Chapter 19

Socioeconomics

19.1 Introduction

This Chapter describes socioeconomic conditions in the Study Area; and potential changes that could occur as a result of implementing the alternatives evaluated in this Environmental Impact Statement (EIS). Implementation of the alternatives could affect socioeconomic conditions through potential changes in operation of the Central Valley Project (CVP) and State Water Project (SWP) that would change CVP and SWP water supply availability to agricultural water users and municipal and industrial (M&I) water users. Changes in CVP and SWP operations also would result in changes to recreational resources at reservoirs that store CVP and SWP water.

Changes in agricultural production, including costs to provide Alternative water supplies when CVP and SWP water supplies are not available, are presented in Chapter 12, Agricultural Resources. Changes in reservoir recreational opportunities that would occur due to reduction in reservoir storage elevations are presented in Chapter 15, Recreational Resources. The results of these analyses are summarized in Section 19.4, Environmental Consequences, of this Chapter and considered in the determination of regional socioeconomics effects.

19.2 Regulatory Environment and Compliance Requirements

Potential actions that could be implemented under the alternatives evaluated in this EIS could affect socioeconomic conditions in portions of the Study Area affected by or served by CVP and SWP water supplies. Actions located on public agency lands; or implemented, funded, or approved by Federal and state agencies would need to be compliant with appropriate Federal and state agency policies and regulations, as summarized in Chapter 4, Approach to Environmental Analyses.

19.3 Affected Environment

This section describes socioeconomic conditions that could be potentially affected by implementation of the alternatives considered in this EIS. The socioeconomic conditions described in this Chapter are related to population, employment, income, and taxes.

Housing information is not described in this Chapter because implementation of the No Action Alternative, Second Basis of Comparison, and Alternatives 1 through 5 would not result in changes to land use that would displace or relocate

housing stocks. Land use would be the same under the No Action Alternative, Second Basis of Comparison, and Alternatives 1 through 5, as described in Chapter 13, Land Use. The only changes in land use between recent historical conditions and conditions in 2030 for the No Action Alternative, Second Basis of Comparison, and Alternatives 1 through 5 would occur due to ecosystem restoration on agricultural lands, open space, and public lands that do not support housing units.

19.3.1 Characterization of Socioeconomic Conditions

Characterization of the socioeconomic conditions within the Study Area is based upon publically available data sources. The data sources used include the U.S. Census Bureau, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics, California Department of Finance, California Employment Development Department, and California Board of Equalization. The data were summarized and used to compare historical and current trends in the socioeconomic conditions in the Study Area.

Population and income data used to characterize the socioeconomic conditions are reported from 2000 to 2012 by the California Department of Finance.

The employment data presented in this Chapter are reported from 2001 to 2008 and from 2008 to 2012 (the latest values from consistent data sources). The first period from 2001 to 2008 represents a period of time prior to implementation of the 2008 U.S. Fish and Wildlife Service (USFWS) Biological Opinion (BO) and the 2009 National Marine Fisheries Service (NMFS) BO. The second period from 2008 to 2012 represents a period of time following implementation of the 2008 USFWS BO and 2009 NMFS BO.

There are two estimates of employment that are typically used to describe employment. The civilian labor force employment data compiled by the Bureau of Labor Statistics reflect the employment status of individuals that are covered by unemployment insurance by "place of residence," and includes the self-employed, employees on unpaid leave of absence, unpaid family workers, and household workers. These data do not include sole proprietors, some self-employed, and some farm workers and domestic workers. Employment by industry data compiled by the Bureau of Economic Analysis, including farm employment, reflect jobs by "place of work" and include sole proprietors and active partners, self-employed, farm workers, and domestic workers. Individuals with more than one job are counted only once in civilian labor force data and counted in each job in the employment by industry data. Therefore, the employment by industry data are greater than the civilian labor force data.

19.3.2 Trinity River Region

The Trinity River Region includes the area in Trinity County along the Trinity River from Trinity Lake to the confluence with the Klamath River; and in Humboldt and Del Norte counties along the lower Klamath River from the confluence with the Trinity River to the Pacific Ocean. Tribal lands along the Trinity or lower Klamath River within the Trinity River Region include the

Hoopa Valley Indian Reservation, Yurok Indian Reservation, and Resighini Rancheria.

Trinity County includes extensive trails, lakes, and the Trinity River Scenic Byway, providing several venues for outdoor enthusiasts and travelers. The recreation and tourism industries are major contributors to the local economy of Trinity County (EDD 2013).

Humboldt County is the largest and most populous of the north coast counties. Its 2012 population of 134,728 ranked 35th among the 58 counties in California (EDD 2014a). Humboldt County encompasses 2.3 million acres, 80 percent of which is forestlands, protected redwoods and recreation areas (Humboldt County 2014). Humboldt County is the leading timber producing county in the state (CDFA 2014). As described in Chapter 13, Land Use, the portion of Humboldt County in the Trinity River Region evaluated in this EIS is located along the Trinity and Klamath rivers. This portion of the county includes the communities of Willow Creek and Orleans within Humboldt County; Hoopa in the Hoopa Valley Indian Reservation; and the communities of Weitchpec, Cappell, Pecwan, and Johnson's in the Yurok Tribe Indian Reservation (Humboldt County 2012).

Del Norte County is the northernmost county in California. The county includes Redwood National Park and other state parks making tourism a natural industry in the county (EDD 2014b). As described in Chapter 13, Land Use, the portion of Del Norte County in the Trinity River Region evaluated in this EIS is located along the lower Klamath River. Most of this area is located within the Yurok Indian Reservation, and includes the communities of Requa and Klamath (Del Norte County 2003).

19.3.2.1 Population

Population in the Trinity River Region, by county and for the region as a whole, is presented in Table 19.1. The population of Trinity River Region has increased, although at a small average annual growth rate for the period shown.

Table 19.1 Population Characteristics in Trinity River Region

Area	Population 2000	Population 2012	Average Annual Growth Rate (percent) 2000-2012
Trinity County	13,022	13,471	0.3
Humboldt County	126,518	134,728	0.5
Del Norte County	27,507	28,527	0.3
Total Trinity River Region	167,047	176,726	0.5
STATE OF CALIFORNIA	33,873,086	37,427,946	0.9

Sources: DOF 2013a, 2013b, 2014

Tribal enrollment for the Hoopa Valley Tribe, Yurok Tribe, Karuk Tribe, and Resighini Rancheria as reported by the Bureau of Indian Affairs is presented in Table 19.2. These values do not necessarily include all members that live within the area, and should be considered as representative of trends. Values were only available for the years of 2001, 2003, 2005, and 2013.

Table 19.2 Tribal Enrollment in Trinity River Region

Tribe	2001	2003	2005	2013
Hoopa Valley Tribe	1,893	1,893	1,893	1,719[a]
Yurok Tribe	4,466	4,466	4,912	Not available
Karuk Tribe	3,165	3,165	3,427	Not available
Resighini Rancheria	90	175	111	Not available
TOTAL	**9,614**	**9,699**	**10,343**	**–**

Sources: BIA 2003, 2006, 2008, 2014

Note:
a. Value is reported as population, not enrollment, for Hoopa Valley Tribe in 2013.

19.3.2.2 Employment

Civilian labor force characteristics for the Trinity River Region are presented in Table 19.3. The civilian labor force (composed of employment and unemployment) in the Trinity River Region increased between 2001 and 2008 and between 2008 and 2012 (BLS 2014).

Table 19.3 Civilian Labor Force and Unemployment Rates in Trinity River Region

Area	Civilian Labor Force (subject to unemployment insurance)			Unemployment Rate (percent)		
	2001	2008	2012	2001	2008	2012
Trinity County	5,394	4,855	5,019	9.3	12.7	15.8
Humboldt County	60,443	60,039	60,144	6.0	7.2	10.5
Del Norte County	10,221	11,376	11,381	8.0	8.8	13.4
Total Trinity River Region	76,058	76,270	76,544	6.5	7.8	11.2
STATE OF CALIFORNIA	17,152,106	18,392,000	18,494,881	5.4	7.2	10.5

Source: BLS 2014

Available labor force and unemployment rates for members of the tribes in the Trinity River Region are presented in Table 19.4. These individuals may or may not be included in the values presented in Table 19.3 because different sources are used for each table.

Table 19.4 Available Labor Force and Unemployment Rates Related to the Tribes in Trinity River Region

Area	Civilian Labor Force				Unemployment Rate (percent)			
	2001	2003	2005	2013	2001	2003	2005	2013
Hoopa Valley Tribe	1,043	1,043	1,043	NA	40	40	40	42
Yurok Tribe	2,151	2,151	1,096	NA	74	74	74	38
Karuk Tribe	3,307	3,307	915	NA	14	14	63	29
Resighini Rancheria	37	44	45	NA	57	59	60	NA

Sources: BIA 2003, 2006, 2008, 2014

Note:
NA = Not Available

Total employment and the farm employment in 2001, 2008 and 2012 in the Trinity River Region counties are presented in Table 19.5. The Trinity River Region farm employment represents less than 1 percent of farm employment in the state and the lowest amount of farm employment in counties within the Study Area, as indicated in Figure 19.1.

Table 19.5 Employment in Trinity River Region

Area	Total Employment			Farm Employment[a]		
	2001	2008	2012	2001	2008	2012
Trinity County	4,878	4,930	4,788	155	161	165
Humboldt County	68,596	71,552	68,861	1,662	1,383	1,227
Del Norte County	10,266	11,531	10,720	384	309	231
Total Trinity River Region	83,740	88,013	84,369	2,201	1,853	1,623
STATE OF CALIFORNIA	19,411,367	20,820,306	20,653,860	479,283	438,013	443,764

Source: BEA 2014a.

Note:
a. Farm employment includes employment numbers in forestry, fishing, and related activities.

19.3.2.3 Income

Per capita personal income for the Trinity River Region counties for 2000, 2008, and 2012 is presented in Table 19.6. Humboldt County had the highest per capita income, and Del Norte County had the lowest.

Table 19.6 Per Capita Personal Income in Trinity River Region

Area	Per Capita Personal Income			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Trinity County	$20,489	$28,861	$34,027	4.4	4.2
Humboldt County	$23,980	$32,859	$35,681	4.0	2.1
Del Norte County	$18,563	$26,420	$30,016	4.5	3.2
Total Trinity River Region	$22,818	$31,497	$34,647	4.1	2.4
STATE OF CALIFORNIA	$33,404	$44,003	$43,647	3.5	1.4

Source: BEA 2014e

19.3.2.4 Local Government Finances

The sales tax rates, as of April 1, 2014, were 7.5 percent in all three counties in the Trinity River Region (BOE 2014). Total annual taxable sales within the Trinity River Region in 2000, 2008, and 2012 are presented in Table 19.7. The region's total taxable sales represents less than one tenth of one percent of total annual state taxable sales.

Table 19.7 Total Taxable Sales in Trinity River Region

Area	Total Taxable Sales (millions)			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Trinity County	$61	$74	$87	2.6	3.9
Humboldt County	$1,293	$1,693	$1,768	3.4	1.1
Del Norte County	$176	$232	$226	3.5	-0.6
Total Trinity River Region	$1,530	$1,999	$2,081	3.4	1.0
STATE OF CALIFORNIA	$441,854	$531,654	$407,714	2.3	-6.4

Sources: BOE 2000, 2008, 2012

Total property tax charges (secured and unsecured) within the Trinity River Region in Fiscal Year 2011-2012 were $160.2 million (California State Controller 2012). The Humboldt County share of the total property tax revenues was the largest at $126 million. The Del Norte and Trinity counties contributions to the total were $19 million and $13 million, respectively.

19.3.3 Central Valley Region

The Central Valley Region extends from above Shasta Lake to the Tehachapi Mountains, and includes the Sacramento Valley, San Joaquin Valley, and Delta and Suisun Marsh subregions.

19.3.3.1 Sacramento Valley

The Sacramento Valley includes the counties of Shasta, Plumas, Tehama, Glenn, Colusa, Butte, Sutter, Yuba, Nevada, Placer, and El Dorado counties. Sacramento, Yolo, and Solano counties also are located within the Sacramento

Valley; however, these counties are discussed below as part of the Delta and Suisun Marsh subsection. Other counties in Sacramento Valley are not anticipated to be affected by changes in CVP and SWP operations, and are not discussed here, including: Alpine, Sierra, Lassen, and Amador counties.

The Sacramento Valley includes major agricultural counties, including Glenn, Colusa, Sutter and Placer counties, as described in Chapter 12, Agricultural Resources. The region also includes some of the leading major timber producing counties of the state. Shasta County is the second and Plumas County is the fifth among the leading timber producing counties in the state.

19.3.3.1.1 Population

Population characteristics in the Sacramento Valley portion of the Central Valley Region are presented in Table 19.8. Among the counties evaluated in the Sacramento Valley portion of the Central Valley Region, Placer County had the highest average annual population growth rate between 2000 and 2012; and Plumas County was the only county with a reduction in population.

Table 19.8 Population Characteristics in Central Valley Region – Sacramento Valley

Area	Population		Average Annual Growth Rate (percent)
	2000	2012	2000-2012
Shasta County	163,256	177,516	0.8
Plumas County	20,824	19,901	-0.4
Tehama County	56,039	62,985	1.1
Glenn County	26,453	28,105	0.6
Colusa County	18,804	21,552	1.2
Butte County	203,171	220,465	0.7
Yuba County	60,219	72,642	1.6
Nevada County	92,033	97,366	0.5
Sutter County	78,930	94,620	1.7
Placer County	248,399	351,463	3.2
El Dorado County	156,299	180,483	1.3
Sacramento Valley Subtotal	1,124,427	1,333,615	1.4
Total Central Valley Region	6,214,316	7,408,750	1.5
STATE OF CALIFORNIA	33,873,086	37,668,804	0.9

Sources: DOF 2013a, 2013b, 2014

Civilian labor force characteristics for the counties in the Sacramento Valley portion of the Central Valley Region are presented in Table 19.9. The civilian labor force increased between 2001 and 2012. The data for 2008 represents the employment situation immediately following the recent economic recession that

started in 2007. The average unemployment rate in the civilian labor force increased from 2001 to 2012. The average unemployment rate in the Sacramento Valley portion of the Central Valley Region between 2001 and 2012 has been higher than the state unemployment rate; and lower than for the counties in the Central Valley Region.

Table 19.9 Civilian Labor Force and Unemployment Rates in Central Valley Region – Sacramento Valley

Area	Civilian Labor Force (subject to unemployment insurance)			Unemployment Rate (percent)		
	2001	2008	2012	2001	2008	2012
Shasta County	77,647	82,675	81,245	6.3	10.0	13.4
Plumas County	9,958	9,824	9,478	7.6	10.5	14.7
Tehama County	24,574	25,185	25,251	6.5	9.2	13.9
Glenn County	11,239	12,196	12,841	8.8	10.4	14.7
Colusa County	9,130	10,505	11,860	12.8	13.7	20.0
Butte County	95,216	102,952	102,063	6.6	8.4	12.2
Yuba County	24,862	27,729	27,772	8.5	11.8	16.9
Nevada County	46,947	50,428	50,742	4.4	6.5	9.4
Sutter County	38,457	41,100	42,810	9.7	12.3	17.6
Placer County	139,106	177,243	178,818	4.0	6.4	9.4
El Dorado County	84,064	90,732	90,525	4.3	6.9	10.4
Sacramento Valley Subtotal	561,200	630,569	633,405	5.8	8.3	12.0
Total Central Valley Region	3,519,870	3,885,435	3,990,083	6.8	8.7	12.6
STATE OF CALIFORNIA	17,152,106	18,392,000	18,494,881	4.9	7.2	10.5

Source: BLS 2014

Total employment and farm employment in 2001, 2008, and 2012 in the Sacramento Valley portion of the Central Valley Region are presented in Table 19.10. The contribution of farm employment to the total employment in the Sacramento Valley portion of the Central Valley Region declined between 2001 and 2008 and increased slightly by 2012.

Table 19.10 Employment in Central Valley Region – Sacramento Valley

Area	Total Employment			Farm Employment		
	2001	2008	2012	2001	2008	2012
Shasta County	85,937	91,883	86,696	1,821	1,781	1,751
Plumas County	10,813	10,524	9,493	288	140	138
Tehama County	23,760	24,284	22,669	2,716	2,332	3,042
Glenn County	11,526	11,987	11,856	2,873	1,927	2,049
Colusa County	9,770	10,863	11,266	2,943	1,954	1,831
Butte County	99,757	105,703	101,805	5,293	4,618	4,527
Yuba County	26,162	26,473	26,861	2,494	1,722	1,623
Nevada County	51,323	57,968	55,898	1,161	1,153	1,089
Sutter County	39,489	43,764	43,329	5,454	4,165	4,427
Placer County	158,070	192,171	188,729	2,064	1,925	1,844
El Dorado County	78,052	95,608	90,435	1,937	1,849	1,737
Sacramento Valley Subtotal	594,659	671,228	649,037	29,044	23,566	24,058
Total Central Valley Region	3,616,241	3,997,557	3,923,230	256,672	226,321	230,832
STATE OF CALIFORNIA	19,411,367	20,820,306	20,653,860	479,283	438,013	443,764

Source: BEA 2014a

Note:
Farm employment includes employment numbers in forestry, fishing, and related activities.

The annual farm employment for the Sacramento Valley portion of the Central Valley Region declined in 2004 and remained relatively stable through 2012, as shown in Figure 19.2. The overall trend in farm employment is influenced by the farm employment trends in Butte, Sutter, Tehama, Colusa, and Glenn counties, as shown in Figure 19.3. The decrease in farm employment is related to the reduction in cultivated acreage during this period, as described in Chapter 12, Agricultural Resources.

The farm employment numbers presented in Table 19.10 include only workers directly involved in farming, forestry, and fishing activities. However, farming is one of the most important basic industries in the Central Valley Region; and supports many other businesses including farm inputs (e.g., fertilizer, seed, machinery, and fuel) and processing of food and fiber grown on farms. As a result, employment both directly on farm and indirectly dependent on farming is higher than the values displayed in Table 19.10.

19.3.3.1.3 Income

The average per capita personal incomes for the counties in the Sacramento Valley portion of the Central Valley Region are presented in Table 19.11. Per capita personal incomes increased by an average annual rate of between 3 and 6 percent from 2000 to 2008. Following the economic downturn that started in 2007, the average annual growth in per capita personal income slowed between 2008 and 2012, except in Tehama County.

Table 19.11 Per Capita Personal Income in Central Valley Region – Sacramento Valley

Area	Per Capita Personal Income			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Shasta County	$25,385	$34,995	$37,593	4.1	1.8
Plumas County	$26,415	$38,401	$43,085	4.8	2.9
Tehama County	$19,461	$25,805	$30,094	3.6	3.9
Glenn County	$20,210	$32,054	$38,568	5.9	4.7
Colusa County	$24,656	$39,568	$45,800	6.1	3.7
Butte County	$23,143	$32,379	$35,696	4.3	2.5
Yuba County	$19,537	$27,655	$32,835	4.4	4.4
Nevada County	$32,253	$44,960	$47,924	4.2	1.6
Sutter County	$25,581	$33,117	$36,243	3.3	2.3
Placer County	$38,034	$49,436	$52,544	3.3	1.5
El Dorado County	$37,397	$50,052	$54,533	3.7	2.2
Average in Sacramento Valley Counties	$29,317	$40,177	$43,873	4.0	2.2
Central Valley Region	$28,163	$37,207	$40,619	3.5	2.2
STATE OF CALIFORNIA	$33,404	$44,003	$46,477	3.5	1.4

Source: BEA 2014e

19.3.3.1.4 Local Government Finances

As of April 1, 2014, the county sales tax rates in the counties within the Sacramento Valley portion of the Central Valley Region was 7.5 percent for all counties except Nevada County (BOE 2014). The Nevada County sales tax rate was 7.625 percent. These rates include the state, county, local and district taxes.

The total annual taxable sales in the Sacramento Valley portion of the Central Valley Region in 2000, 2008, and 2012 are presented in Table 19.12. The total taxable sales represent about 3 percent of total annual state taxable sales. The lower rates of growth for the period 2008 to 2012 may be attributable to the effects of the recession that started in 2007 and a decline in employment, as discussed above.

