CHAPTER 3 – WATER DEMAND AND SUPPLY

The water used in IEUA's service area comes from both local and imported sources. Local sources include groundwater, surface water, desalinated water and recycled water. Imported water from northern California, delivered through the State Water Project[1], is purchased by IEUA from Metropolitan Water District of Southern California (MWD) for wholesale distribution to the retail agencies within IEUA's service area. Thus, a blend of ground, desalinated, surface, recycled and imported water is used to meet water demand.

IEUA, in partnership with the area's cities and retail agencies along with Chino Basin Watermaster, Santa Ana Watershed Project Authority, Orange County Water District, Metropolitan Water District of Southern California, Santa Ana Regional Water Quality Control Board, and other neighboring cities and agencies, have been working since 2000 on an integrated water management strategy. The goals of the integrated water management strategy are to develop additional local water supplies that will reduce the area's dependence on imported water, help to "drought proof" the region, and improve water quality within both the Agency's service area and the Santa Ana River watershed. The primary sources of new local water that have been and will continue to be developed include:

- The Chino Basin Desalter that provides advanced treatment of groundwater using volatile organic compound treatment, reverse osmosis and ion exchange (also see Appendix T);
- Inland Empire Utilities Agency Regional Recycled Water Program using recycled wastewater (Chapters 5 and 6); and
- Chino Basin Optimum Basin Management Program which recharges the groundwater basin using recycled water, stormwater and imported water (Chapter 7) to increase groundwater production for municipal users.

The previous expansions of the Chino Basin Desalter I and construction of Chino Basin Desalter II expanded the treatment capacity from 9,000 AFY to 27,000 AFY. Another planned expansion of Chino Basin Desalter II, scheduled to be completed in 2014, will expand treatment capacity from 27,000 AFY to 40,000 AFY.

The implementation of IEUA's Recycled Water Business Plan will increase recycled water use to 50,000 AFY (35,000 AFY for direct use and 15,000 AFY for recharge).

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[1] MWD distributes water from both the State Water Project and from the Colorado River to its' 26 member agencies. However, IEUA uses only State Water Project water due to salinity concerns within the Chino Basin. This is consistent with the basin plan and regulatory requirements of the Santa Ana Regional Water Quality Control Board.

Current Chino Basin recharge facilities have capacity for approximately 100,000 acre-feet per year of recharge. This includes recharge of storm, recycled and imported water. The Chino Basin Recharge Master Plan Update (completed June 2010) outlines potential projects that would allow capture and recharge of more storm water, as well as supplemental water such as imported and recycled water.

3.1 WATER USE TRENDS

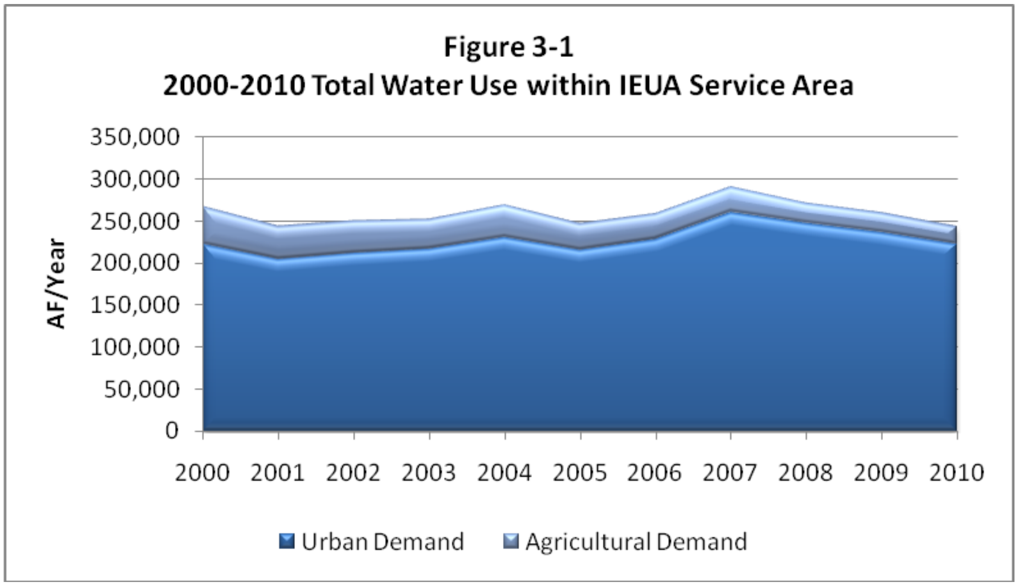
The majority of the water demand within the Agency's service area in recent history has been for urban (residential, commercial, industrial and institutional) uses. The remaining water has been used for agricultural purposes. In 2010, about 90% of the water demand was for urban use and 10% for agriculture.

The overall trend in the area's water demand in the past ten years has essentially flat-lined. The 2007 total water demand was about 255,000 acre-feet, which is approximately the same amount of water used in 2000 despite significant growth in population over the last ten years. However, in the last three years water demand has decreased (see Figure 3-1). The continuing downward trend in overall water use is an excellent indicator of how well the IEUA member agencies have responded to the current water supply challenges including; a third consecutive year of drought, MWD's call for stored water under the Chino Basin Dry Year Yield Program; Judge Wanger's Delta Decision which significantly restricted diversions from the delta, the Governor's declaration of a Statewide Water Emergency, MWD's adoption of a Water Supply Allocation Plan and its call for both voluntary conservation and implementation of mandatory water conservation ordinances. (see Chapter 2 for details)

Despite the flat-lined water use trend over the past ten years, the annual demand within the area has fluctuated with dry and wet year cycles. The early 1990's were characterized by an intense drought (1988-1992) that sharply increased demand and then, as a result of the region's conservation efforts, decreased the area's water usage. Similarly, dry conditions prevailed between 2007 and 2010, fiscal year 2007 being a record-breaking dry year for California with the Agency's service area receiving less than 5 inches of rain – far below the 15-inch average rainfall for the region, and the region saw a short sharp increase in demand followed by a longer lasting decrease in demand.

3.2 HISTORICAL WATER USE

Comparing the year 2000 and 2010, total water demand (urban and agricultural uses) within IEUA's service area decreased by approximately 24,000 acre feet (from approximately 267,000 acre-feet in 2000 to 243,000 acre feet in 2010). However, the water used for urban had multiple demand peaks and valleys over the last ten-years. The agriculture demand declined from about 44,000 acre-feet year in 2000 to approximately 21,000 acre-feet per year in 2010, consistent with the conversion of these lands to urban development and converting agricultural demands to recycled water use.



All of the water used for urban purposes is distributed through the eight member agencies which serve the population within the area. Water used for agricultural purposes is pumped directly from private groundwater wells or recycled water pipelines.

The retail agencies that have the largest water demand within the service area are the Cucamonga Valley Water District (52,000 acre-feet per year), the Fontana Water Company[2] (44,000 acre-feet per year) and the City of Ontario (39,000 acre-feet per year) as shown in Table 3-1. The total urban water use for 2010 was approximately 222,000 acre-feet.

Within the urban sector of the IEUA service area, more than half (50%) of the water used within IEUA's service area in 2010 is for single families. The remaining demand is divided among non-residential (commercial/industrial/institutional) uses (15%), multifamily (11%) and unmetered uses and system losses (10%). (MWD assumes a leakage rate of 7.5% in the MWD-Main Model. The remaining 4.5% can be attributed to unmetered uses).

[2] The Fontana Water Company (FWC) services a small area outside of the IEUA service area and gets additional supplies from San Bernardino Valley Municipal Water District. IEUA has adjusted the FWC supply and demand numbers appropriately to more accurately reflect supply and demand within the IEUA service area.

Table 3-1
2000-2010 Water Demand by Retail Agencies

Agency	2000	2001	2002	2003	2004	2005
City of Chino	15,396	14,170	15,079	15,006	16,037	15,012
City of Chino Hills	17,204	16,039	14,444	15,800	17,344	15,228
City of Ontario	42,903	39,339	42,604	43,349	44,986	42,632
City of Upland	23,038	20,289	22,496	20,864	22,563	19,847
Cucamonga Valley Water District	51,831	48,536	50,669	49,737	55,114	53,425
Fontana Water Company	44,317	42,605	42,341	42,448	45,922	41,989
Monte Vista Water District	11,924	11,735	12,026	12,036	12,448	11,418
San Antonio Water Company	10,257	8,450	8,093	13,365	10,990	10,856
Agricultural	44,242	39,285	38,196	35,168	38,192	31,505
Subtotal	***261,112***	***240,448***	***245,948***	***247,773***	***263,596***	***241,912***
Recycled Water	6,030	3,797	4,442	4,498	5,408	5,396
Total[3]	**267,141**	**244,244**	**250,391**	**252,271**	**269,004**	**247,308**

Agency	2006	2007	2008	2009	2010
City of Chino	15,786	17,877	17,432	16,250	15,601
City of Chino Hills	16,518	18,903	18,063	17,410	16,002
City of Ontario	42,219	46,195	43,720	40,973	33,188
City of Upland	21,024	23,789	20,261	22,144	20,841
Cucamonga Valley Water District	56,132	62,288	58,632	56,677	51,405
Fontana Water Company	44,657	50,541	48,537	46,133	44,165
Monte Vista Water District	11,517	12,375	12,330	10,014	10,085
San Antonio Water Company	11,783	15,434	14,996	13,616	14,036
Agricultural	30,253	29,653	23,539	23,277	21,043
Subtotal	***249,889***	***277,056***	***257,511***	***246,495***	***226,366***
Recycled Water	8,847	13,029	13,493	13,360	17,298
Total[3]	**258,736**	**290,085**	**271,004**	**259,855**	**243,664**

[1]All values are fiscal year totals.

[2]Data from IEUA Annual Production Reports.

