

OVERVIEW OF THE DRAFT FOURTH MANAGEMENT PLAN FOR THE PINAL AMA

Pinal Groundwater Users Advisory Council
May 9, 2017



Information sources reviewed:

- Designations of Assured Water Supply
- Annual Water Withdrawal & Use Reports
- Pinal AMA Groundwater Flow Model
- Demand and Supply Assessment, Pinal AMA
- Residential Demand Study, Montgomery & Associates
- MAG Population Projections by Traffic Analysis Zone
- PAG Population Projections by Traffic Analysis Zone
- CAG Population Projections by Traffic Analysis Zone
- AZ Dept. of Administration Population Projections
- CAGRDR Plan of Operation
- City of Casa Grande Reclaimed Water Plan
- City of Coolidge 2025 General Plan
- US EPA – “WaterSense” plumbing fixture flow rate information
(<http://www.epa.gov/watersense/products/index.html>)



PINAL AMA

DRAFT 4MP Chapters

- Chapter 1 – INTRODUCTION
- Chapter 2 – HYDROLOGY
- Chapter 3 – WATER DEMAND & SUPPLY
- Chapter 4 – AGRICULTURAL CONSERVATION PROGRAM
- Chapter 5 – MUNICIPAL CONSERVATION PROGRAM
- Chapter 6 – INDUSTRIAL CONSERVATION PROGRAM
- Chapter 7 – WATER QUALITY
- Chapter 8 – UNDERGROUND WATER STORAGE, SAVINGS AND REPLENISHMENT
- Chapter 9 – WATER MANAGEMENT ASSISTANCE
- Chapter 10 – IMPLEMENTATION OF 4MP
- Chapter 11 – PROJECTED WATER BUDGET
- Chapter 12 – WATER MANAGEMENT STRATEGY



PINAL AMA DRAFT 4MP

Chapter 1: INTRODUCTION

- AMA Challenges:
 - Continued groundwater reliance
 - Achievement of the Pinal AMA goal
 - Additional water management efforts in addition to the management plan

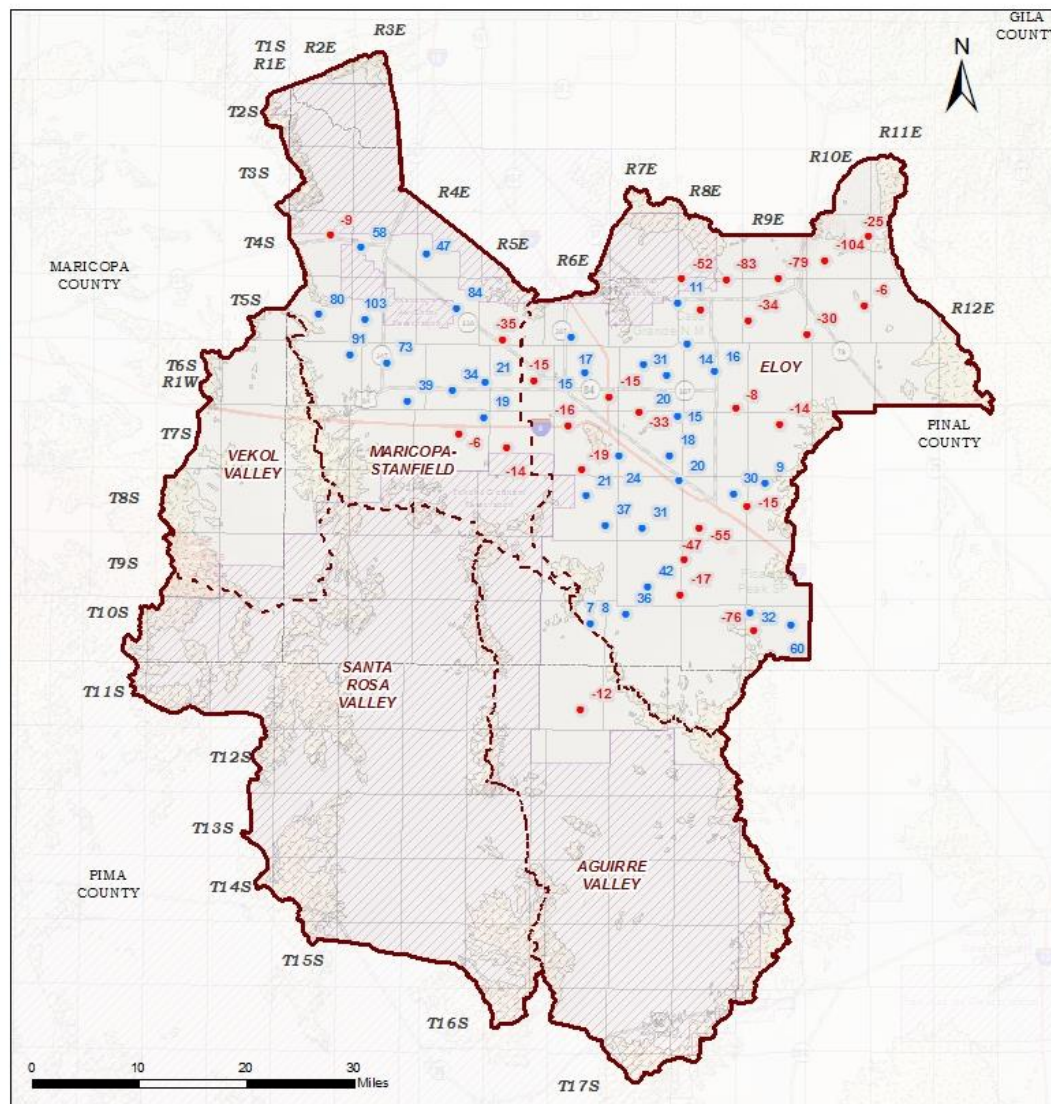


PINAL AMA DRAFT 4MP

Chapter 2: HYDROLOGY

- Historically fluctuating annual precipitation amounts
- Prolonged drought since 1995 (officially since 1999)
- Most natural recharge enters along the tributaries and is highly seasonal and sporadic
- Groundwater Savings Facility in-lieu water and corresponding decreased pumping resulting in some areas of water level stabilization or rise, but LTS credits belong to storers
- Groundwater pumping remains greater than natural recharge, resulting in persistent overdraft condition
- Some areas of the AMA experiencing land subsidence





- Final AMA
- Sub-basin
- City or Town
- Indian Reservations
- Major Road
- Interstate Highway
- Stream
- Park or Forest
- Military
- Hardrock
- Township/Range
- Positive Change
- Negative Change

Water Level Change 2003-2013 Pinal AMA



PINAL AMA DRAFT 4MP

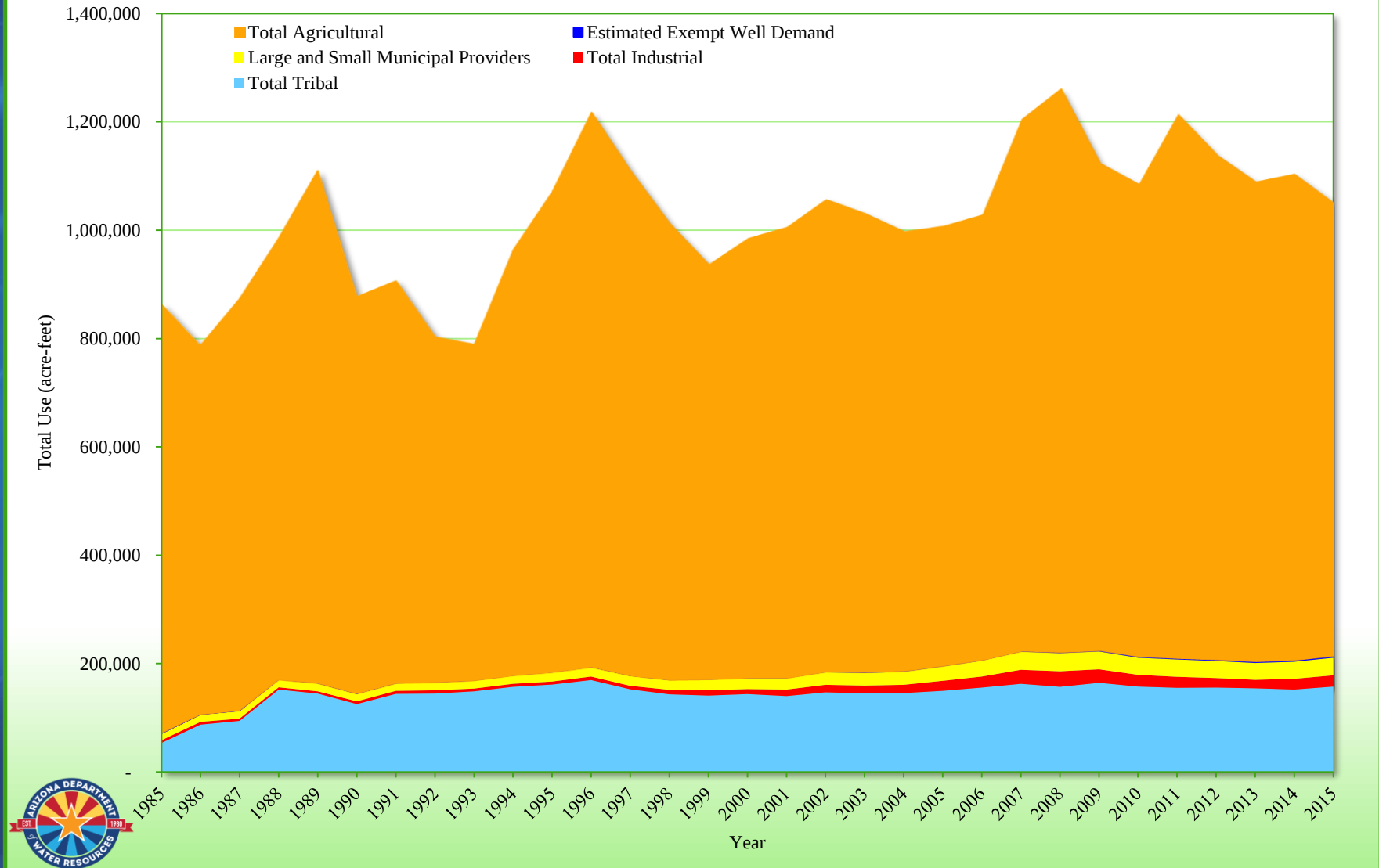
Chapter 3: WATER DEMAND & SUPPLY

- Overall AMA water demand fluctuated 1985-2015 (due to agricultural demand fluctuations)
- Growing demand in other sectors
- 1985 agricultural demand close to 600K af
- 2015 agricultural demand about 412K af
- Overall AMA groundwater demand 37K less in 2015 than in 1985, but not trending down
- Approx. 27K acres retired/extinguished; 255K acres remain active