Table 19.12 Total Taxable Sales in Central Valley Region – Sacramento Valley

Area	Total Taxable Sales (millions)			Average Annual Growth Rate	
	2000	2008	2012	2000-2008	2008-2012
Shasta County	$2,055	$2,641	$2,642	3.2	0.0
Plumas County	$187	$222	$197	2.1	-2.9
Tehama County	$470	$684	$748	4.8	2.3
Glenn County	$231	$318	$327	4.1	0.7
Colusa County	$223	$329	$337	5.0	0.6
Butte County	$2,039	$2,678	$2,714	3.5	0.3
Yuba County	$392	$515	$486	3.5	-1.4
Nevada County	$997	$1,187	$1,105	2.2	-1.8
Sutter County	$1,021	$1,287	$1,367	2.9	1.5
Placer County	$4,742	$6,635	$7,066	4.3	1.6
El Dorado County	$1,324	$1,788	$1,740	3.8	-0.7
Sacramento Valley Subtotal	$13,680	$18,283	$18,729	3.7	0.6
Central Valley Region	$83,363	$109,401	$114,959	3.5	1.2
STATE OF CALIFORNIA	$441,854	$531,654	$407,714	2.3	-6.4

Sources: BOE 2000, 2008, 2012

Combined (secured and unsecured) property tax revenues in each of the counties in the Sacramento Valley portion of the Central Valley Region for Fiscal Year 2011-2012 are presented in Table 19.13. Total property tax revenues from these counties accounted for about 3 percent of the total state property tax revenues.

Table 19.13 Property Tax Revenues, Fiscal Year 2011-2012, in Central Valley Region – Sacramento Valley

Area	Property Tax Revenues (millions)
Shasta County	$168
Plumas County	$41
Tehama County	$48
Glenn County	$30
Colusa County	$36
Butte County	$203
Yuba County	$62
Nevada County	$183
Sutter County	$103
Placer County	$692
El Dorado County	$300
Sacramento Valley Subtotal	$1,866
Central Valley Region	$9,874
STATE OF CALIFORNIA	$55,459

Source: California State Controller 2012

19.3.3.2 San Joaquin Valley

The San Joaquin Valley includes the counties of Stanislaus, Merced, Madera, Fresno, Kings, Tulare, and Kern counties. San Joaquin County also is located within the San Joaquin Valley; however, this county is discussed below as part of the Delta and Suisun Marsh subsection. Other counties in the San Joaquin Valley are not anticipated to be affected by changes in CVP and SWP operations, and are not discussed here, including: Calaveras, Mariposa, and Tuolumne counties.

The San Joaquin Valley includes the major agricultural counties, of Fresno, Kern, Kings and Tulare, as described in Chapter 12, Agricultural Resources.

19.3.3.2.1 Population

Population characteristics in the San Joaquin Valley portion of the Central Valley Region are presented in Table 19.14. Among the counties in the San Joaquin Valley portion of the Central Valley Region, Kern County had the highest average annual population growth rate between 2000 and 2012; and Stanislaus and Kings counties had the lowest growth rate.

Table 19.14 Population Characteristics in Central Valley – San Joaquin Valley

Area	Population		Average Annual Growth Rate (percent)
	2000	2012	2000-2012
Stanislaus County	446,997	519,339	1.3
Madera County	123,109	152,325	1.8
Merced County	210,554	260,029	1.8
Fresno County	799,407	943,493	1.4
Tulare County	368,021	451,540	1.7
Kings County	129,461	151,774	1.3
Kern County	661,653	849,977	2.1
San Joaquin Valley Subtotal	2,739,202	3,328,477	1.6
Total Central Valley Region	6,062,064	7,238,742	1.5
STATE OF CALIFORNIA	33,873,086	37,668,804	0.9

Sources: DOF 2013a, 2013b, 2014

19.3.3.2.2 Employment

Civilian labor force characteristics for the counties in the San Joaquin Valley portion of the Central Valley Region are presented in Table 19.15. The civilian labor force increased between 2001 and 2012. The data for 2008 represents the employment situation immediately following the recession that started in 2007. The average unemployment rate in the civilian labor force increased from 2001 to 2012. The average unemployment rates for the San Joaquin Valley portion of the Central Valley Region between 2001 and 2012 have been higher than for the entire Central Valley Region and the state.

Table 19.15 Civilian Labor Force and Unemployment Rates in Central Valley Region – San Joaquin Valley

Area	Civilian Labor Force (subject to unemployment insurance)			Unemployment Rate (percent)		
	2001	2008	2012	2001	2008	2012
Stanislaus County	214,292	231,965	239,461	8.3	11.0	15.2
Madera County	53,956	65,100	68,167	9.6	9.4	13.6
Merced County	91,825	102,251	111,322	10.1	12.5	17.0
Fresno County	389,805	430,163	442,453	10.7	10.5	15.2
Tulare County	175,357	199,124	207,634	11.4	10.8	15.8
Kings County	50,233	58,801	60,886	10.7	10.5	15.3
Kern County	297,982	359,573	396,657	8.6	9.8	13.3
San Joaquin Valley Subtotal	1,273,450	1,446,977	1,526,580	9.8	10.5	14.9
Total Central Valley Region	3,448,061	3,807,278	3,911,569	6.8	8.7	12.6
STATE OF CALIFORNIA	17,152,106	18,392,000	18,494,881	4.9	7.2	10.5

Source: BLS 2014

Total employment and farm employment in 2001, 2008 and 2012 in the San Joaquin Valley portion of the Central Valley Region are presented in Table 19.16. The contribution of farm employment to the total employment declined between 2001 and 2008, and then increased slightly in 2012, except in Tulare County. In Tulare County, farm employment increased between 2001 and 2008 and decreased between 2008 and 2012.

Table 19.16 Employment in Central Valley Region – San Joaquin Valley

Area	Total Employment			Farm Employment		
	2001	2008	2012	2001	2008	2012
Stanislaus County	208,016	221,632	214,446	18,708	16,000	15,784
Madera County	50,975	59,354	59,027	6,296	4,750	5,186
Merced County	82,803	92,891	93,766	14,147	12,029	8,075
Fresno County	401,025	446,939	437,934	56,655	50,798	51,277
Tulare County	168,523	191,195	186,875	42,851	38,080	36,369
Kings County	48,960	57,513	55,008	4,705	4,061	6,620
Kern County	311,946	369,152	386,642	46,307	47,661	52,583
San Joaquin Valley Subtotal	1,272,248	1,438,676	1,433,698	189,669	173,379	175,894
Total Central Valley Region	3,616,241	3,997,557	3,923,230	256,672	226,321	230,832
STATE OF CALIFORNIA	19,411,367	20,820,306	20,653,860	479,283	438,013	443,764

Source: BEA 2014a

Note:
Farm employment includes employment numbers in forestry, fishing, and related activities.

Annual farm employment for the San Joaquin Valley portion of the Central Valley Region declined in 2004 and continued to fluctuate through 2012, as

shown in Figure 19.2. Farm employment in the San Joaquin Valley portion of the Central Valley Region represents a major portion of the overall farm employment in the Central Valley.

Within the counties in the San Joaquin Valley portion of the Central Valley Region, farm employment declined between 2003 and 2006 and remained about the same between 2007 and 2012. The overall trend in farm employment is influenced by the farm employment trends in Fresno, Kern, and Tulare counties, as shown in Figure 19.4. The decrease in farm employment is related to the reduction in cultivated acreage during this period, as described in Chapter 12, Agricultural Resources.

The farm employment numbers presented in Table 19.16 include only workers directly involved in farming, forestry, and fishing activities. However, farming is one of the most important basic industries in the Central Valley; and supports many other businesses including farm inputs (e.g., fertilizer, seed, machinery, and fuel) and processing of food and fiber grown on farms. As a result, employment both directly on farm and indirectly dependent on farming is higher than the values displayed in Table 19.16.

Total farm-dependent employment is not reported in the U.S. Bureau of Economic Analysis or the U.S. Bureau of Labor Statistics; however, the employment values can be estimated by studies of local economies. A study of the local economy in four counties of the San Joaquin Valley found that, for every on-farm job, about two and one-half additional jobs are supported because of inputs purchased for farming operations (NEA 1997). This estimate includes the associated effects of workers on those farms and businesses spending their incomes on other purchases; however, the estimated values do not include employment in the processing sector. Another study indicated that the employment multiplier of the agricultural production and processing industry is 1.92, or that for every 100 agricultural production and processing jobs in the San Joaquin Valley, 92 other jobs were created in the San Joaquin Valley (UCAIC 2009).

San Joaquin Valley employment also includes employment associated with adult prison facilities. The San Joaquin Valley portion of the Central Valley Region includes eight (or about 24 percent) of the 33 adult prison facilities operated by the California Department of Corrections and Rehabilitation. These prisons are home to about a quarter of the total prison population in the state and employ about a quarter of the total prison staff in the state. Employment for these prisons is summarized in Table 19.17.

Table 19.17 California State Prisons in Central Valley Region - San Joaquin Valley

Prison Facility	Location	Staff
Central California Women's Facility	Chowchilla, Madera County	1,064
Valley State Prison	Chowchilla, Madera County	1,021
Pleasant Valley State Prison	Coalinga, Fresno County	1,357
Avenal State Prison	Avenal, Kings County	1,475
California State Prison	Corcoran, Kings County	2,003
Wasco State Prison	Wasco, Kern County	1,523
North Kern State Prison	Delano, Kern County	1,393
Kern Valley State Prison	Delano, Kern County	1,545

Sources: CDCR 2014a, 2014b, 2014c, 2014d, 2014e, 2014f, 2014g, 2014h

Federal prisons are located at Atwater in Merced County, Mendota in Fresno County, and Taft in Kern County within the San Joaquin Valley portion of the Central Valley Region (BOP 2014).

19.3.3.2.3 Income

The average per capita personal income in the San Joaquin Valley portion of the Central Valley Region was lower than that for the entire Central Valley Region, as presented in Table 19.18. The average per capita personal income in the San Joaquin Valley portion of the Central Valley Region was a little more than two-thirds of the average per capita personal income in the Central Valley Region and the state. With the exception of Stanislaus County, most counties in the San Joaquin Valley portion of the Central Valley Region had higher annual average growth in per capita personal income between 2000 and 2008 than the entire Central Valley Region and the state.

Table 19.18 Per Capita Personal Income in Central Valley Region – San Joaquin Valley

Area	Per Capita Personal Income			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Stanislaus County	$24,284	$31,093	$34,138	3.1	2.4
Madera County	$18,983	$26,693	$31,169	4.4	4.0
Merced County	$19,976	$26,963	$30,630	3.8	3.2
Fresno County	$23,001	$30,977	$34,074	3.8	2.4
Tulare County	$20,070	$28,035	$31,307	4.3	2.8
Kings County	$16,912	$26,339	$31,835	5.7	4.9
Kern County	$21,507	$29,527	$34,453	4.0	3.9
Average in San Joaquin Valley Counties	$21,755	$29,505	$33,303	3.9	3.1
Central Valley Region	$28,183	$37,198	$40,601	3.5	2.2
STATE OF CALIFORNIA	$33,404	$44,003	$46,477	3.5	1.4

Source: BEA 2014e

19.3.3.2.4 Local Government Finances

As of April 1, 2014, the county sales tax rates in the counties within the San Joaquin Valley portion of the Central Valley ranged from 7.5 percent in Merced, Kern, and Kings counties to 8.225 percent in Fresno County (BOE 2014).

The total annual taxable sales for the counties in the San Joaquin Valley portion of the Central Valley Region in 2000, 2008, and 2012 are presented in Table 19.19. The contribution of the area to California total annual taxable sales increased between 2000 and 2012. The lower rates of growth for the period 2008 to 2012 may be attributable to the effects of the recession that started in 2007 and a decline in employment, as discussed above.

Table 19.19 Total Taxable Sales in Central Valley Region – San Joaquin Valley

Area	Total Taxable Sales (millions)			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Stanislaus County	$5,195	$6,729	$7,178	3.3	1.6
Madera County	$881	$1,327	$1,356	5.2	0.5
Merced County	$1,740	$2,388	$2,512	4.0	1.3
Fresno County	$8,472	$11,729	$12,021	4.2	0.6
Tulare County	$3,222	$4,755	$5,499	5.0	3.7
Kings County	$888	$1,389	$1,386	5.8	-0.1
Kern County	$6,938	$12,086	$14,666	7.2	5.0
Total San Joaquin Valley	$27,337	$40,403	$44,619	5.0	2.5
Central Valley Region	$81,975	$107,699	$113,368	3.5	1.3
STATE OF CALIFORNIA	$441,854	$531,654	$407,714	2.3	-6.4

Sources: BOE 2000, 2008, 2012

The combined (secured and unsecured) property tax revenues in each of the counties in the San Joaquin Valley portion of the Central Valley Region for Fiscal Year 2011-2012 are presented in Table 19.20. Total property tax revenues from these counties accounted for about 6 percent of the total state property tax revenues.

Table 19.20 Property Tax Revenues, Fiscal Year 2011-2012, in Central Valley Region – San Joaquin Valley

Area	Property Tax Revenues (millions)
Stanislaus County	$426
Madera County	$128
Merced County	$197
Fresno County	$755
Tulare County	$327
Kings County	$104
Kern County	$1,102
San Joaquin Valley Subtotal	$3,039
Central Valley Region	$9,874
STATE OF CALIFORNIA	$55,459

Source: California State Controller 2012

19.3.3.3 Delta and Suisun Marsh

The Delta and Suisun Marsh portion of the Central Valley Region includes Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties. These counties include some of the leading agricultural areas in the state. In addition to agriculture, this area includes important transportation infrastructures including inland shipping ports (Port of West Sacramento and Port of Stockton); major employment centers (cities of Sacramento, West Sacramento, Fairfield, Stockton, and Concord); and water-based recreation activities (e.g., boating, fishing, and water skiing).

19.3.3.3.1 Population

Population characteristics in the counties of the Delta and Suisun Marsh portion of the Central Valley Region are presented in Table 19.21. San Joaquin County had the highest average annual population growth rate between 2000 and 2012, and Solano County had the lowest growth rate.

Table 19.21 Population Characteristics in Central Valley Region – Delta and Suisun Marsh

Area	Population		Average Annual Growth Rate (percent)
	2000	2012	2000-2012
Sacramento County	1,223,499	1,433,525	1.3
Yolo County	168,660	204,349	1.6
Solano County	394,930	415,787	0.4
San Joaquin County	563,598	692,997	1.7
Contra Costa County	948,816	1,066,602	1.0
Delta and Suisun Marsh Subtotal	3,299,503	3,813,260	1.2
Total Central Valley Region	6,062,064	7,238,742	1.5
STATE OF CALIFORNIA	33,873,086	37,668,804	0.9

Sources: DOF 2013a, 2013b, 2014

19.3.3.3.2 Employment

Civilian labor force characteristics for the Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties are presented in Table 19.22. The civilian labor force in these counties increased between 2001 and 2012. The data for 2008 represents the employment situation immediately following the recession in 2007.

Table 19.22 Civilian Labor Force and Unemployment Rates in Central Valley Region – Delta and Suisun Marsh

Area	Civilian Labor Force (subject to unemployment insurance)			Unemployment Rate (percent)		
	2001	2008	2012	2001	2008	2012
Sacramento County	624,693	680,373	680,349	4.5	7.2	10.6
Yolo County	88,331	98,438	98,475	5.1	7.4	11.5
Solano County	197,178	211,369	217,024	4.6	6.8	10.1
San Joaquin County	266,288	293,190	298,468	7.5	10.4	15.2
Contra Costa County	508,730	524,519	535,782	4.1	6.2	9.0
Delta and Suisun Marsh Subtotal	1,685,220	1,807,889	1,830,098	4.9	7.4	10.8
Total Central Valley Region	3,448,061	3,807,278	3,911,569	6.8	8.7	12.6
STATE OF CALIFORNIA	17,152,106	18,392,000	18,494,881	4.9	7.2	10.5

Source: BLS 2014

Total employment and farm employment in 2001, 2008, and 2012 in the Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties are presented in Table 19.23. The contribution of farm employment to the total employment declined slightly between 2001 and 2008, and then increased slightly between 2008 and 2012.

Table 19.23 Employment in Central Valley Region – Delta and Suisun Marsh

Area	Total Employment			Farm Employment		
	2001	2008	2012	2001	2008	2012
Sacramento County	739,256	806,976	784,386	5,176	4,019	3,924
Yolo County	110,902	122,054	117,609	5,244	5,364	5,745
Solano County	162,874	174,565	169,096	3,321	2,144	2,116
San Joaquin County	260,809	286,171	277,260	21,088	16,939	17,496
Contra Costa County	475,493	497,887	492,144	3,130	910	1,599
Delta and Suisun Marsh Subtotal	1,749,334	1,887,653	1,840,495	37,959	29,376	30,880
Total Central Valley Region	3,616,241	3,997,557	3,923,230	256,672	226,321	230,832
STATE OF CALIFORNIA	19,411,367	20,820,306	20,653,860	479,283	438,013	443,764

Source: BEA 2014a

Note:
Farm employment includes employment numbers in forestry, fishing, and related activities.

Annual farm employment for the Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties declined in 2004, slightly increased in 2006, and continued to fluctuate through 2012, as shown in Figure 19.5. Within these counties, farm employment started to decline in 2004 and began to increase slightly in 2006, as shown in Figure 19.5. The overall trend in farm employment in the Delta and Suisun Marsh portion of the Central Valley Region is influenced by the farm employment trends in San Joaquin County. The decrease in farm employment is related to the reduction in cultivated acreage during this period, as described in Chapter 12, Agricultural Resources.

The farm employment numbers presented in Table 19.23 include only workers directly involved in farming, forestry, and fishing activities. However, farming is one of the most important basic industries in many counties in the Central Valley Region; and supports many other businesses including farm inputs (e.g., fertilizer, seed, machinery, and fuel) and processing of food and fiber grown on farms. As a result, employment both directly on farm and indirectly dependent on farming is higher than the values displayed in Table 19.23.

19.3.3.3.3 Income

The average per capita personal income in the Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties was about 15 percent higher than the average per capita personal income in the entire Central Valley Region, as presented in Table 19.24. San Joaquin and Contra Costa counties experienced the lowest average annual growth rates in per capita personal income between 2000 and 2008. Between 2008 and 2012, Yolo County was the only county with a slightly higher average annual growth rate as compared to the entire Central Valley Region.

Table 19.24 Per Capita Personal Income in Central Valley Region – Delta and Suisun Marsh

Area	Per Capita Personal Income			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Sacramento County	$29,406	$38,782	$41,837	3.5	1.9
Yolo County	$27,093	$37,488	$41,811	4.1	2.8
Solano County	$28,373	$39,178	$42,354	4.1	2.0
San Joaquin County	$25,147	$31,250	$33,024	2.8	1.4
Contra Costa County	$45,576	$58,547	$61,638	3.2	1.3
Average in Delta and Suisun Marsh Counties	$33,079	$42,861	$45,829	3.3	1.7
Central Valley Region	$28,183	$37,198	$40,601	3.5	2.2
STATE OF CALIFORNIA	$33,404	$44,003	$46,477	3.5	1.4

Source: BEA 2014e

19.3.3.3.4 Local Government Finances

As of April 1, 2014, the county sales tax rates in the Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties ranged between 7.5 percent in Yolo to 8 percent in San Joaquin (BOE 2014).

Total annual taxable sales for Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties in 2000, 2008, and 2012 are presented in Table 19.25. Between 2000 and 2008 Yolo, Solano, and San Joaquin counties experienced average annual growth in total taxable sales that were higher than the entire Central Valley Region and the state. Between 2008 and 2012, Sacramento County experienced negative average annual growth in total taxable sales.

Table 19.25 Total Taxable Sales in Central Valley Region – Delta and Suisun Marsh

Area	Total Taxable Sales (millions)			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Sacramento County	$16,594	$19,332	$19,090	1.9	-0.3
Yolo County	$2,416	$3,347	$3,475	4.2	0.9
Solano County	$4,424	$6,033	$6,038	4.0	0.0
San Joaquin County	$6,582	$8,696	$9,011	3.5	0.9
Contra Costa County	$12,331	$13,308	$13,997	1.0	1.3
Delta and Suisun Marsh Counties	$42,347	$50,715	$51,611	2.3	0.4
Central Valley Region	$81,975	$107,699	$113,368	3.5	1.3
STATE OF CALIFORNIA	$441,854	$531,654	$407,714	2.3	-6.4

Sources: BOE 2000, 2008, 2012

The combined (secured and unsecured) property tax revenues in Sacramento, Yolo, Solano, San Joaquin, and Contra Costa counties for Fiscal Year 2011-2012 are presented in Table 19.26. Total property tax revenues from these counties accounted for about 9 percent of the total state property tax revenues.

Table 19.26 Property Tax Revenues, Fiscal Year 2011-2012, in Central Valley Region – Delta and Suisun Marsh

Area	Property Tax Revenues (millions)
Sacramento County	$1,539
Yolo County	$270
Solano County	$497
San Joaquin County	$684
Contra Costa County	$1,979
Delta and Suisun Marsh Counties	$4,969
Central Valley Region	$9,874
STATE OF CALIFORNIA	$55,459

Source: California State Controller 2012

19.3.4 San Francisco Bay Area Region

The San Francisco Bay Area Region includes portions of Napa, Alameda, Santa Clara, and San Benito counties that are within the CVP and SWP service areas. Contra Costa County also is part of the San Francisco Bay Area Region. However, for this chapter, Contra Costa County is discussed under Section 19.3.4.3, Delta and Suisun Marsh.

