

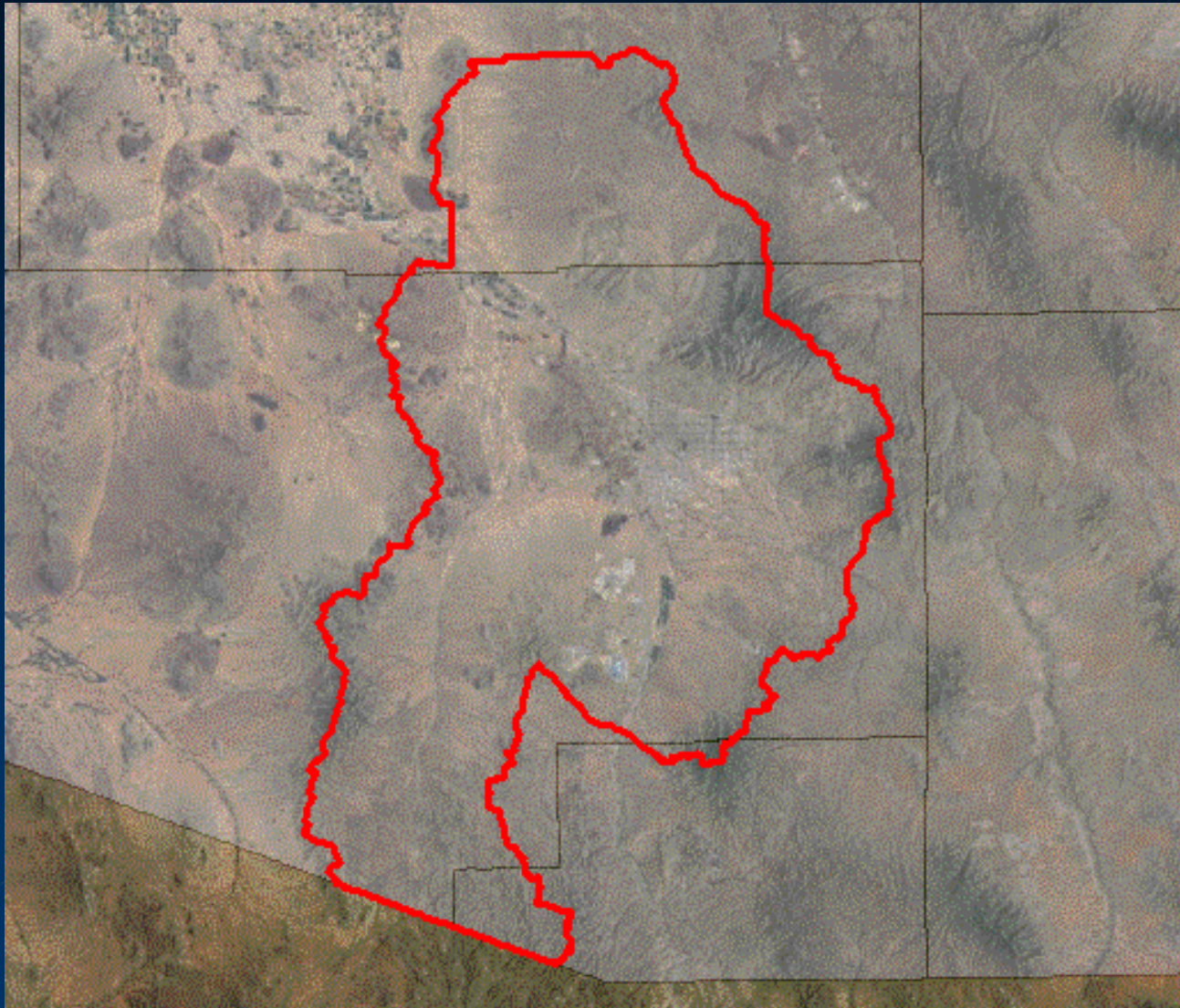
ADWR Water Budget Tucson Active Management Area

Jeff Tannler

Tucson AMA Area Director

Arizona Department of Water Resources

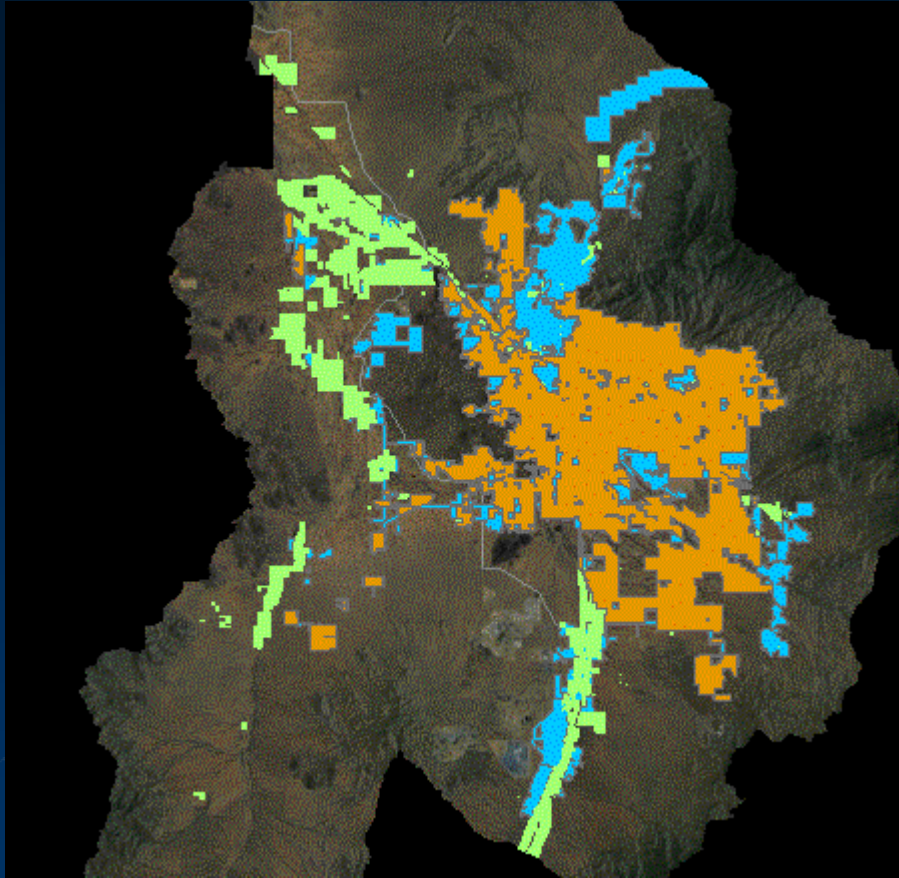
Tucson Active Management Area



Tucson Active Management Area



Tucson Active Management Area



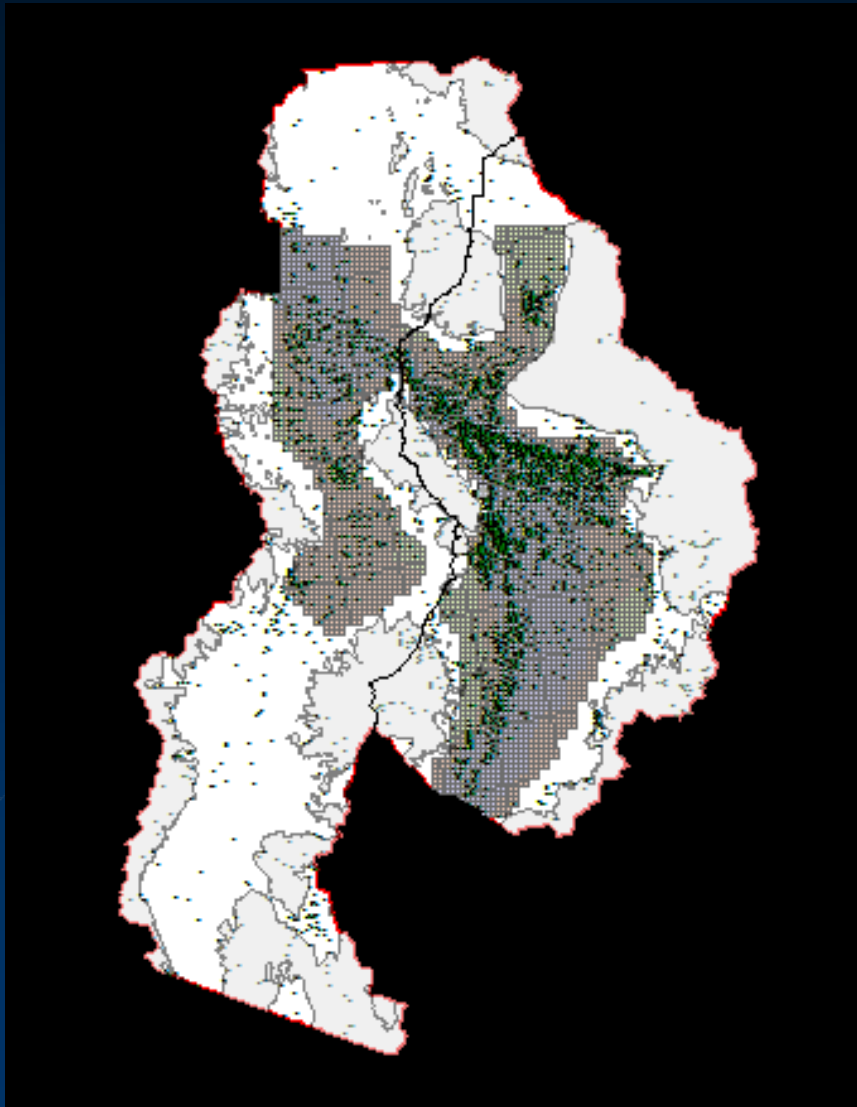
Tucson Active Management Area

- ◆ Goal of **Safe Yield** by 2025
- ◆ **Safe Yield:** *"A groundwater management goal which attempts to achieve and thereafter maintain a long-term balance between the annual amount of groundwater withdrawn in an active management area and the annual amount of natural and artificial recharge in the active management area."* A.R.S. § 45-561(12)