PINAL AMA DRAFT 4MP

HISTORICAL WATER DEMAND BY SECTOR

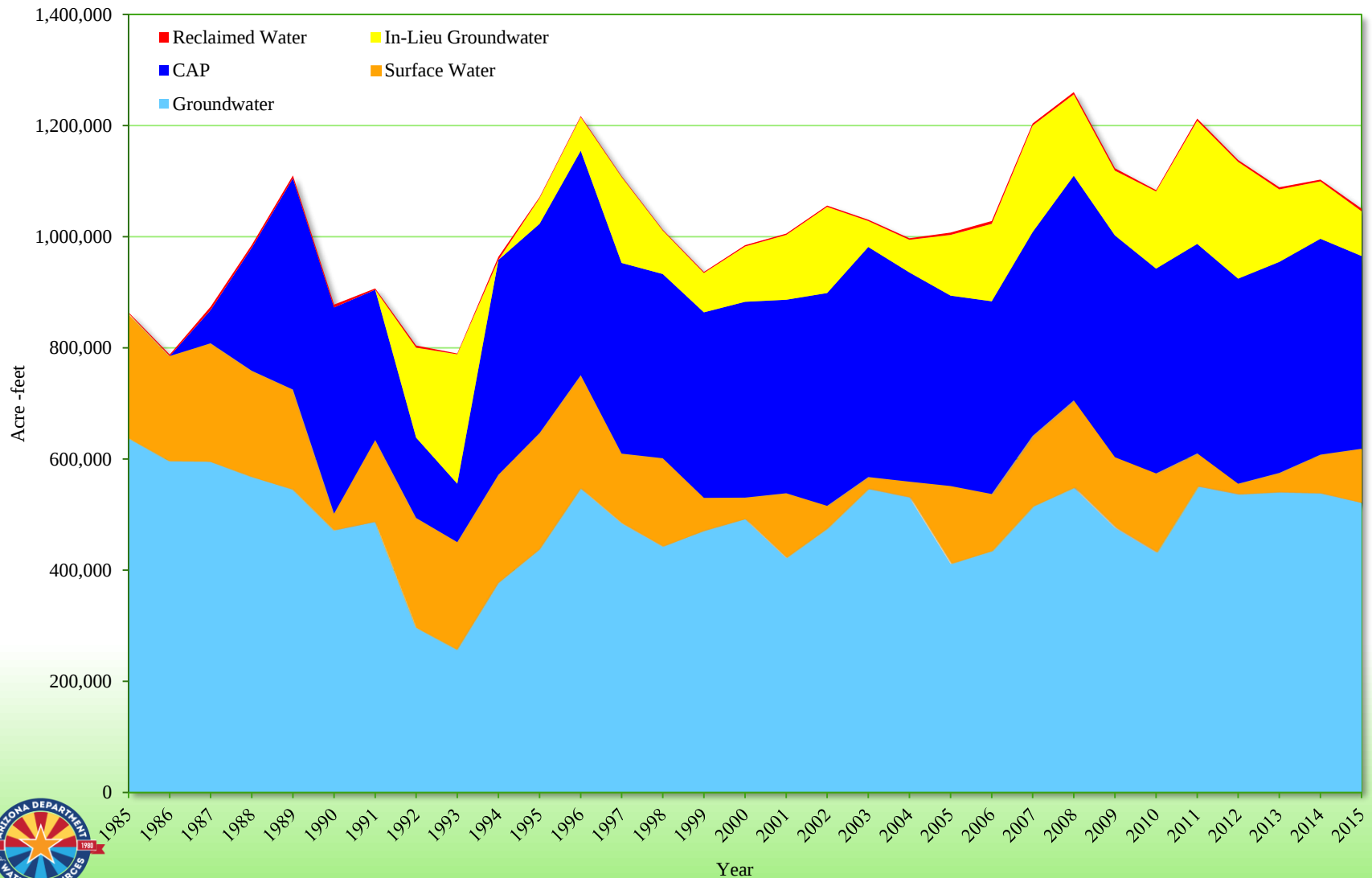
FIGURE 3-1
PINAL AMA WATER DEMAND BY SECTOR



PINAL AMA DRAFT 4MP

HISTORICAL WATER SUPPLIES USED

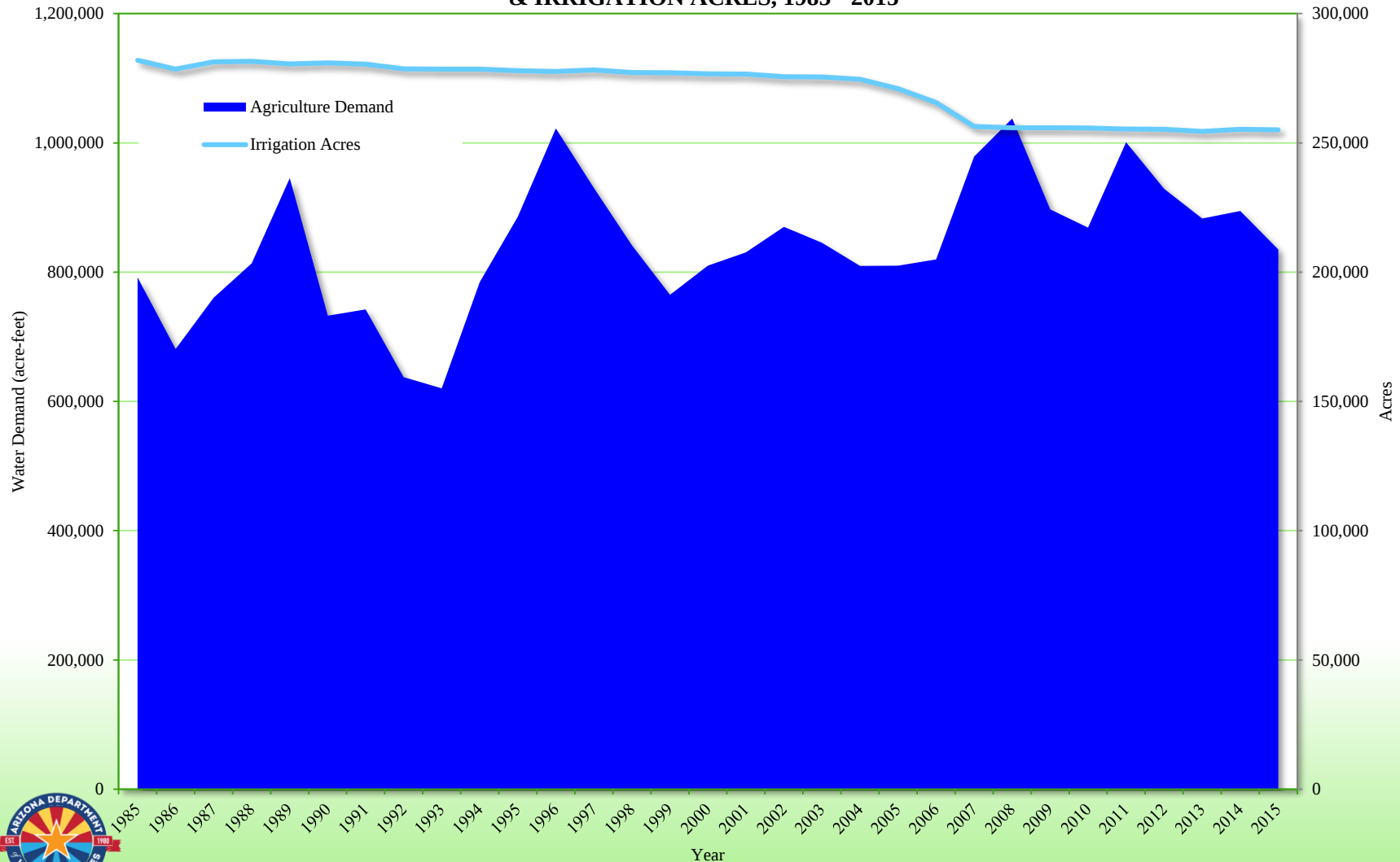
FIGURE 3-2
PINAL AMA WATER SUPPLY SOURCES, 1985 -2015



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HISTORICAL AGRICULTURAL DEMAND & IRRIGATION ACRES

FIGURE 3-5
PINAL AMA AGRICULTURAL WATER DEMAND
& IRRIGATION ACRES, 1985 - 2015



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Chapter 3: WATER DEMAND & SUPPLY

TABLE 3-4
PINAL AMA AGRICULTURAL DEMAND & IRRIGATION ACRES
BY DISTRICT FOR THE YEAR 2015

	CAIDD	MSIDD	SCIDD	HIDD	No District	TOTAL
Groundwater	164,841	124,443	50,638	32,876	36,596	409,395
In-Lieu	24,148	34,700	0	21,779	0	80,627
CAP	99,558	111,735	8,613	36,230	0	256,136
Surface Water	0	0	85,477	0		85,477
Reclaimed			1,176		666	1,842
TOTAL WATER USE	288,547	270,878	145,904	90,885	37,262	833,476
Acres	84,745	76,448	44,936	27,687	21,246	255,062

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Chapter 3: WATER DEMAND & SUPPLY

TABLE 3-6
COMPARISON OF IRRIGATION ACRES AND
DEMAND BY DISTRICT

District	1MP* Acres	1MP* Demand	2015 Acres	2015 Demand	Change in Acres	Percent Change in Acres	Change in Demand	Percent Change in Demand
MSIDD	88,068	194,721	76,448	270,878	-11,620	-13.2%	76,157	39.1%
CAIDD	87,087	169,833	84,745	288,547	-2,342	-2.7%	118,714	69.9%
HIDD	26,691	81,099	27,687	90,885	996	3.7%	9,786	12.1%
SCIDD	45,860	257,465	44,936	145,904	-924	-2.0%	-111,561	-43.3%
Non-district	34,256	88,974	21,246	37,262	-13,010	-38.0%	-51,712	-58.1%
TOTAL	281,962	792,092	255,062	833,476	-26,900	-9.5%	41,384	5.2%

*1MP is approximately the year 1987.

