

SECTION SEVENTEEN

REGIONAL ECONOMICS

This section describes the regional economics setting for the San Luis Drainage Feature Re-evaluation and identifies any potential adverse effects of the alternatives. Conditions of the regional economy are described for the area affected by the action alternatives in the Affected Environment section. The evaluation approach and model used to predict the effects of each drainage disposal alternative is described in the Environmental Consequences section, as are impacts to the regional economy of each alternative. Changes to specific economic indicators are projected out 50 years into the future for the No Action Alternative, as well as for all action alternatives. Specific economic indicators used in the regional economic analysis are output, personal income, and employment.

17.1 AFFECTED ENVIRONMENT

17.1.1 Population

The San Luis Unit is located within Fresno, Kings, and Merced counties in western San Joaquin Valley. These counties comprise the primary affected area under the In-Valley Disposal Alternative. Other counties could be affected by different alternatives. The Delta Disposal Alternatives would affect Alameda, Contra Costa, San Joaquin, and Stanislaus counties, while the Ocean Disposal Alternative would also affect Kern and San Luis Obispo counties. For purposes of analyzing the regional economic effects of the different alternatives, the analysis region is defined as all nine counties.

Population in the nine-county San Luis region has grown from 3,141,000 in 1970 to 5,451,000 in 2000, a 74 percent increase, an equivalent annual growth rate of almost 1.9 percent (U.S. Census Bureau) Population categorized by age and race for 1990 and 2000 is shown in Table 17-1.

Table 17-1
Population by Category, Nine-County San Luis Region, 1990 and 2000

Population	1990		2000	
	Number	% of Total	Number	% of Total
By Gender	4,642,000		5,451,000	
Male	2,311,000	49.78	2,720,000	49.90
Female	2,331,000	50.22	2,731,000	50.10
By Age				
Under 20 years	1,415,000	30.48	1,715,000	31.46
65 years and over	494,000	10.64	568,000	10.42
By Race				
White			3,201,000	58.72
Black			460,000	8.44
American Indian & Alaska Native			57,000	1.05
Asian			594,000	10.90
Native Hawaiian & Other Pacific Islander			19,000	0.35
Some other race			840,000	15.41
Two or more races			280,000	5.14
Hispanic or Latino (of any race)			1,553,000	28.49
Not Hispanic or Latino			3,898,000	72.51

Source: U.S. Census Bureau

17.1.2 Employment

Employment in the region grew from 1,319,000 jobs in 1970 to just over 2,852,000 jobs in 2000, or 2.6 percent per year. The largest employment sector was Services and Professional, which comprised 50 percent of the total jobs in 1970 and over 62 percent of the total jobs in 2000. The Services and Professional sector was also the fastest growing sector during this period of time with an increase of more than 1.12 million jobs. Even though the number of jobs increased from 1970 to 2000 in all employment sectors, Construction was the only sector, other than Services and Professional, that grew as a percent of total employment over this period. The respective shares of Government, Mining, Manufacturing, and the Farm and Agricultural Services sectors all decreased. Government fell from over 22 percent of total employment in 1970 to just over 14 percent in 2000, manufacturing fell from 13.5 to 8.8 percent, and mining fell from 0.8 to 0.5 percent. Even though Farm and Agricultural Services decreased only slightly from 8.8 to 8.2 percent, Agricultural Services actually increased from 1.8 to 4.3 percent while on-farm employment decreased from 7.0 percent in 1970 to 3.8 percent in 2000 (U.S. Census Bureau). Employment numbers are displayed in Table 17-2.

Table 17-2
Employment by Category, San Luis Unit, 1970 and 2000

Population	1970		2000	
	Jobs	% of Total	Jobs	% of Total
Total Employment	1,318,930		2,852,132	
Wage and Salary Employment	1,120,653	84.97	2,315,143	81.17
Proprietors' Employment	198,277	15.03	536,989	15.03
Farm and Agricultural Services	116,385	8.82	233,306	8.18
On-Farm Employment	92,679	7.03	109,297	3.83
Ag. Services	23,706	1.80	124,009	4.35
Mining	9,893	0.75	14,571	0.51
Manufacturing (including forest products)	178,155	13.51	250,472	8.78
Services and Professional	658,907	49.96	1,782,975	62.51
Transportation & Public Utilities	74,155	5.62	140,197	4.92
Wholesale Trade	55,028	4.17	129,430	4.54
Retail Trade	204,384	15.50	442,975	15.53
Finance, Insurance, & Real Estate	88,632	6.72	212,647	7.46
Services (Health, Legal, Business, Others)	236,708	17.95	857,726	30.07
Construction	57,445	4.36	167,815	5.88
Government	298,145	22.61	402,993	14.13

Source: U.S. Census Bureau

17.1.2.1 Unemployment Figures

The unemployment rate for the nine-county region from 1990 to 2000 has been consistently higher than both the State of California and the United States. As seen on Figure 17-1, the unemployment rate for the region has ranged between 7 and 11 percent, with the highest rate occurring in the early 1990s and the lowest occurring in 1999 and 2000 (U.S. Census Bureau).

17.1.2.2 Personal Income

Total personal income in the nine-county San Luis Unit economic effect area increased from \$62.63 billion in 1970 to \$162.41 billion in 2000, or more than 3.2 percent per year. The Services and Professional sector ranked first in terms of income generated in 1970 and 2000. It also had the fastest growth in personal income over the 30-year period of more than \$41.5 billion, or almost 3.9 percent annually.

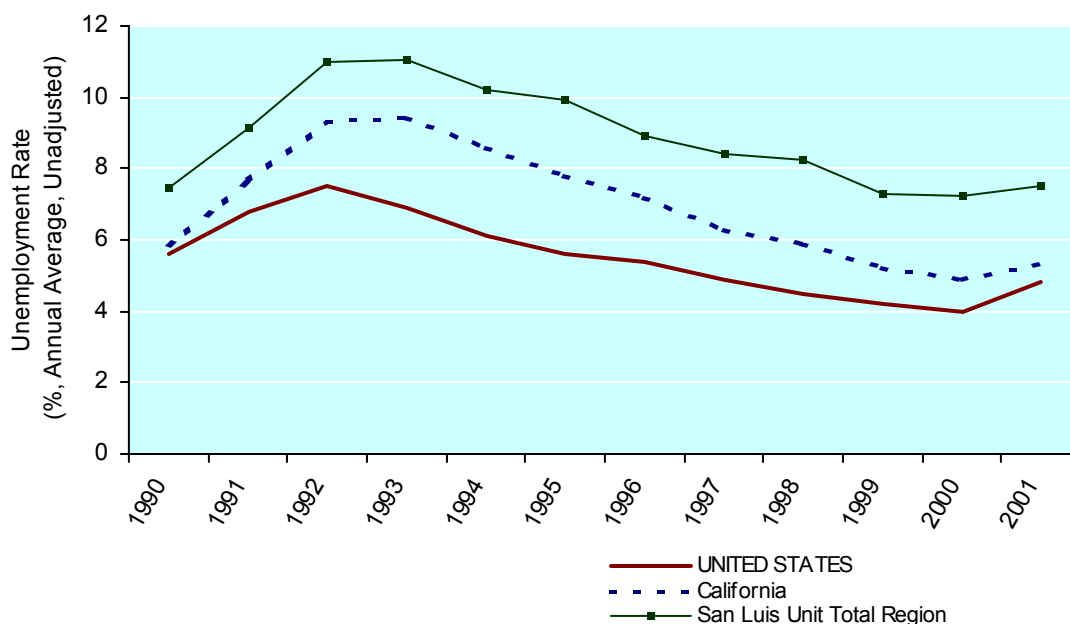


Figure 17-1 Unemployment Rates in the San Luis Region, California, and the United States

17.1.2.3 Farm Income

The only sector to experience negative growth in personal income from 1970 to 2000 was the farm sector. Total personal income earned by individuals who work in farming (including proprietors and wage and salary employees) grew from \$2.7 billion in 1970 to a 30-year high of \$5.1 billion in 1980, then fell to less than \$2.0 billion in 2000 (U.S. Census Bureau). This personal income figure is different than the income generated from farming enterprises (which includes income from farm proprietors and corporate farms).

Farm income from all farming enterprises (including corporate farms) grew from just under \$8.4 billion in 1970 to over \$12.9 billion in 1980 and then fell back to less than \$10.5 billion in 2000. During this same time period, farm production expenses increased from \$6.7 billion in 1970 to \$9.3 billion in 1980 and then to just over \$9.8 billion in 2000. Accounting for changes in on-farm inventories over the period, net farm income rose, in real terms, from \$1.7 billion in 1970 to \$3.9 billion in 1980, and then fell again to \$0.5 billion in 2000 (U.S. Census Bureau).

17.2 ENVIRONMENTAL CONSEQUENCES

17.2.1 Evaluation Criteria

The purpose of this section is to assess and compare how each of the alternatives affects economic activity within the nine-county San Luis region. The following evaluation criteria are addressed:

- Industry output, or the value of an industry's total production
- Employment, or the number of jobs created in each industry
- Personal income, or the change in employee compensation and proprietor income

17.2.2 Evaluation Approach

17.2.2.1 Effect Model

The modeling approach utilized in this study to assess the regional economic effects of each drainage disposal alternative is IMPLAN (IMpact Analysis for PLANning). IMPLAN is an economic input-output modeling system that estimates the effects of economic changes in an economic region. These economic regions are comprised of one or more politically or geographically defined areas such as states, counties, or communities. IMPLAN simulates the flow of money between businesses and between businesses and households within the region.

IMPLAN uses the U.S. Department of Commerce national input-output model to estimate flows of commodities used by industries as well as commodities produced by industries. Social accounts are included in the IMPLAN database for each region under consideration. Social accounts represent the flow of commodities to industry from producers and consumers, as well as consumption of the factors of production from outside the region. Social accounts are converted into input-output accounts and multipliers for each industry within a region. These multipliers estimate the effects of changes in spending within the region. The percentage of expenditures in each category that would remain within the region and expenditures that would flow outside the region are also accounted for within IMPLAN.

17.2.2.2 Effect Area

Defining and selecting the economic effect region is important because the magnitude of change is affected by the size of the area in which the effects occur. For example, the economic effects from a specific action will be greater to the entire State of California than it will be to an individual county or group of counties, which is the result of differences in economic leakages that occur as effect regions vary in size. Since a single county or group of counties is likely to have a smaller number and variety of businesses and industries than the entire State does, consumers and businesses will probably have to purchase more of the products and services they need from businesses located outside a smaller effect area. This outside purchasing represents a leakage of expenditures out of the effect area, resulting in a reduced amount of effects in a smaller region when compared to the entire state.

Since the three main drainage conveyance alternatives (In-Valley, Ocean Disposal, and Delta Disposal) cover three separate geographic areas, all three geographic areas are combined to form the regional effect area (the nine-county San Luis region). This combining provides some level of consistency to the multipliers used to predict the economic effect of similar activities occurring in different areas, which allows for a better comparison among alternatives.

However, in terms of measuring the significance of the effect of a particular action, the potential of that action to be considered significant within the area decreases as the size of the effect area increases. In essence, the effect of an action may be suppressed or hidden in areas with a large amount of economic activity. This may be a problem if the effects of an action are actually concentrated in a small subarea rather than dispersed throughout the entire effect area. An action that might be considered insignificant when analyzed over the entire area could be quite significant if it occurs within a smaller subarea.

17.2.3 No Action Alternative

To estimate the regional economic effects of the various action alternatives, specific information about each alternative must be acquired and compared to the No Action Alternative. This information includes the anticipated change in irrigated acres and cropping patterns, i.e., the amount of land removed from agricultural production, the changes in types of crops grown, and changes in crop yields expected to occur if no drainage facilities are developed.

Assumptions used to analyze regional economic effects of the No Action Alternative in comparison to the existing conditions in 2002 are:

- Increased expenditures for irrigation hardware, technology, and management expertise would be required to improve irrigation efficiency and application uniformity to allow continued agricultural production on drainage-impaired lands. These expenditures are assumed to be a redistribution of expenditures made by irrigators rather than an overall increase in regional expenditures. In other words, the increased cost of implementing improved irrigation management measures is not a measure of additional money spent in the regional economy. Rather, irrigators would have less money to spend on other crop production expenses than they typically would if adequate drainage conditions existed. From a regional economic perspective, this shift in expenditures from one cost category to another should be measured to determine the economic effect within the region. However, since insufficient data exist to predict how irrigators would change specific crop production expenditures, the cost of improved irrigation management measures is not incorporated into the regional economic analysis.
- In spite of irrigation improvements indicated above, the currently existing crop mix would change to one with a lower overall water requirement and a corresponding decrease in on-farm revenues. The decrease in farm revenue is incorporated into the regional economic analysis.
- Approximately 65,000 acres of land within the drainage-impaired area of Westlands would be retired from agricultural production and land retirement payments of \$100 million would be paid by Westlands to compensate landowners for lost farm revenues. Since it is expected that Westlands would fund land retirement payments by charging additional fees to the remaining irrigators within the district, these land retirement payments, like the costs of improved irrigation management discussed above, are considered to be a redistribution of regional expenditures rather than an increase in regional spending. Therefore, any land retirement payments made by Westlands are not included in the regional economic effect analysis.

Estimated changes in agricultural output from switching to a salinity-restricted crop mix are caused by a regional shift to a salinity-restricted crop mix under the No Action Alternative. The projected changes in crop revenues are displayed on Figure 17-2. Economic effects of crop losses estimated to occur in Years 1, 10, 25, and 50 are displayed in Table 17-3.

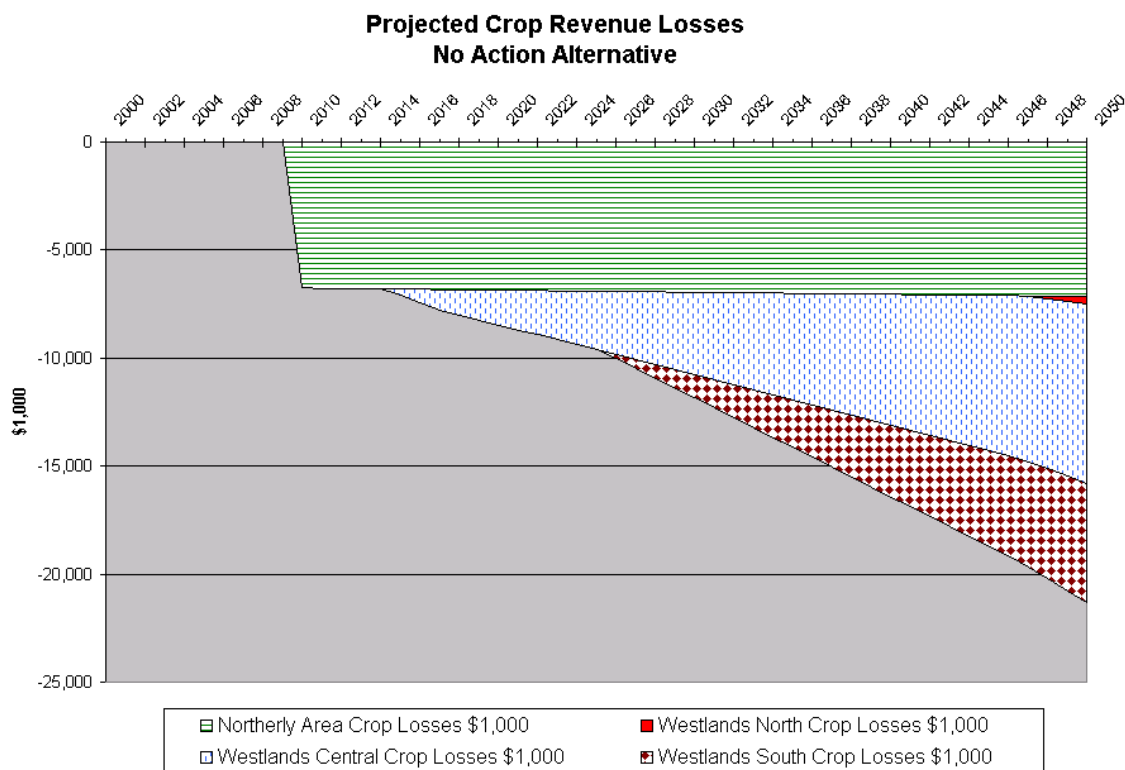


Figure 17-2 Projected Crop Revenue Losses Under the No Action Alternative

**Table 17-3
No Action Alternative
Regional Economic Effects of Annual Crop Revenue Losses**

Year Estimated	Output Effect (\$000)		Labor Income (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Year 1	-2,388,000	-4,302,158	-597,275	-1,295,022	-22.5	-52.4
Year 10	-23,880,000	-43,021,574	-5,972,755	-12,950,223	-225.2	-524.4
Year 25	-38,208,000	-68,834,522	-9,556,407	-20,720,356	-360.4	-839.1
Year 50	-62,088,000	-111,856,095	-15,529,162	-33,670,578	-585.6	-1,363.5

17.2.4 Action Alternatives

The action alternatives differ in their approaches to drainage disposal. The two major disposal alternative configurations, Out-of-Valley Disposal and In-Valley Disposal, provide essentially the same level of drainage service to the Unit. Their potential effects on agricultural production and economics differ only because of the irrigated land converted for use by the treatment, disposal, and conveyance facilities. Importantly, both configurations incorporate the same assumptions for source control/drainwater reduction measures. The land retirement alternatives provide different levels of drainage, because of the amount of land removed from agricultural production through retirement.

Direct regional economic effects occur when any of the following conditions, events, or activities are a component of a drainage service alternative.

- Construction of facilities necessary to provide drainage service. Construction cost estimates include permitting, engineering design, land acquisition, and construction. Necessary project facilities include both Federal and non-Federal funded facilities. The cost of these facilities is treated as a one-time increase in regional expenditures during the beginning stages of the action alternatives.
- Operation, maintenance, replacement, and energy costs. These costs are required to properly operate and maintain required project facilities and are treated in the regional economic analysis as an annually recurring increase in regional expenditures over the life of the action alternatives.
- Avoided net farm revenue losses from salinity-restricted crop mix. In general, crop yields decline as soil salinity increases in the drainage affected areas. Yield reductions result in a corresponding decrease in net farm revenues. As soil salinity continues to increase, certain crops can no longer be grown at all. As more and more crops are eliminated from the crop mix, agricultural revenues decline even further. Since these losses to net revenue occur if drainage service is not provided, they are treated as an increase in net revenue under the action alternatives.
- Avoided land retirement payments associated with the estimated 65,000 acres of land that would be retired from agricultural production under the Westlands Settlement Agreement until Reclamation provides drainage service. For the regional economic analysis of those action alternatives that do not include land retirement, it is assumed that the 65,000 acres would be provided drainage service and remain in production. In addition, any land retirement payments that would have been made by Westlands are considered to be a redistribution of regional expenditures rather than an increase in regional spending. Such payments are not included in the regional economic effects analysis.

However, for those action alternatives that include land retirement, it is assumed that the 65,000 acres in the Westlands Settlement Agreement would be included in all of the land retirement scenarios analyzed. Land retirement payments for these lands are assumed to be federal project expenditures and are considered to be an increase in regional expenditures. In addition, the regional economic analysis assumes that only 50 percent of these Federal land retirement payments would be spent in the affected nine-county economic region.

- Avoided irrigation management costs. If drainage service is not provided, irrigators would be required to spend additional money for additional irrigation equipment, technology, and expertise to enable them to continue to farm drainage impaired land. As with the avoided land retirement payments described above, any alternative that provides drainage service allows irrigators to avoid paying higher costs for additional irrigation and salinity management measures. These avoided irrigation management costs are treated as a reduction in regional expenditures under the action alternatives. Avoided irrigation management expenditures are split 50-50 between the farm equipment sector and engineering and architectural services.

Some expenditures occur only once at the beginning of the project. Typically, these nonrecurring costs are from constructing certain project features. Nonrecurring expenditures are displayed for

each drainage disposal alternative in Table 17-4. Other costs are incurred every year. These annual expenditures include (1) costs of operating and maintaining project facilities, (2) costs of constructing certain project features built or installed as needed to provide the necessary capacity to handle the projected quantity of drainwater as it increases over time, (3) avoided farm revenue losses from a restricted crop mix, and (4) avoided irrigation management costs. These estimated annual costs are listed in Table 17-5.

Table 17-4
Project Implementation Expenditures (\$000)

Project Cost Items	Disposal Alternatives						
	In-Valley	In-Valley/ Groundwater Quality Land Retirement	In-Valley/ Water Needs Land Retirement	In-Valley/ Drainage- Impaired Area Land Retirement	Ocean	Delta- Chipps Island	Delta- Carquinez Strait
Conveyance System	27,825	26,676	23,703	2,046	302,510	205,764	271,987
Evaporation Basins	176,606	157,241	124,505	59,712	0	0	0
Mitigation Facilities*	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Reverse Osmosis Facilities	42,421	39,596	34,772	12,880	0	0	0
Biological Selenium Treatment	75,221	65,871	49,679	26,125	0	137,805	113,363
Land Retirement	0	147,930	455,701	796,962	0	0	0
Drainage Collection System	186,150	156,886	87,000	2,250	187,500	187,500	187,500
Regional Reuse Facilities	96,445	79,524	50,972	16,215	97,079	97,079	97,079
DMC Drainage Collection/Reuse	1,850	1,850	1,850	1,850	1,850	1,850	1,850
Drainwater Recycling	54,476	46,289	30,728	11,857	54,777	54,777	54,777
Seepage Reduction	10,689	10,689	10,689	10,689	10,689	10,689	10,689
Shallow Groundwater Mgt	0	0	0	0	0	0	0
On-Farm Tile Drainage System	109,371	92,072	50,762	3,990	110,168	110,168	110,168
Total	781,054	824,624	920,361	944,578	764,573	695,464	737,245

Note:

*Mitigation facilities, such as alternative and/or compensation habitat including wetlands, may be a component of any of the action alternatives. Sufficient detail is not currently available for calculation of costs.

Table 17-5
Annual Project OM&R Expenditures (\$000)

Project Cost Items	Disposal Alternatives						
	In-Valley	In-Valley/ Groundwater Quality Land Retirement	In-Valley/ Water Needs Land Retirement	In-Valley/ Drainage- Impaired Area Land Retirement	Ocean	Delta- Chippis Island	Delta- Carquinez Strait
Conveyance System	117	104	76	37	4,150	960	965
Evaporation Basins	1,991	1,726	1,280	710	0	0	0
Mitigation Facilities*	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Reverse Osmosis Facilities	8,034	6,999	5,066	2,694	0	0	0
Biological Selenium Treatment	2,265	2,007	1,566	771	0	4,130	4,130
Land Retirement	760	1,604	3,362	5,312	760	760	760
Drainage Collection System	3,014	2,546	1,428	72	3,036	3,036	3,036
Regional Reuse Facilities	3,596	3,116	2,306	1,320	3,614	3,614	3,614
DMC Drainage Collection/Reuse	19	19	19	19	19	19	19
Drainwater Recycling	810	732	546	320	814	814	814
Seepage Reduction	-19	-19	-19	-19	-19	-19	-19
Shallow Groundwater Mgt	780	657	366	11	785	785	785
On-Farm Tile Drainage System	2,044	1,739	1,154	446	2,054	2,054	2,054
Total Project Costs	23,411	21,230	17,150	11,693	15,213	16,153	16,158

Note:

*Mitigation facilities, such as alternative and/or compensation habitat including wetlands, may be a component of any of the action alternatives. Sufficient detail is not currently available for calculation of costs.

Nonrecurring construction expenditures were analyzed for three different time periods under each alternative: 1) the first year of the initial construction period; 2) the remaining years of the initial construction period; and, 3) the second construction period (approximately 18-20 years after the start of the project).

Recurring operation, maintenance, and replacement (OM&R) costs were analyzed at three different time periods to correlate to the construction periods described above. These three periods are: 1) the first year of the initial construction activities to the end of the initial construction period; 2) from the end of the initial construction through the end of the second construction period; and, 3) from the end of the second construction period to the end of the 50-year project life.

Recurring expenditures from projected changes in agricultural production occur as a result of two separate activities: land retirement and installation of on-farm drains. Land is retired or removed from irrigated agricultural production either for the construction of project features or to avoid or reduce the cost of providing drainage service to specific drainage-impaired lands. Lands retired at the beginning of the project, while on-farm drain installation occurs gradually over the project life. As a result, a reduction in agriculture expenditures, such as purchases of seed, fertilizer, herbicides, and other agricultural inputs, as well as spending for farm labor and custom services, occurs immediately when land is retired at the beginning of the analysis period, but they are gradually offset by increasing agricultural expenditures as on-farm drains are

installed over the 50-year project life. The net change of these two activities is selected at times that correspond to the three analysis periods described above for annual OM&R costs.

17.2.4.1 In-Valley Disposal Alternative

Regional economic effects of changes in annual expenditures expected to occur under the In-Valley Disposal Alternative are shown in Tables 17-6 to 17-14 in comparison to No Action. Direct expenditures are expected to increase in the following sectors: Agriculture; Construction; and Transportation, Communication, & Public Utilities (TCPU). Increased TCPU expenditures occur from the construction, operation, and maintenance of water treatment facilities, such as RO and Se treatment plants. The increased expenditures in the agricultural sector are a result of providing drainage service, which allows irrigators to produce a mix of crops unrestricted by soil and water salinity factors. Annual construction expenditures are increased as irrigators gradually install field drainage systems on individual farms, and as regional reuse facilities and drainwater recycling measures are expanded to handle the resulting increase in drainage flows. Annual operation, maintenance, and energy expenditures of project features are the main cause of increased TCPU expenditures. Expenditures in all other sectors decline because of avoided increased irrigation management costs and land retirement payments would not occur.