3.3 HISTORICAL AND CURRENT LOCAL WATER SUPPLIES

The history of water use by source within the IEUA Service Area for the past ten years is presented in Table 3-1. Total water use ranged from a low of 244,000 acre feet in fiscal year 2001 to a high of 290,000 acre feet in fiscal year 2007. The relative contribution of ground, surface, imported, recycled, and desalter water is shown in Table 3-2 and Figure 3-2.

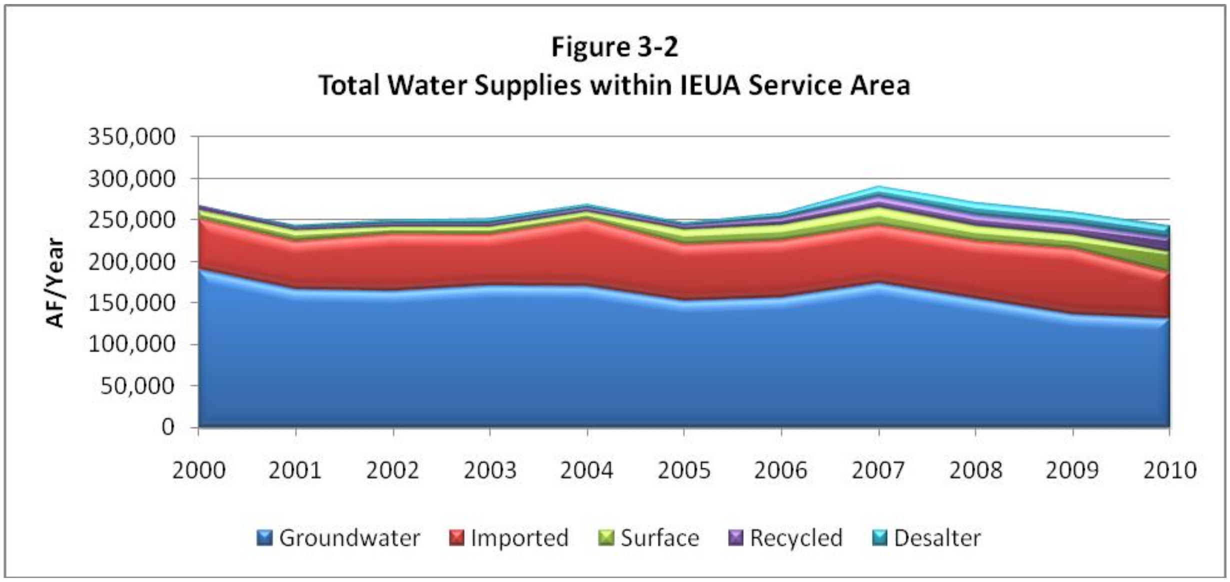
Groundwater is the predominate source of water used in the service area, approximately 60 to 70 percent of the total water supplies for the IEUA service area. Imported water was the next largest category, ranging from 20 to 30 percent of the water used in the service area. Surface water from the San Gabriel Mountains comprise a fairly small portion of the water used in the service area ranging from 5 to 12 percent of the annual supplies depending on wet and dry winters. Recycled and desalter water combined for about 1 to 13 percent of the water use in the service area.

Table 3-2
Total Water Production by Source Within IEUA Service Area (AFY)

	Fiscal Year Ending June 30					
Water Source	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Chino Basin Groundwater	89,879	80,871	85,806	92,501	89,103	84,551
Other Basin Groundwater	56,175	45,991	39,964	43,024	42,377	36,198
Surface Water	9,924	13,543	8,903	9,554	9,058	18,060
Imported Water	60,892	57,545	68,560	61,027	80,170	67,694
Recycled Water[a]	6,030	3,797	4,442	4,498	5,408	5,396
Desalter	0	3,213	4,519	6,499	4,696	3,904
Agricultural groundwater use	44,242	39,285	38,196	35,168	38,192	31,505
Total	**267,142**	**244,245**	**250,390**	**252,271**	**269,004**	**247,308**

	Fiscal Year Ending June 30				
Water Source	**2006**	**2007**	**2008**	**2009**	**2010**
Chino Basin Groundwater	77,195	90,032	87,908	66,351	68,277
Other Basin Groundwater	48,780	53,830	43,401	46,418	41,724
Surface Water	18,756	21,184	18,411	16,767	25,653
Imported Water	68,456	69,453	68,951	78,872	54,934
Recycled Water[a]	8,847	13,029	13,493	13,360	17,298
Desalter	6,449	12,904	15,301	14,810	14,737
Agricultural groundwater use	30,253	29,653	23,539	23,277	21,043
Total	**258,736**	**290,085**	**271,004**	**259,855**	**243,666**

[a]Recycled Water use by eight retail agencies and IEUA
Sources: Chino Basin Watermaster assessment table, WFA water deliveries, and retail agency records.

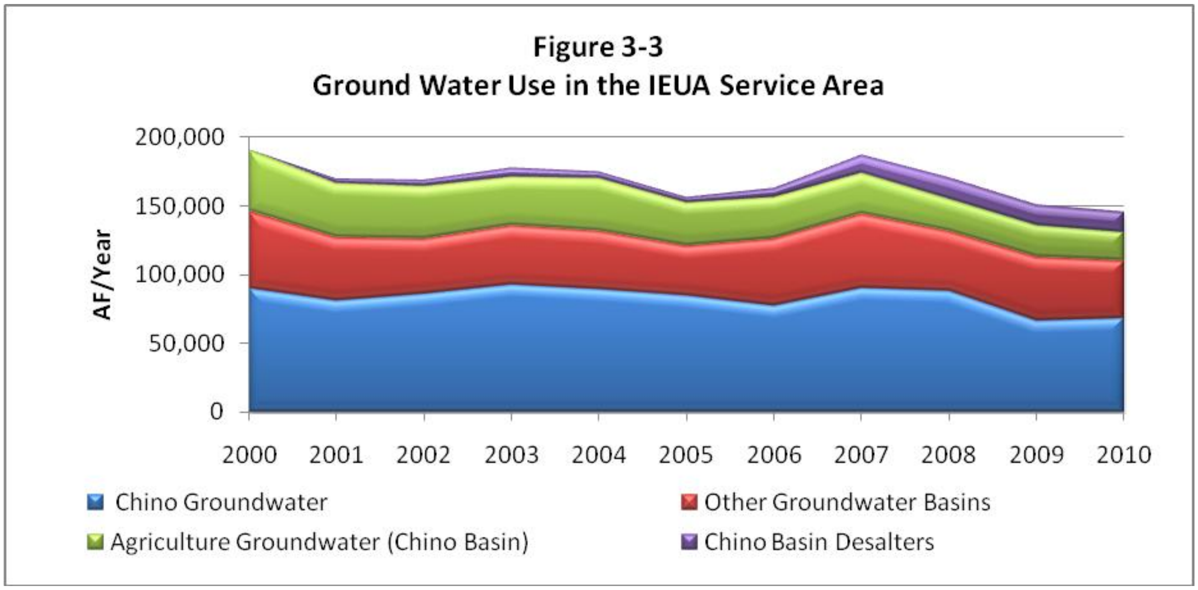


Groundwater supplies in the IEUA service area include:

1. Groundwater extracted from the Chino Groundwater Basin for municipal and industrial use, including recovered water by Chino Basin Desalter;
2. Groundwater extracted from the Chino Groundwater Basin for direct agricultural use via wells; and
3. Other groundwater basins (e.g. Cucamonga).

The volumes of each of these types of groundwater are shown in Figure 3-3. On average, over the last ten years, about 54% of the groundwater used in the service area was from groundwater extracted from Chino Basin for municipal and industrial use. Agricultural use was about 19% of the groundwater used in the service area and 27% of the groundwater use in the service area was from groundwater basins other than the Chino Basin.

MWD made a “call” from its conjunctive use groundwater storage account in 2008, 2009 and 2010. This is represented as imported water in this report, thus it appears there is a decline in groundwater pumping when there actually is not. There was 33,000 AF of groundwater pumped each of the first two years and 17,200 AF the third year that MWD made it’s “call.”



Chino Basin Groundwater

The Chino Groundwater Basin is the largest groundwater basin in the Upper Santa Ana Watershed. It currently contains approximately 5 million acre-feet of water in storage, with an additional unused storage capacity of about 1 million acre-feet.[3] IEUA's service area covers 70% of the Chino Groundwater Basin as shown in Figure 3-4.

Water rights within the Chino Basin were adjudicated in 1978. The average safe-yield of the Basin is about 145,000 acre-feet per year. This water is allocated among three "pools" of users: the Overlying Agriculture Pool (82,800 acre-feet/year), the Overlying Non-Agricultural Pool (7,366 acre-feet/year) and the Appropriative Pool for urban uses (54,834 acre-feet/year). Additional groundwater production (in excess of the safe yield) is allowed by the adjudication provided that the pumped water is replaced with replenishment water.

Management of the Chino Groundwater Basin is now guided by the 2000 "Peace Agreement" and the 2007 "Peace II Agreement" (see Chino Basin Watermaster website at www.cbwm.org) of the Chino Basin Optimum Basin Management Program (OBMP, see Chapter 7). The Chino Basin Watermaster has held oversight responsibilities for the groundwater basin since its formation in 1978 with the adjudication of water rights.

Historically, Chino Basin Watermaster has purchased imported water from MWD (through IEUA) to provide replenishment water when pumping exceeds the safe yield of the basin. New sources of replenishment water now include local storm water and recycled water developed through the Chino Basin Groundwater Recharge Program (see Chapter 7). In addition, groundwater is re-allocated to the Appropriative Pool for urban use from the Overlying Agricultural Pool when it is not pumped by the agricultural users. Over time, as agricultural

3 Estimate of unused storage capacity based upon historic water levels in the Chino Basin.

production declines within the IEUA service area, the reallocation of groundwater to the Appropriative Pool is expected to increase.

A market for the lease or sale of pumping rights within the Chino Basin is an important part of the management of this groundwater supply. Annual water exchanges occur regularly among agencies within IEUA's service area.

