

**MWD**

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

September 28, 1993

To: Board of Directors (Water Problems Committee--Information)
From: General Manager
Subject: Metropolitan's Groundwater Activities in its Service Area

Report

Urban Southern California was founded upon extensive development of local groundwater resources. Currently, about 2,800 square miles of groundwater basins provide over 1.3 million acre-feet per year, nearly one-third of the region's annual water demand. Metropolitan is currently working with member agencies to improve regional water supply reliability by meeting four basic groundwater objectives:

- Expand conjunctive use;
- Reduce peak demands on Metropolitan;
- Recover contaminated groundwater; and
- Protect groundwater quality.

Metropolitan's long history of supporting conjunctive use of local groundwater basins for imported water storage began with discounted groundwater replenishment rates in the mid-1950's. Seasonal Storage Service (SSS) currently serves as Metropolitan's primary program for reservoir and groundwater conjunctive use with member agencies. Our new Cooperative Storage Program will function to enhance SSS, allowing both Metropolitan and participating member agencies to share as partners in local storage arrangements.

Metropolitan has long sought to develop projects where it may pump stored imported water from local groundwater basins directly into its distribution system. Institutional and quality issues have made this goal difficult to accomplish. However, after having developed a consensus among numerous local agencies, Metropolitan recently entered into a Memorandum of Understanding for conjunctive use in the Chino Basin. A demonstration test, pumping 4,800 acre-feet of imported water stored in the basin into Metropolitan's

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distribution system, should begin in October. A comparable conjunctive-use effort is under negotiation in the San Gabriel Basin.

Other programs have been tried with varying degrees of participation by member agencies. These include the 1993 Demonstration Local Storage Program, one-time Drought Storage Agreements of 1991, and the Cyclic Storage Program of the 1970's which served as a model for the Cooperative Storage Program.

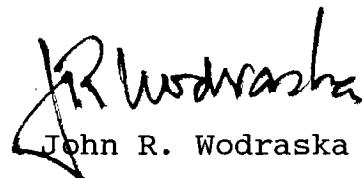
In general, advances in groundwater development are not easily achieved because of contamination, cost, environmental, and institutional issues. Metropolitan is working with its member agencies to resolve these issues and to achieve the groundwater objectives mentioned earlier. The attached report summarizes these regional groundwater activities.

Board Committee Assignment

This letter is referred to the Water Problems Committee for information pursuant to Sections 2481(d) and (i) of Metropolitan's Administrative Code granting it authority regarding policies dealing with the sale and delivery of water for various uses and underground storage of water and use thereof.

Recommendation

For information only.



John R. Wodraska

AS:hah

Attachment

A Short Report on Groundwater
in Metropolitan's Service Area

September 1993

Background

Nearly 100 groundwater basins (see Figure 1) covering 2,800 square miles supply Metropolitan's service area with about 1.33 million acre-feet per year (AFY) on average. This production is sustained through average annual replenishment of 1.19 million AF of local precipitation, return flow and reclaimed water, and 0.14 million AF of Metropolitan imported water. Recent increases in local precipitation and use of available imported water have turned around sustained overdraft conditions of local groundwater basins caused by drought. Groundwater basins are starting to refill (see Figure 2). Contamination continues to be a major problem with about 46 percent of the region's wells (see Figure 3) exceeding at least one primary or secondary drinking water standard. Through agreements with member agencies, Metropolitan now has access to about 100,000 AF of imported water stored in local groundwater basins (see Figure 4).

Regional groundwater storage capacity is significant and is estimated to exceed several million acre-feet. Much of that capacity, however, is devoted to local water management programs. Available data also indicate that regional well capacity for municipal and industrial systems exceed 2.0 million AFY. However, factors such as contamination, geographic distribution, and court imposed pumping limits impede using surplus well capacity during shortages of imported water.

Metropolitan's Groundwater Activities

Metropolitan has supported groundwater development through discounted water rates for replenishment service since the 1950's. Metropolitan is currently working with member agencies to improve regional water supply reliability through four basic groundwater objectives:

- Expand conjunctive-use;
- Reduce peak demands on Metropolitan;
- Recover contaminated groundwater; and
- Protect groundwater quality.

Advances in groundwater development are not easily achieved because of contamination, cost, environmental, and

institutional issues. Metropolitan's progress in expanding groundwater use is summarized below.

Conjunctive-Use

Under the conjunctive-use concept, imported water is stored in groundwater basins and reservoirs during periods of abundance for use during shortages to deal with both seasonal and multi-year imbalances of supply and demand. Groundwater basins offer ample storage capacity for imported water as illustrated in Figure 5. Basins are recharged with imported water using spreading basins, injection wells and in-lieu methods where Metropolitan's water is substituted for well production (see Figure 6). Conjunctive use is being implemented by Metropolitan under the following programs, which have evolved from efforts to work in concert with varied local concerns and changing conditions:

- Seasonal Storage Service (SSS): Seasonal Storage Service currently serves as Metropolitan's primary program for reservoir and groundwater conjunctive use with member agencies. Additionally, under provisions of the SSS program, agencies are reducing peak demands on Metropolitan as illustrated in Figure 7 by shifting groundwater production from winter to summer. Member agencies are encouraged to take SSS through discounted rates offered by Metropolitan. To receive the lower rates, agencies must certify to Metropolitan the amounts of imported water they have stored in reservoirs and groundwater basins by direct and in-lieu means. Fiscal Year (FY) 1992-93 SSS sales were about 374,000 AF. Total FY 1992-93 discounts amounted to about \$40 million. Continuation of SSS through this summer between May 1 and September 30 is expected to deliver about 185,000 AF (107,000 AF in FY 1993-94) into local storage. Historic SSS sales are listed by member agency in Table 1.
- Cooperative Storage Program (CSP): The new Cooperative Storage Program will function to enhance SSS, allowing both Metropolitan and participating member agencies to share as partners in local storage arrangements. Staff is negotiating agreements for advanced delivery and storage of over 100,000 AF of SSS water under this new program to improve water supply reliability.

Metropolitan would provide available imported water for placement into local reservoir and groundwater storage. All of that stored water would be sold to the participating member agency at the prevailing SSS rate at the time of withdrawal from the storage account. Both Metropolitan and the participating agency would have specified withdrawal rights dependant upon imported water supply conditions. Figure 8 illustrates the North Las Posas Basin where a proposed cooperative storage arrangement using locally developed injection/recovery wells would provide mutual water supply benefits to Metropolitan and Calleguas Municipal Water District.