Tables 17-6, 17-7, and 17-8 show the effects of OM&R expenditures during the first year of project construction. Total output increases by more than \$5 million resulting in an increase of more than 80 jobs and \$2 million in labor income in the first year of construction. Total output increases to more than \$24 million per year after Phase 1 project facilities are completed, with a corresponding increase of over \$12 million in labor income and more than 300 jobs. After completion of expanded facilities during the second construction phase, total output increases to over \$39 million annually, generating \$20 million in labor income from nearly 500 jobs.

Table 17-6
In-Valley Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	507,556	228,586	245,546	23	24
Mining	0	8,678	0	2,175	0	0
Construction	2,451,600	2,507,239	1,518,090	1,545,408	31	32
Manufacturing	452,500	748,100	94,068	153,810	3	5
TCPU	0	188,934	0	56,826	0	1
Trade	0	543,801	0	241,817	0	9
FIRE	0	392,959	0	71,346	0	2
Services	0	688,283	0	362,593	0	11
Government	0	40,801	0	18,568	0	0
Other	0	3,642	0	3,642	0	0
Institutions	0	0	0	0	0	0
Totals	3,356,600	5,629,993	1,840,744	2,701,731	57	84

Table 17-7
In-Valley Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	615,115	228,586	280,640	23	27
Mining	0	37,577	0	9,487	0	0
Construction	13,717,900	13,935,334	8,494,453	8,595,994	176	179
Manufacturing	452,500	1,665,729	94,068	340,763	3	9
TCPU	0	812,411	0	242,945	0	4
Trade	0	2,396,533	0	1,074,385	0	39
FIRE	0	1,795,614	0	320,793	0	9
Services	0	3,191,069	0	1,674,813	0	49
Government	0	182,813	0	83,124	0	1
Other	0	17,037	0	17,037	0	1
Institutions	0	0	0	0	0	0
Totals	14,622,900	24,649,232	8,817,107	12,639,981	202	318

Table 17-8
In-Valley Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	223,505	0	72,925	0	5
Mining	0	60,049	0	15,194	0	0
Construction	23,411,000	23,747,205	14,496,653	14,650,885	300	304
Manufacturing	0	1,906,803	0	388,482	0	9
TCPU	0	1,295,565	0	386,750	0	7
Trade	0	3,849,916	0	1,730,049	0	63
FIRE	0	2,914,670	0	518,343	0	14
Services	0	5,200,707	0	2,726,749	0	80
Government	0	295,096	0	134,145	0	2
Other	0	27,836	0	27,836	0	2
Institutions	0	0	0	0	0	0
Totals	23,411,000	39,521,352	14,496,653	20,651,358	300	486

**Table 17-9
In-Valley Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – Year 1**

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	26,307,682	30,342,983	6,323,139	8,220,810	402	585
Mining	0	127,290	0	31,127	0	0
Construction	0	948,272	0	508,526	0	11
Manufacturing	0	2,369,327	0	420,381	0	11
TCPU	0	1,952,437	0	564,359	0	6
Trade	0	4,112,514	0	1,767,895	0	56
FIRE	0	4,401,392	0	822,405	0	22
Services	0	3,473,286	0	1,809,961	0	51
Government	0	313,289	0	122,057	0	0
Other	0	19,237	0	19,237	0	0
Institutions	0	0	0	0	0	0
Totals	26,307,682	48,060,027	6,323,139	14,286,758	402	742

**Table 17-10
In-Valley Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of
Construction**

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	38,202,254	44,023,911	9,167,013	11,902,730	540	804
Mining	0	184,091	0	45,020	0	0
Construction	0	1,378,972	0	739,663	0	14
Manufacturing	0	3,425,450	0	609,058	0	14
TCPU	0	2,838,605	0	820,085	0	9
Trade	0	5,970,396	0	2,566,423	0	80
FIRE	0	6,396,426	0	1,195,736	0	80
Services	0	5,038,822	0	2,625,621	0	75
Government	0	454,707	0	177,095	0	0
Other	0	27,889	0	27,889	0	0
Institutions	0	0	0	0	0	0
Totals	38,202,254	69,739,269	9,167,013	20,709,320	540	1,076

Table 17-11
In-Valley Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	81,018,048	93,246,727	19,394,722	25,134,953	1,010	1,564
Mining	0	388,097	0	94,919	0	0
Construction	0	2,930,508	0	1,572,406	0	27
Manufacturing	0	7,217,889	0	1,287,374	0	27
TCPU	0	6,030,530	0	1,740,939	0	22
Trade	0	12,657,120	0	5,440,328	0	168
FIRE	0	13,580,816	0	2,540,487	0	71
Services	0	10,671,191	0	5,560,046	0	163
Government	0	963,617	0	375,122	0	0
Other	0	59,006	0	59,006	0	0
Institutions	0	0	0	0	0	0
Totals	81,018,048	147,745,501	19,394,722	43,805,580	1,010	2,042

Table 17-12
In-Valley Disposal Alternative
Nonrecurring Regional Economic Effects (Year 1 of Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	488,816	0	154,361	0	9
Mining	0	211,735	0	52,119	0	0
Construction	24,721,600	33,928,367	11,500,117	17,061,549	230	345
Manufacturing	0	4,621,851	0	940,593	0	20
TCPU	84,576,220	88,849,408	15,276,100	16,480,532	212	231
Trade	0	8,310,598	0	3,850,669	0	139
FIRE	0	8,291,861	0	1,560,740	0	44
Services	0	17,072,523	0	9,304,746	0	263
Government	0	901,265	0	444,629	0	7
Other	0	67,264	0	67,264	0	7
Institutions	0	0	0	0	0	0
Totals	109,297,820	162,743,688	26,776,217	49,917,202	442	1,065

Table 17-13
In-Valley Disposal Alternative
Nonrecurring Regional Economic Effects (Remainder of Initial Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	316,775	0	97,386	0	5
Mining	0	170,483	0	41,955	0	0
Construction	4,793,360	13,740,761	2,229,799	7,671,223	45	156
Manufacturing	0	3,234,447	0	643,104	0	14
TCPU	84,576,220	87,865,730	15,276,100	16,188,683	212	225
Trade	0	5,670,465	0	2,532,296	0	94
FIRE	0	5,960,098	0	1,126,165	0	32
Services	0	11,033,629	0	6,235,239	0	177
Government	0	665,175	0	332,552	0	5
Other	0	47,057	0	47,057	0	5
Institutions	0	0	0	0	0	0
Totals	89,369,580	128,704,620	17,505,899	34,915,660	257	713

Table 17-14
In-Valley Disposal Alternative
Nonrecurring Regional Economic Effects (Phase 2 Construction)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	733,989	0	224,766	0	15
Mining	0	297,035	0	72,951	0	0
Construction	1,249,030	28,434,539	581,030	17,181,537	12	351
Manufacturing	0	8,203,557	0	1,608,038	0	30
TCPU	148,927,270	157,425,090	35,004,576	37,436,681	532	577
Trade	0	13,395,869	0	5,976,860	0	224
FIRE	0	14,270,357	0	2,719,386	0	75
Services	0	26,510,899	0	15,505,811	0	448
Government	0	1,729,350	0	915,640	0	15
Other	0	110,205	0	110,205	0	15
Institutions	0	0	0	0	0	0
Totals	150,176,300	251,110,890	35,585,606	81,751,875	544	1,750

Tables 17-9, 17-10, and 17-11 show the effects of changes in regional agricultural expenditures from drainage service as well as land removed from production for treatment and disposal facilities. In the first year, labor income increases by more than \$14 million and jobs increase more than 700 as a result of providing drainage service. As drainage service is provided to more land over time, agricultural production increases with a corresponding increase in jobs and regional income. By the end of the initial construction period, regional income increases more than \$20 million and employment increased by more than 1,000 jobs. At the end of the project analysis period, the increase in agricultural production from drained lands results in an increase of over \$43 million in labor income and 2,000 additional jobs, as shown in Table 17-11.

Values shown in Tables 17-12 through 17-14 indicate the regional economic effects from increased regional spending in the Construction and TCPU sectors. Values shown in Table 17-12 indicate the regional economic effects from increased regional spending in the first year of construction. Increased construction expenditures are from various construction activities. The increased expenditures in the TCPU sector are a result of building the drainage collection and conveyance systems, evaporation basins, and the biological selenium treatment and reverse osmosis treatment facilities. These expenditures result in almost \$50 million of labor income from just over 1,000 jobs in the first year of initial construction.

Economic effects shown in Table 17-13 are projected to occur during the remainder of the initial construction period, which is assumed to last no more than ten years from start to finish. These construction expenditures translate to an increase in total economic output in the region of \$128 million each year for the remainder of the construction period. In addition, these expenditures generate almost \$35 million in additional income and over 700 additional jobs. These effects are limited to the construction period, and would end when construction of the above-mentioned facilities are complete.

Table 17-14 shows the economic effects of construction expenditures that would occur approximately 18-20 years after the initial construction activities begin. This second phase of construction is necessary to provide additional treatment and disposal facilities to handle additional drainage as the quantity of land with installed on-farm drains increases over the life of the project. Expenditures occurring during this second construction period results in an increase of almost \$82 million in labor income and over 1,700 additional jobs.

17.2.4.2 In-Valley/Groundwater Quality Land Retirement Alternative

Regional economic effects of changes in annual expenditures expected to occur under the In-Valley/Groundwater Quality Land Retirement Alternative are shown in Tables 17-15 to 17-23 in comparison to No Action. Tables 17-15, 17-16, and 17-17 show the effects of OM&R expenditures during the first year of project construction. Total output increases by more than \$5 million, resulting in increases of 80 jobs and almost \$3 million in labor income in the first year of construction. After Phase 1 project facilities are completed, total labor income increases by more than \$11 million and employment increases by almost 300 jobs. After completion of expanded facilities during the second construction phase, total output increases by over \$36 million annually, generating \$19 million in labor income from over 400 jobs.

Tables 17-18, 17-19, and 17-20 show the effects of changes in regional agricultural expenditures from drainage service as well as retiring lands that exceed a specific concentration of selenium (50 ppb) in addition to that needed for treatment and disposal facilities. In the first year, labor

income increases by over \$14 million and jobs increase by more than 700 as a result of land retirement. As drainage service is provided to more land over time, agricultural production increases with a corresponding increase in jobs and regional income. By the end of the initial construction period, regional income increases by more than \$6 million compared to the No Action Alternative, and the number of jobs increases by almost 400 more than the No Action Alternative. At the end of the project analysis period, the increase in agricultural production from drained lands results in an increase of more than \$20 million in labor income and more than 1,000 additional jobs, as shown in Table 17-20.

Values shown in Tables 17-21 through 17-23 indicate the regional economic effects from increased regional spending in the Construction and TCPU sectors. Values shown in Table 17-21 indicate the regional economic effects from increased regional spending in the first year of construction. Increased expenditures are from project construction activities and land retirement purchases. The increased expenditures in the TCPU sector are a result of building the drainage collection and conveyance systems, evaporation basins, and the biological selenium treatment and reverse osmosis treatment facilities. These expenditures result in almost \$46 million of labor income from 1,000 jobs in the first year of initial construction.

Table 17-15
In-Valley/Groundwater Quality Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	506,388	228,586	245,165	23	24
Mining	0	8,365	0	2,095	0	0
Construction	2,329,300	2,383,182	1,442,358	1,468,872	30	31
Manufacturing	452,500	738,139	94,068	151,780	3	5
TCPU	0	182,165	0	54,805	0	1
Trade	0	523,689	0	232,779	0	8
FIRE	0	377,733	0	68,638	0	2
Services	0	661,114	0	348,349	0	10
Government	0	39,260	0	17,867	0	0
Other	0	39,260	0	17,867	0	0
Institutions	0	0	0	0	0	0
Totals	3,234,300	5,459,295	1,765,012	2,608,217	56	81

Table 17-16
In-Valley/Groundwater Quality Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	603,340	228,586	276,798	23	26
Mining	0	34,413	0	8,686	0	0
Construction	12,484,500	12,684,221	7,730,702	7,824,118	160	163
Manufacturing	452,500	1,565,270	94,068	320,296	3	9
TCPU	0	744,154	0	222,569	0	4
Trade	0	2,193,701	0	983,238	0	36
FIRE	0	1,642,055	0	293,484	0	8
Services	0	2,917,072	0	1,531,155	0	45
Government	0	167,266	0	76,057	0	1
Other	0	15,571	0	15,571	0	1
Institutions	0	0	0	0	0	0
Totals	13,389,500	22,567,063	8,053,356	11,551,972	186	293

Table 17-17
In-Valley/Groundwater Quality Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	207,265	0	67,627	0	4
Mining	0	55,686	0	14,090	0	0
Construction	21,710,000	22,021,777	13,443,353	13,586,379	278	282
Manufacturing	0	1,768,258	0	360,256	0	9
TCPU	0	1,201,431	0	358,649	0	7
Trade	0	3,570,188	0	1,604,347	0	59
FIRE	0	2,702,895	0	480,681	0	13
Services	0	4,822,833	0	2,528,629	0	74
Government	0	273,688	0	124,398	0	2
Other	0	25,813	0	25,813	0	2
Institutions	0	0	0	0	0	0
Totals	21,710,000	36,649,834	13,443,353	19,150,869	278	452

Table 17-18
In-Valley/Groundwater Quality Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	26,307,342	30,342,592	6,323,057	8,220,705	401	585
Mining	0	127,288	0	31,127	0	0
Construction	0	948,260	0	508,519	0	11
Manufacturing	0	2,369,297	0	420,376	0	11
TCPU	0	1,952,412	0	564,351	0	6
Trade	0	4,112,461	0	1,767,872	0	56
FIRE	0	4,401,335	0	822,394	0	22
Services	0	3,473,241	0	1,809,938	0	51
Government	0	313,285	0	122,055	0	0
Other	0	19,237	0	19,237	0	0
Institutions	0	0	0	0	0	0
Totals	26,307,342	48,059,408	6,323,057	14,286,574	401	742

Table 17-19
In-Valley/Groundwater Quality Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	7,795,886	9,349,877	1,641,005	2,403,953	283	340
Mining	0	237,057	0	57,940	0	0
Construction	0	473,112	0	285,701	0	0
Manufacturing	0	3,179,935	0	557,352	0	10
TCPU	0	1,085,060	0	332,789	0	-6
Trade	0	2,487,363	0	1,072,566	0	26
FIRE	0	2,102,229	0	417,751	0	3
Services	0	2,407,640	0	1,373,318	0	25
Government	0	188,060	0	80,424	0	-5
Other	0	11,206	0	11,206	0	0
Institutions	0	0	0	0	0	0
Totals	7,795,886	21,521,539	1,641,005	6,593,000	283	393

Table 17-20
In-Valley/Groundwater Quality Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	34,154,886	39,650,980	7,936,658	10,548,094	570	805
Mining	0	362,606	0	88,649	0	0
Construction	0	1,428,414	0	798,442	0	8
Manufacturing	0	5,513,789	0	974,865	0	17
TCPU	0	3,050,334	0	899,735	0	2
Trade	0	6,603,868	0	2,841,801	0	80
FIRE	0	6,525,510	0	1,245,720	0	27
Services	0	5,874,844	0	3,179,698	0	80
Government	0	501,350	0	202,328	0	-5
Other	0	30,360	0	30,360	0	0
Institutions	0	0	0	0	0	0
Totals	34,154,886	69,542,055	7,936,658	20,809,692	570	1,014

Table 17-21
In-Valley/Groundwater Quality Land Retirement Alternative
Nonrecurring Regional Economic Effects (Year 1 of Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	89,757	792,630	26,960	241,807	0	12
Mining	3,402	292,009	851	71,784	0	0
Construction	21,060,880	31,544,600	9,797,205	16,061,195	196	325
Manufacturing	1,036,398	6,511,181	172,080	1,284,772	4	27
TCPU	91,816,608	96,834,508	16,745,916	18,160,102	234	257
Trade	3,279,534	12,990,751	1,496,608	534,801	59	220
FIRE	2,875,796	12,838,149	387,798	2,319,658	11	66
Services	3,984,199	23,051,769	2,278,603	12,730,363	67	365
Government	240,682	1,336,056	82,804	623,940	0	10
Other	50,259	127,707	50,259	127,717	4	10
Institutions	6,285,398	6,285,398	0	0	0	0
Totals	130,722,913	192,604,758	31,039,084	52,156,139	575	1,292

Table 17-22
In-Valley/Groundwater Quality Land Retirement Alternative
Nonrecurring Regional Economic Effects (Remainder of Initial Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	89,757	656,110	26,960	196,595	0	9
Mining	3,402	259,317	851	63,760	0	0
Construction	5,245,470	15,522,694	2,440,114	8,608,449	49	174
Manufacturing	1,036,398	5,410,119	172,080	1,048,684	4	23
TCPU	91,842,608	96,079,881	16,748,228	17,930,782	234	252
Trade	3,279,534	10,657,618	1,496,608	4,788,611	59	183
FIRE	2,875,796	10,987,921	387,798	1,974,826	11	57
Services	3,984,199	18,259,414	2,278,603	10,294,381	67	297
Government	240,682	1,148,688	82,804	534,979	0	9
Other	50,259	111,673	50,259	111,673	4	9
Institutions	6,285,398	6,285,398	0	0	0	0
Totals	114,933,503	165,378,833	23,684,305	45,552,740	428	1,013

Table 17-23
In-Valley/Groundwater Quality Land Retirement Alternative
Nonrecurring Regional Economic Effects (Phase 2 Construction)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	653,461	0	200,047	0	13
Mining	0	264,417	0	64,939	0	0
Construction	949,420	25,210,933	441,656	15,257,053	9	312
Manufacturing	0	7,308,996	0	1,432,458	0	27
TCPU	132,724,800	140,299,521	31,221,428	33,389,424	475	515
Trade	0	11,928,197	0	5,321,967	0	200
FIRE	0	12,712,993	0	2,422,734	0	67
Services	0	23,605,791	0	13,811,133	0	399
Government	0	1,541,263	0	816,253	0	13
Other	0	98,157	0	98,157	0	13
Institutions	0	0	0	0	0	0
Totals	133,674,220	223,623,729	31,663,084	72,814,165	484	1,559

Economic effects shown in Table 17-22 are projected to occur during the remainder of the initial construction period, which is assumed to last no more than ten years from start to finish. These construction expenditures translate to an increase in total economic output in the region of more than \$165 million each year for the remainder of the construction period. In addition, these expenditures generate almost \$46 million in additional labor income and 1,000 additional jobs. These effects are limited to the construction period, and would end when construction of the above-mentioned facilities are complete.

Table 17-23 shows the economic effects of construction expenditures that would occur approximately 18-20 years after the initial construction activities begin. This second phase of construction is necessary to provide additional treatment and disposal facilities to handle additional drainage as the quantity of land with installed on-farm drains increases over the life of the project. Expenditures occurring during this second construction period results in an increase of almost \$73 million in labor income and over 1,500 additional jobs.

17.2.4.3 In-Valley/Water Needs Land Retirement Alternative

Regional economic effects of changes in annual expenditures expected to occur under the In-Valley/Water Needs Land Retirement Alternative are shown in Tables 17-24 to 17-32 in comparison to No Action. Tables 17-24 through 17-26 show the effects of OM&R expenditures during the first year of project construction. An increase in total output of almost \$5 million results in an increase of over 70 jobs and \$2 million in labor income in the first year of construction. Total output increases by over \$20 million per year after Phase 1 project facilities are completed, with a corresponding increase of over \$10 million in labor income and more than 260 jobs. After completion of expanded facilities during the second construction phase, total annual output generates an increase of \$15 million in labor income from over 350 jobs.

Tables 17-27, 17-28, and 17-29 show the effects of changes in regional agricultural expenditures from drainage service as well as retiring a sufficient amount of land to ensure a sufficient water supply for the lands remaining under irrigation, in addition to that needed for treatment and disposal facilities. In the first year, labor income increases more than \$14 million and jobs increase by more than 700 as a result of land retirement. As drainage service is provided to more land over time, agricultural production increases with a corresponding increase in jobs and regional income. By the end of the initial construction period, regional labor income is more than \$45 million less than the No Action Alternative, and the number of jobs is almost 1,900 less than the No Action Alternative. At the end of the project analysis period, the change in agricultural production from both retired lands and drained lands results in a decrease of more than \$43 million in labor income and almost 1,800 jobs, as shown in Table 17-29.

Values shown in Tables 17-30 through 17-32 indicate the regional economic effects from increased regional spending in the Construction and TCPU sectors. Values shown in Table 17-30 indicate the regional economic effects from increased regional spending in the first year of construction. Increased expenditures occur from several construction activities, as well as land retirement purchases. The increased expenditures in the TCPU sector are a result of building the drainage collection and conveyance systems, evaporation basins, and the biological selenium treatment and reverse osmosis treatment facilities. Total expenditures of more than \$264 million result in over \$79 million of labor income from over 2,000 jobs in the first year of initial construction.

Economic effects shown in Table 17-31 are projected to occur during the remainder of the initial construction period, which is assumed to last no more than ten years from start to finish. These construction expenditures translate to an increase in total economic output in the region of more than \$235 million each year for the remainder of the construction period. In addition, these expenditures generate \$67 million in additional labor income and 1,700 additional jobs. These effects are limited to the construction period, and would end when construction of the above-mentioned facilities are complete.

Table 17-32 shows the economic effects of construction expenditures that would occur approximately 18-20 years after the initial construction activities begin. This second phase of construction is necessary to provide additional treatment and disposal facilities to handle additional drainage as the quantity of land with installed on-farm drains increases over the life of the project. Total expenditures occurring during this second construction period result in an increase of over \$57 million in labor income and 1,200 additional jobs.

Table 17-24
In-Valley/Water Needs Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	503,655	228,586	244,273	23	24
Mining	0	7,630	0	1,910	0	0
Construction	2,043,000	2,092,771	7,265,075	1,289,702	26	27
Manufacturing	452,500	714,820	94,068	147,029	3	5
TCPU	0	166,322	0	50,076	0	1
Trade	0	476,607	0	211,622	0	7
FIRE	0	342,089	0	62,299	0	2
Services	0	597,513	0	315,002	0	9
Government	0	35,651	0	16,227	0	0
Other	0	3,156	0	3,156	0	0
Institutions	0	0	0	0	0	0
Totals	2,948,000	4,940,214	7,587,729	2,341,296	52	75

Table 17-25
In-Valley/Water Needs Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	591,598	228,586	272,967	23	26
Mining	0	31,258	0	7,888	0	0
Construction	11,254,600	11,436,659	6,969,118	7,054,431	144	147
Manufacturing	452,500	1,465,096	94,068	299,887	3	8
TCPU	0	676,092	0	202,251	0	4
Trade	0	1,991,446	0	892,350	0	32
FIRE	0	1,488,933	0	266,253	0	7
Services	0	2,643,852	0	1,387,905	0	41
Government	0	151,763	0	69,009	0	11
Other	0	14,108	0	14,108	0	1
Institutions	0	0	0	0	0	0
Totals	12,159,600	20,490,805	7,291,772	10,467,049	170	277

Table 17-26
In-Valley/Water Needs Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	163,731	0	53,422	0	3
Mining	0	43,990	0	11,130	0	0
Construction	17,150,000	17,396,291	10,619,692	10,732,676	220	223
Manufacturing	0	1,396,850	0	284,587	0	7
TCPU	0	949,081	0	283,318	0	5
Trade	0	2,820,300	0	1,267,368	0	46
FIRE	0	2,135,175	0	379,718	0	10
Services	0	3,809,838	0	1,997,512	0	58
Government	0	216,176	0	98,270	0	2
Other	0	20,391	0	20,391	0	2
Institutions	0	0	0	0	0	0
Totals	17,150,000	28,951,823	10,619,692	15,128,392	220	356

Table 17-27
In-Valley/Water Needs Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	26,307,342	30,342,592	6,323,057	8,220,705	401	585
Mining	0	127,288	0	31,127	0	0
Construction	0	948,260	0	508,519	0	11
Manufacturing	0	2,369,297	0	420,376	0	11
TCPU	0	1,952,412	0	564,351	0	6
Trade	0	4,112,461	0	1,767,872	0	56
FIRE	0	4,401,335	0	822,394	0	22
Services	0	3,473,241	0	1,809,938	0	51
Government	0	313,285	0	122,055	0	0
Other	0	19,237	0	19,237	0	0
Institutions	0	0	0	0	0	0
Totals	26,307,342	48,059,408	6,323,057	14,286,574	401	742

Table 17-28
In-Valley/Water Needs Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	-97,468,045	-111,097,718	-24,017,047	-30,311,429	-659	-1,332
Mining	0	146,347	0	35,671	0	0
Construction	0	-2,941,927	0	-1,480,259	0	-43
Manufacturing	0	-1,059,532	0	-217,451	0	-13
TCPU	0	-5,718,538	0	-1,590,703	0	-49
Trade	0	-11,354,144	0	-4,869,489	0	-174
FIRE	0	-13,916,434	0	-2,527,851	0	-95
Services	0	-8,610,932	0	-4,119,767	0	-164
Government	0	-867,382	0	-315,535	0	-15
Other	0	-54,064	0	-54,064	0	0
Institutions	0	0	0	0	0	0
Totals	-97,468,045	-155,474,324	-24,017,047	-45,450,877	-659	-1,885

Table 17-29
In-Valley/Water Needs Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	-93,148,129	-106,131,740	-22,985,267	-28,976,704	-612	-1,256
Mining	0	166,923	0	40,703	0	0
Construction	0	-2,785,365	0	-1,396,227	0	-42
Manufacturing	0	-677,042	0	-149,026	0	-12
TCPU	0	-5,396,454	0	-1,497,788	0	-47
Trade	0	-10,679,499	0	-4,579,533	0	-165
FIRE	0	-13,191,512	0	-2,392,157	0	-92
Services	0	-8,042,700	0	-3,823,724	0	-155
Government	0	-816,038	0	-295,557	0	0
Other	0	-50,925	0	50,925	0	0
Institutions	0	0	0	0	0	0
Totals	-93,148,129	-147,604,352	-22,985,267	-43,019,088	-612	-1,769

Table 17-30
In-Valley/Water Needs Land Retirement Alternative
Nonrecurring Regional Economic Effects (Year 1 of Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	368,662	1,752,331	110,735	521,220	0	24
Mining	13,975	510,719	3,494	125,333	0	0
Construction	21,959,650	33,762,109	10,215,300	17,026,295	204	340
Manufacturing	4,256,854	12,298,843	706,792	2,352,458	15	52
TCPU	84,574,823	91,522,891	16,163,305	18,138,269	233	268
Trade	13,470,215	26,789,391	6,147,101	12,087,812	243	456
FIRE	11,811,919	26,628,995	1,592,827	4,610,740	46	134
Services	16,364,523	42,235,172	9,359,033	23,486,754	273	669
Government	988,567	2,636,186	340,105	1,152,833	0	7
Other	206,433	314,080	206,433	314,080	15	22
Institutions	25,816,367	25,816,367	0	0	0	0
Totals	179,831,988	264,267,084	44,845,125	79,815,794	1,029	1,972

Table 17-31
In-Valley/Water Needs Land Retirement Alternative
Nonrecurring Regional Economic Effects (Remainder of Initial Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	368,662	1,608,072	110,735	473,446	0	21
Mining	13,975	476,128	3,494	116,811	0	0
Construction	5,249,430	16,834,405	2,441,956	9,152,322	49	183
Manufacturing	4,256,854	11,135,478	706,792	2,103,008	15	45
TCPU	84,574,823	90,698,058	16,163,305	17,893,548	233	263
Trade	13,470,215	24,324,032	6,147,101	10,982,331	243	417
FIRE	11,811,919	24,673,766	1,592,827	4,246,340	46	124
Services	16,364,523	37,171,441	9,359,003	20,912,912	273	597
Government	988,567	2,438,221	340,105	1,058,855	0	5
Other	206,433	297,136	206,433	297,136	15	20
Institutions	25,816,367	25,816,367	0	0	0	0
Totals	163,121,768	235,473,104	37,071,751	67,236,709	874	1,675

Table 17-32
In-Valley/Water Needs Land Retirement Alternative
Nonrecurring Regional Economic Effects (Phase 2 Construction)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	513,936	0	157,252	0	10
Mining	0	207,864	0	51,048	0	0
Construction	234,530	19,500,442	109,100	11,875,149	2	243
Manufacturing	0	5,765,648	0	1,129,257	0	21
TCPU	104,816,040	110,802,482	24,735,602	26,449,275	377	408
Trade	0	9,387,709	0	4,188,299	0	157
FIRE	0	10,024,629	0	1,910,792	0	52
Services	0	18,576,514	0	10,882,730	0	315
Government	0	1,217,360	0	645,341	0	10
Other	0	77,333	0	77,333	0	10
Institutions	0	0	0	0	0	0
Totals	105,050,570	176,073,917	24,844,702	57,366,476	379	1,226

17.2.4.4 In-Valley/Drainage-Impaired Area Land Retirement Alternative

Regional economic effects of changes in annual expenditures expected to occur under the In-Valley/Water Needs Land Retirement Alternative are shown in Tables 17-33 to 17-41 in comparison to No Action. Tables 17-33, 17-34, and 17-35 show the effects of OM&R expenditures during the first year of project construction. Increased total output of over \$4 million results in an increase of 70 jobs and over \$2 million in labor income in the first year of construction. Total output increases to almost \$17 million per year after Phase 1 project facilities are completed, with a corresponding increase of almost \$9 million in labor income and more than 200 jobs. After completion of expanded facilities during the second construction phase, total annual output increases to over \$19 million annually, generating \$10 million in labor income from over 240 jobs.