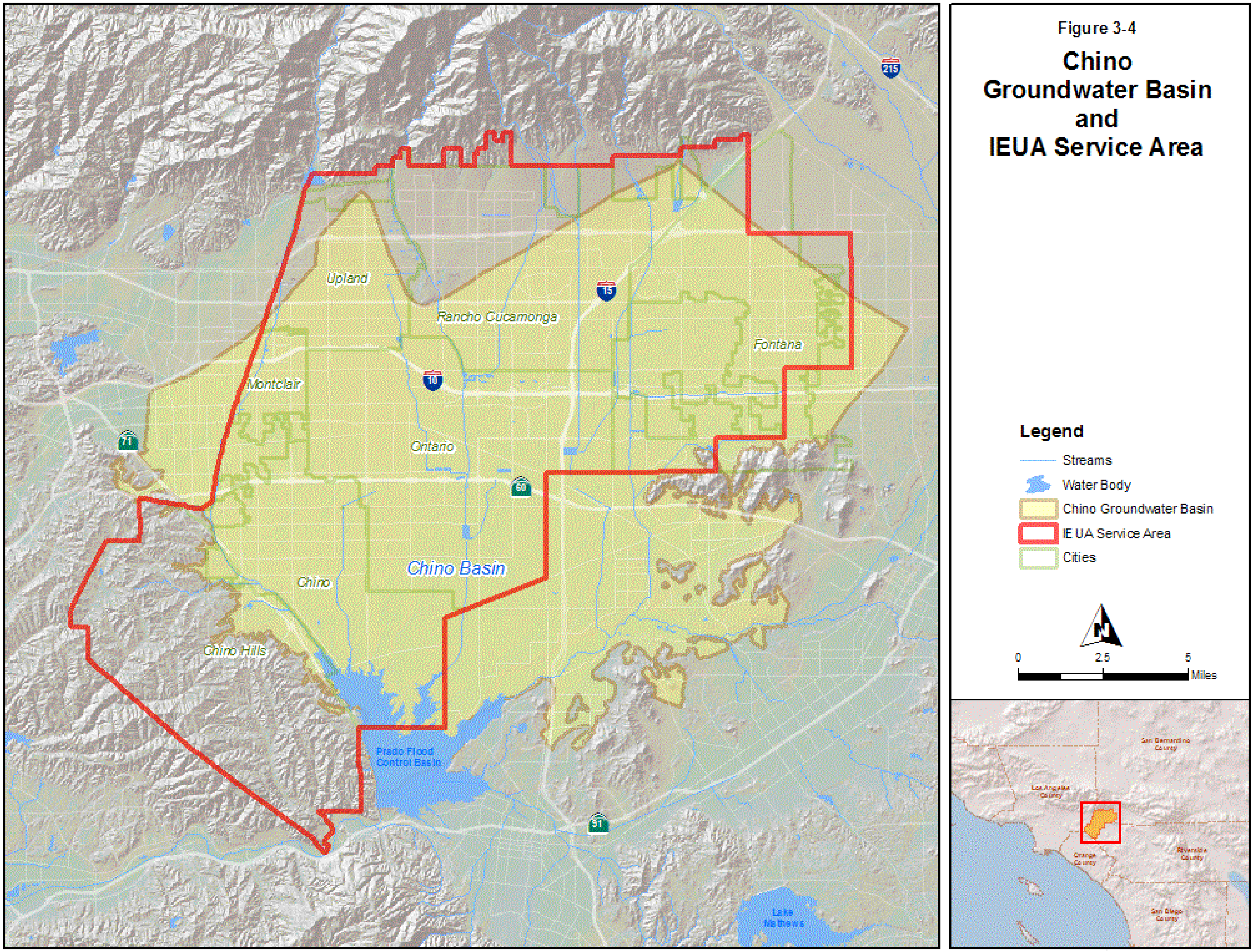


Figure 3-4
Chino Groundwater Basin and IEUA Service Area

Groundwater quality in the lower Chino Basin is poor, as nitrates and Total Dissolved Solids (TDS) exceeding drinking water standards. Other water quality concerns include the presence of perchlorate, volatile organic chemicals and other contaminants in the Chino groundwater. Table 3-3 summarizes water quality analyses from water wells in the Chino Basin for the period of June 2003 through June 2008. Some of the contaminants are from natural sources (such as arsenic). Other contaminants were introduced by human activities, including weapons testing, the use and inappropriate disposal of solvents, and the application of fertilizer products. See Chapter 10 for more information on water quality.

Table 3-3
Summary of Water Quality Data for Groundwater from Chino Basin June 2003 through June 2008

Analyte Group/Constituents	Wells with Exceedances
Inorganic Constituents	
Nitrate	395
Total dissolved solids	221
Perchlorate	188
Iron	185
Sulfate	41
Aluminum	153
Chromium	30
Chloride	25
Managanese	58
Arsenic	24
Vanadium	25
General Physical	
Odor	21
Color	28
pH	14
Specific Conductance	121
Turbidity	78
Chlorinated VOCs	
1,1-Dichloroethane	11
1,1-Dichloroathane	31
1,2,3-Trichloropropane	23
1,2-Dichlorethane	17
cis-1,2-Dichloroethene	10
Tetrachloroethene (PCE)	37
Trichloroethene (TCE)	115
cis-1,2-dichloroethene	10

Source: Adapted from Chino Basin Watermaster, Optimum Basin Management Program, State of the Basin Report, November 2008

Under the OBMP, the Chino Basin Watermaster is working in partnership with the cities, retail agencies, private groundwater pumpers, IEUA and Santa Ana Regional Water Quality Control Board (SARWQCB) to address these water quality problems and increase the water supplies available from the groundwater basin. The construction and operation of facilities to desalt the brackish groundwater (Chino Desalter I and II) along with the installation of well head ion exchange treatment facilities are a critical part of this strategy. In 2005, the State Water Resources Control Board approved the Maximum Benefit Plan for the management of the Chino Basin which will allow recycled water to be used with storm water and imported water to recharge the upper portion of the groundwater basin while requiring the operation of the desalting facilities to pump and treat the generally lower quality water in the lower portion of the Chino Basin.

Groundwater production from the Chino Basin is shown in Table 3-4. Total groundwater production from the Chino Basin has increased from 140,000 acre-feet in 1991 to a peak of just over 180,000 acre-feet, in 2004.

Table 3-4
Production of Chino Basin Groundwater (AFY) by Pool

Fiscal Year	Appropriative Pool	Overlying (Ag) Pool	Overlying (Non-Ag) Pool	Total
1975	70,312	96,567	8,878	**175,757**
1976	79,312	95,349	6,356	**181,017**
1977	72,707	91,450	9,198	**173,355**
1978	60,659	83,934	10,082	**154,675**
1979	60,597	73,688	7,127	**141,412**
1980	63,834	69,369	7,363	**140,566**
1981	70,726	68,040	5,650	**144,416**
1982	66,731	65,117	5,684	**137,532**
1983	63,481	56,759	2,395	**122,635**
1984	70,558	59,033	3,208	**132,799**
1985	76,912	55,543	2,415	**134,870**
1986	80,859	52,061	3,193	**136,113**
1987	84,662	59,847	2,559	**147,068**
1988	91,579	57,865	2,958	**152,402**
1989	93,617	46,762	3,619	**143,998**
1990	101,344	48,420	4,856	**154,620**
1991	86,658	48,085	5,407	**140,150**
1992	91,982	44,682	5,240	**141,904**
1993	86,367	44,092	5,464	**135,923**
1994	80,798	44,298	4,586	**129,682**
1995	93,419	55,022	4,327	**152,768**
1996	101,616	43,639	5,424	**150,679**
1997	110,163	44,809	6,309	**161,281**
1998	97,435	43,345	4,955	**145,735**
1999	107,723	47,538	7,006	**162,267**
2000	126,645	44,401	7,774	**178,820**
2001	113,437	39,954	8,084	**161,475**
2002	120,856	39,495	5,548	**165,899**
2003	121,587	37,457	4,823	**163,867**
2004	136,834	41,978	2,915	**181,727**
2005	127,811	34,450	2,327	**164,588**
2006	124,315	33,900	3,026	**161,241**
2007	130,826	37,295	3,369	**171,491**
2008	103,078	30,910	3,440	**137,427**
2009	84,716	32,143	4,394	**121,253**

Source: Chino Basin Watermaster 31st annual report.

Chino Desalter Facilities
A second critical element to increasing Chino groundwater production is to reduce the salt imbalance within the basin. Consistent with the Optimum Basin Management Program (OBMP, 2000) and the Maximum Benefit Program (approved by the State Water Resources Control Board in 2005), desalting facilities must be constructed in the lower portion of the Chino Basin to remove salt and nitrates as well as to prevent poor quality water from the Chino groundwater basin from moving down the watershed into Orange County groundwater basins.

The Chino I Desalter was constructed in 2000 through a Joint Participation Agreement among five agencies: the Santa Ana Watershed Project Authority, Western Municipal Water District, Orange County Water District, Metropolitan Water District of Southern California and IEUA. Located in Chino, the facility currently produces 10,000 acre-feet per year of which approximately 9,000 acre-feet is used for potable purposes, serving an estimated 20,000 families within the cities of Chino and Chino Hills.

The Chino II Desalter was constructed in 2007, with a capacity of 18,000 acre-feet per year, and currently produces between 14,000 and 15,900 acre-feet per year of water. This water provides a supplemental supply to the cities of Chino, Chino Hills, and Ontario located within IEUA's service area as well as to the Jurupa Community Services District, City of Norco and the Santa Ana River Water Company located outside of IEUA's service area.

The Chino II Desalter expansion is expected to be complete by 2014 and expand existing capacity by another 13,000 acre-feet per year. This expansion will provide a total of 40,000 acre-feet per year of supplemental water.

