• Did anybody bother to check water-supply numbers?

• Table missing

# 8 LAND USE, SOCIAL, AND ECONOMICS ISSUES

## 8.1 AGRICULTURAL RESOURCES

This section discusses relevant agricultural land and water uses, economics, and social issues. The land and water use, economic, and social impacts to agricultural resources are summarized in Tables 8.1-1, 8.1-2, and 8.1-3, respectively.

**Potential land use changes are displayed in Sections 5.2.1, 5.2.2, 5.2.3 and 5.2.4 of Chapter 5. Additionally, Section 5.2.5 identifies potential effects to important farmland soils.**

**No Action Alternative**. As the population of California grows, agricultural lands would be converted and developed as cities and counties expand. The projected increase in demand for fruits and vegetables would shift agricultural production away from field crops and grains. The amount of water allocated to agricultural production would continue to decline and the cost of water would continue to increase.

The No Action Alternative could result in potentially significant land use impacts associated with currently proposed storage and conveyance components. These impacts would occur where existing agricultural uses are converted to No Action uses and where No Action uses may be inconsistent with agricultural objectives of local and regional plans. Under the No Action Alternative, Department of Water Resources' Bulletin 160-93 projects that 45,000 acres of drainage problem lands in the San Joaquin region will be retired by year 2020.

No Action economic conditions are expected to be similar to existing conditions except there would be an increasing demand for fruits and vegetables, an increased use of water transfers to

table 8.1-1

**Impacts to Agricultural Resources**

Split into 3 boxes

- Under the **No Action Alternative,** conversion of agricultural lands to urban uses would continue, increasing water costs, decreasing amount of water allocated to agricultural production, and shifting production to fruits and vegetables and away from field crops and grains.
- **Storage and Conveyance** would convert prime and unique farmland and other agricultural lands and create potential conflicts between proposed actions and regional agricultural land use plans and policies. Storage facilities would potentially increase the amount of water available for agricultural production. Agricultural job losses would represent adverse economic and social well-being impacts.
- **Ecosystem Restoration** and development of storage and conveyance facilities would convert agricultural land, reduce crop revenues, and reduce employment.
- **Water Quality** would result in short-term reduced agricultural productivity and increased production costs. Benefits include improved irrigation water quality, long-term reduced costs, higher crop yields, and greater crop selection. Retirement of drainage problem lands in the San Joaquin River region could significantly affect up to 45,000 acres of important farmland and adversely affect agricultural economics and reduce the number of farm worker jobs.
- **Water Use Efficiency** measures would result in increased crop yield for farmers, but could result in farm worker job loss.
- **Levee System Integrity** would convert Delta Region farmland, but provide greater protection to farmland from inundation and salinity intrusion.
- **Water Transfers** could adversely affect agricultural production at the source of the transferred water and benefit production in the water-receiving regions.
- **Coordinated Watershed Management** would alter land use practices in the upper watershed, which may result in foregone economic opportunities.

| IMPACT ISSUES | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | | ALTERNATIVE 3 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1A | 1B | 1C | 2A | 2B | 2D | 2E | 3A | 3B | 3E | 3H | 3I |
| **Delta Region** | | | | | | | | | | | | |
| *Conversion or Loss of Agricultural Land* | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| *Inconsistency with Local and Regional Plans* | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| **Bay Region** | | | | | | | | | | | | |
| *Conversion or Loss of Agricultural Land* | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| *Inconsistency with Local and Regional Plans* | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| **Sacramento River Region** | | | | | | | | | | | | |
| *Conversion or Loss of Agricultural Land* | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| *Inconsistency with Local and Regional Plans* | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| **San Joaquin River Region** | | | | | | | | | | | | |
| *Conversion or Loss of Agricultural Land* | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| *Inconsistency with Local and Regional Plans* | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| **SWP and CVP Service Areas** | | | | | | | | | | | | |
| *Conversion or Loss of Agricultural Land* | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

**LEGEND:**
Level of Impact

● = Significant and unavoidable
◗ = Significant and mitigable
○ = Less than significant
☐ = None
\+ = Beneficial
U = Unknown

**Table 8.1-1. Summary of Environmental Impacts Related to Agricultural Land Use**

| IMPACT ISSUES | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | | ALTERNATIVE 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1A | 1B | 1C | 2A | 2B | 2D | 2E | 3A | 3B | 3E | 3H | 3I |
| **Delta Region** | | | | | | | | | | | | |
| *Loss of Irrigated Acreage* | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| *Change in Agricultural Water Use* | o | o | + | + | + | + | + | + | + | + | + | + |
| *Change in Water Quality* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Agricultural Costs and Revenues* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Risk and Uncertainty of Agricultural Production* | + | + | + | + | + | + | + | + | + | + | + | + |
| **Bay Region** | | | | | | | | | | | | |
| *Loss of Irrigated Acreage* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Agricultural Water Use* | o | o | + | + | + | + | + | + | + | + | + | + |
| *Change in Water Quality* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Agricultural Costs and Revenues* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Risk and Uncertainty of Agricultural Production* | + | + | + | + | + | + | + | + | + | + | + | + |
| **Sacramento River Region** | | | | | | | | | | | | |
| *Loss of Irrigated Acreage* | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| *Change in Agricultural Water Use* | o | o | + | + | + | + | + | + | + | + | + | + |
| *Change in Water Quality* | o | o | o | o | o | o | o | + | + | + | + | + |
| *Change in Agricultural Costs and Revenues* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Risk and Uncertainty of Agricultural Production* | + | + | + | + | + | + | + | + | + | + | + | + |
| **San Joaquin River Region** | | | | | | | | | | | | |
| *Loss of Irrigated Acreage* | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| *Change in Agricultural Water Use* | o | o | + | + | + | + | + | + | + | + | + | + |
| *Change in Water Quality* | o | o | o | o | o | o | o | + | + | + | + | + |
| *Change in Agricultural Costs and Revenues* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Risk and Uncertainty of Agricultural Production* | + | + | + | + | + | + | + | + | + | + | + | + |

| IMPACT ISSUES | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | | ALTERNATIVE 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1A | 1B | 1C | 2A | 2B | 2D | 2E | 3A | 3B | 3E | 3H | 3I |
| **SWP and CVP Service Areas** | | | | | | | | | | | | |
| *Loss of Irrigated Acreage* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Agricultural Water Use* | o | o | + | + | + | + | + | + | + | + | + | + |
| *Change in Water Quality* | o | o | o | o | o | o | o | + | + | + | + | + |
| *Change in Agricultural Costs and Revenues* | o | o | o | o | o | o | o | o | o | o | o | o |
| *Change in Risk and Uncertainty of Agricultural Production* | + | + | + | + | + | + | + | + | + | + | + | + |

**LEGEND:**
Level of Impact

| | | |
|---|---|---|
| ● | = | Significant and unavoidable |
| ◗ | = | Significant and mitigable |
| o | = | Less than significant |
| □ | = | None |
| + | = | Beneficial |
| U | = | Unknown |

**Table 8.1-2. Summary of Environmental Impacts Related to Agricultural Economics (page 2 of 2)**

| IMPACT ISSUES | No Action | ALTERNATIVE 1 | | | ALTERNATIVE 2 | | | | ALTERNATIVE 3 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1A | 1B | 1C | 2A | 2B | 2D | 2E | 3A | 3B | 3E | 3H | 3I |
| **Delta Region** | | | | | | | | | | | | | |
| *Loss of Jobs Due to Conversion of Agricultural Lands* | ○ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| **Bay Region** | | | | | | | | | | | | | |
| *Loss of Jobs Due to Conversion of Agricultural Lands* | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| **Sacramento River Region** | | | | | | | | | | | | | |
| *Loss of Jobs Due to Conversion of Agricultural Lands* | ○ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| **San Joaquin River Region** | | | | | | | | | | | | | |
| *Loss of Jobs Due to Conversion of Agricultural Lands* | ○ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ | ◗ |
| **SWP and CVP Service Areas** | | | | | | | | | | | | | |
| *Loss of Jobs Due to Conversion of Agricultural Lands* | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

**LEGEND:**
Level of Impact

● = Significant and unavoidable
◗ = Significant and mitigable
○ = Less than significant
□ = None
\+ = Beneficial
U = Unknown

**Table 8.1-3. Summary of Environmental Impacts Related to Agricultural Resources - Social Issues**

meet water demands, and an increase in irrigation water cost due to the CVPIA actions and general supply restrictions. Additionally, there would continue to be reallocations of irrigation water to other uses, such as water transferred by the CVPIA from agriculture to environmental flows and restoration.

Program Alternatives

**Storage and Conveyance.** Each of the three alternatives would result in potential significant adverse land use impacts in the Delta Region from converting existing agricultural land for new uses as part of the Ecosystem Restoration Program (habitat restoration) and Levee System Integrity (levee construction). New storage and conveyance improvements built in the Delta, Sacramento River and San Joaquin River regions would also result in significant adverse impacts from conversion of agricultural land. Similarly, implementing the Ecosystem Restoration Program in the Sacramento and San Joaquin regions would result in the conversion of some important farmlands, including prime and unique farmland.

Storage project facilities typically consist of permanent structures (such as reservoirs, dams, canals, and pumping plants) that displace existing agricultural land, grassland, and rangeland.

During construction of reservoirs, dams, conveyance canals, pumping-generating plants, and other related facilities, access to and around the project area would be temporarily disrupted. The disruption to local land uses would include increased truck traffic on local roads. The greatest disturbance would occur during the excavation phase of reservoir construction. Displacement of residents or businesses not wanting to relocate is considered an unavoidable impact that cannot be mitigated to a less-than-significant level, while converting prime agricultural land to nonagricultural uses is considered a significant unavoidable impact.

The conversion of productive agricultural lands would result in direct and indirect adverse economic impacts, including lost revenue, less labor demand, and reduced farm spending in local economies. There would be a short-term implementation cost associated with best management practices for improved water quality, which could be offset by long-term savings via higher crop yields and additional cropping pattern opportunities. Levee stability improvements would afford greater protection to farmlands, although some agricultural lands would be lost for levee setbacks.

Conversion of agricultural land to other uses could result in the loss of jobs, having a potentially significant impact on social well-being. Impacts would be the greatest in the Delta Region. The Water Use Efficiency Program could result in beneficial impacts to farmers from increased crop yields but may result in job losses for farm workers because fewer workers may be required.

**Ecosystem Restoration.** The long-term benefits of this program include improved water reliability. Potentially significant impacts resulting from the implementation of this program include the conversion of agricultural land and the associated reductions in crop revenues and employment levels. Loss of prime and unique farmland would constitute a significant land use impact, while extensive job loss would be a significant impact to social well-being. This program's activities are not anticipated to have a significant effect on agricultural land uses in the Bay Region or in the SWP and CVP Service Areas Outside the Central Valley.

**Water Quality.** The long-term benefits of this program include reduced production costs, higher crop yields, and greater crop selection flexibility. Potentially significant adverse impacts resulting from implementation of this program include reduced agricultural productivity due to changes in agricultural practices and increased production costs associated with program implementation, and changes in the quantity or pattern of stream flow, which could affect downstream agricultural water users. Implementation of a program to idle drainage/water quality problem lands would have a significant unavoidable impact on up to 45,000 acres of important farmland, agricultural economics, and social well-being in the San

Joaquin River Region. The impact to farm workers and agribusiness workers would depend on the impact to farmers, because changes in the cost of water could affect the number of farm workers that would be hired.

**Water Use Efficiency.** This program is not anticipated to have direct land use impacts; however, there may be indirect impacts to agricultural land use. Agricultural land may be removed from production because of increased costs and decreased profitability which could result from required efficiency improvements or increased district water charges (for example, as part of tiered water pricing). Conversely, improved efficiency may allow the continued viability of agriculture in some areas. Efficiency improvements that result in greater water supply reliability but also higher annual cost may cause a shift in the types of crops grown. Conversion or loss of agricultural land would be a potentially significant adverse land use impact of this program. Improvement in the long-term viability of some agricultural lands would be a potentially beneficial impact.

Potential economic impacts are difficult to assess for the agricultural sector because impacts will be localized based on specific program objectives. Achieving higher agricultural water use efficiency requires costs at both the farm and district level. Greater capital investment and energy is generally required to deliver and apply water more precisely and on demand. These short-term implementation costs, however, are expected to yield long-term cost savings.

Water use efficiency improvements could have adverse impacts on social well-being. One benefit of improved irrigation efficiency may be a reduced need for labor, due either to less cultivation or changes in how crops are irrigated. The addition of pressurized irrigation systems would have the most substantial impact.

Job opportunities also could be created by water use efficiency improvements. As irrigation management improves, so must the knowledge of those irrigating or scheduling irrigations. This would result in the need for more skilled labor, but at a rate of only two skilled laborers for every three unskilled jobs lost. In addition, the design and installation of new or improved on-farm or district water delivery systems would create more jobs for skilled laborers. It is conceivable that efficiency improvements, especially those that involve physical construction, would add to local employment.

Water use efficiency improvements could result in improved crop yields and better quality farm products. Such advances can increase on-farm direct income, benefitting the farmer's net income. This often translates to additional economic activity. Increased income also can help the overall economy in total sales and purchases and increase tax revenues that strengthen vital functions such as schools, roads, and social and health services.

**Levee System Integrity.** The benefits of this program include greater protection of farmland from inundation and salinity intrusion. The conversion of prime farmland and the associated reduction in crop revenues are potentially significant adverse land use impacts resulting from implementation of this program. The majority of impacts from this program would primarily affect agricultural land uses in the Delta Region (up to 35,000 acres) and would not affect land uses in the other four regions.

**Water Transfers.** Water transfers would affect local economies and social well-being primarily through changes to employment and income. However, the impacts resulting from these changes tend to be regional. In addition to the source of water for a transfer, the timing, magnitude, and pathway of each transfer have a tremendous effect on the potential for impacts. For agricultural operations previously served by water transferred to other users, employment levels, crop revenues, and farm worker income levels may significantly decrease due to costs associated with obtaining water from other sources, such as ground water. Potential benefits, such as increased employment, crop revenues, and farm worker income levels, would occur in regions receiving the transferred water.

Water transfers are not expected to have direct land use impacts; however, they could indirectly affect agricultural opportunities by changing availability in selling and receiving areas.