Tables 17-36, 17-37, and 17-38 show the effects of changes in regional agricultural expenditures from drainage service as well as retiring all of the drainage impaired lands in Westlands Water District. In the first year, labor income declines by over \$47 million and employment declines by more than 1,900 jobs as a result of land retirement. Because very little additional drainage service is provided to more land in the Northerly San Luis districts, agricultural production remains essentially the same over the life of the project. By the end of the initial construction period, regional labor income is still more than \$109 million less than the No Action Alternative, and the number of jobs is still about 4,700 less than the No Action Alternative. At the end of the project analysis period, the change in agricultural production from retired lands continues to result in a decrease of almost \$110 million in labor income and more than 4,600 jobs, as shown in Table 17-38.

Table 17-33
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	502,649	228,586	243,945	23	24
Mining	0	7,360	0	1,841	0	0
Construction	1,937,600	1,985,857	1,199,808	1,223,741	25	25
Manufacturing	452,500	706,236	94,068	145,280	3	4
TCPU	0	160,489	0	48,334	0	1
Trade	0	459,274	0	203,833	0	7
FIRE	0	328,966	0	59,965	0	2
Services	0	574,099	0	302,726	0	9
Government	0	34,322	0	15,623	0	0
Other	0	3,031	0	3,031	0	0
Institutions	0	0	0	0	0	0
Totals	2,842,600	4,762,283	1,522,462	2,248,319	51	72

Table 17-34
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	571,403	228,586	266,378	23	26
Mining	0	25,832	0	6,515	0	0
Construction	9,139,300	9,290,981	5,659,274	5,731,651	117	119
Manufacturing	452,500	1,292,807	94,068	264,785	3	7
TCPU	0	559,031	0	167,307	0	3
Trade	0	1,643,587	0	736,031	0	27
FIRE	0	1,225,578	0	219,418	0	6
Services	0	2,173,942	0	1,141,530	0	33
Government	0	125,100	0	56,889	0	1
Other	0	11,593	0	11,593	0	1
Institutions	0	0	0	0	0	0
Totals	10,044,300	16,919,854	5,981,928	8,602,097	143	223

Table 17-35
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	111,633	0	36,424	0	2
Mining	0	29,993	0	7,589	0	0
Construction	11,693,000	11,860,923	7,240,586	7,317,620	150	152
Manufacturing	0	952,383	0	194,034	0	5
TCPU	0	647,091	0	193,168	0	4
Trade	0	1,922,902	0	864,101	0	32
FIRE	0	1,455,779	0	258,895	0	7
Services	0	2,597,577	0	1,361,919	0	40
Government	0	147,390	0	67,001	0	1
Other	0	13,903	0	13,903	0	1
Institutions	0	0	0	0	0	0
Totals	11,693,000	19,739,574	7,240,586	10,314,654	150	244

Table 17-36
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	-98,351,192	-112,262,824	-24,094,148	-30,534,193	-702	-1,367
Mining	0	45,087	0	10,918	0	0
Construction	0	-3,071,429	0	-1,565,515	0	-41
Manufacturing	0	-2,339,232	0	-442,365	0	-16
TCPU	0	-6,040,570	0	-1,692,620	0	-46
Trade	0	-12,119,765	0	-5,199,998	0	-180
FIRE	0	-14,467,656	0	-2,643,763	0	-95
Services	0	-9,401,808	0	-4,598,556	0	-172
Government	0	-924,602	0	-341,278	0	-13
Other	0	-57,370	0	-57,370	0	0
Institutions	0	0	0	0	0	0
Totals	-98,351,192	-160,640,169	-24,094,148	-47,064,740	-702	-1,930

Table 17-37
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	-226,692,169	-259,028,030	-55,454,020	-70,450,683	-1,840	-3,378
Mining	0	-13,801	0	-3,592	0	0
Construction	0	-7,181,814	0	-3,681,649	0	-95
Manufacturing	0	-6,867,624	0	-1,274,655	0	-42
TCPU	0	-14,194,889	0	-3,992,486	0	-100
Trade	0	-28,654,881	0	-12,297,538	0	-421
FIRE	0	-33,776,779	0	-6,186,807	0	-216
Services	0	-22,473,501	0	-11,067,619	0	-400
Government	0	-2,186,312	0	-812,418	0	-26
Other	0	-135,524	0	-135,524	0	0
Institutions	0	0	0	0	0	0
Totals	-226,692,169	-374,513,155	-55,454,020	-109,902,971	-1,840	-4,678

Table 17-38
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	-226,692,169	-259,028,030	-55,454,020	-70,450,683	-1,840	-3,377
Mining	0	-13,801	0	-3,592	0	0
Construction	0	-7,181,814	0	-3,681,649	0	-95
Manufacturing	0	-6,867,624	0	-1,274,655	0	-42
TCPU	0	-14,194,889	0	-3,992,486	0	-100
Trade	0	-28,654,881	0	-12,297,538	0	-421
FIRE	0	-33,776,779	0	-6,186,807	0	-216
Services	0	-22,473,501	0	-11,067,619	0	-400
Government	0	-2,186,312	0	-812,418	0	-26
Other	0	-135,524	0	-135,524	0	0
Institutions	0	0	0	0	0	0
Totals	-226,692,169	-374,513,155	-55,454,020	-109,902,971	-1,840	-4,677

Table 17-39
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Nonrecurring Regional Economic Effects (Year 1 of Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	967,113	3,671,478	290,493	1,077,020	0	47
Mining	36,660	916,616	9,165	224,637	0	0
Construction	19,127,250	30,377,332	8,897,710	14,829,869	178	293
Manufacturing	11,167,032	23,326,914	1,854,132	4,363,973	40	92
TCPU	41,039,075	50,782,520	9,589,912	12,388,979	155	210
Trade	35,336,498	53,904,919	16,125,729	24,391,192	638	968
FIRE	30,986,281	53,724,060	4,178,472	9,055,372	120	267
Services	42,929,155	78,478,476	24,551,610	43,828,716	717	1,293
Government	2,593,314	5,146,951	892,199	2,147,571	0	45
Other	541,536	694,051	541,536	694,051	40	45
Institutions	67,724,237	67,724,237	0	0	0	0
Totals	252,448,151	368,747,554	66,930,958	113,001,380	1,888	3,260

Table 17-40
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Nonrecurring Regional Economic Effects (Remainder of Initial Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	967,113	3,554,824	290,493	1,038,388	0	44
Mining	36,660	888,646	9,165	217,745	0	0
Construction	5,614,750	16,688,967	2,611,897	8,462,684	52	165
Manufacturing	11,167,032	22,386,174	1,854,132	4,162,258	40	88
TCPU	41,039,075	50,115,530	9,589,912	12,191,088	155	206
Trade	35,336,498	51,911,339	16,125,729	23,497,260	638	937
FIRE	30,986,281	52,142,990	4,178,472	8,760,705	120	258
Services	42,929,155	74,383,756	24,551,610	41,747,413	717	1,234
Government	2,593,314	4,986,869	892,199	2,071,576	0	44
Other	541,536	680,349	541,536	680,349	40	44
Institutions	67,724,237	67,724,237	0	0	0	0
Totals	238,935,651	345,463,681	60,645,145	102,829,466	1,762	3,020

Table 17-41
In-Valley/Drainage-Impaired Area Land Retirement Alternative
Nonrecurring Regional Economic Effects (Phase 2 Construction)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	241,570	0	73,893	0	5
Mining	0	97,684	0	23,989	0	0
Construction	0	9095,462	0	5,555,031	0	114
Manufacturing	0	2,713,791	0	531,366	0	10
TCPU	49,360,500	52,180,613	11,665,564	12,472,905	178	193
Trade	0	4,413,964	0	1,969,237	0	74
FIRE	0	4,717,580	0	899,299	0	25
Services	0	8,734,044	0	5,119,720	0	148
Government	0	573,322	0	304,061	0	5
Other	0	36,379	0	36,379	0	5
Institutions	0	0	0	0	0	0
Totals	49,360,500	82,804,409	11,665,564	26,985,880	178	579

Values shown in Tables 17-39 through 17-41 indicate the regional economic effects from Construction activities required to provide drainage service to the Northerly San Luis districts. Values shown in Table 17-39 indicate the regional economic effects from increased regional spending in the first year of construction. Increased expenditures also include almost \$70 million in the form of payments to landowners within the San Luis Unit (primarily the Westlands Water District) to retire drainage-impaired lands. The analysis assumed that these land retirement payments were paid to households with incomes of \$30,000–\$40,000. It was also assumed that 50 percent of the landowners receiving land retirement payments would remain in the drainage study area rather than move out of the area. These expenditures result in over \$113 million of labor income and generate over 3,200 jobs in the first year of initial construction.

Economic effects shown in Table 17-40 are projected to occur during the remainder of the initial construction period. Total expenditures (including land retirement payments) are estimated to generate almost \$103 million in additional labor income and more than 3,000 additional jobs.

Table 17-41 shows the economic effects of construction expenditures in the Northerly San Luis Unit districts that would occur approximately 18-20 years after the initial construction activities begin. This second phase of construction is necessary to provide additional treatment and disposal facilities to handle additional drainage as the quantity of land with installed on-farm drains increases over the life of the project. Total expenditures occurring during this second construction period result in an increase of almost \$27 million in labor income and 600 additional jobs.

17.2.4.5 Ocean Disposal Alternative

Annual economic effects projected to occur under the Ocean Disposal Alternative are shown in Tables 17-42 to 17-50. The increase in annual expenditures takes place in the agriculture, construction, and TCPU sectors. The provision of drainage service supports increased production in the agricultural sector. Increased construction spending is for installing field drainage systems, constructing regional reuse facilities, and implementing drainwater recycling measures. Annual operation, maintenance, replacement, and energy expenditures of project features are assumed to occur in the TCPU sector.

Tables 17-42, 17-43, and 17-44 show the effects of increased expenditures during the first year of project construction. Total increased output of more than \$5 million results in an increase of more than 80 jobs and almost \$3 million in labor income in the first year of construction. Total output increases by almost \$21 million per year after Phase 1 project facilities are completed, with a corresponding increase of almost \$11 million in labor income and 270 jobs. After completion of expanded facilities during the second construction phase, total annual output increases by almost \$26 million annually, generating over \$13 million in labor income from more than 300 jobs.

Table 17-42
Ocean Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	507,591	228,586	245,557	23	24
Mining	0	8,688	0	2,177	0	0
Construction	2,455,300	2,510,992	1,520,381	1,547,724	31	32
Manufacturing	452,500	748,402	94,068	153,871	3	5
TCPU	0	189,138	0	56,887	0	1
Trade	0	544,410	0	242,090	0	9
FIRE	0	393,420	0	71,427	0	2
Services	0	689,105	0	363,024	0	11
Government	0	40,848	0	18,589	0	0
Other	0	3,646	0	3,646	0	0
Institutions	0	0	0	0	0	0
Totals	3,360,300	5,636,240	1,843,035	2,704,992	57	84

Table 17-43
Ocean Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	593,613	228,586	273,624	23	26
Mining	0	31,799	0	8,025	0	0
Construction	11,465,600	11,650,689	7,099,775	7,186,478	147	149
Manufacturing	452,500	1,482,282	94,068	303,388	3	8
TCPU	0	687,768	0	205,737	0	4
Trade	0	2,026,144	0	907,942	0	33
FIRE	0	1,515,202	0	270,925	0	7
Services	0	2,690,725	0	1,412,481	0	41
Government	0	154,423	0	70,218	0	1
Other	0	14,359	0	14,359	0	1
Institutions	0	0	0	0	0	0
Totals	12,370,600	20,847,004	7,422,429	10,653,177	173	270

Table 17-44
Ocean Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	145,239	0	47,388	0	3
Mining	0	39,021	0	9,873	0	0
Construction	15,213,000	15,431,474	9,420,255	9,520,478	195	198
Manufacturing	0	1,239,084	0	252,445	0	6
TCPU	0	841,887	0	251,319	0	5
Trade	0	2,501,763	0	1,124,225	0	41
FIRE	0	1,894,019	0	336,831	0	9
Services	0	3,379,538	0	1,771,904	0	52
Government	0	191,760	0	87,170	0	2
Other	0	18,088	0	18,088	0	2
Institutions	0	0	0	0	0	0
Totals	15,213,000	25,681,873	9,420,255	13,419,721	195	318

Table 17-45
Ocean Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	26,307,682	30,342,983	6,323,139	8,220,810	402	585
Mining	0	127,290	0	31,127	0	0
Construction	0	948,272	0	508,526	0	11
Manufacturing	0	2,369,327	0	420,381	0	11
TCPU	0	1,952,437	0	564,359	0	6
Trade	0	4,112,514	0	1,767,895	0	56
FIRE	0	4,401,392	0	822,405	0	22
Services	0	3,473,286	0	1,809,961	0	51
Government	0	313,289	0	122,057	0	0
Other	0	19,237	0	19,237	0	0
Institutions	0	0	0	0	0	0
Totals	26,307,682	48,060,027	6,323,139	14,286,758	402	742

Table 17-46
Ocean Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	58,127,829	66,933,177	13,927,562	18,062,562	761	1,160
Mining	0	279,070	0	68,252	0	0
Construction	0	2,100,922	0	1,127,141	0	20
Manufacturing	0	5,191,164	0	924,805	0	20
TCPU	0	4,323,882	0	1,248,602	0	15
Trade	0	9,082,338	0	3,903,920	0	121
FIRE	0	9,739,628	0	1,821,477	0	50
Services	0	7,660,263	0	3,991,382	0	116
Government	0	691,555	0	269,261	0	0
Other	0	42,373	0	42,373	0	0
Institutions	0	0	0	0	0	0
Totals	58,127,829	106,044,372	13,927,562	31,459,775	761	1,502

Table 17-47
Ocean Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	81,425,940	93,715,621	19,492,144	25,260,980	1,014	1,571
Mining	0	390,040	0	95,394	0	0
Construction	0	2,945,291	0	1,580,340	0	27
Manufacturing	0	7,254,004	0	1,293,835	0	27
TCPU	0	6,060,942	0	1,749,712	0	22
Trade	0	12,720,821	0	5,467,706	0	169
FIRE	0	13,649,264	0	2,553,300	0	71
Services	0	10,724,844	0	5,587,999	0	164
Government	0	968,465	0	377,009	0	0
Other	0	59,303	0	59,303	0	0
Institutions	0	0	0	0	0	0
Totals	81,425,940	148,488,595	19,492,144	44,025,578	1,014	2,051

Table 17-48
Ocean Disposal Alternative
Nonrecurring Regional Economic Effects (Year 1 of Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	377,005	0	119,654	0	6
Mining	0	200,437	0	49,397	0	0
Construction	24,115,650	28,304,677	11,218,239	13,706,898	224	277
Manufacturing	0	3,252,669	0	674,124	0	16
TCPU	81,814,980	84,705,155	11,457,684	12,244,648	139	149
Trade	0	6,527,618	0	2,921,762	0	104
FIRE	0	6,153,783	0	1,148,356	0	33
Services	0	12,782,973	0	6,724,441	0	186
Government	0	610,766	0	279,499	0	3
Other	0	51,086	0	51,086	0	3
Institutions	0	0	0	0	0	0
Totals	105,930,630	142,966,169	22,675,923	37,919,865	363	777

Table 17-49
Ocean Disposal Alternative
Nonrecurring Regional Economic Effects (Remainder of Initial Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	204,944	0	62,672	0	2
Mining	0	159,180	0	39,233	0	0
Construction	4,185,030	8,114,660	1,946,813	4,315,451	39	87
Manufacturing	0	1,865,099	0	376,599	0	10
TCPU	81,814,980	83,721,359	11,457,684	11,952,764	139	143
Trade	0	3,587,134	0	1,603,232	0	58
FIRE	0	3,821,741	0	713,729	0	21
Services	0	6,743,357	0	3,651,567	0	101
Government	0	374,648	0	167,409	0	1
Other	0	30,876	0	30,876	0	1
Institutions	0	0	0	0	0	0
Totals	86,000,010	108,622,998	13,404,497	22,913,532	178	424

Table 17-50
Ocean Disposal Alternative
Nonrecurring Regional Economic Effects (Phase 2 Construction)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	14,130	0	4,575	0	0
Mining	0	5,944	0	1,465	0	0
Construction	1,264,200	1,340,611	588,087	631,745	12	13
Manufacturing	0	116,191	0	24,537	0	1
TCPU	1,823,200	1,916,471	236,761	262,810	3	3
Trade	0	242,449	0	108,625	0	4
FIRE	0	211,599	0	39,394	0	1
Services	0	483,889	0	248,891	0	7
Government	0	20,747	0	9,467	0	0
Other	0	1,796	0	1,796	0	0
Institutions	0	0	0	0	0	0
Totals	3,087,400	4,353,827	824,848	1,333,305	15	29

Tables 17-45, 17-46, and 17-47 show the effects of changes in regional agricultural expenditures from drainage service as well as land retirement for treatment and disposal facilities. In the first year, total labor income increases by over \$14 million and jobs increase by over 700 as a result of land retirement. As drainage service is provided to more land over time, agricultural production increases with a corresponding increase in jobs and regional income. By the end of the initial construction period, regional labor income has increased by more than \$31 million more than the No Action Alternative and the employment outlook has improved with an increase in the number of jobs by more than 1,500 relative to the No Action Alternative. At the end of the project analysis period, the increase in total output from drained lands results in an increase of more than \$44 million in labor income and over 2,000 additional jobs, as shown in Table 17-47.

Direct one-time expenditures and corresponding economic effects of the Ocean Disposal Alternative are shown in Tables 17-48 to 17-50. Values shown in Table 17-48 indicate the regional economic effects from increased regional spending in the first year of construction. Increased expenditures in the Construction and TCPU sectors are a result of building lagoons for the biological selenium treatment process, the drainage collection and conveyance systems, evaporation basins, and reverse osmosis treatment facilities. These expenditures result in an increase of almost \$38 million of labor income from just over 780 jobs in the first year of initial construction.

Economic effects shown in Table 17-49 are projected to occur during the remainder of the initial construction period, which is assumed to last no more than ten years from start to finish. These construction expenditures translate to an increase in total economic output in the region of more than \$108 million each year for the remainder of the construction period. In addition, these expenditures generate almost \$23 million in additional income and more than 400 additional

jobs. These effects are limited to the construction period and would end when construction of the above-mentioned facilities is complete.

Table 17-50 shows the economic effects of construction expenditures that would occur approximately 18-20 years after the initial construction activities begin. This second phase of construction is necessary to provide additional reuse facilities to handle additional drainage as the quantity of land with installed on-farm drains increases over the life of the project. Expenditures occurring during this second construction period result in an increase of more than \$1 million in labor income and about 30 additional jobs.

17.2.4.6 Delta-Chipps Island Disposal Alternative

Regional economic effects of changes in expenditures expected to occur under the Delta-Chipps Island Disposal Alternative are shown in Tables 17-51 to 17-59. The increase in annual expenditures takes place primarily in the agriculture, construction, and TCPU sectors. The provision of drainage service supports increased production in the agricultural sector. Increased construction spending is from installing field drainage systems, constructing regional reuse facilities, and implementing drainwater recycling measures. Annual operation, maintenance, replacement, and energy expenditures of project features are assumed to occur in the TCPU sector.

