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**PROGRAMS FOR OBTAINING FUTURE SUPPLIES
OF WATER FOR SOUTHERN CALIFORNIA**

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Water Organizations in a Changing West

**Natural Resources Law Center
University of Colorado School of Law
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I. INTRODUCTION

A. Summary

The Metropolitan Water District of Southern California (Metropolitan) is a public agency charged with the responsibility of providing supplemental water supplies to more than 15 million residents and the \$400 billion economy in its 5,149 square mile service area. Metropolitan's service area extends from Ventura to the Mexican border and includes some 240 cities and unincorporated communities in portions of the six counties of Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura. The population of Metropolitan's service area is growing by 300,000 people annually.

Metropolitan obtains water for Southern California from the Colorado River and from the State from Northern California by way of the California Aqueduct (Figure 1). Metropolitan supplies approximately 60 percent of the water needs of Southern California. The balance of Southern California's water needs are supplied from local groundwater sources and the Los Angeles Aqueduct.

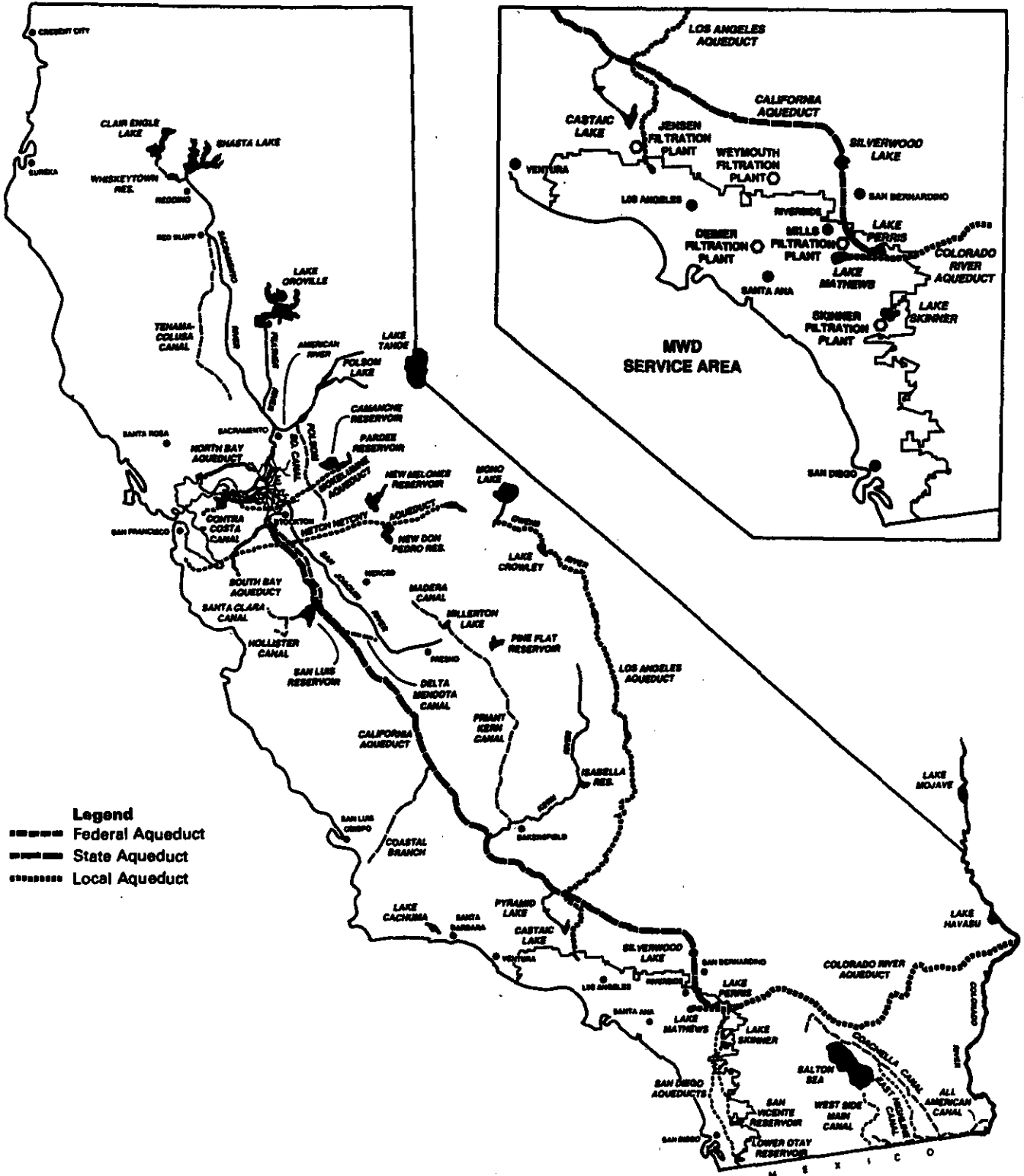
Metropolitan is pursuing a full range of programs to improve water supply reliability within its service area. These include a conservation program with the Imperial Irrigation District (Imperial), a test land fallowing program with the Palo Verde Irrigation District (Palo Verde), the All American Canal lining project, a program to store Colorado River water underground in

