34,439	36,195	37,951	39,707
SRP SW ¹	12,111	12,836	13,563	14,287	15,013	15,739
CAP	48,222	48,222	48,222	48,222	48,222	48,222
Reuse ²	23,600	35,180	53,260	75,348	91,125	107,870
CAGRD ³	20,264	37,941	43,059	56,548	63,374	65,984
Total	135,124	166,862	192,543	230,600	255,685	277,522

¹ – GW is an acronym for groundwater, and SW is an acronym for surface water.

² – Reuse is based on 55% reuse in 2010, and 80% reuse by 2035 (Table 6-3)

³ – from CAGRD's Plan of Operation (Table 5-1)

The CAGRD portion may or may not reflect the entire volume of water available to WESTCAPS as a whole. The volume reflected above is based on individual members requiring a make up in the shortfall of water in their service area.

Water demands based on WESTCAPS' outlook is greater than the outlook being prescribed by the MAG/CAWCD partnership. The WESTCAPS refined water reuse outlook estimates that 55% of the effluent will be reused in 2010 and that 5% more effluent will be reused every 5-years until 80% of the effluent is being reused by 2035. This outlook is provided below in Table ES-5, and the graphical representation of this outlook is provided on the following page and in Chapter 6, Figure 6-2.

The overall supply and demands are shown in Table ES-5.

Table ES-5. Overall Future Water Supply and Demand in Acre-Feet per Year Based on WESTCAPS Membership Outlook for Demand, and CAP, SRP, Reuse, and CAGRD for Water Supplies

Item	2010	2015	2020	2025	2030	2035
Supply	135,124	166,862	192,543	230,600	255,685	277,522
Demand	120,019	187,045	257,374	331,414	387,624	452,111
(Deficit)	15,105	(20,183)	(64,831)	(100,814)	(131,939)	(174,589)

The outlook from Table ES-5 has demands outpacing supplies by 2013. One potential outcome of this shortfall is that any gains made toward safe yield may begin to reverse and might only be achieved through pumping excess groundwater.

The outlook for the west valley cities is challenging when considering the results from the water supply and demand forecasts. The predictions being made are for a transformed west valley of new developments. The availability of private land can

certainly transform the vision into reality. The challenge for the west valley amounts to water allocations which are insufficient because they were assumed at a time when substantial growth was not predicted for the west Phoenix metro area.

One solution to the shortfall is a reallocation of water from the Arizona Water Settlement Act. Two blocks of water remain unallocated through the Act (only one block is likely to be allocated outside of Indian claims).

The Arizona Department of Water Resources will have available a block of 96,295 acre-feet of agricultural priority water which will be held in Trust by the Department of Water Resources and no determination as to its distribution shall be made prior to January 1, 2010. Although this water can be reallocated to municipal and industrial uses, it cannot lose its classification as agricultural priority water.

A second block of 67,300 acre-feet of water is set aside to be used to resolve Indian water claims in Arizona. If the claims are not settled by December 31, 2030, the Secretary of the Interior can allocate the water at their discretion. It is possible that if some of the 67,300 acre-feet of water remains unallocated, after 2030, Congress could modify the act to relinquish some, or all, of the remaining unallocated portion outside of Indian tribes. On the surface this would seem unlikely to happen, and any interested parties would have to wait until after 2030 for a determination.

A third block of unallocated water is identified under the Arizona Water Settlement Act. This water is classified as "uncontracted municipal and industrial water." A total of 65,647 acre-feet of this uncontracted water has already been designated for allocation among 20 municipalities and water companies. WESTCAPS members are represented among the 20 allottees, claiming 4 of 20 spots.¹ The timing for the distribution of this water has been determined to occur as soon as the Arizona Water Settlement Act is finalized.

The west valley cities require enough water in the future to match the growth which is expected in the fastest growing part of the state. The natural tendency is to think that land is the limit to growth, but in the desert the natural limit is water. Without assured water, growth becomes extremely limited, and future investment is curtailed. It's a scenario Arizona does not care to face considering the shortfall in supply occurs for the west valley as soon as 2013.

The report beginning with Chapter 1 provides greater detail on specific aspects of the executive summary.

¹ – Phoenix is one of the 4 allottees and is considered a member of WESTCAPS. Because Phoenix is not solely a west side entity, they are not considered in the supply and demand outlook of this report.

TABLE OF CONTENTS

	<u>Page</u>
EXECUTIVE SUMMARY	i
TABLE OF CONTENTS	vi
LIST OF TABLES	vii
LIST OF FIGURES	ix
ACRONYMS	x
Chapter I – INTRODUCTION	1
Chapter II – MAG BASED POPULATION AND DEVELOPMENT UNIT PROJECTIONS	3
Chapter III – MAG BASED WATER DEMAND PROJECTIONS AND DEMAND RATIOS	7
Chapter IV – WATER SUPPLY THROUGH ALLOCATIONS AND REUSE	11
Chapter V – WATER DEMANDS – THE MEMBER'S OUTLOOK	16
Chapter VI – STRETCHING THE SUPPLY – CAGRD'S REPLENISHMENT PROGRAM AND THE REALISTIC EXPECTATIONS OF WATER REUSE ...	18
Chapter VII – THE ARIZONA WATER SETTLEMENT ACT AND THE TERMS OF THE CENTRAL ARIZONA PROJECT REALLOCATION	24
BIBLIOGRAPHY	28
APPENDIX	29

LIST OF TABLES

	<u>Page</u>
Table 2-1. Population Projections for West Valley Cities Compiled by the Arizona Department of Economic Security	4
Table 2-2. Population Projections for West Valley Cities and Water Companies Published in CAWCD's Outlook 2003 and Compiled by MAG	4
Table 2-3. Overall Predicted Percentage Change in Population from 2010 to 2035 For WESTCAPS Member Areas Based on MAG Projections	5
Table 2-4. Projected Development Units for West Valley Cities and Water Providers From CAWCD's Outlook 2003	5
Table 3-1. Projected Water Demands for WESTCAPS Members in Acre-Feet per Year, Populations from MAG/CAWCD Outlook 2003, and Gallons of Usage per Person per Day (gpcd)	7
Table 3-2. Calculated Demand Ratios and Acre-feet per Person per Year	8
Table 3-3. Calculated Demand Ratios in Acre-feet per Development Unit per Year	8
Table 4-1. CAP Allocations for WESTCAPS Members in Acre-Feet per Year of Water	11
Table 4-2. Avondale's Surface and Groundwater Allocations from SRP (Water Rights) from 2010 to 2035 in Acre-Feet per Year	12
Table 4-3. Peoria's Surface and Groundwater Allocations from SRP (Water Rights) from 2010 to 2035 in Acre-Feet per Year	12
Table 4-4. Reclaimed Water Potential (RWP) for WESTCAPS Members by Year In Acre-Feet per Year from Years 2010 to 2035 Assuming All Reclaimed Water is Reused/Recharged	13
Table 4-5. Excess Water Supplies of Deficits for WESTCAPS Member Entities Under the Theoretical Scenario in Acre-Feet per Year for Years 2010 to 2035 .	14
Table 5-1. Population Based on WESTCAPS' Member Data from 2010 to 2035	16
Table 5-2. Water Demand Projections Based on WESTCAPS' Member Data in Acre-Feet per Year	17

Table 6-1. Timing of the CAGR D Replenishment Obligation, in Acre-Feet per Year For WESTCAPS members	18
Table 6-2. Projections for the Volumes of Reuse Water Utilized in Acre-Feet Per Year from 2010 to 2035 by WESTCAPS Member Entities	19
Table 6-3. Predicted Projections of Effluent Reuse in Acre-Feet Per Year from 2010 to 2035 by WESTCAPS Member Entities	20
Table 6-4. Input Variables and Deficit Water Volumes Over Time from the Year Renewable Supplies Can No Longer Meet Demands in Acre-Feet	21
Table 7-1. Allocation of Uncontracted Central Arizona Project Municipal and Industrial Priority Water, in Acre-Feet per Year	26

LIST OF FIGURES

	<u>Page</u>
Figure 2-1. WESTCAPS Area Population Projection Calculated by MAG	6
Figure 3-1. Water Demand of WESTCAPS Members in Acre-Feet	10
Figure 4-1. Water Demand and Supply for WESTCAPS Entities in Acre-Feet Based on MAG/CAWCD Population Projection	14
Figure 6-1. MAG Projections and Membership Population Projections	18
Figure 6-2. Water Demand and Supply in Acre-Feet Based on Membership Outlook for Population Projection and Projected Membership Reuse	19

ABBREVIATIONS AND ACRONYMS

' , ft.	feet
ac.	acre
af, AF	acre-feet
ADWR	Arizona Department of Water Resources
AMA	ADWR Active Management Area
AZ-Amer.	Arizona American Water Company, Agua Fria Division
AZ-Water	Arizona Water Company, White Tanks Division
CAP	Central Arizona Project
CAGR	Central Arizona Groundwater Replenishment District
CAWCD	Central Arizona Water Conservation District
DAWS	CAGR Designation of Assured Water Supply
DES	Arizona Department of Economic Security
ES	Executive Summary
gpcd	gallons per capita per day (gallons per person per day)
MAG	Maricopa Association of Governments
M&I	Municipal and Industrial
P.L.	Public Law
RWP	reclaimed water potential
SRP	Salt River Project
WESTCAPS	Coalition of West Valley Central Arizona Project Subcontractors
WMC	West Maricopa Combine Water Company

CHAPTER I

INTRODUCTION

The WESTCAPS strategic plan, completed in 2001, was successful at predicting the west valley's future water demand, where those demands would occur, and where it would be most efficient to place the infrastructure to serve the new demands. Since then, unprecedented growth has occurred in the Phoenix metropolitan area fueled by a low interest rate environment, improvements in master planned communities, and the new concept of "paper water" which provides flexibility for "moving" water around in such a large developed arid region of the desert southwest. The original strategic plan has not changed, but the realization that growth forecasts were not in-line with what has occurred is a concern to the Phoenix metro west valley cities and private water companies which will depend on an ever growing availability of water in order to meet the future demand.

Recent searches for population predictions consistently lead to the Arizona Department of Economic Security (Arizona DES) work accomplished in 1997. The recognized authority on population data in Maricopa County is the Maricopa Association of Governments, or MAG. Their work is based on Arizona DES data. The WESTCAPS strategic plan work accomplished in 2001 incorporated the population predictions from the Arizona DES work published in 1997.

Since 1997, a collaboration between MAG and the Central Arizona Water Conservation District (CAWCD) occurred in 2003 which began taking into account the added growth being felt in the valley since 1997. The collaboration melded the population data from MAG with CAWCD's member land data in order to predict future populations, land uses, and water uses.

Data from various sources have been gathered and assembled to update the supply and demand portion of the work accomplished during the last strategic plan. Ultimately a more accurate prediction of what the new demands are with respect to supply for the future of the west Phoenix valley is needed. Many of the cities and private water companies are accomplishing their own short and long term population projections for their service areas. In most cases, the growth predicted by member cities and water providers exceeds the MAG forecasts. The latter sections of this report detail future water demands based on west valley member's population projections.

A straight comparison cannot be made between the results from the 2001 strategic plan and the results from this report. In 2001, Glendale was a WESTCAPS member city, and today they are not. Today, Avondale is a member city and in 2001 they weren't. Consequently, demands and supplies for Glendale are not reported, and Avondale's demands and supplies are.

The report that follows is the most realistic attempt by the west valley cities at predicting water usage, and that the west valley requires additional supplies. The report identifies

future populations for WESTCAPS member lands, how the populations translate into water demands, and the ensuing shortfalls in the supply of water to meet the projected demands of the WESTCAPS member entities.