- Cyclic Storage Agreements: Under long-standing agreements, Metropolitan has made advanced deliveries of replenishment water to groundwater storage. About 240,000 AF was withdrawn from three storage accounts during the 1987-1992 drought period. These agreements served as models for the new Cooperative Storage Program.
- 1993 Demonstration Local Storage Program: Under this program, about 15,000 AF will be stored by two member agencies to offset future firm deliveries at Metropolitan's call over the next ten years. Participation in this temporary program is limited to calendar year 1993.
- One-time Drought Storage Agreements of 1991: During the drought, 75,200 AF of SSS were placed into storage during short-term periods of water availability by five member agencies for their use under Metropolitan's call. Under four of the agreements, the water was sold as it was placed into storage with Metropolitan's call provisions extending through 1994 when the agreements expire. Under one agreement, 15,600 AF were delivered to storage with a deferred sale provision until either Metropolitan invokes its call or the agreement expires in 1995. Negotiations are under way to transfer this 15,600 AF of stored water into a new Cooperative Storage Program arrangement.
- Chino Basin Conjunctive-Use Project: Metropolitan is planning to develop and operate facilities to store up to 50,000 AF. Up to 30,000 AF per year

would be pumped into Metropolitan's Upper Feeder during droughts. Capital costs would be about \$17 million. Under a short-term pilot program, test pumping of 4,800 AF now stored in the basin should begin in October. Ongoing efforts include developing new large-diameter, shallow injection well technology which may prove to be a cost-effective substitute for real estate intensive spreading basins in urban settings.

San Gabriel Basin Conjunctive-Use Project:
Metropolitan is negotiating with the Main San Gabriel Basin Watermaster for 150,000 AF of storage of which about 30,000 AFY could be exported from the basin into Metropolitan's Middle Feeder. In addition to improving regional water supply, this project would help local agencies clean up contamination.

Groundwater Recovery Program (GRP)

Metropolitan's GRP is improving regional water supply reliability by providing financial assistance of up to \$250 per acre-foot to local agencies for treatment and recovery of contaminated groundwater when regional groundwater production is increased. GRP targets reclamation of more than 16 million AF of degraded groundwater known to exist in Southern California basins. Currently, your Board has approved participation in eight projects expected to produce about 22,000 AFY. Four projects that would produce an additional 23,000 AFY are under review. The program goal of 200,000 AFY is forecast to be achieved by about the year 2005. Metropolitan's annual GRP cost would peak at about \$30 million at that time.

Groundwater Quality Protection

Metropolitan is assisting member agencies in regulatory forums to prevent additional groundwater contamination from landfills and wastewater discharges. Metropolitan is also helping member agencies develop groundwater management plans and new technology, such as cost-effective biological denitrification, to contend with existing contamination and prevent its spread. Metropolitan's Local Projects Program (LPP) helps protect groundwater basins from seawater intrusion by financing reclaimed wastewater use in seawater barriers. Ultimately,

about 31,000 AFY of LPP production would be used to replace imported water for barrier projects. Additionally, about another 1,000 AFY of LPP production would be used for general groundwater replenishment needs. A draft copy of Report No. 991 which summarizes groundwater quality conditions will be submitted to member agency's for review and finalized shortly thereafter.

Member Agency Assistance

Metropolitan helps member agencies with guidance on its programs, technical expertise and financial assistance in various planning, and research and development efforts aimed at improved groundwater usage. Table 2 and Figure 9 summarize past and present efforts with members.

Table 1
Seasonal Storage Sales
(Fiscal Years 1989 through 1993)

<u>Agency</u>	<u>Seasonal Storage Service (Acre-Feet)</u>	<u>Percentage of Seasonal Water Sales (%)</u>
City of Anaheim	35,884	2.43
City of Beverly Hills	0	0.00
City of Burbank	3,776	.26
Calleguas MWD	17,708	1.20
Central Basin	175,985	11.93
Chino Basin MWD	158,213	10.73
Coastal MWD	3,262	0.22
City of Compton	1,366	0.09
Eastern MWD	2,635	0.18
Foothill MWD	2,851	0.19
City of Fullerton	4,238	0.29
City of Glendale	992	0.07
Las Virgenes MWD	5,390	0.37
City of Long Beach	20,926	1.42
City of Los Angeles	258,742	17.54
MWD of Orange County	237,763	16.12
City of Pasadena	23,988	1.63
San Diego CWA	221,437	15.01
City of San Fernando	2,358	0.16
City of San Marino	0	0.00
City of Santa Ana	23,107	1.57
City of Santa Monica	642	0.04
Three Valleys MWD	9,936	0.67
City of Torrance	0	0.00
Upper San Gabriel Valley	238,253	16.15
West Basin MWD	21,128	1.43
Western MWD	4,384	0.30
Total	1,474,978	100.00

Table 2
Past and Present Assistance to Member Agencies

<u>No.</u>	<u>Study</u>	<u>Member</u>	<u>Metropolitan's Assistance (\$)</u>
1.	Central Basin Model	Central Basin MWD	25,000
2.	Montebello Forebay	Central Basin MWD	25,000
3.	San Mateo Basin	Coastal MWD	135,000
4.	Santa Monica/Charnock Basins	West Basin MWD	120,000
		Santa Monica	
5.	Beverly Hills Basin	Beverly Hills	70,000
6.	Biological Nitrate Treatment	MWD of Orange County	378,000
7.	Colored Water Treatment	MWD of Orange County	612,000
8.	Hemet Basin	Eastern MWD	300,000
9.	San Jacinto Basin	Eastern MWD	350,000
10.	Chino Basin Task Force	Chino Basin MWD	150,000
		Western MWD	
11.	Azusa Landfill	USGVMWD	1,100,000
12.	West Basin Plume	West Basin MWD	135,000
13.	West & Central Basin Assessment	Central basin MWD	30,000
		West Basin MWD	
14.	Pomona Nitrate Plant	Three Valleys MWD	25,000
15.	Santa Ana River Task	Chino Basin MWD	75,000
		Western MWD	
16.	Los Angeles Headworks	Los Angeles	408,000
17.	Glendora Basin	Three Valleys	17,000
18.	Spadra Basin	Three Valleys	10,000
19.	Alamitos Barrier	Long Beach	15,000
		Central Basin MWD	
20.	Seawater Desalination	Long Beach	125,000
		West Basin MWD	
21.	N. Las Posas Basin	Calleguas MWD	350,000
22.	Live Oak Basin	Three Valleys MWD	17,000
23.	Raymond Basin	Pasadena	265,000
24.	San Juan Basin	MWD of Orange County	103,000
25.	San Gabriel Reclamation	USGVMWD	20,000
26.	San Gabriel Basin	USGVMWD	500,000
27.	Verdugo Basin	Foothill MWD	#
28.	Tijuana Basin	SDCWA	#
29.	N. San Diego Landfills	SDCWA	<u>10,000</u>
	Total		5,370,000