Table 17-51
Delta-Chipps Island Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	507,591	228,586	245,557	23	24
Mining	0	8,688	0	2,177	0	0
Construction	2,455,300	2,510,992	1,520,381	1,547,724	31	32
Manufacturing	452,500	748,402	94,068	153,871	3	5
TCPU	0	189,138	0	56,887	0	1
Trade	0	544,410	0	242,090	0	9
FIRE	0	393,420	0	71,427	0	2
Services	0	689,105	0	363,024	0	11
Government	0	40,848	0	18,589	0	0
Other	0	3,646	0	3,646	0	0
Institutions	0	0	0	0	0	0
Totals	3,360,300	5,636,240	1,843,035	2,704,992	57	84

Table 17-52
Delta-Chipps Island Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	582,872	228,586	270,120	23	26
Mining	0	28,914	0	7,295	0	0
Construction	10,340,600	10,509,533	6,403,148	6,482,439	132	135
Manufacturing	452,500	1,390,652	94,068	284,720	3	8
TCPU	0	625,511	0	187,152	0	3
Trade	0	1,841,139	0	824,806	0	30
FIRE	0	1,375,140	0	246,016	0	7
Services	0	2,440,809	0	1,281,449	0	37
Government	0	140,242	0	63,772	0	1
Other	0	13,022	0	13,022	0	1
Institutions	0	0	0	0	0	0
Totals	11,245,600	18,947,834	6,725,802	9,660,791	158	248

Table 17-53
Delta-Chipps Island Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	154,213	0	50,317	0	3
Mining	0	41,432	0	10,483	0	0
Construction	16,153,000	16,384,973	10,002,325	10,108,741	207	210
Manufacturing	0	1,315,646	0	268,043	0	6
TCPU	0	893,907	0	266,848	0	5
Trade	0	2,656,345	0	1,193,691	0	44
FIRE	0	2,011,049	0	357,644	0	10
Services	0	3,588,357	0	1,881,388	0	55
Government	0	203,609	0	92,557	0	2
Other	0	19,206	0	19,206	0	2
Institutions	0	0	0	0	0	0
Totals	16,153,000	27,268,737	10,002,325	14,248,918	207	337

Table 17-54
Delta-Chipps Island Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	26,307,682	30,342,983	6,323,139	8,220,810	402	585
Mining	0	127,290	0	31,127	0	0
Construction	0	948,272	0	508,526	0	11
Manufacturing	0	2,369,327	0	420,381	0	11
TCPU	0	1,952,437	0	564,359	0	6
Trade	0	4,112,514	0	1,767,895	0	56
FIRE	0	4,401,392	0	822,405	0	22
Services	0	3,473,286	0	1,809,961	0	51
Government	0	313,289	0	122,057	0	0
Other	0	19,237	0	19,237	0	0
Institutions	0	0	0	0	0	0
Totals	26,307,682	48,060,027	6,323,139	14,286,758	402	742

Table 17-55
Delta-Chipps Island Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	58,127,829	66,933,177	13,927,562	18,062,562	761	1,160
Mining	0	279,070	0	68,252	0	0
Construction	0	2,100,922	0	1,127,141	0	20
Manufacturing	0	5,191,164	0	924,805	0	20
TCPU	0	4,323,882	0	1,248,602	0	15
Trade	0	9,082,338	0	3,903,920	0	121
FIRE	0	9,739,628	0	1,821,477	0	50
Services	0	7,660,263	0	3,991,382	0	116
Government	0	691,555	0	269,261	0	0
Other	0	42,373	0	42,373	0	0
Institutions	0	0	0	0	0	0
Totals	58,127,829	106,044,372	13,927,562	31,459,775	761	1,502

Table 17-56
Delta-Chipps Island Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	81,425,940	93,715,621	19,492,144	25,260,980	1,014	1,571
Mining	0	390,040	0	95,394	0	0
Construction	0	2,945,291	0	1,580,340	0	27
Manufacturing	0	7,254,004	0	1,293,835	0	27
TCPU	0	6,060,942	0	1,749,712	0	22
Trade	0	12,720,821	0	5,467,706	0	169
FIRE	0	13,649,264	0	2,553,300	0	71
Services	0	10,724,844	0	5,587,999	0	164
Government	0	968,465	0	377,009	0	0
Other	0	59,303	0	59,303	0	0
Institutions	0	0	0	0	0	0
Totals	81,425,940	148,488,595	19,492,144	44,025,578	1,014	2,051

Table 17-57
Delta-Chipps Island Disposal Alternative
Nonrecurring Regional Economic Effects (Year 1 of Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	434,002	0	137,199	0	7
Mining	0	218,217	0	53,756	0	0
Construction	24,370,150	30,773,743	11,336,628	15,178,729	227	307
Manufacturing	0	3,905,250	0	801,873	0	18
TCPU	90,189,580	93,748,211	13,906,799	14,888,410	179	192
Trade	0	7,573,308	0	3,388,281	0	122
FIRE	0	7,251,619	0	1,358,265	0	39
Services	0	14,878,860	0	7,958,898	0	222
Government	0	748,346	0	353,998	0	4
Other	0	59,524	0	59,524	0	4
Institutions	0	0	0	0	0	0
Totals	114,559,730	159,591,080	25,243,427	44,178,933	406	915

Table 17-58
Delta-Chipps Island Disposal Alternative
Nonrecurring Regional Economic Effects (Remainder of Initial Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	261,946	0	80,219	0	3
Mining	0	176,966	0	43,593	0	0
Construction	4,439,530	10,583,825	2,065,203	5,787,341	41	117
Manufacturing	0	2,517,726	0	504,358	0	12
TCPU	90,192,580	92,767,466	13,907,189	14,596,928	179	186
Trade	0	4,632,916	0	2,069,792	0	76
FIRE	0	4,919,682	0	923,658	0	27
Services	0	8,839,410	0	4,889,114	0	137
Government	0	512,237	0	241,912	0	3
Other	0	39,315	0	39,315	0	3
Institutions	0	0	0	0	0	0
Totals	94,632,110	125,251,489	15,972,392	29,176,230	220	564

Table 17-59
Delta-Chipps Island Disposal Alternative
Nonrecurring Regional Economic Effects (Phase 2 Construction)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	351,339	0	107,722	0	7
Mining	0	142,302	0	34,952	0	0
Construction	1,264,200	14,036,999	588,087	8,386,032	12	171
Manufacturing	0	3,904,382	0	766,272	0	14
TCPU	70,725,700	74,755,577	16,520,764	17,673,783	251	272
Trade	0	6,403,917	0	2,857,490	0	107
FIRE	0	6,796,886	0	1,294,728	0	36
Services	0	12,675,773	0	7,395,527	0	214
Government	0	821,050	0	433,907	0	7
Other	0	52,577	0	52,577	0	7
Institutions	0	0	0	0	0	0
Totals	71,989,900	119,940,802	17,108,851	39,002,990	263	835

Tables 17-51, 17-52, and 17-53 show the effects of OM&R expenditures during the first year of project construction. Total increased output of more than \$5 million results in an increase of more than 80 jobs and almost \$3 million in labor income in the first year of construction. Increased total output of almost \$19 million per year occurs after Phase 1 project facilities are completed, with a corresponding increase of over \$9 million in labor income and more than 240 jobs. Table 17-53 shows that after completion of expanded facilities during the second construction phase, total annual output increases by over \$27 million annually, generating more than \$14 million in labor income from over 330 jobs.

Tables 17-54, 17-55, and 17-56 show the effects of changes in regional agricultural expenditures from drainage service as well as land retirement for treatment and disposal facilities. In the first year, total labor income increases by more than \$14 million and jobs increase by more than 740 as a result of land retirement. As drainage service is provided to more land over time, agricultural production increases with a corresponding increase in jobs and regional income. By the end of the initial construction period, regional labor income has increased by more than \$31 million relative to the No Action Alternative and employment has increased by more than 1,500 jobs. Table 17-56 shows that at the end of the project analysis period, the increase in agricultural production from drained lands results in an increase of more than \$44 million in labor income and almost 2,100 additional jobs.

A one-time increase in expenditures occurs at the beginning of the Delta-Chipps Island Disposal Alternative within the construction and TCPU sectors. This increase is a result of construction expenditures to build the drainage collection and conveyance systems, biological selenium treatment facilities, and seepage reduction measures.

The Delta-Chipps Island Disposal Alternative generates an additional \$115 million in direct expenditures and almost \$160 million more in total economic output during the first year of the initial construction period when compared to the No Action Alternative. In addition to these effects, this alternative annually produces an additional \$44 million in total labor income and over 900 jobs as shown in Table 17-57.

Economic effects of project activities that occur on an annual basis for the remainder of the initial construction period, which is assumed to last no more than ten years from start to finish, are displayed in Table 17-58. These construction expenditures contribute to an increase in total economic output in the region of more than \$125 million each year for the remainder of the construction period. In addition, these expenditures generate over \$29 million in additional income and almost 570 additional jobs. These effects are limited to the construction period, and would end when construction of the above-mentioned facilities are complete.

Table 17-59 shows the economic effects of construction expenditures that would occur approximately 18-20 years after the initial construction activities begin. This second phase of construction is necessary to provide additional reuse facilities to handle additional drainage as the quantity of land with installed on-farm drains increases over the life of the project. Expenditures occurring during this second construction period result in an increase of more than \$39 million in total labor income and over 800 additional jobs.

17.2.4.7 Delta-Carquinez Strait Disposal Alternative

Annual economic effects projected to occur under the Delta-Carquinez Strait Disposal Alternative are shown in Tables 17-60 to 17-68. The only difference in regional expenditures and

the resulting effects between the two Delta Disposal Alternatives is in the costs of the conveyance system. Annual expenditures of the Delta-Carquinez Strait Disposal Alternative in the first year of initial construction are the same as the Delta-Chipps Island Disposal Alternative. Table 17-61 shows an increase of more than \$9 million in total labor income and more than 240 additional jobs compared to the No Action Alternative. Table 17-62 shows that total labor income at the end of the project analysis period increases by more than \$14 million and jobs increase by more than 330 under the Delta-Carquinez Strait Disposal alternative.

Tables 17-63, 17-64, and 17-65 show the effects of changes in regional agricultural expenditures from drainage service as well as land retirement for treatment and disposal facilities. In the first year, total labor income increases by more than \$14 million and jobs increase by more than 700 as a result of land retirement. As drainage service is provided to more land over time, agricultural production increases with a corresponding increase in jobs and regional income. By the end of the initial construction period, regional labor income has increased by more than \$31 million than under the No Action Alternative, and employment has increased by more than 1,500 jobs. At the end of the project analysis period, the increase in total output from drained lands results in an increase of more than \$44 million in labor income and more than 2,000 additional jobs, as shown in Table 17-65.

Table 17-60
Delta-Carquinez Strait Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	507,591	228,586	245,557	23	24
Mining	0	8,688	0	2,177	0	0
Construction	2,455,300	2,510,992	1,520,381	1,547,724	31	32
Manufacturing	452,500	748,402	94,068	153,871	3	5
TCPU	0	189,138	0	56,887	0	1
Trade	0	544,410	0	242,090	0	9
FIRE	0	393,420	0	71,427	0	2
Services	0	689,105	0	363,024	0	11
Government	0	40,848	0	18,589	0	0
Other	0	3,646	0	3,646	0	0
Institutions	0	0	0	0	0	0
Totals	3,360,300	5,636,240	1,843,035	2,704,992	57	84

Table 17-61
Delta-Carquinez Strait Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	452,500	582,920	228,586	270,136	23	26
Mining	0	28,927	0	7,298	0	0
Construction	10,345,600	10,514,604	6,406,244	6,485,568	132	135
Manufacturing	452,500	1,391,059	94,068	284,803	3	8
TCPU	0	625,787	0	187,235	0	3
Trade	0	1,841,961	0	825,175	0	30
FIRE	0	1,375,762	0	246,427	0	7
Services	0	2,441,919	0	1,282,031	0	37
Government	0	140,305	0	63,801	0	1
Other	0	13,028	0	13,028	0	1
Institutions	0	0	0	0	0	0
Totals	11,250,600	18,956,272	6,728,898	9,665,502	158	248

Table 17-62
Delta-Carquinez Strait Disposal Alternative
Regional Economic Effects from Recurring OM&R Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	154,260	0	50,332	0	3
Mining	0	41,445	0	10,487	0	0
Construction	16,158,000	16,390,045	10,005,421	10,111,870	207	210
Manufacturing	0	1,316,053	0	268,126	0	6
TCPU	0	894,184	0	266,930	0	5
Trade	0	2,657,167	0	1,194,060	0	44
FIRE	0	2,011,671	0	357,754	0	10
Services	0	3,589,467	0	1,881,971	0	55
Government	0	203,672	0	92,585	0	2
Other	0	19,212	0	19,212	0	2
Institutions	0	0	0	0	0	0
Totals	16,158,000	27,277,176	10,005,421	14,253,327	207	337

Table 17-63
Delta-Carquinez Strait Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – Year 1

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	26,307,682	30,342,983	6,323,139	8,220,810	402	585
Mining	0	127,290	0	31,127	0	0
Construction	0	948,272	0	508,526	0	11
Manufacturing	0	2,369,327	0	420,381	0	11
TCPU	0	1,952,437	0	564,359	0	6
Trade	0	4,112,514	0	1,767,895	0	56
FIRE	0	4,401,392	0	822,405	0	22
Services	0	3,473,286	0	1,809,961	0	51
Government	0	313,289	0	122,057	0	0
Other	0	19,237	0	19,237	0	0
Institutions	0	0	0	0	0	0
Totals	26,307,682	48,060,027	6,323,139	14,286,758	402	742

Table 17-64
Delta-Carquinez Strait Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Construction

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	58,127,829	66,933,177	13,927,562	18,062,562	761	1,160
Mining	0	279,070	0	68,252	0	0
Construction	0	2,100,922	0	1,127,141	0	20
Manufacturing	0	5,191,164	0	924,805	0	20
TCPU	0	4,323,882	0	1,248,602	0	15
Trade	0	9,082,338	0	3,903,920	0	121
FIRE	0	9,739,628	0	1,821,477	0	50
Services	0	7,660,263	0	3,991,382	0	116
Government	0	691,555	0	269,261	0	0
Other	0	42,373	0	42,373	0	0
Institutions	0	0	0	0	0	0
Totals	58,127,829	106,044,372	13,927,562	31,459,775	761	1,502

Table 17-65
Delta-Carquinez Strait Disposal Alternative
Regional Economic Effects from Changes in Agricultural Expenditures – End of Project

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	81,425,940	93,715,621	19,492,144	25,260,980	1,014	1,571
Mining	0	390,040	0	95,394	0	0
Construction	0	2,945,291	0	1,580,340	0	28
Manufacturing	0	7,254,004	0	1,293,835	0	28
TCPU	0	6,060,942	0	1,749,712	0	22
Trade	0	12,720,821	0	5,467,706	0	169
FIRE	0	13,649,264	0	2,553,300	0	71
Services	0	10,724,844	0	5,587,999	0	164
Government	0	968,465	0	377,009	0	0
Other	0	59,303	0	59,303	0	0
Institutions	0	0	0	0	0	0
Totals	81,425,940	148,488,595	19,492,144	44,025,578	1,014	2,053

Table 17-66
Delta-Carquinez Strait Disposal Alternative
Nonrecurring Regional Economic Effects (Year 1 of Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	446,706	0	140,995	0	7
Mining	0	231,361	0	56,997	0	0
Construction	24,370,150	31,010,598	11,336,628	15,321,119	227	310
Manufacturing	0	4,016,561	0	824,251	0	19
TCPU	97,391,880	101,072,453	14,842,090	15,853,468	189	203
Trade	0	7,794,268	0	3,487,003	0	125
FIRE	0	7,503,167	0	1,404,979	0	40
Services	0	15,277,039	0	8,172,886	0	228
Government	0	771,141	0	363,310	0	4
Other	0	61,555	0	61,555	0	4
Institutions	0	0	0	0	0	0
Totals	121,762,030	168,184,849	26,178,718	45,686,563	416	940

Table 17-67
Delta-Carquinez Strait Disposal Alternative
Nonrecurring Regional Economic Effects (Remainder of Initial Construction Period)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	274,645	0	84,013	0	3
Mining	0	190,104	0	46,833	0	0
Construction	4,439,530	10,820,581	2,065,203	5,929,671	41	120
Manufacturing	0	2,628,992	14,842,090	526,727	0	13
TCPU	97,391,880	100,088,657	0	15,561,584	189	197
Trade	0	4,853,784	0	2,168,473	0	80
FIRE	0	5,171,125	0	970,352	0	28
Services	0	9,237,423	0	5,103,012	0	142
Government	0	535,023	0	251,221	0	3
Other	0	41,345	0	41,345	0	3
Institutions	0	0	0	0	0	0
Totals	101,831,410	133,841,679	16,907,293	30,683,231	230	589

Table 17-68
Delta-Carquinez Strait Disposal Alternative
Nonrecurring Regional Economic Effects (Phase 2 Construction)

Sector	Output Effect (\$000)		Labor Income Effect (\$000)		Employment Effect (Jobs)	
	Direct	Total	Direct	Total	Direct	Total
Agriculture	0	351,339	0	107,722	0	7
Mining	0	142,302	0	34,952	0	0
Construction	1,264,200	14,036,999	588,087	8,386,032	12	171
Manufacturing	0	3,904,382	0	766,272	0	14
TCPU	70,725,700	74,755,577	16,520,764	17,673,783	251	272
Trade	0	6,403,917	0	2,857,490	0	107
FIRE	0	6,796,886	0	1,294,728	0	36
Services	0	12,675,773	0	7,395,527	0	214
Government	0	821,050	0	433,907	0	7
Other	0	52,577	0	52,577	0	7
Institutions	0	0	0	0	0	0
Totals	71,989,900	119,940,802	17,108,851	39,002,990	263	835

A one-time increase in expenditures occurs at the beginning of the Delta-Carquinez Strait Disposal Alternative within the construction and TCPU sectors. This increase is a result of construction expenditures to build the drainage collection and conveyance systems, biological selenium treatment facilities, and seepage reduction measures.

The Delta-Carquinez Strait Disposal Alternative generates over \$168 million in total economic output during the first year of the initial construction period when compared to the No Action Alternative. In addition to these effects, this alternative annually generates more than \$45 million in increased total labor income and almost 950 jobs as shown in Table 17-66.

Economic effects of project activities that occur on an annual basis for the remainder of the initial construction period, which is assumed to last no more than ten years from start to finish, are displayed in Table 17-67. These construction expenditures translate to an increase in total economic output in the region of more than \$130 million each year for the remainder of the construction period. In addition, these expenditures generate in excess of \$30 million in additional income and almost 600 additional jobs. These effects are limited to the construction period, and would end when construction of the above-mentioned facilities are complete.

Table 17-68 shows the economic effects of construction expenditures that would occur approximately 18-20 years after the initial construction activities begin. This second phase of construction is necessary to provide additional reuse facilities to handle additional drainage as the quantity of land with installed on-farm drains increases over the life of the project. Expenditures occurring during this second construction period result in an increase of more than \$39 million in total labor income and over 800 additional jobs.

17.2.5 Cumulative Effects

Cumulative effects of implementing one of the action alternatives have not been analyzed quantitatively. Effects of construction activities for collection and conveyance facilities, while somewhat intensive, are expected to be relatively short term. Installation of on-farm drainage features would occur gradually over the 50-year period of analysis as individual land owners could afford it. Reuse and treatment facilities would be phased in as needed to handle the drainage generated from installed on-farm drains. None of the above activities are expected to contribute to significant cumulative impact on the regional economy.

The potential for any significant ongoing cumulative effects depends largely on the amount of retired land compared to drained land in agricultural production in a specific alternative. Alternatives with more land retired (In-Valley/Water Needs Land Retirement and In-Valley/Drainage-Impaired Area Land Retirement) are more likely to have a negative cumulative effect on the region's agricultural economy. Impacts would occur primarily to farm workers and agricultural support industries, such as seed, fertilizer and chemical, farm equipment, storage, packing, and custom services. Depending on the amount of land retired, as well as the geographic concentration of retired lands, some smaller communities could experience significant economic hardship.

In addition, other potential actions, such as CALFED provisions and Delta exports, have not been fully implemented, or the impacts associated with these actions have not been analyzed or quantified. It is possible, however, that these actions, when combined with the impacts of land retirement, may also result in a significant cumulative impact to the regional economy. However, existing retraining and similar programs to assist the unemployed in the local area may help

avoid significant cumulative unemployment effects. See Section 18.2 for more information on this issue.

17.2.6 Environmental Effects Summary

17.2.6.1 *No Action Alternative*

The difference between the No Action Alternative and existing conditions is very small from a regional perspective. The greatest annual effects (measured as a percent of existing condition values) occur in farm employment, agricultural output, and agricultural income, at 0.54 percent, 0.63 percent, and 0.37 percent, respectively. The projected difference in economic indicators between the No Action Alternative and existing conditions is less than 0.25 percent.

Values in the second and third columns of Table 17-69 provide a comparison of economic indicators under existing conditions to those projected to occur under the No Action Alternative. In addition, values in the last seven columns show the projected changes of each economic indicator for each of the Action Alternatives compared to No Action. Comparisons in this table are made for the entire nine-county region.

17.2.6.2 *Action Alternatives*

All of the action alternatives except the In-Valley/Water Needs Land Retirement Alternative and the In-Valley/Drainage-Impaired Area Land Retirement Alternative have a slightly positive effect on the regional economy when compared to the No Action Alternative. However, none of the effects would be significant, because total projected employment and labor income effects generated by any action alternative are less than 0.2 percent of the affected region's total for those indicators.

The two Delta Disposal Alternatives generate the greatest amount of economic activity in the agricultural sector, while the in-Valley/Drainage-Impaired Area Land Retirement Alternative has the largest negative impact to agriculture in the region (based on the impacts estimated to occur at the end of the 50-year analysis period).

All of the action alternatives generate a large amount of economic activity during the relatively short-term construction phase (first 10 years) of the project, primarily the result of the intensive construction efforts required to build the drainage collection and conveyance systems. In addition, a significant amount of economic activity is generated by money spent to purchase land for those alternatives that include land retirement.

Table 17-69
Summary of Regional Economic Effects

Economic Indicator	Existing Conditions	Projected No Action (Year 50)	In-Valley Disposal Alternative	In-Valley /Groundwater Quality Land Retirement Alternative	In-Valley /Water Needs Land Retirement Alternative	In-Valley /Drainage-Impaired Area Land Retirement Alternative	Ocean Disposal Alternative	Delta-Chippis Island Disposal Alternative	Delta-Carquinez Strait Disposal Alternative
Summary of Annual Effects from Recurring OM&R Expenditures (Year 50)									
Total Output	NA	NA	39,521	36,650	28,952	19,740	25,682	27,269	27,277
Agricultural Output	9,816,000	9,753,912	224	207	164	112	145	154	154
Total Labor Income	106,369,800	106,336,129	20,651	19,151	15,129	10,315	13,420	14,249	14,253
Agricultural Income	4,148,800	4,133,271	73	68	53	36	47	50	50
Total Employment	2,852,132	2,850,768	486	452	356	244	318	337	337
Farm Employment	109,297	108,711	5	4	3	2	3	3	3
Summary of Annual Effects from Changes in Agricultural Expenditures (Year 50)									
Total Output	NA	NA	147,746	69,542	-147,604	-374,513	148,489	148,489	148,489
Agricultural Output	9,816,000	NA	93,247	39,651	-106,132	-259,028	93,716	93,716	93,716
Total Labor Income	106,369,800	NA	43,806	20,810	-43,020	-109,903	44,026	44,026	44,026
Agricultural Income	4,148,800	4,133,271	25,135	10,548	-28,977	-70,451	25,261	25,261	25,261
Total Employment	2,852,132	2,850,768	2,042	1,014	-1,769	-4,678	2,051	2,051	2,053
Farm Employment	109,297	108,711	1,564	805	-1,256	-3,378	1,571	1,571	1,571

All values are shown in thousands of 2002 dollars, except jobs.

Table 17-69 (concluded)
Summary of Regional Economic Effects

Economic Indicator	Existing Conditions	Projected No Action (Year 50)	In-Valley Disposal Alternative	In-Valley /Groundwater Quality Land Retirement Alternative	In-Valley /Water Needs Land Retirement Alternative	In-Valley /Drainage-Impaired Area Land Retirement Alternative	Ocean Disposal Alternative	Delta-Chippis Island Disposal Alternative	Delta-Carquinez Strait Disposal Alternative
Summary of Nonrecurring Effects During First Year of Project Construction Period									
Total Output	NA	NA	162,744	192,605	264,267	368,748	142,966	159,591	168,185
Construction	NA	NA	33,928	31,545	33,762	30,377	28,305	30,774	31,011
TCPU	NA	NA	88,849	96,835	91,523	50,783	84,705	93,748	101,072
Total Labor Income	106,369,800		49,917	52,156	79,816	113,001	37,920	44,179	45,687
Construction	7,954,800		17,062	16,061	17,026	14,830	13,707	15,179	15,321
TCPU	7,559,800		16,481	18,160	18,138	12,389	12,245	14,888	15,853
Total Employment	2,852,132		1,065	1,292	1,972	3,260	777	915	940
Construction	167,815		345	325	340	293	277	307	310
TCPU	140,197		231	257	268	210	149	192	203
Summary of Nonrecurring Effects During Remainder of Project Construction Period									
Total Output	NA	NA	128,705	165,379	235,473	345,464	108,623	125,251	133,842
Construction	NA	NA	13,741	15,523	16,834	16,689	8,115	10,584	10,821
TCPU	NA	NA	87,866	96,080	90,698	50,116	83,721	92,768	100,089
Total Labor Income	106,369,800		34,916	45,553	67,237	102,829	22,914	29,176	30,683
Construction	7,954,800		7,671	8,608	9,152	8,463	4,315	5,787	5,930
TCPU	7,559,800		16,189	17,931	17,894	12,191	11,953	14,597	15,562
Total Employment	2,852,132		713	1,013	1,675	3,020	424	564	589
Construction	167,815		156	174	183	165	87	117	120
TCPU	140,197		225	252	263	206	143	186	197

All values are shown in thousands of 2002 dollars, except jobs.

Tables 17-70 through 17-77 summarize the effects that the No Action Alternative and action alternatives have on regional economics. Changes to Farm Employment, Agricultural Income, and Agricultural Output are compared to the No Action Alternative as well as to existing conditions. These indicators are also shown as a percentage change from No Action and existing conditions.

Table 17-70
Summary Comparison of Effects of No Action Alternative

Affected Resource and Area of Potential Effect	No Action Alternative Compared to Existing Conditions
Regional Agricultural Economics	Farm Employment: 586 compared to 109,297 (0.54 percent) Agricultural Income: \$15,529 compared to \$4,148,800 (0.37 percent) Agricultural Output: \$62,088 compared to \$9,816,000 (0.63 percent)

All values are shown in thousands of 2002 dollars, except jobs.

Table 17-71
Summary Comparison of Effects of In-Valley Disposal Alternative

Affected Resource and Area of Potential Effect	In-Valley Disposal Alternative Compared to No Action	In-Valley Disposal Alternative Compared to Existing Conditions
Regional Agricultural Economics	Farm Employment: 1,569 compared to 108,711 (1.44 percent) Agricultural Income: \$25,208 compared to \$4,133,271 (0.61 percent) Agricultural Output: \$93,471 compared to \$9,753,912 (0.96 percent) No significant effect.	Farm Employment: 1,569 compared to 109,297 (1.44 percent) Agricultural Income: \$25,208 compared to \$4,148,800 (0.61 percent) Agricultural Output: \$93,471 compared to \$9,816,000 (0.96 percent) Minimal effect.

All values are shown in thousands of 2002 dollars, except jobs.

Table 17-72
Summary Comparison of Effects of In-Valley/Groundwater Quality Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Groundwater Quality Land Retirement Compared to No Action	In-Valley/Groundwater Quality Land Retirement Compared to Existing Conditions
Regional Agricultural Economics	Farm Employment: 809 compared to 108,711 (0.74 percent) Agricultural Income: \$10,616 compared to \$4,133,271 (0.26 percent) Agricultural Output: \$39,858 compared to \$9,753,912 (0.41 percent) No significant effect.	Farm Employment: 809 compared to 109,297 (0.74 percent) Agricultural Income: \$10,616 compared to \$4,148,800 (0.26 percent) Agricultural Output: \$39,858 compared to \$9,816,000 (0.41 percent) Minimal effect.

All values are shown in thousands of 2002 dollars, except jobs.