NOTE: Non-district 1MP figures have been adjusted based on updated querying techniques employed in the development of the Assessment and may not match figures shown in Table IV-1 of the PAMA 1MP.

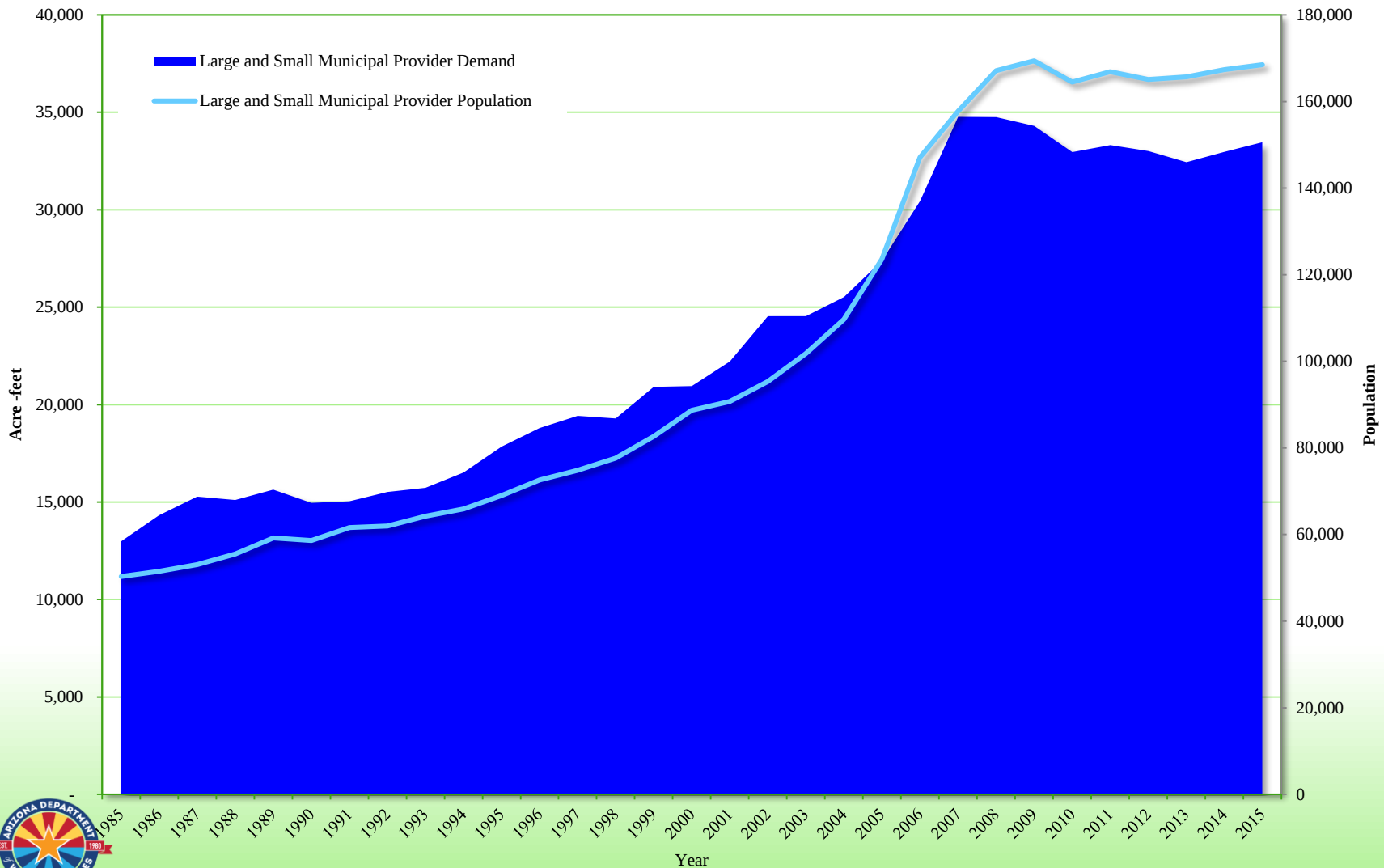


PINAL AMA DRAFT 4MP

Chapter 3: WATER DEMAND & SUPPLY

- 160 IGFRs in Pinal AMA have been extinguished pursuant to the AWS Rules:
 - 13K acres out of production
 - 19,600 acre-feet per year of extinguishment credits
 - About 13,428 acre-feet per year of pledged extinguishment credits
 - Remaining 6,165 acre-feet per year of extinguishment credits remain unpledged
 - Post-2007 AWS Rule change extinguishment credits total 8,700 acre-feet (lump sum); not pledged

FIGURE 3-4
PINAL AMA POPULATION & DEMAND, 1985 - 2015



PINAL AMA DRAFT 4MP

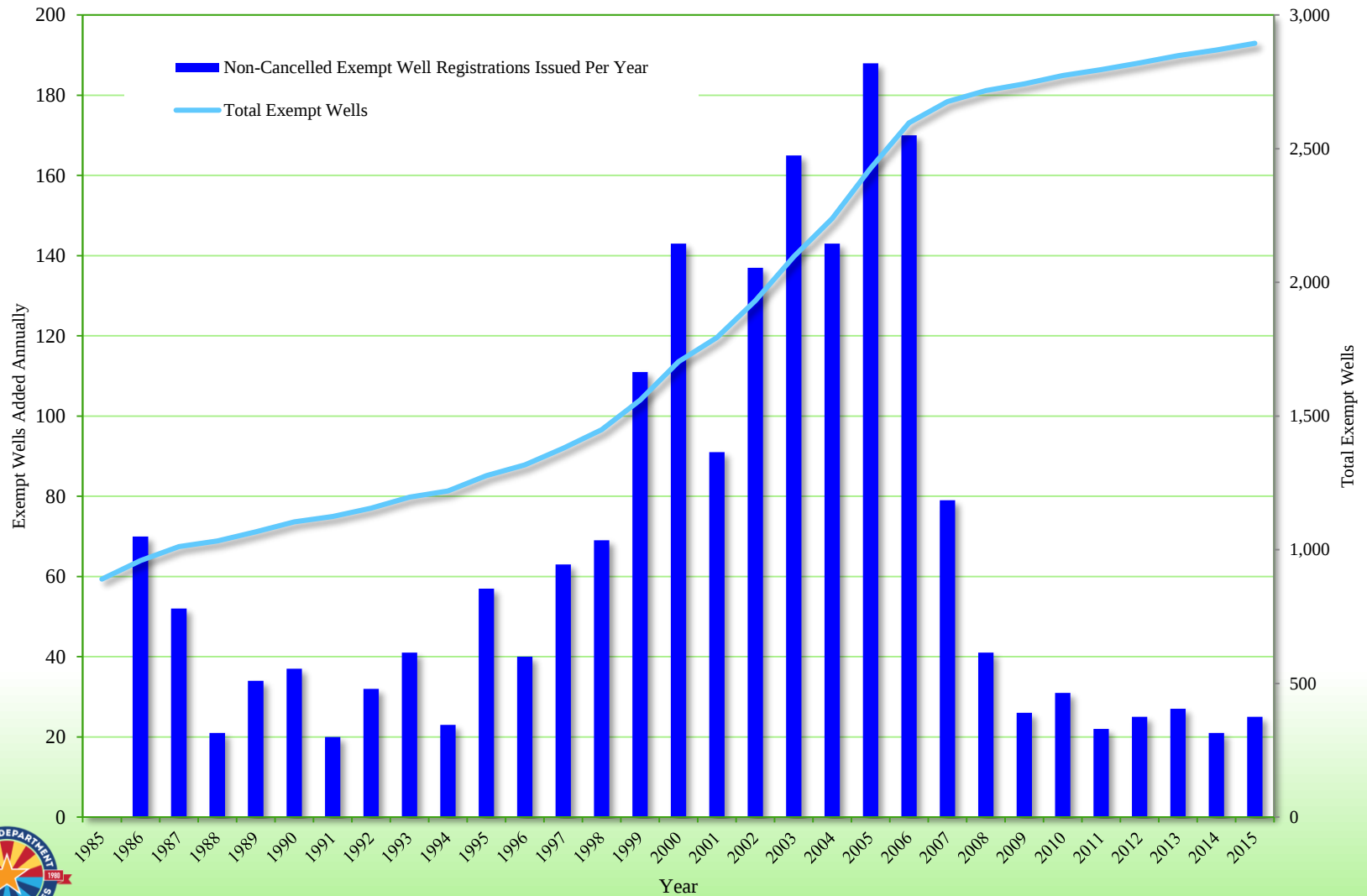
Chapter 3: WATER DEMAND & SUPPLY

- Municipal Sector, 1985 vs. 2015
 - Population increased 235%
 - Demand increased 158%
 - GPCD decreased 23%
 - 2015 municipal demand 3% of total AMA demand
 - 1985 municipal demand 2% of total AMA demand
- Exempt wells
 - <900 exempt wells in 1985
 - About 2,900 exempt wells in 2015
 - 1985 exempt well pop estimated about 1,400 people
 - 2015 exempt well pop estimated about 29,500 people

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EXEMPT WELL REGISTRATIONS ISSUED