Arizona, precipitation management programs, groundwater recovery and treatment, conjunctive use, wastewater reclamation, water conservation, water transfer, and water exchange programs. Metropolitan is also working with the California Department of Water Resources (DWR) to increase the reliable supplies of the State Water Project (SWP).

B. References

Official Statement, \$168,759,889, The Metropolitan Water District of Southern California, Water Revenue Refunding Bonds, 1993 Series A (MWD February 12, 1993)

MAJOR WATER CONVEYANCE FACILITIES IN CALIFORNIA



II. PROGRAMS TO MEET FUTURE DEMANDS

A. Imperial-Metropolitan Water Conservation Agreement

1. In 1988, Metropolitan and Imperial, a California contractor for Colorado River water, signed a Water Conservation Agreement (Agreement). Under this Agreement, Metropolitan is paying the actual costs for a number of construction projects in Imperial's service area.
2. The initial term of the Agreement is 40 years. Metropolitan will pay approximately \$98 million (1988 dollars) for facilities constructed by 1996. Metropolitan will also pay \$23 million for indirect costs which include but are not limited to the loss of water sales and hydroelectric power revenues, mitigation of program impacts on agriculture, and environmental mitigation. Additionally, Metropolitan will pay approximately \$2.6 million per year for annual operation, maintenance and replacement costs through the year 2030.
3. In return, Metropolitan will be entitled to divert from the Colorado River, or store in a reservoir, a quantity of water equal to the amount of conserved water that will result from these projects. The projects are estimated to conserve 106,110 acre-feet per year once implemented.
4. The program includes both structural and non-structural conservation measures. These include projects to line existing irrigation canals, construct local reservoirs and spill interceptor canals, and install gates and

automation equipment. If the conserved water cannot be taken by Metropolitan in a particular year, storage of the conserved water in a reservoir such as Lake Mead would be subject to the negotiation of a separate storage agreement. The water expected to be conserved under this Agreement will meet the residential needs of about a million people in Metropolitan's service area.

B. Test Land Fallowing Program With Palo Verde

1. On August 1, 1992, Metropolitan and Palo Verde, a California Contractor for Colorado River water, began a two year test land fallowing program. Under the program, approximately 20,000 acres of agricultural land in the Palo Verde service area is not being irrigated with Colorado River water.
2. Metropolitan is compensating the landowners/lessees in the Palo Verde Valley who are voluntarily fallowing approximately 25 percent of their farmland. Landowners/lessees are being compensated \$620 per acre of fallowed land per year. Such payments will total \$25 million during the two-year period. Additionally, Palo Verde is being reimbursed \$500,000 by Metropolitan for administrative costs.
3. The saved water is conservatively estimated at 4.6 acre-feet per fallowed acre each year. By not irrigating, approximately 93,000 acre-feet of Colorado River water a year is expected to be saved, stored in Lake Mead and made available by the United States Bureau

of Reclamation (Reclamation) to Metropolitan when needed prior to the year 2000.