The report begins with MAG based population and development unit projections.

CHAPTER II

MAG BASED POPULATION AND DEVELOPMENT UNIT PROJECTIONS

MAG is the recognized source in Maricopa County for current and future population projections. Their source is the Arizona Department of Economic Security which conducts the census every ten years, with an interim census conducted at 5 year intervals. The results from the latest census were incorporated by CAWCD, in collaboration with MAG, to publish Outlook 2003: Municipal Demand Projections for CAWCD's Service Area Assuming Historic Data through January 2003.

Populations and development units are published in the CD version of Outlook 2003. The population and development unit numbers are useful in calculations which can be used to determine the demand per person or demand per development unit. Therefore, any change in the population prediction can be converted to update the water demand. A development unit is considered an average domestic or commercial unit developed in a given area.

The foundation for water demand is the population being served (municipal and industrial based). The 2001 strategic plan demonstrated water demand based on population predictions from compilations made in the 1997 population projection formulated by the Department of Economic Security. The following table demonstrates the outlook for populations for west valley cities from the 1997 work.

The following tables are placed on the same page so that top to bottom comparisons can be made more easily of the projections for WESTCAPS member cities in 1997 versus the projections made in 2003.

Table 2-1. Population Projections for West Valley Cities Compiled by the Arizona Department of Economic Security, 1997

City	2010	2015	2020	2025	2030	2035
Buckeye	28,140	51,410	82,380	102,220	124,070	155,200
Peoria	141,190	167,360	183,820	197,360	213,030	234,070
Avondale	37,500	51,810	84,800	94,900	104,010	112,910
Surprise	41,280	47,340	60,960	70,960	95,960	123,860
Goodyear	38,080	58,030	92,580	128,810	172,400	214,990

A projection from 2003 is shown below and is published in Outlook 2003. The new projections include areas served by water companies.

Table 2-2. Population Projections for West Valley Cities and Water Companies Published in CAWCD's Outlook 2003 and Compiled by MAG.

City	2010	2015	2020	2025	2030	2035
Buckeye	32,596	63,294	93,946	170,970	237,491	324,338
Peoria	144,400	165,829	188,095	212,044	232,649	234,616
Avondale	75,299	93,032	110,753	128,195	146,422	146,740
Surprise	41,832	62,493	83,119	157,149	217,755	331,212
Goodyear	41,490	85,190	128,878	209,003	286,381	301,781
WMC ¹	13,483	20,022	26,540	40,700	52,510	73,490
AZ-Amer. ²	80,606	114,066	147,487	199,731	245,212	257,346
AZ-Water ³	9,983	15,713	21,430	25,600	29,352	31,133

¹ – West Maricopa Combine is Valencia Water Co., Water Utility of Greater Buckeye, and Water Utility of Greater Tonopah.

² – Arizona-American Agua Fria Division

³ – Arizona Water Co. White Tanks Division

The 1997 projections show increasing growth for all cities through 2035. From the 1997 data, one city in particular, the City of Goodyear begins to show explosive growth beginning in 2020 with nearly 100,000 inhabitants, and culminating in 2035 with 215,000 inhabitants.

In contrast, the 2003 data shows explosive growth for three cities, Buckeye, Surprise, and Goodyear, and explosive growth for one private water company's service area, the Arizona-American Water Company. The remaining cities and water companies are nothing less than impressive in their percentage of expected population growth, with some like the West Maricopa Combine Water Company showing an overall population growth of 445% for their service area from 2010 to 2035. The following table shows the percentage increase in population growth from 2010 to 2035, based on the population data from Table 2-2.

Table 2-3. Overall Predicted Percentage Change in Population from 2010 to 2035 for WESTCAPS Member Areas Based on MAG Projections

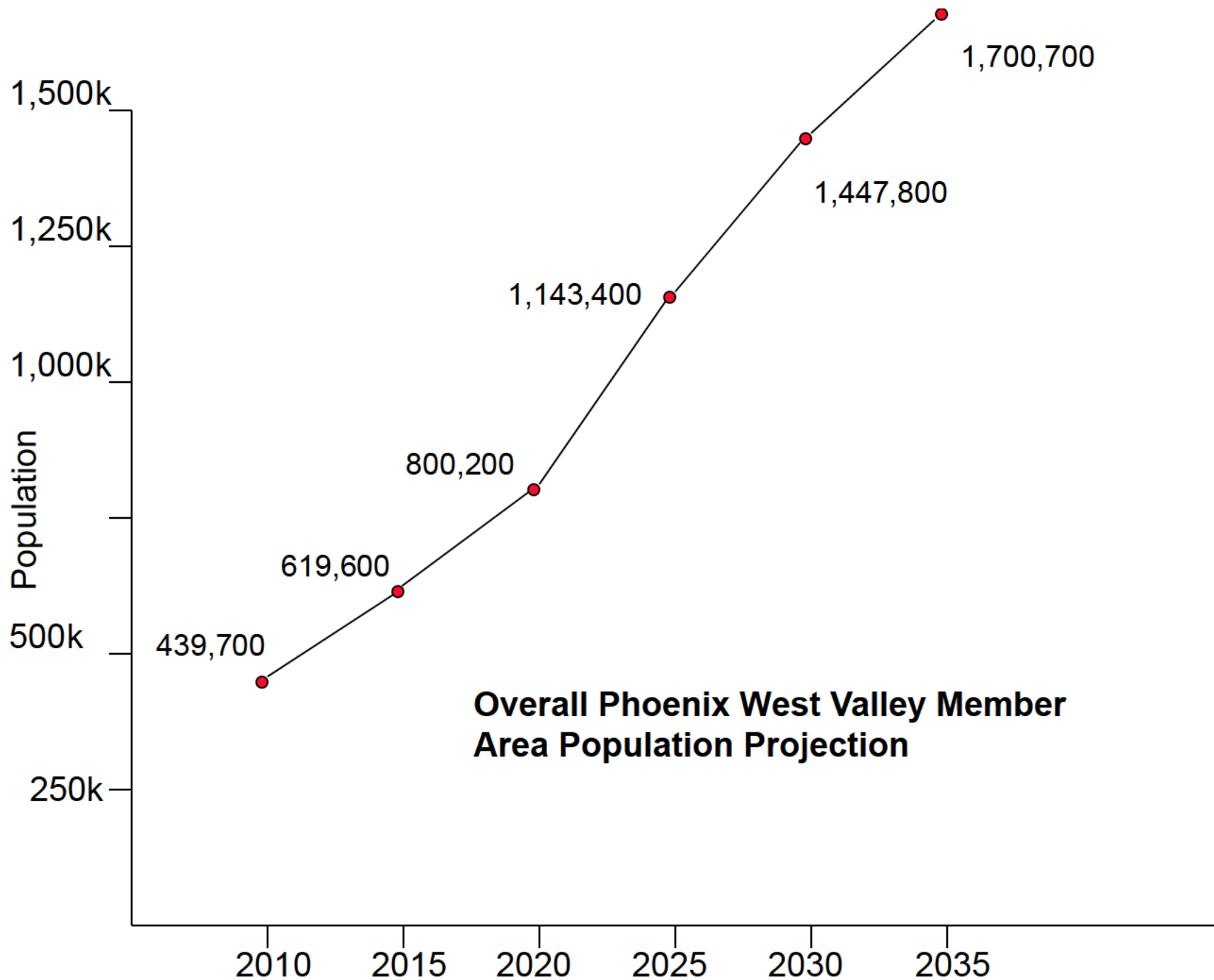
WESTCAPS Member Area	Population Change from 2010 to 2035
Buckeye	895%
Peoria	62%
Avondale	95%
Surprise	692%
Goodyear	627%
West Maricopa Combine	445%
Arizona-American – Agua Fria	219%
Arizona Water Company	212%

Outlook 2003 additionally provides for development unit projections. The traditional method for developing water forecasting is by multiplying the number of development units by the expected number of gallons per development unit demand. Table 2-4 details the number of development units projected by city or water provider area.

Table 2-4. Projected Development Units for West Valley Cities and Water Providers from CAWCD's Outlook 2003

City	2010	2015	2020	2025	2030	2035
Buckeye	12,034	24,303	36,531	67,260	93,761	130,496
Peoria	54,969	63,270	71,890	82,708	91,605	92,590
Avondale	35,123	47,880	60,604	79,800	96,512	100,821
Surprise	15,632	23,185	30,706	57,470	79,533	120,035
Goodyear	15,317	31,877	48,425	81,060	111,904	118,312
WMC	4,994	7,398	9,785	15,190	19,719	27,806
AZ-Amer.	35,123	47,880	60,604	79,799	96,512	100,821
AZ-Water	3,576	5,577	7,567	8,995	10,295	10,917

Figure 2-1 is provided as a graphical representation of the expected growth per MAG outlook. Every 5-year increment from 2010 to 2025 has a higher rate of growth than the previous increment giving the curve an exponential rate of growth look to it. The rate of growth begins to slow from 2025 to 2035, but still has a steeper growth rate than the time span 2010 to 2020.



Overall Phoenix West Valley Member Area Population Projection

Figure 2-1. WESTCAPS Area Population Projection Calculated by MAG

CHAPTER III

MAG BASED WATER DEMAND PROJECTIONS AND DEMAND RATIOS

Following the chapter on population projections based on Outlook 2003, water demands are also projected by CAWCD for its member lands. The water demand for CAWCD's entire member lands are published in Outlook 2003, and only the west valley's projections are re-printed below. Table 3-1 provides projected water demands for WESTCAPS members based on MAG population projections. Additionally, population projections from Chapter 2 are included at the bottom of the table along with overall gallons of usage per person per day.

Table 3-1. Projected Water Demands for WESTCAPS Members in Acre-Feet per Year, Populations from MAG/CAWCD Outlook 2003, and Gallons of Usage per Person per Day (gpcd)¹

Entity	2010	2015	2020	2025	2030	2035
Buckeye	4,944	10,564	16,166	30,244	42,385	59,215
Peoria	30,356	34,940	39,700	45,674	50,587	51,131
Avondale	13,899	17,016	20,127	21,972	23,893	23,923
Surprise	5,516	8,181	10,835	20,278	28,063	42,354
Goodyear	8,373	17,425	26,471	44,310	61,170	64,673
WMC	3,090	4,188	5,284	8,035	10,327	13,894
AZ-Amer.	15,497	21,920	28,263	37,819	46,150	48,298
AZ-Water	2,804	3,670	4,524	5,136	5,694	5,961
Total	84,477	117,903	151,368	213,468	268,269	309,448
Population	439,700	619,600	800,200	1,143,400	1,447,800	1,700,700
gpcd	172	170	169	167	165	162

In the above table, WMC is an acronym for West Maricopa Combine which is a combination of Valencia Water Company, the Water Utility of Greater Buckeye, and the Water Utility of Greater Tonopah. Arizona-American's west side division is the Agua Fria division, and Arizona Water Company's west side territory is the White Tanks Division.

The above water demands can be converted to population ratios. A ratio of water demand per person, or water demand per development unit allows a recalculation of the water demand based on changes to the population or the number of development units. A water demand in 2010 of 30,356 acre-feet divided by a population of 144,400 people yields a water demand per person ratio of 0.21022 acre-feet/person. Should a modified population projection for 2010 be 200,000 people for example, a corrected water demand

¹ – CAWCD member lands, from Outlook 2003.

can be predicted. The value 0.21022 acre-feet/person multiplied by the modified population projection of 200,000 yields a new value of 42,044 acre-feet.

The following tables provide ratios as water demand per person and water demand per development unit. The limitation of a recalculation of the water demand is that a straight population change may not entirely account for differences in the way water is used.

