Chapter 3L. Environmental Setting, Impacts, and Mitigation Measures - Water Supply

This chapter describes the early history of the LADWP water system, recent water supply and demand conditions in the Los Angeles basin, and projected supply and demand conditions over the next 20 years. Later portions of this chapter discuss water supply and demand conditions as they exist under the point-of-reference scenario for the impact and analysis in this EIR, potential impacts of the project alternatives, and suggested mitigation measures.

PREDIVERSION CONDITIONS

This section describes the development of the public water supply in Los Angeles, from the incorporation of the city in 1850 to the diversion of water from Mono Basin in 1941.

Sources of Information

SWRCB consultants reviewed historic records maintained by LADWP on the Los Angeles water supply system and summary publications such as Facts & Figures (LADWP 1988) and the current Urban Water Management Plan (UWMP) (LADWP 1991a). SWRCB consultants also reviewed the transcript of court testimony from the Mono Lake hearings (Sonora County Court of Tuolomne County), commonly referred to as the Aitken case. Recent publications and correspondence by LADWP and others were also reviewed to evaluate alternative supply options.

Development of the LADWP Water Supply System

In 1850, Los Angeles was incorporated under the laws of the United States. Four years later, the city created a department to oversee the water system. The city authorized the first pipeline system for domestic water distribution in 1857 and by 1861 had adopted an ordinance to establish rates for domestic water. From 1865 to 1898, municipal domestic water works were leased to private parties to provide service to the public. In 1899, the citizens of Los Angeles approved a $2 million bond measure to purchase the private water service companies. (LADWP 1988.)

The public completed purchase of the water system in 1902. Although less than 2% of the customers were metered for consumption at the time of purchase, by 1927 the system was 100% metered (LADWP 1988.)

Between 1902 and 1903, Los Angeles began adding to its water supplies to meet increasing demand. In 1903, the U.S. Supreme Court affirmed Los Angeles' paramount rights to surface flow of the Los Angeles River. Two years later, the citizens approved a $1.5 million bond measure to purchase lands, rights-of-way, and water rights in the Owens River basin. The initial proposal was to divert 1,000 cubic feet per second (cfs) for municipal purposes on the Owens River at Charlies Butte near the present Los Angeles Aqueduct (LA Aqueduct) intake. (LADWP 1988.)

U.S. census data indicate that the population of Los Angeles doubled approximately every 10 years from 1910 to 1930. During the same period, Los Angeles' water consumption increased 50% faster than the city's population.

To keep up with its rapidly growing demand, Los Angeles pursued two major sources of water supply between 1910 and 1941: the Colorado River and the waters in Mono Basin and Owens River basin. In 1913, the LA Aqueduct was completed and storage of Owens River water began at Haiwee Reservoir. In 1915, Los Angeles residents received their first deliveries of LA Aqueduct water. Also in 1915, Los Angeles first began to study the potential for appropriating waters in Mono Basin (LADWP 1988).

In 1923, Los Angeles began performing surveys to determine the feasibility of constructing an aqueduct from the Colorado River to Los Angeles. The following year, Los Angeles filed an application with the State Division of Water Resources to appropriate water from the Colorado River at a rate of 1 billion gallons per day (LADWP 1988).

In 1927, the Metropolitan Water District Act was enacted by the California legislature, which allowed for the formation of the Metropolitan Water District (MWD). The next year, the electorate of 13 cities voted to form the MWD. LADWP was one of the 13 founding members of MWD. Initially, MWD was formed to build the Colorado River Aqueduct to import water from the Colorado River. This water was to supplement the local water supplies of the 13 original southern California member cities. (Planning and Management Consultants 1990.)

In 1934, the city applied to the State Water Rights Board for permission to divert water from four Mono Lake tributary streams. Mono Craters Tunnel construction also began that year. The Mono Basin project was finished, and the State Water Rights Board issued the permit to operate the project in 1940. The permits authorized the city to divert water from Lee Vining, Walker, Parker, and Rush Creeks at a combined rate of 189 cfs and to collect 89,200 af per annum by storage in Grant Lake and Long Valley, Tinemaha, and Haiwee Reservoirs. When Mono Basin exports began, the city's population had reached 1.5 million and total water demand had reached 245 thousand acre-feet per year (TAF/yr).

The Colorado River Aqueduct was completed to Lake Mathews in 1940, and Colorado River water was first delivered to Los Angeles in 1941. (LADWP 1988.)

ENVIRONMENTAL SETTING

This section describes changes in water supply and demand conditions from 1941 to 1990. It summarizes historical water demand in the City of Los Angeles, including efforts to reduce demand through conservation, and LADWP historical water supplies. The predicted supply and demand conditions from 1990 to 2010 also are described. Opportunities to increase supplies by reclamation/recycling and conjunctive use of local groundwater basins are also discussed.

Sources of Information

SWRCB consultants reviewed the 1991 LADWP UWMP in preparing this section. The UWMP synthesizes census data on the population served by LADWP, discloses records of LADWP water use, identifies LADWP operations policies, and describes projected water demand and supply conditions for the LADWP service area.

To identify potential sources of water available to LADWP, SWRCB consultants reviewed numerous other studies, including The Regional Urban Water Management Plan for the Metropolitan Water District of Southern California (Planning and Management Consultants 1990), Water Reclamation in the Past, Opportunities and Plans for the Future (Los Angeles Office of Water Reclamation 1990), the Mayor's Blue Ribbon Committee on Water Rates, and Municipal and Industrial Water Use in the Metropolitan Water District Service Area: Interim Report No. 4 (Planning and Management Consultants 1991).

Population Growth and Water Use in the City of Los Angeles

Population growth in the City of Los Angeles between 1940 and 1990 has been uneven (Figure 3L-1). Population served by LADWP increased 10% during the 1940s, 34% during the 1950s, 15% in the 1960s, 5% during the 1970s, and 16% in the 1980s. The 1990 population in the LADWP service area was about 3.46 million.

Total water consumption increased substantially from 1940 to 1990 (Figure 3L-2). Agricultural water use, nonexistent in 1914, peaked at 92,000 af in 1949 and gradually declined thereafter. Current agricultural use is approximately 1,200 af per year. In contrast, total urban water consumption in the

LADWP service area has increased markedly since the early 1900s, once exceeding 700,000 af/yr in the 1980s. Urban consumption temporarily declined in the late 1970s and early 1980s, however.

Between 1976 and 1990, single-family and multifamily water use was approximately 66% of total water demand, with the commercial sector using approximately 21% of the supply (Figure 3L-3). Industry, government, and miscellaneous sales (which includes agriculture) accounted for the remaining 13% of demand.

Water use varies on a month-to-month and year-to-year basis in response to climatological conditions. Demand for water is higher in summer and during hot, dry years and lower in winter and during cooler, rainier years. Indoor water use remains fairly constant, with outdoor water use accounting for most of the variation.

Monthly demand peaks in summer when outdoor irrigation is at a maximum and subsides in winter when outdoor irrigation is at minimum (Figure 3L-4). In the 1989-1990 fiscal year (July 1, 1989 to June 30, 1990), water use in the LADWP area ranged from 44,512 af in February to 72,624 af in July, a 63% fluctuation in seasonal demand.

Per capita water use, as measured by gallons consumed per capita per day (gcpd), has shown an increasing trend between 1945 and 1990 (Figure 3L-5). Over the past 20 years, per capita use has leveled off, however, and a major reduction occurred during the 1976-1977 drought.

Current per capita water use is about 179 gcpd. Per capita annual water use rarely fluctuates more than 5% above or below consumption during an average weather year. During exceptionally hot years, however, water use may increase as much as 8-10% above average water year consumption levels.

The City of Los Angeles' rate of water use is moderately low in comparison to samples of cities nationwide (Table 3L-1). Per capita use in the 11 cities ranged from 149 to 300 gallons per day (gpd).

Conservation Efforts in the City of Los Angeles

Two droughts (1976-1977 and 1986-1992) have intensified the need to accommodate water shortages. Consequently, LADWP has made water conservation a priority.

LADWP's UWMP contains estimates of the savings from water conservation during the past decade. These estimates of conservation savings are reviewed in the "Impact Assessment Methodology" section of this chapter.