19.3.4.1 Population

Population characteristics in the San Francisco Bay Area Region are presented in Table 19.27. The population of the San Francisco Bay Area Region grew slightly less than a quarter million, or at an average annual growth rate of less than one half of one percent between 2000 and 2012.

Table 19.27 Population Characteristics in San Francisco Bay Area Region

Area	Population		Average Annual Growth Rate (percent)
	2000	2012	2000-2012
Alameda County	1,443,939	1,530,176	0.5
Santa Clara County	1,682,585	1,813,696	0.6
San Benito County	53,234	56,137	0.4
Napa County	124,279	137,731	0.9
Total San Francisco Bay Area Region	3,304,037	3,537,740	0.6
STATE OF CALIFORNIA	33,873,086	37,668,804	0.9

Sources: DOF 2013a, 2013b, 2014

19.3.4.2 Employment

Civilian labor force characteristics for the counties in the San Francisco Bay Area Region are presented in Table 19.28. The civilian labor force in the counties within the San Francisco Bay Area Region declined between 2001 and 2008, and then increased between 2008 and 2012. The data for 2008 represents the employment situation immediately following the onset of the recession in 2007.

Table 19.28 Civilian Labor Force and Unemployment Rates in San Francisco Bay Area Region

Area	Civilian Labor Force (subject to unemployment insurance)			Unemployment Rate (percent)		
	2001	2008	2012	2001	2008	2012
Alameda County	778,472	757,566	775,855	4.8	6.2	9.0
Santa Clara County	939,501	870,251	910,983	5.1	6.0	8.4
San Benito County	27,461	24,870	26,611	6.3	9.6	13.9
Napa County	70,447	75,670	77,843	3.6	5.1	7.8
Total San Francisco Bay Area Region	1,815,881	1,728,357	1,791,292	4.9	6.1	8.7
STATE OF CALIFORNIA	17,152,106	18,392,000	18,494,881	4.9	7.2	10.5

Source: BLS 2014

Total employment and farm employment in 2001, 2008 and 2012 in the San Francisco Bay Area Region are presented in Table 19.29. The contribution of farm employment to total employment in the San Francisco Bay Area Region declined slightly between 2001 and 2008, and remained relatively stable between 2008 and 2012.

Table 19.29 Employment in San Francisco Bay Area Region

	Total Employment			Farm Employment		
	2001	**2008**	**2012**	**2001**	**2008**	**2012**
Alameda County	886,316	906,403	894,625	1,704	1,475	1,291
Santa Clara County	1,226,987	1,176,129	1,187,799	5,969	4,436	2,643
San Benito County	21,722	21,827	21,116	1,969	1,244	1,073
Napa County	84,369	91,837	93,050	4,835	5,730	3,148
Total San Francisco Bay Area Region	2,219,394	2,196,196	2,196,590	14,477	12,885	8,155
STATE OF CALIFORNIA	19,411,367	20,820,306	20,653,860	479,283	438,013	443,764

Source: BEA 2014a

Note:
Farm employment includes employment numbers in forestry, fishing, and related activities.

As shown in Table 19.29, overall farm employment has declined by 45 percent between 2001 and 2012, as presented in Figure 19.1. The decrease in farm employment is related to the reduction in cultivated acreage during this period, as described in Chapter 12, Agricultural Resources.

19.3.4.3 Income

The average per capita personal incomes for the counties in the San Francisco Bay Area Region are presented in Table 19.30. Among the four counties in this region, San Benito County had the lowest per capita personal income. Santa Clara County had the lowest average annual per capita growth rate between 2000 and 2008. All counties experienced smaller average annual per capita growth rates between 2008 and 2012 compared to the 2000 to 2008 period.

Table 19.30 Per Capita Personal Income in San Francisco Bay Area Region

Area	Per Capita Personal Income			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Alameda County	$39,613	$50,302	$54,683	3.0	2.1
Santa Clara County	$55,588	$59,927	$66,535	0.9	2.6
San Benito County	$29,608	$36,100	$38,030	2.5	1.3
Napa County	$38,854	$51,712	$54,807	3.6	1.5
Total San Francisco Bay Area Region	$47,546	$55,050	$60,493	1.8	2.4
STATE OF CALIFORNIA	$33,404	$44,003	$46,477	3.5	1.4

Source: BEA 2014e

19.3.4.4 Local Government Finances

As of April 1, 2014, the county sales tax rates in the San Francisco Bay Area region ranged between 7.5 percent in San Benito and 9.0 percent in Alameda (BOE 2014).

Total annual taxable sales for the counties in the San Francisco Bay Area Region in 2000, 2008, and 2012 are presented in Table 19.31. Between 2000 and 2008 all counties in the region, except Santa Clara County, experienced small increases in average annual growth in total taxable sales. All counties experienced increasing growth rates between 2008 and 2012. Santa Clara County had the highest annual average growth rate in total taxable sales among all the counties in the region during this period.

Table 19.31 Total Taxable Sales in San Francisco Bay Area Region

Area	Total Taxable Sales (Millions)			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Alameda County	$23,764	$23,863	$25,182	0.1	1.4
Santa Clara County	$37,304	$32,274	$36,220	-1.8	2.9
San Benito County	$476	$505	$530	0.7	1.2
Napa County	$1,908	$2,549	$2,719	3.7	1.6
Total San Francisco Bay Area Region	$63,451	$59,191	$64,651	-0.9	2.2
STATE OF CALIFORNIA	$441,854	$531,654	$407,714	2.3	-6.4

Sources: BOE 2000, 2008, 2012

The combined (secured and unsecured) property tax revenues in each of the counties in the San Francisco Bay Area Region for Fiscal Year 2011-2012 are presented in Table 19.32. Total property tax revenues in the four counties accounted for about 13 percent of the total state property tax revenues.

Table 19.32 Property Tax Revenues, Fiscal Year 2011-2012, in San Francisco Bay Area Region

Area	Property Tax Revenues (millions)
Alameda County	$2,830
Santa Clara County	$3,973
San Benito County	$68
Napa County	$327
Total San Francisco Bay Area Region	$7,198
STATE OF CALIFORNIA	$55,459

Source: California State Controller 2014

19.3.5 Central Coast Region

The Central Coast Region includes portions of San Luis Obispo and Santa Barbara counties served by the SWP. San Luis Obispo and Santa Barbara counties are among the top 15 counties in total agricultural production in the state.

19.3.5.1 Population

Population characteristics in the Central Coast Region are presented in Table 19.33. The population of the Central Coast Region grew by an average annual growth rate of about one half of one percent between 2000 and 2012.

Table 19.33 Population Characteristics in Central Coast Region

Area	Population		Average Annual Growth Rate (percent)
	2000	2012	2000-2012
San Luis Obispo County	246,681	271,502	0.8
Santa Barbara County	399,347	426,351	0.5
Total Central Coast Region	646,028	697,853	0.6
STATE OF CALIFORNIA	33,873,086	37,668,804	0.9

Sources: DOF 2013a, 2013b, 2014

19.3.5.2 Employment

Civilian labor force characteristics for the counties in the Central Coast Region are presented in Table 19.34. The civilian labor force in the Central Coast Region increased between 2000 and 2012.

Table 19.34 Civilian Labor Force and Unemployment Rates in Central Coast Region

Area	Civilian Labor Force (subject to unemployment insurance)			Unemployment Rate (percent)		
	2001	2008	2012	2001	2008	2012
San Luis Obispo County	126,176	136,615	138,650	4.0	5.7	9.3
Santa Barbara County	203,039	218,429	225,635	4.4	5.4	8.8
Total Central Coast Region	329,215	355,044	364,285	4.3	5.6	5.9
STATE OF CALIFORNIA	17,152,106	18,392,000	18,494,881	4.9	7.2	10.5

Source: BLS 2014

Total employment and farm employment in 2001, 2008, and 2012 in the Central Coast Region are presented in Table 19.35. Farm employment accounted for less than ten percent of total employment during this period.

Table 19.35 Employment in Central Coast Region

Area	Total Employment			Farm Employment		
	2001	2008	2012	2001	2008	2012
San Luis Obispo County	140,320	155,093	156,757	7,775	6,866	7,374
Santa Barbara County	243,955	260,056	257,841	15,228	16,483	18,075
Total Central Coast Region	384,275	415,149	414,598	23,003	23,349	25,449
STATE OF CALIFORNIA	19,411,367	20,820,306	20,653,860	479,283	438,013	443,764

Source: BEA 2014a

Note:
Farm employment includes employment numbers in forestry, fishing, and related activities.

The farm employment numbers presented in Table 19.35 include only workers directly involved in farming, forestry, and fishing activities. However, farming is one of the most important basic industries in many counties in the Central Coast Region; and supports many other businesses including farm inputs (e.g., fertilizer, seed, machinery, and fuel) and processing of food and fiber grown on farms. As a result, employment both directly on farm and indirectly dependent on farming is higher than the values displayed in Table 19.35.

19.3.5.3 Income

Per capita personal incomes for the counties in the Central Coast Region are lower than those for the state. Both San Luis Obispo and Santa Barbara had average annual per capita personal income growth rates between 2000 and 2008 that were among the highest in the state. Per capita personal income for each of the two counties in the Central Coast Region in 2000, 2008 and 2012 are presented in Table 19.36.

Table 19.36 Per Capita Personal Income in Central Coast Region

Area	Per Capita Personal Income			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
San Luis Obispo County	$28,671	$40,204	$43,698	4.3	2.1
Santa Barbara County	$33,317	$45,997	$47,862	4.1	1.0
Central Coast Region	$31,540	$43,735	$46,241	4.2	1.4
STATE OF CALIFORNIA	$33,404	$44,003	$46,477	3.5	1.4

Source: BEA 2014e

19.3.5.4 Local Government Finances

As of April 1, 2014, the county sales tax rates in the San Luis Obispo and Santa Barbara counties were 7.5 percent and 8.0 percent, respectively (BOE 2014).

Total annual taxable sales for San Luis Obispo and Santa Barbara counties in the Central Coast Region in 2000, 2008, and 2012 are presented in Table 19.37. The Central Coast Region's average annual growth in total taxable sales were higher than for the state.

Table 19.37 Total Taxable Sales in Central Coast Region

Area	Total Taxable Sales (Millions)			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
San Luis Obispo County	$2,925	$3,974	$5,026	3.9	6.0
Santa Barbara County	$4,823	$5,884	$6,051	2.5	0.7
Central Coast Region	$7,748	$9,858	$11,077	3.1	3.0
STATE OF CALIFORNIA	$441,854	$531,654	$407,714	2.3	-6.4

Sources: BOE 2000, 2008, 2012

The combined (secured and unsecured) property tax revenues in the Central Coast Region for Fiscal Year 2011-2012 are presented in Table 19.38. Total property tax revenues in the two counties accounted for about 2 percent of the total state property tax revenues.

Table 19.38 Property Tax Revenues, Fiscal Year 2011-2012, in Central Coast Region

Area	Property Tax Revenues (millions)
San Luis Obispo County	$443
Santa Barbara County	$695
Central Coast Region	$1,138
STATE OF CALIFORNIA	$55,459

Source: California State Controller 2014

19.3.6 Southern California Region

The Southern California Region includes portions of Ventura, Los Angeles, Orange, San Diego, Riverside, and San Bernardino counties served by the SWP.

19.3.6.1 Population

Population characteristics in Southern California Region are presented in Table 19.39. Among the counties in the Southern California Region, Riverside County had the highest average annual population growth rate, and Los Angeles County had the lowest average annual population growth rate between 2000 and 2012.

Table 19.39 Population Characteristics in Southern California Region

Area	Population		Average Annual Growth Rate (percent)
	2000	2012	2000-2012
Ventura County	753,197	829,065	0.8
Los Angeles County	9,519,330	9,889,520	0.3
Orange County	2,846,289	3,057,879	0.6
San Diego County	2,813,833	3,128,734	0.9
Riverside County	1,545,387	2,234,193	3.1
San Bernardino County	1,710,139	2,059,699	1.6
Total Southern California Region	19,188,175	21,199,090	0.8
STATE OF CALIFORNIA	33,873,086	37,668,804	0.9

Sources: DOF 2013a, 2013b, 2014

19.3.6.2 Employment

Civilian labor force characteristics for the counties in the Southern California Region are presented in Table 19.40. The civilian labor force in the Southern California Region increased between 2001 and 2012. The average unemployment rates for the Southern California Region have been lower than for the state.

Table 19.40 Civilian Labor Force and Unemployment Rates in Southern California Region

Area	Civilian Labor Force (subject to unemployment insurance)			Unemployment Rate (percent)		
	2001	2008	2012	2001	2008	2012
Ventura County	399,325	429,444	440,649	4.8	6.3	9.0
Los Angeles County	4,752,839	4,934,756	4,879,674	5.7	7.5	10.9
Orange County	1,513,234	1,618,079	1,618,677	4.0	5.3	7.6
San Diego County	1,409,726	1,548,233	1,599,133	4.2	6.0	8.9
Riverside County	711,134	912,717	944,458	5.5	8.5	12.2
San Bernardino County	763,221	863,293	860,895	5.1	8.0	12.0
Total Southern California Region	9,549,479	10,306,522	10,343,486	5.1	7.0	10.2
STATE OF CALIFORNIA	17,152,106	18,392,000	18,494,881	4.9	7.2	10.5

Source: BLS 2014

Total employment and farm employment in 2001, 2008, and 2012 in the Southern California Region are presented in Table 19.41. Farm employment accounted for less than one percent of total employment.

Table 19.41 Employment in Southern California Region

Area	Total Employment			Farm Employment[1]		
	2001	2008	2012	2001	2008	2012
Ventura County	399,928	436,031	431,196	21,329	23,430	24,826
Los Angeles County	5,440,785	5,695,501	5,669,105	11,082	8,709	7,589
Orange County	1,845,392	1,999,036	1,963,080	7,888	4,713	3,183
San Diego County	1,723,801	1,901,598	1,887,077	17,871	15,718	14,778
Riverside County	677,214	866,247	864,308	20,892	15,669	15,024
San Bernardino County	730,150	881,700	864,432	6,050	3,931	3,688
Total Southern California Region	10,817,270	11,780,113	11,679,198	85,112	72,170	69,088
STATE OF CALIFORNIA	19,411,367	20,820,306	20,653,860	479,283	438,013	443,764

Source: BEA 2014a

Note:
Farm employment includes employment numbers in forestry, fishing, and related activities.

19.3.6.3 Income

Among the six counties in this region, San Bernardino County had the lowest per capita personal income in 2000 and 2008, as presented in Table 19.42. In 2012, Riverside County had the lowest per capita personal income.

Table 19.42 Per Capita Personal Income in Southern California Region

Area	Per Capita Personal Income			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Ventura County	$34,296	$46,634	$48,837	3.9	1.2
Los Angeles County	$29,878	$42,881	$44,474	4.6	0.9
Orange County	$38,357	$49,436	$52,342	3.2	1.4
San Diego County	$33,779	$47,197	$49,719	4.3	1.3
Riverside County	$24,528	$30,842	$31,742	2.9	0.7
San Bernardino County	$22,624	$30,220	$32,072	3.7	1.5
Total Southern California Region	$30,801	$41,078	$44,004	3.7	1.7
STATE OF CALIFORNIA	$33,404	$44,003	$46,477	3.5	1.4

Source: BEA 2014e

19.3.6.4 Local Government Finances

As of April 1, 2014, the county sales tax rates in the Southern California Region ranged from 7.5 percent in Ventura County to 9.0 percent in Los Angeles County (BOE 2014).

Total annual taxable sales for the counties in the Southern California Region in 2000, 2008, and 2012 are presented in Table 19.43. The counties in this region have had higher average annual growth rates in total taxable retail sales compared to the state. Between 2000 and 2008, Riverside and San Bernardino led the region with higher average annual growth rates. However, between 2008 and 2012, the two counties experienced declining growth rates.

Table 19.43 Total Taxable Sales in Southern California Region

Area	Total Taxable Sales (millions)			Average Annual Growth Rate (percent)	
	2000	2008	2012	2000-2008	2008-2012
Ventura County	$9,096	$11,322	$11,958	2.8	1.4
Los Angeles County	$106,674	$131,882	$135,296	2.7	0.6
Orange County	$44,462	$53,607	$55,231	2.4	0.7
San Diego County	$36,245	$45,329	$47,947	2.8	1.4
Riverside County	$16,979	$26,004	$28,096	5.5	2.0
San Bernardino County	$18,885	$27,778	$29,532	4.9	1.5
Total Southern California Region	$232,342	$295,921	$308,059	3.1	1.0
STATE OF CALIFORNIA	$441,854	$531,654	$407,714	2.3	-6.4

Sources: BOE 2000, 2008, 2012

The combined (secured and unsecured) property tax revenues in the Southern California Region for Fiscal Year 2011-2012 are presented in Table 19.44. Total property tax revenues accounted for about 55 percent of the total state property tax revenues.

Table 19.44 Property Tax Revenues, Fiscal Year 2011-2012, in Southern California Region

Area	Property Tax Revenues (millions)
Ventura County	$1,230
Los Angeles County	$14,191
Orange County	$5,046
San Diego County	$4,646
Riverside County	$2,812
San Bernardino County	$2,132
Southern California Region	$30,057
STATE OF CALIFORNIA	$55,459

Source: California State Controller 2012

19.3.7 Ocean Salmon Fishery

The ocean salmon fishery along the southern Oregon and northern California coast are affected by the population of salmon that rely upon the northern California rivers, including the Sacramento and San Joaquin rivers. Changes in CVP and SWP water operations would affect the flow patterns and water quality of the Sacramento and San Joaquin rivers; and the survivability of the salmon that use those rivers for habitat, as described in Chapter 9, Fish and Aquatic Resources. This section discusses the economic contributions of the Pacific Coast salmon fishery.

Management of the California ocean salmon fishery is a combined effort of the California Department of Fish and Wildlife (CDFW) and the Pacific Fishery Management Council (PFMC), a regional council of the National Oceanic and Atmospheric Administration. The California Department of Fish and Wildlife manages salmon harvest from the shoreline to three nautical miles off the California coast. From three nautical miles to two hundred nautical miles offshore is managed by the PFMC. The PFMC is responsible for developing the Pacific Coast Salmon Fishery Management Plan (FMP) that guides management of the ocean commercial and recreational fishery in California, Oregon, and Washington (PFMC 2014a). The annual ocean salmon fishery regulations promote the maximum amount of harvest while ensuring that suitable population levels are maintained (NOAA 2014).

19.3.7.1 Commercial Ocean Fisheries for Salmon along the Southern Oregon and Northern California Coasts

The commercial ocean salmon fishery plays a large role in the overall California commercial ocean industry, as shown in Table 19.45. The total harvest value for Chinook salmon ranked fourth among all commercially harvested ocean species in 2012. The harvest value rank of Chinook salmon in California between 2001 and 2012 as compared to the other commercially harvested ocean species are presented in Table 19.46.

Table 19.45 Top Ten Species by Total Value for Commercially Harvested Ocean Species in California in 2012

Rank	Species	Total Value
1	Dungeness Crab	$85,643,530
2	California Market Squid	$63,883,456
3	California Spiny Lobster	$13,706,721
4	**Chinook Salmon**	**$12,841,853**
5	Sablefish	$8,987,599
6	Pacific Oyster	$8,736,923
7	Sea Urchins	$8,320,111
8	Spot Shrimp	$4,462,204
9	Pacific Sardine	$4,248,504
10	Kumamoto Oyster	$3,170,760

Sources: NMFS 2014a, 2014b, 2014c, 2014d, 2014e, 2014f, 2014g, 2014h, 2014i, 2014j

Table 19.46 Chinook Salmon Total Harvest Value Ranking as compared to Other Commercially Harvested Ocean Species in California

Year	Total Value of Chinook Salmon Landings	Rank
2001	$4,760,786	7
2002	$7,610,882	4
2003	$12,153,111	3
2004	$17,770,036	3
2005	$12,804,188	3
2006	$5,260,526	4
2007	$7,835,240	4
2008	Season Closed	
2009	Season Closed	
2010	$1,214,959	19
2011	$5,096,433	7
2012	$12,841,853	4

Source: NMFS 2014k

Annual revenues from commercial ocean salmon fishery in California have fluctuated with changes in salmon prices and total landings. The dollar per dressed pound for Chinook salmon paid to the commercial operator can change within a season, across seasons, and at different ports, as presented in Table 19.47. Prices for Chinook salmon have increased over the past years; however, the costs for fuel, labor, and equipment maintenance also have increased.