**Coordinated Watershed Management.** Watershed management actions would have negligible impacts on agricultural production. The amount of acreage affected would be minimal, with minor economic impacts. Potential for higher crop yields may result from improved water quality.

Potential watershed activities in the Sacramento River and San Joaquin River regions will be compatible with applicable environmental and land use plans and policies in their affected jurisdiction. Reduced grazing activities could also have potentially significant land use impacts in these two regions if they result in a loss of agricultural productivity.

## 8.1.1 Affected Environment: Agricultural Land and Water Use

### 8.1.1.1 Overview

The CALFED study area represents an important agricultural region for both California and the United States. California is the most diversified agricultural economy in the world, producing more than 250 crop and livestock commodities. The study area encompasses approximately 85 % of total California irrigated land, covering all or portions of 39 of the 58 counties in California. In 1995, the 39 counties together contributed about 95 % of California's agricultural production value and represented nine of the top ten agricultural counties in California and seven of the top 10 counties in the nation. Agriculture in the study area is also an important employer and affects the regional economy through the expenditures of farmers and the processing and transportation of crops harvested.

Between 1920 and 1950, irrigated agriculture development increased rapidly from 2.7 million acres to over 4.7 million acres for the entire Central Valley.

#### Existing Conditions

*Agricultural Land Use.* The Natural Resources Conservation Service (NRCS, formerly Soil Conservation Service) distinguishes among four basic designations of farmland: Prime Farmland, Additional Farmland of Statewide Importance, Unique Farmland, and Additional Farmland of Local Importance. Prime and Additional Farmland of Statewide Importance may currently be used as cropland, pastureland, rangeland, forest land, or other land but not as urban built-up land or water.

Prime Farmland is land best suited for producing food, feed, forage, fiber, and oilseed crops, and also is available for these uses. Prime Farmland has the soil quality, growing season, and moisture supply needed to produce sustained high yields or crops economically when treated and managed (including water management) according to modern farming methods.

Additional Farmland of Statewide Importance is land other than Prime Farmland with a good combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and also is available for these uses.

Unique Farmland is land other than Prime and Additional Farmland that currently is used for the production of specific high-value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. Examples of such crops are citrus, olives, avocados, fruit, and vegetables.

Additional Farmland of Local Importance is land used for the production of food, feed, forage, fiber, and oilseed crops, even though these lands are not identified as having national or statewide importance. These lands are identified by a local committee made up of concerned agencies that review the lands under this category on at least a 5-year basis.

Table 8.1.1-1 shows estimated totals of 1994 important farmland acreage based on information from the California Department of Conservation (DOC), Farmland Mapping and Monitoring Program for counties within the Central Valley. The numbers are estimates of important farmland acreage (including prime and unique farmland and farmland of local and statewide importance) in the Delta, Sacramento River and San Joaquin River regions, the regions where important farmland is most likely to be affected. (It is important to note that several of the counties in the study area have not been completely surveyed by the California DOC for important farmland and that these summaries have been approximated. For a detailed discussion of the Farmland Mapping and Monitoring Program and acreages by county, visit the California DOC's internet website at http://www.consrv.ca.gov/olc/farmland.html.)

| Region | Acres |
|---|---|
| Delta | 520,000 |
| San Joaquin | 4,750,000 |
| Sacramento | 2,160,000 |

**Table 8.1.1-1. Important Farmland in the Central Valley**

Table 8.1.1-2 identifies approximate acres in irrigated agriculture for each of the five CALFED regions.

*Agricultural Water Use*. Agriculture in the five CALFED study regions receives irrigation water from the CVP, the SWP, local water rights and water projects, and groundwater. Most of this water is delivered to farmers through irrigation districts and other water agencies. The availability and reliability of supply of high quality water limits the productivity of important farmlands.

Table 8.1.1-3 provides agricultural water use and water pricing in all CALFED regions from 1985 to 1990.

*Central Valley Project.* The CVP supplies about 30% of total agricultural water use in the study area. Most CVP water is delivered to the Central Valley counties in the Sacramento River Region and the San Joaquin River Region. CVP water is delivered to approximately 250 water districts, individuals, and companies through water service contracts, Sacramento River water rights, and San Joaquin River exchange contracts. The terms "water service contract" and "project water" refer here to water developed by the project and delivered pursuant to repayment and water service contracts. CVP exchange contracts and Sacramento River water rights represent water rights that predate the CVP.

*State Water Project.* The SWP supplies about 10% of total agricultural water use in the CALFED study area. Through contracts with 29 water agencies, the SWP provides water within the Central Valley to Butte, Solano, Kings, and Kern counties; outside the Central Valley to several Southern California counties; to Alameda and Santa Clara counties in the South Bay Area; and to Napa and Solano counties in the North Bay Area. In addition, the SWP provides water rights deliveries to water rights holders along the Feather River (Butte and Plumas counties).

*Local Surface Water.* Local surface water supplies (those not delivered by either project) provide about 40% of all agricultural water supplies in the study area. More local surface water supplies are available on the east side of the valley because of the larger amount of precipitation in the Sierra Nevada. Locally owned water projects are especially important on the Yuba, Stanislaus, Tuolumne, Kings, and Merced rivers; but local sources on the west side like the federal Solano Project also are important.

| Crop Category | Delta Region | | Bay Region | | Sacramento River Region | | San Joaquin River Region | | SWP and CVP Service Areas Outside the Central Valley | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Irrigated Acres (1,000 acres) | Production Value (million dollars) | Irrigated Acres (1,000 acres) | Production Value (million dollars) | Irrigated Acres (1,000 acres) | Production Value (million dollars) | Irrigated Acres (1,000 acres) | Production Value (million dollars) | Irrigated Acres (1,000 acres) | Production Value (million dollars) |
| Pasture | 37 | 4 | 15 | 2 | 189 | 19 | 290 | 34 | 185 | 15 |
| Rice | 11 | 9 | 50 | 9 | 161 | 68 | 527 | 374 | 420 | 258 |
| Truck crops | 28 | 77 | 0 | 0 | 28 | 25 | 51 | 54 | 32 | 40 |
| Tomatoes | 45 | 91 | 16 | 10 | 335 | 176 | 786 | 532 | 154 | 67 |
| Alfalfa | 65 | 37 | 0 | 0 | 469 | 394 | 18 | 12 | 0 | 0 |
| Sugar beets | 15 | 13 | 47 | 280 | 16 | 31 | 301 | 982 | 289 | 1,514 |
| Field crops | 151 | 76 | 4 | 10 | 135 | 234 | 180 | 433 | 8 | 47 |
| Orchards | 61 | 177 | 26 | 148 | 265 | 578 | 668 | 2,074 | 22 | 343 |
| Grains | 60 | 16 | 14 | 3 | 175 | 43 | 344 | 103 | 146 | 47 |
| Grapes | 36 | 127 | 70 | 316 | 10 | 42 | 507 | 1,681 | 37 | 215 |
| Cotton | 0 | 0 | 0 | 0 | 4 | 2 | 1,269 | 1,153 | 20 | 19 |
| Subtropical orchards | 0 | 0 | 0 | 0 | 15 | 30 | 221 | 973 | 167 | 842 |
| **Total** | **509** | **628** | **244** | **779** | **1,803** | **1,642** | **5,162** | **8,403** | **1,481** | **3,408** |

SOURCE:
CAC reports various years.

**Table 8.1.1-2. Irrigated Acres and Production Value in All Regions, 1986 to 1995**

| | Irrigation Applied Water Use by Region (1,000 acre-feet) | | | | |
|---|---|---|---|---|---|
| Water Source | Delta | Bay | Sacramento River | San Joaquin River | SWP and CVP Service Areas Outside the Central Valley |
| Local water | 1,100 | 123 | 1,801 | 4,854 | 107 |
| CVP water | 85 | 54 | 1,467 | 4,268 | 0 |
| SWP water | 0 | 13 | 1 | 1,168 | 232 |
| Groundwater | 110 | 544 | 1,448 | 1,803 | 229 |
| | Weighted Average Price ($/af) | | | | |
| Surface water | 0-15 | 15-45 | 0-15 | 20-85 | 15-255 |
| Groundwater | 20-35 | 60-130 | 30-60 | 30-80 | 80-120 |

SOURCE:
DWR 1994.

**Table 8.1.1-3. Agricultural Water Use and Water Pricing in All Regions, 1985 to 1990**

*Groundwater.* Groundwater provides a significant supply of water for agriculture in normal years, and it is often used to reduce or eliminate shortages of surface water supplies during drought. On average, groundwater provides about 20% of total agricultural water use in the study area.

Declining groundwater tables, subsidence, and loss of aquifer storage continue to be costly problems, particularly in the western and southern parts of the San Joaquin River Region and the Bay Region, where less surface water is available. Declining groundwater tables increase pumping costs. The costs of subsidence include damage to structures, failure of well casings, and frequent surveying. Water from the CVP and SWP had replaced some of the groundwater pumping, and withdrawals were about equal to estimated recharge (Bertoldi et al. 1991). However, the recent drought and supply restrictions imposed by the CVPIA of 1992, the Bay-Delta Accord, and Biological Opinions have reduced surface water supplies and renewed the past trend of groundwater depletion throughout the valley.

*Agricultural Habitats.* Croplands, orchards, and vineyards have been developed on some of the state's most fertile soils. Soils supported a much greater diversity of native species and productive natural habitats historically than they do today. Many wildlife species have adapted to areas now converted to cropland. Wintering waterfowl and shorebirds consume waste grains left in fields after harvest, and fields flooded for weed control, leaching, and creation of seasonal wetlands. For a more detailed discussion of the types and value of agricultural habitats and seasonal wetlands see the Vegetation and Wildlife section of Chapter 7, and the Ecosystem Restoration Plan Appendix.

### 8.1.1.2 Delta Region

**Historical Perspective.** Agriculture in the Delta Region began in the mid-1800s, consisting primarily of dryland farming or irrigated agriculture from artesian wells, groundwater pumping, and creek side diversions. Extensive Delta development began in late 1850, when the Federal Swamp Land Act promoted converting swamp and overflow lands to agricultural production. During the early 1900s, a series of levees and human-made waterways were developed to enhance future agricultural and urban development.

Between 1976 and 1993, the total amount of agricultural land in the legal Delta was reduced by about 14,500 acres, almost all of which occurred in the Delta Secondary Zone. This was largely due to conversion of agricultural land to urban uses in the Brentwood and Oakley areas of Contra Costa County, the Pocket area in Sacramento County, the West Sacramento area in Yolo County, and the Stockton and Tracy areas in San Joaquin County.

**Existing Conditions**

*Agricultural Land Use.* Today, of the more than 700,000 acres in the legal Delta, about 500,000 acres are rich farmland. Most of this area is classified as prime farmland, unique farmland, locally important farmland, or as having high statewide significance for agricultural production. The Delta's rich peat and mineral soils support several types of agriculture (DWR 1993b).

**Peat Soil Loss. One of the unique problems with organic/peat soil is that when it is exposed to aerobic conditions by farm cultivation it oxidizes and erodes away. This has led to a drop in land surface elevations several feet below sea level throughout much of the Delta from historical levels at or above sea level. For a more thorough discussion of this unique problem see the Geology and Soils section of Chapter 6.**

*Agricultural Water Use.* Most agricultural water users in the Delta are private water right holders. Local water rights water accounts for over 85% of the total irrigation water use. Other irrigation water sources in the Delta Region are CVP water and groundwater, each accounting for about 5 to 10% of the total agricultural water uses. Between 1985 and 1990, compared with other parts of California, the cost of water was much cheaper in the Delta Region because of large amounts of local riparian and pre-1914 appropriate water rights.

### 8.1.1.2 Bay Region

**Historical Perspective.** As is characteristic of all the CALFED study regions, agriculture in the Bay Region expanded greatly during the Gold Rush of 1849. As more people arrived in California and urban development flourished along the Bay and upon lower watershed areas, more land in the upper watersheds was brought into production. Although the number of farms between the end of World War II and the mid-1960s declined, the number of irrigated acres increased by 25 %, with the average farm containing 51 acres (CALFED 1997). Orchards were by far the most important crop in the Bay region, followed by vegetables and other truck crops (such as melons, potatoes, and garlic). Other crops included alfalfa, sugar beets, and field crops.

**Existing Conditions**

*Agricultural Land Use.* Prior to the 1940s, land uses in the Bay Region were principally urban in the city of San Francisco and rural in other portions of the region. Over the last 50 years, however, land uses throughout the region have become progressively more urbanized. Approximately 240,000 acres of irrigated agricultural land remain in production, most of which are in Contra Costa, Solano, and Sonoma counties.

*Agricultural Water Use.* Over 75% of irrigation water sources in the Bay Region are from groundwater pumping. Local water and project water make up the other 25%. Groundwater extractions commonly exceed groundwater replenishment, therefore, many of the region's aquifers are experiencing overdraft conditions (DWR 1994).

Between 1985 and 1990, the average cost of surface water in this region is estimated at $15 to $45 per acre-foot, which is about the average in California. The cost of groundwater in the Bay Region is much higher ($60 to $130 per acre-foot) compared with the Delta and Sacramento River regions.

### 8.1.1.3 Sacramento River Region

**Historical Perspective.** Rice was the most important crop in the Sacramento River Region, accounting for 30% of the total irrigated acres. Almost 90% of California rice crops were grown in this region during the 1946-1950 period. The next important crops in the Sacramento River Region were irrigated pasture and orchards, each accounting for 20% of the total irrigated acres.

**Existing Conditions**

*Agricultural Land Use.* Land uses in the Sacramento River Region are principally agricultural and open space, with urban development focused in the city of Sacramento. More than half the region's population lives in the greater metropolitan Sacramento area. Other fast-growing communities include Vacaville, Dixon, Redding, Chico, and various Sierra Nevada foothill towns. Urban development has occurred along major highway corridors in Placer, El Dorado, Yolo, Solano, and Sutter counties, and has taken some irrigated agricultural land out of production. Suburban ranchette homes on relatively large parcels surround many of the urban areas, and often include irrigated pastures or small orchards.

Excluding the legal Delta portion of the Sacramento River region, in 1994 there were approximately 2.2 million acres of important farmland mapped in the Sacramento River Region.