Table 17-73
Summary Comparison of Effects of
In-Valley/Water Needs Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Water Needs Land Retirement Alternative Compared to No Action	In-Valley/Water Needs Land Retirement Compared to Existing Conditions
Regional Agricultural Economics	Farm Employment: -1,253 compared to 108,711 (-1.15 percent) Agricultural Income: \$-28,924 compared to \$4,133,271 (-0.70 percent) Agricultural Output: \$-105,968 compared to \$9,753,912 (-1.09 percent) No significant effect.	Farm Employment: -1,253 compared to 109,297 (-1.15 percent) Agricultural Income: \$-28,924 compared to \$4,148,800 (-0.70 percent) Agricultural Output: \$-105,968 compared to \$9,816,000 (-1.08 percent) Minimal effect.

All values are shown in thousands of 2002 dollars, except jobs.

Table 17-74
Summary Comparison of Effects of
In-Valley/Drainage-Impaired Area Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Drainage-Impaired Area Land Retirement Compared to No Action	In-Valley/Drainage-Impaired Area Land Retirement Compared to Existing Conditions
Regional Agricultural Economics	Farm Employment: -3,376 compared to 108,711 (-3.11 percent) Agricultural Income: \$-70,415 compared to \$4,133,271 (-1.70 percent) Agricultural Output: \$-258,916 compared to \$9,753,912 (-2.65 percent) No significant effect.	Farm Employment: -3,376 compared to 109,297 (-3.09 percent) Agricultural Income: \$-70,415 compared to \$4,148,800 (-1.70 percent) Agricultural Output: \$-258,916 compared to \$9,816,000 (-2.64 percent) Minimal effect.

All values are shown in thousands of 2002 dollars, except jobs.

Table 17-75
Summary Comparison of Effects of Ocean Disposal Alternative

Affected Resource and Area of Potential Effect	All Action Alternatives Compared to No Action	All Action Alternatives Compared to Existing Conditions
Regional Agricultural Economics	Farm Employment: 1,574 compared to 108,711 (1.45 percent) Agricultural Income: \$25,308 compared to \$4,133,271 (0.61 percent) Agricultural Output: \$93,861 compared to \$9,753,912 (0.96 percent) No significant effect.	Farm Employment: 1,574 compared to 109,297 (1.44 percent) Agricultural Income: \$25,308 compared to \$4,148,800 (0.61 percent) Agricultural Output: \$93,861 compared to \$9,816,000 (0.96 percent) Minimal effect.

All values are shown in thousands of 2002 dollars, except jobs.

Table 17-76
Summary Comparison of Effects of Delta-Chipps Island Disposal Alternative

Affected Resource and Area of Potential Effect	All Action Alternatives Compared to No Action	All Action Alternatives Compared to Existing Conditions
Regional Agricultural Economics	Farm Employment: 1,574 compared to 108,711 (1.45 percent) Agricultural Income: \$25,311 compared to \$4,133,271 (0.61 percent) Agricultural Output: \$93,870 compared to \$9,753,912 (0.96 percent) No significant effect.	Farm Employment: 1,574 compared to 109,297 (1.44 percent) Agricultural Income: \$25,311 compared to \$4,148,800 (0.61 percent) Agricultural Output: \$93,870 compared to \$9,816,000 (0.96 percent) Minimal effect.

All values are shown in thousands of 2002 dollars, except jobs.

Table 17-77
Summary Comparison of Effects of Delta-Carquinez Strait Disposal Alternative

Affected Resource and Area of Potential Effect	All Action Alternatives Compared to No Action	All Action Alternatives Compared to Existing Conditions
Regional Agricultural Economics	Farm Employment: 1,574 compared to 108,711 (1.45 percent) Agricultural Income: \$25,311 compared to \$4,133,271 (0.61 percent) Agricultural Output: \$93,870 compared to \$9,753,912 (0.96 percent) No significant effect.	Farm Employment: 1,574 compared to 109,297 (1.44 percent) Agricultural Income: \$25,311 compared to \$4,148,800 (0.61 percent) Agricultural Output: \$93,870 compared to \$9,816,000 (0.96 percent) Minimal effect.

All values are shown in thousands of 2002 dollars, except jobs.

17.2.7 Mitigation Recommendations

No mitigation measures are identified for minimal effects to agricultural production and economics. All action alternatives except the In-Valley/Water Needs Land Retirement Alternative and the In-Valley/Drainage-Impaired Area Land Retirement Alternative are projected to provide improved conditions for crop production and generate increased regional economic activity.

SECTION EIGHTEEN

SOCIAL ISSUES AND ENVIRONMENTAL JUSTICE

During the planning process, uncertainty, especially for irrigators (e.g., not knowing how to plan for the future for crops, on-farm investments, etc.), was mentioned as a social issue. Uncertainty for all potentially affected people will continue until the project is implemented. Issues identified by the public were considered during alternative formulation and in preparation of this EIS. A summary of the public scoping concerns is presented in Section 21.1, and the public scoping report is included in this EIS as Appendix A. Potential social issues during construction, including employment opportunities, dust, and other disruptions, are addressed previously in this document.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, dated February 11, 1994, requires agencies to identify and address disproportionately high and adverse human health or environmental effects of their actions on minorities and low-income populations and communities as well as the equity of the distribution of the benefits and risks of their decisions. Environmental justice addresses the fair treatment of people of all races and incomes with respect to actions affecting the environment. Fair treatment implies that no group of people should bear a disproportionate share of negative effects from an environmental action.

To comply with the environmental justice policy established by the Secretary, all Interior agencies are to identify and evaluate any anticipated effects, direct or indirect, from the proposed project, action, or decision on minority and low-income populations and communities, including the equity of the distribution of the benefits and risks. Accordingly, this section examines the anticipated distributional equity of alternative-associated effects with respect to potentially affected minority and economically disadvantaged groups.

18.1 AFFECTED ENVIRONMENT

This section provides baseline demographic information used in the analysis of environmental justice effects.

18.1.1 Race and Ethnicity

Nine counties approximate the area of potential effect from implementation of the action alternatives. Population data from Census 2000 for the State of California and the nine counties are shown in Table 18-1. The percentages of population for seven racial categories: White, Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other Race, and Two or More Races are shown. The percentages of total racial minority population and the Hispanic or Latino populations, a minority ethnic group, are also shown.

**Table 18-1
Population, Race, and Ethnicity, 2000**

Geographic Area	Total Population	Race								Hispanic or Latino (of any race)
		One Race						Two or More Races	Total Racial Minority Population¹	
		White	Black or African American	American Indian and Alaska Native	Asian	Native Hawaiian and Other Pacific Islander	Some Other Race			
California	33,871,648	59.5%	6.7%	1.0%	10.9%	0.3%	16.8%	4.7%	40.5%	32.4%
Alameda County	1,443,741	48.8%	15.8%	0.7%	21.7%	0.7%	9.5%	5.6%	51.2%	19.0%
Contra Costa County	948,816	65.5%	9.4%	0.6%	11.0%	0.4%	8.1%	5.1%	34.5%	17.7%
Fresno County	799,407	54.3%	5.3%	1.6%	8.1%	0.1%	25.9%	4.7%	45.7%	44.0%
Kern County	661,645	61.6%	6.0%	1.5%	3.4%	0.1%	23.2%	4.1%	38.4%	38.4%
Kings County	129,461	53.7%	8.3%	1.7%	3.1%	0.2%	28.3%	4.8%	46.3%	43.6%
Merced County	210,554	56.2%	3.8%	1.2%	6.8%	0.2%	26.1%	5.7%	43.8%	45.3%
San Joaquin County	563,598	58.1%	6.7%	1.1%	11.4%	0.3%	16.3%	6.0%	41.9%	30.5%
San Luis Obispo County	246,681	84.6%	2.0%	0.9%	2.7%	0.1%	6.2%	3.4%	15.4%	16.3%
Stanislaus County	446,997	69.3%	2.6%	1.3%	4.2%	0.3%	16.8%	5.4%	30.7%	31.7%

Source: U.S. Census Bureau 2000a.

¹Includes Black or African American, American Indian and Alaska Native, Asian, Native Hawaiian and Other Pacific Islander, Some Other Race, and Two or More Races.

In comparison to the State of California, three area counties (Fresno, Kings, and Merced) have greater percentages of total racial minority and ethnic (Hispanic or Latino) populations. Alameda and San Joaquin counties have a greater percentage of racial minority populations, while Kern County has a greater percentage of Hispanic or Latino populations.

18.1.2 Low Income

Low-income populations in the area are identified by several socioeconomic characteristics. As categorized by Census 2000, specific characteristics used in this description of the existing

environment are income (per capita and median family), percentage of the population below poverty (all persons and families), substandard housing, and unemployment rates.

As shown in Table 18-2, based on income in 1999 as reported in Census 2000, all of the area counties (except Alameda and Contra Costa) have lower per capita and median family incomes than the State of California. All counties (except Alameda, Contra Costa and San Luis Obispo) have greater percentages of all persons and families below poverty.

Table 18-2
Income and Poverty, 1999

Area	Money Income (dollars)		Percent Below Poverty Level	
	Per Capita	Median Family	All Persons	Families
California	22,711	53,025	14.2	10.6
Alameda	26,680	65,857	11.0	7.7
Contra Costa County	30,615	73,039	7.6	5.4
Fresno County	15,495	38,455	22.9	17.6
Kern County	15,760	39,403	20.8	16.8
Kings County	15,848	38,111	19.5	15.8
Merced County	14,257	38,009	21.7	16.9
San Joaquin County	17,635	46,919	17.7	13.5
San Luis Obispo County	21,864	52,447	12.8	6.8
Stanislaus County	16,913	44,703	16.0	12.3

Source: U.S. Census Bureau 2000b.

Other measures of low income, such as substandard housing and employment (shown in Table 18-3), also characterize demographic data in relation to environmental justice. Substandard housing units are those overcrowded and lacking complete plumbing facilities. The percentage of occupied housing units with 1.01 or more occupants per room in Fresno, Kings, and Merced counties was greater than the State of California. Fresno, Kern, and Merced counties had percentages of housing units lacking complete plumbing facilities greater than the State. The 2000 unemployment rates in all area counties (except Alameda, Contra Costa and San Luis Obispo) ranged from 10.3 to 13.6 percent, which were higher than the State unemployment rate of 7 percent.

Table 18-3
Housing, Labor Force, and Employment, 2000

Area	Housing Units				Civilian Labor Force	
	Total Occupied	Percent Substandard ¹	Total	Percent Substandard ²	Percent in Labor Force ³	Unemployment Rate (percent)
California	11,502,870	15.2	12,214,549	0.9	62.4	7.0
Alameda	523,366	12.2	540,183	0.7	65.3	5.5
Contra Costa County	344,129	7.4	354,577	0.5	65.5	4.8
Fresno County	252,940	17.1	270,767	1.1	59.9	11.8
Kern County	208,652	15.0	231,564	1.2	56.5	12.0
Kings County	34,418	15.6	36,563	0.7	51.1	13.6
Merced County	63,815	20.0	68,373	1.6	59.5	13.1
San Joaquin County	181,629	14.0	189,160	0.8	59.8	10.3
San Luis Obispo County	92,739	5.6	102,275	0.5	58.3	5.9
Stanislaus County	145,146	13.9	150,807	0.7	61.2	11.7

Notes:

¹ 1.01 or more occupants per room.

² Lacking complete plumbing facilities.

³ Population 16 years and over in the labor force.

Source: U.S. Census Bureau 2000c, d, e.

18.2 ENVIRONMENTAL CONSEQUENCES

This section identifies social issues and addresses the environmental justice issue of whether any group of people, including racial, ethnic, or socioeconomic, would bear a disproportionate share of adverse environmental effects from implementation of any of the action alternatives.

As described in *Analysis of Economic Effects of Proposed Land Retirement in Westlands Water District* (Westlands Water District 2003), farmer-provided housing on their farmland for farm laborers in farm labor communities or farm work camps may be adversely affected by land retirement. Other affordable housing in the drainage study area is limited. There are efforts to increase this type of housing, e.g., Self-Help Enterprises, a nonprofit housing developer in the area, produced 100 new affordable homes in 2003 (Robinson 2004). This issue may continue to adversely affect minority and low-income populations and will need to be addressed when specific land parcels are identified for retirement.

In addition to losing housing, farmworkers are losing jobs as a result of the current land retirements described in Section 2.3.3. In September 2004, the Fresno County Workforce Investment Board received an initial \$750,000 grant to help retrain these workers. If the effort is successful, an additional \$1.2 million could be available (Schultz 2004). Having this and similar programs established to assist farmworkers and others in place will enable those affected by future land retirement to quickly receive assistance in finding other employment.

18.2.1 Key Effect and Evaluation Criteria

To address environmental justice concerns, the following issues are evaluated to determine potential effects and their level of significance:

- Are affected resources used by minority or low-income populations?
- Are minority or low-income populations disproportionately subject to adverse environmental, human health, or economic effects?
- Do the resources used for the project support subsistence living?

Within the nine-county study area potentially affected by implementation of the action alternatives, Fresno, Kern, Kings, Merced, San Joaquin, and Stanislaus counties contain high percentages of racial and ethnic minorities and persons and families below the poverty level. Unemployment is significantly higher in these counties than in other areas of the State. Consequently the potential exists for low-income and minority populations to be disproportionately affected.

Environmental justice issues are focused on environmental effects on natural resources (and associated human health effects) and potential socioeconomic effects. Environmental resources potentially used by low-income and minority groups in the study area are primarily aquatic-related recreation resources as discussed in Section 14. People in the project area, including existing minority and low-income groups, currently use these resources and are expected to do so in the future (Maurer, pers. comm., 2004). However, since no subpopulation data exist, e.g., race, ethnicity, income, etc., it is not known whether the minority and low-income groups use these resources disproportionately to the total population. Indeed, as one irrigator in the area stated, the ethnic make up of the individuals observed regularly fishing in the San Luis National Wildlife Refuge and vicinity is “across the board” (Henderson, pers. comm., 2004). People continue to

fish in the area despite signs displaying an advisory in several languages from the California Office of Environmental Health Hazard Assessment for fish in the Grassland area (Merced County) stating “Because of elevated selenium levels, no one should eat more than four ounces of fish from the Grassland area, in any 2-week period. Women who are pregnant or may become pregnant, nursing mothers, and children age 15 and under should not any eat fish from this area.” Under all of the action alternatives, the amount of high selenium drainwater discharged or flowing uncontrolled into the San Luis Drain and area waterways would decrease, and the selenium levels in these fish should also decrease. Thus, an adverse environmental justice effect would not occur.

Definitions of what constitutes “subsistence” tend to differ by geographic area and be influenced by perception. For example, the definition of “subsistence” may include social, cultural, and spiritual aspects of the harvest, or be the definition presented by the Council on Environmental Quality: “The dependence by a minority population, low-income population, Indian tribe or subgroup of such populations on indigenous fish, vegetation and/or wildlife, as the principal portion of their diet” (CEQ 1997). Although data are not available to determine the use of renewable natural resources, e.g., fish, wildlife, and vegetation, for subsistence by any group in the area, it is likely these resources are used to supplement their diet and do not constitute the principle portion of their diet. Since no subsistence level of use of renewable natural resources by any population has been identified in the project area, an adverse environmental justice effect would not occur.

Effects to employment would occur from No Action and the action alternatives (see Section 17.2), so the potential exists for a socioeconomic effect on minority or low-income populations. Table 18-4 is a summary of the regional economic employment effects (from Section 17) referenced in the analyses of the action alternatives below.

Table 18-4
Summary of Section 17 Regional Economic Employment Effects

Alternatives	Construction Jobs			Change in Jobs Associated with OM&R and Crop Production								
	Year 1 of Construction Period	Remainder of Initial Construction Period	Phase 2 Construction	Recurring OM&R Expenditures, Year 1	Changes in Agricultural Expenditures, Year 1	Total	Recurring OM&R Expenditures, End of Construction	Changes in Agricultural Expenditures, End of Construction	Total	Recurring OM&R Expenditures, End of Project	Changes in Agricultural Expenditures, End of Project	Total
In-Valley Disposal	1,064.6	711.9	1,735.2	83.6	741.0	824.6	316.8	1,029.9	1,346.7	484.6	2,042.1	2,526.7
In-Valley/ Groundwater Quality Land Retirement	1,293.0	1,013.1	1,545.4	81.1	741.0	822.1	291.3	398.4	689.7	449.4	1,018.8	1,468.2
In-Valley/ Water Needs Land Retirement	2,016.3	1,720.5	1,217.3	75.1	741.0	816.1	265.8	-1,856.8	-1,591.0	355.0	-1,755.1	-1,400.1
In-Valley/ Drainage-Impaired Area Land Retirement	3,256.4	3,017.2	572.6	73.0	-1,916.1	-1,843.1	222.0	-4,651.6	-4,429.6	242.0	-4,651.6	-4,409.6
Ocean Disposal	784.0	431.2	28.9	83.7	741.0	824.7	270.2	1,503.4	1,773.6	314.9	2,051.7	2,366.6
Delta-Chipps Island Disposal	920.9	568.2	828.2	83.7	741.0	824.7	246.9	1,503.4	1,750.3	334.4	2,051.7	2,386.1
Delta-Carquinez Straits Disposal	946.9	594.1	828.2	83.7	741.0	824.7	247.0	1,503.4	1,750.4	334.5	2,051.7	2,386.2

18.2.2 No Action Alternative

Under the No Action Alternative, as described in Section 17.2.3, an increasing loss of jobs would occur. The estimated employment effect for the nine-county project area would be a loss of 500 jobs during years 1 through 10, a loss of about 800 jobs in year 25, and a loss of about 1,400 jobs in year 50. Since the losses are primarily due to changes in agricultural output, it is likely some of those adversely affected would be minority and low-income workers. Because the number of jobs lost is a small percentage of total minority and low-income employment, the effect is minimal.

18.2.3 In-Valley Disposal Alternative

During the first year of construction, an increase of about 1,060 jobs would occur in the nine-county project area. For the remainder of the initial construction period, which is assumed to last no more than 10 years from start to finish, an increase of about 710 jobs would occur in the project area. For the Phase 2 construction activities an increase of about 1,730 jobs would occur. Construction of this alternative is anticipated to provide some short-term employment opportunities for minority and low-income individuals. The environmental justice effect would be beneficial but not significant.

Changes in employment associated with OM&R and crop production for years corresponding to construction include a gain of about 820 jobs in the first year and an increase of about 1,350 jobs from the end of the initial construction period through the end of the Phase 2 construction activities. For the balance of the 50-year period of analysis, an increase of about 2,530 jobs would occur. It is likely some minority and low-income individuals would fill some of the increased jobs, especially in the agricultural sector. This environmental justice effect would be beneficial but not significant.

Overall, the environmental justice effect associated with this alternative would be beneficial but not significant.

18.2.4 In-Valley/Groundwater Quality Land Retirement Alternative

During the first year of construction, an increase of about 1,300 jobs would occur in the nine-county project area. For the remainder of the initial construction period, which is assumed to last no more than 10 years from start to finish, an increase of about 1,000 jobs would occur in the project area. For the Phase 2 construction activities, an increase of about 1,550 jobs would occur. Overall, construction of the alternative is anticipated to provide some short-term employment opportunities for minority and low-income individuals. The environmental justice effect would be beneficial but not significant.

Changes in employment associated with OM&R and crop production for years corresponding to construction include a gain of about 820 jobs in the first year and an increase of about 690 jobs from the end of the initial construction period through the end of the Phase 2 construction activities. For the balance of the 50-year period of analysis an increase of about 1,470 jobs would occur. It is likely some minority and low-income individuals would fill some of these jobs, especially those in the agricultural sector. This environmental justice effect would be beneficial but not significant.

Overall, the environmental justice effect associated with this alternative would be beneficial but not significant.

18.2.5 In-Valley/Water Needs Land Retirement Alternative

During the first year of construction, an increase of 2,010 jobs would occur in the nine-county study area. For the remainder of the initial construction period, which is assumed to last no more than 10 years from start to finish, an increase of about 1,720 jobs would occur in the study area. For the Phase 2 construction activities an increase of 1,220 jobs would occur. Overall, construction of the alternative is anticipated to provide some short-term employment opportunities for minority and low-income individuals. The environmental justice effect would be beneficial but not significant.

Changes in employment associated with OM&R and crop production for years corresponding to construction include a gain of 820 jobs in the first year and a loss of about 1,600 jobs from the end of the initial construction period through the end of the Phase 2 construction activities. For the balance of the 50-year period of analysis, a loss of about 1,400 jobs would occur. It is likely some minority and low-income individuals would be adversely affected, especially those employed in the agricultural sector. This environmental justice effect would be adverse but not significant.

The environmental justice effect associated with construction of this alternative would be beneficial but not significant. The overall environmental justice effect associated with OM&R and crop production would be adverse but not significant.

18.2.6 In-Valley/Drainage-Impaired Area Land Retirement Alternative

This alternative would provide the largest number of jobs during the construction period. During the first year of construction, an increase of about 3,260 jobs would occur in the nine-county study area. For the remainder of the initial construction period, which is assumed to last no more than 10 years from start to finish, an increase of about 3,020 jobs would occur in the study area. For the Phase 2 construction activities an increase of about 570 jobs would occur. Construction of the alternative is anticipated to provide some short-term employment opportunities for minority and low-income individuals. The environmental justice effect would be beneficial but not significant.

This alternative has the largest loss of employment opportunities associated with OM&R and crop production. Changes in employment for years corresponding to construction include a loss of 1,840 jobs in the first year and a loss of 4,430 jobs from the end of the initial construction period through the end of the Phase 2 construction activities. For the balance of the 50-year period of analysis, a loss of about 4,410 jobs would occur. It is likely some minority and low-income individuals would be adversely affected, especially those employed in the agricultural sector. Since the loss of jobs is less than 1 percent of total employment, this environmental justice effect would be adverse but not significant.

The environmental justice effect associated with construction of this alternative would be beneficial but not significant. The environmental justice effect associated with OM&R and crop production would be adverse but not significant.

18.2.7 Ocean Disposal Alternative

During the first year of construction, an increase of about 780 jobs would occur in the nine-county study area. For the remainder of the initial construction period, which is assumed to last no more than 10 years from start to finish, an increase of about 430 jobs would occur in the study area. For the Phase 2 construction activities an increase of about 30 jobs would occur. Construction of the alternative is anticipated to provide some short-term employment opportunities for minority and low-income individuals. The environmental justice effect would be beneficial but not significant.

Changes in employment associated with OM&R and crop production for years corresponding to construction include a gain of about 820 jobs in the first year and an increase of about 1,770 jobs from the end of the initial construction period through the end of the Phase 2 construction activities. For the balance of the 50-year period of analysis, an increase of about 2,370 jobs would occur. During the construction period and the period of analysis, it is anticipated minority and low-income individuals would fill some of the increased jobs, especially those in the agricultural sector. This environmental justice effect would be beneficial but not significant.

Overall, the environmental justice effect associated with this alternative would be beneficial but not significant.

18.2.8 Delta-Chipps Island Disposal Alternative

During the first year of construction, an increase of about 920 jobs would occur in the nine-county study area. For the remainder of the initial construction period, which is assumed to last no more than 10 years from start to finish, an increase of about 570 jobs would occur in the study area. For the Phase 2 construction activities an increase of about 830 jobs would occur. Overall, construction of the alternative is anticipated to provide some short-term employment opportunities for minority and low-income individuals. The environmental justice effect would be beneficial but not significant.

Changes in employment associated with OM&R and crop production for years corresponding to construction include a gain of about 820 jobs in the first year and an increase of about 1,750 jobs from the end of the initial construction period through the end of the Phase 2 construction activities. For the balance of the 50-year period of analysis, an increase of about 2,390 jobs would occur. During the construction period and the period of analysis, it is anticipated minority and low-income individuals would fill some of the increased jobs, especially those in the agricultural sector. This environmental justice effect would be beneficial but not significant.

Overall, the environmental justice effect associated with this alternative would be beneficial but not significant.

18.2.9 Delta-Carquinez Strait Disposal Alternative

During the first year of construction, an increase of about 950 jobs would occur in the nine-county study area. For the remainder of the initial construction period, which is assumed to last no more than 10 years from start to finish, an increase of about 600 jobs would occur in the study area. For the Phase 2 construction activities an increase of about 830 jobs would occur. Overall, construction of the alternative is anticipated to provide some short-term employment

opportunities for minority and low-income individuals. The environmental justice effect would be beneficial but not significant.

Changes in employment associated with OM&R and crop production for years corresponding to construction include a gain of about 820 jobs in the first year and an increase of about 1,750 jobs from the end of the initial construction period through the end of the Phase 2 construction activities. For the balance of the 50-year period of analysis, an increase of about 2,390 jobs would occur. During the construction period and the period of analysis, it is anticipated minority and low-income individuals would fill some of the increased jobs, especially those in the agricultural sector. This environmental justice effect would be beneficial but not significant.

Overall, the environmental justice effect associated with this alternative would be beneficial but not significant.

18.2.10 Cumulative Effects

Construction activities associated with implementation of any action alternative would provide some short-term employment opportunities for minority and low-income individuals, including those farmworkers losing jobs as a result of the current land retirements described in Section 2.3.3.

Employment associated with OM&R and crop production for all action alternatives except the In-Valley/Water Needs and In-Valley/Drainage-Impaired Area Land Retirement Alternatives would provide job opportunities for minority and low-income individuals, including the above-referenced farmworkers.

As discussed in Section 17.1.2.1, the unemployment rate for the nine-county project area has been considerably higher than the rates in both the State of California and the United States. Employment losses associated with OM&R and crop production for the In-Valley/Water Needs and In-Valley/Drainage-Impaired Area Land Retirement Alternatives would increase the number of people unemployed, including minority and low-income individuals. Continuation of current retraining and similar programs to assist the unemployed in the local area would help avoid significant cumulative unemployment effects.

Loss of farmer-provided housing associated with land retirement under the action alternatives would decrease the limited amount of affordable housing in the drainage study area available for minority and low-income individuals and families. Continued local efforts to increase this type of housing would help avoid significant cumulative effects.