Water Budgets

- ◆ Hydrologic perspective
 - Groundwater Modeling
 - Examines pumping, water levels over time
 - “Wet Water”

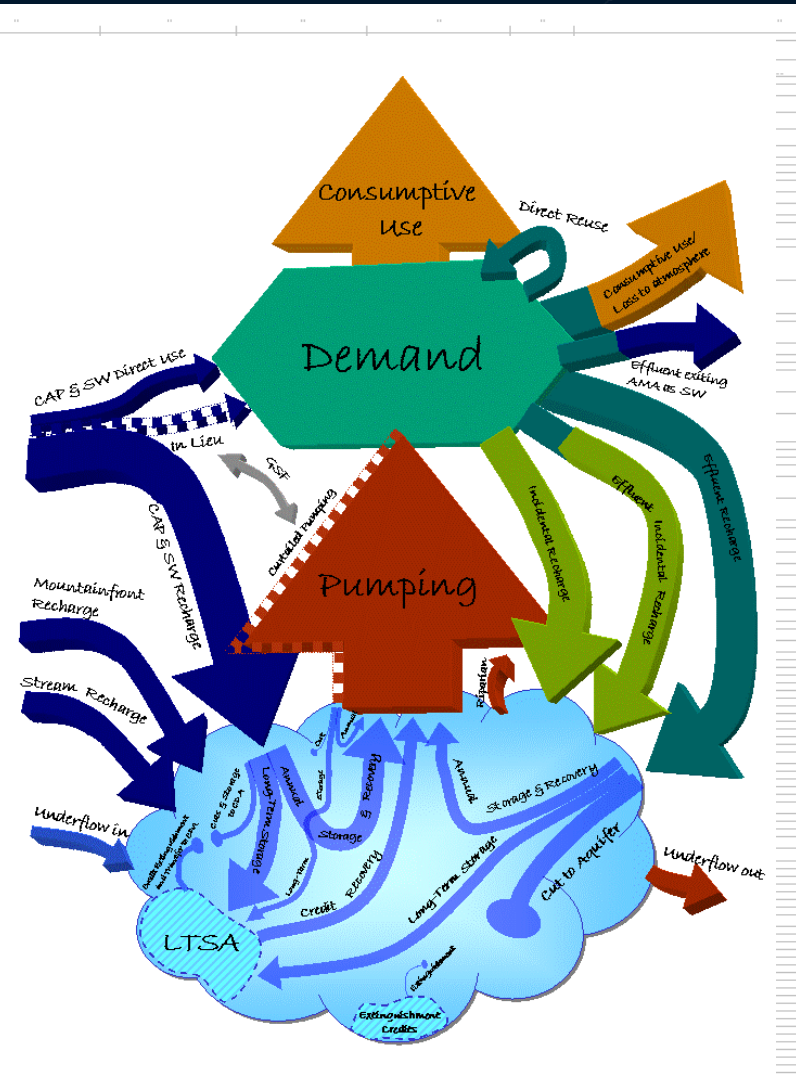
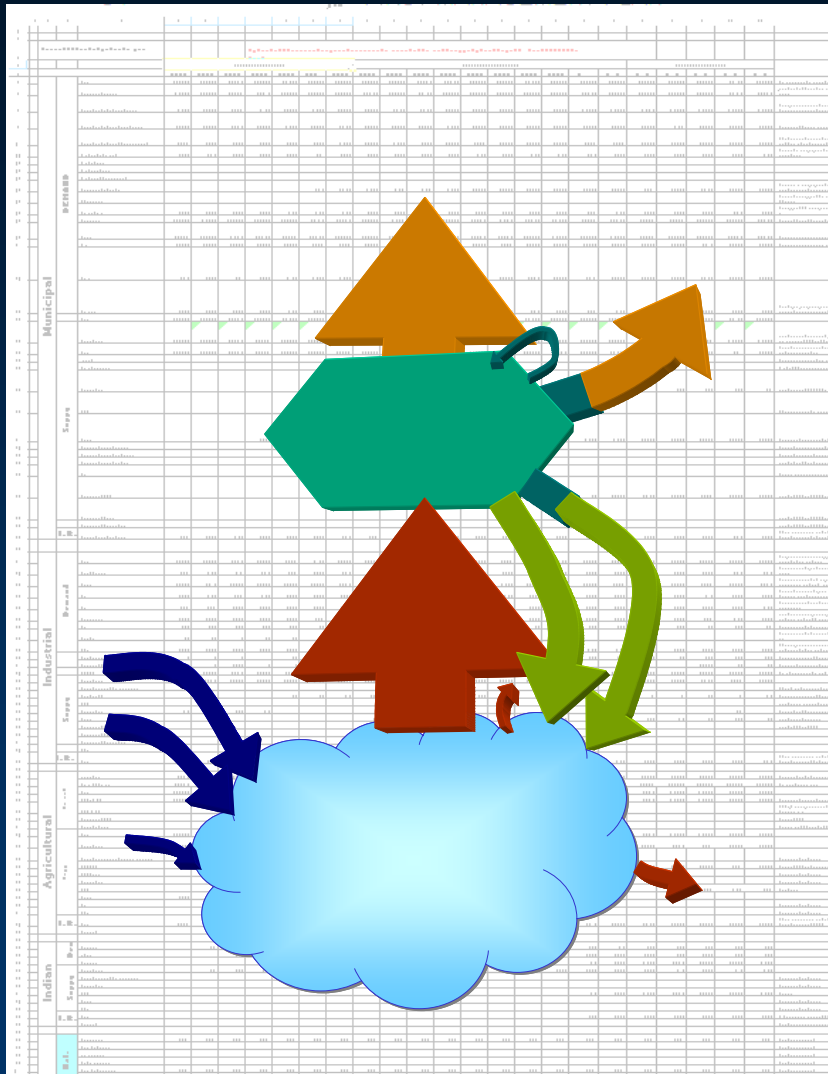
Tucson AMA



Water Budgets

- ◆ Hydrologic perspective
 - Groundwater Modeling
 - Examines pumping, water levels over time
 - “Wet Water”
- ◆ Planning Perspective
 - Used to assess policy within water management framework
 - “Paper Water”

Complexity



Analysis

◆ Hydrologic perspective

- Groundwater Modeling
- Examines pumping, water levels over time
- “Wet Water”

◆ Planning Perspective

- Used to assess policy within water management framework
- “Paper Water”

Water Budget Table

Tucson AMA Supply & Demand

7/22/06 DRAFT, SUBJECT TO REVISION

SECOND MANAGEMENT PLAN

THIRD MANAGEMENT PLAN

All figures expressed in acre-feet

		1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
MUNICIPAL												
DEMAND		163,343	166,322	160,888	163,321	172,616	175,544	185,876	184,671	186,877	130,049	133,468
SUPPLY	Groundwater	155,655	158,411	152,166	153,515	162,358	147,285	155,045	122,552	103,620	105,276	105,132
	CAP <i>(development; expansion; replacement)</i>	0	0	0	0	63	17,378	19,047	43,653	64,340	71,132	72,173
	Other surface water	0	0	0	0	0	0	0	233	173	188	210
	Effluent	8,288	8,511	8,722	9,807	10,183	10,881	11,784	12,227	12,744	13,453	15,347
INCIDENTAL RECHARGE		6,558	6,677	6,436	6,773	6,305	7,022	7,435	7,387	7,475	7,602	7,739
INDUSTRIAL												
DEMAND		53,482	53,310	57,678	61,082	61,624	58,552	48,443	46,647	51,126	52,742	53,337
SUPPLY	Groundwater	53,393	53,232	57,678	60,834	61,307	56,796	48,226	46,542	51,031	52,310	53,313
	Surface water	0	0	0	0	0	0	0	0	0	320	0
	CAP	0	0	0	0	203	1624	0	0	0	0	0
	Effluent	83	78	0	248	108	132	216	105	95	112	84
INCIDENTAL RECHARGE		7,138	7,117	6,321	7,330	7,395	7,026	5,813	5,538	6,135	6,323	6,408
AGRICULTURAL												
DEMAND		121,834	125,819	34,394	33,071	100,006	86,331	32,308	101,643	106,363	35,848	87,755
SUPPLY	Groundwater	102,437	37,525	70,430	68,782	72,033	70,333	75,223	84,301	83,900	68,458	63,511
	Groundwater <i>over</i>	16,661	25,095	22,324	24,283	27,373	15,338	17,085	17,342	16,113	16,400	18,794
	CAP <i>(development; over)</i>	0	0	0	0	0	0	0	0	6,350	10,390	5,450
	Other surface water	0	0	0	0	0	0	0	0	0	0	0
	Effluent	2,676	3,193	380	0	0	0	0	0	0	0	0
INCIDENTAL RECHARGE		30,458	31,455	23,533	23,268	25,002	21,583	23,077	25,411	26,741	23,362	21,339
INDIAN												
DEMAND		3,535	2,245	3,023	3,723	4,013	11,303	12,573	14,415	14,328	14,370	11,678
SUPPLY	Groundwater	3,535	2,245	3,023	3,723	3,311	2,152	1,637	1,007	1,576	1,005	1,043
	CAP <i>(development; over)</i>	0	0	0	0	702	3,157	10,882	13,408	12,752	13,365	10,635
	Other surface water	0	0	0	0	0	0	0	0	0	0	0
	Effluent	0	0	0	0	0	0	0	0	0	0	0
INCIDENTAL RECHARGE		0	0	0	0	176	2,283	2,721	3,352	3,188	3,341	2,653
OTHER												
DEMAND	Riparian	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700	3,700
SUPPLY	Cuts to the aquifer	1,714	1,638	2,327	2,747	6,304	7,111	6,471	6,552	13,617	15,368	16,364
	LTS credits for replenishment	0	0	0	11	14	6,670	6,063	2,046	5,581	7,276	8,477
	Net natural recharge	60,800	60,800	60,800	60,800	60,800	60,800	60,800	60,800	60,800	60,800	60,800
OVERDRAFT												
TOTAL		234,833	238,521	209,904	213,331	223,503	190,432	194,660	166,344	147,984	129,746	129,585
ADDITIONAL RECHARGE FOR FUTURE USE*												
OTHER	Net artificial recharge	32,558	66,613	112,775	170,375	252,562	315,823	385,016	447,058	511,028	536,041	652,470