FIGURE 3-3
PINAL AMA EXEMPT WELL REGISTRATIONS ISSUED, 1985 - 2015





PINAL AMA DRAFT 4MP

Chapter 3: WATER DEMAND & SUPPLY

- Industrial Sector
 - Using less than 40% of Industrial allotment
 - Used about 21,000 acre-feet in 2015
- Tribal Sector
 - Demand increased 194% since 1985
 - Almost exclusively for agriculture
 - 52% of supply in 2015 CAP; 40% groundwater; remainder surface water from SCIP

PINAL AMA DRAFT 4MP

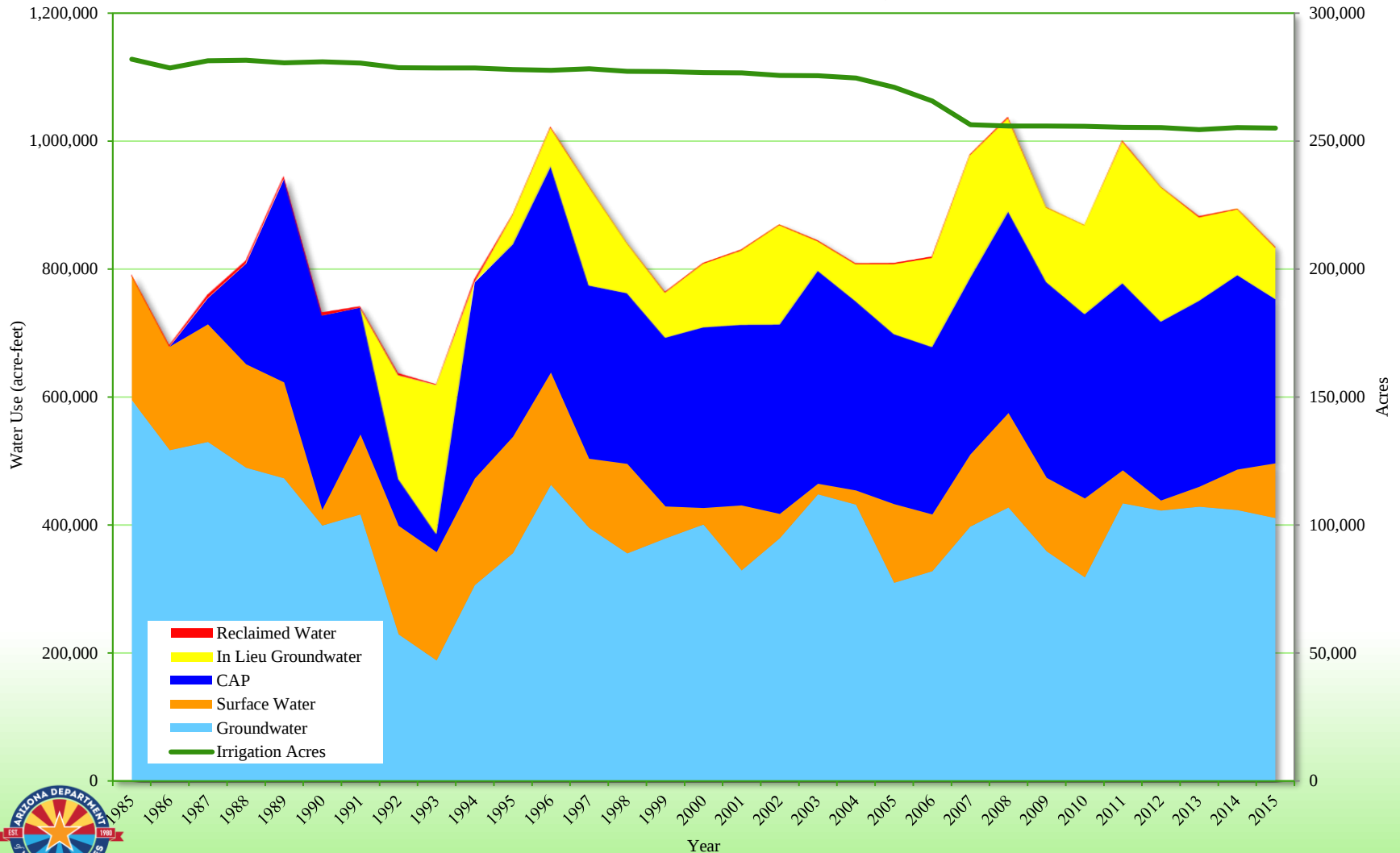
Chapter 4: AGRICULTURAL

- Conservation Program mostly unchanged from Third Management Plan (3MP)
 - Irrigation district lost and unaccounted for requirements
- Agricultural sector water management contribution
 - prohibition on new acres coming into production
 - improved on-farm irrigation practices
 - reduction in irrigation acres due to retirement or development
 - some renewable supply use
- 297 IGFRs (80,348 irrigation acres) in the Best Management Practices (BMP) program in the Pinal AMA

PINAL AMA DRAFT 4MP

HISTORICAL AGRICULTURAL SECTOR DEMAND & SUPPLY

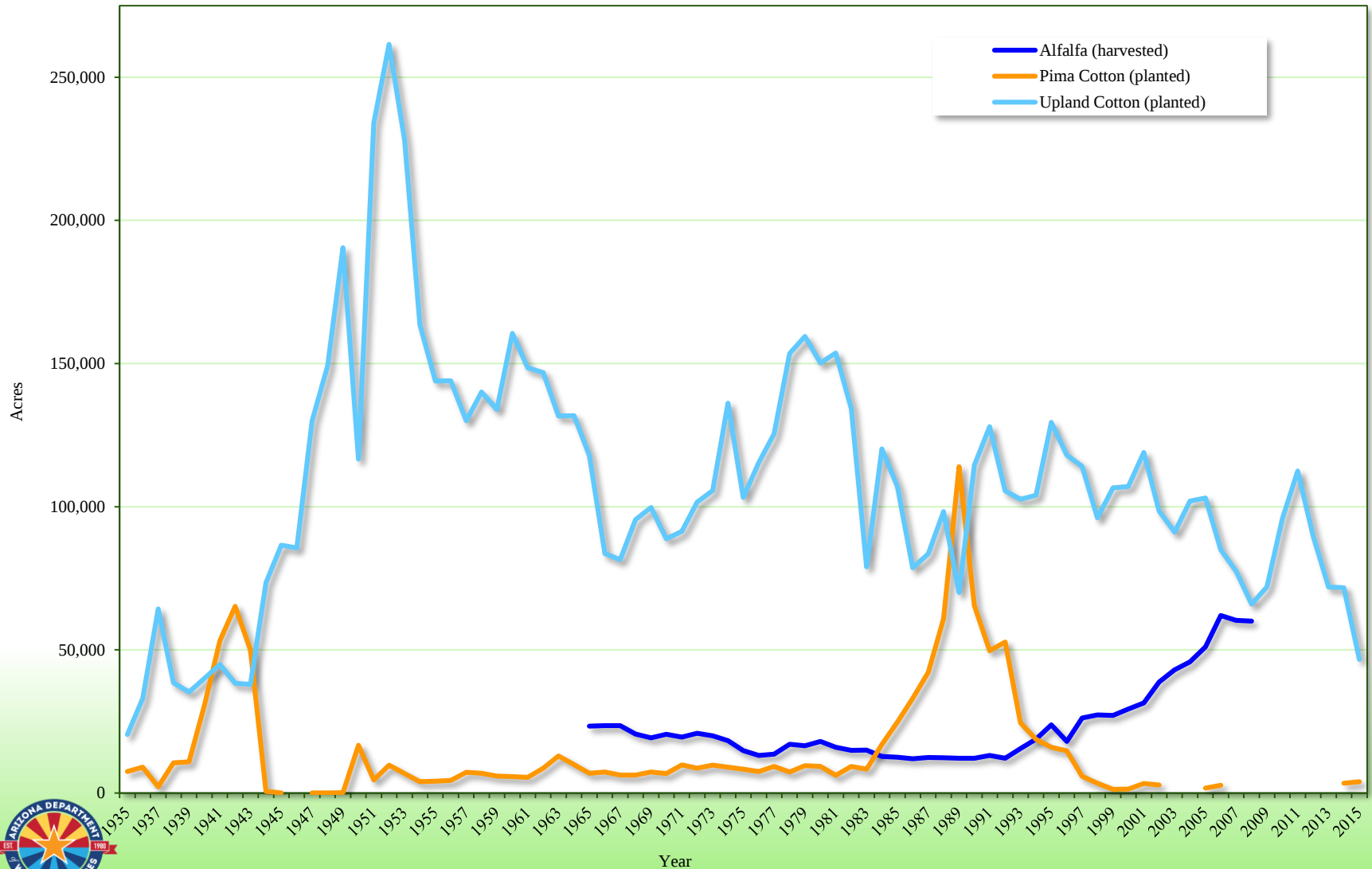
FIGURE 4-2
PINAL AMA AGRICULTURAL WATER DEMAND
BY SOURCE SUPPLY & IRRIGATED ACRES, 1985 - 2015