Notes

1. USGVMWD is Upper San Gabriel Valley MWD
2. MWD is Municipal Water District
3. SDWCA is San Diego County Water Authority
4. # denotes a staff effort without a funding contribution

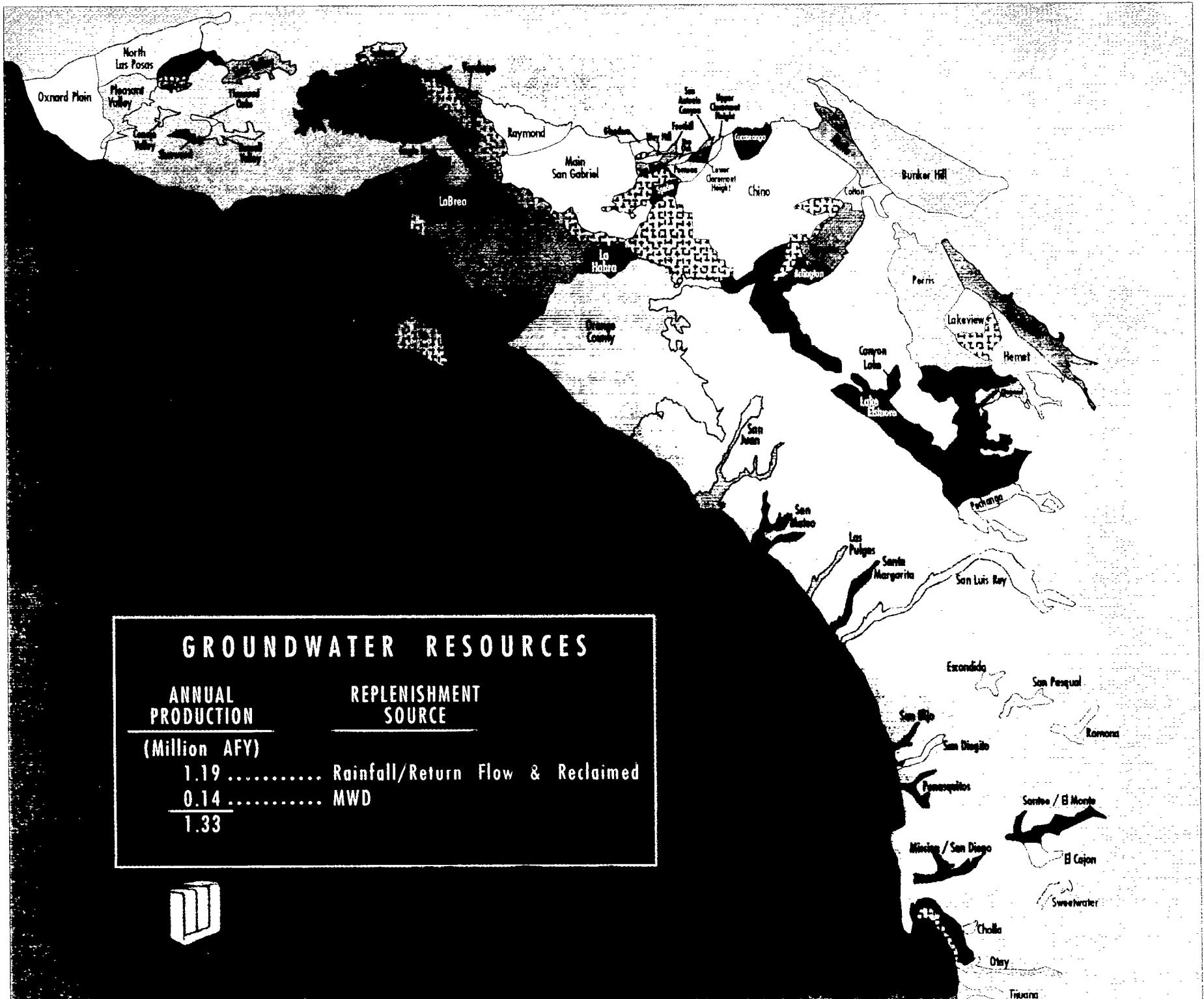


Figure 1

GROUNDWATER STORAGE TRENDS in MAJOR GROUNDWATER BASINS in SOUTHERN CALIFORNIA

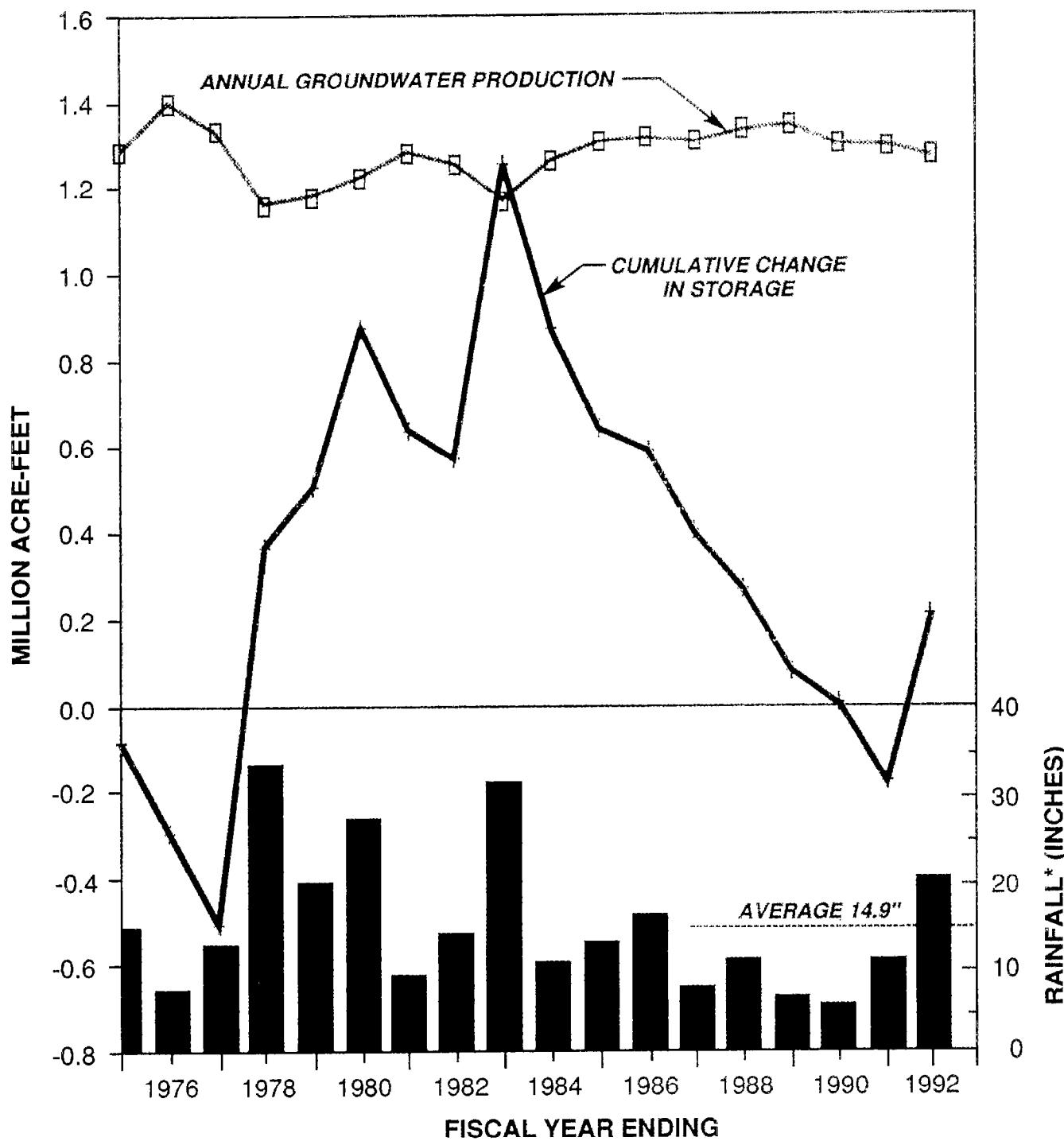


Figure 2

OVERALL CONTAMINATION
*Wells Exceeding Primary and
Secondary Drinking Water Standards*