*Agricultural Water Use.* About 40% of irrigation water sources in the Sacramento River Region are from local water rights or local water projects. CVP project water and groundwater each makes up the rest of the total agricultural water uses. The 30% of the region's lands that are irrigated with groundwater generally have a very reliable supply.

The majority of diverters along the Sacramento and Feather rivers existed before major CVP and SWP reservoirs were built. Between 1985 and 1990, the average cost of surface water in this region is estimated at $0 to $15 per acre-foot, among the lowest costs in California. The cost of groundwater is estimated at $30 to $60 per acre-foot, also among the lowest in the state.

### 8.1.1.4 San Joaquin River Region

**Historical Perspective.** Between 1946 and 1950, in terms of irrigated acres, cotton and grains were the most important crops in the San Joaquin River Region, accounting for 22% and 20% of the total irrigated acres, respectively. The next important crops in the San Joaquin River Region were irrigated pasture, alfalfa and grapes, each accounting for about 15% of the total irrigated acres. Almost 100% of California cotton and 90% of California grapes were grown in this region during the 1964-1950 period.

Prior to the 1960s, land uses in the San Joaquin River Region were principally agriculture and open space, with urban uses limited to small farm communities. Although agriculture and food processing are still the region's major industries, expansion from the San Francisco Bay Area and Sacramento over the past 30 years has resulted in the creation of major urban centers throughout the region.

**Existing Conditions**

*Agricultural Land Use.* Land uses in the San Joaquin River Region are predominantly open space in the mountain and foothill areas, and agricultural in the San Joaquin Valley area. Urban land use in 1990 totaled 295,300 acres. Urban areas include the cities of Stockton, Modesto, Merced, and Tracy, as well as smaller communities such as Lodi, Galt, Madera, and Manteca. The western side of the region, south of Tracy, is sparsely populated. Small farming communities provide services for farms and ranches in the area, all relatively close to Interstate 5.

In 1994, excluding the legal Delta portion of San Joaquin County, about 4,750,000 acres of important farmland were mapped in the San Joaquin River Region.

*Agricultural Water Use.* About 40% of irrigation water sources in the San Joaquin River Region are from local water rights or local water projects. CVP project water provides 35% of total irrigation water uses, mostly to the Westlands Water District. The rest of the region's water is from the SWP and groundwater pumping.

Between 1985 and 1990, the average cost of surface water in this region is estimated at $20 to $85 per acre-foot, among the high end in California. The cost of groundwater is estimated at $30 to $80 per acre-foot, also among the high end in the state.

#### 8.1.1.5 SWP and CVP Service Areas Outside the Central Valley

**Historical Perspective.** Between 1946 and 1950, in terms of irrigated acres, alfalfa and subtropical orchards were the most important crops in the region, accounting for 24% and 22% of the total irrigated acres, respectively. The next important crops in the region were truck crops, field crops, and grains, each accounting for about 15 to 20% of the total irrigated acres. Other crops grown in the region included pasture and orchards. Over 90% of California subtropical orchards were grown in this region during the 1950 to 1964 period. Development in the region has steadily increased since the 1880s.

**Existing Conditions**

*Agricultural Land Use.* About 15% (377,500 acres) of the region's land is estimated to comprise agricultural land uses. Intensive agriculture is in the Santa Maria and lower Santa Ynez valleys; moderate levels of agricultural activity also occur near the South Coast area. Agricultural crops include grapes, vegetables, and truck crops, as well as a thriving flower seed industry. Total irrigated land in the area was about 145,000 acres in 1990.

The South Coast is the most urbanized region in all of California. Irrigated cropland accounts for about 288,000 acres of the region. The largest amount of irrigated agriculture is in Ventura County, where about 116,600 acres of cropland are cultivated, including vegetables, strawberries, citrus fruit, and avocados.

*Agricultural Water Use.* Outside the Central Valley, SWP water and groundwater each provide 40% of total irrigation water in the region. Local water provides the rest of total irrigation water uses.

Between 1985 and 1990, the average cost of surface water in this region is estimated at $15 to $255 per acre-foot, among the highest in California. The cost of groundwater is estimated at $80 to $120 per acre-foot, also among the highest in the state.

### *8.1.2 Affected Environment: Agricultural Economic and Social Issues*

#### 8.1.2.1 Overview

California agriculture produces an abundance of products including over 50% of the U.S. production of fruits, nuts, and vegetables on 3% of the nation's farmland. The economic value of agriculture to the communities of the Sacramento Valley, the Delta, and the San Joaquin Valley is greater than the gross value of the farm products (farm gate value) or the number of direct farm-related jobs. There are two ways in which the agricultural industry impacts local and regional economies. First, to produce and harvest a crop requires a variety of inputs such as seed, fertilizer and chemicals, water, equipment and fuel, and labor. Then, after harvest, farm produce is transported, stored, processed, packaged, and marketed. These tasks result in direct economic activity. The second way is the distribution of the income resulting from the initial direct economic activity. This income supports local and regional economies as this farm and farm-related income is spent for food, housing, and other consumer items. Depending on the farm commodity produced, and the extent of value-added processing it receives, the economic multiplier effect can range from 1.8 to 4, with a general average of 2.7 often cited. According to California agricultural statistics for 1995, farm income totaled $22.1 billion and generated over $70 billion in related economic activity, resulting in an overall economic multiplier of 3.2.

The importance of agriculture to the economy of the Central Valley is even greater. A November, 1992 study by the University of California estimated that farming and farm-related industries in the Central Valley directly and indirectly create about three out of ten jobs and about 30% of personal income. Statewide agriculture and related activities account for about one in every ten jobs.

### Existing Conditions

*Farm Profiles.* Numbers and sizes of farms, together with ownership patterns, describe the general structure of agriculture within a region. A large number of farms can mean larger economic influences within the region in terms of employment, spending, and taxes. Ownership patterns can give an indication of the numbers of farm owners and managers who live within a region. Labor expenses are important to workers and the communities in which they live.

Table 8.1.2-1 shows a summary of farm profiles by region.

*Cropping Patterns and Production Value.* A cropping pattern is the share of acres within a region planted to individual crops or categories of crops, including fallowed land. Agricultural land use can be partially described by its cropping pattern, and cropping patterns are important to agricultural and regional economics. If CALFED actions reduce the amount of irrigation water available, farmers could change their cropping patterns by fallowing a portion of the lands that receive Delta export water, by planting crops that require less irrigation water or by adopting water conservation measures.

*Agricultural Production Costs and Revenues.* Agricultural net returns are revenues less costs. Higher costs reduce farm profits, but some part of costs also represent farm expenditures in the regional economy. Revenues are unit price multiplied by the level of production. Table 8.1.2-2 includes regional summaries of production costs and revenues for example years 1987 and 1992.

*Social Well-Being Related to Agriculture.* To describe the affected environment for social well-being, this document relies on the grouping of counties for each region shown as follows in Table 8.1.2-3. This grouping is necessary in order to aggregate racial, income, and population data from the U. S. Census.

The affected environment for social well-being involves both community stability issues and environmental justice issues. Although community stability and environmental justice issues overlap in many respects (for example, income and poverty levels) they are discussed separately for organizational purposes. Additionally, community stability is described for the entire study area rather than on a regional basis.

*Community Stability.* The affected environment for community stability includes the following:

- Social groups in the CALFED study area,
- Economic indicators of social well-being,
- Employment opportunities, and
- Community social structure.

Several important social groups are related to agriculture in the study area: farmers, farm workers, and agribusiness.

Economic indicators of social well-being include population demographics, median family income, per capita income, poverty rates, and unemployment rates. These indicators are summarized by region in Table 8.1.2-4.

| Region | Year | Number and Size: Number of Farms | Number and Size: Land in Farms (1,000 acres) | Number and Size: Average Farm Size (acres) | Ownership Status: Full Owners | Ownership Status: Part Owners | Ownership Status: Tenants |
|---|---|---|---|---|---|---|---|
| Delta | 1987 | 4,033 | 962 | 238 | 2,817 | 691 | 529 |
| | 1992 | 3,639 | 900 | 247 | 2,525 | 628 | 487 |
| Bay | 1987 | 8,377 | 2,315 | 276 | 5,950 | 1,194 | 1,233 |
| | 1992 | 7,453 | 2,261 | 303 | 5,306 | 1,035 | 1,112 |
| Sacramento River | 1987 | 11,916 | 4,527 | 380 | 8,183 | 2,160 | 1,568 |
| | 1992 | 11,507 | 4,334 | 377 | 7,786 | 2,093 | 1,629 |
| San Joaquin River | 1987 | 28,742 | 10,095 | 351 | 20,942 | 4,610 | 3,730 |
| | 1992 | 26,731 | 9,656 | 361 | 9,144 | 4,420 | 3,168 |
| SWP and CVP Service | 1987 | 21,281 | 6,279 | 295 | 16,744 | 1,837 | 2,700 |
| Areas Outside the Central Valley | 1992 | 19,899 | 5,488 | 276 | 16,063 | 1,639 | 2,197 |

SOURCE:
U.S. Census, 1989 and 1994.

**Table 8.1.2-1. Number of Farms, Farm Sizes, and Farm Ownership in All Regions, 1987 and 1992**

| Region | Year | Total Farm Income (million dollars): Agric. Product Value | Total Farm Income (million dollars): Other Revenue | Total Farm Income (million dollars): Total | Total Production Expenses (million dollars): Livestock Related | Total Production Expenses (million dollars): Fertilizers and Chemicals | Total Production Expenses (million dollars): Hired and Contract Labor | Total Production Expenses (million dollars): Other | Total Production Expenses (million dollars): Total | Net Cash Return (million dollars) |
|---|---|---|---|---|---|---|---|---|---|---|
| Delta | 1987 | 496 | 12 | 508 | 81 | 38 | 97 | 169 | 385 | 123 |
| | 1992 | 590 | 10 | 600 | 89 | 48 | 128 | 209 | 474 | 126 |
| Bay | 1987 | 845 | 2 | 847 | 102 | 36 | 255 | 281 | 674 | 173 |
| | 1992 | 1,065 | 6 | 1,071 | 105 | 53 | 338 | 335 | 831 | 240 |
| Sacramento | 1987 | 1,515 | 145 | 1,660 | 126 | 140 | 252 | 525 | 1,043 | 617 |
| River | 1992 | 1,394 | 183 | 1,577 | 147 | 180 | 316 | 630 | 1,273 | 304 |
| San Joaquin | 1987 | 6,565 | 222 | 6,787 | 1,276 | 531 | 1,337 | 2,197 | 5,341 | 1,446 |
| River | 1992 | 8,089 | 308 | 8397 | 1,780 | 670 | 1,691 | 2,736 | 6,877 | 1,520 |
| SWP and | 1987 | 3,743 | 30 | 3,773 | 872 | 185 | 842 | 1,044 | 2,943 | 830 |
| CVP Service Areas Outside the Central Valley | 1992 | 4,295 | 29 | 4,324 | 904 | 222 | 1,072 | 1,312 | 3,510 | 814 |

SOURCE:
U.S. Census 1989 and 1994.

**Table 8.1.2-2. Farm Income and Production Expense in All Regions, 1987 and 1992**

| CALFED Regions | Counties |
|---|---|
| Delta Region | 98% of Contra Costa, 45% of Sacramento, 46% of San Joaquin, 30% of Solano, and 20% of Yolo. |
| Bay Region | Alameda, 2% of Contra Costa, Marin, Napa, San Benito, San Francisco, San Mateo, Santa Clara, Santa Cruz, and Sonoma. |
| Sacramento River Region | Butte, Colusa, Glenn, Placer, 55% of Sacramento, Shasta, 70% of Solano, Sutter, Tehama, 80% of Yolo, and Yuba. |
| San Joaquin River Region | Fresno, Kern, King, Madera, Merced, 54% of San Joaquin, Stanislaus, and Tulare. |
| SWP and CVP Service Areas Outside Central Valley | Imperial, Los Angeles, Plumas, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura. |

**Table 8.1.2-3. CALFED Regions and Groupings of Counties**

This section summarizes regional economic indicators of social well-being in the study area as they apply to all social groups and communities. Some general conclusions derived from review of the economic data presented in Table 8.1.2-4 are as follows:

- In the study area, people living in predominantly rural areas have lower incomes, higher poverty rates, and higher unemployment rates than those living in the urban regions. However, San Francisco and Los Angeles counties experience high income levels and some of the highest poverty rates in the state.

- In all regions (except the Sacramento River Region) pockets of prosperity have an "averaging effect" of raising average personal income levels and lowering average poverty and unemployment rates.

| Ethnicity | Poverty Rate (Percentage) |
|---|---|
| White | 6 |
| Black | 21 |
| Hispanic | 18 |
| Asian and other | 11 |

**Table 8.1.2-5. Poverty Rate by Ethnicity**

Personal income is measured as family and/or per capita income, as shown in Table 8.1.2-4. Median family income is a measure of the annual income received by families living together in the same household. The median is a statistical term for the midpoint of a data set. There is a wide range of median family income in the study area. Per capita income in the study area ranges from $10,000 in the Tulare Lake area and Yuba County (Sacramento River Region) to $28,000 in Marin County in the Bay Region.

As shown in Table 8.1.2-4, existing unemployment rates are lowest in the Bay and Delta regions where more employment opportunities are available. Unemployment rates are presented as a range in areas with diverse economies such as the urban and agricultural areas in the Sacramento Valley and San Joaquin Valley.