Table 19.47 Average Annual Commercial Chinook Salmon Prices

Year	Average Annual California Price (dollar per dressed pound)	Average Annual Oregon Price (dollar per dressed pound)
2001	$1.98	$1.61
2002	$1.55	$1.54
2003	$1.91	$1.97
2004	$2.87	$3.45
2005	$2.97	$3.17
2006	$5.13	$5.48
2007	$5.18	$5.66
2008	Season Closed	$7.31
2009	Season Closed	Season Closed
2010	$5.46	$5.49
2011	$5.17	$5.96
2012	$5.34	$5.75

Source: PFMC 2014b (Tables D-4, D-5)

The total value of landings for the commercial ocean fishery in southern Oregon and California are presented in Table 19.48.

Table 19.48 Value of Landings for Salmon for the Commercial Ocean Salmon Fishery

Year	Total Value, California	Total Value, Oregon
2001	$4,773	$4,721
2002	$7,776	$5,391
2003	$12,181	$7,222
2004	$17,895	$9,919
2005	$12,913	$8,503
2006	$5,350	$2,701
2007	$7,902	$2,822
2008	Season Closed	$51,118
2009	Season Closed	$51,118
2010	$1,246	$2,791
2011	$5,133	$2,401
2012	$13,521	$4,271

Sources: PFMC 2014b (Tables D-4, D-5); PacFIN 2014

The economic contribution of the California commercial ocean salmon fishery extends beyond the revenues received by fishermen. Supporting industries include fish processors, boat manufacturers, repair and maintenance. The economic contribution of the commercial ocean salmon fishery can be estimated through the use of Input-Output models. Economic contributions are estimated by PFMC using an Input-Output model, the Fishery Economic Assessment Model (FEAM), as summarized in Table 19.49 for the commercial ocean salmon fishery by management area.

Table 19.49 Estimated Total Economic Impact for the Commercial Fishery by PFMC

Year	Economic Values by Management Areas ($1,000)					
	KMZ – Oregon	KMZ – California	Fort Bragg	San Francisco	Monterey	Total
2001	$635	$328	$1,033	$10,857	$2,297	$15,150
2002	$806	$797	$3,730	$15,516	$4,179	$25,028
2003	$699	$259	$15,160	$15,795	$2,491	$34,404
2004	$1,502	$2,373	$7,434	$23,356	$5,257	$39,922
2005	$1,259	$582	$5,420	$13,496	$7,083	$27,840
2006	$378	$0	$2,471	$6,389	$985	$10,223
2007	$780	$1,156	$3,407	$8,131	$1,658	$15,132
2008	$72	$0	$0	$0	$0	$72
2009	$42	$0	$0	$0	$0	$42
2010	$367	$35	$1,780	$140	$161	$2,483
2011	$504	$505	$4,952	$2,225	$979	$9,165
2012	$698	$725	$4,706	$10,653	$5,759	$22,541
2013	$1,252	$2,146	$12,909	$19,181	$4,010	$39,498

Source: PFMC 2014b (Tables IV-16, IV-17)

Notes:
All values estimated using the Fishery Economic Assessment Model, and presented as 2013 dollars.
Southern Oregon values include data for Brookings, Oregon which may include values from landings outside of the KMZ.
a. KMZ –Oregon represents the area from Humbug Mountain to the Oregon-California Border, and includes landings at the Brookings port and season length and quota values for the entire area including Chetco River Ocean Terminal Area between Twin Rocks and the Oregon-California border.
b. KMZ –California represents the area from Oregon-California Border to Humboldt South Jetty, and includes landings at the Crescent City and Eureka ports.

Fisherman and industries that rely on the commercial ocean salmon fishery have access to financial assistance from the federal government in years of low revenue or closure. The fishery can be declared a failure by the Department of Commerce after requests are sent by state or local officials and certain criteria have been met. After a fishery failure is declared, disaster relief can be provided in the form of monetary compensation, community grants, low-interest loans, habitat restoration, or fishery capacity reduction. Disaster relief related to the California commercial ocean salmon fishery has occurred six times between 1994 and 2009, as summarized in Table 19.50 (CRS 2013). Direct payments may involve a minimum amount to any permit holder and additional amounts based upon past landing values (Hackett and Hansen 2008). Disaster relief funds distribution is conducted by the PFMC and the California Salmon Council.

Table 19.50 Disaster Relief Monies and Programs for the Commercial Ocean Salmon Fishery in California

Year	Programs	Dollar Value
1994	Fishery capacity reduction, habitat restoration jobs, and data collection jobs	$12 Million
1995	Similar programs as in 1994	$13 Million

Year	Programs	Dollar Value
1998	Fishery capacity reduction	$3.5 Million
2007	Direct payments to fisherman and businesses dependent on the Klamath River salmon	$60.4 Million
2008	Direct payments to fisherman and businesses dependent on the Sacramento River salmon	$170 Million
2009-2010	Continuation of 2008 programs	Remainder of the 2008 $170 Million

Source: CRS 2013

19.3.7.2 Ocean Sport Fisheries for Salmon along the Southern Oregon and Northern California Coasts

The PFMC and CDFW also manages the ocean sport fishery. The economic contribution of the ocean sport salmon fishery can be estimated through the use of Input-Output models. Economic contributions are estimated by PFMC using an Input-Output model, the Fishery Economic Assessment Model (FEAM), as summarized in Table 19.51.

Table 19.51 Estimated Total Economic Impact for the Recreational Fishery by PFMC

	Economic Values by Management Areas ($1,000)					
Year	KMZ – Oregon	KMZ- California	Fort Bragg	San Francisco	Monterey	Total
2001	$1,052	$1,136	$2,101	$7,683	$3,079	$2,101
2002	$775	$1,026	$2,221	$9,646	$4,752	$2,221
2003	$608	$743	$1,677	$6,990	$2,288	$1,677
2004	$751	$1,229	$2,175	$11,310	$4,439	$2,175
2005	$501	$794	$1,759	$8,554	$3,234	$1,759
2006	$426	$743	$1,450	$5,812	$1,947	$1,450
2007	$437	$977	$1,170	$4,119	$1,427	$1,170
2008	$189	$0	$26	$0	$0	$26
2009	$241	$276	$0	$0	$0	$0
2010	$229	$201	$421	$1,712	$1,140	$421
2011	$241	$744	$972	$3,367	$1,778	$972
2012	$732	$1,614	$970	$6,069	$2,947	$970

Source: PFMC 2014b (Tables IV-16, IV-17)

Notes:
All values estimated using the Fishery Economic Assessment Model, and presented as 2013 dollars.
Southern Oregon values include data for Brookings, Oregon which may include values from landings outside of the KMZ.
a. KMZ –Oregon represents the area from Humbug Mountain to the Oregon-California Border, and includes landings at the Brookings port and season length and quota values for the entire area including Chetco River Ocean Terminal Area between Twin Rocks and the Oregon-California border.
b. KMZ –California represents the area from Oregon-California Border to Humboldt South Jetty, and includes landings at the Crescent City and Eureka ports.

19.3.8 Ocean Salmon Fisheries for the Yurok and Hoopa Valley Tribes

The salmon populations are extremely important to the Yurok Tribe and Hoopa Valley Tribe as part of their lives, cultural traditions, ceremonies, and community health (Reclamation 2012). Fifty percent of the total available salmon in the Trinity River is the federally protected harvest for the Yurok and Hoopa Valley tribes (DOI 1993). Each tribe determines the use of the harvest. Historical landing data for the Yurok and Hoopa Valley tribes are presented in Table 19.52 (Reclamation 2012).

Table 19.52 Salmon Landings by the Yurok Tribe and Hoopa Valley Tribe

Year	Spring Run Chinook Salmon	Fall Run Chinook Salmon	Total
2001	19,640	39,044	58,684
2002	15,136	24,700	39,836
2003	9,065	30,078	39,143
2004	8,682	25,971	34,653
2005	7,302	8,087	15,389
2006	4,409	10,698	15,107
2007	5,849	27,594	33,443
2008	3,439	22,901	26,340
2009	3,562	28,565	32,127
2010	5,023	30,315	35,338
2011	5,005	28,084	33,089
2012	6,477	101,662	108,139
2013[a]	4,972	63,030	68,002

Source: PFMC 2014b (Table B-5)

Note:
a. 2013 data are preliminary.
Includes landings at the Klamath River estuary, along the Klamath River from the estuary to Weitchpec (at the confluence of the Klamath and Trinity rivers), and along the Trinity River.

19.4 Impact Analysis

This section describes the potential mechanisms and analytical methods for change in socioeconomic factors; results of the impact analysis; potential mitigation measures; and cumulative effects.

This Chapter includes the analysis of overall regional economic changes and economic changes related to changes in CVP and SWP water supplies for M&I water users. More detailed discussions of changes in agricultural production are presented in Chapter 12, Agricultural Resources.

19.4.1 Potential Mechanisms and Analytical Methods

As described in Chapter 4, Approach to Environmental Analysis, the impact assessment considers changes in socioeconomic factors related to changes in CVP and SWP operations under the alternatives as compared to the No Action Alternative and Second Basis of Comparison.

Changes in CVP and SWP operations under the alternatives as compared to the No Action Alternative and Second Basis of Comparison could change water supply availability for CVP and SWP water users, recreational opportunities at reservoirs that store CVP and SWP water, and salmon from the Delta watershed that are relied upon by commercial, sport, and tribal fisherman.

19.4.1.1 Regional Changes in Irrigated Agricultural Production Value

Changes in CVP and SWP operations could change the extent of total agricultural production value as compared to the No Action Alternative and the Second Basis of Comparison. As described in Chapter 12, Agricultural Resources, there was no changes in agricultural production in the Central Valley under long-term conditions (over the 81-year model simulation period). Therefore, this analysis only addresses regional economic changes during dry and critical dry years.

This analysis uses model output from the Statewide Agricultural Production (SWAP) model and the IMPLAN model. The SWAP model, **a**s described in Chapter 12, is a regional model of irrigated agricultural production and economics that simulates the decisions of producers (farmers) in the Central Valley Region. The model selects the crops, water supplies, and other inputs that maximize profit subject to constraints on water and land, and subject to economic conditions regarding prices, yields, and costs. The SWAP model incorporates CVP and SWP water supplies, other local water supplies represented in the CalSim II model, and groundwater. As conditions change within a SWAP subregion (e.g., the quantity of available project water supply declines), the model optimizes production by adjusting the crop mix, water sources and quantities used, and other inputs. The model also fallows land when that appears to be the most cost-effective response to resource conditions. The analysis only reduces groundwater withdrawals based upon an optimization of agricultural production costs. The analysis does not restrict groundwater withdrawals based upon groundwater overdraft or groundwater quality conditions.

As described in Chapter 7, Groundwater Resources and Groundwater Quality, The Sustainable Groundwater Management Act (SGMA) requires preparation of Groundwater Sustainability Plans (GSPs) by 2020 or 2022 for most of the groundwater basins. The GSPs will identify methods to implement measures that will achieve sustainable groundwater operations by 2040 or 2042. The analysis in this Chapter is focused on conditions that would occur in 2030. If local agencies fully implement GSPs prior to the regulatory deadline, increasing groundwater use would be less of an option for agricultural water users. However, to achieve sustainable conditions, some measures could require several years to design and construct new water supply facilities, and sustainable groundwater conditions are not required until the 2040s. Therefore, it was assumed that Central Valley

agriculture water users would not reduce groundwater use by 2030, and that groundwater use would increase in response to reduced CVP and SWP water supplies.

As described in Chapter 12, the impact to irrigated acreage and agricultural production is relatively small. Most of the change in CVP or SWP irrigation supplies would be offset by changes in groundwater pumping, with only small changes in crop acreage in production. However, this is an aggregate result for the Central Valley. Individual growers that rely on CVP or SWP supply and have no access to groundwater would have their irrigated acreage affected by larger amounts. Some of their change in production can and would be offset by changes on other farms that have access to groundwater or other surface supplies. Over time, growers without the buffer of access to groundwater could be driven to sell to or merge with other farming operations. From the larger, regional perspective, total value of production is estimated to change relatively little.

The regional economic analysis was conducted using the results of the impact analysis on agricultural production and M&I water use. The incremental impact results, estimated by the SWAP and CWEST economic models, were input into the regional IMPLAN models as the direct change caused by each of Alternative as compared to the No Action Alternative and the Second Basis of Comparison. Changes in economic effects depend upon loss of production or expenditures for water supplies, interactions within the regional economy, and "leakage" of economic activity between regions. Economic linkages create multiplier effects in a regional economy in the IMPLAN input-output model based upon estimates of county-level final demands and final payments developed from published data, national average matrix of technical coefficients, and mathematical relationships. IMPLAN uses information from the U.S. Department of Commerce's Bureau of Economic Analysis, U.S. Department of Labor's Bureau of Labor Statistics, and other federal and state government agencies. Data is collected for 440 different industrial sectors of the national economy per the North American Industry Classification System based on the primary commodity or service produced. Data sets are provided for the IMPLAN model for each county in the United States. In this analysis counties were grouped into the Central Valley Region (does not include Contra Costa County), San Francisco Bay Area Region (does include Contra Costa County), Central Coast Region, and Southern California Region.

IMPLAN is a static model that estimates impacts for a snapshot in time when the impacts are expected to occur, based on the makeup of the economy at the time of the underlying IMPLAN data. IMPLAN measures the initial impact to the economy but does not consider long-term adjustments as labor and capital move into Alternative uses.

Irrigated acreage occurs in the San Francisco Bay Area, Central Coast, and Southern California regions that use CVP and SWP water. This irrigated acreage is not included in the SWAP model simulation; and therefore, is not evaluated quantitatively in this EIS. However, changes in irrigated acreage in response to

reductions in CVP and SWP water deliveries are assumed to occur in a similar manner as projected for the Central Valley Region.

19.4.1.2 Regional Changes in Municipal and Industrial Water Supplies and Water Supply Costs

Changes in CVP and SWP operations could change availability of water supplies for M&I water in the study area, related costs of additional supplies or shortages, and changes in regional economics as compared to the No Action Alternative and the Second Basis of Comparison. The quantitative analyses of regional changes related to changes in M&I water supplies and associated costs, employment, and economic output are analyzed using the California Water Economics Spreadsheet Tool (CWEST) model and the IMPLAN model.

Changes in M&I water supplies were evaluated using a regional economic model that was specifically modified to address water supply and cost changes to CVP and SWP M&I water users. The CWEST is a regional model that considers the economic costs to M&I water users including the cost of CVP and SWP water supplies, regional surface water supplies (including recycled water), conveyance costs, shortage costs, and changes in groundwater pumping costs. Annual supplies are calculated for each water user based upon CVP and/or SWP water supplies, local surface water and groundwater supplies, surface water and groundwater storage, wastewater effluent and stormwater recycling water treatment, and desalination water treatment.

CVP and SWP water supply inputs are provided for the 81-year hydrologic period from the CalSim II model. The CWEST model analyzes the changes in annual conditions over the 81-long-term condition, and averages the overall costs for each Alternative over the 81-long-term condition. The CWEST model evaluates responses to changes in CVP and SWP water supplies separately for the average of wet, above normal, and below normal water year types as compared to responses in dry and critical dry water year types.

The goal of the CWEST model is to minimize the cost for the water users to meet 2030 water demand. In years when the combination of average existing water supplies (either for the wetter or drier conditions) are greater than the 2030 water demand, the CWEST model assumes that groundwater pumping would be reduced and any overage water amount would be placed into surface water or groundwater storage. The CWEST model assumes that use of regional surface water, other imported water supplies, recycled water use, and desalinated water use would not change; however, during extremely wet years, total CVP and SWP water deliveries may not be delivered if storage facilities are full.

In years when annual supplies are less than the 2030 water demand, the model assumes that water users with surface water and groundwater storage would rely upon those supplies, increase groundwater pumping, and participate in water transfers. If shortage and transfer costs occur frequently, the model could select to purchase additional fixed-yield supplies, such as additional desalination water treatment. The model optimizes the additional supply decisions to provide the

lowest-cost water supply portfolio to meet 2030 demands throughout the 81-year hydrologic period.

The CWEST model input for this EIS is primarily based upon information presented in Urban Water Management Plans (UWMPs) developed by the CVP and SWP contractors. The assumptions related to future water supplies presented in the UWMPs were evaluated to determine if the projects were reasonable and certain to occur by 2030. Projects that had undergone environmental review, were under design, or under construction were considered to exist in 2030 water supply assumptions in the CWEST model. Projects described in the UWMPs that currently were under evaluation are considered as options to increase fixed-yield supplies. Existing and future water supplies considered for municipalities by 2030 are presented in Appendix 5B, Future Municipal Water Supplies for CVP and SWP Water Users. For smaller water users that are not addressed in a UWMP, information was obtained from water master plans and integrated regional water management plans.

The CWEST model assumes that groundwater pumping would occur up to the amounts included in the UWMPs for wetter and drier conditions. As described above for agricultural production, it is assumed that full implementation of SGMA would not occur by 2030. Therefore, it was assumed that water users that are not currently operating groundwater resources in accordance with adjudication or other types of agreements, would not reduce groundwater use by 2030.

The IMPLAN model, described above, also is used to analyze changes in regional economics related to M&I water supplies.

19.4.1.3 Changes in Local Government Finances

Changes in CVP and SWP operations would not result in major changes in land use, as described in Chapter 13, Land Use. Therefore, changes to collection of local taxes and fees are not anticipated under the alternatives as compared to the No Action Alternative and the Second Basis of Comparison. Therefore, changes in local government finances are not evaluated in this EIS.

19.4.1.4 Changes in Recreational Economics

Reservoirs that store CVP and SWP water provide a wide diversity of recreational experiences on the water surface, as described in Chapter 15, Recreational Resources. However, changes to recreational economic opportunities under the alternatives primarily would occur due to changes in surface water elevations at San Luis Reservoir and reduced Striped Bass fishing opportunities under Alternatives 3 and 4.

This EIS does not quantitatively analyze potential changes in recreation user days or recreation spending because specific projects or responses to the changes in reservoir elevations are not considered under the purpose and need of this EIS. The qualitative analysis presented in this Chapter is based upon potential changes in recreational use related to changes under the alternatives as compared to the No Action Alternative and the Second Basis of Comparison, as described in Chapter 15, Recreational Resources.

19.4.1.5 Changes in Commercial, Sport, and Tribal Salmon Fishing Opportunities

Changes in CVP and SWP operations under the alternatives could change the salmon population as compared to the No Action Alternative and the Second Basis of Comparison. Commercial, sport, and tribal fishing primarily relies upon Fall-run Chinook Salmon because the populations of other runs of salmon are substantially lower. Specific population changes for Fall-run Chinook Salmon are not projected in this EIS. Therefore, this Chapter presents a qualitative analysis of potential changes in socioeconomic factors under the alternatives as compared to the No Action Alternative and the Second Basis of Comparison.

19.4.1.6 Effects of Cross Delta Water Transfers

Historically water transfer programs have been developed on an annual basis. The demand for water transfers is dependent upon the availability of water supplies to meet water demands. Water transfer transactions have increased over time as CVP and SWP water supply availability has decreased, especially during drier water years.

Parties seeking water transfers generally acquire water from sellers who have available surface water who can make the water available through releasing previously stored water, pump groundwater instead of using surface water (groundwater substitution); idle crops; or substitute crops that uses less water in order to reduce normal consumptive use of surface water.

Water transfers using CVP and SWP Delta pumping plants and south of Delta canals generally occur when there is unused capacity in these facilities. These conditions generally occur drier water year types when the flows from upstream reservoirs plus unregulated flows are adequate to meet the Sacramento Valley water demands and the CVP and SWP export allocations. In non-wet years, the CVP and SWP water allocations would be less than full contract amounts; therefore, capacity may be available in the CVP and SWP conveyance facilities to move water from other sources.

Projecting future socioeconomic conditions related to water transfer activities is difficult because specific water transfer actions required to make the water available, convey the water, and/or use the water would change each year due to changing hydrological conditions, CVP and SWP water availability, specific local agency operations, and local cropping patterns. Reclamation recently prepared a long-term regional water transfer environmental document which evaluated potential changes in conditions related to water transfer actions (Reclamation 2014c). Results from this analysis were used to inform the impact assessment of potential effects of water transfers under the alternatives as compared to the No Action Alternative and the Second Basis of Comparison.

19.4.2 Conditions in Year 2030 without Implementation of Alternatives 1 through 5

This EIS includes two bases of comparison, as described in Chapter 3, Description of Alternatives: the No Action Alternative and the Second Basis of

Comparison. Both of these bases are evaluated at 2030 conditions. Changes that would occur over the next 15 years without implementation of the alternatives are not analyzed in this EIS. However, the changes to socioeconomics that are assumed to occur by 2030 under the No Action Alternative and the Second Basis of Comparison are summarized in this section. Many of the changed conditions would occur in the same manner under both the No Action Alternative and the Second Basis of Comparison.