LADWP's water conservation programs can be grouped into five categories:

restrictive mandates,
pricing policies,
public education programs,
water-conserving fixtures, and
system maintenance measures.

These five programs are discussed separately below.

Restrictive Mandates

Restrictive mandates are regulations that limit the ways in which water may be used. Violation of these mandates may result in financial or other types of penalties.

In response to the 1976-1977 drought, LADWP implemented the Emergency Water Conservation Ordinance (LADWP 1991a). The 1977 ordinance, amended in 1978 and reimposed and amended in 1990, contains measures that can be implemented quickly in the event of a water supply shortage.

The ordinance includes basic use requirements that are always in effect, and five increasingly stringent requirements that may be imposed according to the severity of a shortage. Phase 1A (always in effect) prohibits watering lawns between 10:00 a.m. and 5:00 p.m., hosing paved surfaces, offering water unrequested in restaurants, allowing excess water to run off onto sidewalks or into gutters, and operating nonrecycling decorative fountains. Phase 1B requires a 10% reduction in water use but has no monetary penalties. Phases 2, 3, 4, and 5 require 10, 15, 20, and 25% reductions in water use, with increasingly large surcharges with each violation.

The 1988 Water Conservation/Sewer Flow Reduction Ordinance established goals of reducing overall water consumption by 10% in 5 years and 15% in 2000. The ordinance mandates a 10% reduction in water used for irrigation of turf areas in excess of 3 acres and imposes a surcharge that increases over time on customers who violate the 10% reduction. The ordinance also states that no building permit shall be issued to construct any industrial, commercial, or multifamily structure unless the Los Angeles Department of Planning certifies that drought-resistant landscaping will be installed.

Pricing Policies

Pricing policies can be designed to reduce water demand by increasing the cost of water to consumers. Until recently, LADWP's pricing policies were not designed to promote conservation. Meters were installed to allow each customer to be billed for actual usage, but the declining block rate structure of charges that was used until 1977 resulted in little incentive to conserve.

A uniform rate structure was introduced in 1977 on the recommendation of a Blue Ribbon Committee appointed by the Mayor. In 1985, this rate structure was modified to incorporate a higher rate during the summer season (April-September). Initially, the summer rate was made 12.6% higher than the winter rate; by 1990, the summer surcharge had been raised to 25%.

In summer 1991, the Mayor appointed a new Blue Ribbon Committee to review water rates and recommend any needed changes. The committee proposed a new rate structure keyed more to promoting conservation via increasing block pricing. With a few modifications, this rate structure was adopted by the city council and went into effect at the beginning of 1993. For customers in single-family residences, median use is about 350 gallons/account/day. Under the new rate structure, those who use more than 550 gallons/day in winter, or more than 700 gallons/account/day in summer, will pay a higher rate for consumption in excess of these benchmarks. For other customers (multifamily residential, commercial, and industrial), there is a single rate for consumption in winter; in summer, this same rate would apply for consumption up to 125% of winter consumption, but there is a higher rate for consumption beyond this level. The second block rate is the same for all classes of users; it is based on an estimate of LADWP's marginal cost of supplying water and is different in summer and winter, reflecting seasonal differences in marginal cost. The rate for the first block varies among customer classes and is based on the need to meet revenue requirements. For residential users, the first block rate is $753/af, and in summer the second block rate is $1,298/af. In drought years, the same type of structure will still be applied, but the consumption levels at which the second block begins is reduced, depending on the severity of the shortfall. Also, the rate charged in the second block is raised to be equal to the estimated rationing price that equilibrates demand to supply, given the shortfall.

Public Education Programs

Public education programs provide information on the need to conserve, suggest ways to conserve, and describe any incentives that may be offered. In addition to direct financial incentives (or punitive measures) to conserve water, LADWP promotes public awareness of the need to conserve and means for doing so. Programs include general information targeted at the public and school populations, specific information about individual residential customers' consumption levels, and programs targeted to assist commercial, industrial, and governmental users to implement their conservation options.

Water-Conserving Fixtures

Water-conserving fixtures include plumbing hardware that requires less water to perform a particular task than conventional hardware. Since 1977, LADWP has provided retrofit kits to its customers, including door-to-door distribution to homes in the city. Each retrofit kit contains one toilet displacement bag, low-flow shower heads, dye tablets to identify leaks, installation instructions, and conservation information.

The Water Conservation/Sewer Flow Reduction Ordinance enacted in 1988 requires that low-flow shower heads and toilet displacement devices be installed for all LADWP customers. LADWP offers low-interest loans (since 1980) to residential customers for the financing of conservation measures and $100 rebates (since 1990) for replacement of non-ultra-low-flush toilets with ultra-low-flush toilets.

The National Energy Policy Act (PL 102-486), signed into law on October 24, 1992, by former President Bush, establishes standards for the manufacture and labeling of showerheads, toilets, urinals, and faucets. The new plumbing standards are intended to conserve water, while saving energy and money.

Incorporated into the bill were provisions for standards for showerheads and lavatory and kitchen faucets and faucet aerators manufactured after January 1, 1994, at 2.5 gallons per minute at operating pressures of 80 pounds per square inch. Performance standards for noncommercial tank-type toilets, as of January 1, 1994, are 1.6 gallons per flush, and for urinals, 1.0 gallons per flush. Most toilets that are manufactured after January 1, 1997, must meet the 1.6-gallon standard.

LADWP, by offering rebates to those who replace old units with the new ultra-low-flow models, estimates that as of June 1992, 10,000 af/yr have been conserved at a cost of only $300/af (LADWP 1993). LADWP also estimates that the free distribution of low-flow showerheads, toilet displacement bags, and leak-detecting dye has saved a similar amount. According to LADWP, these types of conservation programs offer the best and cheapest way to reduce consumption (LADWP 1993).

System Maintenance Measures

System maintenance measures are actions taken by LADWP to reduce the amount of water that escapes from the system (e.g., leaks) without serving a beneficial use. LADWP preventive measures include lining existing pipelines, instituting a city plumbing code that requires the installation of pressure regulators in new construction, establishing a corrosion protection program, and periodically replacing existing pipelines and meters.

Leak detection alone is estimated to save approximately 1,000 af/yr. No estimates of the savings associated with other system maintenance are available.

Best Management Practices

In addition to the five water conservation programs described above, a statewide California Best Management Practices (BMPs) work group and MWD have identified the effectiveness of different conservation measures. The concept behind BMPs is the creation of an industry standard for the management and use of water resources (Wilkinson 1991). LADWP has signed the memorandum of understanding to implement the BMPs and has begun implementing all the programs identified by the BMP work group. Those BMPs include:

- interior and exterior water audits and incentive programs for single-family residential, multifamily residential, institutional, and governmental customers;
- new and retrofit plumbing (enforcement of requirement for ultra-low-flush toilets in all new construction beginning January 1, 1993, and plumbing retrofit programs for existing homes);
- ultra-low-flush toilet replacement programs;
- distribution system water audits, leak detection, and repair;
- metering with commodity rates for all new connections and retrofit of existing connections;
- large landscape water audits and incentives;
- landscape water conservation requirements for new and existing commercial, industrial, institutional, governmental, and multifamily developments;
- public information;
- school education;
- commercial and industrial water use review;
- elimination of declining block rate pricing structures within customer classifications;
- landscape water conservation for new and existing single-family homes;
- water waste ordinances;
- water conservation coordination; and
- economic incentives.

Water Supply

Supply Sources

The major historical sources of LADWP water supply are groundwater wells in the Los Angeles Basin, imported water from the LA Aqueduct, and MWD. Supplies from each source for 1941 through 1990 are shown in Figure 3L-6. (Reclamation is not included in Figure 3L-6 because it was a small portion of Los Angeles' historical water supply.)

The amount of water obtained from local groundwater has been a relatively stable source of supply during the past 50 years. Water supplies from the LA Aqueduct and MWD have been more variable, depending on the type of water year. During dry years, reductions from Mono Basin and the Owens River basin usually were replaced by water from MWD. During wet years, LADWP typically has limited purchases from MWD because MWD has historically been LADWP's most expensive source of supply.

