

## Chapter 3N. Environmental Setting, Impacts, and Mitigation Measures - Economics

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This chapter describes the key economic effects caused by implementing the project alternatives. Economic changes focus on two geographic areas: a region defined by the boundaries of Mono and Inyo Counties and the affected area defined primarily by the LADWP service area. Economic effects elsewhere in the state also are evaluated. Appendix X includes additional details of the methodologies used to perform the impact analyses.

Information presented in this chapter is based largely on information contained in other chapters of this document, including Chapter 3G, "Land Use", Chapter 3I, "Recreation Resources", Chapter 3L, "Water Supply", and Chapter 3M, "Power Generation". These chapters should be reviewed for additional information on baseline conditions and effects described below.

### **PREDIVERSION CONDITIONS**

#### **Overview of Socioeconomic Development in the Mono and Inyo Counties Region**

Mono County's population increased rapidly during the 19th century because of gold mining activity around Bodie, but fell sharply during the early part of the 20th century. The county's population was stable between 1890 and 1900, declined between 1900 and 1920, and subsequently rebounded (Table 3N-1). The town of Lee Vining was established in the 1920s to serve an emerging tourist industry around Mono Lake. (Phillips 1967.)

As the consumer markets of Mono County's mining communities diminished, the county's agriculture shifted from a mixture of crop and livestock production to primarily livestock and forage production. Irrigated acreage in Mono County decreased by 41% between 1910 and 1940 (U.S. Bureau of the Census 1913, 1932, 1942). As the region's agriculture became dominated by livestock production, a pattern of seasonal grazing developed that involved sheep operators based in Kern County driving stock into Mono County for temporary pasturing. Many flocks were tended by recent immigrants from Spain (especially the Basque province), Portugal, and France. By 1900, over 200,000 sheep grazed the county's ranges (Inyo National Forest 1989).

The population of Inyo County, where development was based on livestock ranching rather than gold mining, grew relatively steadily until 1910 and then stabilized through the prediversion period (Table 3N-1). Southern Sierra Power Company promoted agricultural development in Inyo County based on power supplied by its Mono County hydroelectric facilities. Economic uncertainty, however, led many ranchers to sell their land and water rights. By the late 1920s, LADWP owned approximately 80,000 acres in the Owens Valley and controlled approximately 90% of the water of the Owens River.

## **Agriculture**

This section describes prediversion agriculture conditions in Mono Basin and Long Valley. Mono Basin and Long Valley are the study areas for which agricultural land use and production are analyzed in Chapter 3G, "Land Use".

### **Mono Basin**

Mono County's early agriculturists tapped the streams of the eastern Sierra to convert the semi-desert to arable farmland. Between 1919 and 1929, the area irrigated from Mono Lake tributaries increased from 4,190 acres to 11,500 acres (U.S. Bureau of the Census 1932).

Aerial photographs taken in 1929 indicate that water diverted from Gibbs, Lee Vining, Walker, Parker, and Rush Creeks was being used to irrigate approximately 4,100 acres of nearby pastures. The acreage irrigated remained relatively stable through 1934. Annual water consumption for irrigation and stock watering along the diverted tributaries was estimated at 30,000 af. Other sources indicate that irrigation water applications may have exceeded this level (refer to Chapter 3G, "Land Use"). (Rawson 1990, Court Testimony, Volumes I-V.)

Forage productivity and livestock use of grazing lands are measured in animal unit months (AUMs). One AUM is the amount of forage required by one cow-calf pair (or five sheep) for 1 month (i.e., 800-1,000 pounds of forage). Based on estimated irrigated acreage of 4,100 acres and estimated productivity of 4.5 AUMs per acre, approximately 18,450 AUMs of forage were produced annually on pastures irrigated by diversions from the Mono Lake tributaries in 1929. This amount of forage would support 15,000-20,000 sheep over the grazing season. Managing this number of sheep would require approximately 20-25 shepherds.

### **Long Valley**

Before 1940, Long Valley, which comprises the land along the Upper Owens River, was primarily in private, family ownership. Cattle production was historically the main agricultural activity on irrigated

land in Long Valley and in adjacent, unimproved rangelands. Several Long Valley cattle operators also owned lands in the Bishop area that provided winter pasture.

Although little information is available on prediversion agricultural production and employment in Long Valley, the filling of Lake Crowley reservoir probably flooded almost half of the irrigable land in Long Valley. As discussed below, approximately 1,350 acres are currently irrigated in Long Valley. Assuming twice this acreage was in irrigated pasture before 1940 and an average productivity of 4.5 AUM per acre, Long Valley could have supported roughly 2,400 cows and an equal number of calves over the grazing season.

## **Recreation and Tourism**

Mono Basin began to be developed for tourism and recreation shortly after the California gold rush. Development accelerated in the 1920s when highways linking Mono County to the state's major metropolitan areas were constructed. The region's prominent prediversion recreation developments included resorts at Mono Lake; resorts, marinas, and campgrounds on the June Lake Loop; and fishing resorts on the Upper Owens River. Boating, swimming, sunbathing, and waterfowl hunting attracted many tourists to Mono Lake, and Rush Creek was renowned as a trophy fishery. By the late 1930s, tourism had become the region's most important industry.

## **ENVIRONMENTAL SETTING**

### **Socioeconomic Conditions in Mono and Inyo Basins**

#### **Overview**

**Population.** Mono County's population remained stable between 1940 and 1960 and then entered a period of rapid growth, increasing by over 300% between 1960 and 1989. Population in Inyo County grew rapidly in the 1940s, stabilized in the 1950s, and then resumed a rapid growth rate. Since the recession of the early 1980s, its population has increased slowly (Table 3N-1). Both counties' population densities are extremely low in comparison with the statewide average of 187 persons per square mile; Mono County's population density is 5.2 persons per square mile and Inyo County's is 2.8 persons per square mile.

Mono and Inyo Counties each have only one incorporated area. Mono County is relatively more urban than Inyo County, with 48% of its population concentrated in Mammoth Lakes, as compared with 20% of the Inyo County population in Bishop. (California Employment Development Department 1991.)

**Employment.** In 1990, Mono and Inyo Counties had a combined civilian labor force of 13,525. Their most important employment sectors are services, trade, and government, which jointly account for 82% of the region's total employment (Table 3N-2). The two-county region's unemployment rate was 6.2% in 1990, up from 4.4% in 1989. Unemployment in the region has historically been near the statewide rate (California Employment Development Department 1991).

Approximately 60% of Mono and Inyo Counties' privately owned establishments employed less than five workers in 1988. Only one establishment, a recreational services provider, employed more than 1,000 people. Five other establishments in the two-county region employed more than 100 people. (U.S. Department of Commerce 1990.)

Tourism is the main source of employment in the region. The trade and services sectors, which jointly account for 60% of the region's employment, are heavily oriented toward serving tourists. For example, roughly half of the region's service-sector employees work at motels, resorts, or ski areas, and half of the trade-sector employees work at restaurants, bars, or service stations (California Employment Development Department 1991, U.S. Department of Commerce 1990). Government, the region's third largest employment sector, is also oriented toward serving tourists.

Agriculture, which formerly was an important industry in the region, directly accounts for less than 1% of the region's jobs (California Employment Development Department 1991). The shift from labor-intensive to capital-intensive crops and farming methods within the two-county region is reflected in trends toward fewer, but larger, farms. The number of farms in the region decreased from 320 to 170 between 1940 and 1987, while the average size of farms increased from 750 acres to 1,720 acres (U.S. Bureau of the Census 1942, 1989).

**Income.** In 1988, per-capita personal income averaged \$17,772 in Mono County and \$15,300 in Inyo County. These income levels are lower than the statewide average of \$18,763. (U.S. Department of Commerce 1990.)

In 1988, payrolls accounted for 74% of all earned income and for 50% of all personal income in the region. Proprietors' income and other labor income accounted for the remaining 26% of earnings. A substantially higher proportion of total personal income is accounted for by earnings in Mono County (77%) than in Inyo County (54%) (Table 3N-3). Unearned income, including government transfers (e.g., social security payments), interest income, and dividends, accounts for a relatively large share of total income in Inyo County. (U.S. Department of Commerce 1990.)

Services, trade, and government are the region's largest sources of earnings (Table 3N-4). The service sector has increased in importance as a source of earnings, while trade and government have contributed relatively stable shares of earnings. The trade sector's share of earnings is smaller than its share of employment; this discrepancy is attributable to the relatively low wage rates characteristic of retail trade occupations.

## Agriculture

### Regional Production and Employment

**Characteristics.** Agricultural production in Mono and Inyo Counties at the commencement of Mono Basin water exports in 1940 and in 1987 are shown in Table 3N-5. The major change in farm tenure in the region between 1940 and 1987 was toward larger and fewer farms and corporate leasing as opposed to family ownership.

Between 1940 and 1987, the region's irrigated acreage decreased from 52,600 acres to 35,200 acres. Part of this decrease is attributable to reduced irrigation of lands adjacent to the diverted Mono Lake tributaries. The area irrigated by diversions from these streams decreased from 4,100 acres in 1934 to 2,280 acres in 1989. Another portion of the decrease is attributable to the filling of Lake Crowley reservoir, which displaced an estimated 1,500 irrigable acres, and idling of lands in Inyo County associated with LADWP's property acquisitions.

Cattle production in the region increased substantially in the postdiversion period while sheep production was relatively stable. Cattle and calf sales (excluding sales from stocker operations) increased from 7,760 in 1940 to 19,450 in 1989, while sheep and lamb sales decreased from 34,250 to 19,400 (U.S. Census Bureau 1942, Inyo-Mono Department of Agriculture 1991).

Agricultural production in Mono County generated approximately \$13.3 million in agricultural products in 1989, up from \$11.6 million (in unadjusted dollars) in 1979 (Table 3N-6). Approximately half of the county's 1989 farm production was generated by sales of livestock and wool. Most of the remaining production consisted of livestock forage, including alfalfa, irrigated pasture, dryland grazing, and grains. Seed crops accounted for the remainder of the county's agriculture.

Inyo County's agricultural sector produced approximately \$9.1 million in agricultural products in 1989, up from \$7.8 million (in unadjusted dollars) in 1979 (Table 3N-6). Similar to Mono County, more than half of the Inyo County's 1989 farm production was generated by sales of livestock.

Agricultural employment (excluding owners and unpaid family members) in Mono and Inyo Counties since 1974 has ranged from 50 jobs in 1974 to 200 jobs in 1983. (Employment data are not disaggregated for the two counties.) In 1989, agriculture accounted for 100 jobs, or 0.7% of all employment in the two-county region.

**Mono Basin.** The Mono Basin study area includes agricultural lands in Mono Basin that could be affected by the water diversion alternatives. The study area includes irrigated lands adjacent to the tributaries and relicited lands adjacent to Mono Lake.

Much of the farmland along Lee Vining, Walker, Parker, and Rush Creeks was purchased by LADWP during the 1930s. LADWP has leased Cain Ranch to the Inyo Sheep Company since 1938.

This company is based in Kern County and uses Mono Basin lands for summer pasturing. The number of sheep grazed in the basin by Inyo Sheep Company decreased by approximately 25% between 1940 and 1989, although this decline resulted more from the loss of grazing access to Conway and DeChambeau Ranches in the northern part of the basin than to reduced irrigation on Cain Ranch. Following the sale of a federal grazing permit in 1986, the company reduced its Mono Basin sheep herd to approximately 10,500 head. (Iturriria pers. comm.)

Within the Mono Basin study area, agricultural production occurs primarily on leased LADWP lands and on federal range allotments. Sheep and a few cattle graze these lands from May through September. Few livestock remain in the basin year round because of its harsh climate and lack of forage. The number of sheep and cattle using the basin each summer varies based on forage and water availability, livestock prices, and other factors.