19.4.2.1 Common Changes in Conditions under the No Action Alternative and Second Basis of Comparison

Conditions in 2030 would be different than existing conditions due to:

- Climate change and sea level rise
- General plan development throughout California, including increased water demands in portions of Sacramento Valley
- Implementation of reasonable and foreseeable water resources management projects to provide water supplies

It is anticipated that climate change would result in more short-duration high-rainfall events and less snowpack in the winter and early spring months. The reservoirs would be full more frequently by the end of April or May by 2030 than in recent historical conditions. However, as the water is released in the spring, there would be less snowpack to refill the reservoirs. This condition would reduce reservoir storage and available water supplies to downstream uses in the summer. The reduced end of September storage also would reduce the ability to release stored water to downstream regional reservoirs. These conditions would occur for all reservoirs in the California foothills and mountains, including non-CVP and SWP reservoirs.

These changes would result in a decline of the long-term average CVP and SWP water supply deliveries by 2030 as compared to recent historical long-term average deliveries under the No Action Alternative and the Second Basis of Comparison. However, the CVP and SWP water deliveries would be less under the No Action Alternative as compared to the Second Basis of Comparison, as described in Chapter 5, Surface Water Resources and Water Supplies, which could result in more crop idling.

Under the No Action Alternative and the Second Basis of Comparison, land uses in 2030 would occur in accordance with adopted general plans.

The No Action Alternative and the Second Basis of Comparison assumes completion of water resources management and environmental restoration projects that would have occurred without implementation of Alternatives 1 through 5, including regional and local recycling projects, surface water and groundwater storage projects, conveyance improvement projects, and desalination projects, as described in Chapter 3, Description of Alternatives. The No Action Alternative and the Second Basis of Comparison also assumes implementation of actions included in the 2008 U.S. Fish and Wildlife Service (USFWS) Biological

Opinion (BO) and 2009 National Marine Fisheries Service (NMFS) BO that would have been implemented without the BOs by 2030, as described in Chapter 3, Description of Alternatives.

19.4.2.2 Population Projections under the No Action Alternative and Second Basis of Comparison

The 2030 population projections for each region addressed in this EIS are presented in Tables 19.53 through 19.59.

Table 19.53 Population Projections in Trinity River Region

Area	Population		Average Annual Growth Rate (percent)
	2012	2030	2012-2030
Trinity County	13,471	15,309	0.7
Humboldt County	134,728	143,811	0.4
Del Norte County	28,527	31,252	0.5
Total Trinity River Region	176,726	190,373	0.4
STATE OF CALIFORNIA	37,427,946	44,574,756	0.9

Sources: DOF 2013a, 2013b, 2014

Table 19.54 Population Projections in Central Valley Region – Sacramento Valley

Area	Population		Average Annual Growth Rate (percent)
	2012	2030	2012-2030
Shasta County	177,516	210,997	0.9
Plumas County	19,901	20,390	0.1
Tehama County	62,985	75,522	1.0
Glenn County	28,105	33,318	0.9
Colusa County	21,552	28,112	1.4
Butte County	220,465	276,009	1.2
Yuba County	72,642	97,037	1.6
Nevada County	97,366	111,836	0.8
Sutter County	94,620	131,390	1.7
Placer County	351,463	454,124	1.4
El Dorado County	180,483	230,503	1.3
Sacramento Valley Subtotal	1,333,615	1,669,238	1.3
Total Central Valley Region	7,408,750	9,677,315	1.5
STATE OF CALIFORNIA	37,668,804	44,574,756	0.9

Sources: DOF 2013a, 2013b, 2014

Table 19.55 Population Projections in Central Valley – San Joaquin Valley

Area	Population		Average Annual Growth Rate (percent)
	2012	2030	2012-2030
Stanislaus County	519,339	666,446	1.4
Madera County	152,325	219,908	2.1
Merced County	260,029	359,798	1.8
Fresno County	943,493	1,232,151	1.5
Tulare County	451,540	636,606	1.9
Kings County	151,774	209,440	1.8
Kern County	849,977	1,276,155	2.3
San Joaquin Valley Subtotal	3,328,477	4,600,505	1.8
Total Central Valley Region	7,238,742	9,468,443	1.5
STATE OF CALIFORNIA	37,668,804	44,574,756	0.9

Sources: DOF 2013a, 2013b, 2014

Table 19.56 Population Projections in Central Valley Region – Delta and Suisun Marsh

Area	Population		Average Annual Growth Rate (percent)
	2012	2030	2012-2030
Sacramento County	1,433,525	1,731,061	1.1
Yolo County	204,349	250,420	1.1
Solano County	415,787	490,381	0.9
San Joaquin County	692,997	935,709	1.7
Contra Costa County	1,066,602	1,263,049	0.9
Delta and Suisun Marsh Subtotal	3,813,260	4,670,621	1.1
Total Central Valley Region	7,238,742	9,468,443	1.5
STATE OF CALIFORNIA	37,668,804	44,574,756	0.9

Sources: DOF 2013a, 2013b, 2014

Table 19.57 Population Projections in San Francisco Bay Area Region

Area	Population		Average Annual Growth Rate (percent)
	2012	2030	2012-2030
Alameda County	1,530,176	1,650,596	0.4
Santa Clara County	1,813,696	2,048,021	0.7
San Benito County	56,137	59,259	0.3
Napa County	137,731	158,538	0.8
Total San Francisco Bay Area Region	3,537,740	3,916,413	0.6
STATE OF CALIFORNIA	37,668,804	44,574,756	0.9

Sources: DOF 2013a, 2013b, 2014

Table 19.58 Population Projections in Central Coast Region

Area	Population		Average Annual Growth Rate (percent)
	2000	2030	2012-2030
San Luis Obispo County	271,502	311,388	0.8
Santa Barbara County	426,351	469,070	0.5
Total Central Coast Region	697,853	780,457	0.6
STATE OF CALIFORNIA	37,668,804	44,574,756	0.9

Sources: DOF 2013a, 2013b, 2014

Table 19.59 Population Projections in Southern California Region

Area	Population		Average Annual Growth Rate (percent)
	2012	2030	2012-2030
Ventura County	829,065	956,324	0.8
Los Angeles County	9,889,520	11,138,280	0.7
Orange County	3,057,879	3,385,762	0.6
San Diego County	3,128,734	3,665,358	0.9
Riverside County	2,234,193	3,145,948	1.9
San Bernardino County	2,059,699	2,588,990	1.3
Total Southern California Region	21,199,090	24,880,663	0.9
STATE OF CALIFORNIA	37,668,804	44,574,756	0.9

Sources: DOF 2013a, 2013b, 2014

19.4.3 Evaluation of Alternatives

Alternatives 1 through 5 have been compared to the No Action Alternative; and the No Action Alternative and Alternatives 1 through 5 have been compared to the Second Basis of Comparison.

During review of the numerical modeling analyses used in this EIS, an error was determined in the CalSim II model assumptions related to the Stanislaus River operations for the Second Basis of Comparison, Alternative 1, and Alternative 4 model runs. Appendix 5C includes a comparison of the CalSim II model run results presented in this Chapter and CalSim II model run results with the error corrected. Appendix 5C also includes a discussion of changes in the comparison of groundwater conditions for the following Alternative analyses.

- No Action Alternative compared to the Second Basis of Comparison
- Alternative 1 compared to the No Action Alternative
- Alternative 3 compared to the Second Basis of Comparison
- Alternative 5 compared to the Second Basis of Comparison.

19.4.3.1 No Action Alternative

The No Action Alternative is compared to the Second Basis of Comparison.

19.4.3.1.1 Trinity River Region

Regional Changes to Irrigated Agriculture

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under the No Action Alternative as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

The CVP would continue to release water in Trinity River for downstream beneficial uses, including water supplies under the No Action Alternative and the Second Basis of Comparison. There are no municipal and industrial CVP or SWP water service contractors in the Trinity River Region.

Regional Changes to Recreational Opportunities

Recreational opportunities would be similar in the Trinity River Region under the No Action Alternative as compared to the Second Basis of Comparison as described in Chapter 15, Recreational Resources.

Regional Changes related to Changes in Salmon Fishing

Trinity River flows would be similar under the No Action Alternative as compared to the Second Basis of Comparison. This could result in similar salmon harvest conditions by the Yurok and Hoopa Valley tribes.

19.4.3.1.2 Central Valley Region

Regional Changes to Irrigated Agriculture

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under the No Action Alternative than under the Second Basis of Comparison. It is anticipated that groundwater use would increase in response to reduced CVP and SWP water supplies in 2030 because sustainable groundwater management plans would not be fully implemented until the 2040s, as discussed in Chapter 12, Agricultural Resources.

The agricultural production value under long-term average conditions would be reduced by less than 1 percent ($1.6 million/year in the Sacramento Valley and $0.5 million/year in the San Joaquin Valley) primarily due to an increase in groundwater pumping of approximately 6 percent. The agricultural production value under dry and critical dry conditions also would be reduced by less than 1 percent ($11.3 million/year in the Sacramento Valley and $20.3 million/year in the San Joaquin Valley) primarily due to an increase in groundwater pumping.

The overall reduction in agricultural production values are less than 0.05 percent under long-term conditions; and, changes in employment and regional economic output would be minimal. Therefore, the analysis of employment and regional economic output is focused on dry and critical dry years.

The direct changes in agricultural production would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.60 and 19.61, respectively.

Table 19.60 Changes in Agricultural-Related Employment and Regional Economic Output for the Sacramento Valley under the No Action Alternative as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-87	-21	0	-108	-11.3	-1.3	0.0	-12.7
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0
Construction	0	-1	0	-1	0.0	-0.1	0.0	-0.2
Manufacturing	0	0	0	0	0.0	-0.1	0.0	-0.1
Transportation, Warehousing & Utilities	0	-1	0	-2	0.0	-0.4	-0.1	-0.5
Wholesale Trade	0	-1	-1	-2	0.0	-0.2	-0.1	-0.3
Retail Trade	0	0	-4	-4	0.0	0.0	-0.3	-0.3
Information	0	0	0	0	0.0	0.0	-0.1	-0.1
Financial Activities	0	-7	-2	-9	0.0	-1.6	-0.8	-2.5
Services	0	-3	-12	-15	0.0	-0.3	-1.0	-1.3
Government	0	0	0	0	0.0	-0.1	0.0	-0.1
Total	**-87**	**-36**	**-19**	**-142**	**-11.3**	**-4.2**	**-2.5**	**-18.1**

Table 19.61 Changes in Agricultural-Related Employment and Regional Economic Output for the San Joaquin Valley under the No Action Alternative as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-139	-53	0	-192	-20.3	-2.3	-0.1	-22.7
Mining & Logging	0	-1	0	-1	0.0	-0.3	0.0	-0.3
Construction	0	-2	0	-2	0.0	-0.2	0.0	-0.2
Manufacturing	0	-1	0	-2	0.0	-1.8	-0.3	-2.1
Transportation, Warehousing & Utilities	0	-3	-1	-4	0.0	-0.8	-0.2	-1.0
Wholesale Trade	0	-2	-1	-3	0.0	-0.4	-0.2	-0.5
Retail Trade	0	0	-7	-8	0.0	0.0	-0.6	-0.6
Information	0	0	0	-1	0.0	-0.1	-0.1	-0.2
Financial Activities	0	-12	-3	-15	0.0	-2.7	-1.5	-4.1
Services	0	-5	-21	-26	0.0	-0.5	-1.7	-2.2
Government	0	-1	0	-1	0.0	-0.2	-0.1	-0.3
Total	**-139**	**-79**	**-35**	**-254**	**-20.3**	**-9.2**	**-4.9**	**-34.4**

As described in Chapter 11, Geology and Soils Resources, increased groundwater pumping under the long-term average conditions may result in an additional increment of subsidence in those areas within the Central Valley. The additional amount of subsidence and the economic costs associated with it have not been quantified in this EIS. However, total subsidence-related costs have been shown to be substantial, as reported by Borchers et al. (2014) who estimated that the cost of subsidence in San Joaquin Valley between 1955 and 1972 was more than $1.3 billion (in 2013 dollars). These estimates are based on the impacts to major infrastructure in the region including the San Joaquin River, Delta Mendota Canal, Friant-Kern Canal and San Luis Canal in addition to privately owned infrastructure. The incremental subsidence-related costs, expressed on an annual basis, could be an unknown fraction of that cumulative cost.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under the No Action Alternative than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis are described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies (e.g., cities of Huron and Coalinga) and would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies are presented in Tables 19.62 and 19.63 for the Sacramento and San Joaquin Valley, respectively.

Table 19.62 Changes in Municipal and Industrial Water Supply Costs for the Sacramento Valley under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	447	463	-16
Delivery Cost ($1,000)	$8,031	$8,317	-$287
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$213	$207	$6
Transfer Costs ($1,000)	$739	$517	$222
Shortage Costs ($1,000)	$69	$68	$1
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$3,858	-$3,916	$58
Excess Water Savings ($1,000)	-$2,275	-$2,563	$288
Average Annual Changes in Water Supply Costs ($1,000)	**$2,919**	**$2,630**	**$288**

Note:
In 2012 dollars

Table 19.63 Changes in Municipal and Industrial Water Supply Costs for the San Joaquin Valley under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	214	237	-23
Delivery Cost ($1,000)	$3,460	$3,854	-$394
Assumed New Supply Deliveries (TAF)	2	0	2
Annualized New Supply Costs ($1,000)	$429	$15	$414
Water Storage Costs ($1,000)	$942	$820	$122
Lost Water Sales Revenues ($1,000)	$361	$322	$39
Transfer Costs ($1,000)	$2,673	$2,623	$50
Shortage Costs ($1,000)	$115	$102	$13
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$15,377	-$16,011	$634
Excess Water Savings ($1,000)	-$1,029	-$1,318	$289
Average Annual Changes in Water Supply Costs ($1,000)	**-$8,427**	**-$9,593**	**$1,166**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.64 and 19.65, respectively. The M&I average annual water supply costs would increase by 11 percent in the Sacramento Valley and decrease by 12 percent in the San Joaquin Valley.

Table 19.64 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Sacramento Valley under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.1	-1.7	-1.6
Mining & Logging	0	0	0	0	0.0	0.4	-0.3	0.1
Construction	0	0	0	0	0.0	29.0	-2.5	26.5
Manufacturing	0	0	0	0	0.0	3.1	-22.2	-19.1
Transportation, Warehousing & Utilities	1	0	0	1	286.4	2.8	-18.0	271.2
Wholesale Trade	0	0	0	0	0.0	1.0	-27.1	-26.1
Retail Trade	0	0	-1	-1	0.0	0.9	-46.6	-45.6
Information	0	0	0	0	0.0	3.4	-20.6	-17.2
Financial Activities	0	0	0	0	0.0	13.0	-147.7	-134.6
Services	0	0	-2	-1	0.0	30.8	-154.7	-123.9
Government	0	0	0	0	0.0	0.2	-3.8	-3.7
Total	**1**	**1**	**-3**	**-1**	**286.4**	**84.8**	**-445.2**	**-74.0**

Note:
In 2012 dollars

Table 19.65 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Joaquin Valley under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	-6.7	-6.7
Mining & Logging	0	0	0	0	0.0	-0.4	-6.4	-6.8
Construction	0	0	0	0	0.0	-13.3	-5.6	-18.9
Manufacturing	0	0	0	0	0.0	-1.4	-46.4	-47.8
Transportation, Warehousing & Utilities	-1	0	0	-1	-140.8	-1.4	-44.7	-186.9
Wholesale Trade	0	0	0	0	0.0	-0.4	-39.0	-39.3
Retail Trade	0	0	-1	-1	0.0	-0.4	-97.4	-97.8
Information	0	0	0	0	0.0	-1.0	-27.0	-28.0
Financial Activities	0	0	-1	-1	0.0	-4.3	-263.7	-268.0
Services	0	0	-3	-3	0.0	-11.7	-292.3	-303.9
Government	0	0	0	0	0.0	-0.1	-12.9	-13.0
Total	**-1**	**0**	**-6**	**-7**	**-140.8**	**-34.3**	**-842.0**	**-1,017.2**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Recreational opportunities would decrease at San Luis Reservoir by 6 percent under the No Action Alternative as compared to the Second Basis of Comparison, as described in Chapter 15, Recreation Resources. Therefore, it is anticipated that recreational economic factors would be reduced under the No Action Alternative as compared to the Second Basis of Comparison.

Effects Related to Cross Delta Water Transfers

Potential effects to socioeconomic factors could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014c). Potential effects to socioeconomic factors were identified as adverse in the seller's service area related to loss of income to farm workers and the associated agriculturally-related businesses and retail enterprises if crop idling methods were used to provide transfer water. The analysis also identified that local sales taxes could decline due to the loss of household income. If groundwater substitution was used to provide transfer water, agricultural production values could decline due to additional cost of pumping. However, income from the water transfer could increase operating income for the sellers. The regional impact would depend upon the extent of lands involved in the water transfer program in any specific year.

Under the No Action Alternative, the timing of cross Delta water transfers would be limited to July through September and include annual volumetric limits, in accordance with the 2008 USFWS BO and 2009 NMFS BO. Under the Second

Basis of Comparison, water could be transferred throughout the year without an annual volumetric limit. Overall, the potential for cross Delta water transfers would be less under the No Action Alternative than under the Second Basis of Comparison.

19.4.3.1.3 San Francisco Bay Area Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the San Francisco Bay Area Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under the No Action Alternative as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under the No Action Alternative than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would increase by 44 percent, as presented in Table 19.66.

Table 19.66 Changes in Municipal and Industrial Water Supply Costs for the San Francisco Bay Area Region under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	396	445	-48
Delivery Cost ($1,000)	$11,044	$12,515	-$1,471
Assumed New Supply Deliveries (TAF)	18	16	2
Annualized New Supply Costs ($1,000)	$599	$234	$365
Water Storage Costs ($1,000)	$1,577	$1,963	-$386
Lost Water Sales Revenues ($1,000)	$4,286	$1,595	$2,691
Transfer Costs ($1,000)	$5,722	$1,154	$4,568
Shortage Costs ($1,000)	$1,410	$523	$887
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$493	-$792	$298
Excess Water Savings ($1,000)	-$225	-$549	$324
Average Annual Changes in Water Supply Costs ($1,000)	**$23,919**	**$16,643**	**$7,276**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.67.

Table 19.67 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Francisco Bay Area Region under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.1	-7.9	-7.8
Mining & Logging	0	0	0	0	0.0	1.6	-5.0	-3.4
Construction	0	1	0	1	0.0	158.8	-37.1	121.7
Manufacturing	0	0	0	0	0.0	28.8	-478.0	-449.1
Transportation, Warehousing & Utilities	5	0	-1	4	1,492.4	11.2	-183.5	1,320.1
Wholesale Trade	0	0	-1	-1	0.0	5.0	-350.6	-345.7
Retail Trade	0	0	-6	-6	0.0	4.2	-567.2	-563.0
Information	0	0	-1	-1	0.0	16.8	-306.6	-289.8
Financial Activities	0	0	-5	-4	0.0	55.8	-1,740.5	-1,684.7
Services	0	1	-20	-19	0.0	133.7	-2,162.8	-2,029.1
Government	0	0	0	0	0.0	0.7	-55.1	-54.4
Total	**5**	**3**	**-35**	**-27**	**1,492.4**	**416.7**	**-5,894.3**	**-3,985.2**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under the No Action Alternative as compared to the Second Basis of Comparison generally would result in lower reservoir elevations in reservoirs (up to 10 to 18 percent) that store CVP and SWP water; and would result in reduced recreational economic factors under the No Action Alternative as compared to the Second Basis of Comparison.

Regional Changes to Salmon Fishing

Changes in commercial and sport ocean salmon fishing primarily would be related to the presence of fall-run Chinook Salmon from Central Valley hatcheries. It is assumed that the production of hatchery fish would be similar under the No Action Alternative and the Second Basis of Comparison. However, survival of the fall-run Chinook Salmon hatchery fish to the Pacific Ocean could be related to changes in CVP and SWP operations. As described in Chapter 9, Fish and Aquatic Resources, there would be little change in through-Delta survival by emigrating natural juvenile fall-run Chinook Salmon under the No Action Alternative as compared to the Second Basis of Comparison. It is assumed that the survival of the hatchery juvenile fall-run Chinook Salmon would be similar to the survival of the natural juvenile fall-run Chinook Salmon. Therefore, the availability of fish for commercial and sport ocean salmon fishing

and the associated economic conditions for the fishing industry would be similar under the No Action Alternative and the Second Basis of Comparison.

19.4.3.1.4 Central Coast Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the Central Coast Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under the No Action Alternative as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under the No Action Alternative than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would decrease by 6 percent, as presented in Table 19.68.

Table 19.68 Changes in Municipal and Industrial Water Supply Costs for the Central Coast Region under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	44	54	-10
Delivery Cost ($1,000)	$6,663	$8,174	-$1,510
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$8,068	-$8,643	$575
Excess Water Savings ($1,000)	-$2,970	-$4,176	$1,206
Average Annual Changes in Water Supply Costs ($1,000)	**-$4,374**	**-$4,645**	**$271**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.69.