Groundwater. LADWP currently obtains an average of 112,000 af/yr from local groundwater basins, including the San Fernando Basin (92,300 af/yr), the Sylmar Basin (3,100 af/yr), the Central Basin (15,000 af/yr), and the West Coast Basin (1,500 af/yr). In the last 20 years, groundwater extraction has ranged from 68,600 af/yr to 136,300 af/yr (LADWP 1991a). In wet years, surplus imported water may be spread to recharge groundwater basins. Groundwater consumption increases during drought years when other sources are more limited. In a drought year, LADWP can extract its annual rights, any stored water credits it has accrued, and any additional pumping it requires from stored native waters on an emergency basis. This native water must be paid back in future years.

Los Angeles Aqueduct. LADWP imports water from the Owens River basin and Mono Basin through the LA Aqueduct. Historically, four times as much water comes from the Owens River basin as from Mono Basin (Figure 3L-7). The 1970 expansion of the aqueduct allowed for an average export of 450,000 af of water to Los Angeles annually. Recent legal challenges have led LADWP to project that future average long-term extraction rates will not exceed 380,000 af/yr.

Owens River basin surface waters are the first to be exported through the aqueduct because of their high quality and lower costs compared to Mono Basin waters (LADWP 1991a). Mono Basin water is exported on a second priority basis; Owens River basin surface waters are sufficient to fill the aqueduct to capacity only in very wet years.

Owens River basin groundwater extraction for export has been the source of substantial controversy. During dry years, Owens River basin groundwater is extracted when necessary to fill the aqueduct. In wet years, surplus surface waters are spread to recharge Owens River basin groundwater. The recently completed Inyo/Owens groundwater pumping agreement prevents additional water from being diverted from current irrigation practices in the Owens River basin in Inyo County. The agreement limits long-term average groundwater pumping to 110,000 af/yr and the annual maximum pumping to approximately 200,000 af/yr.

Metropolitan Water District. LADWP supplements its own local and imported water supplies with water purchases from MWD, which presently serves 27 member agencies. Between 1970 and 1990, LADWP relied on MWD for an average of 78,550 af/yr, or 13% of LADWP's total water supply. LADWP has purchased greater amounts of water from MWD during periods of drought than in normal water years, including a fourfold increase from 25,215 af in fiscal year 1975-1976 to 104,798 af in fiscal year 1976-1977. The fourth consecutive year of drought and the court-imposed halt to LADWP diversions from Mono Basin necessitated purchase by LADWP of approximately 385,000 af of water, or 55% of the city's total water supply, from MWD in fiscal year 1989-1990 (Figure 3L-6). LADWP has continued its high levels of demand from MWD in 1990-1991 and 1991-1992.

Preferential rights to MWD water are allocated to each member agency based on the ratio of the taxes each pays to MWD divided by the total cumulative taxes paid to MWD by all 27 member agencies (LADWP 1991a, Gleason pers. comm.). LADWP's current entitlement to MWD is 26% of the total supply, which represents a decline from 35% in 1970. However, the total amount of water available annually from MWD has increased over the same period from 1,145,000 af to 2,456,250 because of MWD's increased supplies. Thus, LADWP's preferential right has actually increased nearly 60% between 1970 and 1985. There may be practical and political constraints on the extent to which LADWP could take its full entitlement from MWD. LADWP may not want to become more dependent on MWD or to arouse hostility from other MWD members who have access to fewer alternative sources of water than LADWP and believe that their own access to MWD supply is in jeopardy.

MWD's primary sources of water include the Colorado River and the State Water Project (SWP) (Figure 3L-8). In 1964, the U.S. Supreme Court reduced MWD's firm apportionment of Colorado River water to 550,000 af. However, for several years, MWD has been receiving approximately 1.3 million af/yr of Colorado River water, including surplus water, unused California agricultural water, and unused Arizona and Nevada water.

SWP is funded by and serves 30 separate water agencies. MWD's annual contracted entitlement is for 2.01 million af of water, or nearly 50% of the 4.23 million af/yr total project commitments. Presently, the firm yield of the project is about 2.4 million af/yr. Firm yield is the minimum amount of water expected to be available during a repeat of the 7-year dry period that occurred from 1928 to 1934 in California. In most years, the project can deliver about 3-3.5 million af/yr; entitlement requests are now more than 3.7 million af/yr. Unless new SWP facilities are constructed, firm yield will decline over time because of upstream depletions and changes in instream use requirements and water quality standards.

Between 1971 and 1990, SWP delivered an average of 467,000 af/yr of water to MWD, or 31.3% of MWD's water supply, with the balance supplied by the Colorado River. In the 1989-1990 fiscal year, SWP supply to MWD reached a peak of 1,300,000 af, or 52% of MWD's supply.

Reclamation. Water reclamation consists of the treatment of municipal wastewater and its reuse for irrigation, industrial, and other nonpotable uses. Water reclamation represents the largest, most secure source of new water available to LADWP.

LADWP currently obtains 1,000 af/yr through reuse of reclaimed wastewater for irrigation of parks, golf courses, and other greenbelts. The City of Los Angeles' water reclamation goal has been set at 255,000 af by 2010, which would require treatment of 39% of LADWP's estimated total effluent.

Water System Operations

Operation of the LADWP system is designed to minimize the amount of water purchased from MWD because MWD water is more costly than the city's own sources. LADWP generally utilizes maximum amounts of water from the LA Aqueduct and wells as its primary supplies and purchases MWD water only to supplement these supplies.

LADWP purchases most of the water supplied by MWD during winter, when rates are most favorable. Typically, some MWD water is spread to recharge the San Fernando Basin. LADWP attempts to pump its maximum allocation of groundwater and import the maximum amount of aqueduct water during the 5 summer months when MWD water is most expensive. Pumping capacity limitations in the Central and West Basins require that some pumping occur in winter (Adams pers. comm.).

Use of the San Fernando Basin is affected by pumping capacity, which varies as new wells are drilled and older wells are retired because of contamination or low productivity. Maximum storage levels in the basin are limited by the need to keep the water table below a level at which it could adversely affect surface facilities or become contaminated. A minimum water level is required for effective pumping and to prevent seawater intrusion and other problems. Natural recharge and other parties' use of the basin for storage also affect groundwater levels in the basin (Adams pers. comm.).

Projected Supply and Demand

This section summarizes the City of Los Angeles' projected water demand and supply conditions from 1990 through 2010 as reported in LADWP's UWMP (LADWP 1991a). The UWMP projections are used as the starting point for the water supply impact analysis. In the "Impact Assessment Methods" section that follows, revisions to the UWMP supply and demand projections are identified to reflect new information available since the UWMP was published.

Projected Water Demand

The city's water demand is projected to increase 9% from 1990 to 2010 (Figure 3L-9). Total forecasted demand in each year is based on an estimate of future per capita water use multiplied by future population. The estimates of per capita water use incorporate the effects of water conservation, increasing population density; commercial, industrial, governmental growth; and pricing. The estimates do not include the effects of new conservation programs not yet implemented.

The demand estimates shown in Figure 3L-9 are based on normal weather conditions. The actual water use in any one year may vary from the projected use due to the effects of weather.

Projected Water Supply

As described previously, LADWP historically has had three main supplies of water: local groundwater; Mono and Owens Basin water delivered via the LA Aqueduct; and MWD water, which primarily comes from the Colorado River Aqueduct and the SWP. Two additional sources, reclaimed water and savings from conservation and demand management programs, will become increasingly important to LADWP over the next 20 years. (Conservation and demand management programs are usually included as reductions in LADWP's demand rather than increases in supply.)

Table 3L-2 shows the historical yield from 1971 to 1990 of each of LADWP's water supply sources. Figure 3L-10 illustrates the quantity of water from each source that LADWP expects to use to meet future demand. Both projections are based on average-year weather conditions.

Groundwater Pumping

LADWP estimates that it can increase its average groundwater yield from existing levels of 112,000 af/yr up to 132,000 af/yr by 2010. LADWP's average groundwater yield will increase by 20,000 af/yr between 1990 and 2010 because of credit given for imported water used in the San Fernando Valley and returned by natural percolation to the San Fernando Basin.