PINAL AMA DRAFT 4MP

HISTORICAL COTTON AND HAY HARVESTED

FIGURE 4-3
HISTORICAL COTTON & ALFALFA ACRES PLANTED, PINAL COUNTY, AZ



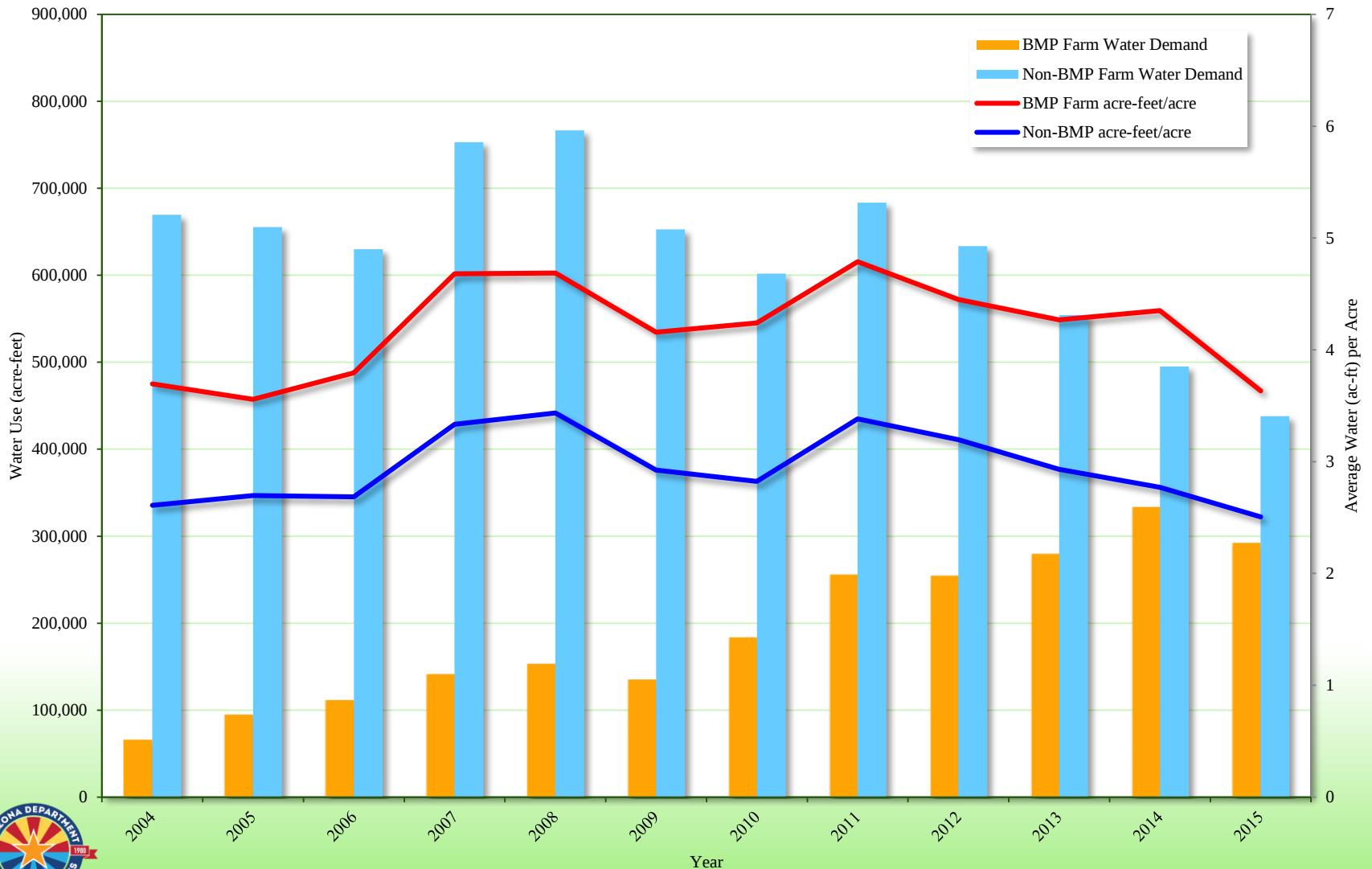
Source: US Department of Agriculture, 2016



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BMP AND NON-BMP DEMAND

FIGURE 4-4
PINAL AMA BMP AND NON-BMP DEMAND



PINAL AMA DRAFT 4MP

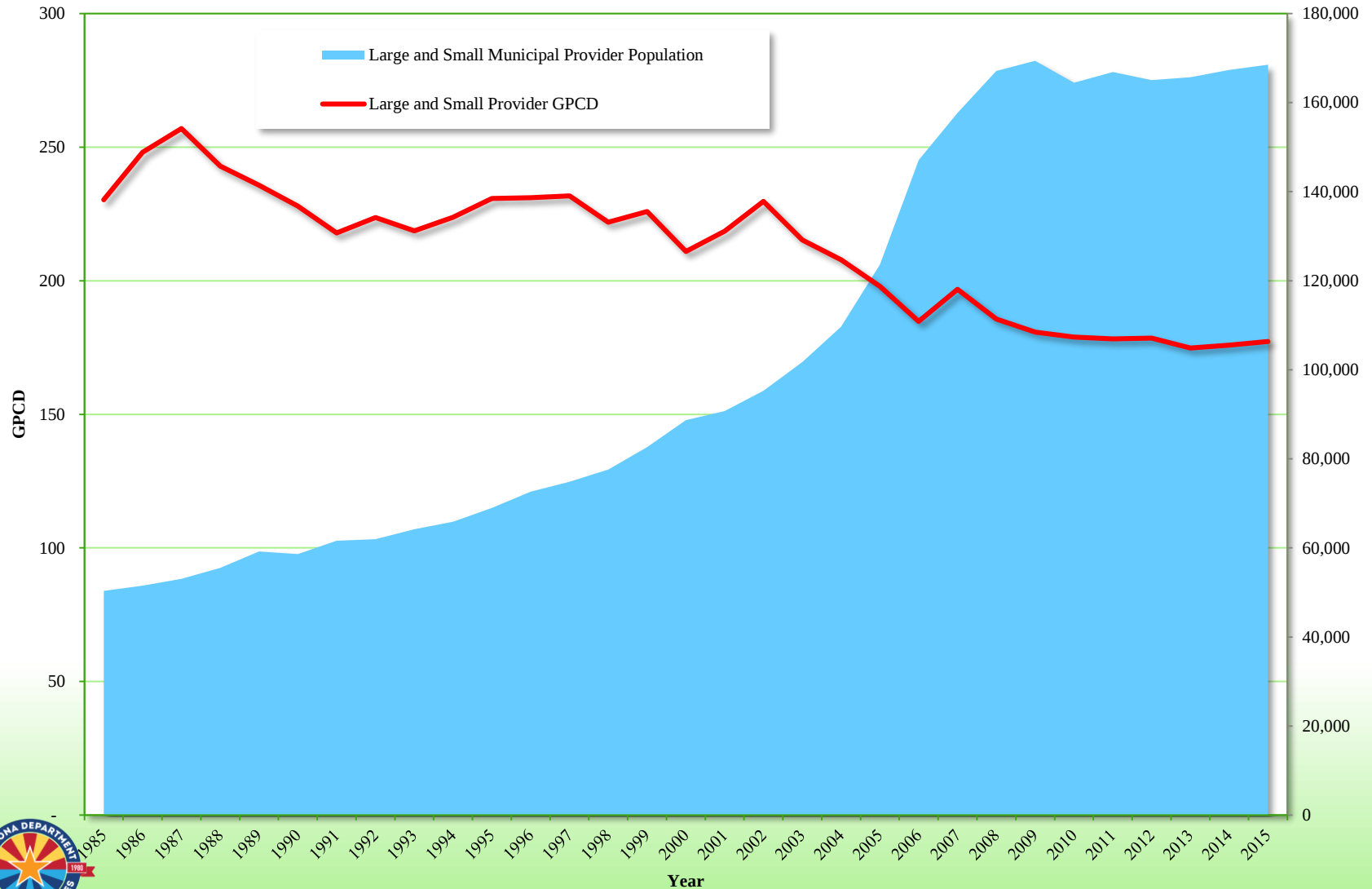
Chapter 5: MUNICIPAL

- Historical objective of municipal program to gradually reduce GPCD, encourage conservation, maximize efficient use of all water supplies
- In the Pinal AMA, annual population growth averaged about 8.0% from 1985-2015
- As AMA population has increased, municipal GPCD has decreased from 230 GPCD in 1985 to 177 GPCD in 2015

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HISTORICAL MUNICIPAL GPCD & POPULATION