The general sense is that population growth will proceed as a municipal and industrial base, and not a trend of lower population or toward agriculture. Thus, the ratios are likely to provide a very close approximation of water demand based on population and development unit growth.

Table 3-2. Calculated Demand Ratios in Acre-feet per Person per Year

Entity	2010	2015	2020	2025	2030	2035
Buckeye	0.1517	0.1669	0.1721	0.1769	0.1785	0.1826
Peoria	0.2102	0.2107	0.2111	0.2154	0.2174	0.2179
Avondale	0.1846	0.1829	0.1817	0.1714	0.1632	0.1630
Surprise	0.1319	0.1319	0.1303	0.1290	0.1289	0.1279
Goodyear	0.2018	0.2045	0.2054	0.2120	0.2136	0.2143
WMC	0.2292	0.2092	0.1991	0.1974	0.1967	0.1891
AZ-Amer.	0.1923	0.1922	0.1916	0.1894	0.1882	0.1877
AZ-Water	0.2809	0.2336	0.2111	0.2006	0.1940	0.1915

Table 3-3. Calculated Demand Ratios in Acre-feet per Development Unit per Year

Entity	2010	2015	2020	2025	2030	2035
Buckeye	0.4108	0.4347	0.4425	0.4497	0.4521	0.4538
Peoria	0.5522	0.5522	0.5522	0.5522	0.5522	0.5522
Avondale	0.3957	0.3554	0.3321	0.2753	0.2476	0.2373
Surprise	0.3528	0.3528	0.3528	0.3528	0.3528	0.3528
Goodyear	0.5466	0.5466	0.5466	0.5466	0.5466	0.5466
WMC	0.6187	0.5661	0.5400	0.5290	0.5237	0.4997
AZ-Amer.	0.4412	0.4578	0.4664	0.4739	0.4782	0.4790
AZ-Water	0.7842	0.6580	0.5978	0.5710	0.5531	0.5460

Figure 3-1 provides a graphical representation of the overall demand for water from 2010 to 2035. Not surprisingly, the demand curve is similar in shape to the population growth curve. Some water demand statistics that stand out are the following.

- According to the MAG/CAWCD Outlook, more than 5 times the water demanded in 2005 from WESTCAPS member lands is expected will be demanded in 2035.
- The amount of water demanded in one year in 2035 by WESTCAPS member lands is the full storage capacities of SRP's Horseshoe and Bartlett dams in 2006.

- The amount of water demanded in the next 10 years is expected to nearly double, from 61,000 acre-feet per year in 2005, to 118,000 acre-feet per year in 2015 according to the MAG/CAWCD outlook.

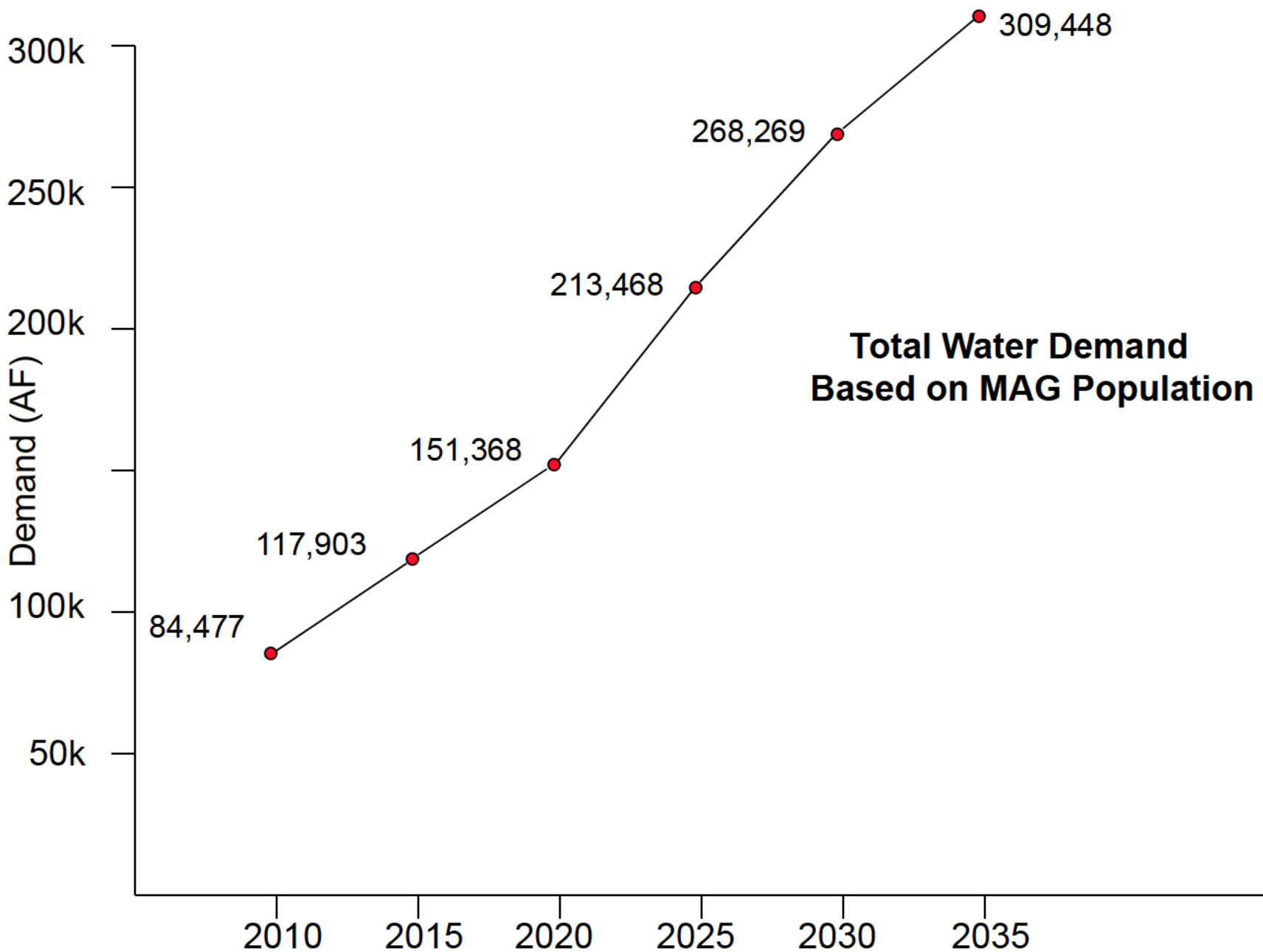


Figure 3-1. Water Demand of WESTCAPS Members in Acre-Feet

CHAPTER IV

WATER SUPPLY THROUGH ALLOCATIONS AND REUSE

The renewable supply of water for the west valley entities can be summarized as a combination of water allocations, and reclaimed water for reuse. Water allocations are a combination of either CAP and/or SRP water. SRP water is divided into surface water or pumped groundwater. Reclaimed water quantities were derived from information from cities, water entities, or, other publications, and include volumes that have been or will be recharged.

The volumes of water provided in the following tables are supplies which are used to offset water demands. Ultimately the goal is to assure a supply sufficient to meet demand. An analysis of whether supply will sustain the future demand is needed.

The analysis shows allocations which are dynamic except for the CAP supply which is a constant supply barring any drought conditions. The CAP and SRP allocations for WESTCAPS member lands are shown in Table 4-1, 4-2, and 4-3.

Table 4-1. CAP Allocations for WESTCAPS Members in Acre-Feet per Year of Water.¹

City/Entity	CAP
Buckeye	25
Peoria	19,709
Avondale	5,416
Surprise	7,373
Goodyear	3,531
WMC ²	107
Arizona-American Water ³	11,093
Arizona-Water Company	968
Total	48,222

¹ – Does not include potential contracts, and only includes the allocations assigned to member entities.

² – West Maricopa Combine's CAP allocation is comprised of 43 ac-ft/yr for the Water Utility of Greater Buckeye, and 64 ac-ft/yr for the Water Utility of Greater Tonopah.

³ – Arizona-American's CAP allocation is comprised of 11,093 ac-ft/yr for the Agua Fria regional area.

A second renewable water supply is available to two west valley cities. The Salt River Project provides surface water allocations and ground water rights to Peoria and Avondale. The allocations are prescribed as current potential and future potential,

without future dates being assigned to either water potential. The "current potential" is assigned to the year 2010, and the "future potential" is assigned to 2035. Intermediate water volumes are interpolated between years 2010 and 2035.

Table 4-2. Avondale's Surface and Groundwater Allocations from SRP (Water Rights) from 2010 to 2035 in Acre-Feet per Year.

Water Type	2010	2015	2020	2025	2030	2035
SW	4,363.2	4,842	5,322	5,800	6,280	6,759.3
GW	9,446.9	10,606	11,765	12,924	14,083	15,242.09
Total	13,810.1	15,448	17,087	18,724	20,363	22,001.39

SW is the acronym for surface water allocation, GW is the acronym for groundwater allocation.

Allocations are based on minimal water supply scenario which has been the allocation norm since 1998.

Only 2005 was a normal water year with respect to allocations since 1998.

Table 4-3. Peoria's Surface and Groundwater Allocations from SRP (Water Rights) from 2010 to 2035 in Acre-Feet per Year.

Water Type	2010	2015	2020	2025	2030	2035
SW	7,748	7,994	8,241	8,487	8,733	8,979.5
GW	21,480	22,077	22,674	23,271	23,868	24,465.3
Total	29,228	30,071	30,915	31,758	32,601	33,444.8

SW is the acronym for surface water allocation, GW is the acronym for groundwater allocation.

Allocations are based on minimal water supply scenario which has been the allocation norm since 1998.

Only 2005 was a normal water year with respect to allocations since 1998.

Reclaimed water potential (RWP) is the theoretical volume of all reclaimed water available for reuse. This value is typically a difficult value for a community to use 100% of. Table 4-4 provides maximum potential values for reclaimed water, which assumes that all of the effluent produced is reusable.

Table 4-4. Reclaimed Water Potential (RWP) for WESTCAPS Members by Year in Acre-Feet per Year from Years 2010 to 2035 Assuming All Reclaimed Water is Reused/Recharged¹

City/Entity	2010	2015	2020	2025	2030	2035
Buckeye ²	3,650	6,935	10,585	19,345	26,645	36,500
Peoria ²	16,060	18,615	21,170	23,725	25,915	26,280
Avondale ²	8,395	10,585	12,410	14,235	16,425	16,425
Surprise ²	4,745	6,935	9,490	17,520	24,455	37,230
Goodyear ²	4,745	9,490	14,600	23,360	32,120	33,945
WMC ³	0	0	0	0	0	0
AZ-Amer.	0	0	0	0	0	0
AZ-Water ³	0	0	0	0	0	0
Total	37,595	52,560	68,255	98,185	125,560	150,380

¹ – more commonly referred to as reclaimed effluent, does not include potential contracts which could be entered into, and only includes the reclaimed potential within the service areas listed.

² – volume computed as 100 gpcd (from 2002 MAG 208 Plan, Chapter 4)

³ – water providers typically do not have reclaimed water to contribute.

Naturally occurring recharge (through precipitation), is not considered a renewable resource for purposes of this study. Naturally occurring recharge is considered a renewable resource for ground water. Since groundwater is limited in its ability to replenish itself quickly, WESTCAPS desires to use less of it, and ADWR mandates that less of it be used through past legislation of the Arizona Groundwater Management Act.

Figure 4-1 illustrates the demands relative to supplies projected to 2035, which includes the results for 100% reuse of effluent. The cost of transporting effluent from point of treatment to point of reuse is far greater than the cost of installing a well at the intended point of use. The use of renewable supplies and the reuse of effluent leaves west valley cities demanding more water than the allocations available. By 2022, the demands by municipalities and industry are matched by the allocations available assuming total reuse of reclaimed water. Beyond 2022 a shortfall in the supply begins, and by 2035 the shortfall has extended to 55,400 acre-feet per year.