The federal government currently charges permit holders \$1.97 per AUM for grazing on federal allotments. LADWP's base lease rates range from \$2.00 per AUM for dry rangeland to \$3.90 per AUM for irrigated pasture. LADWP annually adjusts its lease rates based on the price of beef. The current lease rate is 1.4 times the base rate (Anderson pers. comm.). For this analysis, forage values of \$2.00 per AUM for dryland grazing and \$4.00 per AUM for irrigated pasture were used to estimate forage values, regardless of land ownership.

As discussed in Chapter 3G, "Land Use", forage production near Mono Lake and its tributaries during years of normal water availability is approximately 20,600 AUMs, including 9,100 AUMs on federal lands and 11,500 AUMs on LADWP property (Tables 3G-4 and 3G-5 in Chapter 3G, "Land Use"). Forage produced in Mono Basin is valued at an estimated \$60,000, or approximately 7% of the total value of Mono County's 1989 forage production (Inyo-Mono Department of Agriculture 1990).

Lands along the diverted tributaries are owned by LADWP and were leased to two sheep operations in 1989: the Mono Sheep Company, based in Barstow (San Bernardino County), and the Inyo Sheep Company, based in Oildale (Kern County). (The Inyo Sheep Company has since purchased the Mono Sheep Company and now controls the Mono Sheep Company's lease with LADWP and its federal grazing permits.) The Mono Sheep Company leases additional LADWP lands elsewhere in Mono Basin. The Inyo Sheep Company also holds federal grazing permits in the basin. The estimated value of forage produced by leased LADWP lands in Mono Basin is shown in Table 3N-7.

The Mono Sheep Company irrigates a portion of the land it leases from LADWP from Gibbs Creek (a tributary to Lee Vining Creek) and Lee Vining Creek. The 149 acres of LADWP land irrigated from these creeks produce 670.5 AUMs of forage, valued at an estimated \$2,680, during years of normal water availability.

The Inyo Sheep Company irrigates 1,844 acres of leased LADWP land during normal water years from the Farrington Siphon located on the aqueduct between Lee Vining and Walker Creeks, and from

diversions from Walker and Parker Creeks. Pastures irrigated from these creeks produce an estimated 8,298 AUMs with a total estimated value of \$33,200.

Much of the economic activity associated with the Mono and Inyo Sheep Companies operations occurs outside of Mono County. Because the sheep herds are moved to various locations throughout the year, revenues and expenditures generated by the operations are spread over several locations and counties. For example, lamb and wool sales occur from locations outside Mono County. (Iturriria pers. comm.)

Labor used by these sheep operations is usually hired through a contract with a Sacramento-based ranch employment firm. Approximately seven herders are required during the summer months when the sheep are grazed in Mono Basin; up to 12 herders are required during winter months. Independent truck drivers hired from the local area are occasionally used to truck sheep to different locations, but trucks owned by the sheep operations are usually used for trucking and are driven by employees. (Iturriria pers. comm.)

Very few goods and services are purchased in the local area while the sheep are based in Mono County. The herders live in trailers on ranches. The companies buy groceries and miscellaneous equipment, including tires, salt, and medicines, in the local area, but major purchases during the year are usually made in Kern County. (Iturriria pers. comm.)

**Long Valley.** The Long Valley study area consists of agricultural lands along the Upper Owens River that receive irrigation water from the river and could be affected by changes in river flows. It includes lands adjacent to the river between East Portal and Lake Crowley reservoir.

The upper portion of this study area consists of three privately owned cattle ranches, and the lower portion consists of a cattle operation that leases land from LADWP. The three privately owned ranches are John Arcularius Ranch, Inaja Land Company, and Howard Arcularius Ranch. The LADWP lessee is the J&L Livestock Company.

Three of these operations are cow-calf operations involving cattle breeding and calving. Calves produced by these operations are usually sold locally at weights ranging from 500 to 600 pounds before being shipped to Kern County for finishing. One operation is a stocker operation in which steers are grazed for the season and sold when they weigh approximately 500 pounds.

Few cattle overwinter in Long Valley. Operators move their livestock to lower elevation land (usually in the Bishop area) around October and haul them back to Long Valley in May.

Annual forage production in the Long Valley study area averages an estimated 6,200 AUMs, including 3,900 AUMs off private lands and 2,300 AUMs off LADWP lands. This forage has an estimated value of \$24,000 (Table 3N-8).

Employment directly generated by cattle operations in the study area is relatively low. In addition to the four ranch managers, fewer than 12 seasonal employees likely work on the four study area cattle operations during months livestock are grazed in Long Valley. Expenditures on supplies and equipment by these operations occur primarily in Inyo County because of Long Valley's proximity to Bishop and because most livestock that use Long Valley in summer overwinter near Bishop.

## **Recreation and Tourism**

Increases in population, disposable income and wealth, leisure time, and mobility have caused tremendous growth in recreation and tourism throughout the United States since Mono Basin waters were first exported in 1941. Recreation and tourism have increased most dramatically in California. The residential population has grown rapidly, and the state has become increasingly attractive to visitors from throughout the nation and the world.

Mono and Inyo Counties have participated in the general development of recreation and tourism over the past 50 years. In addition to the increasing numbers of motels, restaurants, gas stations, resorts, marinas, and campgrounds, a new activity and industry, alpine skiing, has emerged to become the dominant element of the region's recreation and tourism sector. Mammoth Mountain Ski Area is the region's largest employer.

Some elements of the region's recreation and tourism sector have declined during the postdiversion period; these declines are directly related to changes in recreation opportunities resulting from the export of water from the Mono Lake tributaries. Use of lower Rush Creek, formerly a popular and renowned sport fishery, became negligible after it was dewatered. Recreational opportunities on the lower reaches of Lee Vining, Parker, and Walker Creeks were similarly affected. Also, as the level of Mono Lake declined and its water became saltier and its beaches muddier, opportunities for swimming, motorboating, sunbathing, and waterfowl hunting have declined substantially. Conversely, opportunities for viewing tufa towers, one of the lake's principal attractions, have increased substantially as the lake level has declined.

### **Regional Economic Importance of Recreation and Tourism**

**Expenditures.** Recreation and tourism expenditures in Mono and Inyo Counties are mainly associated with four types of businesses: ski areas, lodging places, eating and drinking places, and service stations. Other sectors, including public transportation and general retail trade, are somewhat less dependent on recreation and tourism. Although no direct information is available regarding how much spending in each of these sectors is generated by recreation and tourism, these spending levels can be estimated in relation to travel-related expenditure levels.

Until 1985, the State of California estimated travel-related expenditures by county (California Department of Commerce 1987). Approximately 71% of all travel-related expenditures in California between 1980 and 1985 was for pleasure travel and 29% was related to business travel. Relatively little



business travel occurs in Mono and Inyo Counties. A survey-based study conducted in 1979 estimated that 4.3% of all summer highway travel and 5.2% of all winter highway travel in the region were work related (California Department of Transportation 1979). Estimates of recreation-related expenditures are shown in Table 3N-9, based on the assumptions that 95% of all travel-related spending in Mono and Inyo Counties is related to recreation and tourism and that travel-related spending in Mono and Inyo Counties between 1986 and 1989 varied in proportion to the region's taxable sales. An estimated \$339 million was spent on recreation and tourism purchases in the region in 1989, an increase of 49% over the 1983 spending level.

During summer, recreation activities in the region focus on its lakes and streams, including the lakes and streams that could be affected by amendments of Mono Basin water rights. In contrast, winter recreation focuses primarily on downhill skiing, which would not be affected by potential water-rights amendments. The relative importance to the region of summer versus winter recreation is indicated by the seasonal distribution of regional expenditures on lodging. Between 1990 and 1991, 39% of the total regional expenditures on lodging in Mono County occurred between April and September, while 61% occurred between October and March (Wilmot and Mooneyham pers. comms.).

Recreational activity in the region is probably less skewed toward the winter season than is suggested by the seasonal distribution of lodging expenditures, however, because a large share of summer overnight use involves camping, which results in lower per-night expenditures than other forms of lodging. In 1979, 37% of summer overnight travelers surveyed stayed in campgrounds, compared to only 8% of winter overnight travelers (California Department of Transportation 1979).

**Employment.** Estimates of employment generated by recreation-related spending in Mono and Inyo Counties for 1983-1989 are shown in Table 3N-10. Recreation-related employment increased by approximately 1,900 jobs (52%) over the 7-year period, and the share of regional employment accounted for by recreation increased from 32% to 40% over this period.

**Personal Income.** Payroll income (in constant 1989 dollars) related to recreation and tourism for 1983-1989 is shown in Table 3N-11. Real income generated by recreation increased by 45% over the 7-year period, and the average annual real earnings per payroll job decreased from \$11,700 and \$11,200 (4%) over the period.

In 1989, recreation-related employment accounted for 28% of the region's total wages and salaries. This share is lower than the share of employment related to recreation (40%). This discrepancy results from the seasonal nature of recreation-related jobs and their relatively low salaries.

**Affected Recreation Resources.** This section discusses levels of spending generated by visits to the recreation areas that could be directly affected by amendments of Mono Basin water rights, and the contributions to regional employment and personal income associated with these expenditures.

**Mono Lake.** Spending patterns of Mono Lake users were analyzed through a 1992 survey of approximately 300 visitors to the lake. Respondents were asked how much money they spent or intended to spend on groceries and supplies, restaurants, lodging, camping, automotive items, and other items while visiting Mono and Inyo Counties. Results indicate that visitors to Mono Lake spend on average \$15.79 per day per person on travel-related purchases (in 1989 dollars) while visiting the region. Local areas benefiting from visitor expenditures include Lee Vining, Mammoth Lakes, and Bishop.

Between 1985 and 1989, annual use of Mono Basin National Forest Scenic Area, which includes all lands in Mono Lake Tufa State Reserve, averaged approximately 270,200 visitor days, of which most use was associated with Mono Lake. Assuming an average daily expenditure of \$15.79, visitors to the Scenic Area account for an estimated \$4.3 million in annual regional expenditures. Because not all use of lands within the Scenic Area is associated with Mono Lake, some portion of these expenditures is not attributable to Mono Lake visitation.

**Lower Reaches of the Mono Lake Tributaries.** Use of the lower reaches of Lee Vining, Rush, Parker, and Walker Creeks has been negligible since these reaches were dewatered in the 1940s. Between 1985 and 1990, annual use of the four reaches averaged roughly 370 visitor days (Table 3J-1). Based on a 1991 survey of approximately 200 tributary users, recreationists spend, on average, \$9.65 per visitor day on travel-related purchases while recreating at the tributaries. Users of the lower tributaries thus generate approximately \$3,600 in annual regional expenditures, most of which likely occurs in Lee Vining.

**Grant Lake Reservoir.** Based on a 1991 survey of 100 Grant Lake reservoir users, expenditures for groceries, restaurants, lodging, camp sites, and automotive and boating needs averaged \$9.72 per visitor day. Between 1986 and 1991 (excluding 1989), annual use of Grant Lake reservoir averaged approximately 46,200 visitor days. Annual travel-related expenditures by Grant Lake reservoir visitors over this period thus averaged approximately \$449,100. Local expenditures likely occur in Lee Vining, the June Lake Loop area, and, possibly, Mammoth Lakes.

**Lake Crowley Reservoir.** Based on surveys of 300 visitors to Lake Crowley reservoir in 1991 and 1992, travel-related expenditures by visitors averaged approximately \$14.48 per visitor day. Between 1988 and 1991, total use of Lake Crowley reservoir averaged approximately 127,700 visitor days per year. Use of Lake Crowley reservoir thus resulted in regional expenditures averaging \$1.8 million per year. Local spending generated by use of Lake Crowley reservoir would primarily occur in Mammoth Lakes, Bishop, and Toms Place.