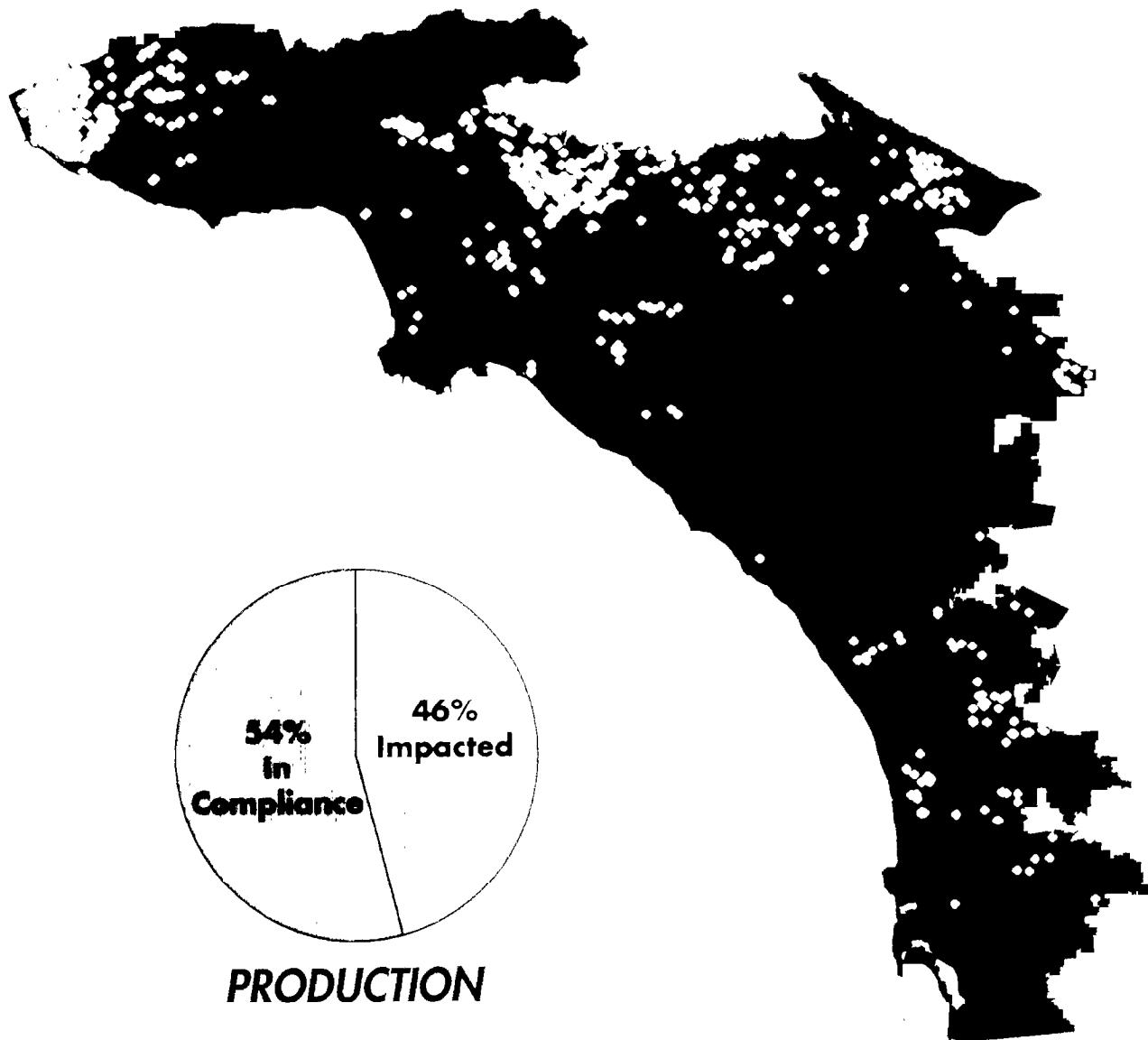


Figure 3