The following table provides the theoretical outlook of water availability, or deficit, based on the results from MAG/CAWCD's Outlook 2003 and the most optimistic outlook for reuse. The graphical representation of supply and demand is shown in Figure 4-1 on page 14.

Table 4-5. Excess Water Supplies or Deficits for WESTCAPS Member Entities Under the Theoretical Scenario in Acre-Feet per Year for Years 2010 to 2035

Projected Year	Theoretical Excess or (Shortfall)
2010	44,378
2015	28,398
2020	13,111
2025	(16,579)
2030	(41,523)
2035	(55,400)

During the formulation of the original strategic plan, the planned allocations were CAP and SRP water, and effluent for reuse. Since then, CAP and SRP allocations have changed very little. At the same time, the idea of reusing water was becoming more common, but few estimates existed for the percentage of effluent which could be reused. The original strategic plan generated values of 100% reuse of effluent. In addition, the Central Arizona Groundwater Replenishment District (CAGR D) was not active in groundwater preservation until 1999, even though the "replenishment act" was signed into law in 1993. In 1999 the CAGR D became committed to replenishing a specified average annual volume of water in a location where the municipal provider could physically access it for service to its customers. In 1999, CAGR D's ability to prove physical availability was set to a maximum of 20,000 acre-feet per year. In today's CAGR D a maximum does not exist and the CAGR D is not hamstrung to replenish water at the point of use, but rather can replenish anywhere inside the AMA. Thus one theory is that WESTCAPS' original strategic plan in 2001 might have glossed over CAGR D's plan of operation as a realistic water source.

The following chapters refine the outlook for supply and demand by replacing MAG's estimates with population estimates provided by each city, implementing CAGR D as an available supply which by State law is part of the available supply, and projecting a realistic outlook for water reuse.

Theoretical Outlook - Entitlements and Reclaimed Water Potential

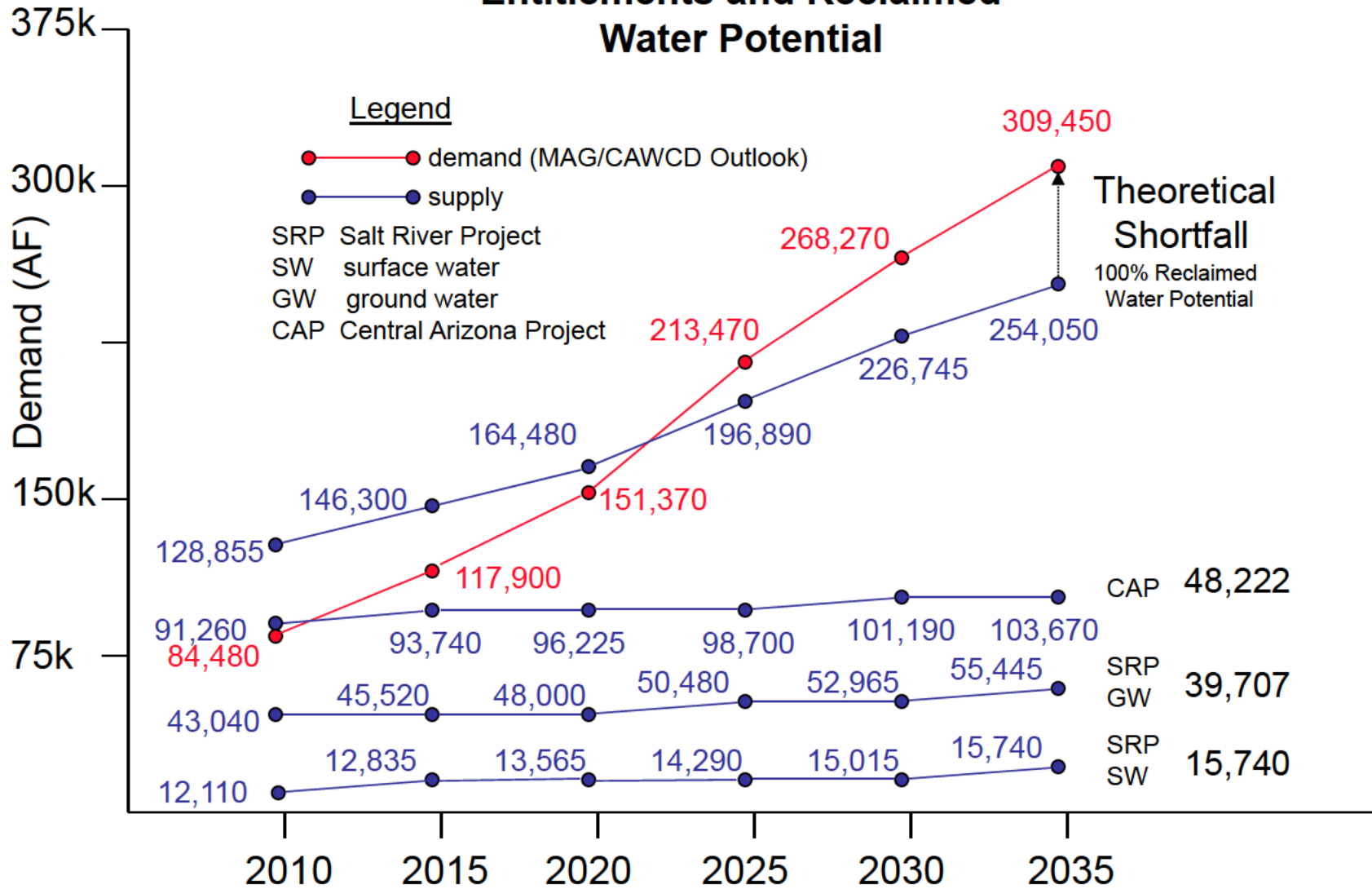


Figure 4-1. Water Demand and Supply for WESTCAPS Entities in Acre-Feet Based on MAG/CAWCD Population Projection

CHAPTER V

WATER DEMANDS – THE MEMBER'S OUTLOOK

The state of Arizona officially recognizes population projections provided by MAG. Since the latest census, most of the WESTCAPS member cities have assembled planning departments of their own and have had to project populations in order to keep up with land use planning within their boundaries. Though the MAG statistics are still considered official with most city councils, it is difficult to ignore the data that land use planning departments are now using within their borders. This chapter aims at disclosing what some of these land use planning departments are projecting. What follows is the water consumption projected based on the populations anticipated. The following table is the outlook based on WESTCAPS member data. Where members have not had the opportunity to project growth within their boundaries, either the MAG population outlook has been used, or another projection has been used and is foot-noted.

Table 5-1. Population Based on WESTCAPS' Member Data from 2010 to 2035

City	2010	2015	2020	2025	2030	2035
Buckeye ¹	100,000	182,500	265,000	345,000	468,000	670,350
Peoria ²	160,800	183,700	206,600	249,000	263,000	269,250
Avondale ³	79,174	100,835	122,496	144,157	153,968	160,816
Surprise ⁴	124,537	167,193	213,950	264,560	315,170	365,780
Goodyear ⁵	58,839	153,793	248,746	343,700	366,600	389,500
WMC ⁶	13,896	25,634	39,858	56,612	75,997	98,303
AZ-Amer. ⁷	102,547	159,327	225,980	273,417	312,797	339,150
AZ-Water ⁸	9,983	15,713	21,430	25,600	29,352	31,133
Totals	649,776	988,695	1,344,060	1,702,046	1,984,884	2,324,282

¹ – Buckeye has not developed a population outlook. Data is from Buckeye Valley Chamber of Commerce and ADWR's Assured Water Supply Report, see appendix.

² – Data available for 2010, and 2020 from Peoria's Planning and Zoning Division - Demographics for Peoria. Additionally a graph is provided in the same report showing population trends. Years 2015, 2025, 2030, and 2035 are interpolated from the graph.

³ – Years 2030 and 2035 were interpolated from data which runs to 2040.

⁴ – Years 2025, 2030, and 2035 were interpolated based on prior years data and the build-out population expected (see appendix for derivations).

⁵ – Years 2015, 2020, and 2030 were interpolated from the data Goodyear's city planning staff developed.

⁶ – WMC is West Maricopa Combine. Data is available from 2005 to 2014. Years 2015, 2020, 2025, 2030, and 2035 are interpolated (see appendix for derivations).

⁷ – Arizona-American projects 1.95 dwelling units per acre at build out (2040), and an Agua Fria Service member land area of 93.71 square miles. See appendix.

⁸ – Arizona Water Company has not developed a population outlook. Data is from MAG/CAWCD's Outlook 2003.

The above is translated into a total demand. Figure 5-2 illustrates the supply/demand outlook. The following table provides the data on WESTCAPS water use projections based on the data provided in Table 5-1, or directly from the WESTCAPS member entity itself.

Table 5-2. Water Demand Projections Based on WESTCAPS' Member Data in Acre-Feet per Year.

City	2010	2015	2020	2025	2030	2035
Buckeye ¹	19,267	34,753	50,166	64,537	86,636	121,662
Peoria ²	33,800	38,706	43,613	53,635	57,176	58,670
Avondale ³	17,737	22,585	27,440	32,295	34,494	36,029
Surprise ⁴	10,730	14,999	21,354	28,308	35,929	44,259
Goodyear ⁵	10,359	31,450	51,092	72,864	78,306	83,470
WMC ⁶	5,609	10,254	15,744	22,079	29,259	36,864
AZ-Amer. ⁷	19,713	30,628	43,441	52,560	60,130	65,196
AZ-Water ⁸	2,804	3,670	4,524	5,136	5,694	5,961
Totals	120,019	187,045	257,374	331,414	387,624	452,111

¹ – Derived from ADWR's Certificate of Assured Water Report, results provided in the appendix.

² – Peoria's water demand is calculated from their population (Table 5-1) multiplied by their demand ratios in ac-ft/person per year (Table 3-2) for Peoria.

³ – Years 2006, 2011, 2026, and 2040 are provided in Avondale's Water Resources Master Plan. The years needed in this table are interpolated (see appendix for derivation).

⁴ – Years 2010 through 2020 are from Surprise's Water Resources Master Plan. Years 2025 through 2035 are derived based on build-out population (see appendix for derivation).

⁵ – Year 2010 is from Goodyear's Water Resources Master Plan. All other years require a derivation. Years 2015 through 2035 are calculated as population multiplied by their demand ratios in ac-ft/person per year (Table 3-2) for Goodyear.

⁶ – Years 2010 and 2014 are provided by WMC. Subsequent years are interpolated (see appendix for derivations).

⁷ – Arizona-American's projection provides for data in years 2010, 2015, 2020, and 2040. Years 2025, 2030, and 2035 were interpolated (see appendix for derivation).

⁸ – Arizona Water Co. has not developed an outlook. Demand is calculated as population (Table 5-1) multiplied by the demand ratio (Table 3-2) for Arizona Water.

CHAPTER VI

STRETCHING THE SUPPLY CAGR'D's REPLENISHMENT PROGRAM AND THE REALISTIC EXPECTATIONS OF WATER REUSE

A replenishment program exists in order to pump groundwater beyond that allowed in an Active Management Area (AMA). The word "replenishment," used to describe the program which exists under the Central Arizona Groundwater Replenishment District (CAGR'D), is so called because groundwater is replenished in the AMA for a specific entity in return for the right to be able to pump excess groundwater (the requirement is membership in the CAGR'D). The concept is that excess water (generally CAP water) is replenished by the CAGR'D in the AMA for a CAGR'D member. Replenishment can occur in the AMA and is not necessarily required to occur in the location where it is pumped.