In 2002 the Chino Basin Desalter Authority, a Joint Powers Authority comprised of the cities of Chino, Chino Hills, Ontario, and Norco, the Jurupa Community Services District, and the Santa Ana River Water Company, was formed to manage the production, treatment and distribution of water produced by this facility (also see Appendix T).

Other Groundwater
Local groundwater supplies from basins other than the Chino Groundwater Basin represent a significant supplemental source of water for the retail water agencies within IEUA's service area. These additional sources of supply include the Claremont Heights, Live Oak, Pomona, and Spadra Basins located in Los Angeles County; the Riverside South and Temescal Basins located in Riverside County; and the Colton-Rialto, Cucamonga, Lytle Creek, Bunker Hill, and Riverside North Basins located in San Bernardino County. The location of the other groundwater basins is shown on Figure 7-2 of Chapter 7.

IEUA's retail agencies that use groundwater from all or some of these basins include the City of Upland, Cucamonga Valley Water District, Fontana Water Company, and the San Antonio Water Company. Water from these basins also yield supplies for the City of Pomona, Southern California Water Company, West End Consolidated Water Company, Jurupa Community Services District, Western Municipal Water District, and West San Bernardino County Water District. The amounts of groundwater production used in the IEUA service area is presented in Table 3-5.

Table 3-5
Groundwater Supply from Other Basins Used Within IEUA Service Area (AFY)

	Fiscal Year Ending June 30					
Entity	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
City of Upland	17,406	11,684	10,609	7,532	10,930	10,947
Cucamonga Valley Water District	10,356	8,202	7,461	7,191	5,468	8,351
Fontana Water Company	18,985	18,826	15,871	16,862	17,267	15,811
San Antonio Water Company	9,428	7,279	6,023	11,439	8,712	1,089
Total Other Groundwater	**56,175**	**45,991**	**39,964**	**43,024**	**42,377**	**36,198**

	Fiscal Year Ending June 30				
Entity	**2006**	**2007**	**2008**	**2009**	**2010**
City of Upland	14,211	15,495	10,330	13,148	12,680
Cucamonga Valley Water District	6,790	6,308	3,041	6,682	5,851
Fontana Water Company	20,268	24,351	22,904	20,990	19,156
San Antonio Water Company	7,511	7,676	7,126	5,597	4,037
Total Other Groundwater	**48,780**	**53,830**	**43,401**	**46,417**	**41,724**

Source: Upland, CVWD, Fontana and SAWC records.

Surface Water

Several of the retail agencies within IEUA's service area obtain a portion of their water supplies from local surface sources. These sources include San Antonio Canyon, Cucamonga Canyon, Day Creek, Deer Creek, Lytle Creek and several smaller surface streams. Production from surface supplies varies dramatically depending on the amount of rainfall/snowpack. During the past 10 years, surface water usage in the service area ranged from about 8,900 acre-feet per year in 2002 to 25,700 acre-feet per year in 2007 as presented in Table 3-6.

Table 3-6
Surface Water Supply Within IEUA Service Area (AFY)

	Fiscal Year Ending June 30					
Entity	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
City of Upland	346	1,999	1,499	1,155	1,364	467
Cucamonga Valley Water District	4,862	4,770	3,361	3,550	1,785	5,087
Fontana Water Company	4,180	5,675	2,905	3,127	3,642	2,742
San Antonio Water Company	536	1,099	1,138	1,721	2,267	9,765
Total Surface Water	**9,924**	**13,543**	**8,903**	**9,553**	**9,058**	**18,061**

	Fiscal Year Ending June 30				
Entity	**2006**	**2007**	**2008**	**2009**	**2010**
City of Upland	467	2,199	2,074	1,589	1992
Cucamonga Valley Water District	5,786	4,369	4,847	4,850	4,156
Fontana Water Company	9,105	9,971	6,419	6,113	10,471
San Antonio Water Company	3,398	4,644	5,070	4,213	9,033
Total Surface Water	**18,756**	**21,183**	**18,410**	**16,765**	**25,652**

Source: Retail agency historical records.

Recycled Water

IEUA has produced and distributed high quality recycled water since 1972 when the Agency expanded its services to include regional wastewater treatment. Initially recycled water was delivered to a few large water users in the cities of Ontario and Chino. By the early 1990's, the Agency completed construction of the Carbon Canyon Recycled Water Plant which included distribution pipelines to serve additional customers in the cities of Chino and Chino Hills. In 1990, IEUA distributed 570 acre-feet of recycled water as a supplemental supply to these communities and this increased to about 17,000 acre-feet in 2010 as presented in Table 3-7 (see Chapter 6 for details).

Currently, IEUA operates four regional recycled water plants that produce disinfected and filtered tertiary treated recycled water in compliance with California's Title 22 regulations. In aggregate, these facilities produced approximately 63,000 acre-feet of recycled water in fiscal year 2009/10. IEUA completed the Inland Empire Utilities Agency Regional Recycled Water Implementation Plan in 2005 and the Recycled Water Business Plan in 2007, which plans for 50,000 acre-feet per year (35,000 AFY for direct use and 15,000 AFY for recharge).

Table 3-7
Recycled Water Supply Within IEUA Service Area (AFY)

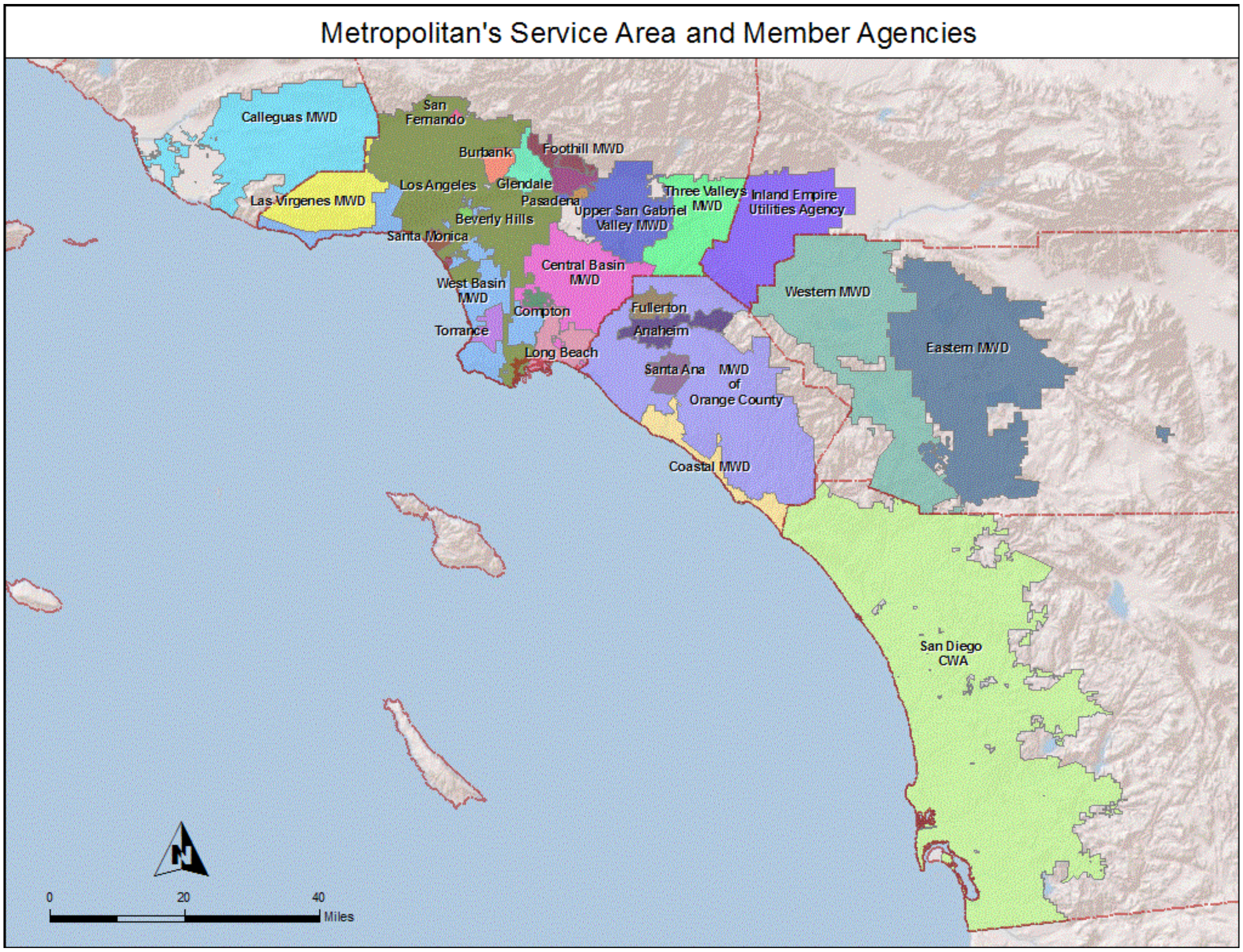
Entity	Fiscal Year Ending June 30					
	2000	**2001**	**2002**	**2003**	**2004**	**2005**
City of Chino	368	293	368	958	1,544	830
City of Chino Hills	129	569	798	767	1,058	815
City of Ontario	3,517	1,001	1,232	1,197	1,160	1,169
City of Upland	0	0	0	0	0	0
San Bernardino County	2016	1428	1439	1342	1502	1459
Inland Empire Utilities Agency	0	505	606	235	144	1,123
Total Recycled Water	**6,030**	**3,796**	**4,443**	**4,499**	**5,408**	**5,396**
Entity	Fiscal Year Ending June 30					
	2006	**2007**	**2008**	**2009**	**2010**	
City of Chino	1,752	2,304	2,897	4,626	7,157	
City of Chino Hills	948	1,631	1,479	1,285	1,494	
City of Ontario	1,587	3,673	3,753	3,955	5,678	
City of Upland	0	17	0	0	0	
Cucamonga Valley Water District	39	253	562	617	660	
Monte Vista Water District	0	0	0	100	240	
San Bernardino County	1,421	1,404	1,288	1,251	1,251	
Inland Empire Utilities Agency	3,101	3,747	3,514	1,527	818	
Total Recycled Water	**8,847**	**13,029**	**13,493**	**13,360**	**17,298**	