* Includes storage for Colorado River drought, and interstate storage on behalf of Nevada

Sectors

- ◆ Agricultural
- ◆ Municipal
- ◆ Industrial
- ◆ Indian

Agricultural Sector

- ◆ 2+ acres of irrigation requires Irrigation GFR
- ◆ 200 IGFRs in Tucson AMA
- ◆ 36,000 irrigable acres

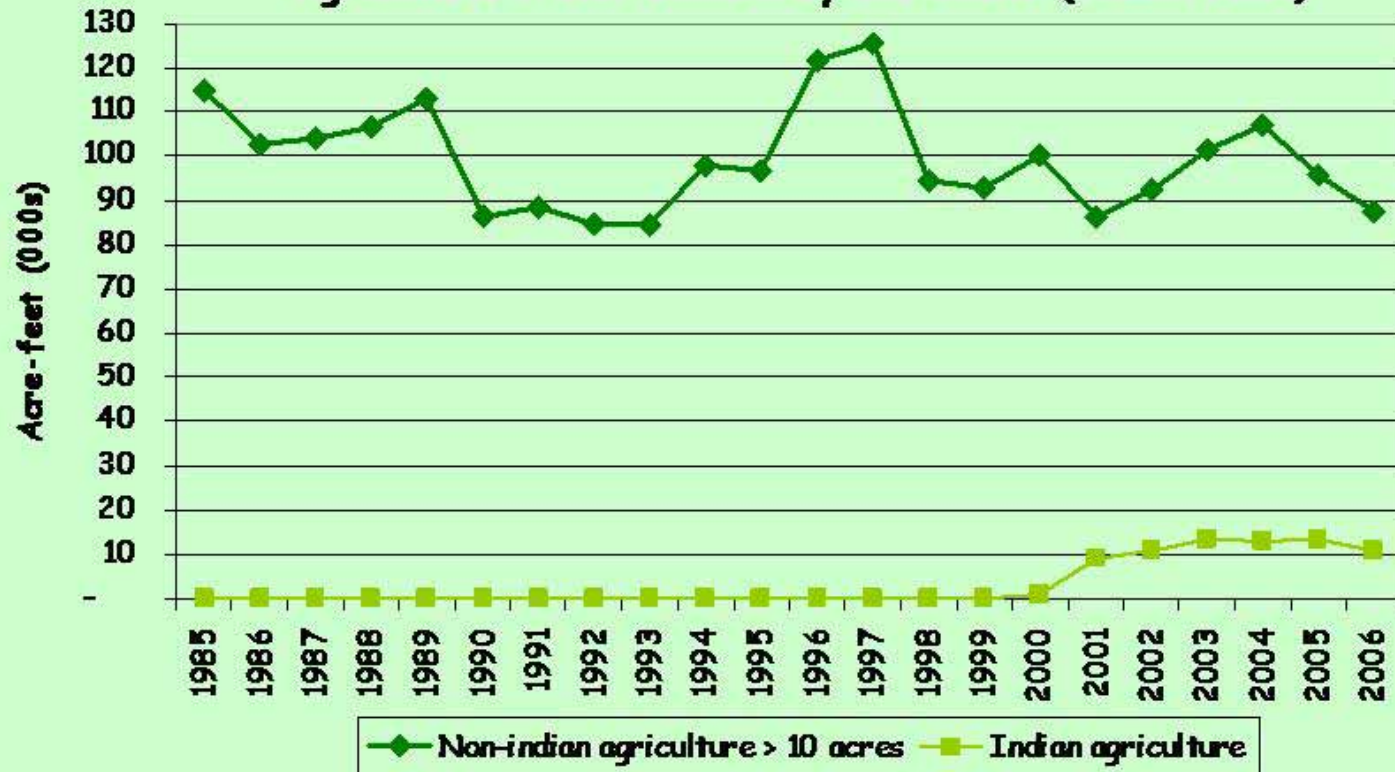
Supplies:

- ◆ Groundwater
- ◆ CAP

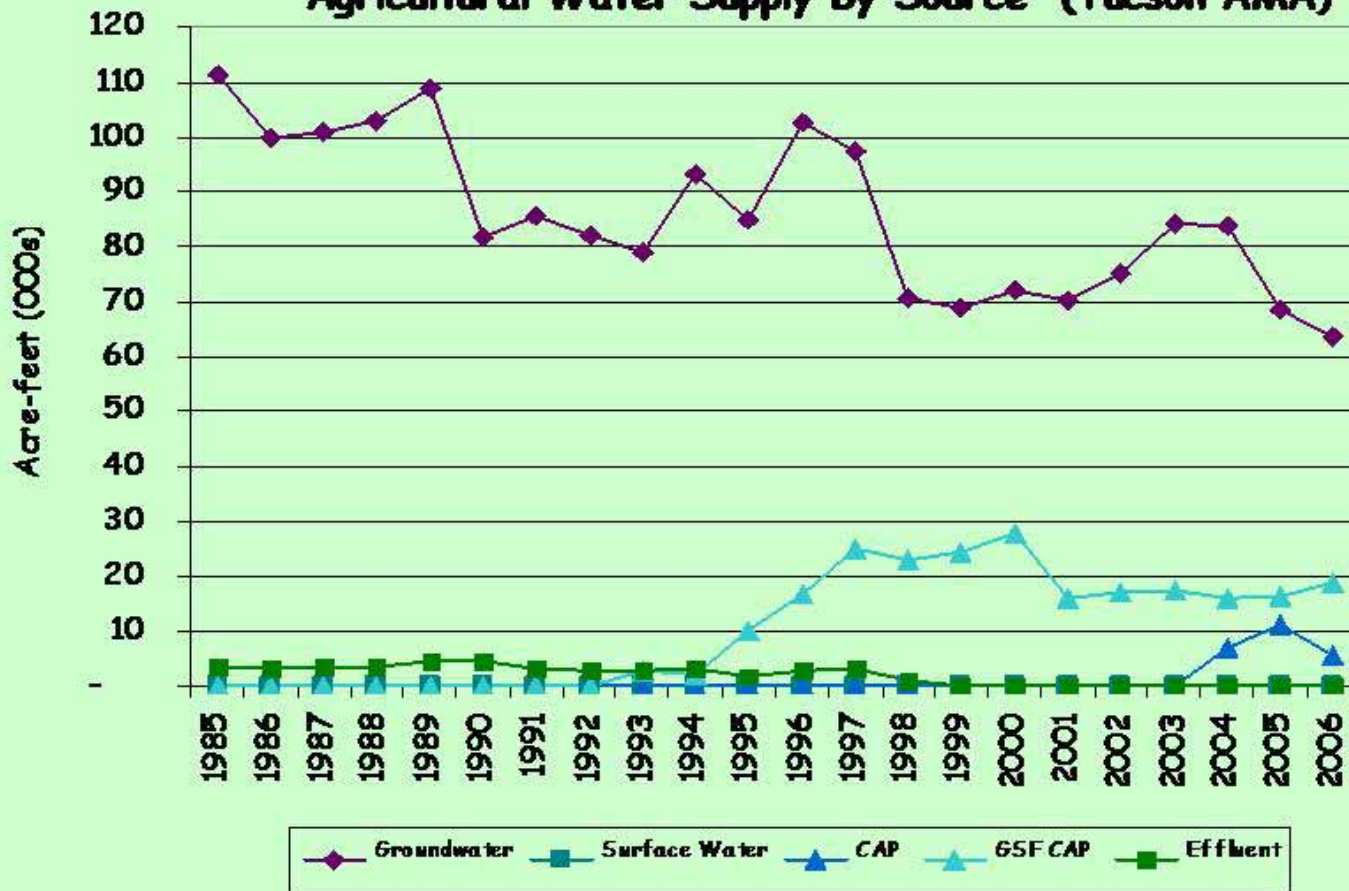
Agricultural Demand, Supply

Tucson AMA Supply & Demand		2008 DRAFT, SUBJECT TO REVISION	
		THIRD MANAGEMENT PLAN	
All figures expressed in acre-feet		2005	2006
AGRICULTURAL			
DEMAND		95,848	87,755
SUPPLY	Groundwater	68,458	63,511
	Groundwater (<i>in lieu</i>)	16,400	18,794
	CAP (direct use; no <i>in lieu</i>)	10,990	5,450
	Other surface water	0	0
	Effluent	0	0
INCIDENTAL RECHARGE		23,962	21,939

Agricultural Water Demand by sub-sector (Tucson AMA)



Agricultural Water Supply by Source (Tucson AMA)



Municipal Sector

- ◆ 26 Large Providers; 119 Small Providers
- ◆ 9 Designated Providers

Supplies:

- ◆ Groundwater
- ◆ Surface Water
- ◆ Effluent
- ◆ CAP

Municipal Demand, Supply

Tucson AMA Supply & Demand

7/22/08 DRAFT, SUBJECT TO REVISION

THIRD MANAGEMENT PLAN

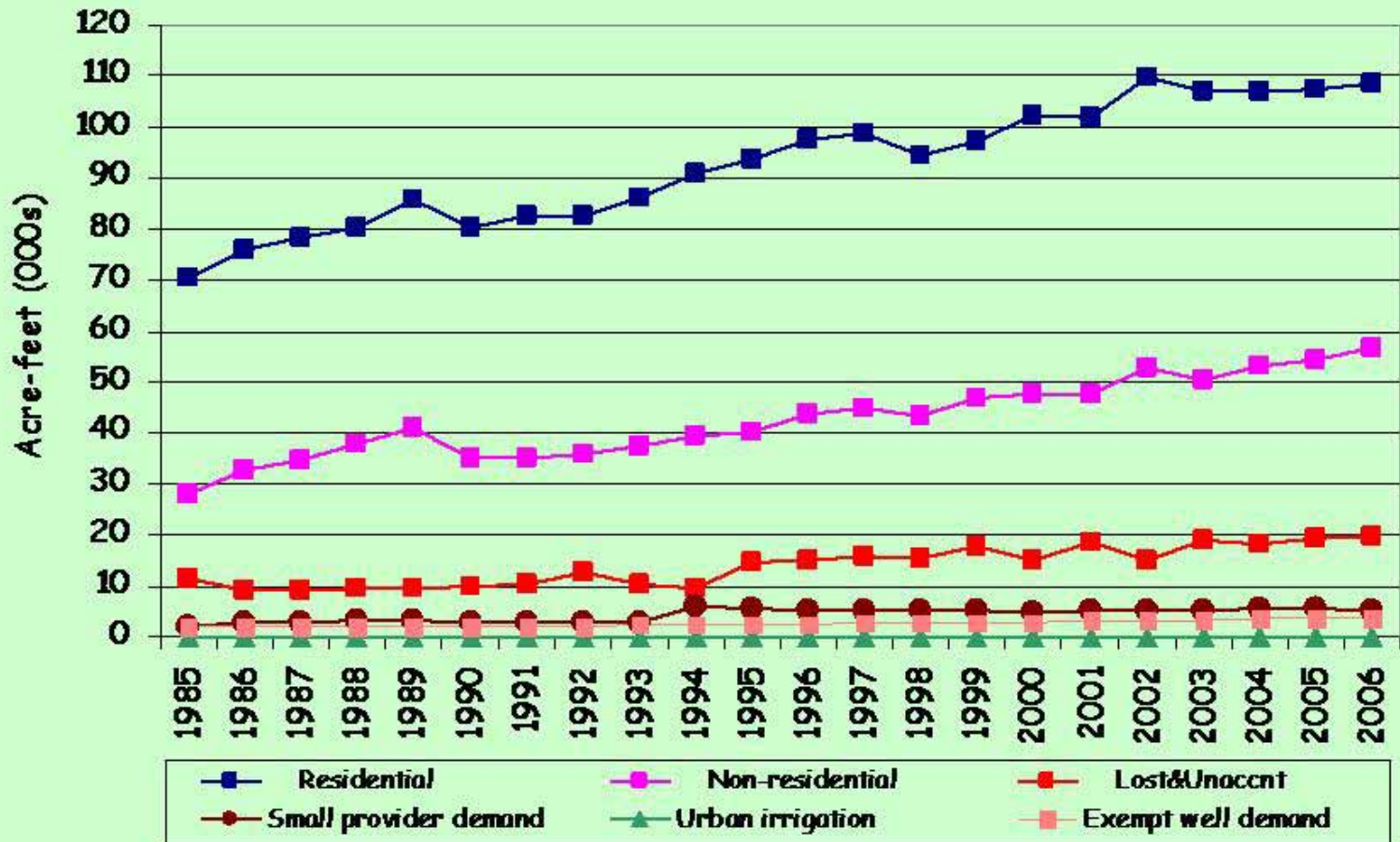
All figures expressed in acre-feet

2002	2003	2004	2005	2006
------	------	------	------	------

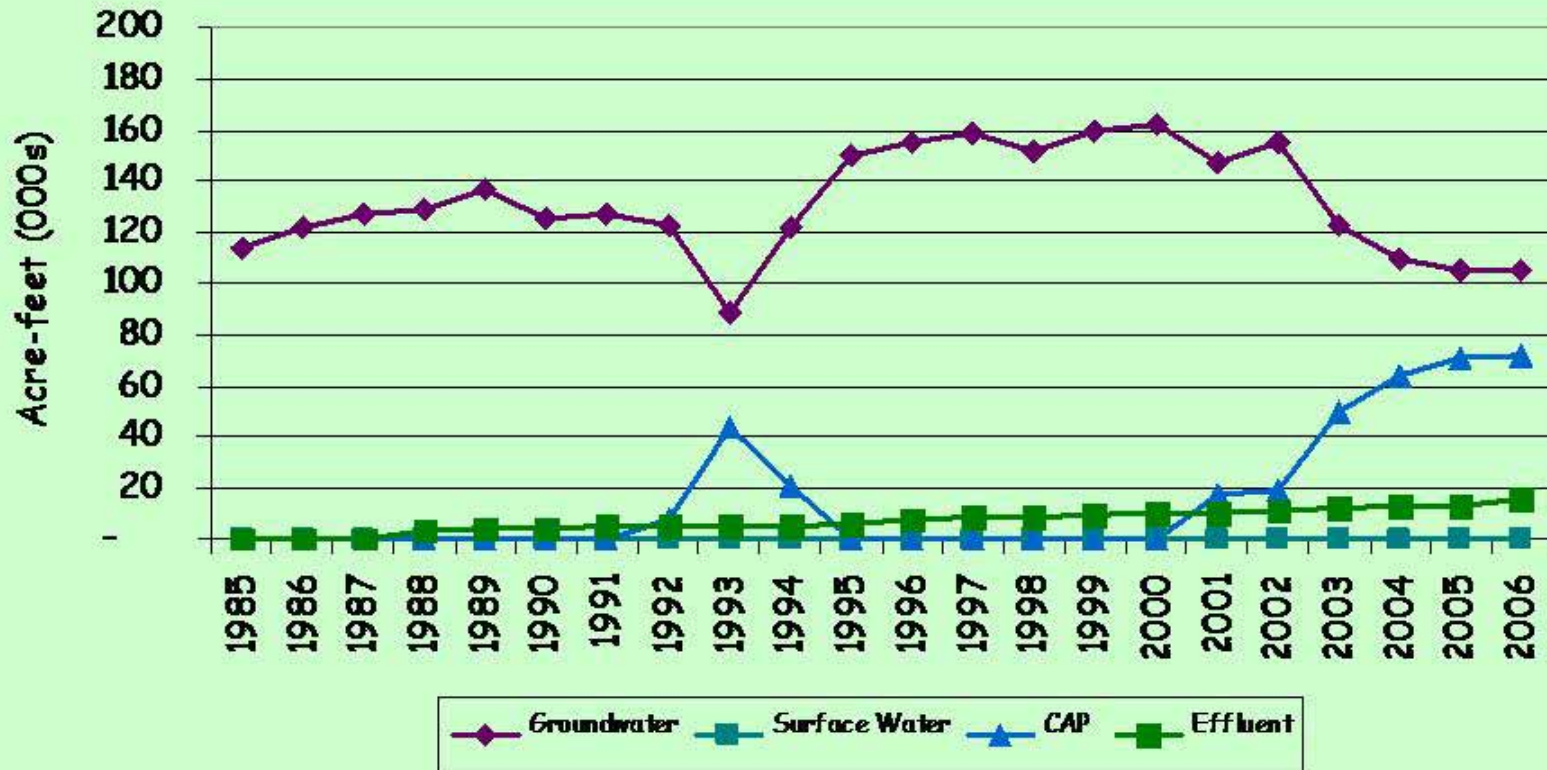
MUNICIPAL (includes exempt wells)

DEMAND		185,876	184,671	186,877	190,049	193,468
SUPPLY	Groundwater	155,045	122,552	109,620	105,276	105,132
	CAP (direct use; recovery; replenishment)	19,047	49,659	64,340	71,132	72,179
	Other surface water	0	233	173	188	210
	Effluent	11,784	12,227	12,744	13,453	15,947
INCIDENTAL RECHARGE		7,435	7,387	7,475	7,602	7,739

Municipal Water Demand by Sub-Sector (Tucson AMA)



Municipal Water Supply by Source (Tucson AMA)



Industrial Sector

- ◆ 1 Dairy
- ◆ 4 Metal Mines; 18 Sand/Gravel Facilities
- ◆ 4 Electrical Power Plants
- ◆ 114 Turf Facilities
 - 45 Golf Courses; 28 Parks; 37 Schools; 4 Cemeteries