Unlike renewable water allocations, the CAGR'D's program water is not "replenished" unless excess groundwater is pumped. Some WESTCAPS entities which have a diverse and extensive water supply won't need their CAGR'D supply for years to come. Other WESTCAPS member cities, with fewer renewable water supplies, currently require the replenishment program. Some sense of this timing can be drawn from the data in Table 6-1.

Table 6-1. Timing of the CAGR'D Replenishment Obligation, in Acre-Feet per Year for WESTCAPS members.

Member	2010	2015	2020	2025	2030	2035
Peoria ¹	0	0	0	4,276	9,189	9,733
Avondale ²	0	0	0	569	0	0
Surprise ³	9,053	14,680	15,959	15,959	15,959	15,959
Goodyear ⁴	4,842	10,000	8,094	8,094	8,094	8,094
AZ-American ⁵	2,463	4,009	6,543	12,710	16,210	16,823
Buckeye ⁵	2,402	6,571	9,221	13,116	14,121	15,231
WMC ⁵	1,504	2,681	3,242	3,935	4,124	4,361
Total	20,264	37,941	43,059	56,548	63,374	65,984

¹ – Peoria's combined allocations (CAP and SRP) equal 41,398 ac-ft/yr.

² – Avondale's combined allocations equal 13,042 ac-ft/yr.

³ – Surprise's CAP entitlement is 7,373 ac-ft/yr, and the maximum DAWS by the CAGR'D is 15,959 ac-ft/yr.

⁴ – Goodyear's CAP allocation is 3,531 ac-ft/yr, and the maximum CAGR'D obligation through 2015 is 10,000 ac-ft/yr, and the maximum DAWS by the CAGR'D is 8,094 ac-ft/yr.

⁵ – Arizona-American's Agua Fria Division, Buckeye and Valencia Water Company (a subsidiary of West Maricopa Combine) are projected to have their deliveries as shown in Appendix Table D-5 of CAGR'D's Plan of Operation, Nov. 8, 2004.

Peoria for example is entitled to replenish up to 12,142 acre-feet per year through the CAGR. ¹ However, Peoria is entitled to anywhere from 48,937 to 53,148 ac-ft/yr between 2010 and 2035 from CAP and SRP surface and ground waters. From Table 6-1, it is projected that Peoria does not begin to use excess water until 2025.

For more information on the CAGR, a publication entitled Central Arizona Groundwater Replenishment District, Plan of Operation, Submitted Draft, November 8, 2004, is available on the internet.

The theoretical outlook is based on MAG/CAWCD population projections and water demands, and reuse of all reclaimed water. A revised projection for reuse is shown in Table 6-2, and is based on approximately 50% reuse or recharge of effluent. The reuse projections come from individual water resources master plans. Collectively, the member cities estimate that about one-half of the effluent will be reused or recharged of the potential effluent available. The results of the individual master plans are listed below along with more detailed information about where the information came from or how it was derived.

Table 6-2. Projections for the Volumes of Reuse Water Utilized in Acre-Feet Per Year from 2010 to 2035 by WESTCAPS Member Entities.

City/Entity	2010	2015	2020	2025	2030	2035
Buckeye ²	0	100	1,000	1,500	2,500	3,500
Peoria ³	3,100	4,000	4,750	5,150	5,650	6,000
Avondale ⁴	7,360	9,180	10,980	12,690	14,460	14,700
Surprise ⁵	8,928	11,986	15,338	18,200	21,400	24,600
Goodyear ⁶	1,165	2,350	7,200	13,980	15,440	18,321
WMC ⁷	0	0	0	0	0	0
AZ-Amer. ⁷	900	1,800	2,700	3,800	3,800	3,800
AZ-Water ⁷	0	0	0	0	0	0
Total	21,453	29,316	40,968	53,820	60,750	67,421

² – Values for Buckeye are estimates. Buckeye does not have predictions or a water resources master plan.

³ – Interpolated values for Peoria, the latest data is 2002, and this table begins at 2010.

⁴ – Avondale does not predict re-use for 2035. The value for 2035 above reflects a small population increase from 2030 to 2035.

⁵ – Values for years 2025, 2030, and 2035 are not part of the Surprise, Arizona Water Resources Master Plan and are interpolated values in order to arrive at the values needed.

⁶ – Values for years 2015, 2020, 2025, and 2030 are not part of the Goodyear, Arizona Water Resources Master Plan and are interpolated values. Build-out is assumed to occur in 2035.

⁷ – private water companies typically do not have reclaimed water to contribute.

¹ – from CAGR's Plan of Operation, Draft, November 8, 2004, Table D-8

Adding the CAGR D supplies combined with a projected reuse/recharge outlook by the members begins to provide a closer estimate of the available renewable water supply.

It is expected that with time, water will become a more expensive commodity, and with its increase in value, more will be reused. WESTCAPS collectively estimates that more effluent will be reused than originally predicted in Chapter 4. Some of the data is beginning to show that more of the communities using effluent are, with time, finding ways to use close to 100% of their effluent. The realistic outlook assumes 55% effluent reuse beginning in 2010 and more effluent used incrementally with time. The WESTCAPS projection is an additional 1% effluent reuse per year with 80% of available effluent expected to be reused by 2035. Table 6-3 is WESTCAPS outlook for effluent reuse from 2010 to 2035.

Table 6-3. Predicted Projections of Effluent Reuse in Acre-Feet Per Year from 2010 to 2035 by WESTCAPS Member Entities.¹

2010	2015	2020	2025	2030	2035
23,600	35,180	53,260	75,348	91,125	107,870

¹ – Based on member projections from Table 6-2. Year 2010 from Table 6-2 estimates 21,453 ac-ft/yr from all of the members. This value is multiplied times 2 to estimate 100% reuse, and lastly multiplied by 0.55 which is the theory of 55% reuse, leading ultimately to 80% reuse by 2035.

The WESTCAPS supply/demand outlook is portrayed in Figure 6-2. It is the most realistic outlook, and the outlook that WESTCAPS has the most confidence in. This confidence is highlighted by the fact that CAP and SRP water allocations are fully utilized, that CAGR D is fully utilized, and that reuse water is graduated from 55% utilization in 2010 to 80% utilization by 2035. A shortfall in water for the west valley cities by 2013 is evidenced from Figure 6-2.

The results illustrate the importance that water will play in the west Phoenix metro area, and the lack of water which can be counted on. Except for Federal land located south of Buckeye, the west Phoenix metro area is unencumbered for growth. The west valley's challenge appears to be water, or the lack of it prescribed through renewable supplies.

Table 6-4 provides a comparison of the theoretical outlook versus the outlook provided in this chapter, the realistic outlook.

Table 6-4. Input Variables and Deficit Water Volumes Over Time from the Year Renewable Supplies Can No Longer Meet Demands in Acre-Feet.

Variable, Year-Span	Theoretical Outlook	Realistic Outlook
Demand	MAG Based Population Projection and MAG Based Water Demands	Membership Based Water Demands
Supply	CAP, SRP, and 100% Reuse	CAP, SRP, membership outlook for reuse, and CAGR D supplies
2010 to 2015	-	25,230
2015 to 2020	-	212,540
2020 to 2025	24,870	414,100
2025 to 2030	145,265	581,900
2030 to 2035	242,315	766,325
TOTAL DEFICIT	412,450	2,000,095

Chapter 7 provides a summary of the Arizona Water Settlement Act and the possible outcomes to the reallocation of Arizona's Colorado River entitlement.

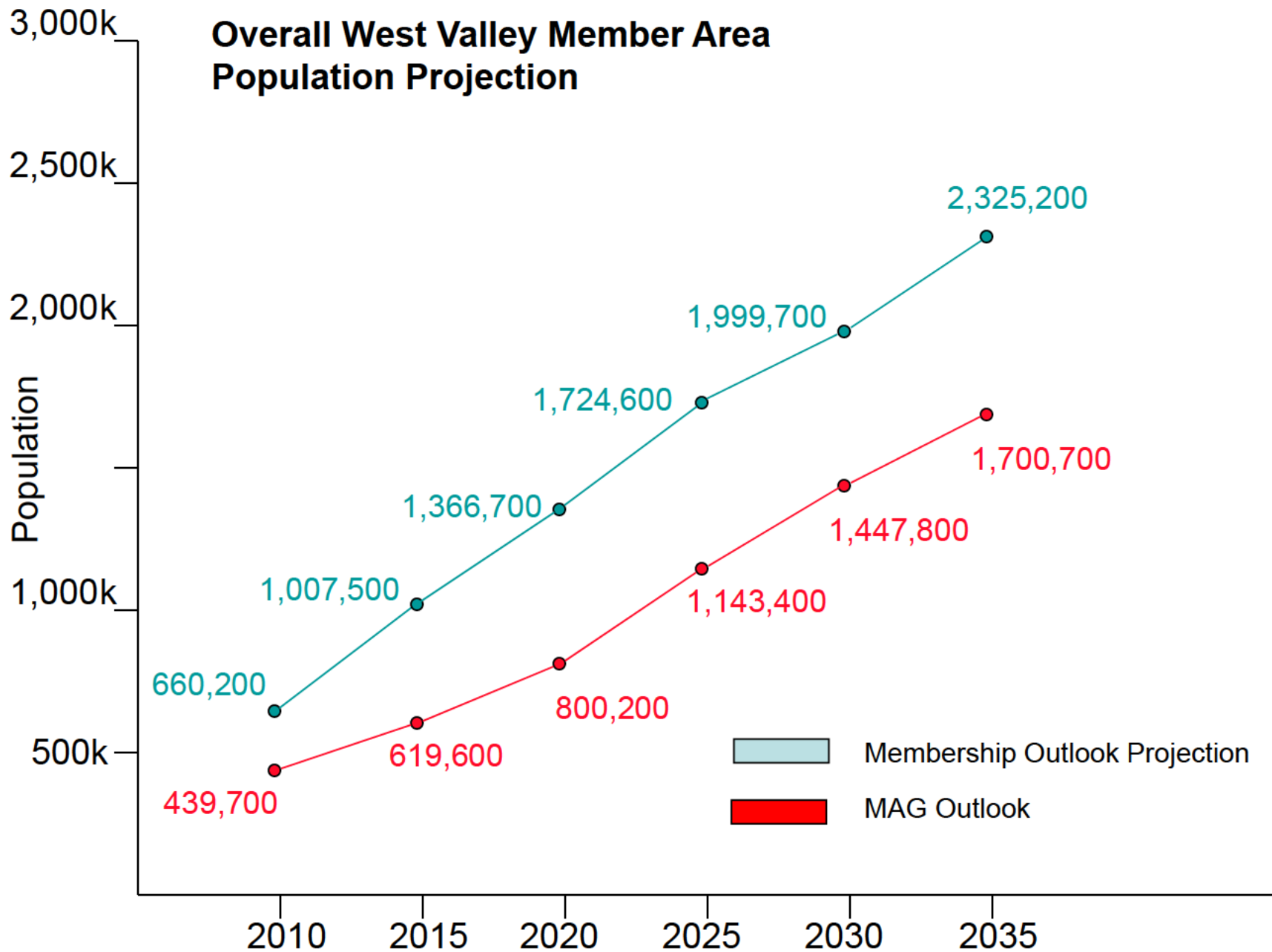


Figure 6-1. MAG Projections and Membership Population Projections

Supply vs. Demand Based on Westcaps Outlook And Westcaps Membership Outlook for Reuse (Graduated Reuse, in 2010=55%, by 2035=80%)