**Owens River.** Approximately half of the 15 miles of the Upper Owens River between Big Springs and Lake Crowley reservoir is publicly accessible, and the other half has restricted access.

Annual use of the public and private reaches averages approximately 21,000 and 6,000 visitor days, respectively.

Users of the *private* reach of the Upper Owens River are estimated to spend approximately \$50 per day on travel-related items, based on daily lodging costs of about \$40 per person and on other costs of an estimated \$10 per person per day. Based on results from lower tributary user surveys, users of the *public* reach are estimated to spend about \$10 per person in an average day. Based on the estimated number of visitors days in 1987 (Table 3J-5), Upper Owens River users generated approximately \$407,000 in 1987 in regional expenditures. Local spending associated with use of the Upper Owens River would occur primarily in Mammoth Lakes and Bishop.

## **Aquaculture**

Aquaculture operations that could be affected by amendments to Mono Basin water rights include a brine shrimp operation at Mono Lake and a trout-raising operation along the Upper Owens River in Long Valley.

Brine shrimp have been harvested from Mono Lake by a single operator, High Sierra (and its predecessor Jungle Laboratories Corporation), for approximately 30 years. High Sierra is the only harvester of brine shrimp in Mono Lake. High Sierra focuses on providing brine shrimp to markets characterized by quality-conscious tropical fish hobbyists, and is believed to be the second largest producer of brine shrimp in the United States (Lai and Insalata 1980).

Shrimp harvesting production levels have varied with changes in the level of effort expended by the company and the introduction of improved harvest technology (including more frequent sampling to locate areas where shrimp density is greater). No direct relationship between harvest amounts and lake levels has been identified; consequently, changes in LADWP operations under the project alternatives are not expected to affect brine shrimp aquaculture operations.

Alpers' Owens River Ranch (Alpers Ranch) is a diversified family-operated business that includes a trout hatchery operation, a limited number of grazing cattle, and a nine-cabin resort for catch-and-release fishing of wild trout (the largest financial contributor). One permanent and two temporary employees are hired to work at the trout hatchery. Although trout migrate upstream to spawn naturally on the property, the trout hatchery operations rely on transplanted fingerlings and are not directly dependent on the migration of wild trout. Consequently, changes in flows in the Upper Owens River resulting from implementation of the project alternatives are not expected to affect trout hatchery operations. (Alpers pers. comm.)

## LADWP Service Area

LADWP provides water and power to its service area population within the City of Los Angeles. The service area population has grown unevenly over the past 50 years. The 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, representing approximately 1.3 million households.

LADWP obtains its water from local wells, the Los Angeles Aqueduct (LA Aqueduct), the Metropolitan Water District of Southern California (MWD), and reclaimed water. The estimated 1990 total costs of water obtained from these sources are shown in Table 3N-12. As shown, the LA Aqueduct and MWD are by far the largest components of LADWP's estimated \$93.9 million water supply costs (based on a supply of 689.9 thousand acre-feet [TAF] of water). Because of cost factors, LADWP generally maximizes the use of LA Aqueduct and well water before it purchases additional MWD water.

LADWP's electrical load is served by a variety of resources, including hydroelectric generating facilities located in the Owens River gorge and the Owens Valley and along the LA Aqueduct. Other generating resources include the Castaic and Hoover hydroelectric facilities, and nuclear-, coal-, oil-, and gas-fueled power stations (Chapter 3M, "Power Generation").

Fixed operation and maintenance (O&M) and fuel expenses incurred by LADWP to generate electricity during 1989 totaled about \$886.5 million (ER-90 Report). Table 3N-13 illustrates the distribution of these costs among generating resources. O&M expenses associated with hydroelectric facilities totaled \$17.1 million, or 1.9% of total fixed O&M and fuel costs during 1989. The average fixed cost for the hydroelectric facilities, including those potentially affected by changes in Mono Basin exports, was approximately 0.8 cents per kilowatt-hour (kWh) during 1989.

## IMPACT ASSESSMENT METHODOLOGY

Changes in LADWP diversions from Mono Basin will have economic effects in the Mono and Inyo Counties region, the LADWP service area, and elsewhere in California. Effects in the Mono and Inyo Counties region would result from changes in agricultural production and recreation activities, and associated direct and secondary impacts on the regional economy. Effects in the LADWP service area are associated with direct changes in power generation and water supplied by the LA Aqueduct; related indirect effects are also likely to occur in other regions.

This section describes the methods used to assess the economic effects of the project alternatives. The analysis focuses on estimating the economic value of predicted changes in the uses and services directly supported by water from the diverted tributaries. These uses and services include:

- # agricultural production in Mono Basin and Upper Owens River basin;
- # recreation activity at Mono Lake, the lower tributaries, Grant Lake reservoir, Upper Owens River, and Lake Crowley reservoir;
- # power generation along the LA Aqueduct;
- # consumptive water supply in the City of Los Angeles; and
- # protection of public trust resources at Mono Lake.

Changes in the economic value of uses and services are measured in appropriate monetary terms and presented in a benefit-cost analysis.

In addition to estimating the economic value of predicted changes in the uses and services identified above, potential changes in regional economic activity in Mono and Inyo County related to changes in agricultural production and recreation activity are analyzed. Potential indirect effects of changes in LADWP's water supply and power generation on parties in other regions also are considered.

The economic effects analyzed in this chapter are not evaluated in terms of impact significance; however, the results of water supply and power generation economic analyses were used to assess the significance of predicted physical changes on resources discussed in other chapters (i.e., Chapter 3L, "Water Supply", and Chapter 3M, "Power Generation"). This approach to using economic information to assess the significance of physical changes is consistent with the State CEQA Guidelines (Section 15064[f]).

### **Impact Prediction Methodology**

The uses and services directly affected by the project alternatives were analyzed over a 20-year period that extends from 1992 to 2011. The methods used to analyze the economic effects of each directly affected use or service are described below.

#### **Agriculture Production in the Mono and Inyo Counties Region**

The project alternatives would affect irrigation and agricultural activities, primarily sheep and cattle production, in Mono Basin and along the Upper Owens River. The economic analysis focused on determining changes in the value of agricultural production associated with the alternatives. Changes in

production value are used as a proxy for the incremental cost that operators would incur to replace forage produced on irrigated pasture on LADWP lands.

Livestock production in Mono Basin and along the Upper Owens River depends on forage production, which, in turn, depends on the amount of water available for irrigation of pastures. Determining changes in livestock production in the study area is complicated because sheep and cattle are moved from area to area to maximize the harvesting of forage and to avoid subjecting the animals to harsh weather conditions. Forage production, however, is more directly linked to the amount of water available for irrigation.

The analysis of changes in production value required several steps. First, forage production was estimated by converting streamflows and irrigation releases for the four diverted streams to irrigated acreage based on an assumed annual irrigation rate of 5 af per acre. Results of the Los Angeles Aqueduct Monthly Program (LAAMP) operations model were used to perform this analysis. Forage production on irrigated lands was then estimated using a production rate of 4.5 AUMs per acre. Finally, production value of forage produced by irrigated lands was estimated using a forage unit value of \$4.00 per AUM. This rate is similar to the base rate charged by LADWP in 1989 for good, irrigated pasture.

These procedures were followed to estimate the annual production value of irrigated lands under the point of reference and each project alternative. The values for each alternative were then compared to the values for the point of reference to estimate the incremental change in production value under each alternative, which is used as a proxy for the incremental cost incurred by operators.

## **Recreation Activity in the Mono and Inyo Counties Region**

The project alternatives would affect recreation opportunities and use at different recreation areas in Mono and Inyo Counties. The economic analysis of recreation effects focused on determining the changes in recreation use and spending, and user benefits at recreation areas directly affected by changes in water availability.

**Recreation Use and Spending.** Projections of recreation use and spending were made for five recreation areas in the region that would be directly affected by the project alternatives. These areas include Mono Lake, the lower reaches of the four diverted tributaries of Mono Lake, Grant Lake reservoir, the Upper Owens River, and Lake Crowley reservoir.

Baseline levels of annual visitor days were estimated for each area from recreation use information in Table 3J-1 (Chapter 3J, "Recreation Resources"). Baseline levels were estimated by averaging the number of annual visitor days reported in Table 3J-1 for each area over the period shown. The estimate of baseline visitor days for each area was as follows: Mono Lake, 168,000 days (the number of days to the Mono Lake Tufa State Reserve); the lower reaches of the Mono Lake tributaries, 370 days; Grant Lake reservoir, 46,200 days; Lake Crowley reservoir, 127,750 days; and the Upper Owens River, 18,300 days.

Baseline visitor-day totals were then adjusted to account for projected population growth in California over the 20-year analysis period using a 1.77% compound growth rate projected by the California Department of Finance (1991). The predicted number of visits by persons who resided within and outside the two-county area was estimated to allow for subsequent analysis of changes in regional economic activity by visitors. This disaggregation was performed based on origin information of visitors from the user surveys.

Annual use projections over the 20-year projection period were then made for each recreation area under the point-of-reference scenario and each alternative. These projections were developed based on the relationships of changes in per-visitor use at each recreation area to streamflows and lake levels. (Additional details of the use-estimating methodology for the affected areas are included in Chapter 3J, "Recreation Resources", and Appendix W.) LAAMP model projections were used to perform the analysis. For Mono Lake, annual median lake levels under each alternative were used to estimate annual visitation. For the tributaries, Grant Lake reservoir, and Lake Crowley reservoir, median water conditions over the recreation season (May-October) corresponding to 10%, 50%, and 90% water-year frequencies (i.e., dry, normal, and wet years, respectively) were used to estimate visitation for each year over the 20-year hydrologic sequence.

Spending profiles for each recreation area developed from the recreation user surveys were then applied to the use estimates by locals and nonlocal visitors to estimate regional recreation expenditures for the point of reference and each project alternative.

**Recreation Benefits.** Outdoor recreation typically provides user benefits that exceed participation costs. These recreation benefits can be measured in terms of users' willingness to pay over and above what they currently pay for the opportunity to participate in different recreation activities. Estimates of net willingness to pay by users are the appropriate economic measure of recreation benefits for benefit-cost analysis.

Several methods are available for estimating recreation benefits or net willingness to pay for recreation opportunities. For this analysis, the contingent valuation method was used in which visitors were asked in onsite interviews if they would pay a specific dollar amount for alternative streamflow or lake level conditions at the directly affected recreation areas. Surveys were conducted at Mono Lake, the lower tributaries, Grant Lake reservoir, and Lake Crowley reservoirs. The streamflow and lake level conditions that were presented to survey respondents are described in Appendix W.

The survey data were then analyzed using statistical models to estimate users' willingness to pay for different streamflow or lake level conditions. Estimates of the mean and median willingness to pay by the sample of visitors were calculated. (Refer to Appendix X for additional details of the analyses.)

Because the surveys were developed before hydrologic conditions of the alternatives were known, the streamflow and lake level conditions described in the surveys did not correspond exactly with the LAAMP results for the project alternatives. Consequently, the estimates of willingness to pay had to be

interpreted to approximate values for the point of reference and project alternatives. The procedures used to perform this analysis also are described in Appendix X.

Estimates of average willingness to pay per visitor (or per visitor day) for the streamflows and lake level conditions associated with the diversion alternatives were then expanded to the population of visitors to estimate total willingness to pay. The predicted number of annual visitor days at each recreation area was divided by the average (mean) number of days per visitor to estimate the number of annual visitors. This number was then multiplied by the average willingness to pay per visitor to estimate total willingness to pay for the recreation opportunities provided by each alternative. Estimates of recreation benefits were not made for some recreation areas under certain alternatives because information was not available for estimating willingness to pay for the conditions associated with the alternative.

## **Regional Economic Effects**

Changes in agricultural production and recreation activity would affect economic activity within the Mono and Inyo County region. The analysis of regional economic effects focused on estimating direct and secondary effects on economic output, employment, and personal income from changes in agricultural production and recreation activity of the project alternatives.