Table 19.69 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Central Coast Region under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.6	-4.0	-3.4
Mining & Logging	0	0	0	0	0.0	6.4	-9.3	-2.9
Construction	0	2	0	2	0.0	201.9	-9.7	192.2
Manufacturing	0	0	0	0	0.0	26.8	-51.8	-25.0
Transportation, Warehousing & Utilities	6	0	0	6	1,510.8	17.0	-56.2	1,471.6
Wholesale Trade	0	0	0	0	0.0	4.8	-58.6	-53.8
Retail Trade	0	0	-1	-1	0.0	6.1	-118.5	-112.4
Information	0	0	0	0	0.0	12.0	-39.0	-27.0
Financial Activities	0	0	-1	-1	0.0	68.9	-352.0	-283.2
Services	0	2	-5	-3	0.0	167.1	-447.4	-280.3
Government	0	0	0	0	0.0	0.9	-13.2	-12.3
Total	**6**	**4**	**-8**	**2**	**1,510.8**	**512.7**	**-1,159.9**	**863.6**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under the No Action Alternative as compared to the Second Basis of Comparison generally would result in lower reservoir elevations in reservoirs that store CVP and SWP water (up to 10 to 18 percent) that store CVP and SWP water; and would result in reduced recreational economic factors under the No Action Alternative as compared to the Second Basis of Comparison..

19.4.3.1.5 Southern California Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the Southern California Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under the No Action Alternative as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under the No Action Alternative than under the Second Basis of Comparison. The analysis assumed CVP and SWP

water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would increase by 17 percent, as presented in Table 19.70.

Table 19.70 Changes in Municipal and Industrial Water Supply Costs for the Southern California Region under the No Action Alternative as Compared to the Second Basis of Comparison

Differences in Total	No Action Alternative	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	1,932	2,394	-461
Delivery Cost ($1,000)	$239,692	$296,795	-$57,103
Assumed New Supply Deliveries (TAF)	47	11	35
Annualized New Supply Costs ($1,000)	$12,688	$4,032	$8,656
Water Storage Costs ($1,000)	$7,598	$2,824	$4,774
Lost Water Sales Revenues ($1,000)	$14,614	$1,119	$13,495
Transfer Costs ($1,000)	$11,484	$3,705	$7,779
Shortage Costs ($1,000)	$17,319	$353	$16,966
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$57,474	-$91,507	$34,033
Excess Water Savings ($1,000)	-$4,629	-$10,573	$5,944
Average Annual Changes in Water Supply Costs ($1,000)	**$241,291**	**$206,749**	**$34,542**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.71.

Table 19.71 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Southern California Region under the No Action Alternative as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	2	0	0.0	-12.5	272.7	260.2
Mining & Logging	0	-1	1	0	0.0	-164.2	369.0	204.8
Construction	0	-43	3	0	0.0	-5,205.5	395.5	-4,810.0
Manufacturing	0	-2	10	0	0.0	-1,452.6	6,814.5	5,361.9
Transportation, Warehousing & Utilities	-175	-2	12	-175	-43,673.4	-592.0	2,602.9	-41,662.5
Wholesale Trade	0	-1	20	0	0.0	-275.3	4,339.0	4,063.8
Retail Trade	0	-2	58	0	0.0	-170.6	5,106.3	4,935.7
Information	0	-1	6	0	0.0	-637.5	2,962.1	2,324.6
Financial Activities	0	-9	52	0	0.0	-2,528.7	17,797.9	15,269.1
Services	0	-46	212	0	0.0	-5,542.2	20,430.6	14,888.4
Government	0	0	3	0	0.0	-29.8	587.3	557.5
Total	**-175**	**-108**	**378**	**-175**	**-43,673.4**	**-16,611.0**	**61,677.8**	**1,393.5**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under the No Action Alternative as compared to the Second Basis of Comparison generally would result in lower reservoir elevations in reservoirs that store CVP and SWP water, (up to 10 to 18 percent) that store CVP and SWP water; and would result in reduced recreational economic factors under the No Action Alternative as compared to the Second Basis of Comparison..

19.4.3.2 Alternative 1

As described in Chapter 3, Description of Alternatives, Alternative 1 is identical to the Second Basis of Comparison. As described in Chapter 4, Approach to Environmental Analysis, Alternative 1 as compared to the No Action Alternative and the Second Basis of Comparison. However, because socioeconomic factors under Alternative 1 are identical to socioeconomic factors under the Second Basis of Comparison; Alternative 1 is only compared to the No Action Alternative.

19.4.3.2.1 Alternative 1 Compared to the No Action Alternative

Trinity River Region

Regional Changes to Irrigated Agriculture

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 1 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

The CVP would continue to release water in Trinity River for downstream beneficial uses, including water supplies under Alternative 1 as compared to the No Action Alternative. There are no CVP or SWP water contractors in the Trinity River Region.

Regional Changes to Recreational Opportunities

Recreational opportunities would be similar in the Trinity River Region under Alternative 1 as compared to the No Action Alternative as described in Chapter 15, Recreational Resources.

Regional Changes to Salmon Fishing

Trinity River flows would be similar under Alternative 1 as compared to the No Action Alternative. This could result in similar salmon harvest conditions by the Yurok and Hoopa Valley tribes.

Central Valley Region

Regional Changes to Irrigated Agriculture

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be greater under Alternative 1 as compared to the No Action Alternative. It is anticipated that groundwater use would decrease in response to increased CVP and SWP water supplies in 2030; and sustainable groundwater management plans would not be fully implemented until the 2040s, as discussed in Chapter 12, Agricultural Resources.

The agricultural production value under long-term average conditions would be increased by less than 1 percent ($1.6 million/year in the Sacramento Valley and $0.5 million/year in the San Joaquin Valley) primarily due to a decrease in groundwater pumping of approximately 7 percent. The agricultural production value under dry and critical dry conditions also would be increased by less than 1 percent ($11.3 million/year in the Sacramento Valley and $20.3 million/year in the San Joaquin Valley) primarily due to a decrease in groundwater pumping.

The overall increase in agricultural production values are less than 0.05 percent under long-term conditions; and, changes in employment and regional economic output would be minimal. Therefore, the analysis of employment and regional economic output is focused on dry and critical dry years.

The direct changes in agricultural production would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.72 and 19.73, respectively.

Table 19.72 Changes in Agricultural-Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 1 as compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	87	21	0	108	11.3	1.3	0	12.7
Mining & Logging	0	0	0	0	0	0	0	0
Construction	0	1	0	1	0	0.1	0	0.2
Manufacturing	0	0	0	0	0	0.1	0	0.1
Transportation, Warehousing & Utilities	0	1	0	2	0	0.4	0.1	0.5
Wholesale Trade	0	1	1	2	0	0.2	0.1	0.3
Retail Trade	0	0	4	4	0	0	0.3	0.3
Information	0	0	0	0	0	0	0.1	0.1
Financial Activities	0	7	2	9	0	1.6	0.8	2.5
Services	0	3	12	15	0	0.3	1	1.3
Government	0	0	0	0	0	0.1	0	0.1
Total	**87**	**36**	**19**	**142**	**11.3**	**4.2**	**2.5**	**18.1**

Note:
In 2012 dollars.

Table 19.73 Changes in Agricultural-Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 1 as compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	139	53	0	192	20.3	2.3	0.1	22.7
Mining & Logging	0	1	0	1	0	0.3	0	0.3
Construction	0	2	0	2	0	0.2	0	0.2
Manufacturing	0	1	0	2	0	1.8	0.3	2.1
Transportation, Warehousing & Utilities	0	3	1	4	0	0.8	0.2	1
Wholesale Trade	0	2	1	3	0	0.4	0.2	0.5
Retail Trade	0	0	7	8	0	0	0.6	0.6
Information	0	0	0	1	0	0.1	0.1	0.2
Financial Activities	0	12	3	15	0	2.7	1.5	4.1
Services	0	5	21	26	0	0.5	1.7	2.2
Government	0	1	0	1	0	0.2	0.1	0.3
Total	**139**	**79**	**35**	**254**	**20.3**	**9.2**	**4.9**	**34.4**

Note:
In 2012 dollars.

As described in Chapter 11, Geology and Soils Resources, increased groundwater pumping under the long-term average conditions may result in an additional increment of subsidence in those areas within the Central Valley. The additional amount of subsidence and the economic costs associated with it have not been quantified in this EIS. However, total subsidence-related costs have been shown to be substantial, as reported by Borchers et al. (2014) who estimated that the cost of subsidence in San Joaquin Valley between 1955 and 1972 was more than $1.3 billion (in 2013 dollars). These estimates are based on the impacts to major infrastructure in the region including the San Joaquin River, Delta Mendota Canal, Friant-Kern Canal and San Luis Canal in addition to privately owned infrastructure. The incremental subsidence-related costs, expressed on an annual basis, could be an unknown fraction of that cumulative cost.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would increase under Alternative 1 as compared to the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis are described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies are presented in Tables 19.74 and 19.75 for the Sacramento and San Joaquin Valley, respectively. The average annual water supply costs would decrease in the Sacramento Valley by 10 percent and increase in the San Joaquin Valley by 14 percent.

Table 19.74 Changes in Municipal and Industrial Water Supply Costs for the Sacramento Valley under Alternative 1 as compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	463	447	16
Delivery Cost ($1,000)	$8,317	$8,031	$287
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$207	$213	-$6
Transfer Costs ($1,000)	$517	$739	-$222
Shortage Costs ($1,000)	$68	$69	-$1
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$3,916	-$3,858	-$58
Excess Water Savings ($1,000)	-$2,563	-$2,275	-$288
Average Annual Changes in Water Supply Costs ($1,000)	**$2,630**	**$2,919**	**-$288**

Note:
In 2012 dollars

Table 19.75 Changes in Municipal and Industrial Water Supply Costs for the San Joaquin Valley under Alternative 1 as compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	237	214	23
Delivery Cost ($1,000)	$3,854	$3,460	$394
Assumed New Supply Deliveries (TAF)	0	2	-2
Annualized New Supply Costs ($1,000)	$15	$429	-$414
Water Storage Costs ($1,000)	$820	$942	-$122
Lost Water Sales Revenues ($1,000)	$322	$361	-$39
Transfer Costs ($1,000)	$2,623	$2,673	-$50
Shortage Costs ($1,000)	$102	$115	-$13
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$16,011	-$15,377	-$634
Excess Water Savings ($1,000)	-$1,318	-$1,029	-$289
Average Annual Changes in Water Supply Costs ($1,000)	**-$9,593**	**-$8,427**	**-$1,166**

The changes in M&I water supply costs would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.76 and 19.77, respectively.

Table 19.76 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 1 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.1	1.7	1.6
Mining & Logging	0	0	0	0	0.0	-0.4	0.3	-0.1
Construction	0	0	0	0	0.0	-29.0	2.5	-26.5
Manufacturing	0	0	0	0	0.0	-3.1	22.2	19.1
Transportation, Warehousing & Utilities	-1	0	0	-1	-286.4	-2.8	18.0	-271.2
Wholesale Trade	0	0	0	0	0.0	-1.0	27.1	26.1
Retail Trade	0	0	1	1	0.0	-0.9	46.6	45.6
Information	0	0	0	0	0.0	-3.4	20.6	17.2
Financial Activities	0	0	0	0	0.0	-13.0	147.7	134.6
Services	0	0	2	-1	0.0	-30.8	154.7	123.9
Government	0	0	0	0	0.0	-0.2	3.8	3.7
Total	**-1**	**-1**	**3**	**-1**	**-286.4**	**-84.8**	**445.2**	**74.0**

Note:
In 2012 dollars

Table 19.77 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 1 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	6.7	6.7
Mining & Logging	0	0	0	0	0.0	0.4	6.4	6.8
Construction	0	0	0	0	0.0	13.3	5.6	18.9
Manufacturing	0	0	0	0	0.0	1.4	46.4	47.8
Transportation, Warehousing & Utilities	1	0	0	1	140.8	1.4	44.7	186.9
Wholesale Trade	0	0	0	0	0.0	0.4	39.0	39.3
Retail Trade	0	0	1	1	0.0	0.4	97.4	97.8
Information	0	0	0	0	0.0	1.0	27.0	28.0
Financial Activities	0	0	1	1	0.0	4.3	263.7	268.0
Services	0	0	3	3	0.0	11.7	292.3	303.9
Government	0	0	0	0	0.0	0.1	12.9	13.0
Total	**1**	**0**	**6**	**7**	**140.8**	**34.3**	**842.0**	**1,017.2**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Recreational opportunities would increase at San Luis Reservoir by 6 percent under Alternative 1 as compared to the No Action Alternative, as described in Chapter 15, Recreation Resources. Therefore, it is anticipated that recreational economic factors would be increased under Alternative 1 as compared to the No Action Alternative.

Effects Related to Cross Delta Water Transfers

Potential effects to socioeconomic factors could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014c) as described above under the No Action Alternative compared to the Second Basis of Comparison. For the purposes of this EIS, it is anticipated that similar conditions would occur during implementation of cross Delta water transfers under Alternative 1 and the No Action Alternative, and that impacts on socioeconomic factors could be adverse in the seller's service area.

Under Alternative 1, water could be transferred throughout the year without an annual volumetric limit. Under the No Action Alternative, the timing of cross Delta water transfers would be limited to July through September and include annual volumetric limits, in accordance with the 2008 USFWS BO and 2009 NMFS BO. Overall, the potential for cross Delta water transfers would be increased under Alternative 1 as compared to the No Action Alternative.

San Francisco Bay Area Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, increases in CVP and SWP water supplies within the San Francisco Bay Area Region would not result in changes in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be an increase in irrigated acreage in dry and critical dry years under Alternative 1 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would increase under Alternative 1 as compared to the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would decrease by 30 percent, as presented in Table 19.78.

Table 19.78 Changes in Municipal and Industrial Water Supply Costs for the San Francisco Bay Area Region under Alternative 1 as compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	445	396	48
Delivery Cost ($1,000)	$12,515	$11,044	$1,471
Assumed New Supply Deliveries (TAF)	16	18	-2
Annualized New Supply Costs ($1,000)	$234	$599	-$365
Water Storage Costs ($1,000)	$1,963	$1,577	$386
Lost Water Sales Revenues ($1,000)	$1,595	$4,286	-$2,691
Transfer Costs ($1,000)	$1,154	$5,722	-$4,568
Shortage Costs ($1,000)	$523	$1,410	-$887
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$792	-$493	-$298
Excess Water Savings ($1,000)	-$549	-$225	-$324
Average Annual Changes in Water Supply Costs ($1,000)	**$16,643**	**$23,919**	**-$7,276**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.79.

Table 19.79 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Francisco Bay Area Region under Alternative 1 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.1	7.9	7.8
Mining & Logging	0	0	0	0	0.0	-1.6	5.0	3.4
Construction	0	-1	0	-1	0.0	-158.8	37.1	-121.7
Manufacturing	0	0	0	0	0.0	-28.8	478.0	449.1
Transportation, Warehousing & Utilities	-5	0	1	-4	-1,492.4	-11.2	183.5	-1,320.1
Wholesale Trade	0	0	1	1	0.0	-5.0	350.6	345.7
Retail Trade	0	0	6	6	0.0	-4.2	567.2	563.0
Information	0	0	1	1	0.0	-16.8	306.6	289.8
Financial Activities	0	0	5	4	0.0	-55.8	1,740.5	1,684.7
Services	0	-1	20	19	0.0	-133.7	2,162.8	2,029.1
Government	0	0	0	0	0.0	-0.7	55.1	54.4
Total	**-5**	**-3**	**35**	**27**	**-1,492.4**	**-416.7**	**5,894.3**	**3,985.2**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 1 as compared to the No Action Alternative generally would result in higher reservoir elevations in reservoirs that store CVP and SWP water (up to 11 to 21 percent); and would result in increased recreational economic factors under Alternative 1 as compared to the No Action Alternative.

Regional Changes to Salmon Fishing

Changes in commercial and sport ocean salmon fishing primarily would be related to the presence of fall-run Chinook Salmon from Central Valley hatcheries. It is assumed that the production of hatchery fish would be similar under Alternative 1 and the No Action Alternative. However, survival of the fall-run Chinook Salmon hatchery fish to the Pacific Ocean could be related to changes in CVP and SWP operations. As described in Chapter 9, Fish and Aquatic Resources, there would be little change in through-Delta survival by emigrating natural juvenile fall-run Chinook Salmon under Alternative 1 and the No Action Alternative. It is assumed that the survival of the hatchery juvenile fall-run Chinook Salmon would be similar to the survival of the natural juvenile fall-run Chinook Salmon. Therefore, the availability of fish for commercial and sport ocean salmon fishing and the associated economic conditions for the fishing industry would be similar under Alternative 1 and the No Action Alternative.

Central Coast Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, increases in CVP and SWP water supplies within the Central Coast Region would not result in increases in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be increased irrigated acreage in dry and critical dry years under Alternative 1 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be higher under Alternative 1 as compared to the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would increase 6 percent, as presented in Table 19.80.

Table 19.80 Changes in Municipal and Industrial Water Supply Costs for the Central Coast Region under Alternative 1 as compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	54	44	10
Delivery Cost ($1,000)	$8,174	$6,663	$1,510
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$8,643	-$8,068	-$575
Excess Water Savings ($1,000)	-$4,176	-$2,970	-$1,206
Average Annual Changes in Water Supply Costs ($1,000)	**-$4,645**	**-$4,374**	**-$271**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.81.

Table 19.81 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Central Coast Region under Alternative 1 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.6	4.0	3.4
Mining & Logging	0	0	0	0	0.0	-6.4	9.3	2.9
Construction	0	-2	0	-2	0.0	-201.9	9.7	-192.2
Manufacturing	0	0	0	0	0.0	-26.8	51.8	25.0
Transportation, Warehousing & Utilities	-6	0	0	-6	-1,510.8	-17.0	56.2	-1,471.6
Wholesale Trade	0	0	0	0	0.0	-4.8	58.6	53.8
Retail Trade	0	0	1	1	0.0	-6.1	118.5	112.4
Information	0	0	0	0	0.0	-12.0	39.0	27.0
Financial Activities	0	0	1	1	0.0	-68.9	352.0	283.2
Services	0	-2	5	3	0.0	-167.1	447.4	280.3
Government	0	0	0	0	0.0	-0.9	13.2	12.3
Total	**-6**	**-4**	**8**	**-2**	**-1,510.8**	**-512.7**	**1,159.9**	**-863.6**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 1 as compared to the No Action Alternative generally would result in higher reservoir elevations in reservoirs that store CVP and SWP water (up to 11 to 21 percent); and would result in increased recreational economic factors under Alternative 1 as compared to the No Action Alternative.

Southern California Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, increases in CVP and SWP water supplies within the Southern California Region would not result in increases in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be increased irrigated acreage in dry and critical dry years under Alternative 1 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be higher under Alternative 1 as compared to the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new

supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would decrease 14 percent, as presented in Table 19.82.

Table 19.82 Changes in Municipal and Industrial Water Supply Costs for the Southern California Region under Alternative 1 as compared to the No Action Alternative

Differences in Total	Alternative 1	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	2,394	1,932	461
Delivery Cost ($1,000)	$296,795	$239,692	$57,103
Assumed New Supply Deliveries (TAF)	11	47	-35
Annualized New Supply Costs ($1,000)	$4,032	$12,688	-$8,656
Water Storage Costs ($1,000)	$2,824	$7,598	-$4,774
Lost Water Sales Revenues ($1,000)	$1,119	$14,614	-$13,495
Transfer Costs ($1,000)	$3,705	$11,484	-$7,779
Shortage Costs ($1,000)	$353	$17,319	-$16,966
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$91,507	-$57,474	-$34,033
Excess Water Savings ($1,000)	-$10,573	-$4,629	-$5,944
Average Annual Changes in Water Supply Costs ($1,000)	**$206,749**	**$241,291**	**-$34,542**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.83.

Table 19.83 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Southern California Region under Alternative 1 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	-2	-1	0.0	12.5	-272.7	-260.2
Mining & Logging	0	1	-1	-1	0.0	164.2	-369.0	-204.8
Construction	0	43	-3	40	0.0	5,205.5	-395.5	4,810.0
Manufacturing	0	2	-10	-8	0.0	1,452.6	-6,814.5	-5,361.9
Transportation, Warehousing & Utilities	175	2	-12	166	43,673.4	592.0	-2,602.9	41,662.5
Wholesale Trade	0	1	-20	-19	0.0	275.3	-4,339.0	-4,063.8
Retail Trade	0	2	-58	-56	0.0	170.6	-5,106.3	-4,935.7
Information	0	1	-6	-5	0.0	637.5	-2,962.1	-2,324.6
Financial Activities	0	9	-52	-43	0.0	2,528.7	-17,797.9	-15,269.1
Services	0	46	-212	-166	0.0	5,542.2	-20,430.6	-14,888.4
Government	0	0	-3	-3	0.0	29.8	-587.3	-557.5
Total	**175**	**108**	**-378**	**-95**	**43,673.4**	**16,611.0**	**-61,677.8**	**-1,393.5**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 1 as compared to the No Action Alternative generally would result in higher reservoir elevations in reservoirs that store CVP and SWP water (up to 11 to 21 percent); and would result in increased recreational economic factors under Alternative 1 as compared to the No Action Alternative.