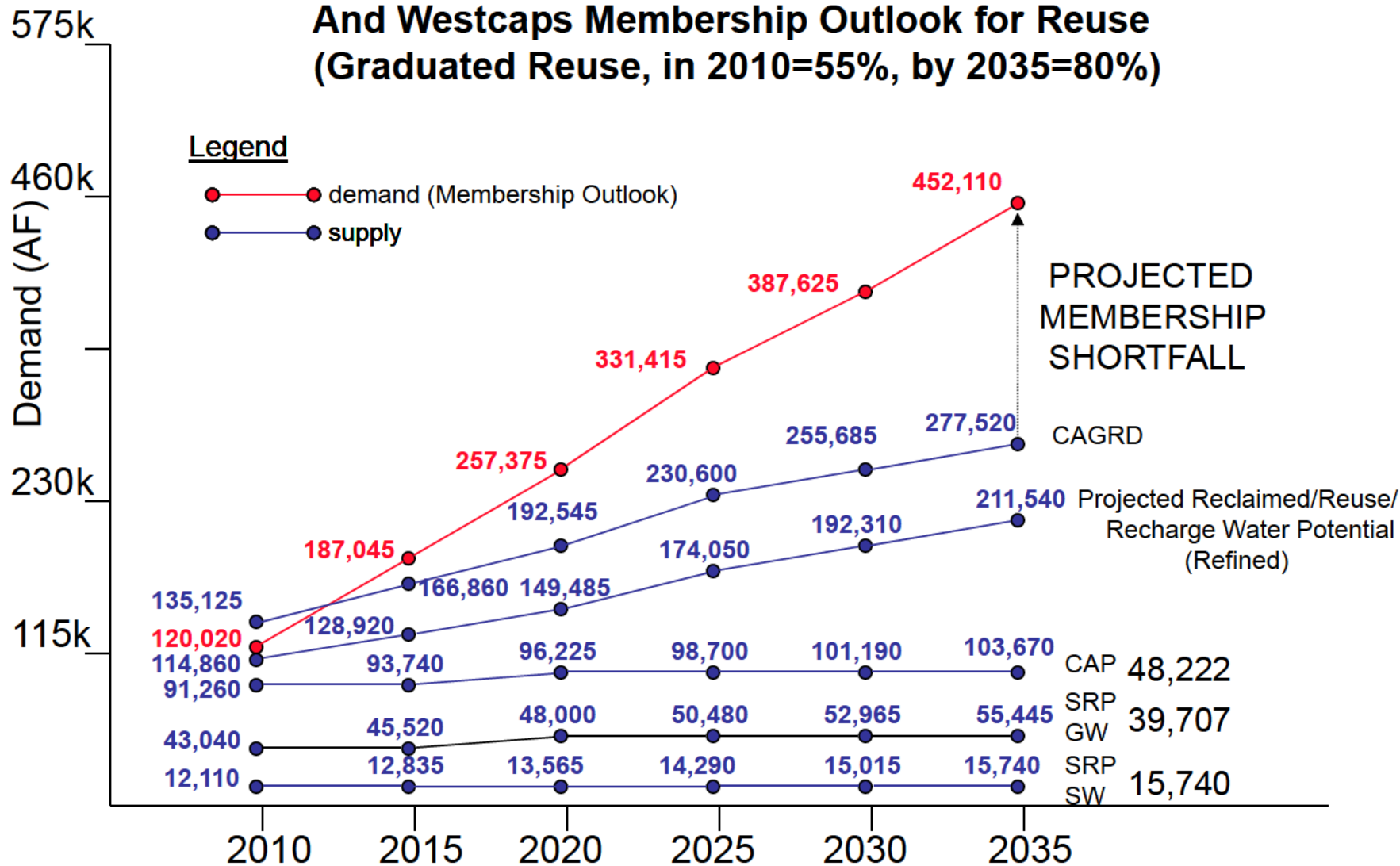


Figure 6-2. Water Demand and Supply in Acre-Feet Based on Membership Outlook for Population Projection and Projected Membership Reuse

CHAPTER VII

THE ARIZONA WATER SETTLEMENT ACT AND THE TERMS OF THE CENTRAL ARIZONA PROJECT REALLOCATION

Background

The intent of the Act is for the CAP to resolve financial issues and resolve water rights claims for the Gila River Indian Community and the Tohono O'odham Nation. What is also in the mix is a modification to the provisions of the Colorado River Basin Project Act regarding the authorization for the Secretary of the Interior to contract with water users in New Mexico to increase diversions from the Gila River in New Mexico over and above the amount established by the US Supreme Court in *Arizona v. California* by 18,000 acre-feet per year through an exchange of Central Arizona Project water. The Congressional Budget Office (CBO) estimates that enacting P.L. 108-451 would increase direct spending by \$445 million over the 2005 to 2014 year period.

Arizona officials are anxious to finalize the settlements so that congressional markup on P.L. 108-451 can occur. Original markup target dates were missed and officials now look forward to the work being done by September 15, 2005, with final legislative action occurring during the 2006 summer session, although they concur that this may be an optimistic goal.

The Terms and Timing of Reallocation

Title I of the act is the only one of the three titles which delves into the allocation/reallocation portion of CAP water. Titles II and III, are more specifically aimed at the claims of the Gila River Indian Community, the Tohono O'odham Nation, New Mexico, San Xavier and Schuck Toak tribes.

In Title I, 197,500 acre-feet of agricultural priority water is reallocated to Indian tribes. Specifically, 102,000 acre-feet is reallocated to the Gila River Indian Community, and 28,200 acre-feet is reallocated to the Tohono O'odham Nation. The remaining 67,300 acre-feet is to be used to resolve Indian water claims in Arizona, and may be allocated by the Secretary to Arizona Indian Tribes in fulfillment of future Arizona Indian water rights settlement agreements approved by an Act of Congress. Of the 67,300 acre-feet remaining, 6,411 acre-feet is retained to settle the claim by the Navajo Nation. If the remaining Indian settlements are not resolved prior to December 31, 2030, the Secretary is free to reallocate the remaining 67,300 unallocated water as the Secretary sees fit. The following are two sentences from Sec. 104, part (a)(1)(B)(i):

"In the absence of an Arizona Indian water rights settlement that is approved by an Act of Congress after the date of enactment of this Act, the Secretary shall not allocate any such water until December 31, 2030. Any allocations made by the Secretary after such date shall be accompanied by a certification that the Secretary is making the allocation in order to assist in the resolution of an Arizona Indian water right claim."

Paragraph B continues on to explain that the 197,500 acre-feet of agricultural priority water shall not be leased, exchanged, forborne, or otherwise transferred by an Arizona Indian tribe without the authorization of Congress for any direct or indirect use outside the reservation of the Arizona Indian tribe. On the surface it would appear that 197,500 acre-feet of agricultural priority water is not available for reallocation outside of Indian tribes. It is possible that if some of the 67,300 acre-feet of water remains unallocated, Congress could modify the act to relinquish some, or all, of the remaining unallocated portion outside of Indian tribes after 2030. It is unlikely that after so many years of negotiations, than any water negotiated for Indian tribes would be reallocated to non-Indian entities. In addition, any outcome would not be decided prior to a 2030 determination.

Section 104, part (a)(2) speaks to the reallocation to the Arizona Department of Water Resources. Subparagraph (A) describes in general that 96,295 acre-feet of agricultural priority water will be held in Trust by the Department of Water Resources and be made available under the following conditions.

- 1) the Director (ADWR) shall submit to the Secretary (Interior) a recommendation for reallocation.
- 2) after receiving the recommendation, the Secretary shall carry out the review and proposed reallocation in accordance with Federal law.
- 3) if the recommendation is rejected by the Secretary, the Secretary shall request a revised recommendation and proceed with any reviews required under part 2) above.

It is important to note that the above (197,500 acre-feet, and 96,295 acre-feet) entitlements are, and will continue to be, classified as agricultural priority water. This is important because if any shortages exist on the Colorado River, Arizona water law dictates that agricultural priority water is the first eliminated. After the 197,500 acre-feet has been made available to the Secretary for reallocation under Indian water claims, all remaining non-Indian agricultural priority water (the 96,295 acre-feet) shall be reallocated by the Secretary to ADWR to be held under a contract in trust for future use by non-Indian Municipal and Industrial water users. The contract prohibits the direct use of this water by ADWR, and the timing is such that ADWR will not make any recommendations to the Secretary for trust water prior to January 1, 2010. Thereafter, ADWR may recommend that all trust water be reallocated to specified M&I water users.

The word "specified" is important to note in the above paragraph because it does not single out any specific entities which will be eligible to receive such waters, and inherently it is left open to the discretion of ADWR to determine who is most eligible to be entitled to this water. The language goes on to state the following.

"ADWR shall make Trust water available for reallocation to non-Indian M&I water users within the State of Arizona at periodic intervals, starting in 2010. Only those M&I water users that meet the criteria established by ADWR shall be eligible to receive Trust water."

A third designation of unallocated water is identified under the Arizona Water Settlement Act. This water is classified as "uncontracted municipal and industrial water." A total of 65,647 acre-feet of this uncontracted water has already been designated for allocation among 20 municipalities and water companies. WESTCAPS members are well represented among the 20 allottees, claiming 4 of 20 spots and 36% of the total allocation. Table 7-1 below provides the details of the distribution.

Table 7-1. Allocation of Uncontracted Central Arizona Project Municipal and Industrial Priority Water, in Acre-Feet per Year.

Municipality/Water Company	Volume/Year
Goodyear, Arizona	7,211
Peoria, Arizona	5,527
Surprise, Arizona	2,876
Phoenix, Arizona	8,206
Superior, Arizona	285
Cave Creek Water Company	806
Chaparral Water Company	1,931
El Mirage, Arizona	508
H2O Water Company	147
Mesa, Arizona	7,115
Scottsdale, Arizona	2,981
AVRA Cooperative	808
Chandler, Arizona	4,986
Del Lago (Vail) Water Company	1,071
Glendale, Arizona	3,053
Community Water Company of Green Valley, Arizona	1,521
Metropolitan Domestic Water Improvement District	4,602
Oro Valley, Arizona	3,557
Tucson, Arizona	8,206
Valley Utilities Water Company	250

The timing of the distribution of the uncontracted municipal and industrial water has been determined to occur as soon as the Arizona Water Settlements Act is finalized.

No further allocations are described in the Act, and what is explained above is available in more detail by reading the Act itself. For further details on the Arizona Water Settlement Act, a copy can be requested from the Bureau of Reclamation, Phoenix Area Office; or the Arizona Department of Water Resources.