Direct effects of alternative levels of agricultural production were estimated based mostly on information obtained from interviews with operators. Estimating direct employment and personal income effects of the alternatives is complicated because of the complex rotations used by livestock producers, especially sheep producers, who operate in the study area and because forage production losses may be replaced, to some extent, by forage or feed produced elsewhere. Notwithstanding these issues, the incremental change in employment and personal income associated with alternative production levels was estimated.

Direct effects of alternative levels of recreation activity were estimated by applying employment and income coefficients from the IMPLAN input-output model, which was developed by the USFS, to estimates of regional spending by nonlocal visitors under each alternative. Spending by nonlocal visitors was used to isolate effects on the region that could result if visitors chose not to visit the region. Spending by local residents was not included because it was assumed that if they changed recreation habits, they would still make expenditures elsewhere in the region (for recreation or other goods and services); therefore, their contribution to regional spending would not change.

Estimates of secondary employment and personal income in Mono County and Inyo Counties under the point of reference and project alternatives also were calculated using the IMPLAN model. Agricultural production values projected for each alternative were used with IMPLAN multipliers to estimate total employment and personal income changes within Mono and Inyo Counties. Projected changes in recreation were applied to appropriate IMPLAN coefficients to estimate total impacts on regional industrial output, personal income, and employment.



## **Consumptive Water Supply in the City of Los Angeles**

Changes in water exports from Mono Basin to Los Angeles would affect LADWP costs of meeting future demands for water. The economic analysis of water supply effects focused on estimating the incremental costs to LADWP to meet future water demands based on predicted changes in supplies from Mono Basin. Changes in water deliveries predicted by the LAAMP model over the 20-year projection period were used in the analysis.

As described in detail in Chapter 3L, "Water Supply", a water supply simulation model that balances annual supply and demand conditions was developed to estimate LADWP's water supply costs for each year over the 20-year analysis period. The model relies on use of increasingly more-expensive sources of water to meet the demands. The simulation model estimates the cost of LADWP's mix of water supplies for the point of reference and each alternative. The incremental change in costs relative to point-of-reference conditions represents the direct economic effect of water supply changes.

In addition to analyzing the direct economic effects on LADWP of the project alternatives, indirect economic effects resulting from LADWP consuming more of the regional supplies provided by MWD were evaluated. LADWP is projected to replace lost Mono Lake supplies by using additional groundwater and reclaimed water and by purchasing additional water from MWD. LADWP's additional purchases of water from MWD would indirectly affect MWD's other member agencies by reducing the availability of MWD supplies.

The evaluation of indirect effects assumes that other MWD member agencies would need to develop other water supplies that are more expensive than MWD supplies. Indirect costs to MWD member agencies of replacing MWD supplies with more expensive alternative supplies were approximated by estimating the average cost differential between MWD supplies and reclamation, which is used as the least-cost alternative, and applying this estimate of incremental costs to the projected amount of increased purchases of water by LADWP from MWD (relative to point of reference) to offset water losses from the LA Aqueduct. The cost differential was estimated by subtracting the projected 20-year average cost of MWD water (\$639/af) from the estimated cost of reclaimed water from developing a dual distribution system (\$800/af), as identified by the City of Los Angeles Office of Water Reclamation (1990).

## **Power Generation from LA Aqueduct Hydroelectric Generation Facilities**

Changes in water exports from Mono Basin to Los Angeles would affect LADWP costs of meeting future demands for energy. The economic analysis of power generation effects focused on estimating the incremental costs to LADWP to meet future power demands considering changes in energy output from

the LA Aqueduct facilities. Predicted changes in power generation were estimated using results of the LAAMP model over the 20-year projection period.

As fully described in Chapter 3M, "Power Generation", power generation impacts were assessed in a three-step process. First, the amounts of energy available from LA Aqueduct hydroelectric generating facilities for alternative water diversion levels were determined on a monthly basis by applying efficiency values for each hydroelectric plant (in kWh per af) to the amounts of water diverted through the plants. The capacity available from aqueduct facilities for given water-diversion scenarios was determined on a monthly basis by applying multipliers determined from a review of historical operation data to the monthly energy production data for each group of hydroelectric plants.

The second step was to use the aqueduct generation information to develop input data representing the aqueduct facilities for the ELFIN production model (see Chapter 3M, "Power Generation"). The amounts and associated costs of energy produced by LADWP's nonaqueduct resources for a given level of aqueduct generation were determined using the ELFIN model.

Step three consisted of performing a comparative analysis of the output of ELFIN simulations representing different levels of aqueduct energy production and capacity availability, and differing levels of energy production and capacity utilization from LADWP's non-aqueduct resources. The results of these simulations were compared to identify changes in LADWP's fuel costs for each alternative.

In addition to analyzing direct costs to LADWP of the project alternatives, indirect effects resulting from additional purchases of energy from other power suppliers were considered. Approximately 20-25% of the energy needed to replace supplies from the LA Aqueduct would come from other purchases. LADWP, which has sufficient capacity over the near- and mid-term to replace these supplies, is expected to obtain energy from existing contracts, which could reduce the amount of less expensive energy available to other utilities. Because the amount of energy purchased from other sources is small, however, the potential effect is considered minimal and is not further evaluated in this analysis.

## **Protection of Public Trust Resources of Mono Lake**

Protecting Mono Lake's natural environment provides social benefits. The economic analysis focused on estimating the public's willingness to pay for different levels of resource protection at Mono Lake.

The contingent valuation method was used to estimate the public's willingness to pay for resource conditions associated with alternative lake levels. A survey of 600 California households was conducted. The survey included contacting households initially by telephone to solicit participation. Survey materials, including a pamphlet describing and visually depicting Mono Lake under alternative lake level conditions, were then mailed to survey participants. A followup interview was conducted by telephone at a predetermined time.

The followup survey included several questions designed to elicit the respondents' willingness to pay for resource conditions at Mono Lake at alternative lake levels. Questions were asked about resource conditions associated with lake levels at 6,375 feet, 6,390 feet, and 6,410 feet. The survey questions were structured in the form of a voter referendum, and respondents were asked whether they would pay different amounts for state-sponsored bonds in which the revenues would be used to purchase additional water supplies for Mono Lake. The survey respondent were told that if a program was not passed by the voters, the lake would drop to 6,372 feet above sea level.

The survey data were analyzed using statistical models described in detail in Appendix X. The average (mean and median) willingness to pay of respondents for the three programs was estimated. These averages were then used to estimate total willingness to pay by state residents for the different lake level alternatives. Procedures used to expand the sample results to the population are also described in Appendix X. Because of data limitations, no estimates were made for the No-Diversion Alternative.

### **Criteria for Determining Impact Significance**

As suggested in the State CEQA Guidelines, the economic effects evaluated in this analysis are not assessed in terms of their impact significance; however, some results are used to assess the significance of physical changes described in other chapter (see Chapter 3L, "Water Supply", and Chapter 3M, "Power Generation").

### **SUMMARY COMPARISON OF COSTS AND BENEFITS OF THE ALTERNATIVES**

As described in the "Impact Assessment Methodology" section, relative economic effects are assessed in this section through several key variables:

- # agricultural production in the Mono and Inyo Counties region;
- # recreation use, spending, and benefits at directly affected recreation areas in the Mono and Inyo region;
- # consumptive water supply costs to the City of Los Angeles;
- # power generation costs to the City of Los Angeles; and
- # preservation values associated with public trust resources at Mono Lake.

Table 3N-14 provides a summary comparison of the average annual economic benefits and costs associated with the project alternatives relative to point-of-reference conditions. The costs include water

supply and power generation costs to the City of Los Angeles. Impacts on the value of agricultural production in Mono and Inyo Counties are not included in the table because they average less than \$35,000 per year. The benefits are preservation values associated with public trust resources at Mono Lake and recreation benefits at affected areas in the region. As noted in the table, the recreation benefits at Mono Lake are not included in the net economic benefits because they are already included in the Mono Lake preservation value.

As the table shows, the No-Restriction Alternative decreases water supply and power generation costs for the City of Los Angeles, but also reduces recreation benefits and results in a substantial loss of preservation values. Compared to the point-of-reference conditions, all other alternatives involve higher lake levels that increase water supply and power generation costs for the City of Los Angeles. Recreation benefits and preservation values also increase for other alternatives, except for those above 6,390 feet.

As indicated in Appendix X, a majority of the respondents to the contingent valuation survey regarded higher lake levels as undesirable because of the negative impacts on tufa towers and snowy plover habitat. Some respondents clearly regarded lake levels above 6,390 feet as desirable despite these negative impacts, but most were willing to pay little, if anything, to secure lake levels above 6,390 feet. Given these different preferences, a survey much larger than the one conducted for this study would be required to measure willingness to pay for lake levels above 6,390 feet with the same precision as for lower lake levels. Results from the survey for this study suggest that the *median* willingness to pay for lake levels above 6,390 feet is zero. Even with a larger survey, it seems clear that the overall willingness to pay for lake levels above 6,390 feet would be significantly less than the willingness to pay for the 6,390-Ft Alternative.

The *marginal* benefits and costs associated with moving from one alternative to another are shown in Figure 3N-1 and Table 3N-15. The marginal benefits exceed the marginal costs for all alternatives up to and including 6,390 feet; consequently, net economic benefits are maximized by the 6,390-Ft Alternative. Because the marginal benefit from higher lake levels is several times greater than the marginal cost for the 6,390-Ft Alternative, the marginal benefits could be reduced by as much as 70-80% and the alternative would still be optimal from the standpoint of net economic benefits (i.e., the marginal benefit curve still lies above the marginal cost curve). The marginal benefits curve drops below the marginal costs curve at lake levels above 6,390 feet (Figure 3N-1) and remains below for the higher lake-level alternatives.

This "robustness" in the results is important because of the substantial degree of uncertainty associated with projecting costs and benefits over the entire 20 years of the analysis period. The uncertainty is likely to be especially important for the estimate of Mono Lake preservation benefits. Although the survey to determine preservation values explicitly asked about paying higher taxes for each year over the next 20 years, respondents can have difficulty projecting their willingness to pay far into the future because preferences often change. Consequently, for the later part of the analysis period some doubt

exists about the willingness to pay. This uncertainty could affect the estimates of average annual preservation value. This issue could be addressed by differentially discounting the preservation values; however, the preservation values could be discounted substantially without affecting the conclusion that the 6,390-foot level is the preferred alternative from an economic point of view.

Regional effects of changes in economic activity in the Mono and Inyo Counties were analyzed, but are not reported in Table 3N-14. These effects, which are measured in terms of employment and personal income, result from changes in agricultural production and recreation activity. As described in the "Impacts" section, these effects are relatively small. The 6,372-Ft, 6,377-Ft, 6,383.5-Ft, and 6,390-Ft Alternatives have a positive effect on economic output and personal income (refer to Table 3N-18); however, all alternatives result in a reduction in employment. Recreation spending is negatively affected by the lower lake alternatives, and agricultural production is negatively affected by the higher lake alternatives.

In addition to direct increases in water supply costs to LADWP, all alternatives, with the exception of the No-Restriction Alternative, would likely increase water supply costs to other members of MWD. Water supplies that are likely more expensive than purchases from MWD would need to be developed. These costs to other MWD members would range from an estimated \$2.5 million annually (6,372-Ft Alternative) to \$9.7 million annually (No-Diversion Alternative).

## **CHARACTERIZATION OF POINT-OF-REFERENCE CONDITIONS**

The point of reference reflects the base economic conditions to which effects of the project alternatives are compared. The point of reference differs from the seven alternatives in the economic value of uses and level of activity that are supported by the diverted water. The supported uses and services include agricultural production, recreation activity, and regional economic effects in the Mono and Inyo Counties region; consumptive water supply by the City of Los Angeles; power generation along the LA Aqueduct; and protection of public trust resources at Mono Lake.