19.4.3.2.2 Alternative 1 Compared to the Second Basis of Comparison

As described in Chapter 3, Description of Alternatives, Alternative 1 is identical to the Second Basis of Comparison.

19.4.3.3 Alternative 2

The CVP and SWP operations under Alternative 2 are identical to the CVP and SWP operations under the No Action Alternative, therefore, Alternative 2 is only compared to the Second Basis of Comparison.

19.4.3.3.1 Alternative 2 Compared to the Second Basis of Comparison

The CVP and SWP operations under Alternative 2 are identical to the CVP and SWP operations under the No Action Alternative. Therefore, changes to socioeconomic factors under Alternatives 2 as compared to the Second Basis of Comparison would be the same as the impacts described in Section 12.4.3.1, No Action Alternative.

19.4.3.4 Alternative 3

As described in Chapter 3, Description of Alternatives, CVP and SWP operations under Alternative 3 are similar to the Second Basis of Comparison with modified Old and Middle River flow criteria and New Melones Reservoir operations and reductions in Striped Bass fishing opportunities. As described in Chapter 4, Approach to Environmental Analysis, Alternative 3 is compared to the No Action Alternative and the Second Basis of Comparison.

19.4.3.4.1 Alternative 3 Compared to the No Action Alternative

Trinity River Region

Regional Changes to Irrigated Agriculture

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 3 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

The CVP would continue to release water in Trinity River for downstream beneficial uses, including water supplies under Alternative 3 as compared to the No Action Alternative. There are no CVP or SWP water contractors in the Trinity River Region.

Regional Changes to Recreational Opportunities

Recreational opportunities would be similar in the Trinity River Region under Alternative 3 as compared to the No Action Alternative as described in Chapter 15, Recreational Resources.

Regional Changes to Salmon Fishing

Trinity River flows would be similar under Alternative 3 as compared to the No Action Alternative. This could result in similar salmon harvest conditions by the Yurok and Hoopa Valley tribes.

Central Valley Region

Regional Changes to Irrigated Agriculture

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be greater under Alternative 3 as compared to the No Action Alternative. It is anticipated that groundwater use would decrease in response to increased CVP and SWP water supplies in 2030; and sustainable groundwater management plans would not be fully implemented until the 2040s, as discussed in Chapter 12, Agricultural Resources.

The agricultural production value under long-term average conditions would be increased by less than 1 percent ($1.2 million/year in the Sacramento Valley and $0.3 million/year in the San Joaquin Valley) primarily due to a decrease in groundwater pumping of approximately 4 percent. The agricultural production value under dry and critical dry conditions also would be increased by less than 1 percent ($9.2 million/year in the Sacramento Valley and $11.4 million/year in the San Joaquin Valley), primarily due to a decrease in groundwater pumping.

The overall increase in agricultural production values are less than 0.05 percent under long-term conditions; and, changes in employment and regional economic output would be minimal. Therefore, the analysis of employment and regional economic output is focused on dry and critical dry years.

The direct changes in agricultural production would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.84 and 19.85, respectively.

Table 19.84 Changes in Agricultural-Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 3 as compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	69	18	0	86	9.2	1.1	0.0	10.3
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0
Construction	0	1	0	1	0.0	0.1	0.0	0.1
Manufacturing	0	0	0	0	0.0	0.1	0.0	0.1
Transportation, Warehousing & Utilities	0	1	0	1	0.0	0.3	0.1	0.4
Wholesale Trade	0	1	0	1	0.0	0.2	0.1	0.3
Retail Trade	0	0	3	3	0.0	0.0	0.3	0.3
Information	0	0	0	0	0.0	0.0	0.1	0.1
Financial Activities	0	5	2	7	0.0	1.3	0.7	2.0
Services	0	3	10	13	0.0	0.2	0.9	1.1
Government	0	0	0	0	0.0	0.1	0.0	0.1
Total	**69**	**29**	**17**	**115**	**9.2**	**3.4**	**2.2**	**14.8**

Note:
In 2012 dollars

Table 19.85 Changes in Agricultural-Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 3 as compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	103	26	0	130	11.4	1.2	0.0	12.7
Mining & Logging	0	1	0	1	0.0	0.2	0.0	0.2
Construction	0	1	0	1	0.0	0.1	0.0	0.1
Manufacturing	0	1	0	1	0.0	1.2	0.1	1.3
Transportation, Warehousing & Utilities	0	2	0	2	0.0	0.5	0.1	0.6
Wholesale Trade	0	1	0	1	0.0	0.2	0.1	0.3
Retail Trade	0	0	3	3	0.0	0.0	0.3	0.3
Information	0	0	0	0	0.0	0.0	0.1	0.1
Financial Activities	0	8	1	10	0.0	1.8	0.6	2.5
Services	0	3	9	12	0.0	0.3	0.7	1.0
Government	0	0	0	1	0.0	0.1	0.0	0.1
Total	103	44	15	161	11.4	5.7	2.1	19.1

Note:
In 2012 dollars

As described in Chapter 11, Geology and Soils Resources, increased groundwater pumping under the long-term average conditions may result in an additional increment of subsidence in those areas within the Central Valley. The additional amount of subsidence and the economic costs associated with it have not been quantified in this EIS. However, total subsidence-related costs have been shown to be substantial, as reported by Borchers et al. (2014) who estimated that the cost of subsidence in San Joaquin Valley between 1955 and 1972 was more than $1.3 billion (in 2013 dollars). These estimates are based on the impacts to major infrastructure in the region including the San Joaquin River, Delta Mendota Canal, Friant-Kern Canal and San Luis Canal in addition to privately owned infrastructure. The incremental subsidence-related costs, expressed on an annual basis, could be an unknown fraction of that cumulative cost.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would increase under Alternative 3 as compared to the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent.

The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies are presented in Tables 19.86 and 19.87 for the Sacramento and San Joaquin Valley, respectively. Average annual water supply costs would decrease by 6 percent in the Sacramento Valley and increase by 21 percent in the San Joaquin Valley.

Table 19.86 Changes in Municipal and Industrial Water Supply Costs for the Sacramento Valley under Alternative 3 as compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	461	447	13
Delivery Cost ($1,000)	$8,285	$8,031	$255
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$243	$213	$30
Transfer Costs ($1,000)	$601	$739	-$138
Shortage Costs ($1,000)	$77	$69	$8
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$3,938	-$3,858	-$81
Excess Water Savings ($1,000)	-$2,517	-$2,275	-$241
Average Annual Changes in Water Supply Costs ($1,000)	**$2,750**	**$2,919**	**-$169**

Note:
In 2012 dollars

Table 19.87 Changes in Municipal and Industrial Water Supply Costs for the San Joaquin Valley under Alternative 3 as compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	241	214	27
Delivery Cost ($1,000)	$3,896	$3,460	$436
Assumed New Supply Deliveries (TAF)	0	2	-2
Annualized New Supply Costs ($1,000)	$13	$429	-$417
Water Storage Costs ($1,000)	$465	$942	-$477
Lost Water Sales Revenues ($1,000)	$284	$361	-$78
Transfer Costs ($1,000)	$2,104	$2,673	-$568
Shortage Costs ($1,000)	$89	$115	-$26
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$15,660	-$15,377	-$283
Excess Water Savings ($1,000)	-$1,378	-$1,029	-$349
Average Annual Changes in Water Supply Costs ($1,000)	**-$10,187**	**-$8,427**	**-$1,761**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.88 and 19.89, respectively.

Table 19.88 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 3 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.1	-1.2	-1.1
Mining & Logging	0	0	0	0	0.0	0.4	-0.2	0.2
Construction	0	0	0	0	0.0	25.8	-1.8	23.9
Manufacturing	0	0	0	0	0.0	2.8	-16.2	-13.5
Transportation, Warehousing & Utilities	1	0	0	1	254.4	2.5	-13.1	243.7
Wholesale Trade	0	0	0	0	0.0	0.9	-20.0	-19.1
Retail Trade	0	0	0	0	0.0	0.8	-33.8	-33.0
Information	0	0	0	0	0.0	3.0	-15.1	-12.1
Financial Activities	0	0	0	0	0.0	11.6	-107.7	-96.1
Services	0	0	-1	-1	0.0	27.4	-112.8	-85.4
Government	0	0	0	0	0.0	0.1	-2.8	-2.7
Total	**1**	**1**	**-2**	**0**	**254.4**	**75.3**	**-324.8**	**4.9**

Note:
In 2012 dollars

Table 19.89 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 3 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.2	-8.9	-9.1
Mining & Logging	0	0	0	0	0.0	-1.2	-8.5	-9.7
Construction	0	0	0	0	0.0	-43.3	-7.4	-50.7
Manufacturing	0	0	0	0	0.0	-4.4	-62.0	-66.3
Transportation, Warehousing & Utilities	-2	0	0	-2	-457.3	-4.4	-59.6	-521.3
Wholesale Trade	0	0	0	0	0.0	-1.2	-51.6	-52.8
Retail Trade	0	0	-2	-2	0.0	-1.3	-130.7	-132.0
Information	0	0	0	0	0.0	-3.2	-36.0	-39.2
Financial Activities	0	0	-1	-1	0.0	-14.1	-352.2	-366.3
Services	0	0	-5	-5	0.0	-38.0	-391.1	-429.1
Government	0	0	0	0	0.0	-0.3	-17.2	-17.5
Total	**-2**	**-1**	**-8**	**-11**	**-457.3**	**-111.6**	**-1,125.2**	**-1,694.1**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Recreational opportunities would be similar at San Luis Reservoir under Alternative 3 as compared to the No Action Alternative, as described in Chapter 15, Recreation Resources. Recreational opportunities related to Striped Bass fishing would decline due to predation control programs. Therefore, it is anticipated that recreational economic factors would be reduced under Alternative 3 as compared to the No Action Alternative.

Effects Related to Cross Delta Water Transfers

Potential effects to socioeconomic factors could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014c) as described above under the No Action Alternative compared to the Second Basis of Comparison. For the purposes of this EIS, it is anticipated that similar conditions would occur during implementation of cross Delta water transfers under Alternative 3 and the No Action Alternative, and that impacts on socioeconomic factors could be adverse in the seller's service area.

Under Alternative 3, water could be transferred throughout the year without an annual volumetric limit. Under the No Action Alternative, the timing of cross Delta water transfers would be limited to July through September and include annual volumetric limits, in accordance with the 2008 USFWS BO and 2009 NMFS BO. Overall, the potential for cross Delta water transfers would be increased under Alternative 3 as compared to the No Action Alternative.

San Francisco Bay Area Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, increases in CVP and SWP water supplies within the San Francisco Bay Area Region would not result in changes in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be an increase in irrigated acreage in dry and critical dry years under Alternative 3 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would increase under Alternative 3 as compared to the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would decrease by 21 percent, as presented in Table 19.90.

Table 19.90 Changes in Municipal and Industrial Water Supply Costs for the San Francisco Bay Area Region under Alternative 3 as compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	431	396	34
Delivery Cost ($1,000)	$12,096	$11,044	$1,052
Assumed New Supply Deliveries (TAF)	18	18	0
Annualized New Supply Costs ($1,000)	$575	$599	-$24
Water Storage Costs ($1,000)	$2,303	$1,577	$726
Lost Water Sales Revenues ($1,000)	$2,381	$4,286	-$1,905
Transfer Costs ($1,000)	$1,826	$5,722	-$3,896
Shortage Costs ($1,000)	$743	$1,410	-$667
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$726	-$493	-$232
Excess Water Savings ($1,000)	-$393	-$225	-$167
Average Annual Changes in Water Supply Costs ($1,000)	**$18,806**	**$23,919**	**-$5,113**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.91.

Table 19.91 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Francisco Bay Area Region under Alternative 3 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.1	-6.0	-5.9
Mining & Logging	0	0	0	0	0.0	1.9	-3.8	-1.9
Construction	0	1	0	1	0.0	186.7	-28.2	158.6
Manufacturing	0	0	0	0	0.0	33.9	-363.5	-329.6
Transportation, Warehousing & Utilities	6	0	-1	5	1,754.5	13.2	-139.1	1,628.6
Wholesale Trade	0	0	-1	-1	0.0	5.8	-268.7	-262.9
Retail Trade	0	0	-5	-5	0.0	4.9	-428.6	-423.7
Information	0	0	0	0	0.0	19.8	-233.1	-213.4
Financial Activities	0	0	-3	-3	0.0	65.6	-1,320.3	-1,254.7
Services	0	1	-15	-14	0.0	157.2	-1,639.6	-1,482.4
Government	0	0	0	0	0.0	0.8	-41.8	-41.0
Total	**6**	**3**	**-26**	**-17**	**1,754.5**	**489.9**	**-4,472.7**	**-2,228.3**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 3 as compared to the No Action Alternative generally would result in higher reservoir elevations in reservoirs that store CVP and SWP water (up to 9 to 17 percent); and would result in increased recreational economic factors under Alternative 3 as compared to the No Action Alternative.

Regional Changes to Salmon Fishing

Changes in commercial and sport ocean salmon fishing primarily would be related to the presence of fall-run Chinook Salmon from Central Valley hatcheries. It is assumed that the production of hatchery fish would be similar under Alternative 3 and the No Action Alternative. However, survival of the fall-run Chinook Salmon hatchery fish to the Pacific Ocean could be related to changes in CVP and SWP operations. As described in Chapter 9, Fish and Aquatic Resources, there would be little change in through-Delta survival by emigrating natural juvenile fall-run Chinook Salmon under Alternative 3 and the No Action Alternative. It is assumed that the survival of the hatchery juvenile fall-run Chinook Salmon would be similar to the survival of the natural juvenile fall-run Chinook Salmon. Therefore, the availability of fish for commercial and sport ocean salmon fishing and the associated economic conditions for the fishing industry would be similar under Alternative 3 and the No Action Alternative.

Central Coast Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, increases in CVP and SWP water supplies within the Central Coast Region would not result in increases in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be increased irrigated acreage in dry and critical dry years under Alternative 3 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be higher under Alternative 3 as compared to the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would be similar (within 5 percent change), as presented in Table 19.92.

Table 19.92 Changes in Municipal and Industrial Water Supply Costs for the Central Coast Region under Alternative 3 as compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	51	44	8
Delivery Cost ($1,000)	$7,814	$6,663	$1,151
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$8,333	-$8,068	-$265
Excess Water Savings ($1,000)	-$3,980	-$2,970	-$1,010
Average Annual Changes in Water Supply Costs ($1,000)	**-$4,499**	**-$4,374**	**-$125**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.93.

Table 19.93 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Central Coast Region under Alternative 3 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.4	-2.8	-2.4
Mining & Logging	0	0	0	0	0.0	4.9	-6.5	-1.7
Construction	0	1	0	1	0.0	153.8	-6.8	147.0
Manufacturing	0	0	0	0	0.0	20.4	-36.5	-16.0
Transportation, Warehousing & Utilities	5	0	0	5	1,150.6	13.0	-39.5	1,124.0
Wholesale Trade	0	0	0	0	0.0	3.7	-41.4	-37.8
Retail Trade	0	0	-1	-1	0.0	4.7	-83.0	-78.4
Information	0	0	0	0	0.0	9.1	-27.4	-18.3
Financial Activities	0	0	-1	0	0.0	52.5	-247.3	-194.8
Services	0	1	-3	-2	0.0	127.3	-314.2	-186.9
Government	0	0	0	0	0.0	0.7	-9.3	-8.6
Total	**5**	**3**	**-6**	**2**	**1,150.6**	**390.4**	**-814.8**	**726.2**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 3 as compared to the No Action Alternative generally would result in higher reservoir elevations in reservoirs that store CVP and SWP water (up to 9 to 17 percent); and would result in increased recreational economic factors under Alternative 3 as compared to the No Action Alternative.

Southern California Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, increases in CVP and SWP water supplies within the Southern California Region would not result in increases in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be increased irrigated acreage in dry and critical dry years under Alternative 3 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be higher under Alternative 3 as compared to the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would similar (within 5 percent change), as presented in Table 19.94.

Table 19.94 Changes in Municipal and Industrial Water Supply Costs for the Southern California Region under Alternative 3 as compared to the No Action Alternative

Differences in Total	Alternative 3	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	2,241	1,932	308
Delivery Cost ($1,000)	$278,085	$239,692	$38,393
Assumed New Supply Deliveries (TAF)	40	47	-7
Annualized New Supply Costs ($1,000)	$10,584	$12,688	-$2,104
Water Storage Costs ($1,000)	$8,154	$7,598	$556
Lost Water Sales Revenues ($1,000)	$11,409	$14,614	-$3,205
Transfer Costs ($1,000)	$6,181	$11,484	-$5,303
Shortage Costs ($1,000)	$12,632	$17,319	-$4,687
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$81,693	-$57,474	-$24,218
Excess Water Savings ($1,000)	-$9,005	-$4,629	-$4,376
Average Annual Changes in Water Supply Costs ($1,000)	**$236,347**	**$241,291**	**-$4,944**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.95.

Table 19.95 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Southern California under Alternative 3 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	-1	-1	0.0	10.5	-146.4	-135.8
Mining & Logging	0	1	-1	0	0.0	138.6	-199.8	-61.2
Construction	0	37	-2	35	0.0	4,391.6	-211.9	4,179.8
Manufacturing	0	2	-6	-3	0.0	1,225.5	-3,662.5	-2,437.0
Transportation, Warehousing & Utilities	148	2	-6	143	36,845.0	499.5	-1,389.7	35,954.8
Wholesale Trade	0	1	-11	-10	0.0	232.2	-2,405.6	-2,173.3
Retail Trade	0	2	-31	-29	0.0	143.9	-2,688.1	-2,544.2
Information	0	1	-3	-2	0.0	537.8	-1,595.7	-1,057.9
Financial Activities	0	7	-28	-20	0.0	2,133.4	-9,496.1	-7,362.8
Services	0	39	-113	-74	0.0	4,675.7	-10,892.2	-6,216.5
Government	0	0	-2	-1	0.0	25.1	-314.7	-289.6
Total	148	91	-202	37	36,845.0	**14,013.9**	**-33,002.7**	**17,856.2**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 3 as compared to the No Action Alternative generally would result in higher reservoir elevations in reservoirs that store CVP and SWP water (up to 9 to 17 percent); and would result in increased recreational economic factors under Alternative 3 as compared to the No Action Alternative.

19.4.3.4.2 Alternative 3 Compared to the Second Basis of Comparison

Trinity River Region

Regional Changes to Irrigated Agriculture

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 3 as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

The CVP would continue to release water in Trinity River for downstream beneficial uses, including water supplies under Alternative 3 and the Second Basis of Comparison. There are no CVP or SWP water contractors in the Trinity River Region.

Regional Changes to Recreational Opportunities

Recreational opportunities would be similar in the Trinity River Region under Alternative 3 as compared to the Second Basis of Comparison as described in Chapter 15, Recreational Resources.

Regional Changes to Salmon Fishing

Trinity River flows would be similar under Alternative 3 as compared to the Second Basis of Comparison. This could result in similar salmon harvest conditions by the Yurok and Hoopa Valley tribes.

Central Valley Region

Regional Changes to Irrigated Agriculture

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 3 than under the Second Basis of Comparison. It is anticipated that groundwater use would increase in response to reduced CVP and SWP water supplies in 2030 because sustainable groundwater management plans would not be fully implemented until the 2040s, as discussed in Chapter 12, Agricultural Resources.

The agricultural production value under long-term average conditions would be reduced by less than 1 percent ($0.3 million/year in the Sacramento Valley and $0.3 million/year in the San Joaquin Valley) primarily due to an increase in groundwater pumping of approximately 2 percent. The agricultural production value under dry and critical dry conditions also would be reduced by less than 1 percent ($2.1 million/year in the Sacramento Valley and $8.9 million/year in the San Joaquin Valley) primarily due to an increase in groundwater pumping.

The overall reduction in agricultural production values are less than 0.05 percent under long-term conditions; and, changes in employment and regional economic output would be minimal. Therefore, the analysis of employment and regional economic output is focused on dry and critical dry years.

The direct changes in agricultural production would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.96 and 19.97, respectively.