As of October 1, 1991, LADWP had a credit of 185,239 af stored in the San Fernando basin. The Cities of Burbank and Glendale had credits of 48,859 af and 32,569 af, respectively (Upper Los Angeles River Area Watermaster 1992). Currently, the San Fernando basin has approximately 250,000 af of available storage space. LADWP may also be able to use the San Fernando Valley basin to recycle reclaimed water provided that the state and federal approvals are received.

Water extractions from the San Fernando Basin are managed on a safe-yield basis in which the long-term average extractions equal the average amount of water that enters the basin each year through three sources: percolation of natural precipitation and runoff, percolation of imported waters used for irrigation, and spreading of native and imported waters. The additional 20,000 af/yr available to LADWP by 2010 will result from percolation of increased amounts of imported water used for irrigation in the San Fernando Valley.

In drought years, the Upper Los Angeles River Area Watermaster may declare an emergency and allow additional pumping up to 170,000 af from stored native waters, which must be paid back in future years. The San Fernando Valley basin adds great flexibility to LADWP's operations.

MWD supports projects that offset a demand for imported water by way of a rebate program. MWD provides a rebate of $250/af for projects that increase or restore groundwater production under this program (Los Angeles Office of Water Reclamation 1992a).

Los Angeles Aqueduct

LADWP (1991a) projects that the aqueduct will continue to supply 380,000 af/yr from 1990 through 2010, assuming average weather conditions. This consists of 326,000 af of surface and groundwater from the Owens River Valley and 54,000 af from Mono Basin. The estimate from Mono Basin is based on current streamflow releases required by the court order in February 1990. The actual amount of Mono Basin surface water available to LADWP may be higher or lower, depending on the SWRCB's final decision on streamflows (LADWP 1991a).

Metropolitan Water District

LADWP (1991a) predicts that MWD will be the primary source of future additional supplies for Los Angeles. LADWP plans to use approximately one-third of its total MWD entitlement during the next 20 years. LADWP has estimated that its request for MWD water will increase from 196,900 af in 1990 to 211,700 af by 2010, assuming normal weather conditions. (LADWP's actual 1990 demand for MWD equaled 385,000 af due to the drought.) LADWP's demand for MWD water is considerably less than its entitlement to MWD water, which was over 639,000 af in 1990 but is projected to drop to about 601,500 af by 2010.

Although MWD is attempting to expand its water supplies, LADWP has indicated that it does not plan to rely solely on MWD to balance supply with demand. Assuming average rainfall, MWD projects a shortage in supplying all its members of 80,000 af/yr in 1995 (2.0%), increasing to 740,000 af/yr by 2010 (15.9%). Under above-average demand and/or lower than normal rainfall conditions, MWD's supply shortfall would be even larger (LADWP 1991a).

Although MWD water currently represents one of LADWP's least expensive sources of new water, LADWP has decided to develop its own presently more expensive resources because of MWD's supply uncertainty.

Reclamation/Recycling

Treated wastewater is a secure future supply. According to an LADWP report, "As long as people live and shower and eat in Los Angeles, there will be sewage" (LADWP 1993). Recycled water can be used for all types of greenbelt irrigation and other nonpotable and potable uses.

Many southern California water agencies are concerned about the future of imported water supplies and are pursuing recycled water projects because of its dependable supply. Los Angeles County recycles 12% of the effluent at the county-operated wastewater treatment plants. At the end of 1991, Los Angeles County recycled 68,645 af/yr and is planning new projects that may double that figure within the next few years. Los Angeles County uses most of its reclaimed water (69%) for groundwater recharge, 15% for landscaping, 7% for agriculture, and 6% for industrial uses. (Los Angeles Office of Water Reclamation 1991.)

Some examples of new projects in various stages of planning are the following (Los Angeles Office of Water Reclamation 1991):

Century Reclamation Project. The Central Basin Municipal Water District is the lead agency in developing a 5,500-af/yr regional reclaimed water distribution system to serve the Cities of Bellflower, Compton, Downey, Lynwood, Norwalk, Paramount, Santa Fe Springs, and South Gate.

Upper San Gabriel Valley Municipal Water District. This water agency is planning a 4- to 5-mile-long pipeline to deliver 25,000-40,000 af/yr of reclaimed water for both groundwater recharge and direct reuse.

Rio Hondo Reclamation Project. A regional distribution system to deliver 5,000-10,000 af/yr of reclaimed water to the Cities of Montebello, Pico Rivera, Commerce, Vernon, and Whittier.

Central and West Basin Water Replenishment District. This agency is evaluating the feasibility of constructing a reverse osmosis facility to allow for an additional 25,000-50,000 af/yr of reclaimed water to be used for groundwater recharge.

MWD has supported water reclamation through its "Local Projects Program" (LPP). MWD provides a rebate of $154/af of reclaimed water produced under the LPP. MWD determines financial need by comparing a facility's projected costs to its projected water rates for a noninterruptible supply of treated water. A program will receive the LPP rebate until its projected unit costs are less than MWD water rates, up to a maximum of 25 years (Los Angeles Office of Water Reclamation 1992a). This program is similar to MWD's rebate program for groundwater supplies.

Several reclamation projects are included in LADWP's 20-year water supply forecast. Several other reclamation projects have been identified that are not part of LADWP's projected 20-year supply. These include projects that would not be operational until after 2010 and additional projects identified by the Los Angeles Office of Water Reclamation (1990). The individual reclamation projects included in LADWP's 20-year forecast are listed in the "Impact Assessment Methodology" section that follows.

The use of reclaimed water is constrained by public acceptability and government regulation. California Department of Health Services has stated that proposals for new reclaimed water spreading projects would have to be evaluated on a case-by-case basis (LADWP 1991a).

IMPACT ASSESSMENT METHODOLOGY

Changes in water exports from Mono Basin to Los Angeles will affect how LADWP meets the future demands of its customers. The water supply impact analysis focuses on predicting possible effects of the diversion alternatives on LADWP, its customers, and others in the region.

This section describes the methods used to predict impacts of the alternatives and to assess the significance of these impacts. Direct, indirect, and cumulative impacts of the diversion alternatives are considered.

Impact Prediction Methodology

For this analysis, direct impacts are defined as predicted changes in the supply of water delivered to LADWP via the LA Aqueduct. Indirect impacts are defined as effects on other water users potentially affected by changes in LADWP's use of Mono Basin water supplies. These impacts focus on potential changes in LADWP's demand for regional water supplies provided by the MWD.

Direct and indirect impacts were examined under three scenarios: a near-term (20-year) analysis, a drought analysis, and a long-term analysis. For the near-term analysis, predicted changes in water deliveries were estimated from results of the LA Aqueduct Monthly Program (LAAMP) over a 20-year projection period (1992-2011). This projection period was constructed by randomly selecting 20 years out of the 50-year historical hydrological record; the number of dry, normal, and wet years was selected proportionate to their percentage of occurrences in the 50-year period. Monthly projections of water delivered from Haiwee Reservoir to the LA Aqueduct were used to construct annual projections over the 20-year period for point-of-reference conditions and the seven EIR alternatives.

The drought analysis was used as a sensitivity analysis of the near-term effects. For each alternative, adjustments were made to the supply assumptions. The effects of having twice as many dry years in the 20-year period were evaluated. The results of the drought analysis are evaluated relative to the near-term impacts of each alternative.

In addition to the near-term and drought analysis, long-term impacts also were analyzed. For three alternatives (6,383.5-ft, 6,390-ft, and 6,410-ft), projected Mono Lake levels do not reach their targets in the first 20 years. For each of these three alternatives, the average exports to LADWP during the period in which equilibrium lake level is reached are compared to the average exports in the near-term analysis.

Cumulative water supply impacts also were analyzed. The cumulative analysis examined the potential loss of Mono Basin supplies with other projects and regulatory changes that could affect LADWP and MWD water supplies.

Criteria for Determining Impact Significance

This section describes the criteria and the thresholds that were used to assess the significance of direct, indirect, and cumulative impacts predicted for the alternatives.

Direct Impacts

The criteria used to assess the significance of predicted changes in water deliveries to LADWP from the LA Aqueduct (direct impacts) include predicted changes in the water supply costs to meet projected demands and predicted occurrences of substantial supply shortfalls (shortages).