3.4 HISTORICAL AND CURRENT IMPORTED WATER SUPPLIES

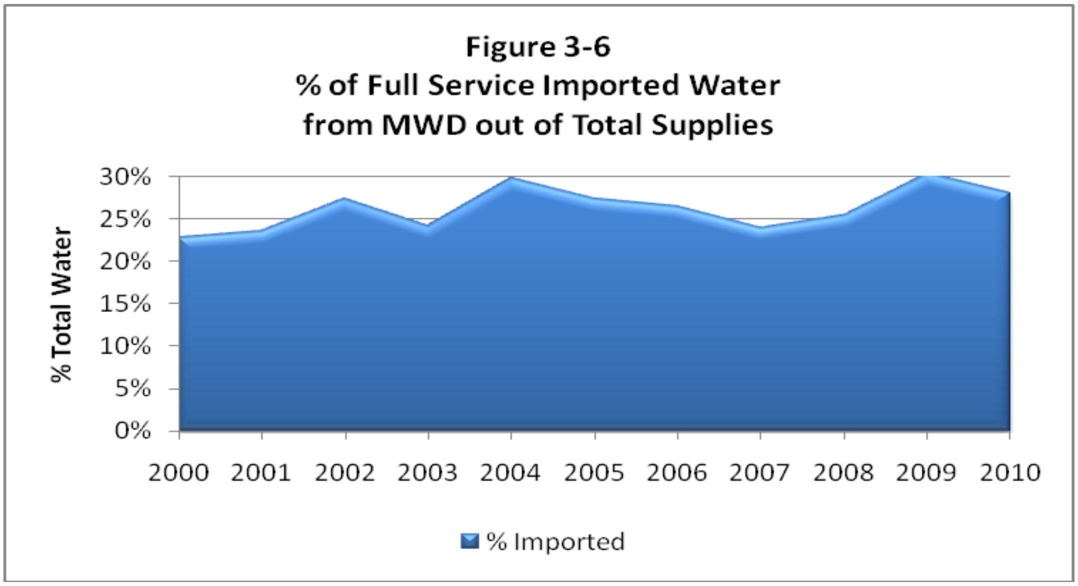
The Metropolitan Water District of Southern California (MWD) supplies imported State Water Project (SWP) water to IEUA for distribution throughout the agency's service area. MWD is a wholesale water agency that serves supplemental imported water from the SWP and the

Colorado River Aqueduct (CRA) to 26 member agencies located within Los Angeles, Orange, Riverside, San Bernardino, San Diego, and Ventura Counties. Nearly 90% of the populations within these counties, about 19.1 million people reside within MWD's 5,200 square mile service area (see Figure 3-5).

Figure 3-5 MWD Service Area Map



When IEUA was formed in 1950, the water used within its service area was supplied exclusively from local groundwater and runoff from the San Gabriel Mountains. Over the next five decades, imported water deliveries steadily increased to help meet growing water demands within the area. By 2000, imported water supplied about 24% of the water demand in the service area, while local water sources supplied 76% of demand. During the past ten years, the percentage of imported full service water required to meet demand has essentially flat-lined with only an increase in the past few years, as shown in Figure 3-6. (Note: Due to the DYY Program, the actual imported water deliveries may vary from what is in figure 3-6.) This increase is due a number of programs being implemented, causing an increase in total imported water. This should not be confused with an increase in dependence of MWD imported water. However, Fontana Water Company did complete its water treatment plant in 2008 and began purchasing small amounts of imported water and is expected to increase purchases as its demands increase.



MWD's 2010 Regional Urban Water Management Plan provides a detailed description of its facilities and imported water supplies. MWD currently supplies an average of 50% of the total urban and agricultural water used within its boundaries. The remaining 50% comes from "local" sources provided by its member agencies, including groundwater, surface water, recycled water, and water from the City of Los Angeles' aqueduct located in the eastern Sierra.[4]

Historic MWD deliveries to the IEUA service area are shown in Table 3-8. IEUA received its first delivery of imported water in 1954. Firm full service imported water purchased by IEUA has grown from 3,000 acre-feet in 1953 to an average of about 68,000 acre-feet since 2005. In 2008, IEUA elected to discontinue its participation in the Interim Agricultural Water Program, as it only had one remaining customer purchasing less than 100 acre-feet per year.

In February 2008, in anticipation of possible water supply shortages, the MWD Board of Directors adopted the Water Supply Allocation Plan (MWD WSAP). The MWD WSAP provides guidance for allocating limited water supplies to Member Agencies should the need arise. On May 1, 2010, MWD implemented a third consecutive year of the Dry Year Yield Program (DYY Program), reducing the amount of direct imported water deliveries IEUA retail agencies could purchase by 31,000 acre-feet. Two months later on July 1, 2010, MWD implemented the WSAP, a Level 2 regional shortage (approximately 10%). IEUA and its retail agencies were allocated approximately 83,000 acre-feet for fiscal year 2010/11 (actual allocation was based on demand and use of local supplies). The overlap of these two programs brought significant challenges to the region and caused a dramatic change in how each retailer used its individual water supply portfolios.

[4] MWD includes the Los Angeles Aqueduct interbasin transfer under local supplies.

Table 3-8
MWD Historical Water Purchases by IEUA (AFY)

Fiscal Year	Full Service	Agricultural	Interruptible/Local Projects	Storage	**Total**
1954	3,135.0				**3,135.0**
1955	4,820.5				**4,820.5**
1956	5,033.3				**5,033.3**
1957	5,983.6				**5,983.6**
1958	6,850.3				**6,850.3**
1959	4,363.7	41.0			**4,404.7**
1960	3,568.1	83.0			**3,651.1**
1961	4,908.6	459.0			**5,367.6**
1962	6,416.4	796.0			**7,212.4**
1963	6,865.2	1,195.0			**8,060.2**
1964	14,598.7	1,579.0			**16,177.7**
1965	18,993.5	2,699.0			**21,692.5**
1966	13,422.2	2,154.0			**15,576.2**
1967	10,071.7	1,072.0			**11,143.7**
1968	10,883.8	1,681.0			**12,564.8**
1969	8,565.2	134.0			**8,699.2**
1970	7,262.5	370.0			**7,632.5**
1971	8,583.8	462.0			**9,045.8**
1972	9,611.7	660.0			**10,271.7**
1973	8,592.6	634.0			**9,226.6**
1974	8,427.7	800.0			**9,227.7**
1975	8,841.0	933.0			**9,774.0**
1976	9,474.0	1,842.0			**11,316.0**
1977	11,096.0	1,698.0			**12,794.0**
1978	20,357.0	924.0			**21,281.0**
1979	10,361.6	817.3	16,088.6		**27,267.5**
1980	11,196.0	69.4	7,841.4	10,677.6	**29,784.4**
1981	13,163.1	335.6	17,861.9	3,020.6	**34,381.2**
1982	7,837.4	588.1	25,914.6	2,453.7	**36,793.8**
1983	4,792.3	303.4	21,797.5		**26,893.2**
1984	4,727.6	404.2	21,230.0		**26,361.8**
1985	8,201.0	558.6	21,001.6		**29,761.2**
1986	9,150.3	398.4	24,701.0	1,072.5	**35,322.2**
1987	11,673.6	368.7	18,393.2	3,522.6	**33,958.1**
1988	9,728.8	459.0	12,245.1	13,142.2	**35,575.1**
1989	20,247.2	175.3	25,931.5		**46,354.0**
1990	15,773.0	117.8	26,156.5	26,616.5	**68,663.8**
1991	20,015.9	26.2	28,071.0	4,011.7	**52,124.8**
1992	31,924.5	152.0		75,976.1	**108,052.6**
1993	29,407.0	94.4		51,553.7	**81,055.1**
1994	28,897.1			28,046.9	**56,944.0**
1995	36,967.8	8.5		1,579.5	**38,555.8**
1996	35,204.1	77.4		4,408.8	**39,690.3**
1997	44,728.2	118.8		5,058.7	**49,905.7**
1998	39,320.6	83.8		11,895.1	**51,299.5**
1999*	41,607.8	68.1	100.3	8,414.1	**50,190.3**
2000	57,070.3	104.1	495.5	5,332.1	**63,002.0**
2001	57,735.6	45.1	4,066.0	11,742.5	**73,589.2**
2002	64,996.0	44.0	5,664.3	9,006.3	**79,710.9**
2003	57,415.5	52.3	5,907.6	13,449.9	**76,825.3**
2004	64,024.7	49.3	9,771.0	7,582.0	**81,427.0**
2005	54,841.4	56.4	8,931.7	42,259.4	**106,089.0**
2006	50,607.8	90.4	11,943.2	36,227.8	**98,869.2**
2007	52,869.1	89.7	13,793.8	24,759.1	**91,511.7**
2008	70,780.0	43.2	23,729.6	0.0	**94,552.8**
2009	81,615.9	3.0	27,687.0	0.0	**109,305.9**

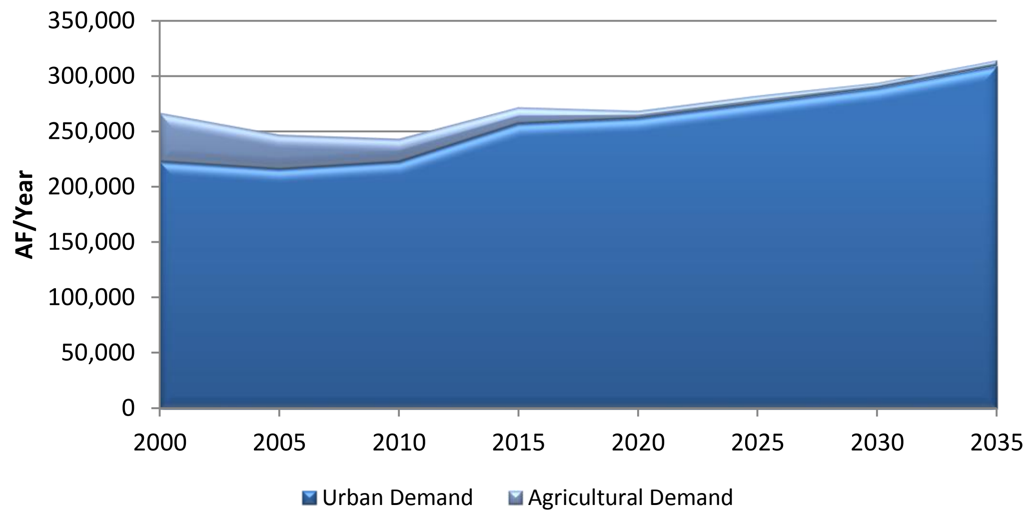
Source: Chino Basin Watermaster 27th annual report.