FIGURE 5-1
PINAL AMA MUNICIPAL POPULATION & GPCD, 1985 - 2015



PINAL AMA DRAFT 4MP

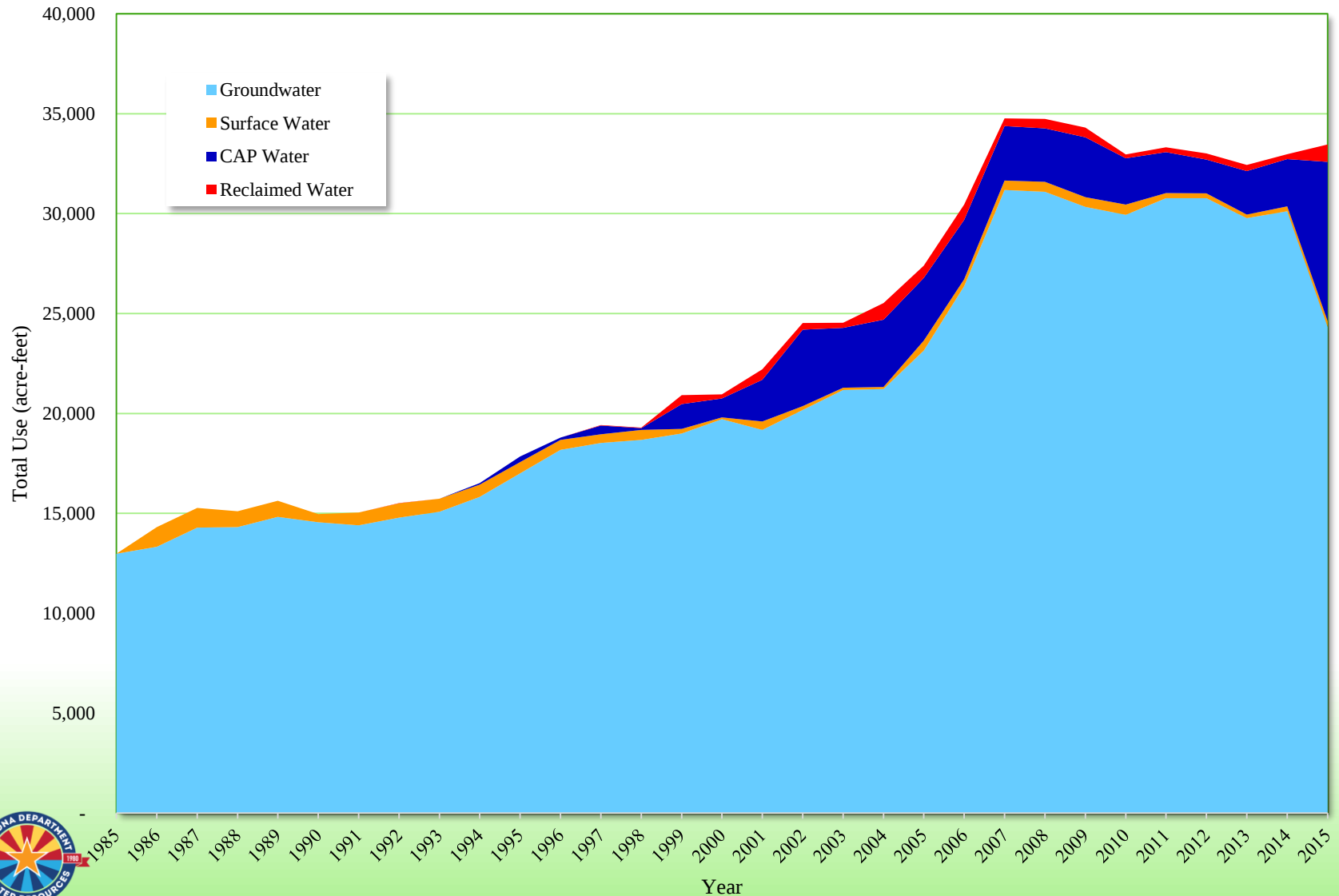
Chapter 5: MUNICIPAL

- Additional efforts are needed to help achieve management goal:
 - Additional water conservation potential
 - Drought and shortage planning and strategy development
 - Increased use of reclaimed water
- Only Total GPCD and the Non Per Capita Conservation Program (NPCCP) for the 4MP for large providers
 - Providers with DAWS in the NPCCP will initially be noticed under the Total GPCD for the 4MP and will be able to opt back into the NPCCP after initial noticing
 - Total GPCD Program one target for the whole fourth management period = 2000-2009 median minus 1 Standard Deviation
 - Five providers hold DAWS in Pinal AMA

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HISTORICAL MUNICIPAL DEMAND & SUPPLY

PINAL AMA MUNICIPAL SUPPLY SOURCES, 1985 - 2015



PINAL AMA DRAFT 4MP

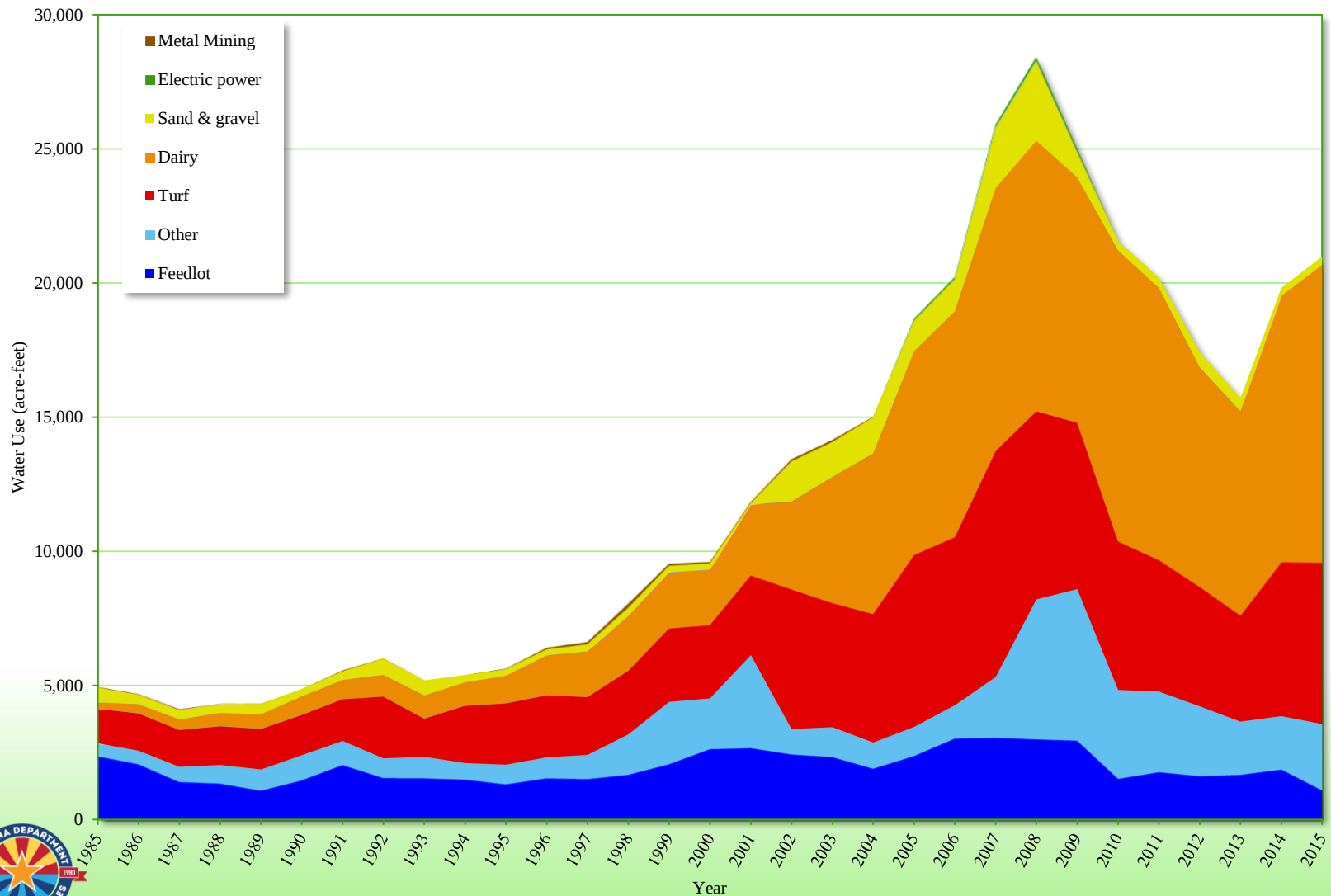
Chapter 6: INDUSTRIAL

- Program mostly unchanged from 3MP
- Historical objectives of industrial program:
 - Move to highest level of water use efficiency economically attainable using the latest conservation technology
 - Efficient use of groundwater
 - Increased use of renewable supplies
- Largest industrial use is dairy; second largest sub-sector is turf

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HISTORICAL INDUSTRIAL DEMAND BY SUB-SECTOR

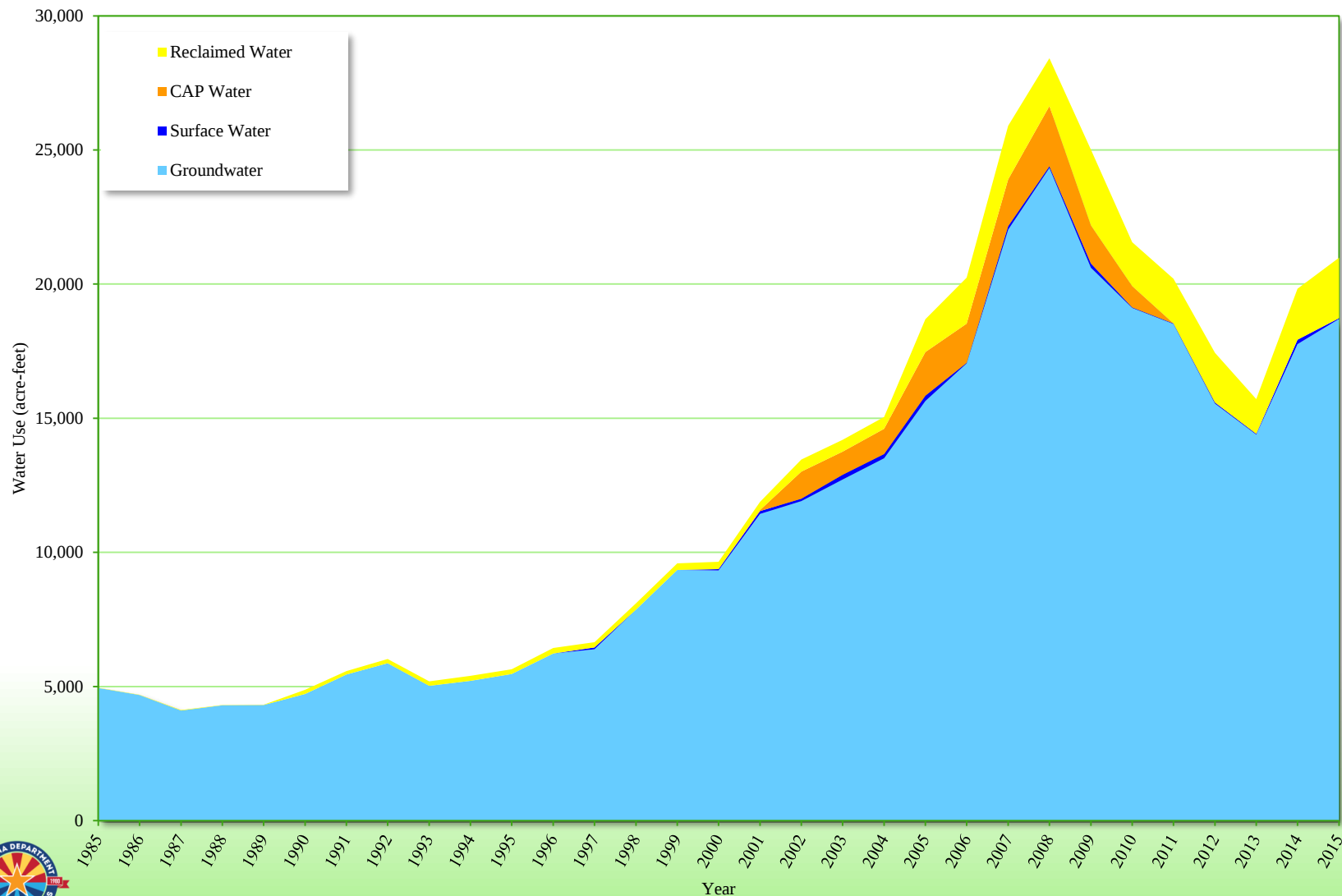
FIGURE 6-1
PINAL AMA INDUSTRIAL DEMAND BY SUBSECTOR, 1985 - 2015