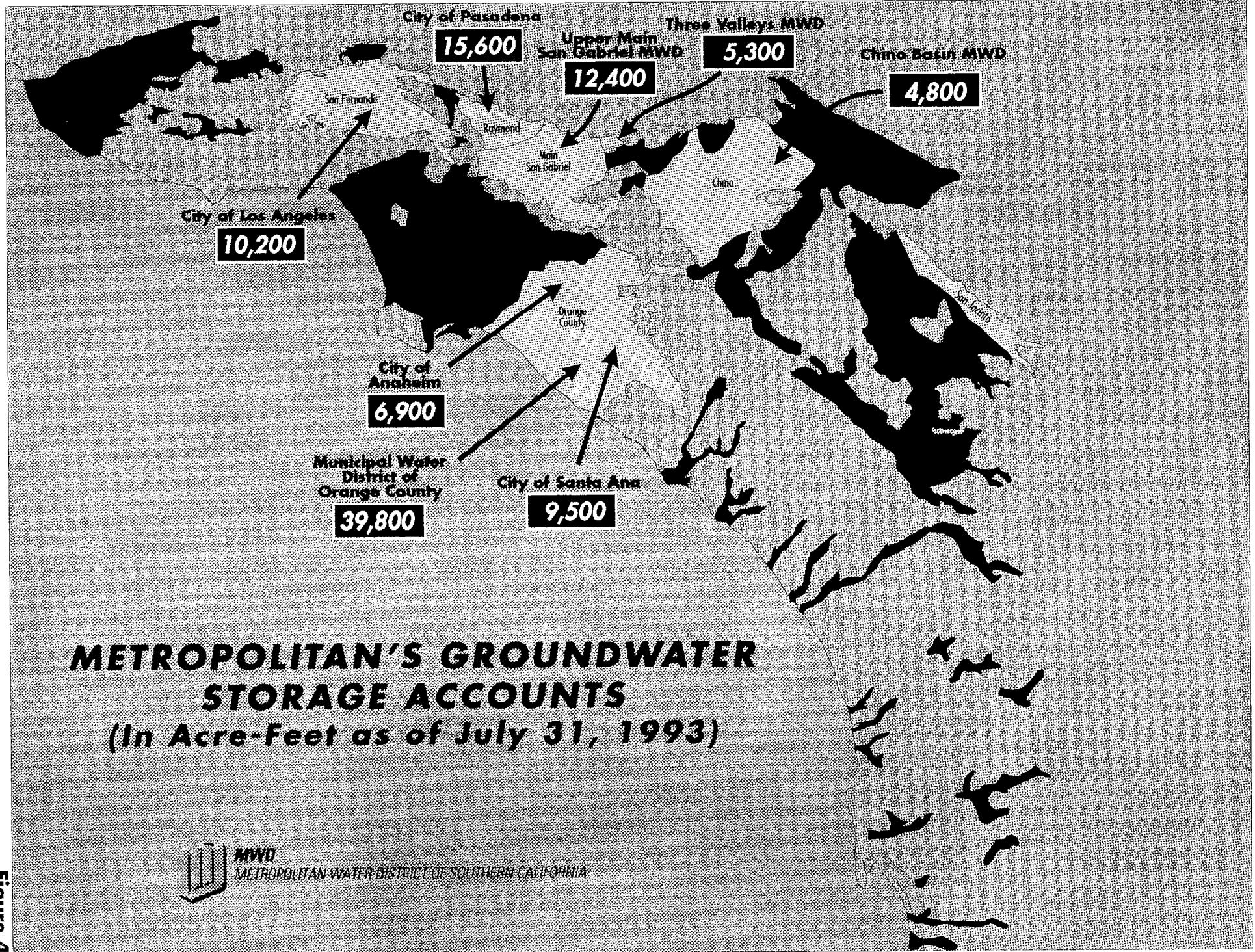
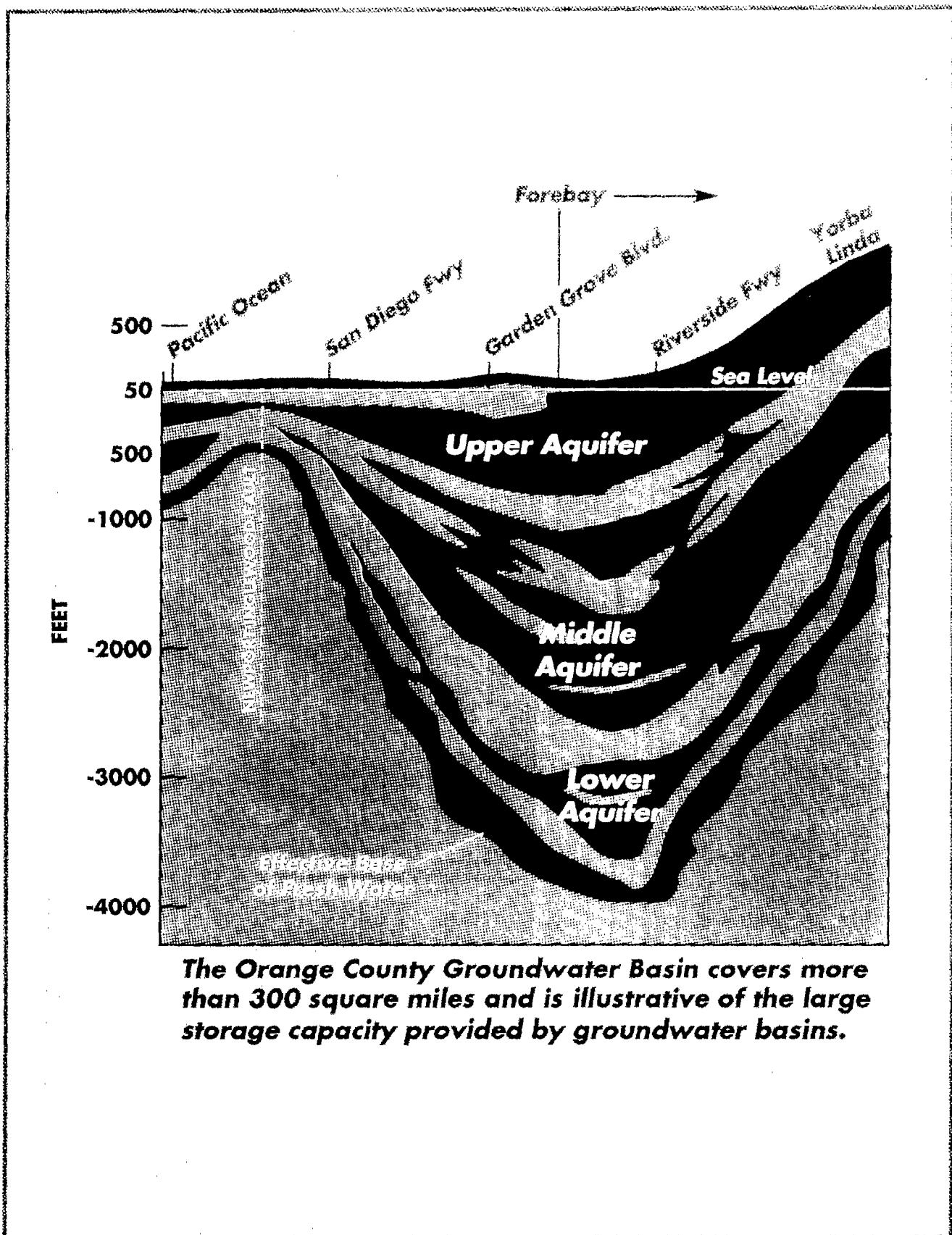