There is a wide range of poverty rates within the study area. The highest poverty rates in the study area occur in predominantly rural areas, and poverty rates are higher among minority ethnic groups. A 1986 study by the California Employment Development Department (EDD) (Ong et al. 1986) estimated the poverty rates among races in California during 1980, as summarized in Table 8.1.2-5. Unemployment rates in the study area are higher among minority ethnic groups. The EDD (Ong et al. 1986) estimated statewide unemployment rates among races in California during 1980, as summarized in Table 8.1.2-6.

| | Delta | Bay | San Joaquin | Sacramento | CVP and SWP Service Areas Outside the Central Valley |
|---|---|---|---|---|---|
| 1996 Population[a] | 2,362,514 | 5,498,964 | 3,004,222 | 1,666,650 | 19,159,450 |
| **Economic Indicators** | | | | | |
| Median Family Income (1989)[b] | 40,690 | 46,373 | 30,862 | 31,794 | 38,825 |
| Per Capita Income[c] (1994) | 21,991 | 28,079 | 16,475 | 18,313 | 20, 358 |
| Poverty Rate[d] | 11% | 9% | 18% | 13% | 13% |
| 1995 Unemployment Rate[e] Average<br>Range | 7.8%<br>5.8 to 12.3% | 6.6%<br>4.3 to 13.5% | 13.3%<br>8.2 to 16.9% | 11.2%<br>6.1 to 19.7% | 10%<br>5.1 to 28.8% |

NOTES:
[a] Source: California Department of Finance, County Population Data, aggregated into CALFED Regions according to Table 1.
[b] Source: California Department of Finance, Median Family Income for each county was averaged to show average median family income for each CALFED region.
[c] Source: California Department of Finance, Per Capital Income for each county was averaged to show average per capita income for each CALFED region.
[d] Poverty Rate
[e] Source: California Department of Finance; average of counties within each CALFED Region.

**Table 8.1.2-4 Existing Conditions: Regional Demographics and Economic Indicators of Social Well- Being**

| Ethnicity | Unemployment Rate (percentage) |
|---|---|
| White | 4 |
| Black | 7 |
| Hispanic | 7 |
| Asian and other | 4 |

**Table 8.1.2-6. Unemployment Rate by Ethnicity**

Average annual agricultural employment was about 400,000 to 435,000 jobs from 1987 to 1992. Approximately 420,000 people were employed in the agriculture industry in 1992 (EDD 1993). The relationship between the agricultural sector and the larger economy of the Central Valley is important in the assessment of social factors. Agricultural employment is becoming a less significant factor in measuring the viability of the local economy in all areas of the Central Valley than it once was. The economy of the Central Valley has grown and diversified, and nonagricultural employment opportunities are increasing. This general trend does not hold true for some communities. Agriculture remains the dominant industry and economic force in many smaller communities.

Factors affecting social well-being include not only employment opportunities but also job guarantees. Job guarantees are affected by seasonal employment trends and economic trends and, in some cases, natural occurrences. Seasonal employment affects agricultural workers. Economic trends also may affect agriculture. Natural occurrences such as weather conditions can shorten or lengthen seasonal employment opportunities. For example, water shortages can reduce the number of acres farmed. Natural occurrences such as drought and flood conditions and economic conditions are not under the control of CALFED and, although they are not addressed further in this chapter, are important to consider in the assessment of existing conditions.

For the CALFED study area, the largest sectors of workers who may be affected are seasonal farm workers and agricultural workers. Seasonal unemployment among farm workers and agricultural workers usually occurs during winter months following harvest and summer vacation periods. Changes in seasonal employment can affect the demand for social services. The demand for social services increases during periods of unemployment, such as requests for unemployment payments, health services, and other family support programs. The need to utilize family, health, and income support services can decrease social well-being among persons who are employed during much of the year but are seasonally unemployed.

Local communities provide a social base for people to access assistance and support during times of need. The social structure of a community may provide job training, educational opportunities, family support services, religious and cultural outlets for support and counseling, recreational opportunities, and monetary assistance. These services may be available through community or county agencies or from cultural and religious institutions within the community. The local community also provides an identifying factor for all residents and a sense of belonging. When economic changes occur within an area, such as the loss or gain of a major employer or drought or flood conditions, the local community can be affected significantly.

This is especially true if the local economy is centered around one industry type, such as agriculture. The community is a crucial level of social organization. It is at this level that most social services are delivered, social networks formed, and values and beliefs confirmed.

*Environmental Justice.* The analysis of potential environmental justice issues focuses on the farm worker population. Within the population potentially affected by the CALFED program, this population is the most racially diverse. Table 8.1.2-7 indicates ethnicity by region, and Table 8.1.2-8 presents the racial distribution of farm workers by region.

| Region | Ethnicity (percentage) | | | |
|---|---|---|---|---|
| | White | Black | Asian | Hispanic |
| Delta Region | 68 | 8 | 9 | 14 |
| Bay Region | 61 | 8 | 15 | 16 |
| Sacramento River Region | 82 | 4 | 5 | 10 |
| San Joaquin River Region | 62 | 4 | 6 | 30 |
| SWP and CVP Service Areas Outside the Central Valley | 52 | 9 | 9 | 30 |

SOURCE:
California Department of Finance, 1993.

**Table 8.1.2-7. Ethnicity by Region**

| Region | Hispanic | White | Black | American Indian/Eskimo Aleutian | Asian Pacific/ Islander | Total Number of Farm Workers |
|---|---|---|---|---|---|---|
| Delta | 77% | 15.1% | 0.8% | 0.3% | 6.5% | 5,470 |
| Bay | 82.2% | 14.4% | 1% | 0% | 2.2% | 12,230 |
| Sacramento River | 58.9% | 30.9% | 0.4% | 1% | 8.2% | 11,560 |
| San Joaquin River | 84% | 11.9% | 0.3% | 0.2% | 3.4% | 74,220 |
| SWP and CVP Service Areas Outside the Central Valley | 86.9% | 10.1% | .9% | .2% | 1.7% | 44,960 |
| **Totals** | **122,490** | **19,500** | **840** | **400** | **4,860** | **148,440** |

SOURCE:
Census of Population and Housing, 1990.

**Table 8.1.2-8. Racial Distribution of Farm Workers by Region**

The vast majority of U.S. farm workers have been Mexican immigrants and their children since the Bracero Program, which operated from 1942 to 1964, brought in more than 4 million laborers from Mexico. Earlier decades saw substantial numbers of Chinese, Japanese, Filipinos, Native Americans, and African Americans. By 1983, an estimated 90% of the seasonal farm laborers in California were Mexicans or Chicanos, while nationwide the figure was 60%. Most migrant farm workers are either American citizens or are working in the country legally. The Department of Labor estimates that about 25% of migrant farm workers are illegal immigrants.

Additionally, the Department of Labor estimates that at any given time, 12% (or at least 190,000) domestic farm workers are out of work nationwide. The majority of farm workers earn annual wages of less than $7,500. Although wage rates for farm workers have increased over the last decade, when they are adjusted for inflation, farm workers' real wages have decreased 15 to 25% in that time. (USDA 1991.)

### 8.1.2.3 Delta Region

**Historical Perspective.** Between 1944 and 1964, the number of farms in the region increased from 3,457 in 1944 to 4,502 in 1949, and then declined to 3,374 in 1964. The decline was due mainly to the accumulation of irrigated land into fewer and larger farms. As a result, the average farm size in the Delta Region increased from 58 acres in 1944 to 132 acres in 1964.

**Existing Conditions**

*Farm Profiles.* The number of farms decreased from 4,033 in 1987 to 3,639 in 1992 in the Delta Region, partly due to loss of farm land (62,000 acres) to industrial and urban uses, and partly to the accumulation of farm land into fewer and larger farms. The average farm size increased from 238 acres to 247 acres during this period. About 70% of farms in the Delta are operated by full owners.

Cropping Patterns and Production Value. Truck crops dominate Delta crop production, accounting for 30% of the region's total harvested acres. The next important group of crops in the region include alfalfa, grains, and orchards, each accounting for 10 to 15% of the total crop acreage. Orchards and grapes together accounted for less than 20% of the total harvest acreage in the Delta between 1986 and 1995, but produced about 50% of the total production value, reflecting high crop values per acre. Alfalfa and field crops produced about 15% of total production value, with more than 40% of total harvested acres, indicating lower crop values per acre.

Agricultural Production Costs and Revenues. Agricultural net returns are revenues less costs. Higher costs reduce farm profits, but some part of costs also represent farm expenditures in the regional economy. Revenues are unit price multiplied by the level of production.

Farms in the Delta Region achieved $496 million in agricultural sales in 1987 and $590 million in 1992, as shown in Table 8.1.2-2. Production expenses were about $474 million in 1992, leaving a net cash return of $126 million. Hired and contract labor was the largest expense reported, accounting for 25% of total expenses.

*Social Well-Being Related to Agriculture.* As shown in Table 8.1.2-4, the 1996 total population for the Delta Region was 2,362,514. The median family income was $40,690 (1989), per capita income was $21,991 (1994), poverty rate was 11% (1990), and the unemployment rate ranged from 5.8 to 12.3% (1995).

### 8.1.2.4 Bay Region

**Historical Perspective.** Between 1944 and 1964, the number of farms increased from 5,581 in 1944 to 6,146 in 1954 in the Bay Region, then declined to 4,103 in 1964. This was partly due to the accumulation of irrigated land into fewer and larger farms and urban encroachment.

**Existing Conditions**

*Farm Profiles.* The number of farms decreased from 8,377 in 1987 to 7,453 in 1992 in the Bay Region, partly due to loss of farm land (54,000 acres) to industrial and urban uses, and partly to the accumulation of farm land into fewer and larger farms. The average farm size increased from 276 acres to 303 acres during this period. About 70% of farms in the Bay Region are operated by full owners.

*Cropping Patterns and Production Value.* Grapes are the dominant crop in the Bay Region, accounting for 30% of the region's total harvested acres. The next important group of crops in the region is sugar beets and truck crops, each accounting for about 20% of the total crop acreage. Between 1986 and 1995, grapes and orchards together accounted for less than 50% of the total harvest acreage, but produced about 80% of the total production value, reflecting high crop values per acre. Alfalfa, grains, and field crops produced about 2% of total production value, with more than 35% of total harvested acres.

*Agricultural Production Costs and Revenues.* Farms in the Bay Region achieved $845 million in agricultural sales in 1987 and $1,065 million in 1992, as shown in Table 8.1.2-2. Production expenses were about $831 million in 1992, leaving a net cash return of $240 million. Hired and contract labor was the largest expense reported, accounting for about 40% of total expenses, and it has been increasing over time.

*Social Well-Being Related to Agriculture.* As shown in Table 8.1.2-4, the 1996 total population for the Bay Region was 5,498,964. The median family income was $46,373 (1989), per capita income was $28,079 (1994), poverty rate was 9% (1990), and the unemployment rate ranged from 4.3 to 13.5% (1995).

### 8.1.2.5 Sacramento River Region

**Historical Perspective.** Between 1944 and 1964, the number of farms increased from 9,948 in 1944 to 11,538 in 1954 in the Sacramento River Region, then declined to 9,255 in 1964. This was mainly due to the accumulation of irrigated land into fewer and larger farms. As a result, the average farm size in the region increased from 64 acres in 1944 to 138 acres in 1964.

**Existing Conditions**

*Farm Profiles.* The number of farms decreased from 11,916 in 1987 to 11,507 in 1992 in the Sacramento River Region, primarily due to loss of farmland (193,000 acres) to industrial and urban uses. The average farm size remained about the same during this period. About 70% of farms are operated by full owners.

*Cropping Patterns and Production Value.* Rice is the number one crop in the Sacramento River Region, accounting for 26% of the region's total harvested acres. The next important group of crops in the region includes field crops (19%), orchards (15%), pasture (11%), and grains (10%). Between 1986 and 1995, orchards and tomatoes together accounted for less than 25% of the total harvest acreage in this region, but produced about 50% of the total production value, reflecting high crop values per acre. Pasture, alfalfa, grains, and field crops produced less than 20% of total production value, with more than 50% of total harvested acres, indicating lower crop values per acre.

Due to extensive re-use of water in the Central Valley, significant savings only occur from fallowing or through crop shifts. Decreased reliability constrains the conversion to high-value crops because of increased risk, particularly when groundwater is unavailable or of low quality. More lower-value but drought-tolerant crops are planted instead.

*Agricultural Production Costs and Revenues.* Farms in the Sacramento River Region achieved $1,515 million in agricultural sales in 1987 and $1,349 million in 1992, as shown in Table 8.1.2-2. Production expenses were about $630 million in 1992, leaving a net cash return of $304 million. Hired and contract labor was the largest expense reported, accounting for about 25% of total expenses.

The region supports about 2,145,000 acres of irrigated agriculture. About 1,847,000 acres are irrigated on the valley floor; the surrounding mountain valleys within the region add about 298,000 irrigated acres (primarily pasture and alfalfa) to the region's total.

*Social Well-Being Related to Agriculture.* As shown in Table 8.1.2-4, the 1996 total population for the Sacramento River Region was 1,666,650. The median family income was $31,794 (1989), per capita income was $18,313 (1994), poverty rate was 13%, and the unemployment rate ranged from 6.1 to 19.7% (1995).

#### 8.1.2.6 San Joaquin River Region

**Historical Perspective.** Between 1944 and 1964, the number of farms increased from 30,212 in 1944 to 33,832 in 1949 in the San Joaquin River Region, then declined to 25,153 in 1964. This was mainly due to the accumulation of irrigated land into fewer and larger farms. As a result, the average farm size in the region increased from 78 acres in 1944 to 155 acres in 1964.

**Existing Conditions**

*Farm Profiles.* The number of farms in the San Joaquin River Region decreased from 28,742 in 1987 to 26,731 in 1992, partly due to loss of farm land (439,000 acres) to industrial and urban uses, and partly due to the accumulation of farm land into fewer and larger farms. The average farm size increased from 351 acres to 361 acres during this period. About 73% of farms are operated by full owners.

*Cropping Patterns and Production Value.* In terms of harvested acres, cotton is the number one crop in the San Joaquin River Region, accounting for 25% of the region's total harvested acres. The next important crops in the region are field crops (15%), orchards (13%), grapes (10%), and alfalfa (10%). Between 1986 and 1995, grapes and orchards together accounted for less than 25% of the total harvest acreage in this region but produced about 50% of the total production value. Pasture, alfalfa, grains, and field crops produced less than 20% of total production value with more than 50% of total harvested acres.

*Agricultural Production Costs and Revenues.* Farms in the San Joaquin River Region achieved $6,565 million in agricultural sales in 1987 and $8,089 million in 1992, as shown in Table 8.1.2-2. Production expenses were about $2,736 million in 1992, leaving a net cash return of $1,520 million. Hired and contract labor was the largest expense reported, accounting for about 25% of total expenses.

*Social Well-Being Related to Agriculture.* As shown in Table 8.1.2-4, the 1996 total population for the San Joaquin Region was 3,004,222. The median family income was $30,862 (1989), per capita income was $16,475 (1994), poverty rate was 18% (1990), and the unemployment rate ranged from 8.1 to 16.9% (1995).