A water supply simulation model that balances annual supply and demand conditions was developed to provide the data needed to apply the criteria related to costs and water shortages. This simulation model was used for both the near-term and drought analyses. Figure 3L-11 illustrates the concept behind the water supply model. It shows water demand in the LADWP service area for the next 20 years and hypothetical supply sources representing point-of-reference conditions. Water supply sources are brought online as needed to meet increasing demand.

For each of the seven EIR alternatives, the amount of water available to LADWP from the LA Aqueduct will differ from that available under point-of-reference conditions. In Figure 3L-11, arrows show this shift in the current supply sources. A downward shift may indicate a shortage if enough resources are not available to meet demand. If LADWP does not have enough of its own resources to meet demand in any year, purchases of more expensive resources may be necessary. Conversely, an upward shift in the current supply sources may indicate a water surplus, reducing LADWP's demand for purchases from third parties. The simulation model estimates the cost of LADWP's water supplies for each alternative, including point-of-reference conditions.

The primary components of the model are demand projections, available supplies and associated costs, and the procedures for balancing annual supply with demand. These three model components are described below.

Demand Projections. Two different forecasts of future LADWP water demand are LADWP's projections, which are included in its UWMP (LADWP 1990); and MWD projections of the entire MWD service area (Planning and Management Consultants 1990). The MWD forecast breaks out the LADWP service area as one of its geographical subareas. These two forecasts are shown in Figure 3L-12.

An extensive analysis was performed of the assumptions that underlie both forecasts (Hanemann 1992). Based on this analysis, the LADWP UWMP forecast is considered to represent the best estimate of LADWP's future demand.

In the LADWP forecast, water use is projected to grow from 697,000 af in 1992 to 759,000 af in 2011, an increase of 9%. During the same period, the population served by LADWP is expected to rise by 30%. The demand projections are based on historical average temperatures and incorporate the effects of water conservation, population density, commercial and industrial growth, pricing, and other miscellaneous factors that affect water use (LADWP 1991a). These demand projections remain constant for all near-term modeling scenarios, including point-of-reference conditions.

Supply Projections. Supply sources in the model include LADWP's three major historical sources and a fourth source, water reclamation, that will become increasingly important in the future. The historical sources are Mono Basin and Owens River basin water delivered through the LA Aqueduct; local wells that draw from the San Fernando, Sylmar, Central, and West Coast basins; and MWD water, which primarily comes from the Colorado River Aqueduct and the SWP. In the analysis that follows, resource costs refer to the total cost from these sources.

Mono Basin and Owens River Basin. The amount of water that would be available to LADWP from Mono Basin and the Owens River basin for each EIR alternative and the point-of-reference conditions was determined using the LAAMP. The 20 years of aqueduct water supply projected for each alternative were based on a random selection of years from the 50-year historical hydrological record (1940-1989). The near-term 20-year analysis contains 12 average water years, 4 dry years, and 4 wet years.

The drought analysis was performed by using 4 additional dry water years to replace 2 average and 2 wet years. For each alternative, the water available in the 4 additional dry years was based on the average amount available from the existing 4 dry years included in the near-term analysis. Consequently, the drought analysis assumes 8 dry years, 4 wet years, and 8 average water years. Also, the 8 dry years are assumed to occur during the first 8 years of the analysis.

The costs associated with obtaining water from the LA Aqueduct were obtained from LADWP's UWMP. Water costs from the aqueduct consist primarily of fixed costs ($48 million/year) associated with debt payments and maintenance activities. A variable cost of $20/af also is included in the analysis to account for filtration costs (LADWP 1991a). The average annual cost of aqueduct water delivered fluctuates in part because of the large percentage of fixed costs associated with the aqueduct.

Groundwater. Groundwater availability to LADWP is based on information included in LADWP's UWMP and data supplied by the City of Los Angeles' Watermaster for the Upper Los Angeles Water Basin (Blevins pers. comm.).

Figure 3L-13 shows the maximum amount of groundwater available to LADWP between 1992 and 2011. Groundwater availability is estimated to increase from 112,000 af in 1992 to as much as 134,000 af by 2011. This increase in groundwater availability over the next 20 years is due to expected increases in the amount of water delivered to the San Fernando Valley for municipal uses and eventually returned by natural percolation to the San Fernando Basin (LADWP 1991a). LADWP currently has 185,000 af of stored water credits available for use in the future (Blevins pers. comm.). This credit is assumed to remain constant for each alternative.

Based on information in the UWMP, groundwater is assumed to cost $90/af without treatment (LADWP 1991a); this cost includes the rebate obtained from participating in MWD's groundwater program. Treatment costs are expected to add $53/af in 1992, increasing to $246/af by 2011 (Porter pers. comm.). Treatment costs for intermediate years were derived by interpolation.

Metropolitan Water District. The availability and cost of water from MWD are based on information included in LADWP's UWMP, data supplied by the City of Los Angeles' Watermaster for the Upper Los Angeles Water Basin (Blevins pers. comm.), newsletters published by the Los Angeles Office of Water Reclamation, and personal contacts with MWD.

Figure 3L-14 shows, for 1992 through 2011, the maximum amount of MWD water that LADWP would use, assuming maximum demand associated with drought conditions. LADWP's demand for MWD water would range from 280,000 to 300,000 af during the 20-year period. These estimates represent the upper limit of MWD water assumed to be available to LADWP, although LADWP's preferential rights to MWD water exceed this amount (see page 3L-9). The maximum amount of MWD water available to LADWP shown in Figure 3L-14 is assumed to remain the same for each alternative.

Costs for treated MWD water are expected to increase from $322/af in 1992 to $680/af in 2000 and reach $800/af by 2010 (Porter pers. comm.).

Reclamation Water. The expected amount of water available from different reclamation projects was identified from several sources (including the UWMP), documents published by the Los Angeles Office of Water Reclamation (such as WR News, the newsletter of the Los Angeles Office of Water Reclamation), and feasibility reports and environmental impact reports published for individual reclamation projects.

Figure 3L-15 shows the reclamation water available to LADWP between 1992 and 2011, based on a review of the sources cited above. Water available from reclamation projects will increase from 4,900 af in 1992 to 119,000 af by 2011. These estimates are much lower than the City of Los Angeles' 2010 water reclamation goal of 255,000 af. The cumulative predicted reclamation yield depicted in Figure 3L-16 is based on the projects identified in Table 3L-3. They consist of 21 separate projects ranging in size from 100 af to 35,000 af/yr. The costs of these projects, which range from $346 to $620/af (1992 dollars), were used in the analysis.

Balancing Procedures. Figure 3L-16 illustrates the procedures followed to estimate the costs to replace water supplies from Mono Lake. The model sequentially steps through each year of the 20-year analysis period. For each year, the model attempts to equate supply and demand.

The model uses a three-step procedure to equate supply and demand. The first step focuses on determining the availability of base resources, which include resources owned by LADWP and those that LADWP proposes to acquire over the next 20 years. These include LA Aqueduct water, groundwater, and reclamation projects. Nonbase resources are either not owned by LADWP or are not included in LADWP's 1991-2010 supply projections (primarily MWD water).

Base resources are selected in the order of least cost. After each resource is selected, cumulative resource costs are calculated and total resource supply is compared to demand. If the total supply equals or exceeds demand, the model adds any surplus from the marginal supply source to the future-year groundwater credit before it moves to the next year. After all years have been completed, total costs are summed and the modeling results are calculated.

The model moves to step two if total annual supply is less than total demand after all base resources have been selected. In step two, the model examines whether any groundwater credits are available. (These credits differ from LADWP's annual right to a specific amount of groundwater because LADWP is allowed to store surplus water in the ground as credits that can be extracted in future years.) If groundwater credit is available for pumping, then groundwater is pumped until supply equals demand or until the credit limit is reached. The model does not allow a negative credit; that is, LADWP is not allowed to pump more than the credit amount. Once the groundwater credit is used up, no additional groundwater can be pumped. After groundwater is pumped, the credit amount is adjusted and the costs of groundwater pumping are estimated.

If supply equals demand after pumping, total costs are estimated, the credit limit is adjusted to account for the credit usage, and the model moves to the next year. If a supply shortfall still exists, the model moves to step three.