Figure 4

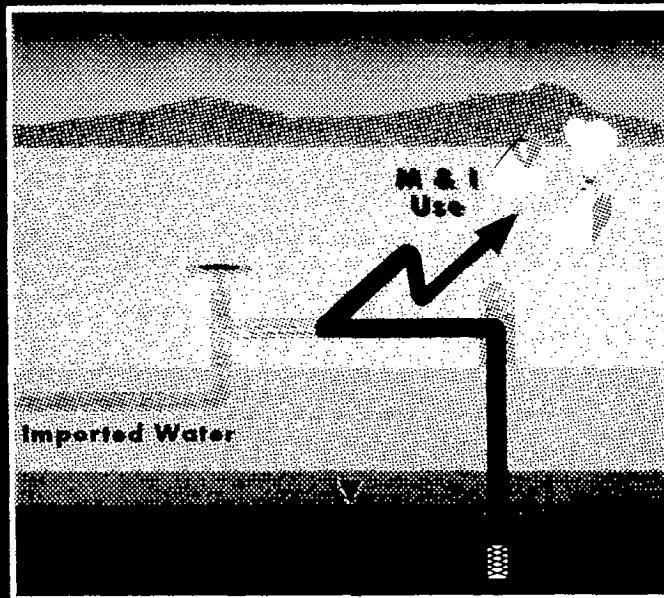


The Orange County Groundwater Basin covers more than 300 square miles and is illustrative of the large storage capacity provided by groundwater basins.