Supplies

- ◆ Groundwater
- ◆ Effluent

Industrial Demand, Supply

Tucson AMA Supply & Demand

7/22/08 DRAFT, SUBJECT TO REVISION

THIRD MANAGEMENT PLAN

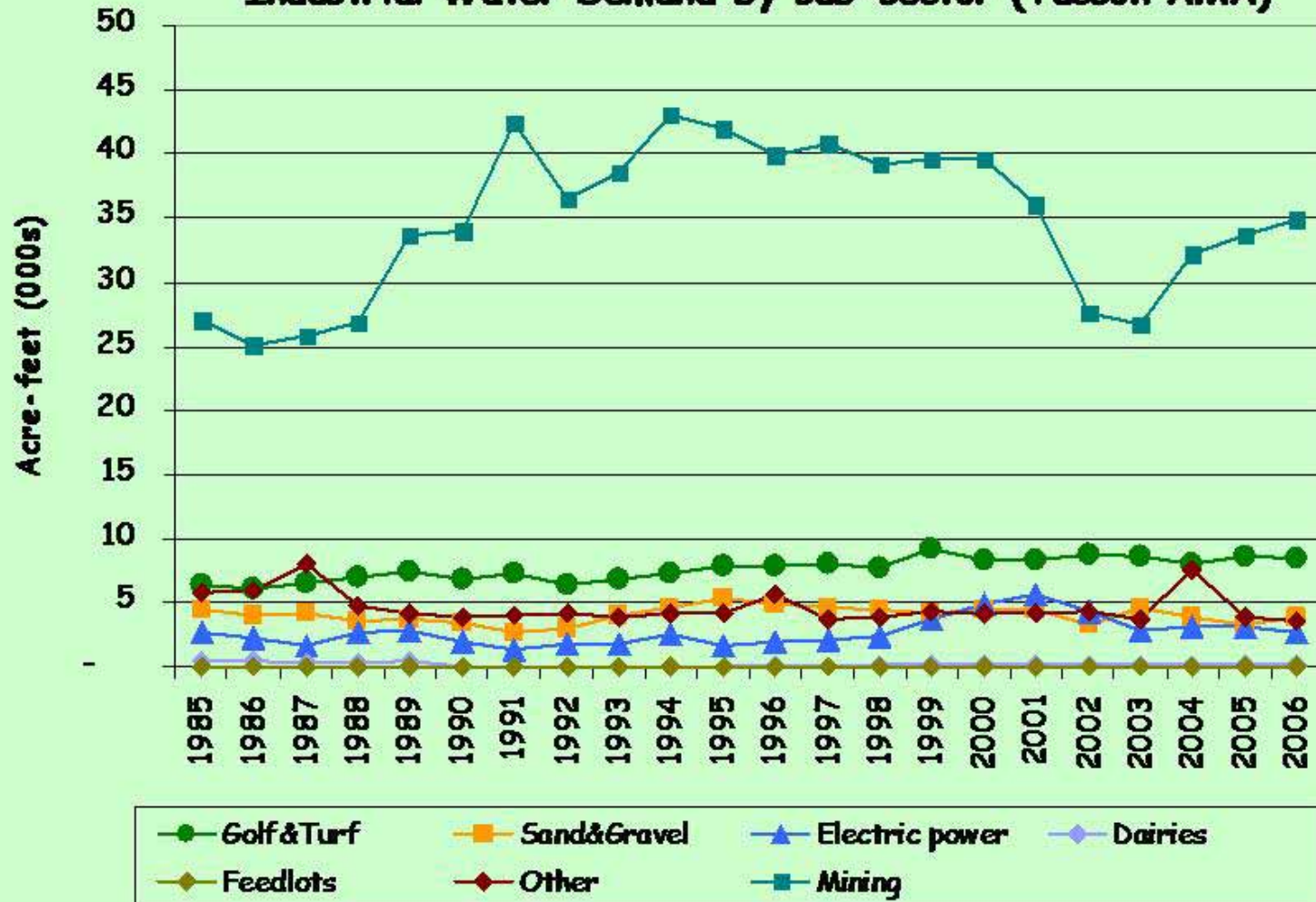
All figures expressed in acre-feet

2002	2003	2004	2005	2006
------	------	------	------	------

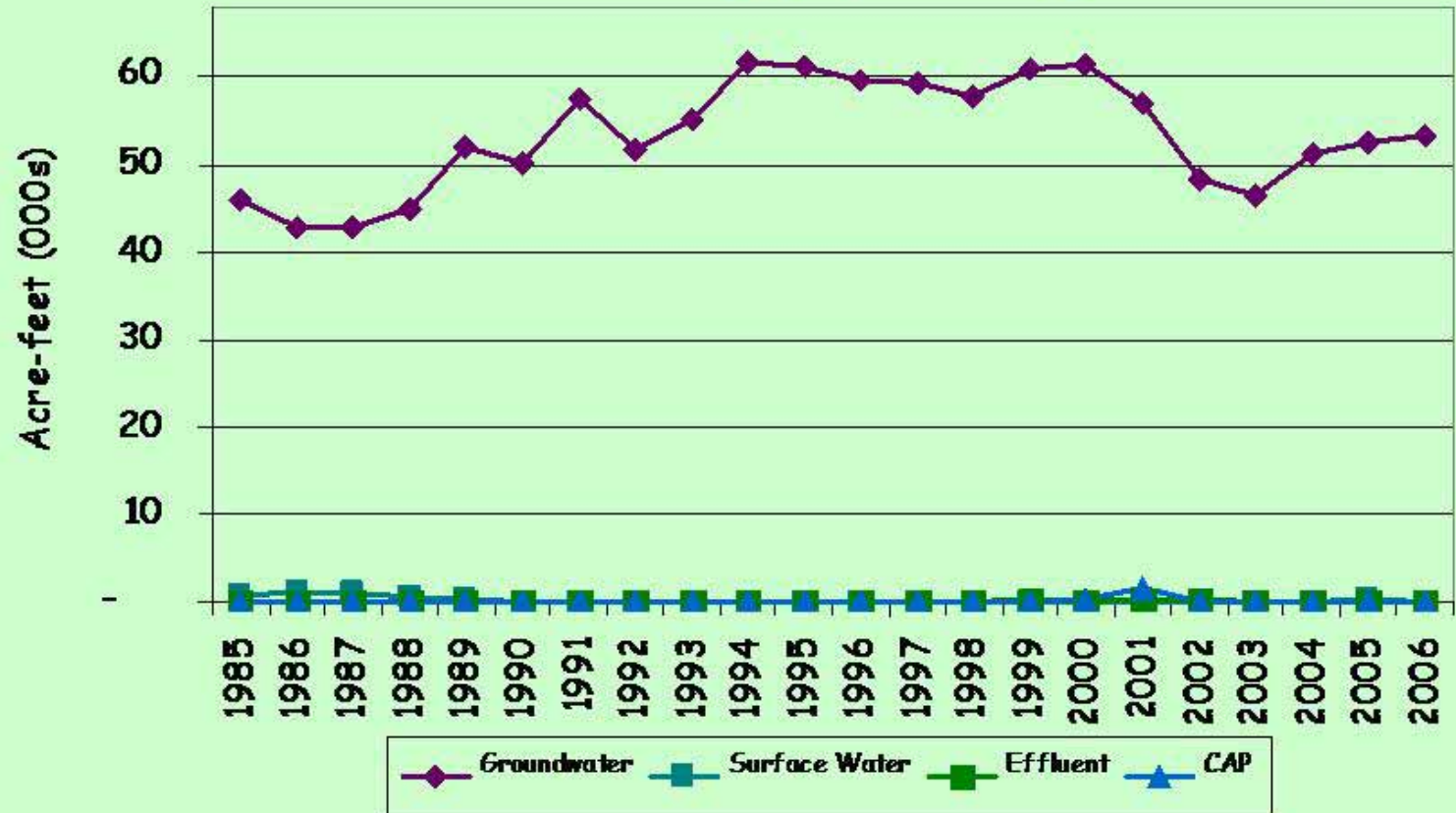
INDUSTRIAL

DEMAND		48,443	46,647	51,126	52,742	53,397
SUPPLY	Groundwater	48,226	46,542	51,031	52,310	53,313
	Surface water	0	0	0	320	0
	CAP	0	0	0	0	0
	Effluent	216	105	95	112	84
INCIDENTAL RECHARGE		5,813	5,598	6,135	6,329	6,408

Industrial Water Demand by sub-sector (Tucson AMA)



Industrial Water Supply by Source (Tucson AMA)



Indian Water Use

Tucson AMA Supply & Demand

08 DRAFT, SUBJECT TO REVISIONS

THIRD MANAGEMENT PLAN

All figures expressed in acre-feet

2005

2006

INDIAN

DEMAND

14,370

11,678

SUPPLY

Groundwater

1,005

1,043

CAP (direct use; no *in lieu*)

13,365

10,635

Other surface water

0

0

Effluent

0

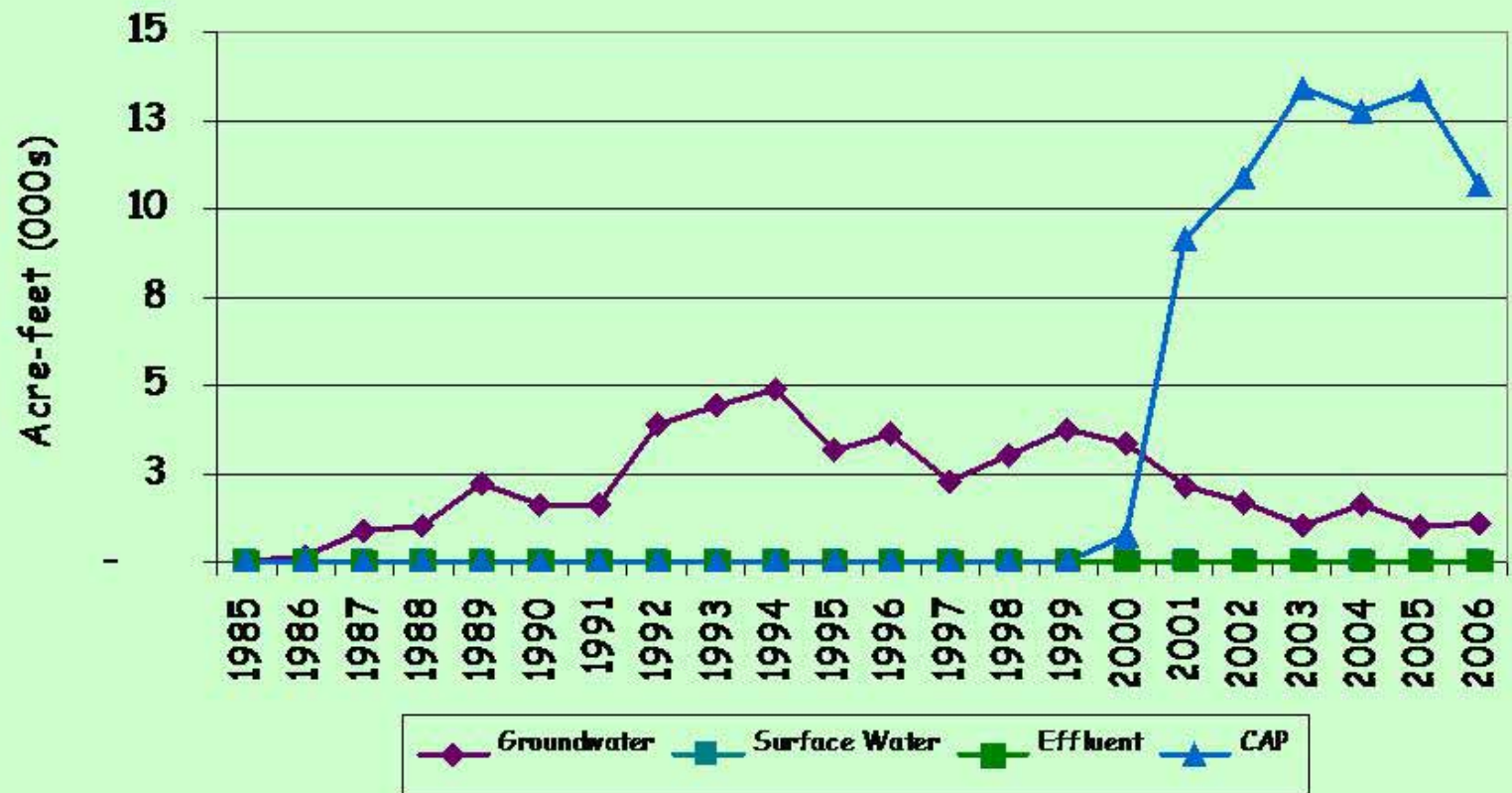
0

INCIDENTAL RECHARGE

3,341

2,659

Indian Water Supply by Source (Tucson AMA)