In the third step, nonbase resources are selected in the order of least cost until supply equals demand. Also, the model assumes that nonbase resources are not used to increase the groundwater credit. Nonbase resources are primarily supplied from MWD but also include up to 6,000 af/yr of water that is currently diverted for irrigation from the Upper Owens River and its tributaries under LADWP leases. (The 6,000 af/yr of irrigation water from the Upper Owens River was included for modeling purposes; LADWP must decide on a year-to-year basis how to use this supply.) After each nonbase resource is selected, total supply costs are estimated.

If a supply shortfall still exists after all nonbase resources are selected, the model estimates the costs of that shortfall, using the shortage costs of LADWP water developed by the Mayor's Blue Ribbon Committee on Water Rates. These costs, which were approved by the committee and its technical panel, are shown in Table 3L-4.

Total shortage costs were calculated by multiplying the marginal cost (in dollars/af) associated with a given percent shortage by the shortage amount (in af/yr). This calculation is repeated for each year in which a shortage occurs. Shortage costs in each year are then summed to give total shortage costs.

For a predicted change in the supply of water delivered to LADWP via the LA Aqueduct (direct impact) to be considered significant, implementation of an alternative must:

result in a 12% or greater average annual increase in LADWP's resource and shortage costs compared to the point-of-reference condition (the 12% significance threshold was based on LADWP's average increase in operating expenses [including depreciation] between 1981 and 1990) (LADWP 1991b.)

cause a supply shortfall to occur more often (greater number of years) than under the point-of-reference condition and have LADWP demand exceed supply by more than 10% in any of those years (the 10% shortage is based on the level at which shortage costs would be implemented by LADWP under the recommendation by the Mayor's Blue Ribbon Committee on Water Rates).

Indirect Impacts

Indirect impacts are potential effects on other water users resulting from changes in diversions from Mono Basin. The change in LADWP's demand on projected MWD supplies is used as an indicator for evaluating these effects.

The criteria used to assess the significance of predicted increases in demand on MWD supplies are predicted percent changes in the amount of MWD water used by LADWP. Results of the water supply simulations for assessing direct impacts were used in conjunction with data from MWD's UWMP to estimate these changes. MWD's projections in the UWMP incorporate anticipated reductions associated with reduced deliveries of Colorado River water resulting from completion of the Central Arizona Project.

For a predicted effect on MWD and its member agencies in the region (indirect impact) to be considered significant, implementation of an alternative must cause:

- an increase in demand for MWD water that exceeds LADWP's 19-year (1971-1989) weighted average share of MWD supplies (5.1%).

Cumulative Impacts

Both direct and indirect cumulative impacts were evaluated. Direct cumulative impacts are those that would result from all potential changes in LADWP's supplies. For direct cumulative impacts of an alternative to be considered significant, implementation of the alternative must cause:

- LADWP's cumulative water supply to be lower than the total supply predicted for that Mono Basin diversion alternative.

Indirect cumulative impacts are those that would result from cumulative effects on MWD caused by changes in LADWP's Mono Basin supplies combined with changes in MWD water supplies from other sources. The combined changes in LADWP's demand on projected MWD supplies, plus potential changes in MWD's sources of supply, are used as an indicator for evaluating indirect cumulative impacts. For indirect cumulative impacts of an alternative to be considered significant, implementation of the alternative must cause:

- an increase in LADWP's demand for MWD water, when combined with reductions in MWD's supply to exceed LADWP's historical 19-year (1971-1989) weighted share of MWD supplies (5.1%).

The criteria used to assess the cumulative significance of predicted increases in LADWP's demand on MWD supplies are predicted percent changes in the amount of MWD water used by LADWP after adjustments were made to account for cumulative changes in MWD supplies. For a predicted effect on MWD and its member agencies in the region (cumulative impact) to be considered significant, implementation of an alternative must cause:

- an increase in LADWP's demand for MWD water and/or a decrease in MWD's supply that resulted in LADWP's average annual demand (1992-2011) for MWD water to exceed LADWP's historical 19-year (1971-1989) weighted share of MWD supplies (5.1%).

SUMMARY COMPARISON OF IMPACTS AND BENEFITS OF THE ALTERNATIVES

As described in the "Impact Assessment Methodology" section, relative water supply effects of the alternatives are assessed in this chapter through several key variables:

- average annual availability of LA Aqueduct water,
- percentage increases in resource acquisition and shortage costs,
- occurrence of water supply shortages, and
- percentage change in demand for MWD supplies.

Table 3L-5 provides a summary comparison of each alternative using these variables. Values of the variables for each alternative are compared to values for the point-of-reference condition. Those values representing significant adverse changes from the point-of-reference condition are indicated with an asterisk. A discussion of these variables for each alternative is provided in the following sections of this chapter.

CHARACTERIZATION OF POINT-OF-REFERENCE CONDITIONS

The point of reference is the base condition to which all seven water supply alternatives are compared. The point-of-reference condition differs from conditions under the seven alternatives in the amount of water that flows through the LA Aqueduct for use by LADWP.

Figure 3L-17 shows the average annual amount of water available to LADWP from the LA Aqueduct under point-of-reference conditions. Dry water years represented by low levels of water deliveries from the aqueduct occur in 2000 and during the last 3 years of the 20-year scenario.

Point-of-reference results show that 442,000 af/yr would be available from the LA Aqueduct, averaged over the 20-year period (Table 3L-5). Average annual resource costs would equal $174.8 million per year in 1992 dollars. These costs include expenditures for LA Aqueduct water, groundwater pumping, reclamation projects, and MWD water purchases. No supply shortages are predicted to occur under point-of-reference conditions.

The following analysis examines the water supply impacts of each alternative compared to point-of-reference conditions.

IMPACTS AND MITIGATION MEASURES FOR THE NO-RESTRICTION ALTERNATIVE

Changes in Water Supply Conditions

Near-Term Effects

Direct Impacts. Under the No-Restriction Alternative, LADWP would continue to divert water based on its historical record of diversions. The amount of aqueduct water that would be available under the No-Restriction Alternative varies from year to year, both in absolute terms and compared to point-of-reference conditions (Figure 3L-18). The No-Restriction Alternative would provide LADWP with an average increase of 7,700 af/yr compared to point-of-reference conditions (Table 3L-5). This increase in water deliveries from the LA Aqueduct would result in a reduced demand on other sources of water, primarily water purchased from MWD.

The No-Restriction Alternative would reduce resource costs over the 20-year period by 3% per year and would not result in any supply shortages (Table 3L-5). The No-Restriction Alternative would have a beneficial water supply impact on LADWP compared to point-of-reference conditions.

Indirect Impacts. Under the No-Restriction Alternative, LADWP would require 2.3% of projected MWD supplies compared to 2.6% under point-of-reference conditions. This alternative would have a beneficial impact on MWD and member agencies.

Long-Term Effects

No change from short-term conditions would occur.

Drought Effects

The drought scenario, which consists of 8 dry hydrologic years over the 20-year projection period instead of 4 years, would reduce LA Aqueduct water deliveries by an average of 34,000 af/yr compared to representative conditions (Table 3L-5).

Summary of Benefits and Significant Impacts and Identification of Mitigation Measures (No-Restriction Alternative)

- Provides an additional 7,700 af of water per year to LADWP, resulting in 3% lower total cost (direct benefit to LADWP).

- Reduces LADWP's share of projected MWD supplies from 2.6% to 2.3% (indirect benefit to MWD and its member agencies).

IMPACTS AND MITIGATION MEASURES FOR THE 6,372-FT ALTERNATIVE

Changes in Water Supply Conditions

Near-Term Effects

Direct Impacts. Figure 3L-18 shows the amount of aqueduct water available to LADWP under the 6,372-Ft Alternative. The 6,372-Ft Alternative would decrease water available to LADWP by an average of 16,900 af/yr compared to point-of-reference conditions (Table 3L-5). This decrease in water deliveries from the LA Aqueduct would result in a supply increase primarily from additional MWD purchases (90% of replacement supplies would be from MWD).

The decreased availability of LA Aqueduct supplies would increase resource costs by 6% compared to point-of-reference conditions (Table 3L-5) but would not result in water supply shortages. Based on the significance criteria, the 6,372-Ft Alternative would not have a significant adverse impact on LADWP or its customers.