18.2.11 Environmental Effects Summary

18.2.11.1 No Action Alternative

The number of jobs lost is a small percentage of total minority and low-income employment. The adverse effect would be minimal.

18.2.11.2 In-Valley Disposal Alternative

Employment opportunities are provided for minority and low-income individuals. The environmental justice effect would be beneficial but not significant.

18.2.11.3 In-Valley/Groundwater Quality Land Retirement Alternative

Opportunities for minority and low-income employment would be beneficial but not significant.

18.2.11.4 In-Valley/Water Needs Land Retirement Alternative

Employment opportunities are provided for minority and low-income individuals during construction. The environmental justice effect would be beneficial but not significant.

The loss of employment opportunities associated with OM&R and crop production may affect low-income and minority individuals. The environmental justice effect would be adverse but not significant.

18.2.11.5 In-Valley/Drainage-Impaired Area Land Retirement Alternative

Employment opportunities are provided for minority and low-income individuals during construction. The environmental justice effect would be beneficial but not significant.

The loss of employment opportunities associated with OM&R and crop production may affect low-income and minority individuals. The environmental justice effect would be adverse but not significant.

18.2.11.6 Ocean Disposal Alternative

Opportunities for minority and low-income employment would be beneficial but not significant.

18.2.11.7 Delta-Chipps Island Disposal Alternative

Beneficial but not significant minority and low-income employment opportunities would be available.

18.2.11.8 Delta-Carquinez Strait Disposal Alternative

Opportunities for minority and low-income employment would be beneficial but not significant.

Tables 18-5 through 18-12 summarize the effects of the No Action Alternative and the action alternatives on social issues and environmental justice.

Table 18-5
Summary Comparison of Effects of the No Action Alternative

Affected Resource and Area of Potential Effect	No Action Alternative Compared to Existing Conditions
Social Issues	Minimal loss of jobs
Environmental Justice	Minimal loss of jobs

Table 18-6
Summary Comparison of Effects of In-Valley Disposal Alternative

Affected Resource and Area of Potential Effect	In-Valley Disposal Compared to No Action	In-Valley Disposal Compared to Existing Conditions
Social Issues	Small employment increase. No significant effect.	Small employment increase; minimal effect.
Environmental Justice	Small employment increase. No significant effect.	Small employment increase; minimal effect.

Table 18-7
Summary Comparison of Effects of In-Valley/Groundwater Quality Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Groundwater Quality Land Retirement Compared to No Action	In-Valley/Groundwater Quality Land Retirement Compared to Existing Conditions
Social Issues	Small employment increase. No significant effect.	Small employment increase., No effect.
Environmental Justice	Small employment increase. No significant effect.	Small employment increase. No effect.

Table 18-8
Summary Comparison of Effects of In-Valley/Water Needs Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Water Needs Land Retirement Compared to No Action	In-Valley/Water Needs Land Retirement Compared to Existing Conditions
Social Issues	Small employment increase during construction. Small loss of jobs associated with OM&R and crop production. Overall, no significant effect.	Small employment increase during construction. Small loss of jobs associated with OM&R and crop production. Overall, no effect.
Environmental Justice	Small employment increase during construction. Small loss of jobs associated with OM&R and crop production. Overall, no significant effect.	Small employment increase during construction. Small loss of jobs associated with OM&R and crop production. Overall, no effect.

Table 18-9
Summary Comparison of Effects of
In-Valley/Drainage-Impaired Area Land Retirement Alternative

Affected Resource and Area of Potential Effect	In-Valley/Drainage-Impaired Area Land Retirement Compared to No Action	In-Valley/Drainage-Impaired Area Land Retirement Compared to Existing Conditions
Social Issues	Small employment increase during construction. Small loss of jobs associated with OM&R and crop production. Overall, no significant effect.	Small employment increase during construction. Small loss of jobs associated with OM&R and crop production. Overall, no effect.
Environmental Justice	Small employment increase during construction. Small loss of jobs associated with OM&R and crop production. Overall, no significant effect.	Small employment increase during construction. Small loss of jobs associated with OM&R and crop production. Overall, no effect.

Table 18-10
Summary Comparison of Effects of Ocean Disposal Alternative

Affected Resource and Area of Potential Effect	Ocean Disposal Compared to No Action	Ocean Disposal Compared to Existing Conditions
Social Issues	Small employment increase. No significant effect.	Small employment increase; minimal effect.
Environmental Justice	Small employment increase. No significant effect.	Small employment increase; minimal effect.

Table 18-11
Summary Comparison of Effects of Delta-Chipps Island Disposal Alternative

Affected Resource and Area of Potential Effect	Delta-Chipps Island Disposal Compared to No Action	Delta-Chipps Island Disposal Compared to Existing Conditions
Social Issues	Small employment increase. No significant effect.	Small employment increase; minimal effect.
Environmental Justice	Small employment increase. No significant effect.	Small employment increase; minimal effect.

Table 18-12
Summary Comparison of Effects of Delta-Carquinez Strait Disposal Alternative

Affected Resource and Area of Potential Effect	Delta-Carquinez Strait Disposal Compared to No Action	Delta-Carquinez Strait Disposal Compared to Existing Conditions
Social Issues	Small employment increase. No significant effect.	Small employment increase; minimal effect.
Environmental Justice	Small employment increase. No significant effect.	Small employment increase; minimal effect.

SECTION NINETEEN

OTHER REQUIRED DISCLOSURES

This section addresses other potential effects as required by NEPA: relationship between short-term uses and maintenance of long-term productivity, irreversible or irretrievable commitment of natural resources, unavoidable adverse impacts, and growth-inducing effects.

19.1 RELATIONSHIP BETWEEN SHORT-TERM USES AND MAINTENANCE OF LONG-TERM PRODUCTIVITY

The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity of the affected resources (identified below) for the seven action alternatives (four In-Valley Disposal Alternatives) and three Out-of-Valley Disposal Alternatives [Ocean, Delta-Chippis Island, and Delta-Carquinez Strait Disposal Alternatives]) is described below. Short-term effects, primarily due to construction of facilities, are associated with the implementation of all of the action alternatives. **However, the maintenance of long-term resource productivity benefits of improved water quality on the San Joaquin River ecosystem, protection of soil resources, and enhanced agricultural production outweigh short-term adverse effects on individual resources.** The short-term uses of the action alternatives are addressed in the discussion below by resource category.

19.1.1 Surface Water Resources

Effects of construction of any of the facilities would be limited to soil erosion and resultant turbidity at surface streams.

19.1.2 Groundwater Resources

No short-term effects occur. The effects on groundwater resources are to maintain long-term sustainability and productivity of groundwater resources, soil resources, and agricultural lands.

19.1.3 Biological Resources

The short-term adverse effects are related primarily to construction and are temporary, as explained below.

19.1.3.1 Terrestrial Resources

Surface disturbances associated with both construction and operation of each action alternative's facilities could increase introduction of noxious weeds and/or the spread of existing noxious weed infestations; these effects can be minimized with appropriate construction procedures, site management, and operating controls. Fallowed and grazed retired lands could have an active weed management program.

Construction along the Ocean Disposal Alternative Aqueduct corridor would temporarily disturb up to 1,700 acres of existing native and natural terrestrial habitats on grazed annual grasslands, alkali desert scrub, coastal scrub, and valley oak woodland. This estimate includes permanent removal of up to 56 acres of valley oak woodland that can be mitigated. For both Delta Disposal Alternatives, up to 1,000 acres of habitat would be affected. This acreage includes 73 acres of sensitive habitats (including coastal brackish marsh and other wetlands, riparian areas at stream crossings, and valley oak woodlands) for the Delta-Chipps Island Disposal Alternative that would be temporarily disturbed but can be mitigated. For the Delta-Carquinez Strait Disposal Alternative, 120 acres of sensitive habitats would be affected and could be mitigated. No proposed facilities would be constructed or operated in areas of native or natural terrestrial habitat for the In-Valley Disposal Alternative.

19.1.3.2 Aquatic and Wetland Resources

For all action alternatives, pipeline crossings of agricultural waterways and intermittent streams and swales, if any, could be restored to preconstruction conditions. Temporary effects to existing wetlands and fish passage can be mitigated.

19.1.3.3 Federally Listed Special-Status Species

For all action alternatives, significant construction effects at reuse areas to the San Joaquin kit fox could be reduced with preconstruction surveys and subsequent avoidance and conservation measures. In addition, the giant kangaroo rat and San Joaquin woolly-threads could be affected by construction of the Ocean Disposal Alternative aqueduct. For both Delta Disposal Alternatives, construction effects of the aqueduct on vernal pool crustaceans and other listed aquatic and wetland-dependent species could also be reduced with surveys and subsequent avoidance and conservation measures. For the Ocean Disposal Alternative, the tidewater goby could be affected by construction of the aqueduct, but these effects could be mitigated. Section 7 consultation would be initiated for these federally listed species that could be affected.

19.1.3.4 State-Listed Special-Status Species

For all action alternatives, significant construction effects at reuse areas to the San Joaquin kit fox, Swainson's hawk, giant garter snake, California red-legged frog, and burrowing owl could be reduced with preconstruction surveys and subsequent avoidance and conservation measures. In addition, peregrine falcon and sandhill crane would be affected by the four In-Valley Disposal Alternatives, and the giant kangaroo rat would be affected by construction of the Ocean Disposal Alternative aqueduct. For both Delta Disposal Alternatives, construction effects of the underwater outfall on three Chinook salmon ESUs, Delta smelt, and green sturgeon could be reduced with surveys and subsequent avoidance and conservation measures. For the Ocean Disposal Alternative, the tidewater goby would be affected by construction of the aqueduct, but these effects could be mitigated.

19.1.3.5 Selenium Exposure

The risk of population-level exposure to Se on terrestrial resources in the San Joaquin Valley is primarily a long-term concern arising from operation of the reuse areas (all alternatives) and the evaporation basins (In-Valley Disposal Alternatives) by increasing potential exposure to elevated Se in preferred dietary items. However, wildlife species foraging at the sites for even short periods of time would be at risk. Avoidance and mitigation measures for these upland species could reduce, but may not entirely eliminate, the potential for Se bioaccumulation.

Population-level effects to aquatic resources (including waterbirds) in the San Joaquin Valley due to Se bioaccumulation could have significant effects to birds using the evaporation basins. Potential adverse effects include decreased reproduction and development, as well as direct mortality. With successful mitigation, the effect could be reduced to not significant.

Individual-level effects on federally listed special-status species due to Se bioaccumulation may adversely affect San Joaquin kit fox (at proposed reuse areas and evaporation basins) in the San Joaquin Valley by increasing potential exposure to elevated Se in preferred dietary items. For the Delta Disposal Alternatives, if the green sturgeon is present in the affected area, this special-status species may experience significant adverse effects. Section 7 consultation would be initiated.

19.1.4 Geology Resources

The principal short-term effect is construction-related erosion for all facilities during periods of stormwater runoff in each action alternative. For the In-Valley Disposal Alternative, the concern is greatest with construction of the evaporation basins. Erosion of soils during construction can be mitigated with temporary hydroseeding of slopes or by use of straw bales, Visqueen plastic cover, and temporary drainage measures.

19.1.5 Energy Resources

Incremental energy requirements associated with construction activities are not significant and would not affect the long-term productivity of energy systems.

19.1.6 Air Resources

For all of the action alternatives, emissions associated with the construction of facilities would have significant short-term effects on air quality in the San Joaquin Valley. Mitigation measures can reduce this effect to not significant.

19.1.7 Agricultural Production and Economics

No short-term significant adverse effects occur. All action alternatives, except for the In-Valley/Water Needs and In-Valley/Drainage-Impaired Area Land Retirement Alternatives allow over 6,000 to 55,000 acres of agricultural land to remain in production, thereby maintaining long-term productivity of agricultural land.

19.1.8 Land and Soil Resources

The beneficial effects of increasing Prime Farmland acreage and land productivity offset the lands removed from production for project facilities under all of the action alternatives or offset the increase in acreage of salt sinks for the In-Valley/Water Needs or In-Valley/Drainage-Impaired Area Land Retirement Alternatives.

19.1.9 Recreation Resources

Pipeline and canal alignments for the Out-of-Valley Alternatives can be designed to avoid existing recreation areas and water-based recreation in the Delta such that any temporary disruptions due to construction can be mitigated and would have no long-term effects on maintaining recreation resources.

19.1.10 Cultural Resources

Construction of action alternative facilities could disrupt historic properties. Further studies are needed during the planning process to determine how the properties could be avoided.

19.1.11 Aesthetic Resources

The effects on visual character and scenic highways associated with the action alternatives are primarily long term and not significant.

19.1.12 Regional Economics

All action alternatives generate the greatest economic effects during the 10-year construction phase of the project. This is primarily the result of the intensive construction efforts required to build the drainage collection and conveyance systems. Short-term positive effects on the regional economy would have no significant long-term effects on the productivity of the regional economy. (The total projected effects generated by any action alternative are less than 0.2 percent of the affected region's total economic activity). The cost of facilities is treated as a one-time increase in regional expenditures during the beginning stages of the action alternatives.

19.1.13 Social Issues and Environmental Justice

No short-term significant adverse effects occur.

19.2 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF NATURAL RESOURCES

Irreversible commitments are those that cause either directly or indirectly the use of natural resources so that they cannot be restored or returned to their original condition. Irreversible decisions affect renewable resources such as soils, wetlands, and waterfowl habitats. They are considered irreversible because their implementation would affect a resource that has deteriorated such that renewal takes extensive time or financial resources or because they would destroy the resource.

Irretrievable commitments of natural resources mean the decision would result in loss of production or use of the resource. They represent opportunities forgone for a substantial period of time that the resource cannot be used.

For all of the action alternatives, these potential irreversible and irretrievable effects are associated with consumption of the following resources: energy and land (including biological habitat). Table 19-1 summarizes the energy and land requirements for each action alternative.

19.2.1 Energy Resources

Electrical energy that would be used varies among the action alternatives and by project feature. Overall, the Ocean Disposal Alternative requires the greatest power consumption due to 81,400,000 kWh/year being required, which exceeds the conveyance and treatment requirements of the other six action alternatives.

19.2.2 Land Resources

Land resource consumption is shown in Table 19-1 for each of the action alternatives for facilities and for removal of important biological habitat. Permanently affected land resources involve the commitment of up to 19,000 acres of agricultural land to reuse facilities. Crops would be converted to salt-tolerant types, but most of the area would remain in production and could be restored to its original condition (including the flushing of salts from the soil) but with drainage added. Consequently, reuse areas could be considered retrievable for other uses if desired. The effects on shallow groundwater below the reuse facilities are reversible. For the treatment facilities, including evaporation basins, 3,290 acres is the maximum requirement (In-Valley Disposal Alternative) for direct use and is essentially an irretrievable commitment of the land resource. Acres of permanent ROW for conveyance is greatest for the Delta-Carquinez Strait Disposal Alternative, requiring 1,040 acres. Both permanent and temporary effects occur to important habitat for the Out-of-Valley Disposal Alternatives (Table 19-1 and Section 19.1.3 above).

19.3 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects are those environmental consequences of an action that cannot be avoided, either by changing the nature of the action or through mitigation if the action is undertaken. Significant effects from No Action are assumed to be not mitigatable in most cases, because an action that is currently unplanned and/or unfunded would be required to resolve the effect. A summary of the unavoidable adverse effects by alternative follows.

19.3.1 No Action Alternative

- The No Action Alternative has an adverse effect on bare soil evaporation relative to existing conditions.
- Increased bare-soil evaporation without drainage to remove salts would increase soil and groundwater salinity. In the Grassland Drainage Area, a 10 percent groundwater salinity increase is estimated after 9 years of conditions similar to the No Action Alternative that would be an adverse effect.
- The risk of introduction or spread of noxious weeds and invasive species would increase as the aerial extent of retired, settlement, temporarily fallowed, and drainage-impaired lands increases and would be considered a significant adverse effect.
- Without continued use of the Drain (as part of the Grassland Bypass Project), seepage of drainwater into the supply channels and periodic overtopping during storm events would degrade the water quality in the channels and in downstream wetlands, resulting in unavoidable effects to Federally and State-listed special-status species.
- With the No Action Alternative, additional acres of agricultural land would go out of production. Higher costs of irrigation and salinity management and restricted crop production would occur. The loss of access to the Grassland Bypass for drainage discharge would result in irrigation management and crop revenue losses.
- The No Action Alternative would result in a net loss of about 76,000 acres Prime Farmland and 87,000 acres FSI, an adverse effect and largely unavoidable.
- The increase of salt sinks due to the No Action Alternative would have an adverse, unavoidable effect.
- Land uses would change and become inconsistent with local zoning policies and general plans, resulting in an adverse effect on land use.
- With possible unplanned discharges or seepage of stormwater runoff into the existing San Luis Drain, the No Action Alternative may have an adverse effect on wildlife viewing/hunting opportunities in refuges connected to the San Joaquin River.

Table 19-1
Energy and Land Requirements for Disposal Alternatives

		In-Valley Disposal Alternative	In-Valley/ Groundwater Quality Land Retirement	In-Valley/Water Needs land Retirement	In-Valley/Drainage- Impaired Area Land Retirement	Ocean Disposal Alternative	Delta-Chipps Island Disposal Alternative	Delta-Carquinez Strait Disposal Alternative
Energy Use/Generation	Energy requirements for conveyance (kw-hr/year)	6,343,000	5,600,000	4,000,000	2,457,000	81,400,000	14,000,000	14,000,000
	Energy requirements for RO treatment (kw-hr/year)	18,700,000	15,900,000	11,100,00	6,600,000	0	0	0
	Energy requirements for Se biotreatment (kw-hr/year)	750,000	550,000	450,000	250,000	0	1,000,000	1,000,000
	Energy generated (kw-hr/year)	0	0	0	0	0	0	0
Land Requirements	Acres of reuse	19,000	16,700	12,500	7,500	19,000	19,000	19,000
	Acres of RO treatment facility	8	7	5	3	0	0	0
	Acres of Se treatment facility	6	5	4	2	0	8	8
	Acres of evaporation basin-maximum	3,290	2,890	2,150	1,270	0	0	0
	Acres of temporary right-of-way	645	645	645	10	1,980	1,600	1,750
	Acres of permanent right-of-way	260	260	260	4	830	0	0
	Acres of permanent right-of-way (pipeline)	0	0	0	0	0	420	480
	Acres of permanent right-of-way (canal)	0	0	0	0	0	560	560
Biology	Acres of sensitive habitat impacted*	NA	NA	NA	NA	55	73	120

Notes:
*Identified during appraisal level analysis.
NA: Not applicable to this disposal alternative
Source: Table 2.13-1

- In the absence of actual cultural resource site locations, the conservative approach would be to consider that the No Action Alternative would have adverse effects on historic properties. However, the No Action Alternative is not an undertaking subject to Section 106 of the NHPA; therefore, it does not require mitigation for adverse effects.

19.3.2 In-Valley Disposal Alternative

- Operation of the In-Valley Disposal facilities may adversely affect San Joaquin kit fox, American peregrine falcon, Swainson's hawk, and greater sandhill crane (at reuse areas and evaporation basins) by increasing exposure to elevated Se in preferred dietary items. Any taking under ESA/CESA would be considered a significant effect.
- There is a significant unavoidable adverse effect to waterbirds at proposed evaporation basins due to human activity, seasonal conditions, hazing, salt toxicosis and encrustation, and other physical/behavioral stressors.
- The evaporation basins required for this alternative (up to 3,290 acres removed from production) would be an unavoidable adverse effect on land resources.

19.3.3 In-Valley/Groundwater Quality Land Retirement Alternative

- Operation of the In-Valley/Groundwater Quality Land Retirement facilities may adversely affect San Joaquin kit fox, American peregrine falcon, Swainson's hawk, and greater sandhill crane (at reuse areas and evaporation basins) by increasing exposure to elevated Se in preferred dietary items. Any taking under ESA/CESA would be considered a significant effect.
- There is a significant unavoidable adverse effect to waterbirds at proposed evaporation basins due to human activity, seasonal conditions, hazing, salt toxicosis and encrustation, and other physical/behavioral stressors.
- The evaporation basins required for this alternative (up to 2,890 acres removed from production) would be an unavoidable adverse effect on land resources.
- The In-Valley/Groundwater Quality Land Retirement Alternative consists of retiring all the lands in Westlands with Se concentration greater than 50 ppb in the shallow groundwater and lands acquired by Westlands (that could be brought into production with drainage service, Table 2.3-1). It would also retire 10,000 acres in Broadview Water District in the Northerly Area. Total land retirement is about 92,600 acres (44,106 plus additional 48,486 acres). This alternative includes irrigation system improvements to reduce deep percolation to shallow groundwater.

19.3.4 In-Valley/Water Needs Retirement Alternative

- Operation of the In-Valley/Water Needs Land Retirement facilities may adversely affect San Joaquin kit fox, American peregrine falcon, Swainson's hawk, and greater sandhill crane (at reuse areas and evaporation basins) by increasing exposure to elevated Se in preferred dietary items. Any taking under ESA/CESA would be considered a significant effect.

- There is a significant unavoidable adverse effect to waterbirds at proposed evaporation basins due to human activity, seasonal conditions, hazing, salt toxicosis and encrustation, and other physical/behavioral stressors.
- A total of 194,000 acres would be retired (149,850 more acres than under No Action). Of the total, 7,000 would be retired under the CVPIA Land Retirement Program and managed for wildlife habitat, and about 14,919 would be used for project facilities and ROWs. The remaining retired lands would convert to dryland farming, summer fallowing, or sheep grazing. Minor to significant increases/decreases in habitat value would result, depending on location, season, existing vegetation, and affected species. Any significant net reduction in the amount of higher-valued (for wildlife) agricultural crops could result in localized unavoidable significant adverse effects for some foraging species.
- The decrease of 91,000 acres of FSI less 20,000 acres for compensation would result in an unavoidable adverse effect of 71,000 acres.
- The evaporation basins required for this alternative (up to 2,150 acres removed from production) would be an unavoidable adverse effect on land resources.
- Major land use changes would occur that are inconsistent with local plans and State laws under this alternative.

19.3.5 In-Valley/Drainage-Impaired Area Retirement Alternative

- Operation of the In-Valley/Drainage-Impaired Area Land Retirement facilities may adversely affect San Joaquin kit fox, American peregrine falcon, Swainson' hawk, and greater sandhill crane (at reuse areas and evaporation basins) by increasing exposure to elevated Se in preferred dietary items. Any taking under ESA/CESA would be considered a significant effect.
- There is a significant unavoidable adverse effect to waterbirds at proposed evaporation basins due to human activity, seasonal conditions, hazing, salt toxicosis and encrustation, and other physical/behavioral stressors.
- A total of 308,000 acres would be retired (198,894 more acres than under No Action). Of the total, 7,000 would be retired under the CVPIA Land Retirement Program and managed for wildlife habitat, and about 8,779 would be used for project facilities and ROWs. The remaining retired lands would convert to dryland farming, summer fallowing, or sheep grazing. Minor to significant increases/decreases in habitat value would result, depending on location, season, existing vegetation, and affected species. Any significant net reduction in the amount of higher-valued (for wildlife) agricultural crops could result in localized unavoidable significant adverse effects for some foraging species.
- The decrease of 211,000 acres of FSI less 20,000 acres for compensation would result in an unavoidable adverse effect of 191,000 acres.
- The evaporation basins required for this alternative (up to 1,270 acres removed from production) would be an unavoidable adverse effect on land resources.
- Major land use changes would occur that are inconsistent with local plans and State laws under this alternative.

19.3.6 Ocean Disposal Alternative

- Operation of the Ocean Disposal facilities may adversely affect San Joaquin kit fox, Swainson's hawk, and greater sandhill crane by increasing exposure to elevated Se in preferred dietary items at reuse areas. Any taking under ESA/CESA would be considered a significant effect.

19.3.7 Delta-Chipps Island Disposal Alternative

- The Delta-Chipps Island Disposal Alternative may adversely affect San Joaquin kit fox, Swainson's hawk, and greater sandhill crane by increasing exposure to elevated Se in preferred dietary items at reuse areas. Any taking under ESA/CESA would be considered a significant effect.
- If the green sturgeon is present in the affected area, this special-status species may experience significant adverse effects.

19.3.8 Delta-Carquinez Strait Alternative

- The Delta-Carquinez Strait Disposal Alternative may adversely affect San Joaquin kit fox, Swainson's hawk, and greater sandhill crane by increasing exposure to elevated Se in preferred dietary items at reuse areas. Any taking under ESA/CESA would be considered a significant effect.
- If the green sturgeon is present in the affected area, this special-status species may experience significant adverse effects.

19.4 GROWTH-INDUCING EFFECTS

In NEPA, growth-inducing effects fall under the category of potential indirect effects. Indirect effects include those that occur later in time or farther away in distance, but are still reasonably foreseeable. Growth-inducing projects are those that remove obstacles to population growth or encourage and facilitate other activities that could stimulate growth later in time.

Sections 12.2 and 17.2 discuss the effects of the proposed and alternative actions on agricultural land use and the regional economy and employment. Changes in agricultural land use, including 52,000 acres of land to remain in production, are described in Section 12.2.6.2. For the action alternatives, the effect on employment ranges from -3,441 to 1,473 jobs on an annual basis (over the long-term, 50-year planning horizon). Nonrecurring employment occurring at the beginning of the project (10-year construction period) is estimated at 460 to 2,910 jobs. These economic effects are not significant in a nine-county region of 2.85 million jobs in 2000 and, therefore, are not expected to stimulate demand for housing and local services.