* In 1999, Local Projects for IEUA came on line and are displayed in the same column as Interruptible.

3.5 FUTURE WATER DEMANDS FOR IEUA'S SERVICE AREA

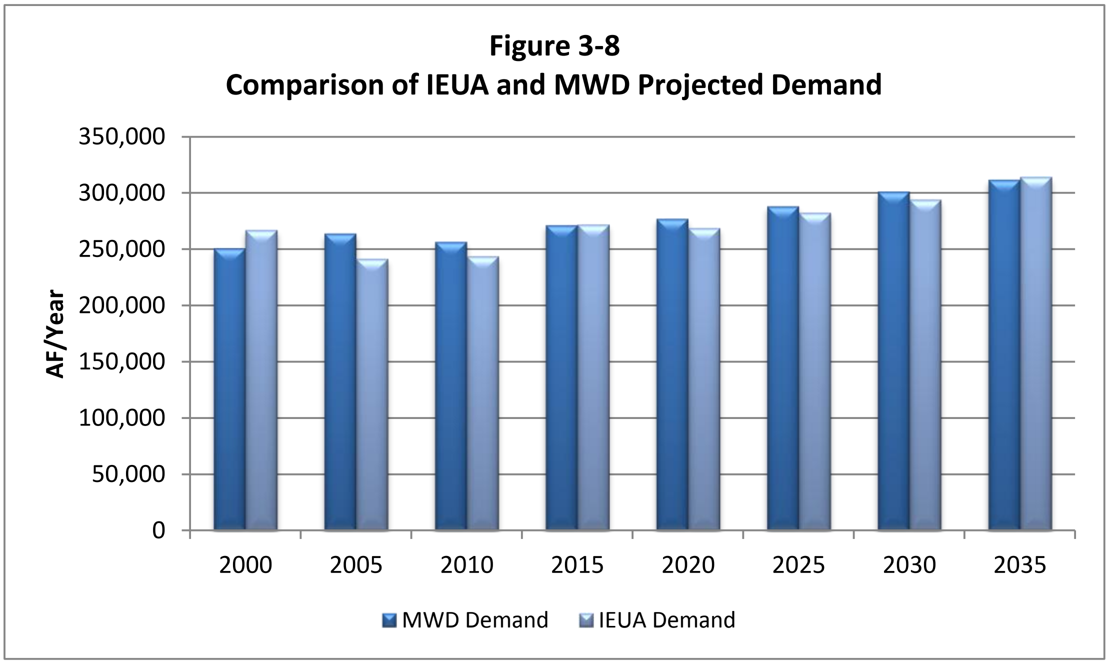
Total future water demand (which includes agricultural production) within IEUA's service area over the next twenty-five years is expected to increase by approximately 70,000 acre-feet (from 244,000 acre-feet to about 314,000 acre feet per year, see Figure 3-7 and Table 3-9)[5]. This represents a potential 30% increase in the area's projected water demands. With the conversion of agricultural land to urban uses over the next twenty-five years, the percentage of water used in the area to meet urban demand will increase while the share of water used for agricultural purposes will decline. By 2035, urban water use is expected to be 98.5% of the water demand (about 309,000 acre-feet), while agriculture will use less than 1.5% (about 5,000 acre-feet).

Figure 3-7
2000-2035 Total Water Use within IEUA Service Area



The conservative nature of these demand projections are underscored when compared with the demand projections made by MWD for IEUA's service through its MWD-MAIN model (see Figure 3-8) (MWD's 2010 RUWMP). Overall, IEUA's member agency demand projections are very similar to MWD's projections; with IEUA's demand ending approximately 1% higher than MWD's in the year 2035.

[5] The water demand forecasts used in preparation of IEUA's 2010 UWMP are based upon information provided by the respective member agencies.



By 2035, the IEUA member agencies that are projected to have the largest water demand within IEUA's service area are the city of Ontario (at 70,966 acre-feet per year, a 114% increase above 2010 water usage), the Cucamonga Valley Water District (at 58,186 acre-feet per year, a 13% increase above 2010 water usage), and Fontana Water Company (at 50,741 acre-feet per year, a 15% increase above 2010 water usage) as shown in Table 3-9.

Total water demand in the IEUA service area includes water pumped from the Chino Groundwater Basin for agricultural purposes. Over the next twenty-five years as the region becomes even more urban, agricultural water production will decrease rapidly. Agricultural water use which is projected to decrease from 10% of total water use to less than 2% as the region becomes more urbanized. Much of the water pumped for agricultural production will instead be pumped for urban uses.

Table 3-9

Water Demand Projection by IEUA Member Agencies [1]

	2000	2005	2010	2015	2020	2025	2030	2035
City of Chino	15,396	15,012	15,601	16,602	17,401	18,874	19,954	20,990
City of Chino Hills	17,204	15,228	16,002	20,800	21,400	21,400	21,400	21,400
City of Ontario	42,903	42,632	33,188	44,413	49,647	54,889	60,127	70,966
City of Upland	23,038	19,847	20,841	20,330	20,330	20,330	20,330	20,330
Cucamonga Valley Water District	51,831	53,425	51,405	54,144	52,922	54,614	56,494	58,186
Fontana Water Company	44,317	41,989	44,165	46,017	43,363	45,822	48,282	50,741
Monte Vista Water District	11,924	11,418	10,085	11,700	10,740	11,040	11,290	11,620
San Antonio Water Company	10,257	10,856	14,036	14,000	14,000	14,000	14,000	14,000
Agricultural	44,242	25,593	21,043	15,000	7,000	7,000	5,000	5,000
Potable Demand	**261,112**	**236,000**	**226,366**	**243,006**	**236,803**	**247,969**	**256,877**	**273,233**
Recycled Water (Direct Reuse)	6,030	5,396	17,298	28,865	31,662	34,359	37,056	40,903
Total Demand	**267,141**	**241,396**	**243,664**	**271,871**	**268,465**	**282,328**	**293,933**	**314,136**

	2000	2005	2010	2015	2020	2025	2030	2035
MWD M&I Demand[2]	220,951	236,394	234,227	256,085	269,790	280,962	294,133	304,546
MWD Agricultural Demand	29,830	27,464	22,296	15,202	7,094	7,094	7,094	7,094
Total Demand	**250,781**	**263,858**	**256,523**	**271,287**	**276,884**	**288,056**	**301,227**	**311,640**

[1]Demand projections taken from local agency's UWMPs

[2]For comparison purposes – MWD's 2010 UWMP

3.6 FUTURE WATER SUPPLY STRATEGY FOR IEUA'S SERVICE AREA

The goal of the IEUA 2010 UWMP is to maximize local water sources and minimize the need for imported water, especially during dry years and other emergency shortages from MWD. The integrated plan strives to achieve multiple objectives of increased water supply, enhanced water quality, improved quality of life, and energy savings.

Throughout the rest of this chapter, agricultural uses are not included in the discussion of future urban water supplies. Water for agricultural use is generally supplied by privately-owned groundwater wells (or recycled water). The adjudicated agricultural groundwater rights provide more than enough to supply future agricultural demand for water. Future agricultural demand will decrease with time as agricultural land use areas are converted to urban land uses. Therefore, the analysis of future water uses focuses on urban water uses. A projected water supply from each of the retail agencies was collected from member agencies 2010 UWMP. Water supply projections throughout the rest of this chapter are primarily based on these data, IEUA recycled water availability information and CDA groundwater recovery production information.

Through the implementation of the integrated water management strategy within IEUA's service area, available water supplies will exceed anticipated demand. Projected water supply mix needed to meet urban water use by source within the IEUA service area is shown in Table 3-10, which summarizes the projected urban water supply by source within IEUA's service area. Urban water supplies within the service area are projected to increase to 393,746 AFY by 2035. The increase in supplies will come from a number of areas: groundwater production is expected to increase to approximately 195,000 AFY by 2035 (made up of the Chino Basin, including desalters, land other local groundwater basins); imported water is expected to increase to approximately 85,000 AFY by 2035; recycled water is expected to increase to approximately 83,000 AFY; and local surface water is not expected to change.

Table 3-10
Projected Urban Water Supply In IEUA Service Area By Source (AFY)

Source of Water Use	**Fiscal Year Ending June 30**						
	2005*	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
Chino Basin Groundwater	84,551	68,277	106,673	107,812	116,176	124,075	136,437
Other Basin Groundwater	36,198	41,724	40,672	41,672	41,672	41,672	41,672
Imported Water	67,694	54,934	80,556	81,641	82,725	83,809	85,978
Surface Water	18,060	25,653	28,490	28,490	28,490	28,490	28,490
Recycled Water	5,396	17,298	66,241	70,391	74,402	78,884	83,436
Desalter Water	3,904	14,737	17,733	17,733	17,733	17,733	17,733
Total	**215,803**	**222,623**	**340,365**	**347,739**	**361,198**	**374,663**	**393,746**

*Note: 2005 and 2010 data represents actual water usage, not supplies available.