C. Lining of the All American and Coachella Canals

1. In 1988, the President signed Public Law 100-675 which authorized the Secretary of the Interior (Secretary) to construct a new lined canal or line previously unlined portions of the All American and Coachella canals in southeastern California. It also authorized the Secretary to enter into agreements with Metropolitan and/or certain other California water agencies to fund the lining project.
2. Imperial has indicated its intention to exercise its option to become the sole participating contractor for the All American Canal lining project. However, negotiations are under way between Imperial and Metropolitan that would allow Metropolitan to assume the role of participating contractor.
3. The preferred alternative for lining the All American Canal is to construct a parallel concrete lined canal. The preferred alternative for the Coachella Canal is to construct a lined canal in the existing cross section while bypassing the canal flow through temporary pipelines.
4. The canals are owned by the United States. Approximately 100,000 acre-feet of water a year now lost to seepage in unlined portions of the canals could be saved by these

projects and made available for use in urban Southern California through the District's delivery system.

5. Reclamation expects to release a final environmental impact statement for the All American Canal lining project and draft environmental impact statement for the Coachella Canal lining project in 1993.

D. Demonstration Program on Interstate Underground Storage of Colorado River Water in Arizona

1. On October 15, 1992, the Central Arizona Water Conservation District (CAWCD) and Metropolitan signed an agreement for a Demonstration Project on Underground Storage of Colorado River Water (Agreement). Under the demonstration program, Colorado River water is being placed in groundwater storage in central Arizona in years in which net diversions for beneficial consumptive use are forecast to be less than 7.5 million acre-feet in the three states or in years in which a surplus is declared and all requests are met.
2. Unused Colorado River water is transported to groundwater basins in Arizona via Central Arizona Project facilities. Approximately 30,000 acre-feet of water was stored in central Arizona in 1992 at a cost to Metropolitan of \$2 million (\$68 per acre-foot). The maximum amount of water that could be stored under the program is 100,000 acre-feet.
3. At this time, the other California contractors holding priorities to delivery of Colorado River water have

chosen not to participate in the demonstration program. The Southern Nevada Water Authority (Authority) has elected to participate at a level of 50 percent. As such, 15,000 acre-feet of water stored in 1992 will be funded by the Authority, through reimbursement of Metropolitan.

4. If, in the future, Colorado River reservoirs refill and flood releases occur, the stored groundwater would be made available at a later date through water exchanges to Metropolitan and other parties funding the program. Ninety percent of the stored water would be exchanged providing consideration for the use of Arizona facilities utilized to store and recover the water.
5. Recovery of the stored water could also occur if the Secretary declares a shortage in Colorado River supplies. In this case, CAWCD would have the right to withdraw the stored groundwater to reduce the impact of the shortage on its customers.

E. Unused Colorado River Water

1. Historically, during most years, the agricultural entities in California holding priorities to delivery of Colorado River water have used less than their full entitlement of Colorado River water. These entities have shared the first three priorities to use of 3.85 million acre-feet per year of California's 4.4 million acre-foot basic apportionment.

2. Reclamation, the Colorado River Board of California, and Metropolitan continue to utilize methods developed for forecasting water use by these entities, and thus how much unused water could be available for diversion by Metropolitan in a particular year. Reclamation proposes to quantify the amount of water which can be delivered under each priority. Reclamation believes the existing system of priorities without specific assignments of water frustrates the practical and timely determinations and enforcement of annual reasonable beneficial use.
3. Arizona and Nevada have historically used less than their full apportionments to Colorado River water. While the use of Colorado River water by these states will increase in the future, the Secretary has allowed California to use this unused water in the past. Metropolitan has first call to this water.