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HISTORICAL INDUSTRIAL DEMAND BY SOURCE OF SUPPLY

FIGURE 6-2
PINAL AMA INDUSTRIAL DEMAND BY SUPPLY SOURCE, 1985 – 2015



PINAL AMA DRAFT 4MP

HISTORICAL WATER DEMAND BY SECTOR



Year	Municipal Provider Demand	Exempt Well Demand	Industrial Demand	Agricultural Demand	Tribal Demand	TOTAL AMA DEMAND	Renewable Supplies to Meet Demand ¹	Ground- water to Meet Demand	Offsets to GW Pumping ²	OVERDRAFT
1985	12,984	175	4,955	792,092	53,645	863,851	226,377	637,475	636,416	-1,058
1986	14,317	188	4,692	681,160	87,522	787,879	191,962	595,917	466,875	-129,042
1987	15,278	202	4,120	760,311	94,060	873,971	278,946	595,025	468,905	-126,120
1988	15,103	217	4,312	813,672	152,037	985,341	418,022	567,319	531,328	-35,991
1989	15,637	233	4,321	945,290	144,654	1,110,136	565,436	544,700	566,907	22,207
1990	14,965	251	4,875	732,494	125,292	877,877	406,559	471,318	407,992	-63,326
1991	15,040	270	5,574	742,286	143,969	907,139	420,464	486,675	431,654	-55,021
1992	15,520	290	6,023	637,503	144,727	804,063	345,147	458,915	531,313	72,397
1993	15,731	312	5,192	620,147	148,644	790,026	300,581	489,445	1,016,340	526,895
1994	16,510	335	5,216	784,621	157,242	963,924	587,303	376,621	496,901	120,280
1995	17,840	360	5,647	885,900	161,399	1,071,146	587,874	483,273	619,654	136,382
1996	18,793	387	6,434	1,022,389	169,477	1,217,480	610,074	607,406	613,402	5,996
1997	19,424	416	6,648	930,111	152,434	1,109,033	470,384	638,649	537,046	-101,603
1998	19,293	448	8,098	841,487	143,352	1,012,677	492,018	520,660	518,281	-2,378
1999	20,917	481	9,590	764,710	141,109	936,807	396,243	540,564	457,337	-83,227
2000	20,953	517	9,653	810,109	143,507	984,738	393,055	591,683	507,076	-84,608
2001	22,207	731	11,883	830,720	139,944	1,005,485	467,284	538,201	479,175	-59,027
2002	24,531	945	13,465	870,179	147,142	1,056,261	426,379	629,883	496,877	-133,006
2003	24,540	1,159	14,191	845,454	145,259	1,030,603	438,393	592,210	489,837	-102,373
2004	25,520	1,373	15,046	809,510	145,777	997,225	408,378	588,848	482,270	-106,578
2005	27,395	1,586	18,696	809,891	149,734	1,007,303	487,081	520,222	528,804	8,582
2006	30,448	1,800	20,243	819,894	155,732	1,028,117	454,170	573,947	605,837	31,890
2007	34,765	2,014	25,905	978,778	162,481	1,203,944	498,069	705,875	570,206	-135,669
2008	34,746	2,228	28,423	1,037,653	157,325	1,260,374	566,311	694,063	590,586	-103,477
2009	34,306	2,442	25,014	896,932	164,413	1,123,107	530,857	592,251	494,063	-98,187
2010	32,965	2,656	21,565	868,995	157,750	1,083,931	513,461	570,471	478,338	-92,132
2011	33,316	2,841	20,199	1,001,126	155,320	1,212,802	440,962	771,840	441,949	-329,892
2012	33,019	3,039	17,434	928,761	155,653	1,137,906	391,469	746,437	409,587	-336,851
2013	32,441	3,251	15,714	883,043	154,436	1,088,885	418,096	670,789	398,695	-272,094
2014	32,976	3,478	19,831	894,630	151,982	1,102,898	462,028	640,869	428,694	-212,176
2015	33,463	3,720	20,986	834,976	157,553	1,050,698	698,572	601,525	415,802	-185,723

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Chapter 7: WATER QUALITY

- There are no Water Quality Assurance Revolving Fund (WQARF), US EPA National Priorities List (NPL) site, or Department of Defense (DOD) sites in the Pinal AMA
- Groundwater quality in Pinal AMA is generally good
- Some wells exceed EPA limits for nitrates and fluoride
- During the fourth management period, ADWR will continue to coordinate with ADEQ to monitor water levels, land subsidence, and other changes in aquifer conditions

PINAL AMA DRAFT 4MP

Chapter 8: AUGMENTATION & RECHARGE

- Program Objectives
 - Encourage storage of renewable water supplies
 - Increase use of renewable supplies and protection from renewable supply shortages
 - Utilize increased awareness and improved understanding of local conditions in water management approaches
- Total water stored through 2015 = 2,912,825 acre-feet
- Total water recovered through 2015 = 91,589 acre-feet
- Slightly more in Eloy sub-basin than Maricopa-Stanfield
- Historical recovery more concentrated in Eloy sub-basin

PINAL AMA DRAFT 4MP

SUMMARY OF WATER STORAGE AND RECOVERY, 1986 - 2015

	Subbasin	Eloy	Maricopa - Stanfield	Multiple Subbasins ¹	AMA TOTAL
Delivered to be Stored through 2015	USF CAP	1,775	-	-	1,775
	USF Reclaimed	16,882	-	-	16,882
	USF TOTAL	18,657	-	-	18,657
	GSF (CAP) TOTAL	1,684,675	1,191,517	17,976	2,894,168
	TOTAL DELIVERED TO BE STORED	1,703,332	1,191,517	17,976	2,912,825
Recovered through 2015	CAP	51,013	37,566	-	88,579
	Reclaimed	3,010	-	-	3,010
	TOTAL RECOVERED	54,023	37,566	-	91,589
Recovered Water in 2015	CAP	2,454	2,787	-	5,241
	Reclaimed	611	-	-	611
	Total	3,065	2,787	-	5,852
	Within 1 mile of any storage location	1,008	344		1,352
Recovered Water in 2005	CAP	-	-	-	-
	Reclaimed	299	-	-	299
	Total	299	-	-	299
	Within 1 mile of any storage location	299			299

¹ Includes recharge projects that span both sub-basins.

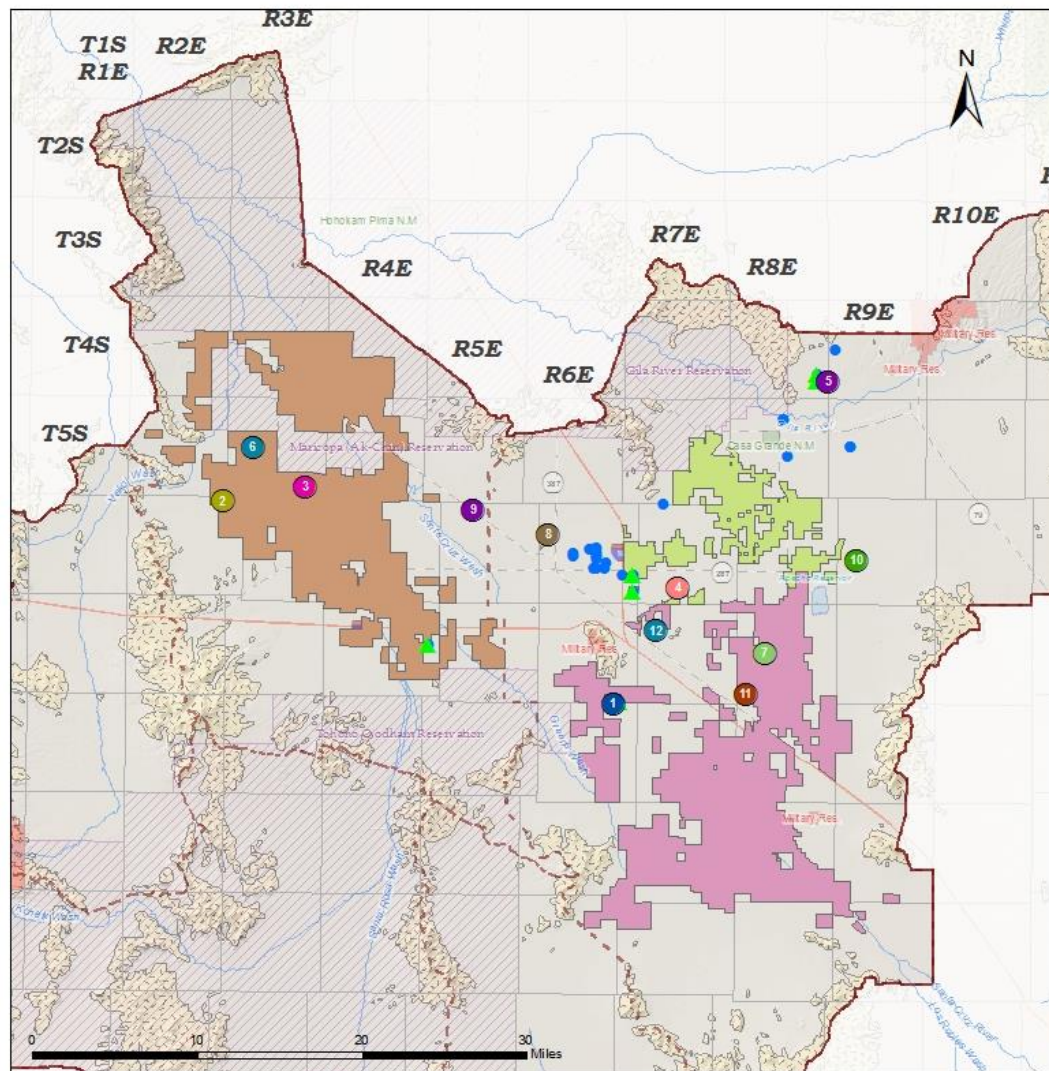




PINAL AMA DRAFT 4MP

Chapter 8: AUGMENTATION & RECHARGE

- Twelve active USFs in the Pinal AMA as of 2017
- Three active GSFs in the Pinal AMA as of 2017
- Total Long-Term Storage (LTS) credits as of 2015 more than 2.6 million acre-feet (CAP and reclaimed water)
- Fourth management period augmentation/recharge opportunities:
 - Develop groundwater monitoring programs to facilitate regional recharge planning
 - Coordinate recovery of stored water to enhance local aquifer conditions
 - Integrate AWS, water banking and groundwater replenishment to facilitate achievement of water management objectives