Indirect Impacts. Under the 6,372-Ft Alternative, LADWP would require an average of 3.1% per year of projected MWD supplies over the 20-year period compared to 2.6% under point-of-reference conditions. Because this share is less than its historical share of 5.1%, this impact is considered less than significant.

Long-Term Effects

No change from short-term conditions would occur.

Drought Effects

The drought scenario would reduce LA Aqueduct water deliveries by an average of 32,900 af compared to representative conditions (Table 3L-5).

Summary of Benefits and Significant Impacts and Identification of Mitigation Measures (6,372-Ft Alternative)

No benefits or significant impacts would result from implementation of this alternative.

IMPACTS AND MITIGATION MEASURES FOR THE 6,377-FT ALTERNATIVE

Changes in Water Supply Conditions

Near-Term Effects

Direct Impacts. Figure 3L-18 shows the amount of aqueduct water available under the 6,377-Ft Alternative. The 6,377-Ft Alternative would reduce deliveries to LADWP by an average of 28,100 af/yr compared to point-of-reference conditions (Table 3L-5). This decrease in water deliveries from the LA Aqueduct would result in a supply increase primarily from MWD purchases (94% of replacement supplies would be from MWD).

This additional decrease in water availability of LA Aqueduct supplies would increase resource costs by 9% but would not result in water supply shortages (Table 3L-5). Based on the significance criteria, the 6,377-Ft Alternative would not have a significant adverse impact on LADWP or its customers.

Indirect Impacts. Under the 6,377-Ft Alternative, LADWP would require an average of 3.4% of MWD supplies over the next 20 years compared to point-of-reference conditions. Because this share is less than its historical share of 5.1%, this impact is considered less than significant.

Long-Term Effects

No change from short-term effects would occur.

Drought Effects

The drought scenario would reduce LA Aqueduct water deliveries by an average of 38,000 af/yr compared to representative conditions (Table 3L-5).

Summary of Benefits and Significant Impacts and Identification of Mitigation Measures (6,377-Ft Alternative)

No benefits or significant impacts would result from implementation of this alternative.

IMPACTS AND MITIGATION MEASURES FOR THE 6,383.5-FT ALTERNATIVE

Changes in Water Supply Conditions

Near-Term Effects

Direct Impacts. Figure 3L-18 shows the amount of aqueduct water available under the 6,383.5-Ft Alternative compared to point-of-reference conditions. The 6,383.5-Ft Alternative would reduce deliveries to LADWP by an average of 42,000 af/yr (Table 3L-5). This decrease in water deliveries from the LA Aqueduct would result in a supply increase primarily from additional MWD purchases (95% of replacement supplies would be from MWD).

This decrease in availability of LA Aqueduct supplies would increase resource costs by an estimated 14% (Table 3L-5). This alternative would also result in a water supply shortage of 4% during 1 year of the 20-year period. Total resource and shortage costs of this alternative are 15% higher than for the point-of-reference condition (Table 3L-5). Based on the significance criteria, the 6,383.5-Ft Alternative would have a significant adverse impact on LADWP and its customers.

Indirect Impacts. Under the 6,383.5-Ft Alternative, LADWP would require an average of 3.8% of MWD's projected supplies over the 20-year period. Because this share is less than LADWP's historical share of 5.1%, this impact is considered less than significant.

Long-Term Effects

Average LA Aqueduct exports equal 408,000 af/yr compared to 400,000 af/yr over the near term (Table 3L-5).

Drought Effects

The drought scenarios would reduce LA Aqueduct water deliveries by 39,100 af/yr compared to representative conditions (Table 3L-5).

Summary of Benefits and Significant Impacts and Identification of Mitigation Measures (6,383.5-Ft Alternative)

- Reduces LADWP supplies by 42,000 af/yr, increasing LADWP's resource and shortage costs by 15% (a significant adverse impact on LADWP and its customers).

Mitigation Measures

The following mitigation measures could be implemented for the 6,383.5-Ft Alternative and all higher lake level alternatives.

- LADWP and the MLC should jointly apply for the remaining $48 million in Assembly Bill 444 funds that are available for developing Mono Lake replacement supplies. This funding could be used to offset the costs that LADWP would incur to develop additional water reclamation projects.

- HR 429 (Bradley & Miller), which was signed in fall 1992 by former President Bush, authorizes two elements that would assist LADWP in offsetting Mono Basin water reductions. Those elements are:

  - developing 120,000 af/yr of reclaimed water in southern California specifically designated to replace water diverted from Mono Basin (projects have been authorized, but monies have not yet been appropriated) and

  - authorizing water transfers from agricultural users to urban water districts, such as LADWP.

- LADWP should participate to the maximum degree possible in the MWD rebate programs (LPP and groundwater recovery).

LADWP could pursue other state and federal funding sources to assist in its efforts to gain the capital financing necessary for developing water reclamation projects to meet its water reuse goals of:

- 250,000 af/yr in 2010,
- 600,000 af/yr in 2050, and
- 800,000 af/yr in 2090.

LADWP should continue to develop demand-side reductions from its water conservation program and implement and monitor compliance with all BMPs identified in the UWMP.

LADWP could assess the feasibility of future projects that conserve additional amounts of local stormwater runoff.

If LADWP fully participates in the programs described above, it is likely that the water supply impacts could be reduced to a less-than-significant level.

IMPACTS AND MITIGATION MEASURES FOR THE 6,390-FT ALTERNATIVE

Changes in Water Supply Conditions

Near-Term Effects

Direct Impacts. Figure 3L-18 shows the amount of aqueduct water available under the 6,390-Ft Alternative compared to point-of-reference conditions. The 6,390-Ft Alternative would reduce deliveries to LADWP by an average of 47,300 af/yr (Table 3L-5). This decrease in water deliveries from the LA Aqueduct would result in a supply increase primarily from additional MWD purchases (92% of replacement supplies would be from MWD).

This decrease in availability of LA Aqueduct supplies would increase resource costs by an estimated 16% compared to point-of-reference conditions (Table 3L-5). This alternative also would result in a water supply shortage of 4% during 1 year of the 20-year period. Total resource and shortage costs of this alternative are 17% higher than costs under point-of-reference conditions (Table 3L-5). Based on the significance criteria, the 6,390-Ft Alternative would have a significant adverse impact on LADWP and its customers.

Indirect Impacts. Under the 6,390-Ft Alternative, LADWP would require an average of 3.9% of MWD's projected supplies over the 20-year period. Because this share is less than LADWP's historical average share of 5.1%, this impact is considered less than significant.

Long-Term Effects

Average LA Aqueduct exports equal 404,300 af/yr compared to 394,700 af/yr over the near term (Table 3L-5).

Drought Effects

The drought scenario would reduce LA Aqueduct water deliveries by 38,300 af/yr compared to representative conditions (Table 3L-5).

Summary of Benefits and Significant Impacts and Identification of Mitigation Measures (6,390-Ft Alternative)

- Reduces LADWP's supplies by 47,300 af/yr, increasing LADWP's resource and shortage costs by 17% (a significant adverse impact on LADWP and its customers).

Mitigation Measures

The mitigation measures for direct impacts of the 6,390-Ft Alternative are identical to those described for the 6,383.5-Ft Alternative. If LADWP fully participates in these mitigation programs, it is likely that the water supply impacts associated with the 6,390-Ft Alternative could be reduced to a less-than-significant level.

IMPACTS AND MITIGATION MEASURES FOR THE 6,410-FT ALTERNATIVE

Changes in Water Supply Conditions

Near-Term Effects

Direct Impacts. Figure 3L-18 shows the amount of aqueduct water available under the 6,410-Ft Alternative compared to point-of-reference conditions. The 6,410-Ft Alternative would reduce deliveries to LADWP by an average of 57,600 af/yr (Table 3L-5). This decrease in water deliveries from the LA Aqueduct would result in a supply increase primarily from MWD (90% of replacement supplies would come from MWD).

This decrease in availability of LA Aqueduct supplies would increase resource costs by an estimated 20% compared to point-of-reference conditions (Table 3L-5). This alternative also would result in a water supply shortage of 5% during 1 year of the 20-year scenario. Total resource and shortage costs of this alternative are 22% higher than costs under point-of-reference conditions (Table 3L-5). Based on the significance criteria, the 6,410-Ft Alternative would have a significant adverse impact on LADWP and its customers.