F. Snowpack Augmentation

1. Reclamation is preparing a plan for conducting a precipitation management demonstration program in the Upper Colorado River Basin to increase runoff. Reclamation, the Upper Colorado River Commission, Utah Division of Water Resources, Colorado River Commission of Nevada, CAWCD, and the Six Agency Committee of California are contributing funds to the effort. The plan will describe the technical basis for, and activities and

monies required to conduct a multi-year demonstration program to validate, quantify, and transfer cloud-seeding technology within the Basin.

G. Water Banking, Interstate Transfers, and Interim Operating Criteria

1. Metropolitan supports the concept that the Colorado River system reservoirs be operated and managed to optimize the water available for consumptive use within the United States. This can be accomplished through development of guidelines and procedures for making surplus water available, and permitting water banking, without injuring the other Basin states or water users in those states.
2. The current operation and management philosophies for the Colorado River system reservoirs needs to be reevaluated to avoid a significant risk of spill. Alternatives need to be developed that address the conjunctive use of Colorado River system reservoirs and groundwater basins, water conservation and water exchanges.
3. Establishment of an interstate water bank as suggested by California in 1991 would allow the Basin states to govern how interstate transfers would occur. The water bank could provide a source of water for each state during critical, emergency or unique water supply/demand conditions.

H. State Water Project Programs

1. The California Department of Water Resources (DWR) is currently planning three State Water Project (SWP) programs which would allow diversion and storage of additional water from the Sacramento-San Joaquin Delta (Delta). These three programs are the South Delta Water Management Program, Los Banos Grandes Reservoir, and the Kern Water Bank.
2. The South Delta Water Management Program would consist of improvements in the southern Delta that would lead to DWR being able to increase potential diversions during periods of excess Delta outflows to the full capacity of the California Aqueduct. Improvements include channel widening, and enlarging the forebay to the SWP's Delta pumping plant.
3. The Los Banos Grandes Reservoir is a proposed 1.73 million acre-foot off-stream storage reservoir which would improve water supply reliability by storing water diverted from the Delta during periods of excess Delta outflows. The reservoir would be located south of Santa Nella outside of the town of Los Banos in the Central Valley of California.
4. The Kern Water Bank is a combination of groundwater storage programs DWR is developing in Kern County. Combined, these three facilities could increase annual

SWP supplies by more than 300,000 acre-feet during dry periods.

I. Groundwater Recovery Program

1. Metropolitan's Groundwater Recovery Program provides financial assistance to encourage local agencies to treat undeveloped groundwater degraded by minerals and other contaminants. The program seeks to improve regional water supply reliability by helping develop approximately 40 new groundwater treatment projects, increasing annual production by 200,000 acre-feet within ten years. To date, eight Groundwater Recovery projects have been authorized and it is estimated they will produce approximately 22,000 acre-feet per year by 1995. Three additional projects are under review.

J. Conjunctive Use

1. Metropolitan contributes to the effective management of Southern California groundwater basins by facilitating conjunctive use. Conjunctive use is accomplished when groundwater basins are used to store imported supplies during water abundant periods.
2. The stored water is then used during shortages and emergencies. Regional benefits include enhancing Metropolitan's ability to store water when available. Groundwater storage is accomplished using spreading

basins, injection wells, and in-lieu deliveries in which imported water is used instead of groundwater.

K. Reclamation

1. Southern California is a leader in the development of water reclamation projects. Currently, 61 reclaimed water projects with an ultimate yield of 400,000 acre-feet per year are being operated by local agencies in Metropolitan's service area for landscape irrigation, groundwater recharge, commercial and industrial use.
2. Metropolitan promotes water reclamation through its Local Projects Program. Under this program, Metropolitan provides financial assistance to local water reclamation projects which develop new water supplies. Thus far, this program includes 37 projects which represent a total ultimate yield of 147,500 acre-feet per year. Another four projects are under review for inclusion in the program.