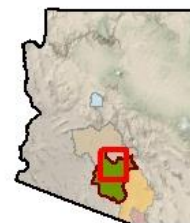


Locations of Recharge and Recovery 2015 Pinal AMA



-  Pinal AMA
-  Sub-basin
-  Hardrock
-  Township & Range
-  Indian Reservations
-  Park or Forest
-  Military
-  Lake
-  Stream
-  Major Road
-  Interstate Highway
-  2015 Recovery Wells Used
-  Recovery Wells Used Within AOI

- Groundwater Savings Facilities (GSF)**
 -  Central Arizona Irrigation and Drainage District
 -  Hohokam Irrigation District
 -  Maricopa - Sanfield Irrigation and Drainage District
- Underground Storage Facilities (USF)**
 - 1. Arizona City/Sanitary District USF
 - 2. 37th Water Reclamation Center
 - 3. Santa Rosa Valley Company USF
 - 4. EJR Ranch Recharge Facility
 - 5. Anthem At Merrill Ranch Recharge Facility
 - 6. Southwest Water Reclamation Facility (Campus 2)
 - 7. Elery Detention Center USF
 - 8. Casa Grande Connected Recharge Facility
 - 9. Casa Grande Storage/Recharge Facility
 - 10. AWC Pinal Valley Recharge USF
 - 11. Elroy Recharged Water Recharge Project
 - 12. Sun Lakes At Casa Grande Effluent Recharge Facility



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Chapter 9: WATER MANAGEMENT ASSISTANCE

- Purpose of Water Management Assistance Program (WMAP) is to provide financial and technical resources to help water users develop and implement conservation programs, facilitate augmentation and renewable supply utilization, and collect hydrologic information
- Total monies collected since 1997 = \$4,617,276
- Total collected in 2015 = \$258,878
- Several projects funded during the third management period focusing on conservation, education, monitoring and researching conservation potential

PINAL AMA DRAFT 4MP

Chapter 10: IMPLEMENTATION

- Description of ADWR's process for implementing, determining compliance with, and enforcing the 4MP regulatory requirements.
- No substantive changes were made to Chapter 10

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Chapter 11: Projected Budget

- Two projected water supply/demand scenarios are included in Chapter 11:
 - Normal CAP Delivery Scenario
 - Uses the May 22, 2015 CAP Delivery Schedule
 - Tier 1 Shortage Scenario
 - Assumes Tier 1 (320,000 af) CAP shortage each year from 2015 – 2040
- In taking this approach, ADWR is not projecting nor predicting that there will be a Tier 1 shortage every year in the future
- The Tier 1 Shortage scenario is included to give an idea of the potential impact of an extended shortage on groundwater overdraft

PINAL AMA DRAFT 4MP

Chapter 11: Projected Budget

- Demand/supply utilization assumptions common to both scenarios:
 - Ag and industrial projections adjusted based on longer historical trend (1985-2015)
 - Met with districts
 - Used projections by TAZ for Pinal, Maricopa and Pima Counties
 - Each large provider at their own historical GPCD trend
 - Most municipal providers who can store/use CAP, do so
- Projection period from 2016 - 2040

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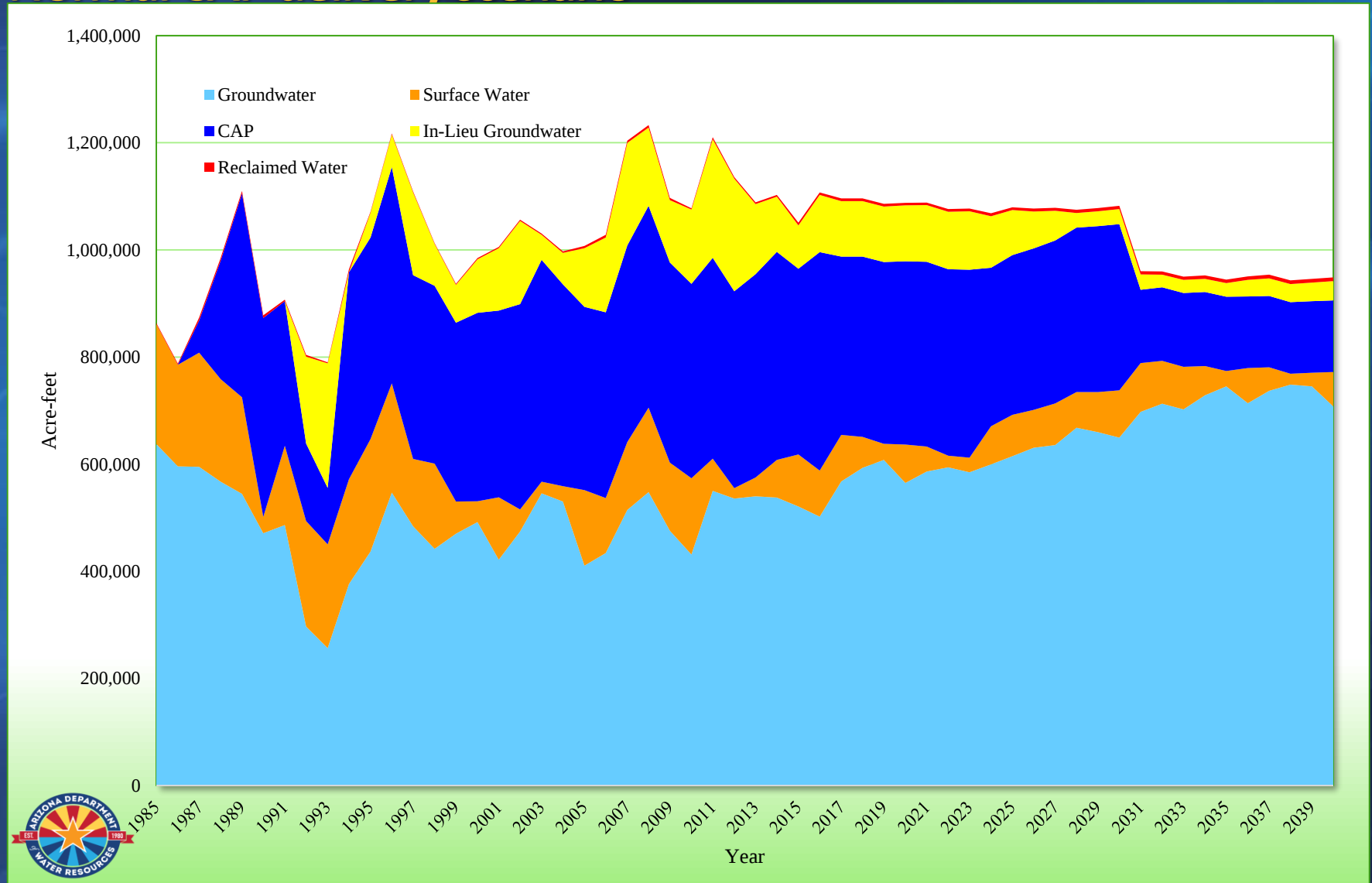
Chapter 11: WATER BUDGETS

- Natural system components
 - Streambed recharge based on a portion of the historical record to mimic annual fluctuation in flood recharge
 - Incidental recharge is lagged 20 years
 - Groundwater inflow and outflow based on relationship with incidental and stream channel recharge
- Any unused CAP is assumed to be stored, mostly at GSFs
- Reclaimed water (effluent) storage increases

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PROJECTED SUPPLIES

Normal CAP delivery scenario





PINAL AMA DRAFT 4MP

Chapter 12: WATER MANAGEMENT STRATEGY

- Challenges:
 - Groundwater Use and the Pinal AMA Goal
 - Underground Storage and Recovery
 - Groundwater Savings Facilities
 - Conservation Insufficient to Preserve Water Supplies
 - Reclaimed Re-Use
 - Susceptibility of CAP Supplies to Reduction
 - Limited Renewable Supplies

PINAL AMA DRAFT 4MP

Chapter 12: WATER MANAGEMENT STRATEGY

- Possible Approaches:
 - Work with agricultural community to ensure conservation requirements are effective and appropriate
 - Monitor crop and water use patterns to assess agriculture's impact on the Pinal AMA goal
 - Research additional water conservation opportunities for industrial uses
 - Improve municipal data collection and conservation program evaluation efforts
 - Further incentivize utilization of CAP and reclaimed water
 - Develop and adopt economic incentives to achieve water management objectives at local levels
 - Address residual groundwater pumping and allowable groundwater pumping in the municipal sector
 - Consider the cost-effectiveness of reclaiming brackish groundwater

REVIEW OF PINAL AMA DRAFT 4MP:



- Pinal AMA DRAFT 4MP
 - Supplied hard copies to GUAC members today
 - Will be posted to ADWR's website
 - ADWR is requesting written comments by June 9, 2017
 - Electronically to jmtannler@azwater.gov
 - Hard copy to Jeff Tannler, Statewide AMA Director, ADWR
- ADWR will review and summarize comments received
- ADWR will present any proposed Plan changes and request GUAC recommendation at subsequent GUAC
- Promulgation will occur after ADWR receives GUAC recommendation and makes changes to the proposed Plan

Questions:

Jeff Tannler, jmtannler@azwater.gov

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