### **Agricultural Production in the Mono and Inyo Counties Region**

Lands that would be directly affected by changes in streamflows and water availability include irrigated lands along the diverted tributaries in Mono Basin and along the Upper Owens River.

## **Irrigated Lands along Diverted Tributaries in Mono Basin**

Under point-of-reference conditions, maximum irrigation diversions from Lee Vining and Gibbs Creeks that are allowed for lands leased by the Mono Sheep Company and the Inyo Sheep Company would occur. Forage production from the 149 acres irrigated from Gibbs Creek and the Gibbs Siphon Valve by the Mono Sheep Company would be annually maintained at 670.5 AUMs. Based on a forage value of \$4.00 per AUM, the average annual value of agricultural production would be approximately \$2,680 (in constant 1992 dollars) over the 20-year period.

The amount of land irrigated by the Inyo Sheep Company from Walker and Parker Creeks would be limited periodically. Forage production would vary from a maximum of 8,298 AUMs to minimum of 5,653 AUMs and, over the 20-year evaluation period, would average 7,181 AUMs per year. The value of annual forage production would vary from approximately \$22,610 to \$33,190. The average annual value of production over the 20-year period would be \$28,720.

Total forage production from lands irrigated by the diverted tributary streams would range from 6,323 AUMs to 8,968 AUMs, and would average 7,852 AUMs, over the 20-year period. The annual value of agricultural production would vary from approximately \$25,290 to \$35,870 over the 20-year period, with an average annual value of approximately \$31,410 (Table 3N-16).

## **Lands Irrigated from the Upper Owens River**

Three private landowners and one LADWP lessee, J&L Livestock Company, irrigate from the Upper Owens River south of East Portal. Under point-of-reference conditions, adequate water would be available in the Upper Owens River during all years to meet the existing needs of the four agricultural water users. During dry years, however, flows may be too low to effectively divert water to irrigation ditches. In addition, low flows may inhibit the ability of gravity-flow ditches to deliver water to pastures on higher grounds, which would require modifying irrigation systems. The amounts of irrigated acreage, however, should not vary considerably from year to year.

Assuming that LADWP would not restrict irrigation by J&L Livestock Company to levels below those allowed by its current lease, forage production levels from lands irrigated from the Upper Owens River would be maintained at existing levels over the point-of-reference period. Forage production would average an estimated 6,047 AUMs over the 20-year period. Production values would average approximately \$24,190 over the same period (Table 3N-16).

## **Recreation Activity in the Mono and Inyo Counties Region**

Recreation areas that would be directly affected by the project alternatives are Mono Lake, the lower tributaries, Grant Lake reservoir, the Upper Owens River, and Lake Crowley reservoir.

### **Recreation Use and Spending**

Under point-of-reference conditions, recreational use of the five directly affected recreation areas would vary in response to changes in recreation opportunities. Similarly, spending within the two-county region associated with recreation at these areas would vary over the point-of-reference period in response to changes in use levels. Predicted average annual use and spending associated with recreation at each of these directly affected recreation areas under point-of-reference conditions are shown in Table 3N-17.

- # At Mono Lake, annual visitation would range from a projected 177,300-227,800 visitor days over the 20-year period, with an average of 195,900 visitor days. Based on average spending of \$15.78 per visitor day, annual spending within the two-county region associated with visitation to Mono Lake would average approximately \$3.1 million.
- # Along the lower reaches of the diverted tributaries, annual recreational use would range from a projected 230 to 830 visitor days over the 20-year period, with an average of 380 visitor days. Based on average spending of \$9.65 per visitor day, annual spending within the two-county region associated with recreational use of the Mono Lake tributaries would average approximately \$3,700.
- # At Grant Lake reservoir, annual recreational use would range from a projected 56,500 to 87,200 visitor days over the 20-year period, with an average of 68,800 visitor days. Based on average spending of \$9.72 per visitor day, annual spending within the two-county region associated with recreational use of Grant Lake reservoir would average approximately \$668,700.
- # Along the Upper Owens River, annual recreation use would range from a projected 19,300 to 26,900 visitor days over the 20-year period, with an average of 22,900 visitor days. Based on average spending of \$50 per visitor day on private lands and \$10 per visitor day on public lands, annual spending within the two-county region associated with recreation use along the Upper Owens River would average approximately \$513,000.
- # At Lake Crowley reservoir, annual recreational use would range from a projected 155,000 to 234,200 visitor days over the 20-year period, with an average of 191,900 visitor days. Based on average spending of \$14.48 per visitor day, annual spending within the two-county region

associated with recreational use of Lake Crowley reservoir would average approximately \$2.8 million.

## **Recreation Benefits**

Streamflows and lake level conditions associated with the point of reference would provide recreation opportunities that yield benefits to those who visit the directly affected recreation areas. Because the point of reference is used as the base condition to assess changes, recreation benefits of point-of-reference conditions are not estimated.

## **Regional Economic Effects in Mono and Inyo Counties**

Changes in agricultural production and recreational spending related to the project alternatives affect levels of economic activity within Mono and Inyo Counties. Both direct and indirect effects on employment and personal income in different sectors of the economy would occur. The following sections describe direct and total effects of economic activity associated with agricultural production and recreation spending. These effects are summarized in Table 3N-18.

### **Direct Effects**

The total value of agricultural production on irrigated lands along the diverted tributaries in Mono Basin and along the Upper Owens River would average \$55,600 annually. This production would generate approximately \$2,800 annually in personal income and approximately 15 person-years of full-time equivalent (FTE) employment (seven herders and two owner-operators in Mono Basin and 20 seasonal jobs in Long Valley). Employment would not substantially change over the 20-year period.

The projected \$6.7 million in annual recreation-related spending would provide an estimated \$2.7 million in personal income and support 122 FTE jobs in Inyo and Mono Counties. Most economic activity would occur in the retail trade, restaurant, lodging, and automobile services sectors. Much of the spending and resulting economic activity would occur in commercial centers near the affected recreation areas, such as Lee Vining, Bishop, and Mammoth Lakes.

Together, agricultural production and recreation-related spending would generate a projected \$6.7 million in industrial output, provide \$2.7 million in personal income, and support 137 FTE jobs within the region.



## **Total Regional Effects**

Agricultural production on irrigated lands along the diverted tributaries and the Upper Owens River would generate an average of \$85,200 annually in total industrial output in the two-county region (Table 3N-18). Total personal income within the region provided by these activities would be about \$12,600 annually. Total employment in the region supported by agricultural activities would be almost 40 FTE jobs annually.

Projected recreation-related spending associated with use of the five directly affected recreation areas would generate an estimated \$10.8 million annually in industrial output, provide \$4.1 million in personal income, and support 176 FTE jobs within the region.

Together, agricultural production and recreation spending would generate approximately \$10.8 million in industrial output, provide \$4.1 million in personal income, and support 216 FTE jobs.

## **Water Supply Costs to the City of Los Angeles**

Under point-of-reference conditions, average annual costs to meet the demand for water within the LADWP service area would total a projected \$174.9 million. A projected average of 442,000 acre-feet (af) of water from the LA Aqueduct would be delivered annually to LADWP over the 20-year period (Table 3N-19).

## **Power Generation Costs to the City of Los Angeles**

Under point-of-reference conditions, average annual fuel costs to LADWP to meet the demand for energy within the service area would be a projected \$675.5 million. Hydroelectric facilities along the LA Aqueduct system would annually generate a projected average of 1,038,000 megawatt hours (MWh) of electricity over the 20-year period (Table 3N-19).

## **Protecting Mono Lake's Public Trust Resources**

Resource conditions under the point of reference are used as a baseline to assess social benefits associated with changes from this condition. Consequently, benefits of maintaining point-of-reference conditions are not estimated.

## **IMPACTS OF THE NO-RESTRICTION ALTERNATIVE**

### **Agricultural Production in Mono and Inyo Counties Region**

#### **Irrigated Lands along Diverted Tributaries in Mono Basin**

Under the No-Restriction Alternative, irrigated lands leased by LADWP to the Mono and Inyo Sheep Companies would continue to receive water from Gibbs, Lee Vining, Walker, and Parker Creeks at historical levels. Agricultural production from irrigated lands over the 20-year period of analysis would be similar to levels under point-of-reference conditions (Table 3N-16).

#### **Lands Irrigated from the Upper Owens River**

Under the No-Restriction Alternative, private landowners with riparian water rights would continue to irrigate at levels similar to historical levels. The LADWP lessee irrigating from the Upper Owens River north of Lake Crowley reservoir would also continue to irrigate at historical levels. Consequently, agricultural production from irrigated lands along the Upper Owens River would be similar to levels under point-of-reference conditions over the 20-year period of analysis (Table 3N-16).

### **Recreation Activity in the Mono and Inyo Counties Region**

#### **Recreation Use and Spending**

Total visitation at the five affected recreation sites would decrease relative to the point of reference. As shown in Table 3N-17, projected annual average visitation would decrease from 479,880 to 476,460 visitor days under the No-Restriction Alternative. This change would occur primarily because of predicted reductions in visits to Mono Lake, which would more than offset increased recreational use of Grant Lake and Lake Crowley reservoirs.

Recreation spending within the region also would decrease. On average, annual recreation spending would decrease by a projected \$59,100, or 1.0%, relative to spending levels under point-of-reference conditions (Table 3N-17). Spending by visitors to Mono Lake would decrease, affecting retail, restaurant, and lodging establishments in Lee Vining, while spending by visitors to Grant Lake and Lake Crowley reservoirs would increase, benefiting communities such as Mammoth Lakes and Bishop.

## **Recreation Benefits**

Under the No-Restriction Alternative, the decline in recreation opportunities and use at Mono Lake and along the lower tributaries would result in a corresponding loss in recreation benefits (Table 3N-20). Increased opportunities and use of Grant Lake reservoir, Upper Owens River, and Lake Crowley reservoir would result in an increase in recreation benefits to those areas. Overall, recreation benefits would decrease by an estimated \$2.9 million annually.

## **Regional Economic Effects in Mono and Inyo Counties**

### **Direct Effects**

Under the No-Restriction Alternative, direct output, personal income, and employment generated by recreation spending would decline relative to point-of-reference conditions. No changes in agricultural output, personal income, and employment would occur. As shown in Table 3N-18, average industrial output would decrease by a projected \$65,700 annually. This reduction would result in a loss of \$26,200 in personal income and 1.2 FTE jobs.

### **Total Regional Effects**

Under the No-Restriction Alternative, total regional output, personal income, and employment would decline relative to point-of-reference conditions. The projected decrease in economic activity would be caused solely by reductions in regional recreation spending.

Average industrial output within Mono and Inyo Counties would decrease by a projected \$105,900 annually. This reduction would result in regional loss of 1.7 FTE jobs and \$40,100 in personal income annually (Table 3N-18).

## **Water Supply Costs to the City of Los Angeles**

Water deliveries to LADWP from the LA Aqueduct would increase under the No-Restriction Alternative. Annual water availability would average 449,700 af, compared to 442,000 af under point-of-reference conditions. Average water costs to meet the demand for water in the LADWP service area would decrease by a projected \$5.1 million annually, or 2.9% lower than average annual costs under the point of reference (Table 3N-19).

Under the No-Restriction Alternative, LADWP would purchase less water supplies from MWD, compared to point-of-reference conditions. Consequently, additional MWD supplies would be available to other MWD member agencies.

### **Power Generation Costs to the City of Los Angeles**

Hydroelectric energy generated from the LA Aqueduct system would slightly increase under the No-Restriction Alternative. Annual average power generation would average 1,072,000 MWh, compared to 1,038,000 MWh under point-of-reference conditions. Average fuel costs to meet the demand for energy in the LADWP service area would decrease by a projected \$1.2 million annually, or 0.2% lower than average annual costs under the point of reference (Table 3N-19).