L. Water Transfer and Exchange Programs

1. Metropolitan is involved with the development of water transfer and exchange programs that would make a portion of California's agricultural water supply available to support the State's urban economies. These voluntary water transfer and exchange programs will play an important role in improving water supply reliability within Metropolitan's service area.

2. The enactment of the Federal Central Valley Project Improvement Act on October 30, 1992 represents a major breakthrough in California water policy and has significantly enhanced Metropolitan's ability to transfer water from CVP contractors.
3. Metropolitan's transfer and exchange projects include the Arvin-Edison Storage and Exchange Program, the Semitropic Water Storage and Exchange Program, and the Dudley Ridge Water Transfer Program.
4. The Arvin-Edison Storage and Exchange Program involves storing up to 800,000 acre-feet of Metropolitan's State Water Project supply in the groundwater basin underlying the Arvin-Edison Water Storage District (Arvin-Edison). This area is located in the southern portion of the San Joaquin Valley. During shortage years, a portion of Arvin-Edison's federal Central Valley Project water would be delivered to Metropolitan. In exchange, Arvin-Edison would serve its customers by pumping groundwater previously stored by Metropolitan. The program could increase Metropolitan's dry year supplies by approximately 93,000 acre-feet per year. An interim agreement for the program has been approved by the boards of directors of Metropolitan and Arvin-Edison.
5. The Semitropic/Metropolitan Water Storage and Exchange Program involves groundwater storage and recovery

operations. Under a long-term program, Metropolitan would store water in the groundwater basin underlying the Semitropic Water Storage District (Semitropic). This area is located in the southern portion of the San Joaquin Valley. During shortage years, Semitropic would pump Metropolitan's stored water from the groundwater basin into the California Aqueduct. Metropolitan would pay Semitropic for storage and recovery operations to provide consideration for the use of Semitropic's facilities. Stored water could also be recovered by exchanging a portion of Semitropic's SWP entitlement for Metropolitan's stored water. Negotiations on a long-term agreement are in progress. Under a short-term program Metropolitan stored over 45,000 acre-feet of its 1992 SWP carryover water in the groundwater basin underlying Semitropic.

6. The Dudley Ridge/Metropolitan Water Transfer Program involves the transfer of a portion of Dudley Ridge Water District's SWP entitlement to Metropolitan. Negotiations for a short-term water transfer program for 1993 have been completed. A long-term program is currently being negotiated.

M. Seawater Desalination

1. Metropolitan is currently conducting preliminary engineering studies for a Demonstration Plant to desalt

seawater. The studies include the construction and operation of a 2,000 gallon per day test unit.

Construction of the test unit is expected to be complete by summer, 1993.

2. Test results performed on the 2,000 gallon per day unit will determine if a 5 million gallon per day (mgd) demonstration plant is constructed. This facility would be constructed adjacent to an existing power plant on the coast of Southern California and would utilize a distillation process to desalt seawater. Studies and operational experience show that a desalting plant operated adjacent to or in conjunction with a power plant can significantly reduce operating expenses.
3. Construction of the Demonstration Plant is part of a larger study to investigate the economic feasibility of developing a seawater desalination process for large capacity plants (50-100 mgd).

N. Water Conservation

1. While seeking ways to augment its water supplies, Metropolitan is actively pursuing ways to make more efficient use of its existing supplies. Metropolitan has funded television, radio, and billboard advertising campaigns and has distributed over a million residential water conservation kits.
2. Metropolitan's water conservation program includes public education, school instruction, audits to promote

conservation by large water users, improvements in distribution system management, demonstration of low-water using landscape, and research.

3. As of April 1993, via its Conservation Credits Program, Metropolitan has implemented 72 contracts, the bulk of which were for Ultra-Low-Flush Toilet projects. In total the 72 Conservation Credits Program projects are expected to save an estimated 243,000 acre-feet of water during their economic lives at a total outlay of \$58 million by Metropolitan and its member agencies and subagencies.

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