Over the last ten-years, significant investments in local supply facilities has helped reduce dependence on imported water and to achieve the other program goals. These include capital expenditures of about $110 million dollars for recycled water projects, $50 million dollars for improvements of recharge basins, $150 million for Desalters I and II, and $ 27.5 million for the MWD recharge and extraction of stored imported water for the Dry Year Yield Program. Together, almost $350 million has been spent to enhance local water supplies.

3.7 FUTURE LOCAL WATER SUPPLIES

In order to reduce the amount of full service imported water used in the future in this rapidly growing area, the use of future local water supplies will need to increase dramatically, particularly the use of groundwater, recycled water and recovered groundwater from the Chino Desalters. Surface water use is estimated to continue at existing levels.

Chino Basin Groundwater

Increased groundwater pumping from the Chino Basin, particularly during dry years, is a critical element of the integrated water management strategy for meeting future water needs within IEUA's service area. The water extracted in excess of the annual safe yield, will be replenished from a mix of stormwater, recycled water and imported water during wet year periods.

Chino Basin groundwater supplies will be significantly enhanced over the next twenty-five years through the implementation of conjunctive management and groundwater quality improvement programs identified in the Optimum Basin Management Program (OBMP, see Chapter 7) and coordinated with the Chino Basin Watermaster. This includes:

- Improvements to the Chino Basin Groundwater Recharge Program, which will substantially increase the replenishment of the groundwater basin through a combination of storm water, recycled water and imported water (designed to maximize the use of interruptible supplies when available);
- Groundwater treatment facilities (well head ion exchange and aquifer storage and recovery wells) via the Dry Year Yield (Conjunctive Use) Program to facilitate recovery of the stored water during dry years;
- Over the next twenty-five years, there is the potential to increase the safe storage capacity of the Chino Basin by 500,000 acre-feet.

As a result of these programs, Chino Basin groundwater supplies used to meet future water needs within IEUA's service are expected to double over the next twenty-five years (from about 68,000 acre-feet in 2010 to 136,000 acre feet in 2035 (Table 3-11).

Table 3-11
Projected Chino Basin Groundwater Production for Urban Use in IEUA Service Area (AFY)

Agency	Fiscal Year Ending June 30						
	2005*	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
Chino, City of	6,096	6,846	8,574	9,526	11,278	12,563	13,796
Chino Hills, City of	6,108	7,591	15,400	16,000	16,000	16,000	16,000
Ontario, City of	28,620	19,741	21,302	25,456	29,609	33,763	42,433
Upland, City of	1,569	939	2,140	2,140	2,140	2,140	2,140
Cucamonga Valley Water District	12,051	12,918	23,380	22,467	22,467	22,467	22,467
Fontana Water Company	23,436	13,558	4,617	963	3,422	5,882	8,341
Monte Vista Water District	6,668	5,718	30,260	30,260	30,260	30,260	30,260
San Antonio Water Company	3	966	1,000	1,000	1,000	1,000	1,000
Total	**84,551**	**68,277**	**106,673**	**107,812**	**116,176**	**124,075**	**136,437**

*Note: 2005 and 2010 data represents actual water usage, not supplies available.

Chino Desalter Facilities

Under the Optimum Basin Management Plan, approximately 40,000 acre-feet of desalter treatment capacity is proposed to be constructed. The desalters will use a combination of reverse osmosis and ion exchange technology to treat the pumped groundwater. The concentrated brine from the desalter operations will be delivered to the Inland Empire Brine Line (IEBL) and conveyed to the Orange County Sanitation District for treatment and ultimate disposal in the Pacific Ocean.

The Desalter program is currently administered through the Chino Basin Desalter Authority (CDA), a joint powers authority among the Cities of Chino, Chino Hills and Ontario (within IEUA's service area), the City of Norco, Santa Ana River Water Company, Jurupa Community Services District and Western Municipal Water District.

Currently Desalter I and Desalter II are online, producing about 14,000 acre-feet per year and 10,000 acre-feet per year respectively. A third Desalter expansion will add 16,000 acre-feet of treatment capacity is expected to come online in 2014, giving a total of approximately 40,000 acre-feet per year of alternative supply to the lower Chino Basin (see Chapter 7 for details).

Table 3-12
Projected Chino Basin Desalter Water for Urban Supply (AFY)

Agency	Contracted Volume	Fiscal Year Ending June 30						
		2005*	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
City of Chino	5,000	2,654	5,000	5,000	5,000	5,000	5,000	5,000
City of Chino Hills	4,200	1,250	4,200	4,200	4,200	4,200	4,200	4,200
City of Ontario	8,533	0	5,400	8,533	8,533	8,533	8,533	8,533
Subtotal for IEUA	**17,733**	**3,904**	**14,600**	**17,733**	**17,733**	**17,733**	**17,733**	**17,733**
JCSD	11,733	8,700	8,700	11,733	11,733	11,733	11,733	11,733
SARWC	1,200	0	1,000	1,200	1,200	1,200	1,200	1,200
City of Norco	1,000	0	0	1,000	1,000	1,000	1,000	1,000
Western Municipal Water District	3,534	0	0	3,534	3,534	3,534	3,534	3,534
Subtotal for WMWD	**17,467**	**8,700**	**9,700**	**17,467**	**17,467**	**17,467**	**17,467**	**17,467**
Total	**35,200**	**12,604**	**24,300**	**35,200**	**35,200**	**35,200**	**35,200**	**35,200**

Note: the contracted volumes are potable water supplies, the remaining produced desalter water is disposed of through the IEB L.
*Note: 2005 and 2010 data represents actual water usage, not supplies available.

Other Groundwater

No significant changes are forecasted for the average amount of water supply production from other groundwater basins that are used to meet demands within IEUA's service area. On average, about 41,000 acre-feet per year is projected to be pumped from these outside basins between 2010 and 2035. This is a conservative estimate, consistent with historic production levels. Table 3-12 presents this projected use of other groundwater by agency.

Table 3-13
Projected Other Basin Groundwater Supply in IEUA Service Area (AFY)

	Fiscal Year Ending June 30						
Agency	**2005***	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
Chino, City of	0	0	0	0	0	0	0
Chino Hills, City of	0	0	0	0	0	0	0
Ontario, City of	0	0	0	0	0	0	0
Upland, City of	10,948	12,680	6,420	6,420	6,420	6,420	6,420
Cucamonga Valley Water District	8,351	5,851	8,852	8,852	8,852	8,852	8,852
Fontana Water Company	15,811	19,156	21,400	22,400	22,400	22,400	22,400
Monte Vista Water District	0	0	0	0	0	0	0
San Antonio Water Company	1,089	4,037	4,000	4,000	4,000	4,000	4,000
Total	**36,199**	**41,724**	**40,672**	**41,672**	**41,672**	**41,672**	**41,672**

*Note: 2005 and 2010 data represents actual water usage, not supplies available.

Surface Water

No significant changes are forecasted on the average amount of water production from surface supplies that are used to meet demands within IEUA's service area. The availability of surface water supplies fluctuates greatly with wet and dry years. Retail agencies with access to surface supplies are investing in infrastructure that will improve their ability to capture and use these water sources.

On average, about 28,000 acre-feet annually of surface water is projected to be available between 2010 and 2035 as shown on Table 3-14. This is a conservative estimate, consistent with historic production levels.

Table 3-14
Projected Surface Water Production Supply in IEUA Service Area (AFY)

	Fiscal Year Ending June 30						
Agency	**2005***	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
Chino, City of	0	0	0	0	0	0	0
Chino Hills, City of	0	0	0	0	0	0	0
Ontario, City of	0	0	0	0	0	0	0
Upland, City of	467	1,992	7,490	7,490	7,490	7,490	7,490
Cucamonga Valley Water District	5,087	4,156	4,200	4,200	4,200	4,200	4,200
Fontana Water Company	2,742	10,471	7,000	7,000	7,000	7,000	7,000
Monte Vista Water District**	0	0	800	800	800	800	800
San Antonio Water Company	9,765	9,033	9,000	9,000	9,000	9,000	9,000
Total	**18,061**	**25,652**	**28,490**	**28,490**	**28,490**	**28,490**	**28,490**

*Note: 2005 and 2010 data represents actual water usage, not supplies available. Highlighted areas have yet to be updated.
**Note: MVWD's 800 AFY of supply comes from San Antonio Water Company and is a blend of surface, Chino Basin & Other Basin water.

Recycled Water

The implementation of the planned Regional Recycled Water Program is another critical element of the integrated water management strategy for meeting future water needs within IEUA's service area.

Water supplied through the IEUA's Regional Recycled Water Program will serve the area's needs for irrigation and industrial process water (direct use) as well as provide replenishment water for the Chino Basin in conjunction with local storm water and imported deliveries. Over 2,000 direct use customers have been identified as potential recycled water users. In 2007, IEUA and its retail agencies developed a Recycled Water Three Year Business Plan with the intent of designing, constructing and delivering 50,000 acre-feet per year of recycled water. Of that 50,000 acre-feet per year, 35,000 acre-feet per year is designated for the 2,000 direct use customers (irrigation, industrial processing) that have been identified and 15,000 acre-fee per year is designated for groundwater recharge. Since the inception of the Recycled Water Three Year Business Plan, approximately 90% of the regional "backbone" distribution pipeline system and related facilities has been constructed, as well as significant progress on construction of laterals within individual retail agencies (also see Chapter 5 and 6).

The regional distribution facilities include over fifty separate pipelines, pump stations, and reservoir projects. The phased construction of these facilities is projected to cost $200 million and is scheduled to be complete by 2012. The Regional Recycled Water Program is planned to deliver a total of approximately 62,000 acre-feet of new water supplies for both direct and replenishment by the year 2035 (41,000 acre-feet for direct use and 21,000 acre-feet available for recharge). An aggressive marketing program is underway to make the recycled water available to the customers. This additional high quality recycled water will be available through IEUA's treatment plants as a result of expected population growth within its service area. This represents a new alternative water supply that will continue to expand as growth occurs in the IEUA service area. The projected recycled water demand by agency is shown in Table 3-15.