The In-Valley Disposal Alternatives would reclaim up to 10,558 AF/year of water. This volume of product water from the RO facility would be used for agricultural purposes along with any other water conserved due to the treatment/reuse of drainwater that would still be used as irrigation water (i.e., not affect total deliveries), because the affected districts anticipate receiving less than 100 percent of their previous contract deliveries from the CVP and have experienced water shortages in recent years. The conserved/recycled water would help to reduce future

shortages for irrigation water supplies in the GDA. Should it be made available in the long-term for municipal and industrial uses, it would not be of sufficient volume to stimulate urban growth. Assuming the average household (3.0 persons per household) would use 1 AF/year, this amount would supply only 10,558 households. A water transfer from irrigation to municipal and industrial uses would potentially require additional NEPA and CEQA analysis.

19.5 ENVIRONMENTALLY PREFERRED ALTERNATIVE

The environmentally preferred alternative is defined as the one that promotes the national environmental policy and causes the least damage to the biological and physical environment and that best protects, preserves, and enhances historic, cultural, and natural resources. Each of the action alternatives has some significant negative environmental effects; no single alternative is superior to the others. The In-Valley Alternatives would have major effects to migratory waterfowl from the evaporation basins, while the Delta Disposal Alternatives would cause some increases in salt and Se in the Delta. The Out-of-Valley Disposal Alternatives also have greater potential impact on cultural resources. Selection of an environmentally preferred alternative involves balancing effects on different resources, a judgment that would place higher value on some resources than others. (See Table ES-10 for a comparison of adverse effects.) Reclamation will continue to investigate the feasibility of mitigation and consider comments on the Draft EIS prior to designation of an environmentally preferred alternative no later than in the Final EIS.

SECTION TWENTY

ENVIRONMENTAL MITIGATION

The environmental consequences sections of this EIS discuss potential mitigation measures and their effects. Section 20 brings together the effects and potential mitigation measures from the resource sections, for the seven action alternatives. This section presents conceptual mitigation for key features of each of the action alternatives. It begins with an overview of mitigation recommendations for significant adverse effects. Key components of mitigation are identified in separate sections following the summary. As Reclamation proceeds with the SLDFR Feasibility Study for the provision of drainage service, conceptual mitigation will be refined, leading to the selection of specific sites and/or techniques. **For now, the mitigation measures discussed herein are conceptual and are for discussion purposes only.**

20.1 MITIGATION OVERVIEW

This section of the EIS identifies the significant adverse effects associated with the seven action alternatives, and potential measures for avoiding, minimizing, rectifying, or compensating for the adverse effect. Nearly all of these measures are currently “technical recommendations” under consideration by Reclamation.¹ Subsequently, these draft recommendations may be modified in response to public comments and Section 7 consultations with the Service for the Final EIS. Specific environmental commitments will be identified in the Record of Decision.

Mitigation measures must be fully enforceable through project design, permit conditions, agreements, or other measures. As the lead agency, Reclamation is responsible for ensuring that implementation of selected measures occurs in accordance with an approved mitigation program

¹ Reclamation intends to incorporate odor control into the Se treatment facility designs, establish groundwater monitoring wells near each evaporation basin, and require noxious weed management for retired lands (non-Federal) and for areas disturbed for Federal facilities construction and operation. The effects determinations are based on these assumptions about facility design and management.

or plan, including monitoring of the effectiveness of the approved plan, although other agencies may be involved in actual implementation or monitoring activities.

20.2 MITIGATION MEASURES

All action alternatives may include design features, operating procedures, and other pre- and post-construction measures to minimize significant impacts to biological resources and, if necessary, to compensate for losses or damage to protected species, important habitats, or natural communities. All action alternatives may include a range of measures and strategies from the following mitigation categories:

- **Preliminary Site Studies, Biological Surveys (PSS)**
 - Preliminary studies must be completed during feasibility and final design project planning stages to define site conditions and biological resources that could affect project plans. These studies involve biologists using established or approved protocols to conduct appropriate biological and botanical surveys to identify the occurrences of protected plant and animal species, rare communities, mature oak trees, stream crossings, wetlands, and other significant biological resources or special-status species that could be impacted by project construction. Preliminary site studies may also include on-site wetlands delineation as needed. A detailed *Biological Survey Plan*, which will identify the timing, locations, and intensity of individual site surveys will be developed for the preferred alternative in consultation with the Service, Endangered Species Recovery Program, and CDFG. While site studies in and of themselves do not constitute mitigation, they are used to determine appropriate mitigation measures and to establish a baseline for evaluation of impacts.
- **Project Design, Facility Operations Measures (DOM)**
 - Design and Siting Measures – Design features incorporated into the planning, sizing, or routing/siting of project facilities to minimize their adverse environmental effects (e.g., odor control for the bioreactors, installing tailwater collection systems at reuse areas, using diffusers at Bay-Delta and Ocean Disposal outfalls, locating pipeline corridors within previously disturbed road and utility ROWs, constructing evaporation basins with steep embankments, providing alternative habitat near evaporation basins to reduce Se-related impacts to migratory birds, and installing groundwater monitoring wells near each basin site).
 - Operation and Maintenance Measures – Measures incorporated into the standard operating procedures of each facility to minimize the long- and short-term biological effects that could result from facility operation (e.g., using portable pumps to facilitate more rapid draining/filling of evaporation pond cells, limiting furrow lengths at reuse facilities, developing “wildlife friendly” management plans for selected retired lands). Such measures would also include weed management prescriptions for retired lands.
 - Construction-related Measures – Actions incorporated into construction activities and construction contract specifications to eliminate or reduce potential impacts that could occur during construction. Actions may include impact avoidance strategies (e.g., construction scheduling to avoid critical life stages of selected species, exclusion fencing, limiting disturbance zones); utilizing approved construction techniques and practices

(e.g., excavations at stream crossings, stockpiling topsoil); construction monitoring activities (including utilization of on-site biologists at selected construction sites); and construction site restoration/revegetation (including post-construction monitoring).

- **Mitigation Habitat Site Measures (MSM)**

- Alternative Habitat Measures – Dedicated site measures developed to provide specific habitat function associated with attracting impacted species away from hazard areas, and/or diluting the concentration of harmful substances in dietary food sources in the impact area or vicinity.
- Enhancement Habitat Measures – Typically consists of enhancing an existing wildlife habitat resource to provide additional quality or quantity of specific habitat functions that potentially contributes toward overall mitigation habitat objectives (functions or values).
- Other Mitigation Habitat Measures – Measures established at dedicated mitigation sites that may not meet all or part of multiple criteria for alternative habitat or compensation habitat, but provide benefits that contribute toward overall mitigation habitat objectives.

- **Adaptive Management Measures (AMM)**

- Implementation of Facility Monitoring and Adaptive Operation and Maintenance Plans (AM) – Long-term monitoring activities, contingency plans, and adaptive management plans incorporated into the operating plans of individual facilities (e.g., biological and water quality monitoring at evaporation ponds, reuse facilities, or outfall sites). A detailed *Monitoring and Adaptive Management Plan* will be developed for the preferred alternative.
- Compensation Habitat Measures – Measures that are developed to replace or compensate for lost or irreparably damaged biological resources when significant impacts cannot be avoided. For example, building and operating habitat to replenish migratory bird populations harmed by project facilities, or replacing mature trees removed during construction of pipelines or other facilities. Compensation measures are defined as part of follow-up monitoring plans and are also monitored to ensure compensation objectives are met.

20.3 MITIGATION SCHEDULE AND REPORTING

The Draft Mitigation Monitoring and Reporting Program is summarized in matrix form in Table 20-1. Table 20-1 is organized by resource effects (rather than by project feature), starting with effects common to all of the action alternatives, followed by effects of the In-Valley, Delta, and Ocean alternatives, and all in comparison to No Action. All of the significant adverse effects identified in earlier sections of the EIS, where mitigation was determined to be feasible and could reduce the effect to not significant, are addressed in the Draft Mitigation Monitoring and Reporting Program. The relevant sections of the EIS are noted in Table 20-1, and these sections should be referred to for complete statements of the effect. Table 20-1 also includes some significant biological effects (to Federally listed special-status species) where the severity of the effect and mitigation would be determined based on Section 7 consultations with the Service.

For each effect and potential mitigation measure, the matrix identifies the agency responsible for ensuring that the implementation action occurs (reporting responsibility), and the timing

requirements for implementation. This information is preliminary and subject to refinement and change during review of the Draft EIS. Comments on the Draft EIS may supplement or revise this material, as agencies identify specific requirements during the review process.

Following the table, technical mitigation recommendations for each resource are presented in the text. Design, construction, and/or operations recommendations to avoid or minimize potential adverse effects are expected to be developed in greater detail as the environmental review and planning/design phases continue. See Appendix J, Implementation of In-Valley Alternatives, for a discussion of an adaptive management approach for mitigation of potential effects to waterbirds. In some cases where environmental effects were not significant, but the effect could be further reduced or avoided by design or construction measures, these recommendations are provided herein. In other cases, the mitigation measures represent facility design assumptions. Each mitigation measure included in Table 20-1 falls into one of the above categories, as identified in the last column. For the majority of these measures, comprehensive descriptions and detailed estimates have not been included in this Draft EIS.

Table 20-1
Draft Mitigation Monitoring and Reporting Program for
San Luis Drainage Feature Re-evaluation Environmental Impact Statement

Significant Effects Common to all Action Alternatives	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
Biological Resources and Se Bioaccumulation, Sections 7.2.12.2 through 7.2.12.5 and 8.2.4 through 8.2.7			
<u>Terrestrial Resources</u> Potential permanent loss or degradation of native or natural terrestrial habitat resulting from construction activities.	Complete site-specific botanic/biologic surveys at all proposed facility sites to verify initial reconnaissance-level habitat assessments.	Reclamation	PSS Feasibility design
	Modify initial impact sites and designs, as necessary, to avoid/minimize impacts to native or natural habitats.	Reclamation	DOM Feasibility design Final design
<u>Aquatic & Wetland Resources</u> Permanent and temporary effects to jurisdictional wetlands and other waters of the U.S. from filling or draining	Establish appropriate avoidance measures, construction techniques, site restoration plans, and restoration monitoring procedures and include in CWA Section 404 permit and CDFG Streambed Alteration Agreement.	Reclamation to USACE and CDFG	DOM Prior to construction
<u>Terrestrial Resources</u> Due to elevated Se concentrations in soil, Se bioaccumulation at reuse areas could increase the risk of Se-related effects for some terrestrial species.	Conduct further evaluation and include management measures and/or contingencies for inclusion in <i>Adaptive Operation and Monitoring Plans</i> .	Reclamation to Service and CDFG	DOM Feasibility design
<u>Federally Listed Special-Status Species</u> Potential adverse effects to San Joaquin kit fox due to Se bioaccumulation in reuse areas.	Initiate Section 7 consultation with Service and complete approved surveys for special-status species.	Reclamation to Service	PSS Prior to Record of Decision.
<u>State-Listed Special-Status Species</u> Potential adverse effects to Swainson's hawk, greater sandhill crane, and San Joaquin kit fox due to Se bioaccumulation in reuse areas.	Identify design and management measures in consultation with CDFG and complete approved surveys for special-status species.	Reclamation to CDFG	PSS Prior to Record of Decision.
Air Resources, Sections 11.2.10.2 through 11.2.10.5			
Emissions associated with the construction of all action alternatives would have significant effects on air quality.	Implement SJVAPCD-recommended Regulation VIII Control Measures for Construction Emissions of PM ₁₀ .	Reclamation	DOM Prior to and during construction

Table 20-1
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Significant Effects Common to all Action Alternatives	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
Geology and Seismicity, Sections 9.2.11.2 through 9.2.11.5			
Facilities would be exposed to potential subsidence/uplift.	Review groundwater management plan by Central Valley Regional Board, and implement careful management of groundwater resources.	Reclamation to Central Valley Regional Board	DOM Project operations
Facilities would be subject to heave from expansive soils.	Remove and/or treat such soils. Review grading plan by city/county overseeing implementation of California Building Code. Review by Regional Board for erosion and runoff issues.	Reclamation to city/county Building Department and Regional Board.	DOM Design phase
Construction-related erosion, especially during construction of evaporation basins where large volume earthwork may be required, may be significant during periods of stormwater runoff.	Implement temporary hydroseeding to provide a vegetation cover or by the use of straw bales, Visquene plastic cover, and temporary drainage measures. Review of surface runoff management plan. Review by Regional Board for erosion and runoff issues.	Reclamation to city/county Building Department and Regional Board	DOM Construction
Cultural Resources, Section 15.2.4			
Various adverse effects may occur to historic properties through construction activities for all action alternatives.	Prepare a Class III survey Programmatic Agreement and Historic Property Management Plan. Incorporate avoidance measures during the planning process, and conduct periodic review. Inventory, evaluate, and treat in accordance with NHPA Section 106.	Reclamation to SHPO	DOM Selection of Preferred Alternative

Table 20-1
Draft Mitigation Monitoring and Reporting Program for
San Luis Drainage Feature Re-evaluation Environmental Impact Statement

Additional Significant Effects Common to all In-Valley Alternatives	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
Biological Resources, Sections 7.2.12.2 through 7.2.12.5 and 8.2.4 through 8.2.7			
<u>Aquatic & Wetland Resources</u> Potential non Se-related adverse effects at evaporation facilities: potential salt encrustations on feathers of wintering waterbirds, increased predation and rapid spread of avian diseases due to crowding direct mortality from human/equipment activity, and stress-related reductions in the health and vigor of breeding, migrating, and wintering birds.	Develop and implement <i>Adaptive Operation and Monitoring Plans</i> as required under WDR permits for each evaporation facility to identify and minimize adverse effects to migrating and nesting waterbirds and other wildlife.	Reclamation to Central Valley Regional Board, CDFG, and Service	AMM Feasibility design, operation
<u>Federally Listed Special-Status Species</u> San Joaquin kit fox, giant garter snake, California red-legged frog, and bald eagle could experience significant adverse effects due to construction activities.	These effects could be mitigated to not significant by conducting preconstruction surveys and implementing avoidance and conservation measures. Swainson's hawks and sandhill cranes could benefit from improved and expanded foraging habitat associated with conversion of retired lands to dryland farming and grazing.	Reclamation to Service	PSS, Prior to and during construction
<u>State-Listed Special-Status Species</u> Potential adverse effects American peregrine falcon at evaporation basins due to exposure to elevated Se in preferred dietary items at In-Valley Disposal Alternative facilities.	Develop and implement <i>Adaptive Operation and Monitoring Plans</i> and comply with WDR permit stipulations and Service Biological Opinion for each reuse area and evaporation facility to eliminate or minimize Se-related adverse effects to migrating, wintering, or nesting special-status birds and other listed wildlife species.	Reclamation to Central Valley Regional Board, CDFG; and Service	AMM Feasibility design, operation

Table 20-1
Draft Mitigation Monitoring and Reporting Program for
San Luis Drainage Feature Re-evaluation Environmental Impact Statement

Additional Significant Effects Common to all In-Valley Alternatives	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
<u>State-Listed Special-Status Species</u> Potential adverse effects to western burrowing owl, San Joaquin kit fox, Swainson's hawk, American peregrine falcon, bald eagle, California black rail, western yellow-billed cuckoo, giant garter snake, and California red-legged frog due to construction activities.	Conduct preconstruction species-focused biological and botanical surveys using established or approved protocols.	Reclamation to Service and CDFG	PSS Prior to construction
	Implement appropriate avoidance measures, construction BMPs, construction monitoring procedures, and species conservation plans as identified during Service consultation and/or stipulated in the Service Biological Opinion.	Reclamation to Service and CDFG	DOM Feasibility design phase, prior to and during construction (some species conservation measures may extend throughout the life of the project)
<u>Se Exposure and Bioaccumulation</u> Predicted mean Se concentrations in invertebrate tissue exceed the effects threshold of 4 mg/kg for all four evaporation basins, i.e., increases of Se in prey of aquatic birds in the San Joaquin Valley. Potential adverse effects include decreased reproduction and development, as well as direct mortality.	Design and implement measures identified during Service consultation and/or stipulated in the Service Biological Opinion to minimize pond use by waterfowl and shorebirds: • Pond depths >4 feet • Vegetation control at basin edges to minimize nesting and roosting habitat • No islands or windbreaks • Steep side slopes Operation measures: • Hazing • Vegetation control	Reclamation to Service	DOM Prior to construction
Air Resources, Sections 11.2.10.2 through 11.2.10.5			
Significant adverse effects on air quality ONLY under the In-Valley Disposal Alternative (approximately 60,000 acres less land retirement compared to the No Action Alternative).	Implement additional SJVAPCD-recommended Rule 4550 Conservation Management Practices.	Reclamation to SJVAPCD	DOM Prior to and during construction

**Table 20-1
Draft Mitigation Monitoring and Reporting Program for
San Luis Drainage Feature Re-evaluation Environmental Impact Statement**

Additional Significant Effects Common to all In-Valley Alternatives	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
Land and Soil Resources, Sections 13.2.10.2 through 13.2.10.5			
Construction-related changes. Significant adverse effects under all In-Valley Disposal Alternatives EXCEPT Drainage-Impaired Area Land Retirement Alternative.	Backfill topsoil and reseed pipeline areas. Spray new construction and stockpiles.	Reclamation	DOM Prior to and during construction
Losses of FSI for In-Valley/Water Needs and In-Valley/Drainage-Impaired Area Land Retirement Alternatives (91,000 and 211,000 acres, respectively).	Unavoidable effects.	Reclamation	DOM Operations
Permanent land use changes. Significant adverse effects ONLY under Water Needs and Drainage-Impaired Area Land Retirement Alternatives.	Unavoidable effects.	Reclamation	DOM Feasibility Study
Recreation, Sections 14.2.12.2 through 14.2.12.5			
Evaporation basins and reuse facilities would accumulate salts and Se that could pose a biological risk to wildlife. Indirectly, this may have a significant adverse effect on wildlife viewing/hunting if wildlife numbers are reduced.	See biological resources section. Mitigation habitat could provide additional wildlife viewing opportunities.	See biological resources section.	MSM

Table 20-1
Draft Mitigation Monitoring and Reporting Program for
San Luis Drainage Feature Re-evaluation Environmental Impact Statement

Additional Significant Effects Common to Delta Disposal Alternatives	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
Biological Resources, Sections 7.2.12.2 through 7.2.12.5 and 8.2.4 through 8.2.7			
<u>Terrestrial Resources</u> Terrestrial habitat with low value for most species disturbed during aqueduct construction.	Implement appropriate construction procedures, site management, and operating controls.	Reclamation	DOM Prior to and during construction and operation.
<u>Aquatic and Wetland Resources</u> Sensitive wetland habitat disturbed and alteration of historical channel characteristic during aqueduct construction.	Implement appropriate construction procedures, site management, and operating controls. Maintain or restore affected channels at pipeline and aqueduct crossings.	Reclamation	DOM Prior to and during construction and operation.
<u>Federally Listed Special-Status Species</u> Potential significant adverse effects to San Joaquin kit fox, California clapper rail, saltmarsh harvest mouse, four vernal pool crustaceans, California tiger salamander, California red-legged frog, and giant garter snake during construction of aqueduct. Potential significant adverse effects to three Chinook salmon ESUs, Delta smelt, and green sturgeon during construction of underwater outfall. Potential significant adverse effects to the green sturgeon due to increased Se bioaccumulation in the Delta.	Section 7 consultation would be required. Conduct preconstruction species-focused biological and botanical surveys using established or approved protocols. Use approved construction techniques and scheduling.	Reclamation to Service	PSS, DOM Prior to construction.
<u>State-Listed Special-Status Species</u> Potential significant adverse effects to San Joaquin kit fox, Swainson's hawk, western burrowing owl, California clapper rail, saltmarsh harvest mouse, four vernal pool crustaceans, California tiger salamander, California red-legged frog, and giant garter snake during construction of aqueduct. Potential significant adverse effects to three Chinook salmon ESUs, Delta smelt, and green sturgeon during construction of underwater outfall.	Consultation with CDFG would be required. Conduct preconstruction species-focused biological and botanical surveys using established or approved protocols. Use approved construction techniques and scheduling.	Reclamation to CDFG	PSS, DOM Prior to construction.

Table 20-1
Draft Mitigation Monitoring and Reporting Program for
San Luis Drainage Feature Re-evaluation Environmental Impact Statement

Additional Significant Effects Common to Delta Disposal Alternatives	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
Potential significant adverse effects to the green sturgeon due to increased Se bioaccumulation in the Delta.			
Geology and Seismicity, Sections 9.2.11.2 through 9.2.11.5			
Significant effect due to increased potential for surface fault rupture.	Perform detailed engineering geologic investigations along the conveyance routes to identify potential problem areas for appropriate slope stability design. Avoid placing pipelines subject to fault displacement under compression. Design pipelines subject to fault displacement to cross the fault at an oblique angle to the direction of motion to ensure that the pipeline fault crossing would undergo extension.	Reclamation	DOM Feasibility Study and Design.
Air Resources, Sections 11.2.10.2 through 11.2.10.5			
Significant adverse effects on air quality (approximately 60,000 acres less land retirement compared to the No Action Alternative).	Implement additional SJVAPCD-recommended Regulation VIII Control Measures for Construction Emissions of PM ₁₀ .	Reclamation	DOM Prior to and during construction
Land and Soil Resources, Sections 13.2.10.2 through 13.2.10.5			
Construction-related changes resulting in significant adverse effects.	Backfill topsoil and reseed pipeline areas. Spray new construction and stockpiles.	Reclamation	DOM Prior to and during construction

Table 20-1
Draft Mitigation Monitoring and Reporting Program for
San Luis Drainage Feature Re-evaluation Environmental Impact Statement

Additional Significant Effects Specific to Ocean Disposal Alternative	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
Biological Resources, Sections 7.2.12.2 through 7.2.12.5 and 8.2.4 through 8.2.7			
<u>Terrestrial Resources</u> Three acres of valley foothills riparian and 56 acres of valley oak woodland habitats permanently removed for aqueduct construction.	Implement appropriate construction procedures, site management and operating controls.	Reclamation	DOM Prior to and during construction and operation
<u>Aquatic and Wetland Resources</u> Sensitive wetland habitat disturbed and alteration of historical channel characteristics during aqueduct construction.	Implement appropriate construction procedures, site management, and operating controls. Maintain or restore affected channels at pipeline and aqueduct crossings.	Reclamation	DOM Prior to and during construction and operation
<u>Federally Listed Special-Status Species</u> Potential significant adverse effects to San Joaquin kit fox, giant kangaroo rat, giant garter snake, California red-legged frog, and San Joaquin woolly-threads during construction. Potential significant adverse effects to tidewater goby during construction of outfall.	Section 7 consultation would be required. Conduct preconstruction species-focused biological and botanical surveys using established or approved protocols. Use approved construction techniques and scheduling.	Reclamation to Service	PSS, DOM Prior to construction.
<u>State-Listed Special-Status Species</u> Potential significant adverse effects to San Joaquin kit fox, Swainson's hawk, giant kangaroo rat, giant garter snake, California red-legged frog, and western burrowing owl during construction. Potential significant adverse effects to tidewater goby during construction of outfall.	Section 7 consultation would be required. Conduct preconstruction species-focused biological and botanical surveys using established or approved protocols. Use approved construction techniques and scheduling.	Reclamation to CDFG	PSS, DOM Prior to construction.

Table 20-1
Draft Mitigation Monitoring and Reporting Program for
San Luis Drainage Feature Re-evaluation Environmental Impact Statement

Additional Significant Effects Specific to Ocean Disposal Alternative	Potential Mitigation Measures	Reporting Responsibility	Mitigation Type*/Timing
Geology and Seismicity, Sections 9.2.11.2 through 9.2.11.5			
Significant adverse effect due to increased potential for damage from surface fault rupture.	Perform detailed engineering geologic investigations along the conveyance routes to identify potential problem areas for appropriate slope stability design Avoid placing pipelines subject to fault displacement under compression. Design pipelines subject to fault displacement to cross the fault at an oblique angle to the direction of motion to ensure that the pipeline fault crossing would undergo extension.	Reclamation	DOM Feasibility Study and Design.
Significant adverse effect due to increased potential for damage from landsliding/mass wasting.	Design with appropriate slope stability.	Reclamation	DOM Feasibility Study and Design.
Significant adverse effect due to increased potential for damage from tsunami/seiche.	Site facilities above inundation zone or bury pipeline.	Reclamation	DOM Feasibility Study and Design.
Air Resources, Sections 11.2.10.2 through 11.2.10.5			
Significant adverse effects on air quality (approximately 60,000 acres less land retirement compared to the No Action Alternative).	Implement additional SJVAPCD-recommended Rule 4550 Conservation Management Practices.	Reclamation to SJVAPCD	DOM Prior to and during construction
Land Use and Soil Resources, Sections 13.2.10.2 through 13.2.10.5			
Construction-related changes resulting in significant adverse effects.	Backfill topsoil and reseed pipeline areas. Spray new construction and stockpiles.	Reclamation	DOM Prior to and during construction

DSOD=Division of Safety of Dams

***Mitigation Types**

PSS = Preliminary site studies and biological surveys, including wetland delineations, as needed.

DOM = Project facility design and operations measures, including construction measures as appropriate.

MSM = Mitigation habitat measures including alternative habitat, enhancement, and other habitat site features.

AMM = Adaptive management measures including allowance for monitoring and compensation measures as required.

20.4 BIOLOGICAL RESOURCES

The following sections describe potential mitigation measures for each type of adverse effect.