Recharge

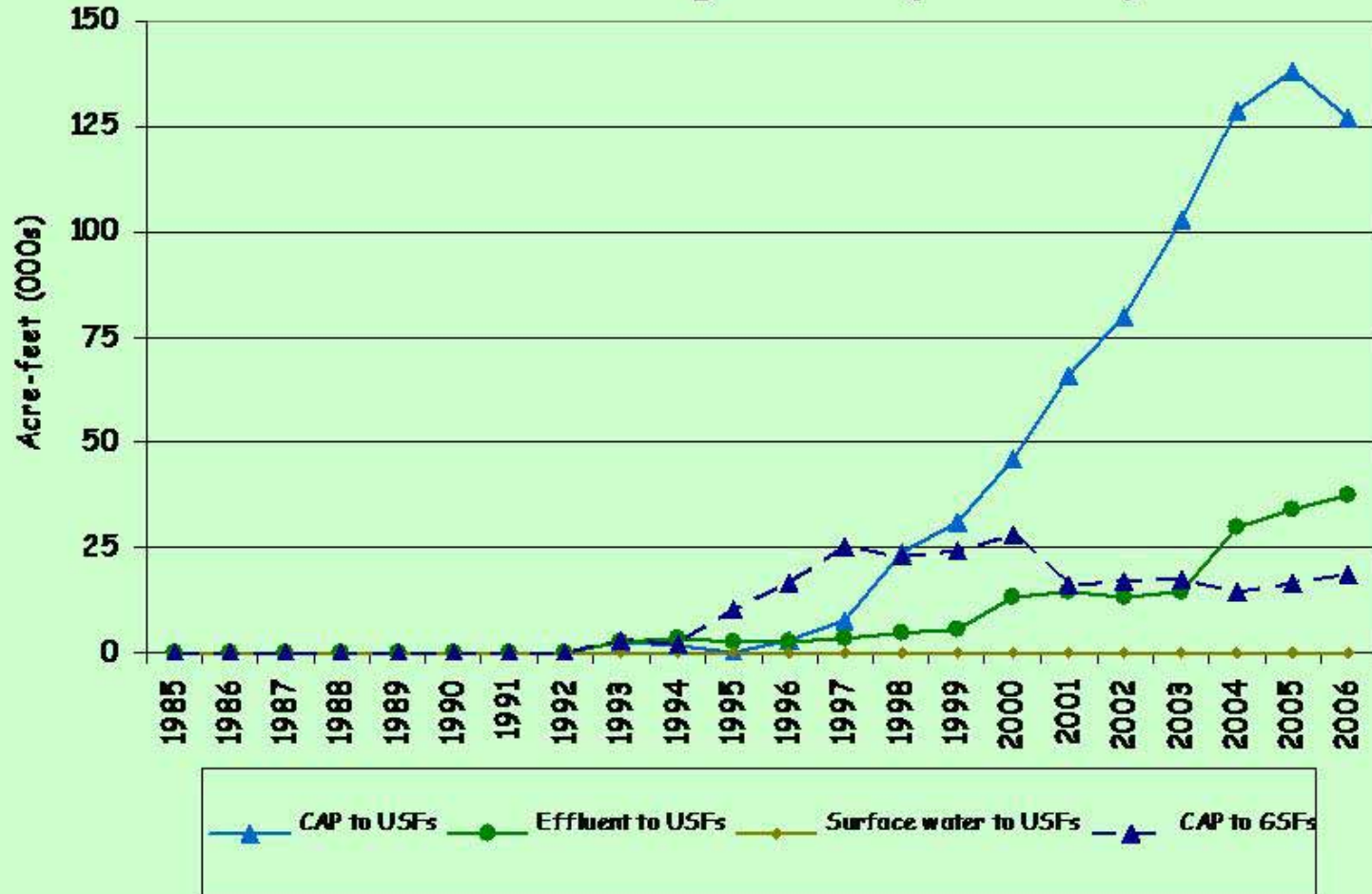
◆ Types of Permits

- Water Storage Permit
- Underground Storage Facility (USF)
- Groundwater Savings Facility (GSF)
- Recovery Well Permit

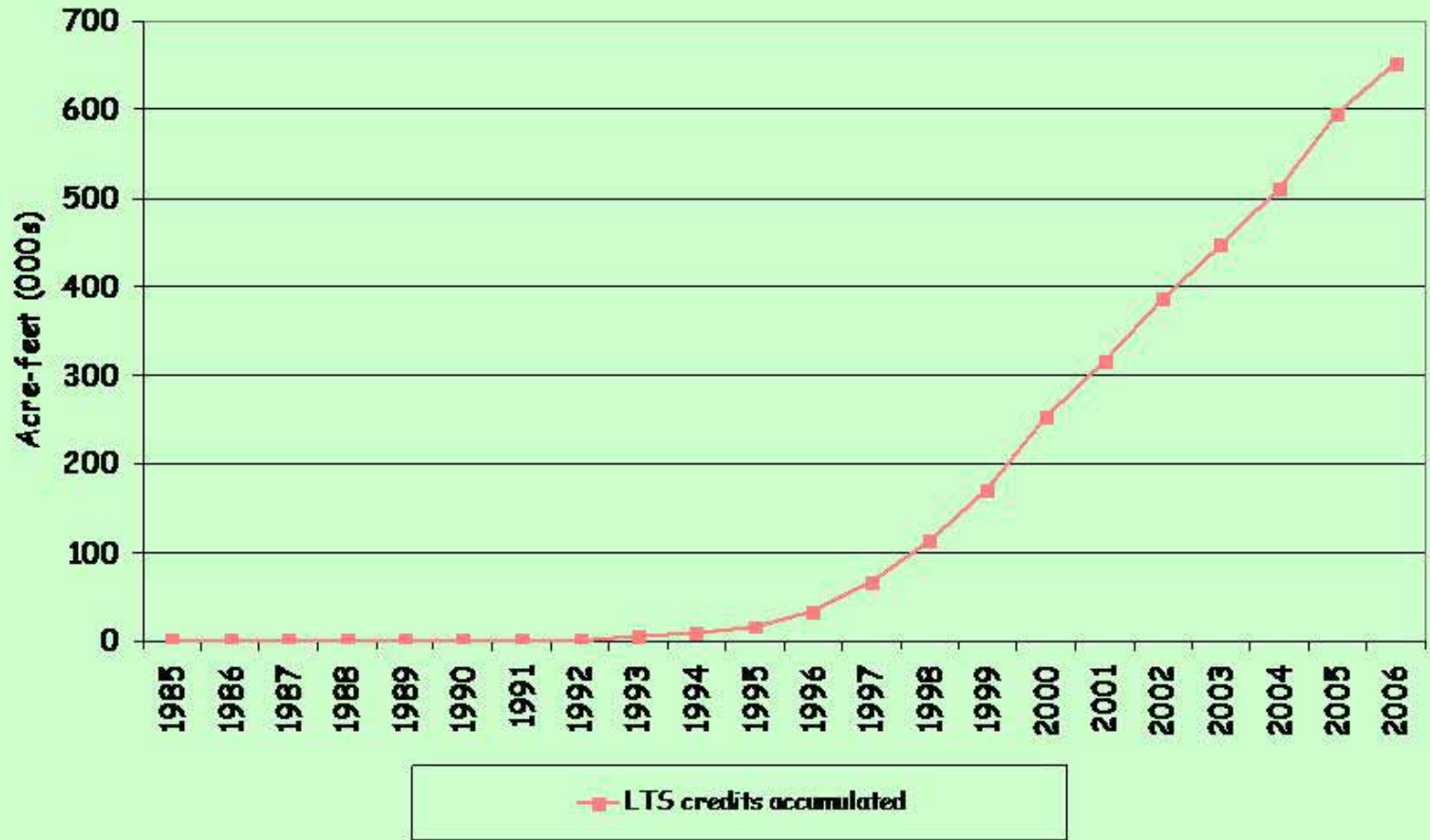
◆ Activities

- Replenishment
- Annual Storage/Recovery
- Long Term Storage Credit Accrual

Water Stored at Recharge Facilities (Tucson AMA)



Long Term Storage Credits Accumulated (Tucson AMA)