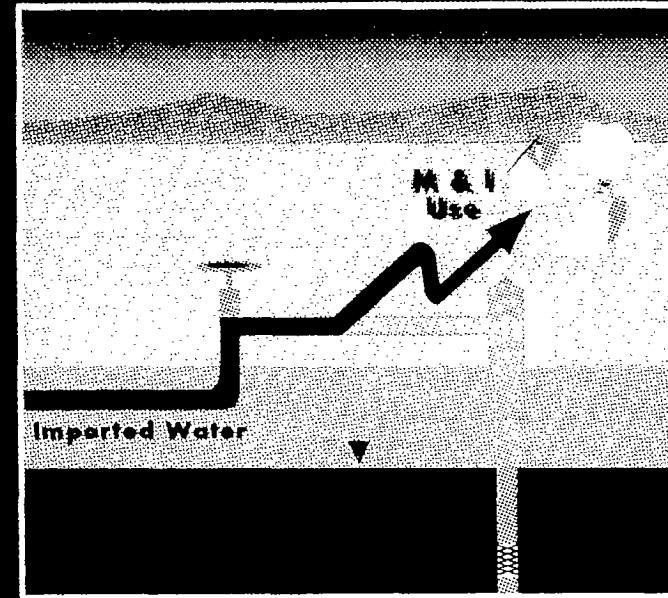
Figure 5

GROUNDWATER REPLENISHMENT METHODS

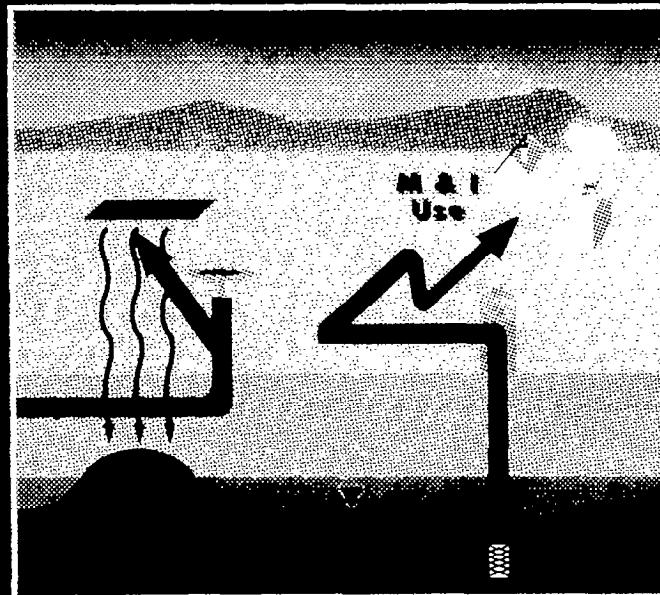
NORMAL OPERATIONS



IN-LIEU EXCHANGE



SPREADING



INJECTION AND IN-LIEU

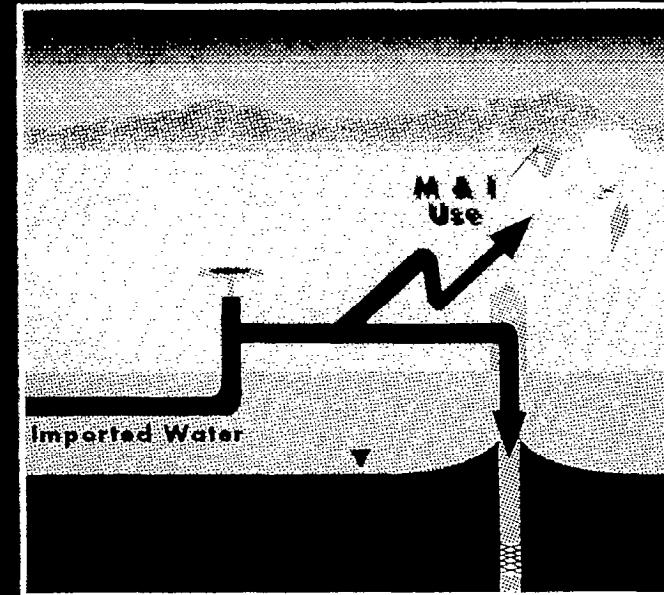
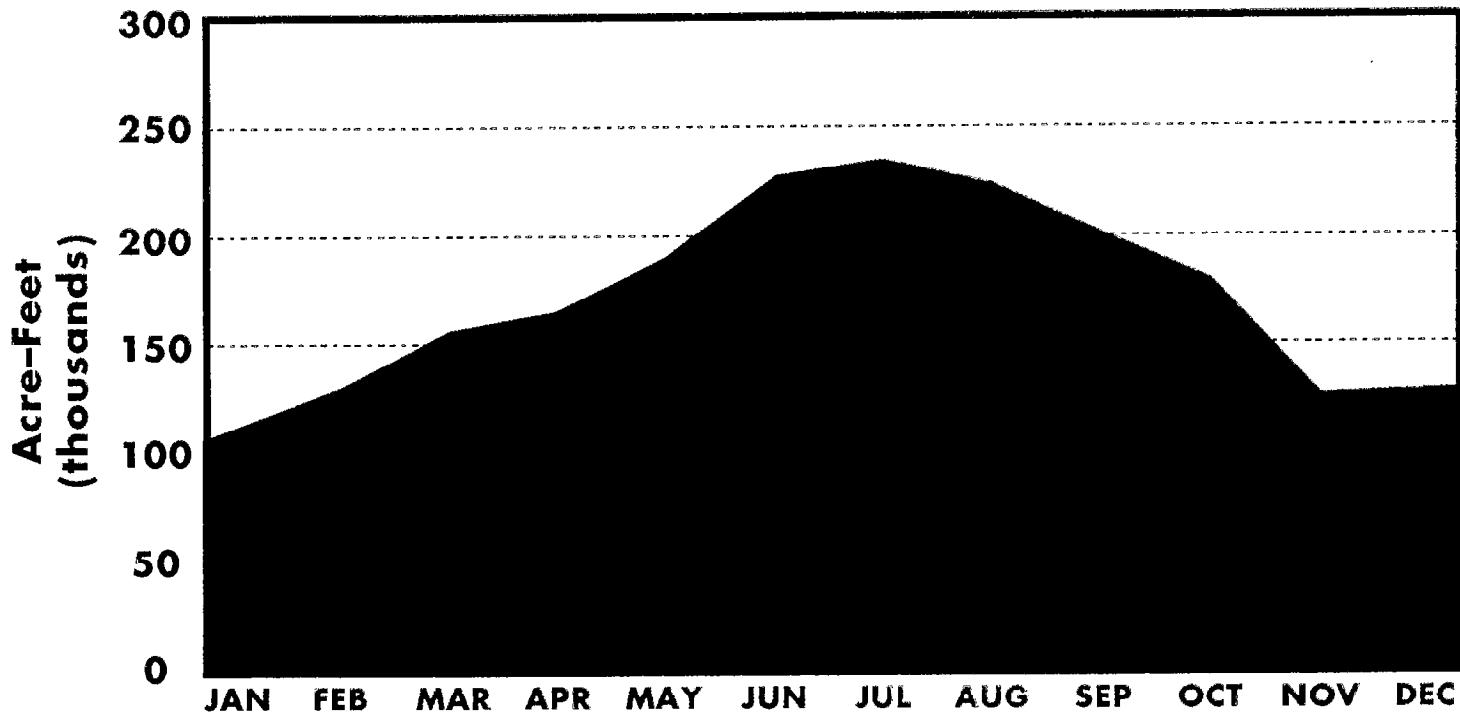
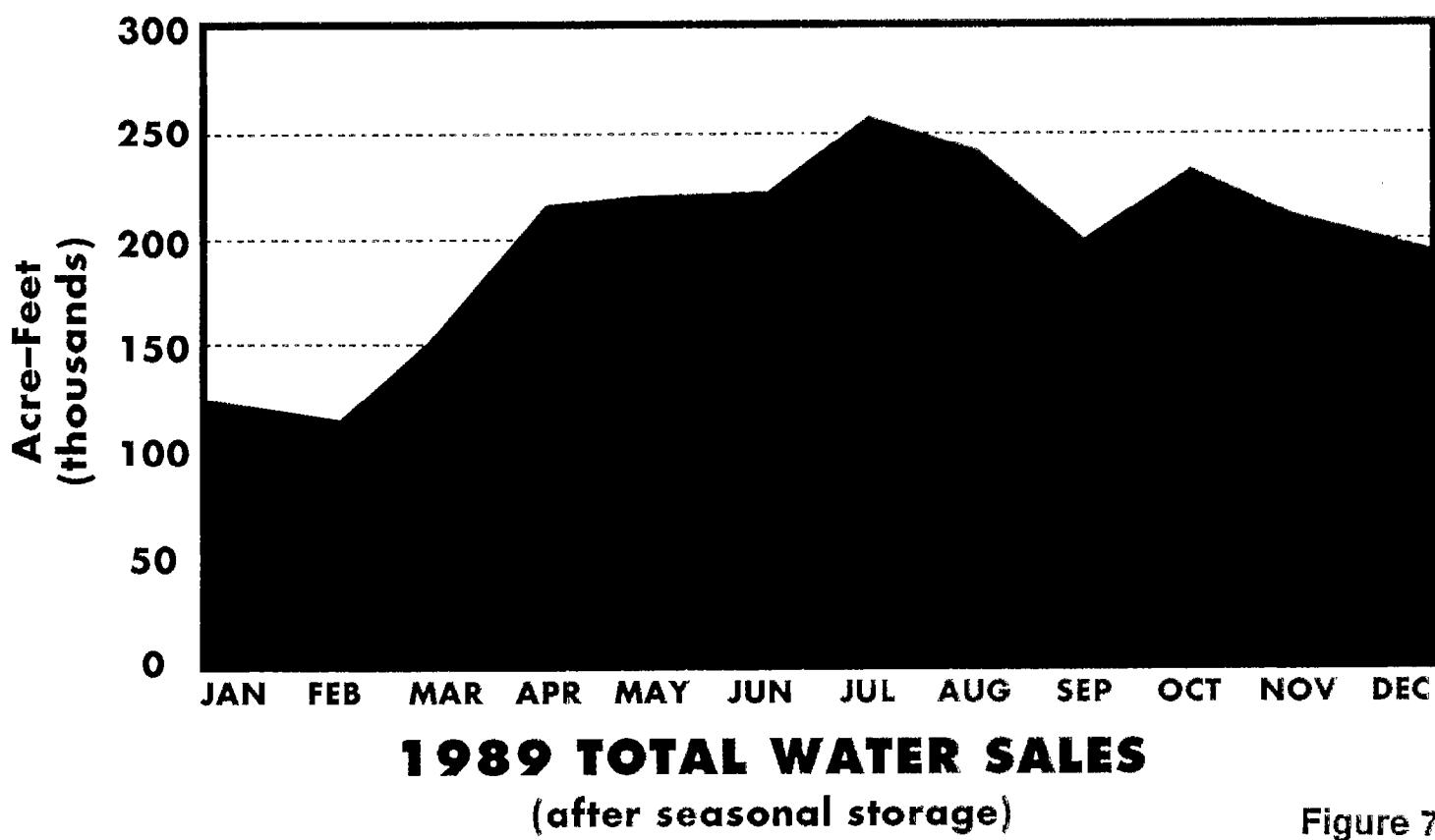