Bibliography

Arizona Department of Water Resources, Certificate of Assured Water Supply report, January 2006

Central Arizona Groundwater Replenishment District, Plan of Operation, Submitted Draft, November 8, 2004

Interim Socioeconomic Projections Documentation, Maricopa Association of Governments, July 2003

Outlook 2003, Municipal Demand Projections for CAWCD's Service Area Assuming Historic Data through January 2003, Central Arizona Project & Maricopa Association of Governments Information Center, Volume One, November 2004

Planning and Zoning Division – Demographics for Peoria; City of Peoria, December 2003

thinkAZ. An Analysis of the Water Budgets of Buckeye, Payson, and Prescott Valley. Rita P. Maguire, Herb Dishlop, Michael J. Pearce; Pub. 2005

Water Resources Master Plan, City of Avondale, Arizona, RBF Consulting, March 2002

Water Resources Master Plan, City of Goodyear, Arizona, Final August 2004

Water Resources Master Plan, City of Surprise, Arizona, Executive Summary, Revised – June 1, 2004

West Maricopa Combine, Inc., Customer Growth Projections, June 2005

SRP Water Entitlement Report, Water Delivery (Avondale, Peoria), February 6, 2006

APPENDIX

27-401486.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 46B	08/09/2004	Issued	30-Aug-05	126	62.41	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401497.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 32	09/02/2004	Issued	19-Oct-04	87	71.74	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401503.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 16	09/10/2004	Issued	9-Dec-04	132	60.92	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401504.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 23A	09/10/2004	Issued	23-Nov-04	156	84.92	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401505.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 17	09/10/2004	Issued	23-Nov-04	114	55.97	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401522.0000	Town of Buckeye	Certificate of Assured Water	Mountain View Estates	09/27/2004	Issued	31-Mar-05	161	82.71	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	2004	
27-401532.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 7	10/06/2004	Issued	22-Feb-05	242	122.07	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401536.0000	Town of Buckeye	Certificate of Assured Water	ParkPlace at Buckeye	10/06/2004	Issued	13-Jan-05	267	137.71	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	2004	
27-401601.0000	Town of Buckeye	Certificate of Assured Water	Encantada Estates	12/09/2004	Issued	30-Jun-05	307	163.62	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	2004	
27-401626.0000	Town of Buckeye	Certificate of Assured Water	Westpark Phase 2, Parcels 13 & 14	01/14/2005	Issued	28-Mar-05	214	98.89	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400513
27-401634.0000	Town of Buckeye	Certificate of Assured Water	Painted Rock	02/01/2005	Issued	30-Aug-05	122	82.65	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	2005	
27-401679.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 45C	03/23/2005	Issued	26-Aug-05	46	33.15	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401680.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 10	03/23/2005	Issued	26-Aug-05	25	24.33	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401681.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 47	03/23/2005	Issued	26-Aug-05	11	38.65	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401682.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 49A	03/23/2005	Issued	26-Aug-05	81	39.47	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400400
27-401795.0000	Town of Buckeye	Certificate of Assured Water	Westpark Phase 2, Parcels 18S & 20S	06/23/2005	Issued	15-Nov-05	226	120.78	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400513
27-401808.0000	Town of Buckeye	Certificate of Assured Water	Sundance Parcel 48	07/01/2005	Issued	30-Aug-05	249	153.58	TRUE	FALSE	FALSE	FALSE	FALSE	TRUE		28-400400
28-400513.0000	Town of Buckeye	Analysis of Assured Water	Roston/Buckeye Community	04/04/2001	Issued	4-Jul-01	3895	2490.22	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	2001	28-400513
28-400947.0000	Town of Buckeye	Analysis of Assured Water	Tartesso and Tartesso West	04/25/2003	Issued	1-Oct-03	36925	26360.49	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	2003	28-400947
28-400956.0000	Town of Buckeye	Analysis of Assured Water	Sun Valley Community	04/30/2003	Issued	1-Oct-03	34196	20449.59	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	1988	
28-400993.0000	Town of Buckeye	Analysis of Assured Water	Bell 3000	06/11/2003	Issued	1-Oct-03	10076	6871.47	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	2003
28-401013.0000	Town of Buckeye	Analysis of Assured Water	Spurlock Property	07/08/2003	Issued	1-Oct-03	7329	9553.62	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	2003
28-401037.0000	Town of Buckeye	Analysis of Assured Water	Douglas Ranch - Phases 1,2,3,4 & 5	08/08/2003	Issued	12-May-04	55000	23654.12	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	2001
28-401061.0000	Town of Buckeye	Analysis of Assured Water	Festival Ranch, Phase 1	08/28/2003	Issued	22-Jan-04	13676	7705.06	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	2003	
28-401120.0000	Town of Buckeye	Analysis of Assured Water	Tartesso Master - Planned Community	10/16/2003	Issued	9-Feb-04	9321	6404.54	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	2003	28-401120
28-401222.0000	Town of Buckeye	Analysis of Assured Water	Tartesso North	01/30/2004	Issued	26-Mar-04	12022	7912.52	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	2004	
28-401539.0000	Town of Buckeye	Analysis of Assured Water	Festival Ranch	10/08/2004	Issued	23-May-05	10500	11733.37	TRUE	FALSE	FALSE	FALSE	FALSE	FALSE	TRUE	2005
28-401719.0000	Town of Buckeye	Analysis of Assured Water	Sun Valley South	10/16/2003	Issued	2-Feb-04	17392	12053	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	
							Subtotal of Subdivisions	226,741.0	144,931.8							
							minus duplicate applications	4,770.0	2,681.1							
							Total of Subdivisions	221,971.0	142,250.7							

interpolated number based on AF/lot determination (as no original value was provided)

AF/lot = 0.641

AF/person = 0.21220
population of 3.02/lot = 670,352

red value

Population Projection for Buckeye Based on ADWR Certificate of Assured Water Spreadsheet

Build-out assumed at 15-years from application approval date

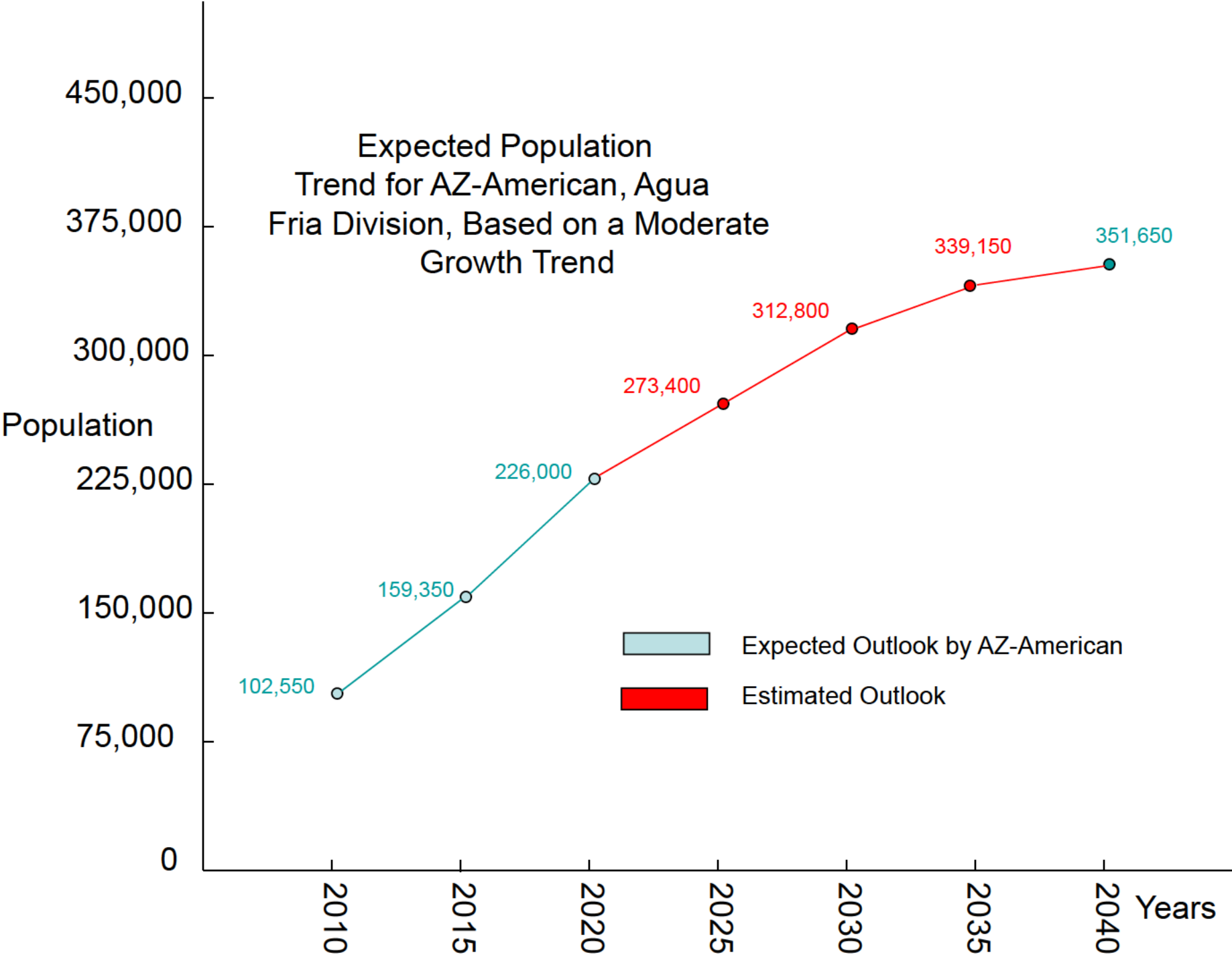
	Build-out occurs	3.02 persons per lot per ADWR	Lots	Population
2001 Application Status Dates	2031		3,895	11,763
2002 Application Status Dates	2032		2,297	6,937
2003 Application Status Dates	2033		89,759	271,072
2004 Application Status Dates	2034		113,095	341,547
2005 Application Status Dates	2035		12,925	39,034
Totals			221,971	670,352

	per BVCoC*	per ADWR	Ultimate Population Projection	water demand (AF)	calculated gpcd	corrected gpcd	corrected water demand (AF)
2005			100,000	21,220	189.4	173	19,267
2010	100,000		182,500	38,727	189.4	170	34,753
2015			265,000	56,234	189.4	169	50,166
2020			345,000	73,210	189.4	167	64,537
2025				468,750	189.4	165	86,636
2030		670,352	670,450	142,271	189.4	162	121,662
2035			864,600	183,471	189.4	162	156,894
2040			990,000	210,081	189.4	162	179,649
2045			1,031,000	218,781	189.4	162	187,089
2050			1,054,000	223,662	189.4	162	191,263
2055				1,053,960			
ADWR Values for 2055 (348,994 lots)							
* - BVCoC is the Buckeye Valley Chamber of Commerce							

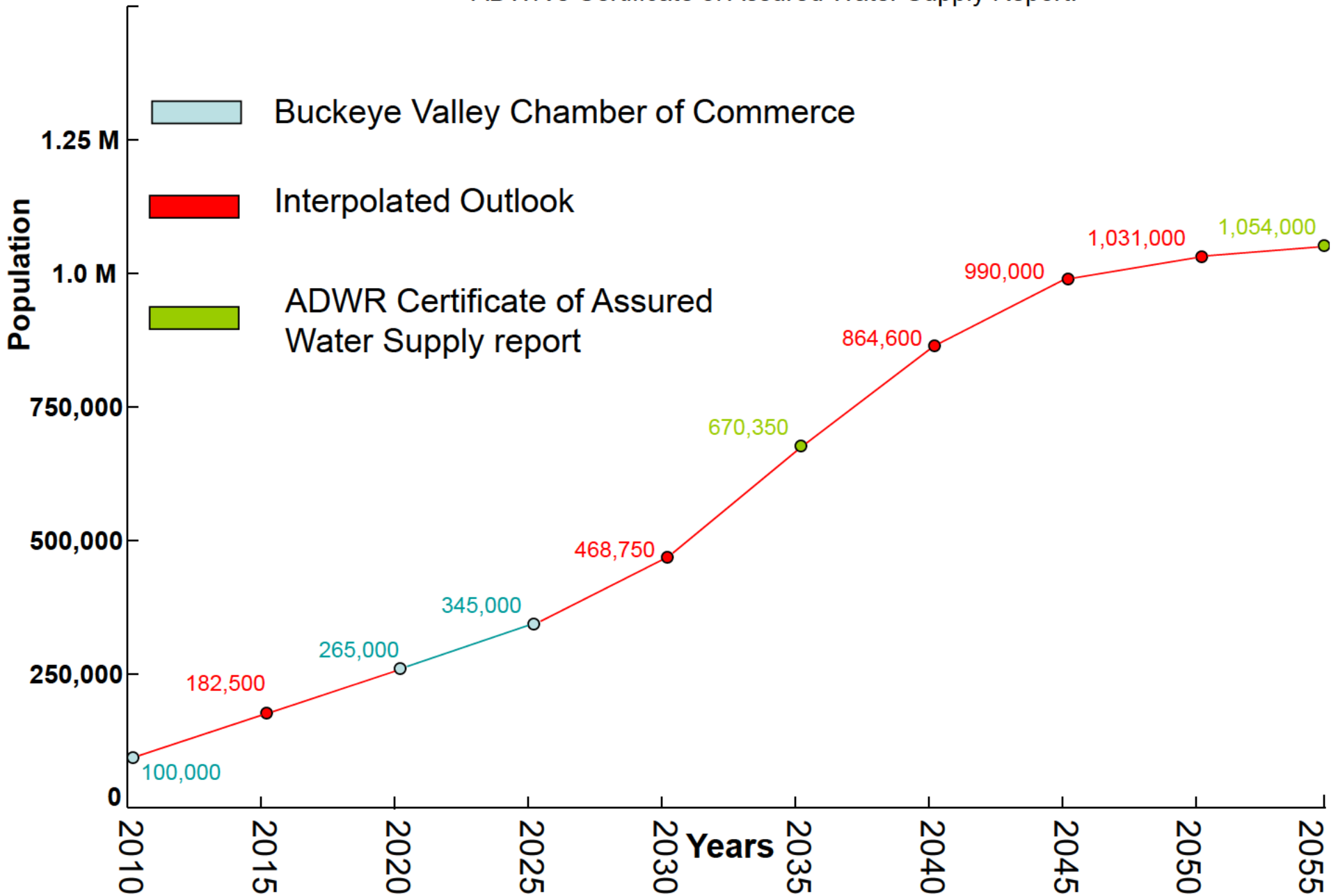
Population projection steps for Buckeye, Arizona