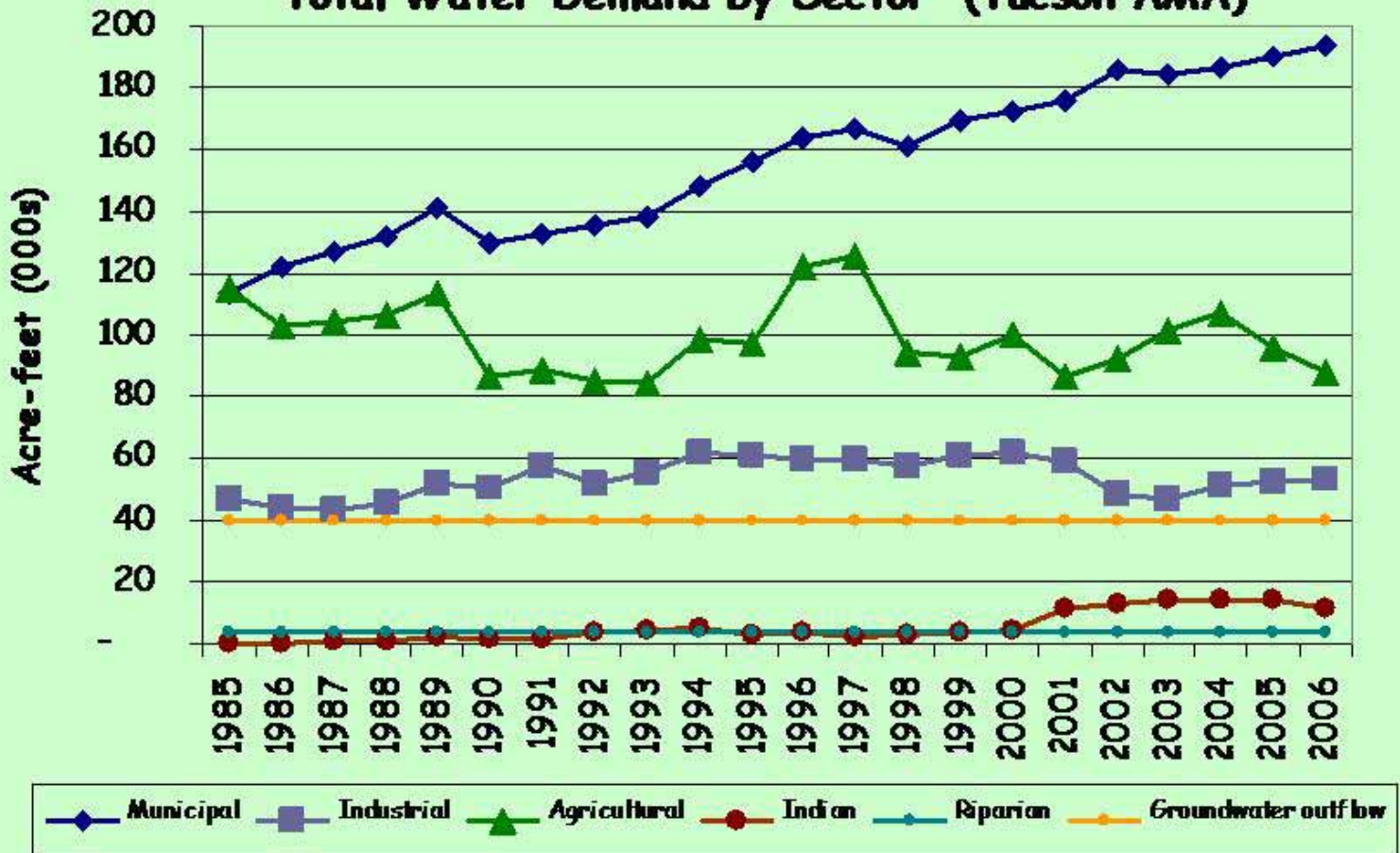


Other Parts of Budget

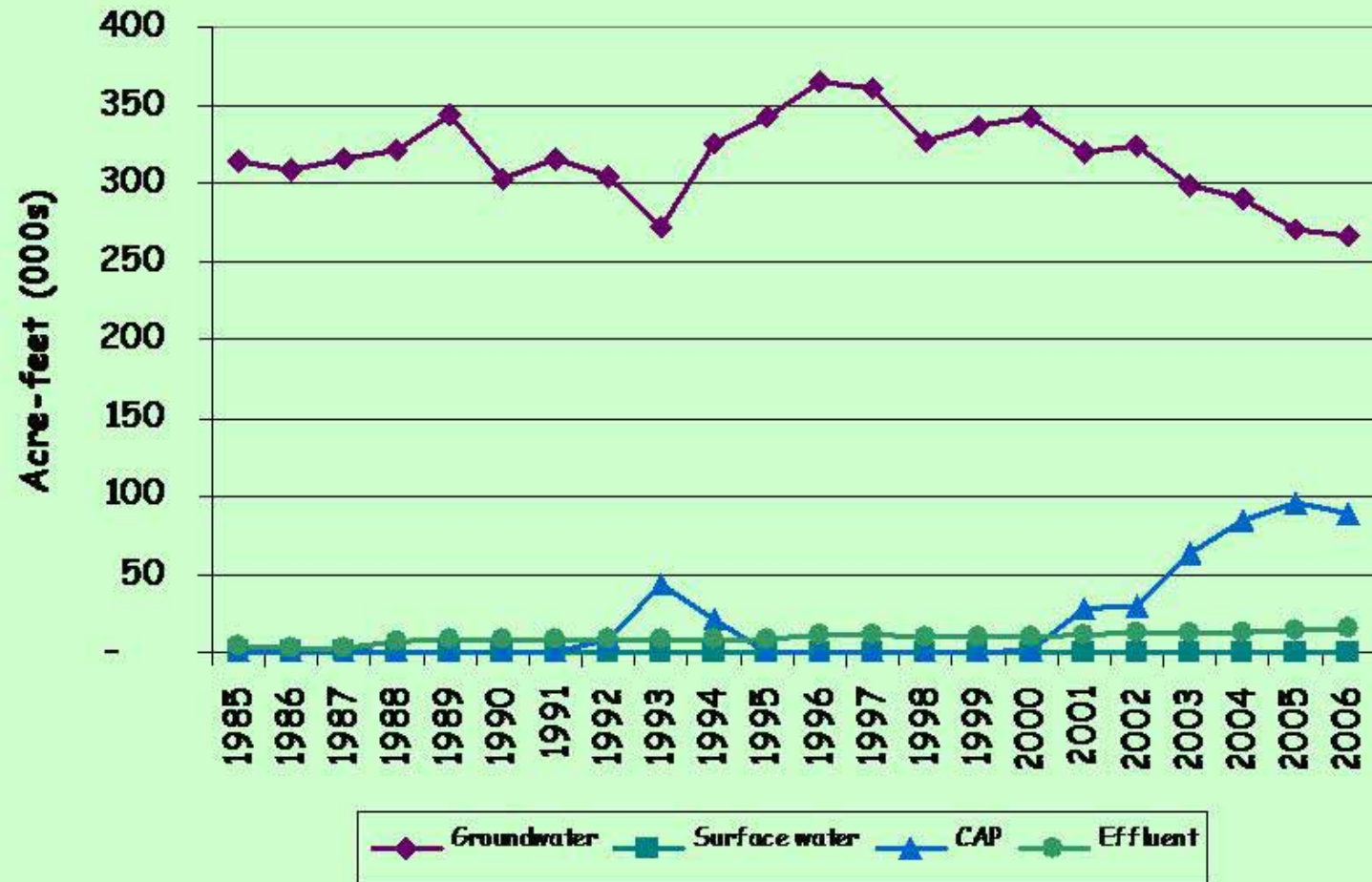
- ◆ Riparian Demands
- ◆ Cuts to Aquifer
- ◆ Long Term Storage Credits
- ◆ Net Natural Recharge

Tucson AMA Supply & Demand		7/22/08 DRAFT, SUBJECT TO REVISION				
		THIRD MANAGEMENT PLAN				
All figures expressed in acre-feet		2002	2003	2004	2005	2006
OTHER						
DEMAND	Riparian	3,700	3,700	3,700	3,700	3,700
SUPPLY	Cuts to the aquifer	6,471	6,552	13,617	15,368	16,364
	LTS credits for replenishment	6,069	2,046	5,581	7,276	8,477
	Net natural recharge	60,800	60,800	60,800	60,800	60,800

Total Water Demand by Sector (Tucson AMA)