#### 8.1.2.7 SWP and CVP Service Areas Outside the Central Valley

**Historical Perspective.** Between 1944 and 1964 in the SWP and CVP Service Areas Outside the Central Valley, the number of farms decreased from 33,715 in 1944 to 13,603 in 1964, mainly due to the accumulation of irrigated land into fewer and larger farms. As a result, the average farm size in the region increased from 30 acres in 1944 to 82 acres in 1964.

**Existing Conditions**

*Farm Profiles.* The number of farms in the region decreased from 21,281 in 1987 to 19,899 in 1992, primarily due to loss of farm land (791,000 acres) to industrial and urban uses. The average farm size decreased from 295 acres to 276 acres during this period.

*Cropping Patterns and Production Value.* In terms of harvested acres, alfalfa is the number one crop in the region, accounting for 28% of the region's total harvested acres. The next important crops in the region are pasture (12%), subtropical orchards (11%), field crops (10%), and grains (10%). Between 1986 and 1995, truck crops and orchards together accounted for less than 30% of the total harvest acreage in this region but produced about 70% of the total production value. Pasture, alfalfa, grains, and field crops produced less than 15% of total production value with more than 50% of total harvested acres.

*Agricultural Production Costs and Revenues.* Farms in the SWP and CVP Service Areas Outside the Central Valley achieved $3,743 million in agricultural sales in 1987 and $4,295 million in 1992, as shown in Table 8.1.2-2. Production expenses were about $3,510 million in 1992, leaving a net cash return of $814 million. Hired and contract labor was the largest expense reported, accounting for about 30% of total expenses.

Moderate levels of irrigated agriculture subsist in the Mojave River, Antelope, and Indian Wells valleys. Most of the acreage produces alfalfa, pasture, or deciduous fruit. About one-half (30,000 acres) of the entire region's irrigated crop land is estimated to lie in the SWP and CVP Service Areas Outside the Central Valley.

Prominent agricultural crops in the southern portion of San Bernardino County, the middle portion of Riverside County, and the Salton Sea in Imperial County include alfalfa, winter vegetables, melons, grapes, dates, and wheat, located primarily in the Coachella Valley area.

*Social Well-Being Related to Agriculture.* As shown in Table 8.1.2-4, the 1996 total population for the CVP and SWP Service Areas was 19,159,450. The median family income was $38,825 (1989), per capita income was $20,358 (1994), poverty rate was 13%, and the unemployment rate ranged from 5.1 to 28.8% (1995).

## *8.1.3 Environmental Consequences: Agricultural Land and Water Use*

### 8.1.3.1 Assessment Methods

Agricultural land and water use impacts could occur in two main categories: direct and construction-related impacts; and indirect and operational impacts.

Direct impacts are those changes in physical land and water uses, or in land use designations, which result from construction of new facilities or conversion of lands from one use to another. For purposes of this analysis, direct impacts are those that would occur if any of alternatives, or combinations of alternatives, were implemented.

Indirect effects occur later in time and could be farther removed in distance. Indirect land use effects would be changes in broad land use policies, resources, or economies which could result from changes in land uses, or in the long-term availability of water resources. Potential indirect and operational impacts of the program include long-term changes in the number of acres in agricultural use.

As a Programmatic EIS/EIR, this assessment does not provide site-specific details or specific estimates of acreages potentially affected for a given alternative. Rather, potential increases or decreases in agricultural and uses by region is qualitatively estimated, or described with a range of gross acres.

### 8.1.3.2 Significance Criteria

The following impacts would have potentially significant agricultural land or water use effects:

- **Agricultural Land Use:** Permanent or long-term reduction in agricultural acreage within a region or the conversion of any lands categorized as prime or unique farmlands, or inconsistency with agricultural objectives of local, regional, and state plans would be considered significant.

- **Agricultural Water Use:** Any increase in groundwater pumping that would cause or exacerbate overdraft of a basin would be considered significant. A change in surface water use could be significant if it leads to changes in land use or higher regional unemployment.

This section also addresses the land use significance criteria related to agriculture recommended in the *State CEQA Guidelines*:

- Affects an agricultural resources or operations (e.g., impacts to soils or farmlands, or impacts from incompatible land uses);

- Conflicts with applicable environmental plans or policies adopted by agencies with jurisdiction over the project; or

- Conflicts with general plan designations or zoning.

### 8.1.3.3 Comparison of No Action Alternative to Existing Conditions

The key changes between current conditions and No Action conditions involve converting agricultural land uses to accommodate facilities associated with reasonably foreseeable future actions in the Central Valley. Additional agricultural impacts are anticipated from urbanization of agricultural lands as Central Valley towns and cities grown in population. Specific agricultural land use impacts (versus impacts to open space or municipal and industrial lands) would depend upon the actual location of the modifications and improvements to be implemented under the No Action Alternative.

In addition, under the No Action Alternative, DWR Bulletin 160-93 projects that about 45,000 acres of drainage problem lands in the San Joaquin River Region will be retired by year 2020.

Table 8.1.1-6 summarizes the agricultural water use in the Central Valley before and after water was reallocated according to the CVPIA. This table illustrates how changes in surface water delivery correspond to changes in groundwater pumping. The estimates indicate that part of any change in surface water delivery is likely to be offset by a change in groundwater use. The degree of replacement depends on the relative cost of groundwater and surface water, and on the relative cost and benefit of other potential adjustments (for example, changing the amount of acreage irrigated or changing irrigation methods).

### 8.1.3.4 Comparison of Program Alternatives to No Action Alternatives

The impacts to agricultural land and water use resulting from the storage and conveyance program element will vary by alternative, as discussed below. Impacts to agricultural land and water use resulting from other program elements, such as ecosystem restoration, do not vary substantially from one alternative to another at the programmatic level. Therefore, the discussions of environmentalconsequences associated with other program elements are not grouped by alternative. In those cases where no environmental impacts have been associated with a program element within a regions, the program element is not discussed.

> **Potential land use changes attributable to each Alternative are noted in Chapter 5, in Sections 5.2.1, 5.2.2, 5.2.3 and 5.2.4. Further, potential effects on important farmlands are noted in Section 5.2.5.**

#### Delta Region

*Storage and Conveyance.* Significant and unavoidable adverse land use impacts could occur by converting existing land uses from new or expanded surface storage. Specific land use impacts would depend on the exact location of the new storage facility. For purposes of this programmatic analysis, it is assumed that most new reservoir sites would be located in the foothills rather than in flat, valley-bottom areas where agricultural land uses would occur. Therefore, storage elements would likely affect less productive agricultural lands, such as grazing lands, and not the better farmland generally found on the valley floor.

*Alternative 2.* Channel widening and island flooding in Alternative 2 will require the purchase and conversion of between 4,000 and 28,000 acres of agricultural lands, depending on the variation chosen. Adverse land use impacts of the modifications would be significant.

*Alternative 3.* Creating an open-channel isolated conveyance in Alternative 3 would be a significant adverse land use impact due to permanently converting between 4,500 and 33,500 acres of important farmland.

Conversion of prime or unique farmland to other uses could also conflict with local or regional agricultural land use plans or policies, which could be a significant impact.

The specific locations of improvements contemplated for the alternatives have not been identified for this programmatic-level analysis. Thus, the consistency of project alternatives with general plan land use designations or zoning are not evaluated herein. However, inconsistency with these plans could result in a significant adverse land use impact.

*Ecosystem Restoration.* The Ecosystem Restoration Program recommends conversion of land in the Delta Region to habitat and ecosystem restoration, levee setbacks, and floodways. In general, agriculture is the dominant land use on the nonconveyance side of levee structures in the Delta. The ecosystem restoration program could convert up to 115,000 acres of important farmland. Some of these agricultural uses may be shifted to the Central Valley or elsewhere.

The mix of crops taken out of production and converted to habitat is difficult to assess because the specific locations where willing seller land acquisitions and restoration will occur are still unknown. Consequently, estimating the reduction in applied water is somewhat speculative. However, using a hypothetical example, and assuming a rough average of 4 acre-feet of applied water per acre of land in production and that the maximum potential footprint of 115,000 acres was converted to habitat in the Delta, about 460,000 acre-feet of applied water would be left in the stream or consumed by the new habitat. It is important to note that this reduction in agricultural applied water does not equal water potentially available for other beneficial users other than the new habitat. Much of the water applied to Delta lands not consumed by crops returns as flow to the rivers in the Delta. In addition, flora that is restored in the Delta will consume much of the water that would have been used by crops.

*Water Quality.* The long-term benefits of this program include improved water quality conditions relative to the No Action Alternative.

*Water Use Efficiency.* This program is not anticipated to have direct land use impacts; however, there may be indirect impacts to agricultural land use. Agricultural land may be removed from production because of increased costs and decreased profitability which could result from required efficiency improvements or increased district water charges (for example, as part of tiered water pricing). Conversely, improved efficiency may allow the continued viability of agriculture in some areas. Efficiency improvements that result in greater water supply reliability but also higher annual cost may cause a shift in the types of crops grown. A shift to high-value crops may lead to a hardening of water demand. Conversion or loss of agricultural land would be a potentially significant adverse land use impact of this program. Improvement in the long-term viability of some agricultural lands would be a potentially beneficial impact.

*Levee System Integrity.* Levee system integrity measures could affect up to 35,000 acres of land in the Delta, most of which would likely be important agricultural land. However, the specific locations of lands that would be affected by the Program are not known at this time. The impacts from this program would primarily affect agricultural land uses in the Delta Region and would not directly affect land uses in the other four regions.

*Water Transfers.* This program would affect land use economics primarily through changes to agricultural, open space, habitat, and developed land use. In addition to the source of water for a transfer, the timing, magnitude, and pathway of each transfer have a tremendous effect on the potential for significant impacts. The water source varies according to the water transfer category: crop fallowing (surface water or groundwater), shifting to a crop with a lower water demand (surface water or groundwater), groundwater substitution for surface water (surface water), direct groundwater transfers (groundwater), conserved water (surface water or groundwater), and stored water in reservoirs (surface water).

Potentially significant beneficial impacts are associated with the transferred water's destination, and include: 1) increasing agricultural acreage in areas with limited water supplies; and 2) increasing habitat acreage in areas with limited water supplies.

Potentially significant adverse impacts are associated with the transferred water's origin, and include: 1) decreasing agricultural acreage due to crop fallowing; 2) decreasing agricultural acreage due to increased costs resulting from direct groundwater or groundwater replacement transfers; 3) causing land use changes that could be inconsistent with local agricultural objectives; and 4) decreasing habitat acreage.

Water transfers are not expected to have direct land use impacts; however, they could indirectly affect agricultural opportunities by changing availability of water in selling and receiving areas.

**Applied Water Reduction Versus Real Water Savings**

With the exception of a negligible amount of water required for plant metabolic processes, agricultural applied water can be accounted for by various demand elements. The "consumptive" elements (crop evapotranspiration, on-farm evaporation, and conveyance consumption) are lost to the atmosphere and generally not recovered. The "non-consumptive" elements (tailwater, deep percolation, conveyance seepage, canal spill, and gate leakage) flow either to local surface or groundwater resources.

In theory, all losses are recoverable. In practice, however, losses that flow to very deep aquifers or excessively degraded water bodies may not be recoverable because of prohibitively expensive energy requirements (that is, they become non-recoverable). Determining recoverability varies with location and time as well as other factors.

Distinguishing between non-recoverable and recoverable losses is typically based solely on water quality considerations. This assumes that all losses to usable water bodies can be economically recovered. Principal water bodies that are regarded as non-recoverable include saline, perched groundwater underlying irrigated land on the west side of the San Joaquin Valley; Salton Sea, which received drainage from Coachella and Imperial valleys; San Francisco Bay; and the Pacific Ocean.

Real water savings can only be achieved by reducing non-recoverable losses because they are truly lost from the system. Water is considered "saved" when these losses are reduced. Such water savings are available for reallocation for other water supply users, including urban, agricultural, or the ecosystem.

Recoverable losses, on the other hand, often constitute a supply for downstream uses. Downstream uses can include groundwater recharge, agricultural and urban water use, and environmental uses, including wetlands, riparian corridors, and in-stream flows. Often, recoverable losses are used many times over by may downstream beneficiaries. Thus, reducing applied water when the losses are considered recoverable does not generate a new water supply for reallocation to other uses. However, other non-water supply benefits can be derived. These include improved water quality, modifications in the timing and/or location of diversions, and local instream benefits. More information can be found in Chapters 4 and 5 of the Water Use Efficiency Component Technical Appendix.

### Bay Region

The compatibility and consistency of potential actions with these plans is not evaluated in this programmatic-level analysis. However, inconsistency between applicable Alternative 1 program elements with existing area city and county land use plans could result in a significant adverse land use impact.

Potential land use impacts to important agricultural land in the Bay Region are anticipated to be minimal and have not been quantified.

### Sacramento and San Joaquin River Regions

*Storage and Conveyance.* Storage facilities could result in conversion of agricultural land in the foothill or mountain areas, a potentially significant and unavoidable adverse impact. Development of storage facilities could also conflict with local and regional plans regarding agricultural lands.

The compatibility and consistency of potential actions with county and city local general land use plans are not evaluated in this programmatic-level analysis. However, inconsistency between applicable Alternative 1 program elements with these plans could result in a significant adverse land use impact.

Between 18,000 and 32,000 acres of agricultural land could be affected by the program storage elements. But, because storage facility locations have not been chosen, the amount of important farmland affected is not known and will be determined in project-specific environmental documentation.

*Ecosystem Restoration.* The ecosystem restoration program could convert up to 34,000 acres of important farmland, primarily on the east side of the valley and the valley trough in the Sacramento Valley and up to 11,000 acres of important farmland primarily east of the San Joaquin River in the San Joaquin Region.

*Water Quality.* Approximately 35,000 to 45,000 acres of agricultural land with water quality problems (that is, due to selenium) may be idled in the San Joaquin River Region as a measure to improve water quality in the region. The location of these lands and, consequently, the types of crops that would be idled are not known. But up to 45,000 acres of important farmland, including prime and unique, could be affected.