- step 1 Analysis of certificate of assured water supply report. Determine which lots have been double counted so they aren't counted a second time. Total up population and water demand. Lots which are a duplicate have a box placed around the lot number
- step 2 Determination of when Buckeye can expect population total from step 1. Recommendation is 30 years from application status date time-frame. ADWR recommends 3.02 persons per lot.
- step 3 Determine populations and build-out time frames from the 2001 through 2005 application status dates.
- step 4 Determine Buckeye's population in 5-year increments through a graphical "best fit" analysis by plotting known target populations from the Buckeye Valley Development Group and ADWR (see Buckeye Expected Population Trend in the Appendix)
- step 5 Determine the water demand. The total water demand can be obtained from the analysis of certificate of assured water supply report. The number of lots is known, and the number of persons per lot is known. Therefore, the factor for demand per person is known, and the 5-year increment of water demands can be calculated. The gpcd is calculated (calculated gpcd column) and corrected to current and projected averages (from table 3-1). Assessment is accurate at the 2055 buildout corrected water demand of 191,263 is the approximate value estimated by ADWR of 192,781 AF total.

Expected Population
Trend for AZ-American, Agua
Fria Division, Based on a Moderate
Growth Trend



Buckeye's Expected Population Trend by Combining Data From Buckeye Valley Chamber of Commerce, and ADWR's Certificate of Assured Water Supply Report.



Filling in the Gaps – Determination of Populations or Water Demand Where a Specific Year of Data Couldn't be Provided by a Municipality or Private Water Company

from Avondale's Water Resources Master Plan

<u>year</u>	<u>volume</u>	
2006	13,855	ac-ft
2011	18,708	ac-ft
2026	33,266	ac-ft
2040	37,562	ac-ft

calculating year 2010

2011 minus 2006 = 4,853
change per year during time frame: 971
Year 2010 = Year 2011 minus 971 ac-ft = 17,737 ac-ft/year

calculating year 2015

2026 minus 2011 = 14,558
change per year during time frame: 971
Year 2015 = Year 2026 minus (971 ac-ft times 11 years) = 22,585 ac-ft/year

calculating year 2020

2026 minus 2011 = 14,558
change per year during time frame: 971
Year 2020 = Year 2026 minus (971 ac-ft times 6 years) = 27,440 ac-ft/year

calculating year 2025

2026 minus 2011 = 14,558
change per year during time frame: 971
Year 2025 = Year 2026 minus 971 ac-ft = 32,295 ac-ft/year

calculating year 2030

2040 minus 2026 = 4,296
change per year during time frame: 307
Year 2030 = Year 2026 plus (307 ac-ft times 4 years) = 34,494 ac-ft/year

calculating year 2035

2040 minus 2026 = 4,296
change per year during time frame: 307
Year 2035 = Year 2026 plus (307 ac-ft times 9 years) = 36,029 ac-ft/year

Water Demand Summary

<u>year</u>	<u>volume</u>	
2010	17,737	ac-ft
2015	22,585	ac-ft
2020	27,440	ac-ft
2025	32,295	ac-ft
2030	34,494	ac-ft
2035	36,029	ac-ft

Arizona-American Specific Membership Land Data

	<u>year: 2005*</u>		<u>year: 2010*</u>		<u>year: 2015*</u>
enter ac-ft:	11492	enter ac-ft:	19713	enter ac-ft:	30628
= gallons:	3,740,611,524	= gallons:	6,416,522,361	= gallons:	9,969,322,116
= gpm	7,117	= gpm	12,208	= gpm	18,968
= popul.	59,781	= popul.	102,547	= popul.	159,327
= dwell unit:	19,927	= dwell unit:	34,182	= dwell unit:	53,109
= du/acre	0.33	= du/acre	0.57	= du/acre	0.89
	<u>year: 2020*</u>		<u>year: 2025</u>		<u>year: 2030</u>
enter ac-ft:	43441	enter ac-ft:	52560	enter ac-ft:	60130
= gallons:	14,139,915,177	= gallons:	17,108,122,320	= gallons:	19,572,134,610
= gpm	26,902	= gpm	32,550	= gpm	37,238
= popul.	225,980	= popul.	273,417	= popul.	312,797
= dwell unit:	75,327	= dwell unit:	91,139	= dwell unit:	104,266
= du/acre	1.26	= du/acre	1.52	= du/acre	1.74
	<u>year: 2035</u>		<u>year: 2040*</u>		
enter ac-ft:	65196	enter ac-ft:	67600		
= gallons:	21,221,102,412	= gallons:	22,003,597,200		
= gpm	40,375	= gpm	41,864		
= popul.	339,150	= popul.	351,656		
= dwell unit:	113,050	= dwell unit:	117,219		
= du/acre	1.88	= du/acre	1.95		

* - values for demand in ac-ft/yr are from AZ-American, with populations 2025, 2030, and 2035 graphically interpolated (graphic interpolation provided in appendix).

1. the "enter ac-ft:" value is the demand predicted by AZ-American
2. AZ-American Development units per acre predicted to equal 1.95 by 2040.

Goodyear's Population

Goodyear's Data		Interpolated from Goodyear's Data	
2005	30,757	2005	30,757
2010	58,839	2010	58,839
2015	unknown	2015	153,793
2020	unknown	2020	248,746
2025	343,700	2025	343,700
2030	unknown	2030	366,600
2035	389,500	2035	389,500

the above populations for Goodyear are provided in Goodyear's 2004 Water Resources Master Plan (Plan). For this study, the years 2015, 2020, and 2030 are needed, but are not provided by the Plan. The following is the analysis for interpolating those years.

	<u>2025</u>	<u>2010</u>	<u>delta</u>	<u>delta/yr</u>
2015, 2020 = 2025-2010	343,700	58,839	284861	18990.733
	<u>2035</u>	<u>2025</u>	<u>delta</u>	<u>delta/yr</u>
2030 = 2035-2025	389,500	343,700	45800	4580

delta = the difference in population from the years provided (provided to the left of the delta value)
 delta/yr = the average rate of change in population per year during the time years analyzed.

Year 2015 = Year 2010 + (5 X delta/yr for line 2015, 2020)	
Year 2015 = 58,839 + (5 X 18,990.73), therefore	2015 = 153,793
Year 2020 = Year 2010 + (10 X delta/yr for line 2015, 2020)	
Year 2020 = 58,839 + (10 X 18,990.73), therefore	2020 = 248,746
Year 2030 = Year 2025 + (5 X delta/yr for line 2030)	
Year 2030 = 343,700 + (5 X 4,580), therefore	2030 = 366,600

Surprise's Population and Water Demand

Surprise's Data			Interpolated from Surprise's Data	
2005	81,006		2005	81,006
2010	124,537		2010	124,537
2015	167,193		2015	167,193
2020	213,951		2020	213,951
2025	unknown		2025	264,560
2030	unknown		2030	315,170
2035	unknown		2035	365,779
build-out	517,607	2050?		

	<u>2020</u>	<u>2050</u>	<u>delta</u>	<u>delta/yr</u>
2015, 2020 = 2025-2010	213,951	517,607	303,656	10,122

- Surprise reaches build-out by 2050, and the difference between build out population and 2020 population is the value delta, with an average change per year under the term delta/yr. The unknown year 2025 is 2020's population plus 5 times the delta/yr value. Year 2030 is 2020's population plus 10 times the delta/yr value, and 2035 is 2020' population plus 15 times the delta/yr value.

Population Summary, Percentage of Total and Determination of Water Demand

<u>Yr</u>	<u>Population</u>	<u>Water Demand ac-ft/yr</u>	<u>Percent of Demand vs. Population</u>	<u>Calculated Percent or Supposed?</u>
2005	81,006	6,402	7.9%	calculated
2010	124,537	10,730	8.6%	calculated
2015	167,193	14,999	9.0%	calculated
2020	213,951	21,354	10.0%	calculated
2025	264,560	28,308	10.7%	supposed
2030	315,170	35,929	11.4%	supposed
2035	365,779	44,259	12.1%	supposed

- values of demand on "calculated" lines are from Surprise's Water Resources Master Plan. Values of demand on "supposed" lines are determined by the following. The average rate of growth percent demand vs. population is 0.7% per 5 year period. Years 2025 through 2035 are given a 0.7% increase in percent demand vs. population per 5 year period. Population for those years is then multiplied by the percent column to arrive at water demand.

West Maricopa Combine - Population and Water Demand Determination

<u>Year</u>	<u>Customers</u>	<u>Population</u>	Water <u>gpm</u>	Water <u>ac-ft/yr</u>	water delta <u>(Per 4/5 Yrs)</u>	<u>delta/yr</u>	demand ratio <u>(ac-ft/yr/pers.)</u>
2005	1,495	4,485	1,121	1,810	-		0.4037
2010	4,632	13,896	3,474	5,609	3,799	760	0.4037
2014	7,700	23,100	5,775	9,325	3,715	929	0.4037
2015		25,634		10,254		929	0.4000
2020		39,858		15,744		1,098	0.3950
2025		56,612		22,079		1,267	0.3900
2030		75,997		29,259		1,436	0.3850
2035		98,303		36,864		1,521	0.3750

- data provided by WMC for years 2005, 2010, and 2014. Only data for Valencia, Greater Buckeye, and Greater Tonopah is used (data for Willow Valley, and North Scottsdale excluded).
- 2015's water demand is derived by adding the change per year (delta/yr) to 2014's water demand.
- 2015's population is calculated by dividing the water demand by the demand ratio.
- demand ratio for 2005 through 2014 is calculated using WMC data. Efficiency is assumed in demand ratio numbers from 2020 through 2035.
- change per year, or delta per year, is calculated for 2015
- delta/yr derived as increasing until 2030, then slowing for 2035.
- calculation of water demand for 2020 through 2035 by multiplying delta/yr by period and adding to previous demand.
- population for 2020 through 2035 is derived by dividing the water demand by the demand ratio.