### **Protecting Mono Lake's Public Trust Resources**

Under the No-Restriction Alternative, the elevation of Mono Lake would decline to 6,354 feet over the long term. Based on a survey of California households, the public's total willingness to pay to avoid resource conditions associated with this alternative is estimated at \$759.7 million. Consequently, implementing this alternative would incur an equivalent loss in social benefits.

## **IMPACTS FOR THE 6,372-FT ALTERNATIVE**

### **Agricultural Production in the Mono and Inyo Counties Region**

#### **Irrigated Lands along Diverted Tributaries in Mono Basin**

Under the 6,372-Ft Alternative, LADWP would terminate irrigation releases from Gibbs, Lee Vining, Walker, and Parker Creeks. Lands currently irrigated from these creeks would no longer be irrigated and would likely be used for dryland grazing.

The loss of forage would substantially affect the operations of the Mono and Inyo Sheep Companies. The forage provides feed for approximately 6,500-8,000 sheep during the 5- to 6-month summer grazing season and accounts for approximately 50% of the forage available to the Mono and Inyo Sheep Companies in Mono Basin. This loss of forage would require these operators to either reduce herd sizes or obtain summer forage elsewhere. Either option would likely result in adverse changes in net revenues for the two operations.

The decrease in forage value in Mono County would annually average \$31,410 over the 20-year period of analysis (Table 3N-16). This decrease would represent approximately 3.7% of the total value of irrigated pasture and 0.3% of total agricultural production in Mono County in 1989.

### **Lands Irrigated from the Upper Owens River**

Under the 6,372-Ft Alternative, flows in the Upper Owens River would be adequate during virtually all years to allow for irrigation of pastures along the river; inadequate flows would occur in July in 1 in 20 years. These low flows would affect an estimated 310 of the 1,821 acres typically irrigated from the Upper Owens River, resulting in an average annual production loss of 16 acres over the 20-year period. The production value generated by forage production along the Upper Owens River would be slightly lower than levels under the point-of-reference conditions (Table 3N-16).

## **Recreation Activity in the Mono and Inyo Counties Region**

### **Recreation Use and Spending**

Total visitation at the five directly affected recreation sites would increase relative to the point of reference. As shown in Table 3N-17, projected annual average visitation would increase from 479,880 to 492,260 visitor days under the 6,372-Ft Alternative. This change would occur primarily because of increased visits to Mono Lake, which would more than offset reductions in recreational use of Grant Lake and Lake Crowley reservoirs.

Recreation spending within the region also would increase. On average, annual recreation spending would increase by a projected \$224,700, or 3.2%, relative to spending levels under point-of-reference conditions (Table 3N-17). Spending by visitors to Mono Lake and the Upper Owens River would increase, benefiting retail, restaurant, and lodging establishments in Lee Vining, whereas spending by visitors to Grant Lake and Lake Crowley reservoirs would decrease, potentially affecting communities such as Mammoth Lakes and Bishop.

### **Recreation Benefits**

Under the 6,372-Ft Alternative, the increase in recreation opportunities and use at Mono Lake and Upper Owens River would result in a corresponding increase in recreation benefits (Table 3N-20). Decreased opportunities and use at Grant Lake and Lake Crowley reservoirs would result in a decrease in recreation benefits at those areas. Overall, recreation benefits would increase by an estimated \$428,900 annually.

## **Regional Economic Effects in Mono and Inyo Counties**

### **Direct Effects**

Under the 6,372-Ft Alternative, direct output generated by agricultural production would decrease by approximately \$31,500 annually, while average annual recreation spending would increase by approximately \$223,500. These effects would result in a net increase in industrial output of \$192,000 annually compared to point-of-reference conditions. Personal income within the region would increase by \$87,500; however, the number of jobs would decrease by an estimated 0.9 FTE (Table 3N-18).

### **Total Regional Effects**

Under the 6,372-Ft Alternative, total regional output and personal income would increase and total regional employment would decrease, relative to point-of-reference conditions. The projected increase in regional economic activity would result from increased spending on recreation, offsetting reductions in agricultural production.

Average industrial output within Mono and Inyo Counties would increase by a projected \$311,900 (Table 3N-18). Personal income would increase by an average of \$129,400 annually. Total employment within the region, however, would decrease by 7.3 FTE jobs relative to point-of-reference conditions. Large secondary job losses resulting from reductions in agricultural production would more than offset secondary employment growth associated with increased recreation spending.

## **Water Supply Costs to the City of Los Angeles**

Water deliveries to LADWP from the LA Aqueduct would decrease under the 6,372-Ft Alternative. Annual water deliveries would average 425,100 af, compared to 442,000 af under point-of-reference conditions. Average water costs to meet the demand for water in the LADWP service area would increase by a projected \$10.8 million annually, or 6.2% higher than average annual costs under the point of reference (Table 3N-19).

Under the 6,372-Ft Alternative, LADWP would purchase a projected average of 15,260 af of additional water annually from MWD compared to point-of-reference conditions. Based on an estimated cost differential of \$161 per af, other MWD member agencies could incur an additional cost of \$2.5 million annually to replace less expensive MWD supplies.

## **Power Generation Costs to the City of Los Angeles**

Hydroelectric energy generated from the LA Aqueduct system would slightly decrease under the 6,372-Ft Alternative. Annual power generation would average 1,005,000 MWh annually, compared to 1,038,000 MWh under point-of-reference conditions. Average fuel costs to meet the demand for energy in the LADWP service area would increase by a projected \$1.9 million annually, or 0.3% higher than average annual costs under the point of reference (Table 3N-19).

### **Protecting Mono Lake's Public Trust Resources**

Under the 6,372-Ft Alternative, the elevation of Mono Lake would be at 6,375 feet over the long term. This level is comparable to the point of reference (6,376 feet) and therefore would have no measurable effect on social benefits associated with protecting Mono Lake's public trust resources.

## **IMPACTS FOR THE 6,377-FT ALTERNATIVE**

### **Agricultural Production in the Mono and Inyo Counties Region**

#### **Irrigated Lands along Diverted Tributaries in Mono Basin**

Under the 6,377-Ft Alternative, LADWP would terminate irrigation releases from Gibbs, Lee Vining, Walker, and Parker Creeks. Lands currently irrigated from these creeks by LADWP lessees would no longer be irrigated. Forage production and production value effects would be the same as those described above for the 6,372-Ft Alternative (Table 3N-16).

#### **Lands Irrigated from the Upper Owens River**

Under the 6,377-Ft Alternative, flows in the Upper Owens River would be adequate during virtually all years to allow for irrigation of pastures along the river. Inadequate flows would occur in June and July in 1 in 20 years, resulting in production effects similar to those described for the 6,372-Ft Alternative (Table 3N-16).

## **Recreation Activity in the Mono and Inyo Counties Region**

### **Recreation Use and Spending**

Total visitation at the five directly affected recreation sites would increase relative to the point of reference. As shown in Table 3N-17, projected annual average visitation would increase from 479,880 to 493,940 visitor days under the 6,377-Ft Alternative. This change would occur primarily because of increased visits to Mono Lake, which would more than offset reductions in recreational use of Grant Lake and Lake Crowley reservoirs.

Recreation spending within the region also would increase. On average, annual recreation spending would increase by a projected \$247,500, or 3.5%, relative to spending levels under point-of-reference conditions (Table 3N-17). Spending by visitors to Mono Lake would increase, benefiting retail, restaurant, and lodging establishments in Lee Vining, while spending by visitors to Grant Lake and Lake Crowley reservoirs would decrease, potentially affecting communities such as Mammoth Lakes and Bishop.

### **Recreation Benefits**

Under the 6,377-Ft Alternative, the increase in recreation opportunities and use at Mono Lake and along the tributaries would result in a corresponding increase in recreation benefits (Table 3N-20). Decreased opportunities and use at Grant Lake reservoir, Upper Owens River, and Lake Crowley reservoir would result in a decrease in recreation benefits at those areas. Overall, recreation benefits would increase by an estimated \$1.1 million annually.

## **Regional Economic Effects in Mono and Inyo Counties**

### **Direct Effects**

Under the 6,377-Ft Alternative, direct output generated by agricultural production would decrease by approximately \$31,500 annually, while average annual recreation spending would increase by approximately \$256,900. These effects would result in a net increase in industrial output of \$225,400 annually, compared to point-of-reference conditions. Personal income within the region would increase by \$100,800 and the number of jobs would decrease by an estimated 0.3 FTE (Table 3N-18).



## **Total Regional Effects**

Under the 6,377-Ft Alternative, total regional output, personal income, and employment would increase relative to point-of-reference conditions. The projected increase in regional economic activity would result from increased spending on recreation relative to point-of-reference conditions, offsetting reductions in agricultural production.

Average industrial output within Mono and Inyo Counties would increase by a projected \$365,700 (Table 3N-18). Personal income would increase by an average of \$149,800 annually; however, employment losses caused by decreased agricultural production would exceed increased employment by increased recreation spending, resulting in a net decrease of 6.4 FTE jobs.

### **Water Supply Costs to the City of Los Angeles**

Water deliveries to LADWP from the LA Aqueduct would decrease under the 6,377-Ft Alternative. Annual water deliveries would average 413,900 af, compared to 442,000 af under point-of-reference conditions. Average water costs to meet the demand for water in the LADWP service area would increase by a projected \$16.5 million, or 9.5% higher than average annual costs under the point of reference (Table 3N-19).

Under the 6,377-Ft Alternative, LADWP would purchase a projected average of 26,410 af of additional water annually from MWD compared to point-of-reference conditions. Based on an estimated cost differential of \$161 per af, other MWD member agencies could incur an additional cost of \$4.3 million annually to replace less expensive MWD supplies.

### **Power Generation Costs to the City of Los Angeles**

Hydroelectric energy generated from the LA Aqueduct system would slightly decrease under the 6,377-Ft Alternative. Annual power generation would average 984,000 MWh annually, compared to 1,038,000 MWh under point-of-reference conditions. Average fuel costs to meet the demand for energy in the LADWP service area would increase by a projected \$2.7 million annually, or 0.4% higher than average annual costs under the point of reference (Table 3N-19).

## **Protecting Mono Lake's Public Trust Resources**

Under the 6,377-Ft Alternative, the elevation of Mono Lake would be at 6,379 feet over the long term. The public's annual willingness to pay to ensure resource conditions associated with this lake level is estimated at \$22.9 million. This value reflects the social benefits of maintaining the lake at this level.

## **IMPACTS OF THE 6,383.5-FT ALTERNATIVE**

### **Agricultural Production in the Mono and Inyo Counties Region**

#### **Irrigated Lands along Diverted Tributaries in Mono Basin**

Under the 6,383.5-Ft Alternative, LADWP would terminate irrigation releases from Gibbs, Lee Vining, Walker, and Parker Creeks. Lands currently irrigated from these creeks by LADWP lessees would no longer be irrigated. Forage production and production value effects would be the same as those described above for the 6,372-Ft Alternative (Table 3N-16).

#### **Lands Irrigated from the Upper Owens River**

Under the 6,383.5-Ft Alternative, flows in the Upper Owens River would be adequate during virtually all years to allow for irrigation of pastures along the river. Inadequate flows would occur in May, June, and July in 1 in 20 years, resulting in production effects similar to those described for the 6,372-Ft Alternative (Table 3N-16).

### **Recreation Activity in the Mono and Inyo Counties Region**

#### **Recreation Use and Spending**

Total visitation at the five directly affected recreation sites would increase relative to the point of reference. As shown in Table 3N-17, projected annual average visitation would increase from 479,880 to 491,610 visitor days under the 6,383.5-Ft Alternative. This change would occur primarily because of increased visits to Mono Lake, which would more than offset reductions in recreational use of Grant Lake reservoir, Upper Owens River, and Lake Crowley reservoir.