Again, the mix of crops that would be retired as part of the Water Quality Program is unknown. But assuming an average of 3 acre-feet of applied water per crop acre and a maximum of 45,000 acres of drainage problem lands idled, approximately 135,000 acre-feet of water would not be applied. As discussed in the Delta Region Land and Water Use impact section, this reduction in applied water does not necessarily equate to new water. Some of this water would likely be recoverable in the San Joaquin River Region by downstream or in-basin users.

*Water Transfers.* Potential water transfer program impacts would be similar to those discussed under the Delta Region.

*Coordinated Watershed Management.* Potential watershed activities in the Sacramento River and San Joaquin River regions will be compatible with applicable agricultural land use plans and policies in their affected jurisdiction. Reduced grazing activities in the watershed could have potentially significant land use impacts in this region if they result in a loss of agricultural productivity.

### SWP and CVP Service Areas Outside the Central Valley

Potential land use impacts to agricultural land in the SWP and CVP Service Areas outside the Central Valley are anticipated to be minimal and have not been quantified.

*Water Use Efficiency.* Indirect changes in land use may result from the Water Use Efficiency Program. In some instances, agricultural land may be removed from production because of increased costs and decreased profitability which





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could result from required efficiency improvements or increased district water charges (for example, as part of tiered water pricing). Conversely, improved efficiency may allow the continued viability of agriculture in some areas. This will tend to maintain the existing uses of agricultural lands in some regions and reduce the amount that may go out of production or become urbanized. Efficiency improvements that result in greater water supply reliability but also higher annual cost may cause a shift in the types of crops grown. Conversion or loss of agricultural land would be a potentially significant adverse land use impact of the program. Improvement in the long-term viability of some agricultural lands would be a potential beneficial impact.

#### 8.1.3.4 Comparison of Program Alternatives to Existing Conditions

Comparison of program alternatives to existing conditions indicates:

- All potentially significant adverse impacts that were identified when compared to the No Action Alternative would still be considered significant when compared to existing conditions.

- No additional significant environmental consequences have been identified when program effects are compared to existing conditions as opposed to No Action.

- The beneficial effects of the Program would still be beneficial when compared to existing conditions. Many of the beneficial effects would be related to long-term improvements to a number of water quality. These effects are beneficial compared to existing conditions, and even more beneficial when considered with respect to future demands on surface water.

In summary, the conclusions regarding the significance of project effects on surface water quality when compared to existing conditions would be similar to those compared to No Action.

#### 8.1.3.5 Land and Water Use Mitigation Strategies

As discussed in the introduction to this summary, mitigations are proposed as strategies in this programmatic document and are conceptual in nature. Final mitigations would need to be approved by responsible agencies as specific projects are approved by subsequent environmental review.

Avoidance or minimization strategies:

- Develop assurance measures to increase water supply reliability such as providing long-term water supply contracts;

- Site and align Program features to avoid or minimize impacts on agriculture;

- Examine structural and nonstructural alternatives to achieving project goals without impacting agricultural lands;

- Implement features that are consistent with local and regional land use plans;

- Work with local and regional jurisdictions to amend local plans and policies to bring Program features into compliance;

- Involve all affected parties, especially landowners and local communities in developing appropriate configurations to achieve the optimal balance between resource impacts and benefits;

- To the extent practicable, maintain the productivity and flexibility of California's agricultural resources.

Some examples of Ecosystem Restoration Program avoidance or minimization measures are:

- Restore existing degraded habitat first;

- Focus habitat restoration efforts first on developing new habitat on public lands;

- Absent public lands, restoration efforts will occur on lands acquired from willing sellers where at least part of the reason to sell is an economic hardship, that is, land that floods frequently or the levees are too expensive to maintain;

- Where small parcels of land are needed for waterside habitat, acquisition efforts will seek out points of land on islands where the ratio of levee miles to acres farmed is high;

- Obtain easements on existing agricultural land which would allow for minor changes in agricultural practices thus increasing the value of the agricultural crop(s) to wildlife;

- Floodplain restoration efforts would include provisions for continued agricultural practices on an annual basis;

- Water acquired for habitat purposes could be purchased using temporary or rotating contracts so that the same land or locality is not impacted every year; and

- Use a planned or phased habitat development approach in concert with adaptive management.

Some examples of avoidance and minimization measures from the Levee System Integrity Program include:

- In implementing levee reconstruction measures, work with landowners to establish levee reconstruction methods which avoid or minimize the taking of agricultural land; and

- When planning subsidence control measures, work with landowners to establish Best Management Practices (BMPs) which avoid or minimize changing land use practices while protecting levees from the effects of subsidence. Through adaptive management, modify BMPs to further reduce impacts to agricultural land;

- Protection of other agricultural land of equivalent productive potential for agricultural use without restrictions. This could be accomplished via easements.

- Implementation of erosion control measures to the extent possible during and after project construction activities. These erosion control measures can include grading the site to avoid acceleration and concentration of overland flows, using silt fences or hay bales to trap sediment, and revegetating areas with native riparian plants and wet meadow grasses;

- Protect exposed soils with mulches, geotextiles, and vegetative ground covers to the extent possible during and after project construction activities to minimize soil loss;

- Schedule construction activities in a manner to that current crops may be harvested prior to construction initiation;

- Develop agricultural infrastructure, buffers and other tangible support for remaining agricultural lands. These buffers should have vegetation compatible with farming and habitat objectives; and

- The CALFED benefits of water supply and reliability should be provided to agricultural water users on an equitable basis considering the nature and extent of impacts to agricultural resources, including land and water.

#### 8.1.3.6 Potentially Significant Unavoidable Impacts

Program actions associated with the Ecosystem Restoration, Levee System Integrity, and Water Quality programs, or storage and conveyance components could convert existing agricultural uses, including prime and unique farmland. Locally implemented water transfers could also convert existing agricultural land uses to other land uses, though not specifically CALFED Program uses.

## 8.1.4 Environmental Consequences: Agricultural Economics

### 8.1.4.1 Assessment Methods

Assessment variables for agricultural economic impacts are irrigated acres, agricultural water and land use, water quality, costs and revenues from agricultural production, and risk and uncertainty. Potential impacts are quantified based on existing estimates of land and water value, crop revenue per acre, and costs. Each configuration (1A, 1B, and so on) is evaluated as part of an alternative. All of the potential impacts described are based on review of and experience with other studies.

Estimates of water supply changes, land conversion, and costs are made using existing policy-level models, such as the Central Valley Production Model, and by interpolating or extrapolating estimates made in other studies.

Changes in water quality are modeled for a number of scenarios that correspond to various CALFED alternatives. Key measurement points in the Delta are used to indicate the TDS of water diverted for irrigation. TDS (measured in ppm) is converted into electrical conductivity (EC) measured as millimhos per centimeter, using the approximation that 1 mmho/cm equals about 640 ppm.

Potential impacts on crop yield are based on the standard Maas-Hoffman (MH) salinity threshold relationships. For a given crop, the MH relationship defines the soil water salinity at which crop yield begins to be affected, and shows the estimated rate at which yield declines as soil salinity increases beyond the threshold. Table 8.1.4-1 shows the threshold and rate of decline due to salinity for major categories of crops grown in the Delta.

### 8.1.4.2 Significance Criteria

Criteria used to judge whether an impact of the Program is potentially significant to agricultural resources are described below. Significance criteria are applied only to adverse impacts.

- **Irrigated Acres:** Permanent or long-term reduction in acres of irrigated land within a region would be considered significant.
- **Water Quality:** Impacts of water quality changes on agriculture may be caused by changes in the salinity of water used for irrigation, measured as TDS. Potential impacts could arise because of reduced yields of salt-sensitive crops, additional water application and management costs due to salinity, or foregone revenue due to restricted crop selection. Several components of the CALFED program could affect the TDS of water delivered for agricultural use, including flows associated with the ERP, storage and conveyance components, and BMPs or other components of the Water Quality Program. A change in water quality that would reduce crop yields by 10% is considered significant.
- **Production Costs and Revenues:** Changes in costs and revenues would not, in themselves, be considered significant environmental impacts. However, changes in costs or revenues could change the economics of farming to an extent that land use, water use, and employment could be affected.
- **Risk and Uncertainty:** No objective or numerical thresholds have been identified for judging the significance of changes in risk or uncertainty of agricultural production. Adverse impacts may be judged potentially significant if they could affect agricultural land use and water use decisions.

| Crop Category | Irrigated Acres (1,000 acres) | Threshold Salinity Level (Ece) | Percent Yield Decrease from the Threshold (%) |
|---|---|---|---|
| Pasture | 37 | 5.0 | 10.0% |
| Rice | 11 | 3.0 | 12.0% |
| Truck Crops | 28 | 1.5 | 14.0% |
| Tomatoes | 45 | 2.5 | 9.9% |
| Alfalfa | 65 | 2.0 | 7.3% |
| Sugar Beets | 15 | 7.0 | 5.9% |
| Field Crops | 151 | 1.7 | 15.0% |
| Orchards | 61 | 1.5 | 12.0% |
| Grains | 60 | 6.0 | 7.1% |
| Grapes | 36 | 1.5 | 19.0% |

NOTE:
The salinity of the soil saturation extract is expressed as Ece, which is the electrical conductivity (in mmho/cm).
SOURCES:
1. Irrigated acreage is from Affected Environment and Environmental Impacts: Agricultural Production and Economics, CALFED Bay-Delta Program, September 1997.
2. Maas-Hoffman coefficients are described in United Nations, Food and Agriculture Organization Irrigation and Drainage Paper 29, "Water Quality For Agriculture," 1976.

**Table 8.1.4-1. Major Crops in the Delta Region and Corresponding Maas-Hoffman Coefficients**

### 8.1.4.3 Comparison of No Action Alternative to Existing Conditions

The predominant changes between existing conditions and the No Action conditions that would affect agricultural economics are: changes in the markets for agricultural products, the supply and reliability of irrigation water, changes in water quality, development of water transfer markets, and the cost of water.

- **Changes in the Agricultural Market**: There will be an increasing demand for fruits and vegetables, resulting in a shift away from field crops and grain production.
- **Irrigation Water Supply:** Several important changes have occurred to water supply conditions for agriculture. The CVPIA reallocates up to 800,000 AF of CVP water per year away from agricultural use for environmental restoration. Likewise, the 1994 Bay-Delta Accord reduces the amount of water pumped from the Delta and delivered for agricultural and municipal uses.

Estimates of the net impact on agricultural economics of the CVPIA range from a gain of $2 million to a loss of $48 million.

- **Water Quality:** Reasonably foreseeable changes in water management are expected to affect water quality, and thereby will impact agricultural yields. As shown in Table 8.1.4-2, the expected TDS range is

Since the CVPIA preferred alternative has not been chosen, the net economic effect is uncertain.

| Selected Locations | In Total Dissolved Solids (TDS, in ppm) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **No Action, 1A, 1B** | | | **Configuration 1C** | | | **Configuration 2B** | | | **Configuration 2D** | | |
| **Selected Locations** | Low | Average | High | Low | Average | High | Low | Average | High | Low | Average | High |
| Middle Delta | 109 | 139 | 207 | 112 | 148 | 206 | 106 | 123 | 137 | 106 | 124 | 141 |
| Delta Export Pumps | 217 | 278 | 366 | 185 | 235 | 356 | 175 | 193 | 216 | 163 | 191 | 215 |
| South Delta | 282 | 331 | 389 | 226 | 320 | 395 | 221 | 318 | 395 | 247 | 326 | 395 |
| | **Configuration 2E** | | | **Configuration 3A** | | | **Configuration 3B** | | | **Configurations 3E, 3H, 3I** | | |
| **Selected Locations** | Low | Average | High | Low | Average | High | Low | Average | High | Low | Average | High |
| Middle Delta | 104 | 121 | 135 | 132 | 185 | 254 | 134 | 186 | 254 | 179 | 240 | 270 |
| Delta Export Pumps | 164 | 190 | 214 | 112 | 149 | 185 | 112 | 143 | 176 | 100 | 127 | 177 |
| South Delta | 248 | 326 | 395 | 310 | 373 | 448 | 328 | 378 | 448 | 301 | 346 | 395 |
| | **In Electrical Conductivity (ED, in mmho/cm)** | | | | | | | | | | | |
| | **No Action, 1A, 1B** | | | **Configuration 1C** | | | **Configuration 2B** | | | **Configuration 2D** | | |
| **Selected Locations** | Low | Average | High | Low | Average | High | Low | Average | High | Low | Average | High |
| Middle Delta | 0.17 | 0.22 | 0.32 | 0.18 | 0.23 | 0.32 | 0.17 | 0.19 | 0.21 | 0.17 | 0.19 | 0.22 |
| Delta Export Pumps | 0.34 | 0.43 | 0.57 | 0.29 | 0.37 | 0.56 | 0.27 | 0.30 | 0.34 | 0.25 | 0.30 | 0.34 |
| South Delta | 0.44 | 0.52 | 0.61 | 0.35 | 0.50 | 0.62 | 0.35 | 0.50 | 0.62 | 0.39 | 0.51 | 0.62 |
| | **Configuration 2E** | | | **Configuration 3A** | | | **Configuration 3B** | | | **Configuration 3E, 3H, 3I** | | |
| **Selected Locations** | Low | Average | High | Low | Average | High | Low | Average | High | Low | Average | High |
| Middle Delta | 0.16 | 0.19 | 0.21 | 0.21 | 0.29 | 0.40 | 0.21 | 0.29 | 0.40 | 0.28 | 0.37 | 0.42 |
| Delta Export Pumps | 0.26 | 0.30 | 0.33 | 0.18 | 0.23 | 0.29 | 0.18 | 0.22 | 0.28 | 0.16 | 0.20 | 0.28 |
| South Delta | 0.39 | 0.51 | 0.62 | 0.48 | 0.58 | 0.70 | 0.51 | 0.59 | 0.70 | 0.47 | 0.54 | 0.62 |

NOTES:
1. EC = TDS/640 is used to convert TDS to EC.
2. Data for Configurations 2A are not available.
3. Middle Delta location is Prisoner's Point; South Delta location is Old River at Middle River. Tracy Pumping Plant is export location.

SOURCE: Status Reports on Technical Studies for the CALFED Alternatives, DWR, 1997.

**Table 8.1.4-2. Estimated Salinity of Irrigation Water in Selected Locations, by Alternative (During Irrigation Season: April to September)**

between 109 and 389 ppm or between an EC of 0.17 to 0.61 mmho/cm.