Table 3-15
Projected Recycled Water Use and Supply in IEUA Service Area (AFY)

Agency	Fiscal Year Ending June 30						
	2005*	**2010***	**2015**	**2020**	**2025**	**2030**	**2035**
Chino, City of	830	7,157	8,190	7,987	7,784	7,581	7,379
Chino Hills, City of	815	1,494	2,400	2,500	2,500	2,500	2,500
Ontario, City of	1,169	5,678	5,975	8,625	11,275	13,925	17,724
Upland, City of	0	0	1,070	1,070	1,070	1,070	1,070
Cucamonga Valley Water District	0	660	1,800	2,050	2,300	2,550	2,800
Fontana Water Company	0	0	6,000	6,000	6,000	6,000	6,000
Monte Vista Water District	0	240	430	430	430	430	430
San Antonio Water Company	0	0	0	0	0	0	0
Subtotal	***2,814***	***15,229***	***25,865***	***28,662***	***31,359***	***34,056***	***37,903***
San Bernardino County	1459	1,251	1,500	1,500	1,500	1,500	1,500
IEUA	1,123	818	1,500	1,500	1,500	1,500	1,500
Total Recycled Water Direct Use	**5,396**	**17,298**	**28,865**	**31,662**	**34,359**	**37,056**	**40,903**
Direct Use	5,396	17,298	28,865	31,662	34,359	37,056	40,903
Groundwater Recharge Potential	0	7,208	20,000	21,000	21,000	21,000	21,000
Total Recycled Water Use	**5,396**	**24,506**	**48,865**	**52,662**	**55,359**	**58,056**	**61,903**
Total Recycled Water Supply	**56,352**	**61,383**	**66,241**	**70,391**	**74,402**	**78,884**	**83,436**

*Note: 2005 and 2010 data represents actual water usage, not supplies available.

3.8 FUTURE IMPORTED WATER SUPPLIES

Increasing conflicts over the quantity and quality of the imported water from the State Water Project (SWP) and Colorado River Aqueduct (CRA) have increased the costs of these supplemental supplies in Southern California as well reduced their potential reliability.

MWD evaluated the dependability of these supplies and concluded that the combination of imported water and expanding local resource programs would ensure its service area's demands would be met in the future. IEUA expressly relies upon MWD's 2010 UWMP in estimating future imported water availability to its service area (see Chapter 11).

In April of 1998, Metropolitan's Board of Directors adopted the Water Surplus and Drought Management Plan (WSDM). The guiding principle of the WSDM Plan is to manage Metropolitan's water resources and management programs to maximize management to wet year supplies and minimize adverse impacts of water shortages to retail customers. From this guiding principle come the following supporting principles:

- Encourage efficient water use and economical local resource programs
- Coordinate operations with member agencies to make as much surplus water as possible available for use in dry years

- Pursue innovative transfer and banking programs to secure more imported water for use in dry years.

- Increase public awareness about water supply issues.

In February of 2008, Metropolitan's Board of Directors adopted the Water Supply Allocation Plan (WSAP). The WSAP was developed in consideration of the principles and guidelines described in the WSDM Plan, with the objective of creating an equitable needs-based allocation. The WSAP formula seeks to balance the impacts of a shortage at the retail level while maintaining equity on the wholesale level for shortages of MWD supplies of up to 50%.

As a result of the integrated water management strategy being implemented within IEUA's service area, the amount of firm full service imported water needed to meet the area's expected water demands over the next twenty-five years is only expected to increase from approximately 55,000 AFY to about 85,000 AFY as presented in Table 3-16.

Six out of the past eight years, full service imported water purchases have gone into MWD's higher cost Tier II fee schedule for most current users of these supplies. By 2012, MWD and its member agencies expect to have developed a new Tier I/Tier II limit for each member agency. IEUA's limit is expected to increase from its current amount of 59,792 AF.

Table 3-16
Projected Imported Water Supply in IEUA Service Area (AFY)

	Fiscal Year Ending June 30						
Agency	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**
Chino, City of	6,263	3,716	5,353	5,353	5,353	5,353	5,353
Chino Hills, City of	7,869	4,016	1,200	1,200	1,200	1,200	1,200
Ontario, City of	13,454	8,143	14,578	15,663	16,747	17,831	20,000
Upland, City of	6,905	5,231	4,280	4,280	4,280	4,280	4,280
Cucamonga Valley Water District	27,937	28,480	28,369	28,369	28,369	28,369	28,369
Fontana Water Company	4,750	4,368	5,000	5,000	5,000	5,000	5,000
Monte Vista Water District	0	980	21,776	21,776	21,776	21,776	21,776
San Antonio Water Company	0	0	0	0	0	0	0
Total	**67,178**	**54,934**	**80,556**	**81,641**	**82,725**	**83,809**	**85,978**

*Note: 2005 and 2010 data represents actual water usage, not supplies available.

3.9 CLIMATE CHANGE IMPACTS ON WATER DEMANDS AND SUPPLIES

Water resource managers have long strived to meet their goals of system reliability and environmental protection in the face of many uncertainties, including demographic and economic forecasts and intrinsic weather variability. Now water managers also face a new uncertainty—the potential for climate change, which in coming years may significantly affect patterns of water demand and the availability of supplies. However, information about the future impacts of climate change is deeply uncertain and likely to remain so for the foreseeable future. Thus, the scientific community is debating how to most usefully characterize this important yet uncertain information for decision makers.

The IEUA region will face significant water management challenges in the future. Its current population of approximately 850,000 is expected to grow to about 1,200,000 by 2035. As population grows and the economy evolves, water supply and wastewater treatment demands will likely increase and be difficult to match with new supplies and means for disposal. Landowners and cities will continue to place heavy demands on the region's groundwater resources, requiring continuous, diligent management of both supply and quality. As a net importer of water, IEUA may face difficulties in meeting reliability objectives as other demands in the state compete for those same supplies. While IEUA already has reduced its vulnerability to cutbacks and interruptions of imported supply through conjunctive use[6] management and supply diversification, it could face supply shortfalls under prolonged drought conditions. Reliability concerns could be exacerbated under possible climate change.

Climate change could affect water management in the IEUA service area in a number of ways. First, climate warming would likely increase the water needs of vegetation (natural, landscaping, and agricultural) through increased evapotranspiration. With no change in precipitation, this warming could lead to: (1) drying of soils and impacts on natural vegetation in non-irrigated regions; (2) increasing irrigation demands for landscaping and agriculture; and (3) reductions in natural flows due to increased evaporation of lakes, rivers, and streams, and greater absorption by soils.

Precipitation changes add another dimension to the impacts of climate change. The average amount of precipitation may decrease or increase, the intensity of precipitation events will likely become more intense, and the variability of precipitation could change (also expected to increase (IPCC 2007). These changes in precipitation could affect timing of winter snow runoff, the variability of local surface supplies, the long-term replenishment of the groundwater basins, and the intensity of flooding events (Dracup et al. 2005; Zhu et al. 2006).

Finally, climate change impacts outside the region could also affect IEUA's operations. Of particular importance to IEUA, changes in rain and snowfall patterns in the Sacramento River watershed in northern California are likely to reduce the reliability of State Water Project supplies. Although a formal assessment of these impacts upon SWP supplies has not yet been completed, initial assessments suggest that climate change would reduce the reliability of this supply and reduce average yields (Fried et al. 2005).

Climate Change Decision Making Under Uncertainty – RAND Corporation

In 2006, RAND Corporation conducted a large multi-year study under a grant from the National Science Foundation (NSF) on climate change decision making under uncertainty. As part of this project, RAND worked with water agencies in California to help them better understand how climate change might affect their systems and what actions, if any, they need to take to address climate change. IEUA was one of these agencies.

[6] Conjunctive use refers to water supply systems that draw on two or more different types of sources, most commonly surface water and ground water. Conjunctive use management provides water suppliers with more flexibility to manage surface water shortfalls by "banking" water in the subsurface or otherwise drawing on groundwater supplies to supplement surface deliveries.

Previous IEUA Urban Water Management Plan's (UWMP) have not included a systematic consideration of the potential impacts of future climate change relative to other uncertainties that IEUA and similar water agencies will face. Three main outcomes of RAND's study are listed below:

- Developed methods to assess and interpret decision makers' preferences among three different representations of key uncertainties and their impact on water resources systems performance;
- Developed and exercise a new planning model for IEUA that enables consideration of the impacts of large uncertainties on future system performance; and
- Provided IEUA with state-of-the-art estimates of future climate change for their service area.

Modeling Climate Change Effects on IEUA – RAND Corporation
RAND developed a quantitative model of the IEUA system to examine relationships among supply and demand, changing climate and hydrologic conditions, and impacts of various management actions and policies on supply, demand, and reliability. This "systems" model is critical to IEUA's ability to understand how different characterizations of uncertainty – whether arising from ordinary hydrologic variability, supply- or demand-side implementation of management measures, or climate change – may influence long-term water management decisions.

RAND used this model to evaluate how various water management strategies in the IEUA region would perform under alternative future conditions. Three different analyses were performed:

- **Traditional Scenarios** – four scenarios were evaluated reflecting different assumptions about future climate and the level of success in meeting key management objectives.
- **Probabilistic-Weighted Scenarios** – a large set of future conditions were developed on the basis of information pertaining to their likelihood as reported in scientific literature and surveys administered during the study. Single probability-weighted results were then computed for each management strategy.
- **Policy-Relevant Scenarios** – a wide range of plausible future conditions were evaluated and a few key scenarios that were most relevant to the choice among plans were identified.

The full RAND report is available at the IEUA Headquarters.