Recreation spending within the region also would increase. On average, annual recreation spending would increase by a projected \$214,300, or 3.0%, relative to spending levels under point-of-reference conditions (Table 3N-17). Spending by visitors to Mono Lake would increase, benefiting retail, restaurant, and lodging establishments in Lee Vining, while spending by visitors to Grant Lake and Lake Crowley reservoirs would decrease, potentially affecting communities such as Mammoth Lakes and Bishop.

## **Recreation Benefits**

Under the 6,383.5-Ft Alternative, the increase in recreation opportunities and use at Mono Lake and along the tributaries would result in a corresponding increase in recreation benefits (Table 3N-20). Decreased opportunities and use at Grant Lake reservoir, Upper Owens River, and Lake Crowley reservoir would result in a decrease in recreation benefits at those areas. Overall, recreation benefits would increase by an estimated \$1.9 million annually.

## **Regional Economic Effects in Mono and Inyo Counties**

### **Direct Effects**

Under the 6,383.5-Ft Alternative, direct output generated by agricultural production would decrease by approximately \$31,500 annually, whereas average annual recreation spending would increase by approximately \$238,400. These effects would result in a net increase in industrial output of \$206,900 annually, compared to point-of-reference conditions. Personal income within the region would increase by \$93,500; however, the number of jobs would decrease by an estimated 0.6 FTE (Table 3N-18).

### **Total Regional Effects**

Under the 6,383.5-Ft Alternative, total regional output, personal income, and employment would increase relative to point-of-reference conditions. The projected increase in regional economic activity would result from increased spending on recreation relative to point-of-reference conditions, offsetting reductions in agricultural production.

Average industrial output within Mono and Inyo Counties would increase by a projected \$335,900 (Table 3N-18). Personal income would increase by an average of \$138,500 annually; however, employment would decrease by 6.9 FTE jobs compared to point-of-reference employment levels because of the more significant impact of the change in agricultural production.

## **Water Supply Costs to the City of Los Angeles**

Water deliveries to LADWP from the LA Aqueduct would decrease under the 6,383.5-Ft Alternative. Annual water deliveries would average 400,000 af, compared to 442,000 af under point-of-reference conditions. Average water costs to meet the demand for water in the LADWP service area would increase by a projected \$26.4 million, or 15.1% higher than average annual costs under the point of reference (Table 3N-19).

Under the 6,383.5-Ft Alternative, LADWP would purchase a projected average of 39,730 af of additional water annually from MWD compared to point-of-reference conditions. Based on an estimated cost differential of \$161 per af, other MWD member agencies could incur an additional cost of \$6.4 million annually to replace less expensive MWD supplies.

## **Power Generation Costs to the City of Los Angeles**

Hydroelectric energy generated from the LA Aqueduct system would slightly decrease under the 6,383.5-Ft Alternative. Annual power generation would average 930,000 MWh annually, compared to 1,038,000 MWh under point-of-reference conditions. Average fuel costs to meet the demand for energy in the LADWP service area would increase by a projected \$4.2 million annually, or 0.6% higher than average annual costs under the point of reference (Table 3N-19).

## **Protecting Mono Lake's Public Trust Resources**

Under the 6,383.5-Ft Alternative, the elevation of Mono Lake would be at 6,386 feet over the long term. The public's annual willingness to pay to ensure resource conditions associated with this lake level is estimated at \$63.0 million. This value reflects the social benefits of maintaining the lake at this level.

## **IMPACTS OF THE 6,390-FT ALTERNATIVE**

### **Agricultural Production in the Mono and Inyo Counties Region**

#### **Irrigated Lands along Diverted Tributaries in Mono Basin**

Under the 6,390-Ft Alternative, LADWP would terminate irrigation releases from Gibbs, Lee Vining, Walker, and Parker Creeks. Lands currently irrigated from these creeks by LADWP lessees would no longer be irrigated. Forage production and production value effects would be the same as those described above for the 6,372-Ft Alternative (Table 3N-16).

#### **Lands Irrigated from the Upper Owens River**

Under the 6,390-Ft Alternative, flows in the Upper Owens River would be adequate during virtually all years to allow for irrigation of pastures along the river. Inadequate flows would occur in May, June, and July in 1 in 20 years, resulting in production effects similar to those described for the 6,372-Ft Alternative (Table 3N-16).

### **Recreation Activity in the Mono and Inyo Counties Region**

#### **Recreation Use and Spending**

Total visitation at the five directly affected recreation areas would increase relative to the point of reference. As shown in Table 3N-17, projected annual average visitation would increase from 479,880 to 490,610 visitor days under the 6,390-Ft Alternative. This change would occur primarily because of increased visits to Mono Lake, which would more than offset reductions in recreational use of Grant Lake and Lake Crowley reservoirs.

Recreation spending within the region also would increase. On average, annual recreation spending would increase by a projected \$198,700, or 2.8%, relative to spending levels under point-of-reference conditions (Table 3N-17). Spending by visitors to Mono Lake would increase, benefiting retail, restaurant, and lodging establishments in Lee Vining, while spending by visitors to Grant Lake and Lake Crowley reservoirs would decrease, potentially affecting communities such as Mammoth Lakes and Bishop.

## **Recreation Benefits**

Under the 6,390-Ft Alternative, the increase in recreation opportunities and use at Mono Lake and along the tributaries would result in a corresponding increase in recreation benefits (Table 3N-20). Decreased opportunities and use at Grant Lake and Lake Crowley reservoirs would result in a decrease in recreation benefits at those areas. Overall, recreation benefits would increase by an estimated \$2.7 million annually.

## **Regional Economic Effects in Mono and Inyo Counties**

### **Direct Effects**

Under the 6,390-Ft Alternative, direct output generated by agricultural production would decrease by approximately \$31,500 annually, whereas average annual recreation spending would increase by approximately \$225,300. These effects would result in a net increase in industrial output of \$193,800 annually, compared to point-of-reference conditions. Personal income within the region would increase by \$88,200; however, the number of jobs would decrease by an estimated 0.9 FTE (Table 3N-18).

### **Total Regional Effects**

Under the 6,390-Ft Alternative, total regional output, personal income, and employment would increase relative to point-of-reference conditions. The projected increase in regional economic activity would result from increased spending on recreation relative to point-of-reference conditions, offsetting reductions in agricultural production.

Average industrial output within Mono and Inyo Counties would increase by a projected \$314,800 (Table 3N-18). Personal income would increase by an average of \$130,500 annually; however, employment would decrease by 7.3 FTE jobs compared to point-of-reference employment levels.

## **Water Supply Costs to the City of Los Angeles**

Water deliveries to LADWP from the LA Aqueduct would decrease under the 6,390-Ft Alternative. Annual water deliveries would average 394,700 af, compared to 442,000 af under point-of-reference conditions. Average water costs to meet the demand for water in the LADWP service area would increase by a projected \$30.4 million, or 17.4% higher than average annual costs under the point of reference (Table 3N-19).

Under the 6,390-Ft Alternative, LADWP would purchase a projected 43,420 af of additional water annually from MWD compared to point-of-reference conditions. Based on an estimated cost differential of \$161 per af, other MWD member agencies could incur an additional cost of \$7.0 million annually to replace less expensive MWD supplies.

### **Power Generation Costs to the City of Los Angeles**

Hydroelectric energy generated from the LA Aqueduct system would slightly decrease under the 6,390-Ft Alternative. Annual power generation would average 904,000 MWh annually, compared to 1,038,000 MWh under point-of-reference conditions. Average annual fuel costs to meet the demand for energy in the LADWP service area would increase by a projected \$5.0 million annually, or 0.7% higher than average annual costs under the point of reference (Table 3N-19).

### **Protecting Mono Lake's Public Trust Resources**

Under the 6,390-Ft Alternative, the elevation of Mono Lake would be at 6,392 feet over the long term. The public's annual willingness to pay to ensure resource conditions associated with this lake level is estimated at \$85.9 million. This value reflects the social benefits of maintaining the lake at this level.

## **IMPACTS OF THE 6,410-FT ALTERNATIVE**

### **Agricultural Production in the Mono and Inyo Counties Region**

#### **Irrigated Lands along Diverted Tributaries in Mono Basin**

Under the 6,410-Ft Alternative, LADWP would terminate irrigation releases from Gibbs, Lee Vining, Walker, and Parker Creeks. Lands currently irrigated from these creeks by LADWP lessees would no longer be irrigated. Forage production and production value effects would be the same as those described above for the 6,372-Ft Alternative (Table 3N-16).

## **Lands Irrigated from the Upper Owens River**

Under the 6,410-Ft Alternative, flows in the Upper Owens River would be adequate during virtually all years to allow for irrigation of pastures along the river. Inadequate flows would occur in May, June, and July in 1 in 20 years, resulting in production effects similar to those described for the 6,372-Ft Alternative (Table 3N-16).

## **Recreation Activity in the Mono and Inyo Counties Region**

### **Recreation Use and Spending**

Total visitation at the five directly affected recreation areas would increase relative to the point of reference. As shown in Table 3N-17, projected annual average visitation would decrease from 479,880 to 475,010 visitor days under the 6,410-Ft Alternative. This change would occur primarily because of decreased visits to Lake Crowley and Grant Lake reservoirs, which would more than offset increases in recreational use at Mono Lake.

Recreation spending within the region would decrease slightly. On average, annual recreation spending would decrease by a projected \$45,900, or 0.7%, relative to spending levels under point-of-reference conditions (Table 3N-17). Spending by visitors to Mono Lake would increase, benefiting retail, restaurant, and lodging establishments in Lee Vining, while spending by visitors to Grant Lake reservoir, Upper Owens River, and Lake Crowley reservoir would decrease, potentially affecting communities such as Mammoth Lakes and Bishop.

### **Recreation Benefits**

Under the 6,410-Ft Alternative, the increase in recreation opportunities and use at Mono Lake and along the tributaries would result in a corresponding increase in recreation benefits (Table 3N-20). Decreased opportunities and use at Grant Lake reservoir, Upper Owens River, and Lake Crowley reservoir would result in a decrease in recreation benefits at those areas. Overall, recreation benefits would increase by an estimated \$1.2 million annually.



## **Regional Economic Effects in Mono and Inyo Counties**

### **Direct Effects**

Under the 6,410-Ft Alternative, direct output generated by agricultural production would decrease by approximately \$31,500 annually, and average annual recreation spending would decrease by approximately \$8,900. These effects would result in a net decrease in industrial output of \$40,400 annually, compared to point-of-reference conditions. Personal income within the region would decrease by \$5,200, and the number of jobs would increase by an estimated 5.2 FTE (Table 3N-18).

### **Total Regional Effects**

Under the 6,410-Ft Alternative, total regional output and personal income would increase, and total regional employment would decrease, relative to point-of-reference conditions. The projected increase in regional economic activity would result from increased spending on recreation relative to point-of-reference conditions, offsetting reductions in agricultural production.

Average industrial output within Mono and Inyo Counties would decrease by a projected \$62,600 (Table 3N-18). Personal income would decrease by an average of \$12,500 annually. Employment within the region would decrease by 13.4 FTE jobs under the 6,410-Ft Alternative relative to point-of-reference employment levels. Relatively large secondary job losses resulting from reductions in agricultural production would more than offset secondary employment growth associated with increased recreation spending (Table 3N-18).

## **Water Supply Costs to the City of Los Angeles**

Water deliveries to LADWP from the LA Aqueduct would decrease under the 6,410-Ft Alternative. Annual water deliveries would average 384,400 af, compared to 442,000 af under point-of-reference conditions. Average water costs to meet the demand for water in the LADWP service area would increase by a projected \$37.9 million, or 21.7% higher than average annual costs under the point of reference (Table 3N-19).