- **Water Transfers:** The use of water transfers will likely increase in the future, however, they have not been assessed in this report due to the uncertainty and speculation involved.

- **Cost of Water:** Implementing cost-of-service and tiered water pricing, plus the restoration charges and surcharges imposed by the CVPIA, will increase the cost of water by up to 100% in some CVP service areas. Also, districts looking for water to transfer are almost certain to spend more for that water than they have in the past.

### 8.1.4.4 Comparison of Program Alternatives to No Action Alternative

The impacts to agricultural economics resulting from the storage and conveyance program element will vary by alternative, as discussed below. Impacts to agricultural economics resulting from other program elements, such as ecosystem restoration, do not vary substantially from one alternative to another at the programmatic level. Therefore, the discussions of environmental consequences associated with other program elements are not grouped by alternative.

#### Delta Region

*Storage and Conveyance*

Alternative 1. Alternative 1 conveyance configurations would affect up to 400 acres of agricultural land. The economic impact would be negligible.

Alternative 2. The major difference between Alternatives 1 and 2 is in the conveyance components. For all Alternative 2 configurations, conveyance options would require conversion of agricultural land producing crop revenues of between $1.9 and $6.2 million per year. Loss of this revenue would be a substantial adverse economic impact.

Alternative. 3. The major difference between Alternatives 1 and 2 and Alternative 3 is in the in-Delta storage and conveyance components. Conveyance and storage options would require conversion of agricultural land producing crop revenue of between $2.3 and $21 million per year. In-Delta storage would have potential negligible to minor beneficial effects on agricultural production in other parts of the Delta Region, by providing more reliability in flows and deliveries. Impacts to farm employment, agricultural suppliers, and other economic sectors are described in the next section. Impacts of water supply increases within the Delta Region would be small.

All Alternatives. Potential charges imposed on agricultural water use to recover costs of program components could lead to significant changes in agricultural activities (for example, land use, crop selection, water use).

In the middle Delta, irrigation water quality under all alternatives averages between 121 and 240 ppm, which converts to an EC range of 0.22 to 0.37 mmho/cm (Table 8.1.4-2). The average EC during the months of highest salinity ranges from 0.21 to 0.42. Assuming an effective leaching fraction of 15%, the soil salinity would be 1.5 x 0.42 = 0.63 under the worst case of Configuration 3D. The most sensitive vegetable crops begin to experience salinity effects at 1.0 EC. Therefore, no significant positive or negative impact is expected from water quality changes in the middle Delta.

TDS in the south Delta is substantially higher than in the middle Delta. As shown for the Old River at Middle River location in Table 8.1.4-2, average water quality ranges from 318 to 378 ppm, depending on the configuration. This converts to a soil salinity of 0.75 to 0.88, assuming an effective leaching of 15%. During months of the poorest water quality, salinity of applied water can be 450 ppm. This level of salinity approaches the yield threshold for several salt-sensitive truck crops, including beans and strawberries, and some care in water management is required to avoid yield losses. However, none of the alternative configurations show any significant change in salinity compared to the No Action Alternative; therefore no significant positive or negative impacts are apparent.

*Ecosystem Restoration.* Direct impacts of this program would be felt most in the Delta region where agricultural land would be taken out of production. The crops removed could range from a mix of field and forage crops (corn, grain, and pasture) to high-value orchards. The agricultural land would be purchased at a negotiated fair market value to reduce economic hardship on local farmers. These impacts would result in a gross revenue loss of $50 to $135 million per year. Some of this acreage and revenue would likely shift to other regions of the state, placing more demand on existing surface water and groundwater resources in those regions.

*Water Quality.* Control of upstream drain water quality and quantity from this could reduce salinity of water diverted in the Delta for irrigation. Benefits could include reduced costs, higher yields, and more flexible crop selection. Water quality BMPs, if applied to Delta agriculture, could raise production costs.

*Levee System Integrity.* This program would benefit Delta agriculture by providing greater protection from inundation and salinity intrusion. Setback levees would require purchasing and converting agricultural land. The value of crops taken out of production could be between $6 and $13 million per year. This loss may be offset by lower flood risks to remaining agricultural lands.

Additionally, the loss of farmland may adversely affect the financial viability of local agencies, especially water and reclamation districts.

*Water Transfers.* Due to minimal in-Delta conveyance facility changes, conveyance capacity in Alternative 1 will continue to be the principle limiting factor to water transfers. The number and magnitude of water transfers will continue to be relatively small, except in critically dry years. Water transfers will influence only a fraction of Central Valley and Delta flows, generally increasing base flows but not exacerbating high flows. Alternatives 2 and 3 provide increasingly better water transfer opportunities than Alternative 1.

**Bay Region** ?

*Storage and Conveyance.* Up to 3,500 acre-feet of irrigation water per year could be available from the Storage and Conveyance components, although the cost may remain high.

Potential charges imposed on agricultural water use to recover costs of program components could lead to significant changes in agricultural activities (such as, crop selection, water use).

*Ecosystem Restoration.* Impacts from the Ecosystem Restoration Program on important farmland are expected to be minor.

*Water Quality.* To the extent that they apply to areas non-tributary to the Delta, BMPs under the Water Quality and Water Use Efficiency programs could substantially increase production costs.

*Water Transfers.* Because of water supply deficiencies in some agricultural areas, especially the San Felipe Division of the CVP, water transfers may be an important source of water in the future.

**Sacramento River and San Joaquin River Regions**

*Storage and Conveyance.* Agricultural lands in the Sacramento Region River and the San Joaquin River regions could be affected by the location of storage and conveyance facilities. The likely location of large storage facilities is in foothill or mountain areas, where land use is likely to be non-irrigated grazing. Impacts include permanent conversion and inundation and temporary disruption of agricultural activity during construction. Permanent conversion of farmland for facilities is a potentially significant impact. Impacts from improvements in water supply reliability are small in the Sacramento River Region.

$H_2O$ supply changes?

Potential beneficiaries in the Sacramento River Region would be primarily CVP contractors, who would use the water to replace groundwater or supply lost from the CVPIA. According to an analysis completed for CVPIA, the direct value of this water to agriculture ranges from $30 to $40 per acre-foot, making it relatively costly. Much of the additional water in the San Joaquin River Region would be used to reduce groundwater overdraft, to increase in-stream flows, to support production of lands fallowed by supply restrictions of the CVPIA and Bay Delta Accord, and for agricultural production. The marginal value of this water for agricultural production is $60 to $100 per acre-foot. Some of this water could support acreage shifted out of the Delta Region due to land conversion.

Potential charges imposed on agricultural water use to recover costs of program components could lead to significant changes in agricultural activities (such as, crop selection, water use).

*Ecosystem Restoration.* This program would convert productive farmland in the Sacramento River and San Joaquin River regions for habitat restoration. The crop revenue loss associated with taking these lands out of production generally ranges from $500 to $1,000 per acre, resulting in a regional loss in crop revenue of between $13 and $34 million per year in the Sacramento River Region and between $25 and $50 million in the San Joaquin River Region. This would have a substantial adverse economic impact on farm revenues, income generation, and employment levels. Loss of production may also adversely affect the financial viability of local agencies, especially water and reclamation districts.

Any changes in water supply, such as purchase of water rights for in-stream flow, could result in changes to crop patterns, potentially affecting crop value. Direct impacts to the landowner would not be significant because the transaction would be only with willing sellers. Changes in the quantity or pattern of in-stream flow could affect downstream agricultural users and could potentially be significant.

*Water Quality.* Best Management Practices for this program could lead to significant impacts (both beneficial and adverse) in land and water use patterns. Adverse impacts would more likely result from costs imposed. Beneficial effects include reduced salinity of irrigation, which could increase yields, reduce production costs, and provide more flexible crop selection.

More carefully monitored application of water can result in substantially increased yields and reduced chemical costs, irrespective of salinity. Lower applied water amounts can adversely affect drain water users (forcing them to search for another source of supply), raise groundwater pumping lifts and impair groundwater storage for conjunctive use.

Retirement of lands with water quality problems in the San Joaquin River Region would have a significant adverse impact on jobs similar in magnitude to the impact of the Ecosystem Restoration Program land conversion in the San Joaquin River Region.

*Water Use Efficiency.* The economic impact of this program is uncertain, and could range from little or no measurable effect to potentially substantial reductions in applied water. Based on preliminary estimates prepared for the CALFED Program, costs of achieving efficiency increases could range from $40 to $60 per acre-foot of reduced applied water in the Sacramento River Region and from $50 to $100 per acre-foot in the San Joaquin River Region. In the San Joaquin River Region, approximately $500 per acre-foot of net savings could be realized; however, because virtually all applied water losses are recoverable and reusable in the Sacramento River Region, no net savings in consumptive use or irrecoverable loss (that is, "real" water savings) are likely. Additional district-level costs could range from $5 to $12 per acre of land served in both regions.

*Water Transfers.* Water transfers would generally have the same beneficial and adverse impacts as identified for the Delta region. Reduced pumping costs due to receiving a water transfer could also occur. Similarly, other potential significant adverse impacts could occur. Water transfers due to direct groundwater pumping or groundwater substitution could cause a temporal or volumetric increase in groundwater pumping and increased costs associated with exacerbating groundwater overdraft; pumping from lowered groundwater levels; deepening wells; lowering pumps; and redrilling wells. These increased operating costs could reduce irrigated acreage at nearby farms that are not transferring water. Direct groundwater and groundwater substitution transfers could also cause a reduction in surface water flows due to induced seepage; reduce crop yields due to lower water quality; reduce demand for crop storage and processing; reduce demand for farm inputs; lower ground elevations, making affected areas more susceptible to flooding; and reduce habitat supported by surface seepage of groundwater.

Salinity of water diverted from the Delta for use in the San Joaquin Valley is measured at the Tracy Pumping Plant Intake as the measurement location. As seen in Table 8.1.4-2, average salinity ranges from 278 ppm in the No Action Alternative to a low of 127 ppm in Configuration 3D. The highest salinity months range from 366 ppm for the No Action Alternative down to 177 ppm in Configuration 3D. Soil salinity associated with these average values would range from 0.30 to 0.65. The highest salinity is estimated in the No Action Alternative, and the lowest in Alternative 3. Some areas receiving water from the Delta also have poor drainage, and some areas apply a mixture of groundwater and surface water. Therefore, the improvements to water quality, especially in Alternative 3, are potentially large enough to have some effect on crop selection, water management, and yields, and could provide a potentially significant benefit.

These estimates account for water quality changes due to water supply, conveyance, and operations changes. Impacts associated with the Water Quality Program and the Water Use Efficiency Program could potentially affect agricultural users, but the size and direction of these impacts are unclear. No estimates of changes in water quality for irrigation have been made for the Sacramento River Region.

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*Coordinated Watershed Management.* Implementation of upper watershed enhancements could result in converting upper watershed agricultural lands located adjacent to waterways in order to restore riparian habitat, stabilize stream-channels, restore natural stream hydrology, and create a non-point source pollution buffer. Conversion of land use could have an adverse impact on net income and public finances, and result in foregone economic opportunities.

### SWP and CVP Service Areas Outside the Central Valley

Impacts on agriculture in this region are expected to be small. Potential cost impacts from the Water Quality and Water Use Efficiency programs may occur if BMPs are applied to areas outside the Central Valley. Salinity intrusion avoidance benefits of the Levee System Integrity Program would also accrue to this region.

Substantial conversion of agricultural land in the Delta Region could shift some production to desert areas in Southern California, such as the Imperial Valley. Additional water would be available to SWP contractors in the South Coast and Central Coast areas. However, it is unlikely that a significant amount of this water would be delivered for irrigation use.

SWP water delivered for irrigation in Southern California would have the same quality changes as described for the San Joaquin River Region. Relatively little SWP water pumped into Southern California is used for irrigation, and some of that gets mixed with other local water sources. The aggregate impact on agriculture in these areas is potentially beneficial but probably not significant.

Potential charges imposed on agricultural water use to recover costs of program components could lead to significant changes in agricultural activities (such as, crop selection, water use).

The Water Transfer Program benefits are related to the increased agricultural production, incomes, and employment opportunities associated with any transfer that uses the water for agricultural production outside of the Central Valley.

### 8.1.4.5 Comparison of Program Elements to Existing Conditions

Comparison of program alternatives to existing conditions indicates:

- All potentially significant adverse impacts that were identified when compared to the No Action Alternative would still be considered significant when compared to existing conditions.
- No additional significant environmental consequences have been identified when program effects are compared to existing conditions as opposed to No Action.
- The beneficial effects of the Program would still be beneficial when compared to existing conditions. Many of the beneficial effects would be related to long-term improvements to a number of water quality. These effects are beneficial compared to existing conditions, and even more beneficial when considered with respect to future demands on surface water.

In summary, the conclusions regarding the significance of project effects on surface water quality when compared to existing conditions would be similar to those compared to No Action.

### 8.4.1..6 Mitigation Strategies

As discussed in the introduction to this summary, mitigations are proposed as strategies in this programmatic document and are conceptual in nature. Final mitigations would need to be approved by responsible agencies as specific projects are approved by subsequent environmental review.

Strategies to minimize economic consequences include:

- Advice on how to stretch existing water supplies in cost-effective ways to keep water acquisition costs down;
- Advice on ways to increase the production yielded from a unit of water (through things like improvement in distribution uniformity), which will tend to keep production up even as acreage goes down;
- Cost-sharing and other financial assistance to reduce the indirect impacts potentially resulting from the cost of the Water Use Efficiency and Water Quality programs;
- Purchase water acquired for habitat purposes using temporary or rotating contracts so that the same land or locality is not impacted every year;
- Continue the flow of property tax revenues to the local counties, providing opportunities for alternative industries to develop (that is, recreation) and other economic incentives;
- Implement financial incentives to increase wildlife forage on agricultural lands (pay for inefficient harvest methods). Reduce unit charges for water when a farmer implements measures to control discharge of contaminants in excess of regulatory requirements;
- Alter water delivery schedules during shortages to reward farmers who implement measures to control discharge of contaminants in excess of regulatory requirements;
- Create a loan program to support construction of agricultural pollution control facilities;
- Provide technical assistance to farmers wishing to install pollution control facilities;

- Provide technical and financial assistance to develop a regional solution to the San Joaquin Valley drainage problem;

- Schedule construction activities in a manner so that current crops may be harvested prior to construction initiation;

- Pay fair market value for any crops destroyed or taken out of production on private or leased lands as a result of project construction;

- Compensate property owners for the value of their land and associated improvements, including dwelling units, in compliance with state regulations for providing relocation assistance to displaced persons or businesses; and

- Avoid fallowing or shifting crops that require high input and output expenditures.