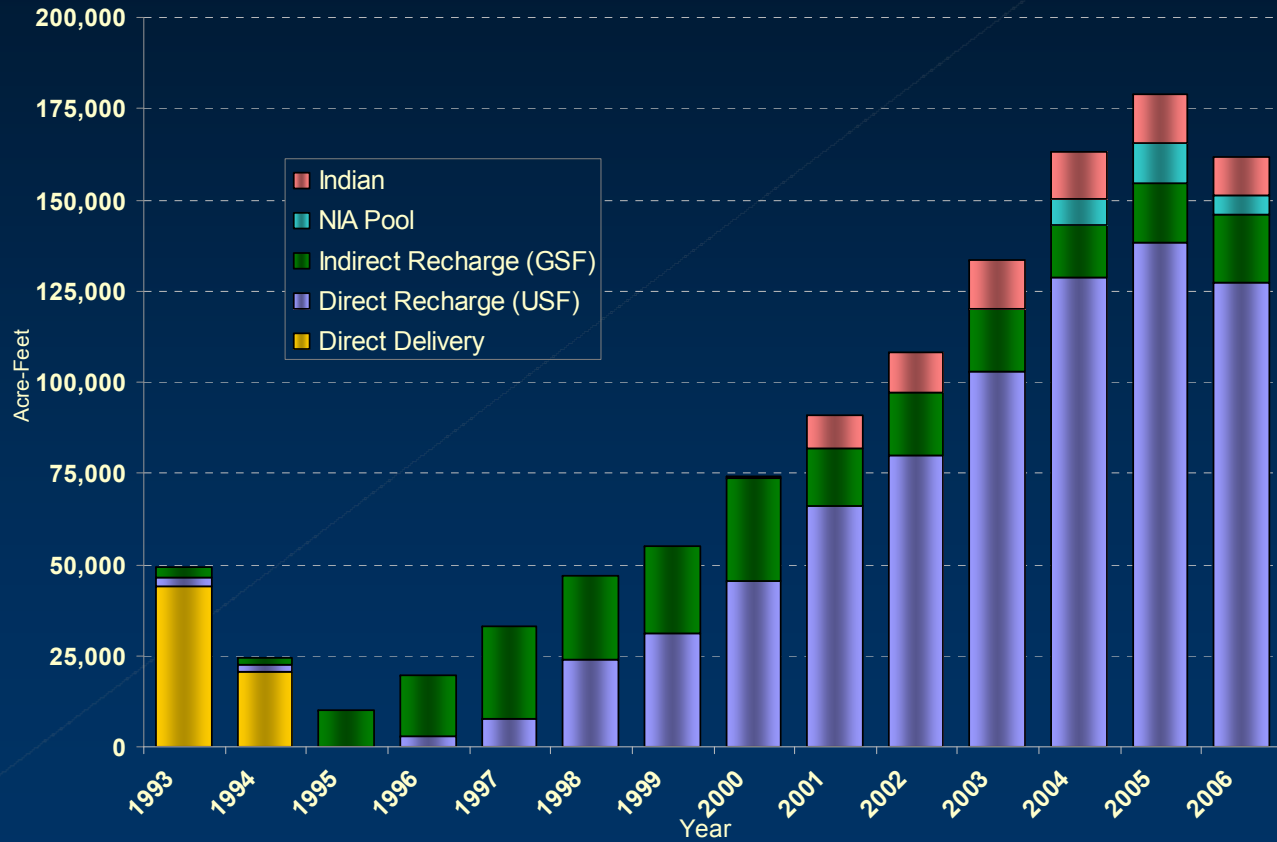


Total Water Supply by Source (Tucson AMA)



Water Supply

CAP Utilization



PRELIMINARY INFORMATION, SUBJECT TO REVISION

Overdraft – Tucson AMA

Tucson AMA Supply & Demand

All figures expressed in acre-feet

7/22/08 DRAFT, SUBJECT TO REVISION

THIRD MANAGEMENT PLAN

2002	2003	2004	2005	2006
------	------	------	------	------

OVERDRAFT

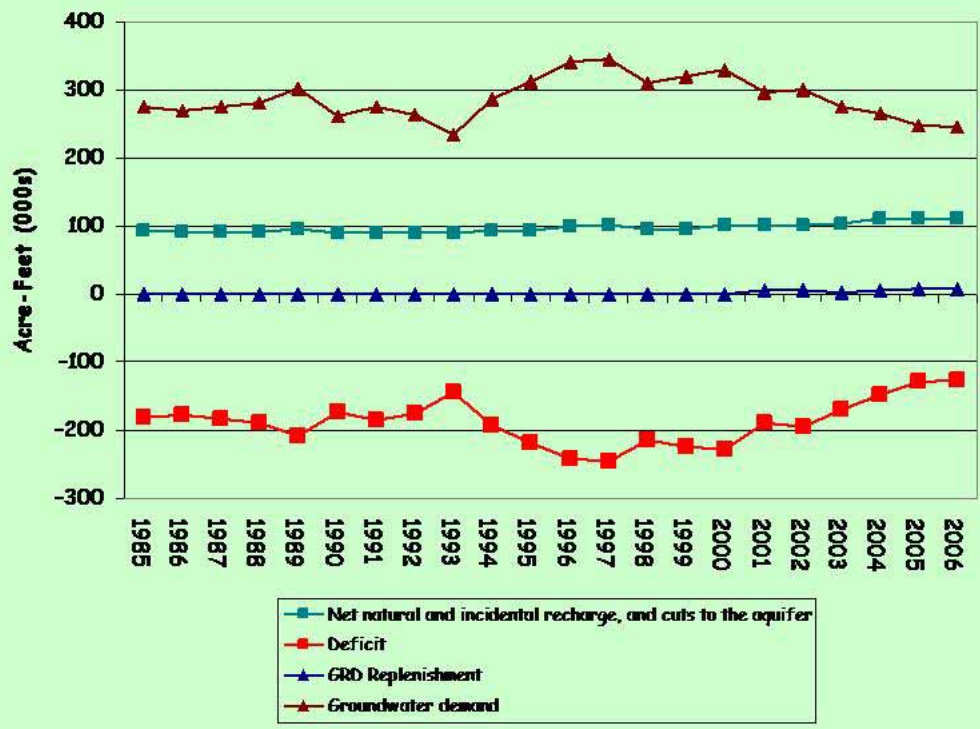
TOTAL	194,660	166,344	147,984	129,746	129,585
--------------	---------	---------	---------	---------	---------

ADDITIONAL RECHARGE FOR FUTURE USE*

OTHER	Net artificial recharge	385,016	447,058	511,028	596,041	652,470
--------------	-------------------------	---------	---------	---------	---------	---------

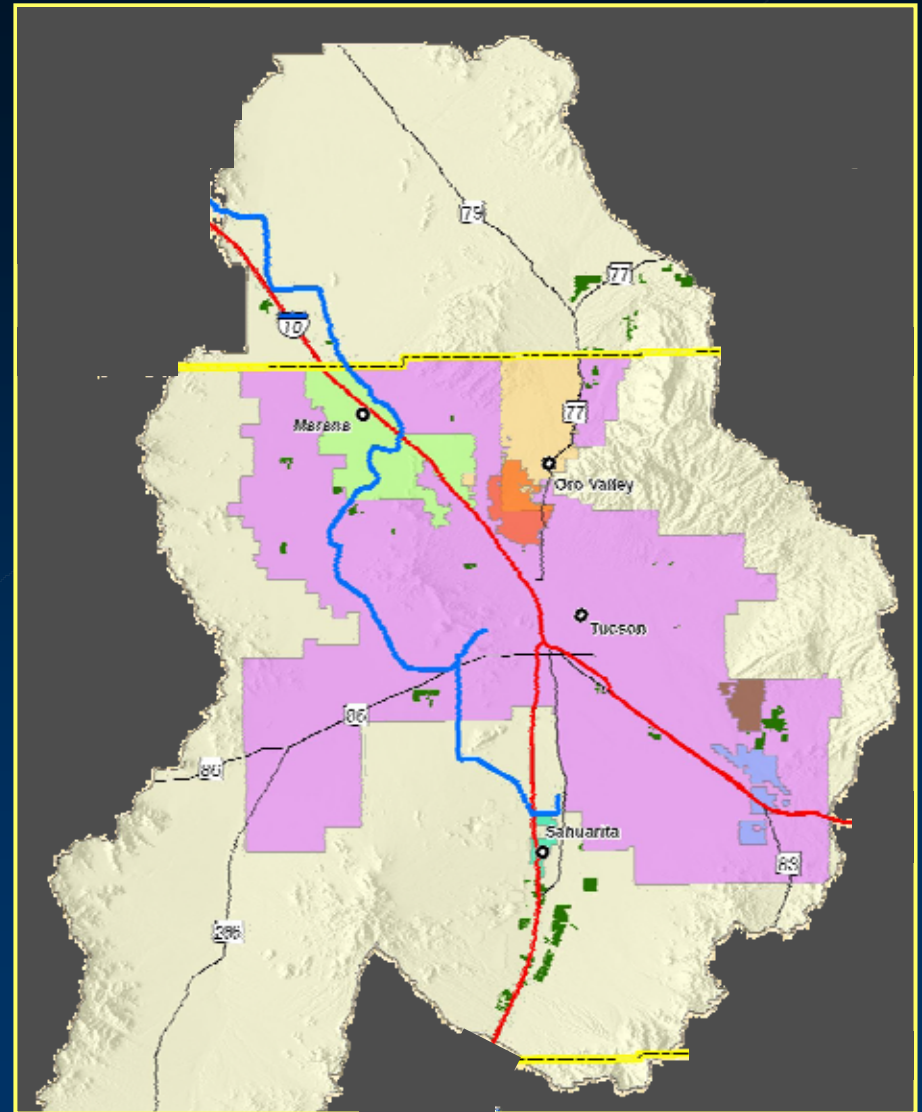
* Includes storage for Colorado River drought, and interstate storage on behalf of Nevada

Tucson AMA Overdraft



CAGRD Members

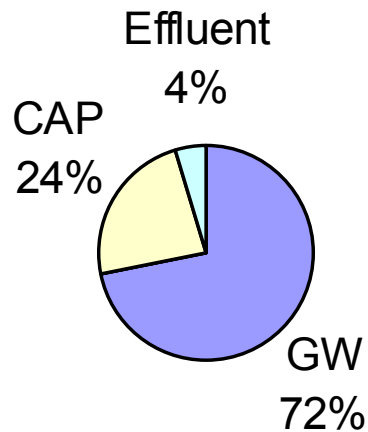
- Tucson AMA Member Service Areas (MSAs)
 - Marana
 - Metro Water
 - Metro - West
 - Oro Valley
 - Sahuarita
 - Spanish Trail
 - Tucson
 - Vail Water Co.
 - Willow Springs
- Member Lands



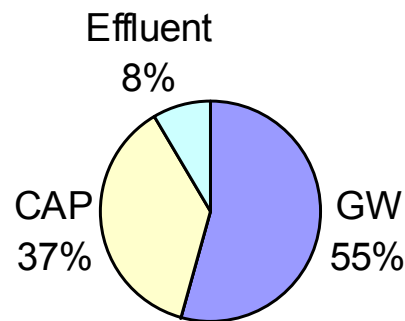
Member Lands & Planning Areas for MSAs

Supplies Used to Meet Demands, 2006

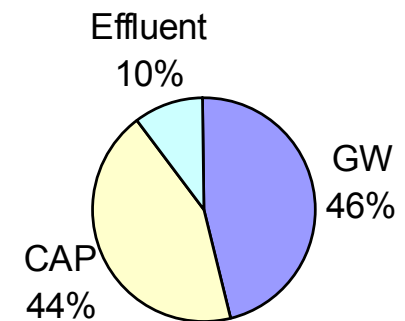
Tucson AMA



Muni Sector



Tucson Water



Jeff Tannler, Arizona Department of Water Resources

jmtannler@azwater.gov