Figure 6

EFFECTS OF SEASONAL STORAGE ON METROPOLITAN'S PEAK WATER SALES



1988 TOTAL WATER SALES
(before seasonal storage)



1989 TOTAL WATER SALES

(after seasonal storage)

Figure 7

COOPERATIVE STORAGE IN THE NORTH LAS POSAS BASIN

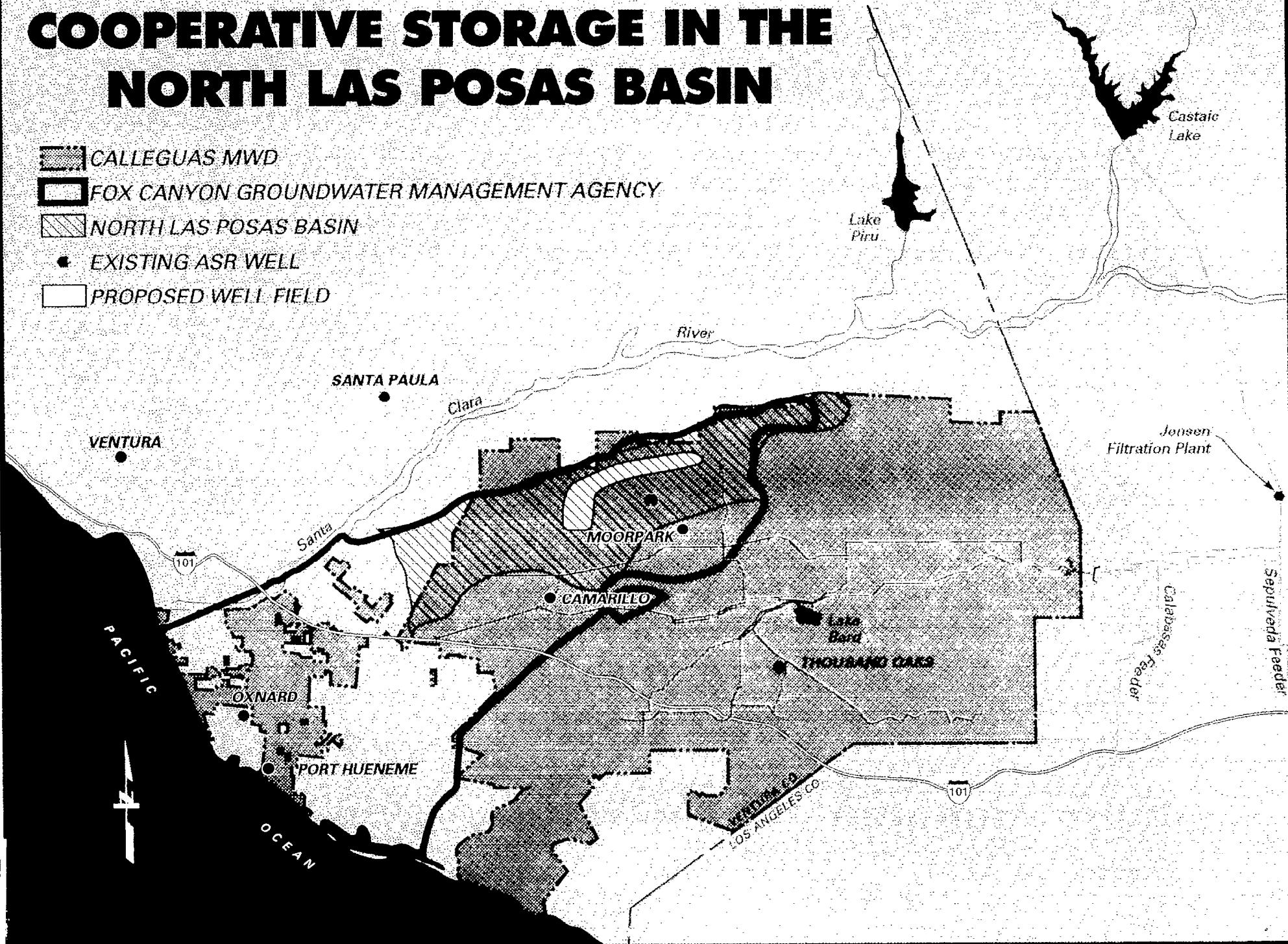


Figure 8

Figure 9