#### 8.1.4.7 Potentially Significant Unavoidable Impacts

Unavoidable impacts to agricultural economics that have the greatest potential to be significant are loss of prime and unique farmland to other uses, such as for habitat or levee setbacks. These impacts would be both direct, such as loss of farm revenue and production opportunities, and indirect, such as less labor demand and reduced farm spending for goods and services.

## *8.1.5 Environmental Consequences: Agricultural Social Issues*

#### 8.1.5.1 Assessment Methods

Social well-being, for purposes of this analysis, is measured in terms of community stability. Community stability is a measure of a communities' ability to absorb social and economic changes that may result from a proposed action such as the CALFED action. Assessment of community stability is based on changes in economic and social indicators that may occur as a result of a CALFED action. These indicators include median family income, per capita income, poverty rates and unemployment rates, as summarized by region in Table 8.1.2-4. Chapter 8.11 provides a detailed region by region discussion of related Environmental Justice issues.

Predicting the human behavior that could result from CALFED actions is a difficult task. Past studies of community stability and social conditions related to water supply projects have focused on social, economic, and land use changes resulting from short-term drought conditions. The actual effects of implementation of long-term water supply programs cannot be predicted with complete assurance, but must be projected based on assumptions of human behavior, primarily the assumed actions of farm managers and land owners implementing long-term changes to farm operations. This analysis is based on the regional economics analysis and projected changes to regional employment. These findings have been applied to the analysis for farmers, farm workers, and agribusiness.

#### 8.1.5.2 Significance Criteria

For purposes of this analysis, socioeconomic effects are measured in terms of community stability. Community stability is measured by several economic indicators. Economic indicators include median and per capita income, poverty rates, and unemployment. Adverse impacts to community stability could result from changes to any of these indicators that substantially exceed historical fluctuations.

#### 8.1.5.3 Comparison of No Action Alternative to Existing Conditions

Comparison of Program Alternatives to existing conditions indicates:

- All potentially significant adverse impacts that were identified when compared to the No Action Alternative would still be



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considered significant when compared to existing conditions.

- No additional significant environmental consequences have been identified when program effects are compared to existing conditions as opposed to No Action.

- The beneficial effects of the Program would still be beneficial when compared to existing conditions. Many of the beneficial effects would be related to long-term improvements to a number of water quality. These effects are beneficial compared to existing conditions, and even more beneficial when considered with respect to future demands on surface water.

In summary, the conclusions regarding the significance of project effects on surface water quality when compared to existing conditions would be similar to those compared to No Action.

All Regions. The key factors that would affect farmers under the No Action Alternative include changes in the markets for agricultural products; the supply and reliability of irrigation water; the development of water transfer markets; and the cost of water. Increasing demand for fruits and vegetables is expected to result in a shift toward production of these commodities, and away from field crops and grains. Decreases in water availability due to the Central Valley Project Improvement Act (CVPIA) and the Bay-Delta Accord would likely be made up with groundwater supplies, however, depending on the size of the deficit, groundwater may not be able to completely compensate.

The number of agricultural jobs may increase in areas due to projected changes in crop production to higher value and more labor intensive crops. However, agricultural employment would remain seasonal. There could be improvements in mechanization for picking and sorting crops and other improvements that could eliminate tasks that are currently labor intensive. Changes in irrigation technology also may occur that could change farm labor needs. Changes to the population, crop production, and technology resulting in a decrease in employment opportunities or the duration of employment may create an increased need for social services to provide food, health care, and housing for those facing economic hardship. These needs may be seasonal or could be year-around depending on the extent of the change and the education, training, and technical skills of the population in the area affected.

### 8.1.5.4 Comparison of the Alternatives with the No Action Alternative

The impacts to agricultural social issues resulting from the storage and conveyance program element will vary by alternative, as discussed below. Impacts to agricultural social issues resulting from other program elements, such as ecosystem restoration, do not vary substantially from one alternative to another at the programmatic level. Therefore, the discussions of environmental consequences associated with other program elements are not grouped by alternative. In those cases where no environmental impacts have been associated with a program element within a regions, the program element is not discussed.

#### Delta Region

*Storage and Conveyance.* The extent of impacts would vary due to the variation in water yield and the opportunity to shift agriculture to various parts of the Delta. The alternatives could result in a significant but perhaps mitigable impact to farmers, farm workers, and agribusiness as a result of agricultural land conversion due to the conveyance and in-Delta storage options. This conversion would result in changes in the number of jobs for farmers, farm workers, and agribusiness. The intensity of this adverse impact depends on the magnitude of job loss.

*Ecosystem Restoration and Levee System Integrity.* Implementation of ecosystem restoration in the Delta would result in the conversion of agricultural lands to restored habitat. This conversion would result in changes in the number of jobs for farmers, farm workers, and agribusiness. This job loss would be a potentially significant adverse impact depending on the magnitude of the job loss and extent of mitigation efforts.

The most significant impact would be the concentrated loss of jobs for farm workers who tend to have limited skills. Stress may be put on existing social services, such as welfare and job training, to help provide transitions for displaced farm workers. Because the Delta Region is already experiencing high levels of unemployment and the labor force is primarily farm workers, the social and economic structure of these communities could be adversely affected. Examples may include higher demand for social services, increased crime, and loss of local small businesses such that customers may have to travel further to purchase supplies. Less technically skilled workers and those lacking basic education levels and English language skills may have more difficulty finding new employment.

Per capita income for displaced farmers and families may decline and could be mitigated by social service and support programs, such as welfare and job training. Farm managers may be required to travel farther to their place of employment or move to other areas to gain employment. The need to move or to be away from home and family for longer periods could add additional burden to family members.

It is anticipated that displaced farm managers and technicians could find work in other regions or other jobs related to agriculture. While there may be a temporary increase in the need for social services to provide training or economic assistance for a portion of these displaced workers, this need would not be expected to be significant.

*Water Use Efficiency.* During the drought of the early 1990s, many communities faced reduced employment resulting from significant reduction in irrigated acreage, which left farm laborers without jobs. To the extent that efficiency improvements would help improve water supply reliability, employment opportunities would be maintained. This would contribute to the stability of many local agricultural communities.

Job opportunities could be created by water use efficiency improvements. As irrigation management improves, so must the knowledge of those irrigating or scheduling irrigations. This would result in the need for more skilled labor, but at higher costs. In addition, the design and installation of new or improved on-farm or district water delivery systems would create more jobs for skilled laborers. It is conceivable that efficiency improvements, especially those that involve physical construction would add to local employment.

However, water use efficiency improvements also could have adverse impacts on farm labor. One benefit of improved irrigation efficiency that may be experienced by a farmer is a reduced need for labor, due either to less cultivation or changes in how crops are irrigated. The addition of pressurized irrigation systems would have the most substantial impact. With pressurized irrigation, what used to be the job of several workers could now be replaced by just one. It is estimated that, as technology advances, 30% less labor would be needed to perform the same amount of work. This means that two out of three farm workers may be employed once efficiency measures are implemented.

Improved water use efficiencies often translate to higher crop yields and better quality of farm products. Such advances can increase on-farm direct income, benefitting the farmer's net income. This often translates to additional economic activity. Increased income also can help the overall economy in total sales and purchases and increase tax revenues that strengthen vital functions such as schools, roads, and social and health services.

Water use efficiency improvements also could result in improved crop yields. Improvements in the yield per acre-foot of applied water, even with possible reductions in water supply, would result in greater production of food and fiber on the same land. As populations continue to increase, not only in the state, but in the nation and globally, highly efficient food production would be an asset.

### Bay Region

No significant impacts are anticipated to farmers, farm workers or agri-business.

### Sacramento River Region

*Storage and Conveyance.* Configuration 1C would provide an additional 34,600 acre-feet per year of water. Configurations 2A and 3A would provide an additional 10,000 acre-feet per year and 15,000 acre-feet per year, respectively, of water for the Sacramento River Region, Configuration 2B would provide about 34,600 acre-feet per year, Configuration 2D would provide about 17,900 acre-feet per year, and Configuration 2E would provide about 34,600 acre-feet per year. Configurations 3B, 3E, 3H, and 3I would provide about 36,700 acre-feet per year of water. The impacts of this additional water supply could include the development of additional acreage for agriculture, increased water supply reliability resulting in greater farm investments, and shifts to higher water use and higher value crops. Other beneficial impacts include development of additional acreage shifted from the Delta due to land conversion, changes to higher water use and higher value crops, and additional farm worker jobs may become available if additional acreage is developed. The extent of this beneficial impact would vary and would be dependent on the ultimate cost of the water.

Development of the storage and conveyance facilities in Configurations 2B, and 2D; and 2E, 3B, and 3E, 3H, and 3I, depending on the location, could require the conversion of agricultural lands resulting in a potentially significant impact to farmers. This impact could be offset by shifting acreage to other parts of the Sacramento River Region. Impacts to farm workers would depend on new acreage developed by farmers. Configurations 2A and 3A would likely result in minimal new jobs; however, Configurations 2B, 2D, 2E, 3B, 3E, and 3H could result in a significant number of jobs and a beneficial impact to farm workers as well as associated agricultural businesses.

*Ecosystem Restoration.* The impacts in this region for Alternatives 1, 2, and 3 would be similar in character to those described for the Delta Region. Ecosystem restoration could result in conversion or idling of productive agricultural land in the Sacramento River Region. Conversion or idling of agricultural lands would result in a loss of jobs for farmers, farm workers, and agribusiness. The severity of this impact would depend on the magnitude of farm worker job loss and the extent of mitigation efforts.

*Water Use Efficiency and Water Transfers.* The impacts from these programs are the same as discussed under the Delta Region. Additional adverse impacts to local groundwater pumping and facility costs could occur under some conditions of direct groundwater transfers or groundwater substitution transfers.

### San Joaquin River Region

*Storage and Conveyance.* Configuration 1C would provide an average of up to 166,700 acre-feet per year of additional water supply. Configuration 2A would provide an additional 48,300 acre-feet per year of water for the San Joaquin River Region, Configurations 2B and 2E would provide about 166,700 acre-feet per year, and Configuration 2D would provide about 86,100 acre-feet per year. Configuration 3A would provide an additional 72,500 acre-feet per year of water for the San Joaquin River Region, and Configurations 3B, 3E, 3H, and 3I would provide about 177,200 acre-feet per year. The impacts of this additional water supply could include the development of additional acreage and increased water supply reliability, which may result in greater farm investments and shifts to higher water use and higher value crops. A significant amount of jobs could become available if additional acreage or higher labor demand crops were developed.

Development of the storage and conveyance facilities in Configurations 2B, 2D, 2E, 3A, 3E, 3H, and 3I, depending on the location, could require the conversion of agricultural lands, resulting in a potentially significant impact to farmers. This impact could be offset by shifting acreage to other parts of the San Joaquin River Region.

Impacts to farm workers would depend on new agricultural acreage developed by farmers. Configurations 2A and 3A would likely result in several new jobs. Configurations 2B, 2D, 2E, 3B, 3E, 3H, and 3I could result in a significant number of jobs and a beneficial impact to farm workers as well as associated agricultural business.

*Ecosystem Restoration.* Ecosystem restoration could result in conversion or idling of agricultural land in the San Joaquin River Region. The impacts would be similar in character to those described for the Delta Region.

*Water Quality.* Retirement of lands with water quality problems in the San Joaquin River Region would have a significant adverse impact on jobs similar in magnitude to the impact of the Ecosystem Restoration Program land conversion in the San Joaquin River Region.

*Water Use Efficiency and Water Transfers.* The impacts from these programs are the same as those discussed under the Sacramento Region.

#### SWP and CVP Service Areas Outside the Central Valley

Impacts on agriculture in this region are expected to be small. Substantial conversion of agricultural land in the Delta Region could shift some production to desert areas in Southern California, such as the Imperial Valley. Water transfers would increase agricultural production, incomes, and employment opportunities associated with any transfer that uses the water for agricultural production outside of the Central Valley. The net change in jobs is expected to be minimal, with only minor effects on community stability.

### 8.1.5.5 Comparison of Program Elements to Existing Conditions

The primary actions that differentiate existing conditions and No Action conditions are the CVPIA and Bay-Delta Accord. These actions are currently being implemented and results forecasted. Therefore, the conclusions regarding the magnitude and significance of impacts would be the same if they are compared to existing conditions as compared to the No Action Alternative.

### 8.1.5.6 Mitigation Strategies

As discussed in the introduction to this summary, mitigations are proposed as strategies in this programmatic document and are conceptual in nature. Final mitigations would need to be approved by responsible agencies as specific projects are approved by subsequent environmental review.

### 8.1.5.7 Social Well-Being

Strategies for minimizing the social/employment impacts as a result of agricultural land conversion include:

- Continuing the flow of property tax revenues to the local counties, providing opportunities for alternative industries to develop (that is, recreation) and other economic incentives, relocating facilities and shifting agriculture to new areas;
- Compensate local governments for increased demand for services resulting from labor displacement, compensate workers displaced by specific transfers through such actions as augmenting unemployment insurance benefits;
- Provide training and educational opportunities for unemployed individuals to reenter the workforce, job referral and placement services, and job retraining;

- Implement cost-sharing and other financial assistance to reduce the social/employment impacts potentially resulting from the cost of Water Use Efficiency and Water Quality programs;
- Schedule construction activities in a manner so that current crops may be harvested prior to construction initiation;
- Pay fair market value for any crops destroyed or taken out of production on private or leased lands as a result of project construction; and
- Limit the amount of acreage that can be fallowed in a given area.

#### 8.1.5.8 Potentially Significant Unavoidable Impacts

Farm worker job loss may result in adverse unavoidable impacts. In some cases jobs may be shifted to other areas; however, jobs also may be eliminated with no replacement. This would represent a significant unavoidable impact of the CALFED program.