Under the 6,410-Ft Alternative, LADWP would purchase a projected 51,610 af of additional water annually from MWD compared to point-of-reference conditions. Based on an estimated cost differential of \$161 per af, other MWD member agencies could incur an additional cost of \$8.3 million annually to replace less expensive MWD supplies.

## **Power Generation Costs to the City of Los Angeles**

Hydroelectric energy generated from the LA Aqueduct system would slightly decrease under the 6,410-Ft Alternative. Annual power generation would average 854,000 MWh, compared to 1,038,000 MWh under point-of-reference conditions. Average fuel costs to meet the demand for energy in the LADWP service area would increase by a projected \$6.6 million annually, or 1.0% higher than average annual costs under the point of reference (Table 3N-19).

### **Protecting Mono Lake's Public Trust Resources**

Under the 6,410-Ft Alternative, the elevation of Mono Lake would be at 6,411 feet over the long term. Based on responses to the public survey, the willingness to pay by California households for conditions associated with this alternative appears to be positive but not statistically different from zero. Consequently, no value is estimated for this alternative.

## **IMPACTS OF THE NO-DIVERSION ALTERNATIVE**

### **Agricultural Production in the Mono and Inyo Counties Region**

#### **Irrigated Lands along Diverted Tributaries in Mono Basin**

Under the No-Diversion Alternative, LADWP would terminate irrigation releases from Gibbs, Lee Vining, Walker, and Parker Creeks. Lands currently irrigated from these creeks by LADWP lessees would no longer be irrigated. Forage production and production value effects would be the same as those described above for the 6,372-Ft Alternative (Table 3N-16).

#### **Lands Irrigated from the Upper Owens River**

Under the No-Diversion Alternative, flows in the Upper Owens River would be adequate during virtually all years to allow for irrigation of pastures along the river. Inadequate flows would occur in May, June, and July in 1 in 20 years, resulting in production effects similar to those described for the 6,372-Ft Alternative (Table 3N-16).

## **Recreation Activity in the Mono and Inyo Counties Region**

### **Recreation Use and Spending**

Total visitation at the five directly affected recreation areas would decrease relative to the point of reference. As shown in Table 3N-17, projected annual average visitation would decrease from 479,880 to 448,190 visitor days under the No-Diversion Alternative. This change would occur primarily because of decreased visits to Mono Lake and Lake Crowley reservoir, which would more than offset increased recreational use of Grant Lake reservoir.

Recreation spending within the region also would decrease. On average, annual recreation spending would decrease by a projected \$583,000, or 8.3%, relative to spending levels under point-of-reference conditions (Table 3N-17). Spending by visitors to Mono Lake and Lake Crowley reservoir would decrease, potentially affecting retail, restaurant, and lodging establishments in Lee Vining and Bishop, while spending by visitors to Grant Lake reservoir would increase, potentially benefiting businesses in communities such as Mammoth Lakes and in the June Lake Loop area.

### **Recreation Benefits**

Under the No-Diversion Alternative, the increase in recreation opportunities and use at Grant Lake reservoir and along the tributaries would result in a corresponding increase in recreation benefits (Table 3N-20). Decreased opportunities and use at Lake Crowley reservoir would result in a decrease in recreation benefits. The impact on recreation benefits at Mono Lake could not be estimated because the lake level is beyond the range of study in the survey. Consequently, the total change in recreation benefits associated with the No-Diversion Alternative could not be estimated.

## **Regional Economic Effects in Mono and Inyo Counties**

### **Direct Effects**

Under the No-Diversion Alternative, direct output generated by agricultural production would decrease by approximately \$31,500 and average annual recreation spending would decrease by approximately \$606,500. These effects would result in a decrease in regional output of \$575,000 annually, compared to point-of-reference conditions. Personal income within the region would decrease by \$218,400, and the number of jobs would decrease by an estimated 14.9 FTE (Table 3N-18).

## **Total Regional Effects**

Under the No-Diversion Alternative, total regional output, personal income, and employment would decrease relative to point-of-reference conditions. The projected decrease in regional economic activity would result from decrease spending on recreation relative to point-of-reference conditions and reductions in agricultural production.

Average industrial output within Mono and Inyo Counties would decrease by a projected \$924,200 (Table 3N-18). Personal income would decrease by an average of \$339,000 annually. Employment within the region would decrease by 27.5 FTE jobs under the No-Diversion Alternative relative to point-of-reference employment levels.

## **Water Supply Costs to the City of Los Angeles**

Water deliveries to LADWP from the LA Aqueduct would decrease under the No-Diversion Alternative. Annual water deliveries would average 375,200 af, compared to 442,000 af under point-of-reference conditions. Average water costs to meet the demand for water in the LADWP service area would increase by a projected \$43.2 million, or 24.7% higher than average annual costs under the point of reference (Table 3N-19).

Under the No-Diversion Alternative, LADWP would purchase a projected 60,390 af of additional water annually from MWD compared to point-of-reference conditions. Based on an estimated cost differential of \$161 per af, other MWD member agencies could incur an additional cost of \$9.7 million annually to replace less expensive MWD supplies.

## **Power Generation Costs to the City of Los Angeles**

Hydroelectric energy generated from the LA Aqueduct system would decrease under the No-Diversion Alternative. Annual power generation would average 817,000 MWh, compared to 1,038,000 MWh under point-of-reference conditions. Average fuel costs to meet the demand for energy in the LADWP service area would increase by a projected \$8.2 million annually, or 1.2% higher than average annual costs under the point of reference (Table 3N-19).

## **Protecting Mono Lake's Public Trust Resources**

Under the No-Diversion Alternative, the elevation of Mono Lake would be at 6,427 feet over the long term. Because this lake elevation is above the levels asked about in the public survey, no estimates are made of social benefits associated with maintaining this lake level.

## CITATIONS

### Printed References

- California. Department of Commerce. 1987. The economic impact of domestic travelers on California counties, 1980-1985. Sacramento, CA.
- California. Department of Finance. 1970. California statistical abstract. Sacramento, CA.
- \_\_\_\_\_. Department of Finance. 1990. California statistical abstract. Sacramento, CA.
- \_\_\_\_\_. Department of Finance. 1991. Interim population projections for California state and counties, 1990-2005. (Report 91 P-1.) Sacramento, CA.
- California. Department of Transportation, District 09. 1979. Inyo and Mono County recreation and highway travel survey 1979 summary report. Bishop, CA.
- California. Employment Development Department. 1990. Annual planning information: Inyo and Mono Counties. Southern Area Labor Market Information Group. Los Angeles, CA.
- \_\_\_\_\_. Employment Development Department. 1991. Annual planning information: Inyo and Mono Counties. Labor Market Information Division. Los Angeles, CA.
- California. State Board of Equalization. 1987. Taxable sales in California. Sacramento, CA.
- \_\_\_\_\_. State Board of Equalization. 1988. Taxable sales in California. Sacramento, CA.
- \_\_\_\_\_. State Board of Equalization. 1989. Taxable sales in California. Sacramento, CA.
- \_\_\_\_\_. State Board of Equalization. 1990. Taxable sales in California. Sacramento, CA.
- Emondston, B., and D. Fost. 1991. The frontier is still here. Pages 50-52 in American Demographics, July 1991. Dow Jones & Company, Inc. Anaheim, CA.
- Fletcher, T. C. 1982. The Mono Basin in the nineteenth century: discovery, settlement, land use. (M.A. thesis.) Berkeley, CA. Prepared for Graduate Division of the University of California, Berkeley, CA.
- Hoffman, A. 1984. The public perception of Mono Lake. Reseda, CA.
- Inyo-Mono Department of Agriculture. 1975. Annual crop and livestock report: Inyo-Mono Counties. Bishop, CA.
- \_\_\_\_\_. 1981. Annual crop and livestock report: Inyo-Mono Counties. Bishop, CA.
- \_\_\_\_\_. 1990. 1990 annual crop and livestock report for Inyo and Mono Counties. Bishop, CA.
- \_\_\_\_\_. 1991. Annual crop and livestock report: Inyo-Mono Counties. Bishop, CA.

- Inyo National Forest. 1989. Final environmental impact statement for the comprehensive management plan, Mono Basin National Forest Scenic Area. U.S. Forest Service, Pacific Southwest Region. Mono County, CA.
- Lai, L., and I. Insalata. 1980. The commercial brine shrimp industry, review of Cole and Herbst articles. Aquafauna, Inc. Los Angeles, CA. Prepared for Los Angeles Department of Water and Power, Los Angeles, CA.
- Los Angeles, City of. Office of Water Reclamation. 1990. Water reclamation in the past: opportunities and plans for the future. January. (Technical Memorandum No. 71, Systemwide Water Reclamation and Wastewater Disposal Concepts, and Technical Memorandum No. 11A, Systemwide Wastewater Reclamation and Disposal Goals and Strategies.) Los Angeles, CA.
- Los Angeles Department of Water and Power. 1991a. Executive summary - common forecasting methodology 9 demand forecast. Los Angeles, CA. Prepared for the California Energy Commission, Sacramento, CA.
- \_\_\_\_\_. 1991b. Urban water management plan. Los Angeles, CA.
- Phillips, W. E. 1967. Regional development of Owens Valley, California: an economic base study of natural resources. Davis, CA.
- Rawson, R. 1990. See Superior Court for the State of California for the County of El Dorado streamflow hearings. Volumes I-V. South Lake Tahoe, CA.
- Superior Court of the State of California for the County of El Dorado. 1990. Coordination proceedings - special title (Rule 1550[b]). Mono water rights cases. Volumes I-II. Placerville, CA.
- U.S. Bureau of the Census. 1913. Census of agriculture. U.S. Government Printing Office. Washington, DC.
- \_\_\_\_\_. 1932. Census of agriculture. U.S. Government Printing Office. Washington, DC.
- \_\_\_\_\_. 1942. Census of agriculture. U.S. Government Printing Office. Washington, DC.
- \_\_\_\_\_. 1989. Census of agriculture. U.S. Government Printing Office. Washington, DC.
- U.S. Department of Commerce. 1987. County business patterns: 1987, California. (CBP-87-06.) U.S. Bureau of the Census. Washington, DC.
- \_\_\_\_\_. 1990. County business patterns: 1988, California. (CBP-88-06.) Washington, DC.

### **Personal Communications**

- Alpers, Tim. Owner. Owens River Ranch, Mammoth Lakes, CA. July 29, 1991 - meeting.
- Anderson, Lloyd. Ranchlands manager. City of Los Angeles Department of Water and Power, Bishop, CA. June 26, 1991 - meeting; August 27, 1991 - telephone conversation.
- Arcularius, Howard. Owner. Howard Arcularius Ranch, Mammoth Lakes, CA. July 30, 1991 - meeting.
- Arcularius, John. Owner. John Arcularius Ranch, Mammoth Lakes, CA. June 25 and July 30, 1991 - meetings.

Freeman, Barry. Resource officer. U.S. Forest Service, Lee Vining, CA. June 12 and September 11, 1991 - telephone conversations; June 26, 1991 - meeting.

Iturriria, Lorenzo. Partner. Inyo Sheep Company and J&L Livestock Company, Bishop, CA. July 29, 1991 - meeting; September 24, 1991 - telephone conversation.

Mooneyham, L. Mono County tax collector's office. November 20, 1991 - data presented to Marvin Feldman.

Primosch, Larry. Range conservationist. U.S. Bureau of Land Management, Bishop, CA. June 26, 1991 - meeting; September 6, 1991 - telephone conversation.

Rossi, Chance. Caretaker. Inaja Land Company Ranch, Mammoth Lakes, CA. July 30, 1991 - meeting.

Wilmont, B. Mono County tax collector's office. October 1, 1991 - data presented to Marvin Feldman.