20.4.1 Terrestrial Resources

Potential measures to avoid or minimize adverse effects to terrestrial resources include:

- To the extent possible, locate all major project facilities in areas of active or temporarily fallowed agricultural land or on permanently retired croplands, settlement lands, or other previously disturbed agricultural parcels (e.g., farm roads, ditches, canal ROWs, fencelines, farmsteads, equipment and staging yards, etc.).
- Complete site-specific surveys at all proposed facility sites to verify initial reconnaissance-level habitat assessments and to determine if additional avoidance measures, special construction techniques, or mitigation measures, if any, would be appropriate.
- Establish noxious weed control procedures for all construction sites and construction-related activities, and include these as conditions in construction contract specifications.
- Develop a *Noxious Weed Management and Control Program* for all facility sites and mitigation areas and for retired lands.
- In consultation with the Service and CDFG, develop an *Adaptive Operation and Monitoring Plan* for each reuse facility to eliminate or minimize Se exposure hazards for wildlife species that could forage at the facilities. Operating rules would specify suitable crop types, irrigation strategies, surface and drainwater management strategies, and emergency contingencies. Monitoring would include groundwater monitoring and scheduled sampling of water quality and soil chemistry, as well as plant material, invertebrates, bird eggs/tissues, and wildlife use.

20.4.2 Aquatic and Wetland Resources

Potential measures to avoid or minimize adverse effects to aquatic and wetland resources include:

- Complete a wetland delineation to identify, characterize, and quantify any jurisdictional wetlands and other waters of the U.S., if any, that would be affected by construction of project features. (see Section 4.3.1). If any such wetlands would be affected by the In-Valley Disposal Alternatives, establish avoidance measures, construction techniques, site restoration plans, and restoration monitoring procedures to eliminate or reduce permanent or temporary effects to jurisdictional wetlands and other waters of the U.S.
- Design all evaporation basins to reduce shorebird foraging and nesting habitat and to discourage growth of emergent vegetation. Ponds would be designed with steep side slopes, no islands or windbreaks, and depths of at least 4 feet.
- In consultation with the Service, CDFG, and Central Valley Regional Board, develop an *Adaptive Operation and Monitoring Plan* for each evaporation facility to identify and minimize adverse effects to migrating and nesting waterbirds and other wildlife evaporation facility operating rules will include hazing strategies, vegetation control, water depth

management, and emergency contingencies. The monitoring plans would be based on WDR permit reporting requirements.

- Develop an *Evaporation Basin Closure and Monitoring Plan* for each evaporation facility prior to closure. The plan would include procedures for capping, contouring, and revegetating closed pond cells/facilities and will specify data collection and timeframe requirements for each site's post-closure monitoring program.

20.4.3 Federally and State-Listed Species

As described in Sections 7 and 8 of this EIS, a number of Federally listed species may experience significant adverse effects under any of the alternatives evaluated. Under ESA Section 7, Reclamation will complete a consultation with the Service prior to the signing of the Record of Decision. Mitigation elements may include:

- Complete species-focused surveys using established or approved Service and/or CDFG protocols during the feasibility design phase and repeat, as necessary, prior to construction.
- In consultation with the Service and CDFG, develop and implement appropriate avoidance measures, conservation protocols, construction BMPs, and construction monitoring procedures to avoid or minimize potential adverse effects to listed and protected species.
- Where appropriate, develop long-term management plans for special-status species that may be affected by operation of facilities.

20.4.4 Selenium Exposure and Bioaccumulation

Reclamation is currently working with the Service, the Regional Board, and others to develop *Adaptive Operation and Monitoring Plans* for each reuse and evaporation facility. These plans will include provisions to minimize Se-related adverse effects to migrating, wintering, or nesting special-status birds and other listed wildlife species. Measures under consideration include:

- Design of the evaporation basins to reduce their attractiveness to breeding shorebirds and other waterbirds
- Management of the evaporation basins to limit the availability of food resources for wildlife in the basins
- Management of the evaporation basins and reuse areas to reduce wildlife use
- Creation and/or enhancement of Se-safe mitigation habitat to dilute dietary Se concentrations and/or compensate for adverse impacts (e.g., alternative and/or compensation habitat)

20.5 GEOLOGY AND SEISMICITY

The greatest effect from the geologic environment would be from landsliding, surface fault rupture, subsidence, and expansive soils. Careful management of groundwater resources (pumping and injection rates) would minimize the effect of subsidence. Removing and/or treating expansive soils would minimize the effect of shrink/swell behavior.

The action alternatives may all result in adverse effects to the geologic environment through disturbance of soils during construction and the potential for erosion during periods of

stormwater runoff. Erosion of soils during construction can be minimized by temporary hydroseeding of slopes to provide a vegetation cover or by the use of straw bales, Visquene plastic cover, and temporary drainage measures to prevent excessive slope runoff.

20.6 AIR QUALITY

Emissions associated with the construction of facilities would have significant effects on air quality in the San Joaquin Valley. The following construction equipment mitigation measures will be considered:

- Use alternative fueled or catalyst equipped diesel construction equipment.
- Minimize idling time (e.g., 10-minute maximum).
- Limit the hours of operation of heavy-duty equipment and/or the amount of equipment in use.
- Replace fossil-fueled equipment with electrically driven equivalents (provided they are not run via a portable generator set).
- Curtail construction during periods of high ambient pollutant concentrations, which may include ceasing of construction activity during the peak-hour of vehicular traffic on adjacent roadways.
- Implement activity management (e.g., rescheduling activities to reduce short-term effects).

20.7 LAND AND SOIL RESOURCES

Providing bridges and canal siphons at regular intervals across canals to reduce severance effects on local land users can mitigate permanent land use effects. Pipelines in areas of cropland and high-quality rangelands could be backfilled in a manner that places the existing topsoil back on the surface of the backfill. Pipeline areas could be reseeded with rangeland grasses and forbs common in the adjacent areas. Stockpiles, new canal banks, and temporary construction zones could be periodically sprayed with water to prevent wind erosion and abate dust. Water erosion control measures may be needed along some pipeline alignments and canals. These mitigation measures will be considered to reduce construction effects to the no-significant-effect level or in some alternatives the minor adverse effect level.

20.8 RECREATION

The primary need for mitigation would be the indirect effect on recreation that the accumulation of salts and Se in the evaporation basins and reuse facilities could have on wildlife populations. Mitigation could include constructing and operating the evaporation facilities in such a way that they would be unattractive to wildlife. In addition, if habitat is constructed or enhanced to mitigate for effects to waterfowl of the evaporation basins; this habitat is likely to include managed wetlands. It is possible that some of the waterfowl currently using existing wildlife refuges or duck clubs could use these newly created or enhanced wetlands, and they could be located near existing refuges or wildlife management areas. However, the future design and management of potential mitigation lands is uncertain, and it may be that some could be

managed for recreation, such as hunting or wildlife viewing, as are current refuges in the San Joaquin Valley.

20.9 CULTURAL

The action alternatives may all result in adverse effects to historic properties through direct disturbance during construction activities. Such effects may be addressed through mitigation measures designed to eliminate or reduce the adverse effects. Measures which could be taken to resolve adverse effects or reduce effects to not significant levels include inventory, evaluation, and treatment activities conducted in accordance with Section 106 of the NHPA.

Upon selection of an action alternative, a Class III (intensive) cultural resources survey could be undertaken for any areas of the APE that have not been subject to prior survey coverage meeting current professional standards. The purpose of the Class III survey is to locate and record cultural resources that may be affected by project activities. Once cultural resources within the APE have been identified and recorded, ground-disturbing activities can be planned to avoid these resources whenever feasible.

When it is not possible to avoid cultural resources during project implementation, it may be necessary to evaluate the significance of the resources through further research or test excavations. Evaluation would be undertaken to determine whether the resources meet National Register of Historic Places and/or CEQA significance criteria.

Treatment processes can be developed to mitigate the effects of the project on significant resources. Effects to significant cultural resources may be mitigated by a variety of methods, depending on the nature of the particular resource. Such methods may include data recovery, public interpretation, further documentation and recordation, or preservation by other means. Treatment measures would follow specific Historic Property Treatment Plans developed for the project, or would adhere to procedures outlined in a Memorandum of Agreement developed between Reclamation, the SHPO, and other consulting parties in the Section 106 process.

SECTION TWENTY-ONE

CONSULTATION AND COORDINATION

Section 21 explains consultation and coordination efforts by Reclamation relevant to preparation of this EIS. Public scoping is summarized first, followed by consultation activities with Federal, State, and local agencies. The distribution list for the Draft EIS is the final section.

21.1 PUBLIC SCOPING

21.1.1 Public Scoping Process

Reclamation published a Notice of Intent to prepare an EIS in the *Federal Register* in October 2001. The first public scoping meetings were held in Fresno on November 14, 2001, and in Concord on November 15, 2001. At these meetings, Reclamation provided information on the court decision prompting the re-evaluation, study plans, options to be re-evaluated, and other important components of the project. Notices announcing the meetings were mailed to approximately 400 interested individuals, stakeholders, and organizations. Interested parties were encouraged to ask questions and provide comments on issues of concern.

Following the distribution of the Plan Formulation Report in December 2002, Reclamation held a second series of scoping meetings to receive comments from the public on issues that should be included in the EIS. These meetings were held on January 27, 2003, in Morro Bay; January 28, 2003, in Fresno; January 29, 2003, in Concord; and January 31, 2003, in Sacramento.

Reclamation presented an update on plan formulation activities including a brief history of the project; a review of the In-Valley, Delta, and Ocean Disposal Alternatives; an explanation of the evaluation factors and screening criteria that were applied to identify the proposed action and alternatives; and next steps in the environmental review process. Following this presentation Reclamation solicited input from the interested parties.

Comments received at the public scoping meetings, as well as those received in response to the Notice of Intent, reflected regional preferences for drainage disposal, a desire among stakeholders to reduce or eliminate the need for drainage service, and concerns about the potential environmental impacts of drainage service. Public concerns can be categorized into the six areas described below. For a complete discussion of these topic areas, see Appendix A.

- **Ocean and Delta Disposal.** Stakeholders from the areas identified as potential outfall locations for either the Ocean or Delta Disposal Alternatives suggested that the drainage problem be contained within the San Luis Unit. Major concerns were related to safety hazards associated with transporting drainwater, potential impacts to habitat at the disposal location, and potential water quality changes for drinking water supplies. Other stakeholders stated that out-of-valley solutions are the only long-term solutions that can be sustainable and that eventually the salt must be transported out of the valley.
- **Evaporation Basins.** Many stakeholders voiced concerns over the operation of large evaporation basins and expressed a strong desire to minimize the size of the evaporation basins and develop and manage the basins in a way that avoids impacts to wildlife. Some stakeholders had concerns regarding groundwater contamination from evaporation basins and regional reuse areas.
- **Land Retirement.** Reclamation received numerous comments requesting that large-scale land retirement of drainage-impaired lands (200,000+ acres) be considered as an alternative in the EIS. An additional stated purpose of large-scale land retirement proposals is the alternate use of the water saved from irrigation. Some commenters want the water used in the San Luis Unit, some believe it should no longer be exported from its basin of origin, and others suggested that it be used for water users or the environment outside the Unit.
- **Study Area.** Several commenters requested that Reclamation consider increasing the size of the study area to include impacts to lands adjacent to the San Luis Unit. These comments focused on assessing impacts of Se and other contaminants from drainage activities to the San Joaquin River, groundwater drinking supplies, and the San Francisco Bay-Delta.
- **Implementation Schedule.** Many comments mentioned that the implementation schedule provided by Reclamation did not provide for timely drainage service. Others suggested that Reclamation apply an adaptive management approach to implementing drainage service. The adaptive management approach should be implemented in such a way that Reclamation can take full advantage of emerging drainage treatment technologies. Some stakeholders also pointed out that an adaptive management approach could also provide timely drainage service, and the two are not mutually exclusive.
- **Drainage Reduction.** Stakeholders provided numerous comments regarding regulatory compliance, implementation responsibilities, and development of clear drainage reduction protocols. Included in these comments was a request that Reclamation comply with all current water quality regulations as well as consider future regulations, for drainage discharge to the ocean or Delta. Additionally, a number of comments focused on establishing enforceable drainage quality and quantity criteria and determining the optimum level of drainage service based on various level of on-farm drainage management.

In addition, a coalition of environmental groups and local agencies in Contra Costa County produced a briefing book called *Drainage without a Drain* to propose a strategy for resolving the

agricultural drainage problem. Likewise, water districts in the study area provided Reclamation with the *Westside Regional Drainage Plan*, outlining approaches for drainage management.

Based on agency and public comments during scoping, Reclamation decided to include land retirement as an alternative in the Draft EIS, if the parties to the lawsuit would agree that land retirement can be considered an alternative to drainage service. In December 2003, the parties agreed. Reclamation initiated additional public scoping on developing new or modified alternatives and related issues and environmental analysis. Between March 1 and 4, 2004, Reclamation conducted scoping meetings (including meetings with stakeholders) at four locations: Sacramento, Concord, Fresno, and Cayucos (Morro Bay). At these meetings, Reclamation outlined its approach to the analysis, including factors influencing land retirement, and requested comments on components of a land retirement alternative and environmental issues and impacts associated with land retirement that should be covered in the EIS. The public comments and Reclamation responses regarding how land retirement would be defined or implemented are summarized in Appendix A.

21.1.2 Scope of the Environmental Impact Analysis

Through all of its scoping efforts, Reclamation identified the following resource areas that require analysis, based on the potential impacts of the alternatives and the comments received. Coordination with resource agencies and specialists involved in preparing the EIS further defined the impact issues addressed in Sections 5 through 18.

Resources Requiring Major Analysis

- Surface Water Resources
- Biological Resources
- Selenium Bioaccumulation
- Regional Economics
- Ground Water Resources
- Geologic Hazards
- Agricultural Production
- Social Issues and Environmental Justice
- Energy Resources

Resources Requiring Minimal Analysis

- Air Quality
- Recreation Resources
- Cultural Resources
- Aesthetics

Resources Requiring No Further Analysis

- Traffic and Transportation
- Noise
- Utilities and Public Services
- Indian Trust Assets

21.1.3 Public Review of the Draft Environmental Impact Statement

The public Draft EIS is available for review and comment for 60 days following filing of the Notice of Availability of the EIS with the EPA. This notice, and the notice of public hearing on the EIS, were published in the *Federal Register* on the date indicated in the notice attached to this Draft EIS.

The purpose of public review is to receive comments from interested parties on the Draft EIS's completeness and adequacy in disclosing the environmental effects of the array of alternatives under consideration. Following the close of the public review period, a final document will be prepared that will include comments received on the Draft EIS and Reclamation's responses to those comments. An additional 30-day public review is provided for the Final EIS. Reclamation is responsible for adopting the Final EIS as adequate in compliance with NEPA. After adoption of the EIS, Reclamation will use the EIS to make a decision on the proposed action. That decision will be documented in a Record of Decision.

21.2 AGENCY CONSULTATION AND INVOLVEMENT**21.2.1 Interagency Meetings and Workshops**

Reclamation has integrated agency consultation and involvement into the overall planning process starting with the Functional Analysis Workshop that was held from August 20, 2001, through August 24, 2001. The purpose of the Functional Analysis Workshop was to verify the formulation of alternatives previously developed to ensure that current technological developments were not overlooked and to identify any fatal flaws in existing alternatives or components of alternatives before proceeding to further refine these alternatives. Another purpose of the workshop was to gather recommendations on the specific direction the process should take, including additional alternatives that might be considered. At the beginning of the workshop, Reclamation hosted an Open Forum for representatives from the regulatory, environmental, and water user organizations to present their views on how Reclamation should provide drainage service as directed by the court order.

Reclamation also held a series of Interagency Workshops at key points during the plan formulation process. The first of these was held on October 25, 2001, to discuss the following:

- Key project components
- Agency roles

- Public involvement activities
- Project work plan

A second Interagency Workshop was held on March 5, 2002, after Reclamation developed a set of guiding assumptions to assist the team in refining preliminary alternatives and identifying a short list of alternatives for detailed evaluation. Input from state and federal agencies was solicited on the following:

- Approach to alternatives formulation
- Review of current alternatives, including input to make alternatives complete
- Assumptions for each alternative
- Areas for improvement and optimization

As Reclamation began to identify the preliminary proposed alternative, a third Interagency Workshop was held on September 10, 2002, to solicit input from Federal and State agencies. Topic areas covered were:

- Review of the purpose and approach to alternatives development
- Alternative screening process and results
- Input to evaluate the screening process
- Discussion of the remaining alternatives
- Discussion of the impact analysis approach
- Identification of areas for improvement and optimization

On December 12, 2003, Reclamation conducted a fourth Interagency Workshop as preliminary land retirement alternatives were developed. Topic areas covered were:

- Project status update
- Land retirement alternatives development
- Schedule and agency coordination in preparing the Draft EIS

21.2.2 Agency and Interest Group Briefings

In addition to the public scoping meetings and Interagency Workshops, Reclamation conducted briefings for a number of local agencies, environmental groups, and congressional staff. These briefings are listed below:

- October 30, 2001 – Briefing for San Joaquin Valley Drainage Authority in Los Banos
- March 13, 2002 – Briefing for Contra Costa County and Contra Costa Water District in Oakland
- March 26, 2002 – Presentation at Salinity Drainage Conference in Sacramento
- August 26, 2002 – Briefing for Point Estero area elected officials and County Planning Department in San Luis Obispo

- September 18, 2002 – Briefing for San Joaquin River Settlement Group in Los Banos
- October 8, 2002 – Briefing for staff from the Coastal Commission in San Francisco
- October 8, 2002 – Briefing for Contra Costa County and Contra Costa Water District in San Francisco
- October 21, 2002 – Briefing for staff of Senator Feinstein and the County Planning Department in Fresno
- November 6, 2002 – Briefing for staff of Congresswoman Tauscher and Congressman Miller in Concord
- February 7, 2003 – Briefing for the San Francisco Bay Estuary project team in Vacaville
- March 26, 2003 – Salinity Conference presentation in Sacramento
- November 17, 2003 – Briefing to environmental interests in San Francisco
- December 8, 2004 – Briefing to San Joaquin River drainage interests in Los Banos

21.2.3 Cooperating Agencies

In November 2002, Reclamation formally invited the following to become cooperating agencies for preparing the Draft and Final EIS:

- California Department of Water Resources
- California Department of Fish and Game
- California Department of Food and Agriculture
- Natural Resources Conservation Service
- U.S. Fish and Wildlife Service
- National Oceanic & Atmospheric Administration, Fisheries
- U.S. Geological Survey
- U.S. Army Corps of Engineers
- Western Area Power Administration

Only the Service elected to become a cooperating agency.

21.2.4 Fish and Wildlife Coordination

21.2.4.1 Coordination Act Activities

Reclamation requested a series of Planning Aid Memorandums (PAMs) from the Service and a Coordination Act Report (CAR) in compliance with the Fish and Wildlife Coordination Act of 1958. The purpose of the PAMs was to assist Reclamation in scoping, planning, developing the feasibility study, and communicating Service positions and recommendations. Service staff was also tasked with participating in interagency meetings and workshops and reviewing

Reclamation's technical work. One PAM entitled Species List for San Luis Drain Feature Re-evaluation, Ocean Disposal Alternative dated June 3, 2002, and another entitled Species List for San Luis Drain Feature Re-evaluation. dated December 4, 2001, were received from the Service. Another PAM was received and dated July 2003. Reclamation also received comments on the San Luis Drainage Feature Re-Evaluation Plan from the Service dated July 15, 2003, and November 17, 2004. In addition, Reclamation requested a CAR, which is included as Appendix M. Recommendations provided by the Service in their CAR will be addressed in Section 7, Biological Resources, of the Final EIS and in other sections as appropriate.

Section 7 Consultation

Reclamation will prepare a Biological Assessment for the agency's preferred alternative, which has not been identified in this Draft EIS. This Biological Assessment will evaluate the potential effects of the agency's preferred alternative to federally listed threatened and endangered species identified on initial species lists received from the Service and NOAA-Fisheries on December 4, 2001, and updated lists from June 3, 2002, and June 3, 2003.

Reclamation plans to initiate formal consultation in mid-March 2005. Reclamation then expects to complete formal consultation prior to issuing the Final EIS.

Indian Trust Assets and Native American Consultation

Reclamation reviewed the location of Native American rancherias, reservations, and public domain allotments in relation to each of the alternatives. No Native American lands were found to be in conflict with any of the alternative alignments. Santa Rosa Rancheria is the only Native American land found in or near any alignment. The Santa Rosa Rancheria is southeast of Lemoore Naval Air Station, about 8 miles east of the terminus of the In-Valley Disposal Alternative pipeline. Reclamation will continue to review any changes in the alternative alignments throughout the planning process to determine whether consultation would be necessary in the future.

21.2.5 National Historic Preservation Act/State Historic Preservation Officer Consultation

As the lead federal agency, Reclamation has determined that any of the alternatives constitutes an undertaking subject to Section 106 of the National Historic Preservation Act of 1966, as amended. Reclamation is delineating the Area of Potential Effect (APE) for cultural resources and initiating consultation with the State Historic Preservation Officer (SHPO) pursuant to implementing regulations (36 CFR 800) for Section 106. As appropriate, the Section 106 process will be coordinated with planning and review procedures required under NEPA. Reclamation will consult with the California SHPO to delineate the APE and identify other consulting parties in the Section 106 process. Once the APE and consulting parties have been established, Section 106 efforts will focus on the identification of historic properties and the assessment and resolution of adverse effects to those properties to be affected by the undertaking.

21.3 LIST OF ENVIRONMENTAL COMMITMENTS

As stated in Section 2.3.2, Reclamation will design all Federal facilities to comply with all applicable Federal and State regulations. In addition, Reclamation intends to:

- Incorporate odor control into the Se treatment designs
- Establish groundwater monitoring wells near each evaporation basin
- Design/site/maintain facilities to not impede or be overtopped by 100-year floodflows
- Require noxious weed management for retired lands (non-Federal) and for areas disturbed for Federal facilities construction and operation.

Reclamation is continuing to investigate mitigation strategies and measures as part of the SLDFR Feasibility Study. Specific commitments to mitigate for significant adverse effects will be listed in the Record of Decision.

21.4 DISTRIBUTION LIST**21.4.1 Elected Officials***Federal*

- Senator Boxer
- Senator Feinstein
- Congresswoman Capps
- Congressman Dooley
- Congresswoman Lofgren
- Congressman Miller
- Congresswoman Tauscher
- Congressman Thomas
- Congressman Pombo
- Congressman Radanovich
- Congressman Nunes

State

- Senator Ackerman
- Senator Ashburn
- Senator Burton
- Senator Denham
- Senator Florez
- Senator Machado
- Senator McPherson
- Senator Ortiz
- Senator Perata
- Senator Poochigian
- Senator Torlakson
- Assembly member Aghazarian
- Assembly member Canciamilla
- Assembly member Chan
- Assembly member Cogdill
- Assembly member Dutra
- Assembly member Hancock
- Assembly member Houston
- Assembly member Lieber
- Assembly member Maldonado
- Assembly member Matthews
- Assembly member Nakanishi
- Assembly member Parra
- Assembly member Reyes
- Assembly member Salinas
- Assembly member Samuelian
- Assembly member Yee

Local

- Kings County Board of Supervisors
- Santa Clara County Board of Supervisors
- Fresno County Board of Supervisors
- Stanislaus County Board of supervisors
- Merced County Board of Supervisors
- San Benito County Board of Supervisors
- Madera County Board of Supervisors
- San Luis Obispo County
- San Joaquin County Board of Supervisors

21.4.2 Federal Agencies

- Department of Interior
 - Bureau of Reclamation
 - Fish and Wildlife Service
 - Geological Survey
- Department of Commerce
 - National Marine Fisheries Service
- Department of Justice
- Army Corps of Engineers

- Natural Resources Conservation Service
- Environmental Protection Agency, Region 9
- Western Area Power Administration
- Advisory Council on Historic Preservation
- Department of Energy

- Department of Health and Human Services
- Federal Emergency Management Administration

21.4.3 State Agencies

- Department of Fish and Game
- State Water Resources Control Board
- Regional Water Quality Control Board
 - Central Coast Regional Water Quality Control Board
 - Central Valley Regional Water Quality Control Board

- Central Valley Regional Water Quality Control Board - Fresno
- Department of Water Resources
- Department of Food and Agriculture
- California Coastal Commission
- Delta Protection Commission
- California Bay-Delta Authority

21.4.4 Local Agencies

- Alameda County Water District
- Contra Costa Water District
- Stockton East Water District
- Westlands Water District
- Firebaugh Canal Water District
- Broadview Water District
- Santa Clara Valley Water District
- Kings County Water District
- Pajaro Valley Water Management Agency
- San Luis Water District
- Fresno County Farm Bureau
- Santa Clara County Farm Bureau
- Alameda County Farm Bureau
- Merced County Farm Bureau
- San Joaquin County Farm Bureau
- San Benito County Farm Bureau
- Kings County Farm Bureau
- Contra Costa County Farm Bureau
- Madera County Farm Bureau
- Coalition of Central Coast County Farm Bureaus
- California Farm Bureau
- Association of California Water Agencies

- Merced County Planning Department
- San Luis Obispo County Planning Department
- Kings County Planning Department
- Trinity County Planning Department
- Madera Irrigation District
- East Contra Costa Irrigation District
- Merced Irrigation District
- Fresno Irrigation District
- Turlock Irrigation District
- Central California Irrigation District
- Santa Clara County Open Space Authority
- San Joaquin River Exchange Contractors Water Authority
- Fresno Westside Mosquito Abatement District
- San Joaquin Valley Drainage Authority
- San Luis & Delta-Mendota Water Authority
- South Delta Water Agency
- Panoche Drainage District
- Friant Water Users Authority
- East Bay Municipal Utility District
- Cayucos Citizens Advisory Council

- Upper Salinas Los Tablos Resource Conservation District

- Westside Resource Conservation District

21.4.5 Environmental Organizations

- The Bay Institute
- Natural Resources Defense Council
- California Trout – Bay Area Office
- Defenders of Wildlife
- California Natural Resources Foundation

- Friends of the Trinity River
- Environmental Water Caucus
- Environmental Defense
- California Striped Bass Association

21.4.6 Interested Individuals

- Patrick Porgans and Associates
- Yurok Tribe
- O'Neill Farms

- Triple T Farms
- Red Rock Ranch

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