Indirect Impacts. Under the 6,410-Ft Alternative, LADWP would require an average of 4.2% of MWD's projected supplies over the 20-year period. Because this share is less than LADWP's historical share of 5.1%, this impact is considered less than significant.

Long-Term Effects

For the 6,410-foot lake level, average LA Aqueduct exports equal 393,300 af/yr compared to 384,400 af/yr over the near term (Table 3L-5).

Drought Effects

The drought scenario would reduce LA Aqueduct water deliveries by 37,700 af/yr compared to representative conditions.

Summary of Benefits and Significant Impacts and Identification of Mitigation Measures (6,410-Ft Alternative)

Reduces LADWP's supplies by 57,600 af/yr, increasing LADWP's resource and shortage costs by 22% (a significant adverse impact on LADWP and its customers).

Mitigation Measures

The mitigation measures for the direct impacts of 6,410-Ft Alternative are identical to those described for the 6,383.5-Ft Alternative. If LADWP fully participates in those mitigation programs, it is likely that the water supply impacts associated with the 6,410-Ft Alternative could be reduced to a less-than-significant level.

IMPACTS AND MITIGATION MEASURES FOR THE NO-DIVERSION ALTERNATIVE

Changes in Water Supply Conditions

Near-Term Effects

Direct Impacts. Figure 3L-18 shows the amount of aqueduct water available under the No-Diversion Alternative compared to point-of-reference conditions. The No-Diversion Alternative would reduce deliveries to LADWP by an average of 66,800 af/yr (Table 3L-5). This decrease in water deliveries from the LA Aqueduct would result in a supply increase primarily from MWD purchases (90% of the replacement supplies would be from MWD).

This decrease in availability of LA Aqueduct supplies would increase resource costs by an estimated 20% compared to point-of-reference conditions (Table 3L-5). This alternative also would result in a water supply shortage of 4% during 1 year of the 20-year scenario. Total resource and shortage costs of this alternative are 25% higher than costs under point-of-reference conditions (Table 3L-5). Based on the significance criteria, the No-Diversion Alternative would have a significant adverse impact on LADWP and its customers.

Indirect Effects. Under the No-Diversion Alternative, LADWP would require an average of 4.5% of MWD's projected supplies over the 20-year period. Because this share is less than LADWP's historical average share of 5.1%, this impact is considered less than significant.

Drought Effects

The drought scenario would reduce LA Aqueduct water deliveries by 34,400 af/yr compared to representative conditions.

Summary of Benefits and Significant Impacts and Identification of Mitigation Measures (No-Diversion Alternative)

- Reduces LADWP's supplies by 66,800 af/yr, increasing LADWP's resource and shortage costs by 25% (a significant adverse impact on LADWP and its customers).

Mitigation Measures

The mitigation measures for direct impacts of the No-Diversion Alternative are identical to those described for the 6,383.5-Ft Alternative. If LADWP fully participates in those mitigation programs, it is likely that the water supply impacts associated with the No-Diversion Alternative could be reduced to a less-than-significant level.

CUMULATIVE IMPACTS OF THE ALTERNATIVES

Related Impacts of Earlier Stream Diversions by LADWP

Diversion of Mono Basin and Owens River basin waters to the Los Angeles basin have been ongoing since 1941. Between 1941 and 1970, the LA Aqueduct's limited capacity prevented full appropriation of Mono Basin waters. Completion of the second barrel of the LA Aqueduct in 1970 allowed LADWP to fully divert Mono Basin waters during periods of average runoff. Diversion of Mono Basin and Owens River basin waters has had a beneficial economic effect on LADWP and its ratepayers because it has provided a relatively large, inexpensive source of water.

Related Impacts of Other Past, Present, or Anticipated Projects or Events

Several past, present, and future events may cause direct or indirect cumulative impacts on water supply. These events include:

the Inyo-Owens Grounding Pumping Agreement;

future demands for in-basin Mono Basin waters, including development of the Conway Ranch Resort Community, USFS, City of Lee Vining, and the June Lake Public Utility District;

enactment of the Western Water Bill (HR 429);

potential changes in exports from the San Joaquin/Sacramento River Delta as a result of modified Bay-Delta water quality standards;

SWP facilities and programs downstream of the delta; and

changes in the availability of Colorado River supplies.

The first three items listed above have the potential to directly affect supply sources controlled by LADWP. The Inyo-Owens Pumping Agreement set limits on the amount of groundwater that LADWP can pump from the Owens River groundwater basin. The limits imposed by this agreement have been incorporated into the LAAMP model and are reflected in the above discussion of alternative impacts.

Development projects in Mono Basin and the Owens River basin have the potential to reduce the amount of water available to LADWP. The Conway Ranch Resort Community, currently in the planning stages, has been proposed for Mono Basin. This project could result in diversions from Mono Lake tributaries. Increasing diversions from Lee Vining Creek by the City of Lee Vining and/or the USFS for future needs could reduce water supplies available. Also, the Town of Mammoth Lakes is investigating diverting waters tributary to the Upper Owens River for municipal water supply purposes.

The Western Water Bill (HR 429) allows for restructuring California's Central Valley Project (CVP). Under this bill, farmers will be able to voluntarily sell their water to municipalities. Consequently, urban shortages could be overcome by the purchase of irrigation supplies. Also, the old price structure for Central Valley customers will be replaced with a structure that encourages conservation.

The activities described, combined with the Mono Basin water supply alternatives, have the potential to directly affect LADWP's supply of water. On balance, these projects are expected to have a beneficial impact on LADWP's water supply; decreases from Mono Basin alternatives and Mono Basin/Owens River basin development projects would be outweighed by increased water availability associated with the Western Water Bill. Consequently, no significant direct cumulative impacts would be associated with the project alternatives.

Several projects have the potential to affect MWD's water supply.

The existing water quality standards for the Sacramento-San Joaquin River Delta set minimum water quality requirements to protect fisheries and related natural resources. Proposed revision to these minimum standards (April 22, 1993 draft of Water Rights Decision 1630) is expected to lead to decreases in the amount of water available to the SWP and CVP.

Future shortfalls in Delta water exports that could result from adoption of proposed Decision 1630 would be divided between the SWP and CVP. In addition, any decreased deliveries to the SWP could be divided between agricultural and municipal uses. At this time, any estimates of the effect of revised Delta water quality standards on MWD would be speculative.

Potential SWP projects and programs downstream of the Delta could, if implemented, supply additional water to southern California. These include the Los Banos Grandes Reservoir, the Kern water bank, and the CVP Water Purchase. These projects and programs, together with the Delta management programs, have the potential to add 450,000 af/yr of reliable supply to the SWP. (Planning and Management Consultants 1990.)

MWD's dependable supply of Colorado River water was reduced with the commencement of Colorado River deliveries to the Central Arizona Project in Arizona. MWD has entered into a water conservation agreement with Imperial Irrigation District that will augment MWD reliable supplies from the Colorado River by approximately 100 TAF/yr. Several other programs may be available to offset reductions in supplies from the Colorado River. These include land fallowing programs, Colorado River banking, canal lining, and the use of currently unused agricultural water and unused Arizona and Nevada water. The losses to MWD associated with the Central Arizona Project have already been incorporated into estimates of MWD supplies used in the analysis.

For impacts on MWD and its customers, projects that could affect MWD's future water supply include potential changes in exports from the Bay-Delta as a result of proposed Decision 1630, potential increases in yield from SWP facilities and programs, changes in the availability of Colorado River supplies, and water transfers under HR 429. On balance, these projects, in conjunction with the adverse impacts associated with each of the project alternatives, would probably lower MWD's total supplies.

The indirect cumulative impacts of the alternatives addressed in this report are considered to be less than significant because LADWP's increased demand for MWD water would be less than LADWP's historical 19-year (1971-1989) weighted share of MWD supplies (5.1%).

Significant Cumulative Impacts

Several past, present, and future activities have the potential to reduce water deliveries to the City of Los Angeles. Impacts of these projects, when considered in conjunction with impacts of the project alternatives, are not expected, however, to result in significant cumulative impacts.

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