Table 19.96 Changes in Agricultural-Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 3 as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-18	-4	0	-22	-2.1	-0.2	0.0	-2.3
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0	0	0.0	0.0	0.0	0.0
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0
Transportation, Warehousing & Utilities	0	0	0	0	0.0	-0.1	0.0	-0.1
Wholesale Trade	0	0	0	0	0.0	0.0	0.0	-0.1
Retail Trade	0	0	0	-1	0.0	0.0	0.0	0.0
Information	0	0	0	0	0.0	0.0	0.0	0.0
Financial Activities	0	-2	0	-2	0.0	-0.4	-0.1	-0.5
Services	0	-1	-1	-2	0.0	-0.1	-0.1	-0.2
Government	0	0	0	0	0.0	0.0	0.0	0.0
Total	**-18**	**-7**	**-2**	**-27**	**-2.1**	**-0.9**	**-0.3**	**-3.3**

Note:
In 2012 dollars

Table 19.97 Changes in Agricultural-Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 3 as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-36	-26	0	-63	-8.9	-1.1	0.0	-10.0
Mining & Logging	0	0	0	0	0.0	-0.1	0.0	-0.1
Construction	0	-1	0	-1	0.0	-0.1	0.0	-0.1
Manufacturing	0	0	0	-1	0.0	-0.7	-0.2	-0.8
Transportation, Warehousing & Utilities	0	-1	-1	-2	0.0	-0.3	-0.1	-0.5
Wholesale Trade	0	-1	-1	-1	0.0	-0.1	-0.1	-0.2
Retail Trade	0	0	-4	-4	0.0	0.0	-0.4	-0.4
Information	0	0	0	0	0.0	0.0	-0.1	-0.1
Financial Activities	0	-4	-2	-5	0.0	-0.8	-0.9	-1.7
Services	0	-2	-12	-14	0.0	-0.2	-1.0	-1.2
Government	0	0	0	0	0.0	-0.1	0.0	-0.1
Total	**-36**	**-36**	**-20**	**-92**	**-8.9**	**-3.5**	**-2.8**	**-15.3**

Note:
In 2012 dollars

As described in Chapter 11, Geology and Soils Resources, increased groundwater pumping under the long-term average conditions may result in an additional increment of subsidence in those areas within the Central Valley. The additional amount of subsidence and the economic costs associated with it have not been quantified in this EIS. However, total subsidence-related costs have been shown to be substantial, as reported by Borchers et al. (2014) who estimated that the cost of subsidence in San Joaquin Valley between 1955 and 1972 was more than $1.3 billion (in 2013 dollars). These estimates are based on the impacts to major infrastructure in the region including the San Joaquin River, Delta Mendota Canal, Friant-Kern Canal and San Luis Canal in addition to privately owned infrastructure. The incremental subsidence-related costs, expressed on an annual basis, could be an unknown fraction of that cumulative cost.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be similar in the Sacramento Valley and greater in the San Joaquin Valley under Alternative 3 than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of

these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies are presented in Tables 19.98 and 19.99 for the Sacramento and San Joaquin Valley, respectively. Average annual water supply costs would increase in the Sacramento and San Joaquin valleys by 5 and 6 percent, respectively.

Table 19.98 Changes in Municipal and Industrial Water Supply Costs for the Sacramento Valley under Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	461	463	-2
Delivery Cost ($1,000)	$8,285	$8,317	-$32
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$243	$207	$35
Transfer Costs ($1,000)	$601	$517	$84
Shortage Costs ($1,000)	$77	$68	$9
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$3,938	-$3,916	-$23
Excess Water Savings ($1,000)	-$2,517	-$2,563	$46
Average Annual Changes in Water Supply Costs ($1,000)	**$2,750**	**$2,630**	**$119**

Note:
In 2012 dollars

Table 19.99 Changes in Municipal and Industrial Water Supply Costs for the San Joaquin Valley under Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	241	237	4
Delivery Cost ($1,000)	$3,896	$3,854	$42
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$13	$15	-$3
Water Storage Costs ($1,000)	$465	$820	-$355
Lost Water Sales Revenues ($1,000)	$284	$322	-$39
Transfer Costs ($1,000)	$2,104	$2,623	-$518
Shortage Costs ($1,000)	$89	$102	-$13
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$15,660	-$16,011	$351
Excess Water Savings ($1,000)	-$1,378	-$1,318	-$59
Average Annual Changes in Water Supply Costs ($1,000)	**-$10,187**	**-$9,593**	**-$595**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.100 and 19.101, respectively.

Table 19.100 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 3 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.5	0.5
Mining & Logging	0	0	0	0	0.0	0.0	0.1	0.0
Construction	0	0	0	0	0.0	-3.5	0.7	-2.8
Manufacturing	0	0	0	0	0.0	-0.4	6.4	6.0
Transportation, Warehousing & Utilities	0	0	0	0	-34.6	-0.3	5.2	-29.7
Wholesale Trade	0	0	0	0	0.0	-0.1	7.7	7.6
Retail Trade	0	0	0	0	0.0	-0.1	13.6	13.5
Information	0	0	0	0	0.0	-0.4	6.0	5.5
Financial Activities	0	0	0	0	0.0	-1.6	42.9	41.3
Services	0	0	0	0	0.0	-3.7	45.0	41.2
Government	0	0	0	0	0.0	0.0	1.1	1.1
Total	**0**	**0**	**1**	**1**	**-34.6**	**-10.2**	**129.2**	**84.4**

Note:
In 2012 dollars

Table 19.101 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 3 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.1	-2.3	-2.4
Mining & Logging	0	0	0	0	0.0	-0.8	-2.1	-3.0
Construction	0	0	0	0	0.0	-29.9	-1.9	-31.8
Manufacturing	0	0	0	0	0.0	-3.0	-15.5	-18.6
Transportation, Warehousing & Utilities	-1	0	0	-1	-315.8	-3.0	-14.9	-333.7
Wholesale Trade	0	0	0	0	0.0	-0.8	-12.7	-13.5
Retail Trade	0	0	0	0	0.0	-0.9	-33.4	-34.3
Information	0	0	0	0	0.0	-2.2	-9.0	-11.2
Financial Activities	0	0	0	0	0.0	-9.7	-88.6	-98.4
Services	0	0	-1	-1	0.0	-26.2	-99.0	-125.2
Government	0	0	0	0	0.0	-0.2	-4.3	-4.5
Total	**-1**	**-1**	**-2**	**-4**	**-315.8**	**-77.0**	**-283.5**	**-676.3**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Recreational opportunities would be similar at San Luis Reservoir under Alternative 3 as compared to the Second Basis of Comparison, as described in Chapter 15, Recreation Resources. Recreational opportunities related to Striped Bass fishing would decline due to predation control programs. Therefore, it is anticipated that recreational economic factors would be reduced under Alternative 3 as compared to the Second Basis of Comparison.

Effects Related to Cross Delta Water Transfers

Potential effects to socioeconomic factors could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014c) as described above under the No Action Alternative compared to the Second Basis of Comparison. For the purposes of this EIS, it is anticipated that similar conditions would occur during implementation of cross Delta water transfers under Alternative 3 and the Second Basis of Comparison, and that impacts on socioeconomic factors could be adverse in the seller's service area.

Under Alternative 3 and Second Basis of Comparison, water could be transferred throughout the year without an annual volumetric limit. Overall, the potential for cross Delta water transfers would be similar under Alternative 3 as compared to the Second Basis of Comparison.

San Francisco Bay Area Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the San Francisco Bay Area Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under Alternative 3 as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 3 than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would increase by 13 percent, as presented in Table 19.102.

Table 19.102 Changes in Municipal and Industrial Water Supply Costs for the San Francisco Bay Area Region under Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	431	445	-14
Delivery Cost ($1,000)	$12,096	$12,515	-$419
Assumed New Supply Deliveries (TAF)	18	16	2
Annualized New Supply Costs ($1,000)	$575	$234	$342
Water Storage Costs ($1,000)	$2,303	$1,963	$340
Lost Water Sales Revenues ($1,000)	$2,381	$1,595	$786
Transfer Costs ($1,000)	$1,826	$1,154	$672
Shortage Costs ($1,000)	$743	$523	$221
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$726	-$792	$66
Excess Water Savings ($1,000)	-$393	-$549	$156
Average Annual Changes in Water Supply Costs ($1,000)	**$18,806**	**$16,643**	**$2,163**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.103.

Table 19.103 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Francisco Bay Area Region under Alternative 3 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	1.9	1.9
Mining & Logging	0	0	0	0	0.0	0.3	1.2	1.5
Construction	0	0	0	0	0.0	28.0	9.0	36.9
Manufacturing	0	0	0	0	0.0	5.1	114.4	119.5
Transportation, Warehousing & Utilities	1	0	0	1	262.6	2.0	44.3	308.9
Wholesale Trade	0	0	0	0	0.0	0.9	81.9	82.8
Retail Trade	0	0	2	2	0.0	0.7	138.5	139.3
Information	0	0	0	0	0.0	3.0	73.5	76.4
Financial Activities	0	0	1	1	0.0	9.8	420.2	430.0
Services	0	0	5	5	0.0	23.5	523.1	546.7
Government	0	0	0	0	0.0	0.1	13.3	13.4
Total	**1**	**0**	**8**	**10**	**262.6**	**73.3**	**1,421.3**	**1,757.2**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 3 as compared to the Second Basis of Comparison generally would result in similar reservoir elevations in reservoirs that store CVP and SWP water and similar recreational economic factors under Alternative 3 as compared to the Second Basis of Comparison.

Regional Changes to Salmon Fishing

Changes in commercial and sport ocean salmon fishing primarily would be related to the presence of fall-run Chinook Salmon from Central Valley hatcheries. It is assumed that the production of hatchery fish would be similar under Alternative 3 and the Second Basis of Comparison. However, survival of the fall-run Chinook Salmon hatchery fish to the Pacific Ocean could be related to changes in CVP and SWP operations. As described in Chapter 9, Fish and Aquatic Resources, there would be little change in through-Delta survival by emigrating natural juvenile fall-run Chinook Salmon under Alternative 3 as compared to the Second Basis of Comparison. It is assumed that the survival of the hatchery juvenile fall-run Chinook Salmon would be similar to the survival of the natural juvenile fall-run Chinook Salmon. Therefore, the availability of fish for commercial and sport ocean salmon fishing and the associated economic conditions for the fishing industry would be similar under Alternative 3 and the Second Basis of Comparison.

Central Coast Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the Central Coast Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under Alternative 3 as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 3 than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would similar (within 5 percent change), as presented in Table 19.104.

Table 19.104 Changes in Municipal and Industrial Water Supply Costs for the Central Coast Region under Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	51	54	-2
Delivery Cost ($1,000)	$7,814	$8,174	-$360
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$8,333	-$8,643	$310
Excess Water Savings ($1,000)	-$3,980	-$4,176	$196
Average Annual Changes in Water Supply Costs ($1,000)	**-$4,499**	**-$4,645**	**$146**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.105.

Table 19.105 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Central Coast Region under Alternative 3 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.1	1.2	1.0
Mining & Logging	0	0	0	0	0.0	-1.5	2.8	1.2
Construction	0	0	0	0	0.0	-48.1	2.9	-45.2
Manufacturing	0	0	0	0	0.0	-6.4	15.4	9.0
Transportation, Warehousing & Utilities	-2	0	0	-2	-359.9	-4.1	16.7	-347.2
Wholesale Trade	0	0	0	0	0.0	-1.2	17.2	16.1
Retail Trade	0	0	0	0	0.0	-1.5	35.5	34.1
Information	0	0	0	0	0.0	-2.9	11.6	8.8
Financial Activities	0	0	0	0	0.0	-16.4	104.9	88.5
Services	0	0	1	1	0.0	-39.8	133.4	93.6
Government	0	0	0	0	0.0	-0.2	3.9	3.7
Total	**-2**	**-1**	**2**	**0**	**-359.9**	**-122.1**	**345.5**	**-136.5**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 3 as compared to the Second Basis of Comparison generally would result in similar reservoir elevations in reservoirs that store CVP and SWP water and similar

recreational economic factors under Alternative 3 as compared to the Second Basis of Comparison.

Southern California Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the Southern California Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under Alternative 3 as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 3 than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would increase by 14 percent, as presented in Table 19.106.

Table 19.106 Changes in Municipal and Industrial Water Supply Costs for the Southern California Region under Alternative 3 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 3	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	2,241	2,394	-153
Delivery Cost ($1,000)	$278,085	$296,795	-$18,710
Assumed New Supply Deliveries (TAF)	40	11	28
Annualized New Supply Costs ($1,000)	$10,584	$4,032	$6,552
Water Storage Costs ($1,000)	$8,154	$2,824	$5,330
Lost Water Sales Revenues ($1,000)	$11,409	$1,119	$10,289
Transfer Costs ($1,000)	$6,181	$3,705	$2,476
Shortage Costs ($1,000)	$12,632	$353	$12,279
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$81,693	-$91,507	$9,814
Excess Water Savings ($1,000)	-$9,005	-$10,573	$1,568
Average Annual Changes in Water Supply Costs ($1,000)	**$236,347**	**$206,749**	**$29,598**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.107.

Table 19.107 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Southern California Region under Alternative 3 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	1	1	0.0	-2.0	126.3	124.4
Mining & Logging	0	0	1	0	0.0	-25.7	169.2	143.5
Construction	0	-7	1	-5	0.0	-813.9	183.7	-630.2
Manufacturing	0	0	5	4	0.0	-227.1	3,152.0	2,924.9
Transportation, Warehousing & Utilities	-27	0	5	-22	-6,828.3	-92.6	1,213.1	-5,707.8
Wholesale Trade	0	0	9	9	0.0	-43.0	1,933.5	1,890.4
Retail Trade	0	0	27	27	0.0	-26.7	2,418.2	2,391.5
Information	0	0	3	3	0.0	-99.7	1,366.4	1,266.7
Financial Activities	0	-1	24	23	0.0	-395.4	8,301.7	7,906.3
Services	0	-7	99	92	0.0	-866.5	9,538.4	8,671.9
Government	0	0	1	1	0.0	-4.7	272.6	268.0
Total	**-27**	**-17**	**177**	**132**	**-6,828.3**	**-2,597.1**	**28,675.1**	**19,249.7**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 3 as compared to the Second Basis of Comparison generally would result in similar reservoir elevations in reservoirs that store CVP and SWP water and similar recreational economic factors under Alternative 3 as compared to the Second Basis of Comparison.

19.4.3.5 Alternative 4

The CVP and SWP operations under Alternative 4 are identical to the CVP and SWP operations under the Second Basis of Comparison and Alternative 1, as described in Chapter 3, Description of Alternatives. In addition, Alternative 4 includes Striped Bass predation control which would reduce recreational opportunities. The non-recreational socioeconomic factors under Alternative 4 would be identical to the conditions under the Second Basis of Comparison. Alternative 4 is compared to the No Action Alternative and the Second Basis of Comparison.

19.4.3.5.1 Alternative 4 Compared to the No Action Alternative

The CVP and SWP operations under Alternative 4 are identical to the CVP and SWP operations under the Second Basis of Comparison and Alternative 1. Therefore, changes in non-recreational socioeconomic factors under Alternative 4 as compared to the No Action Alternative would be the similar to impacts described in Section 12.4.3.2.1, Alternative 1 Compared to the No Action

Alternative. However recreational economic opportunities related to Striped Bass fishing would decline due to predation control programs.

19.4.3.5.2 Alternative 4 Compared to the Second Basis of Comparison

As described in Chapter 3, Description of Alternatives, socioeconomic factors under Alternative 4 are the same as non-recreational socioeconomic factors under the Second Basis of Comparison. However recreational economic opportunities related to Striped Bass fishing would decline due to predation control programs.

19.4.3.6 Alternative 5

As described in Chapter 3, Description of Alternatives, CVP and SWP operations under Alternative 5 are similar to the No Action Alternative with modified Old and Middle River flow criteria and New Melones Reservoir operations. As described in Chapter 4, Approach to Environmental Analysis, Alternative 5 is compared to the No Action Alternative and the Second Basis of Comparison.

19.4.3.6.1 Alternative 5 Compared to the No Action Alternative

Trinity River Region

Regional Changes to Irrigated Agriculture

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 5 as compared to the No Action Alternative.

Regional Changes to Municipal and Industrial Water Supplies

The CVP would continue to release water in Trinity River for downstream beneficial uses, including water supplies under Alternative 5 as compared to the No Action Alternative. There are no CVP or SWP water contractors in the Trinity River Region.

Regional Changes to Recreational Opportunities

Recreational opportunities would be similar in the Trinity River Region under Alternative 5 as compared to the No Action Alternative as described in Chapter 15, Recreational Resources.

Regional Changes to Salmon Fishing

Trinity River flows would be similar under Alternative 5 as compared to the No Action Alternative. This could result in similar salmon harvest conditions by the Yurok and Hoopa Valley tribes.

Central Valley Region

Regional Changes to Irrigated Agriculture

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be similar under Alternative 5 and the No Action Alternative. It is anticipated that groundwater use would be similar and sustainable groundwater management plans would not be fully implemented until the 2040s, as discussed in Chapter 12, Agricultural Resources.

The agricultural production value under long-term average conditions would be the same under Alternative 5 as the No Action Alternative. The agricultural production value under dry and critical dry conditions also would be reduced by less than 1 percent ($0.8 million/year increase in the Sacramento Valley and $2.7 million/year decrease in the San Joaquin Valley), although groundwater pumping is not anticipated to change.

The overall decrease in agricultural production values are less than 0.05 percent under long-term conditions; and, changes in employment and regional economic output would be minimal. Therefore, the analysis of employment and regional economic output is focused on dry and critical dry years.

The direct changes in agricultural production would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.108 and 19.109, respectively.

Table 19.108 Changes in Agricultural-Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 5 as compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	3	2	0	4	0.8	0.1	0.0	0.9
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0	0	0.0	0.0	0.0	0.0
Manufacturing	0	0	0	0	0.0	0.0	0.0	0.0
Transportation, Warehousing & Utilities	0	0	0	0	0.0	0.0	0.0	0.0
Wholesale Trade	0	0	0	0	0.0	0.0	0.0	0.0
Retail Trade	0	0	0	0	0.0	0.0	0.0	0.0
Information	0	0	0	0	0.0	0.0	0.0	0.0
Financial Activities	0	0	0	0	0.0	0.1	0.1	0.2
Services	0	0	1	2	0.0	0.0	0.1	0.1
Government	0	0	0	0	0.0	0.0	0.0	0.0
Total	**3**	**2**	**2**	**7**	**0.8**	**0.2**	**0.3**	**1.3**

Note:
In 2012 dollars

Table 19.109 Changes in Agricultural-Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 5 as compared to the No Action Alternative in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-5	-9	0	-14	-2.7	-0.4	0.0	-3.0
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0	0	0.0	0.0	0.0	0.0
Manufacturing	0	0	0	0	0.0	-0.2	-0.1	-0.2
Transportation, Warehousing & Utilities	0	0	0	-1	0.0	-0.1	0.0	-0.1
Wholesale Trade	0	0	0	0	0.0	0.0	0.0	-0.1
Retail Trade	0	0	-2	-2	0.0	0.0	-0.1	-0.1
Information	0	0	0	0	0.0	0.0	0.0	0.0
Financial Activities	0	-1	-1	-1	0.0	-0.2	-0.3	-0.5
Services	0	-1	-4	-5	0.0	-0.1	-0.4	-0.4
Government	0	0	0	0	0.0	0.0	0.0	0.0
Total	**-5**	**-11**	**-7**	**-24**	**-2.7**	**-0.9**	**-1.0**	**-4.6**

Note:
In 2012 dollars

As described in Chapter 11, Geology and Soils Resources, increased groundwater pumping under the long-term average conditions may result in an additional increment of subsidence in those areas within the Central Valley. The additional amount of subsidence and the economic costs associated with it have not been quantified in this EIS. However, total subsidence-related costs have been shown to be substantial, as reported by Borchers et al. (2014) who estimated that the cost of subsidence in San Joaquin Valley between 1955 and 1972 was more than $1.3 billion (in 2013 dollars). These estimates are based on the impacts to major infrastructure in the region including the San Joaquin River, Delta Mendota Canal, Friant-Kern Canal and San Luis Canal in addition to privately owned infrastructure. The incremental subsidence-related costs, expressed on an annual basis, could be an unknown fraction of that cumulative cost.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be similar in the Sacramento Valley and lower in the San Joaquin Valley under Alternative 5 and the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of

these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies are presented in Tables 19.110 and 19.111 for the Sacramento and San Joaquin Valley, respectively. Average annual water supply costs would be similar (within 5 percent change) for the Sacramento and San Joaquin valleys.

Table 19.110 Changes in Municipal and Industrial Water Supply Costs for the Sacramento Valley under Alternative 5 as compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	447	447	-1
Delivery Cost ($1,000)	$8,022	$8,031	-$8
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$204	$213	-$9
Transfer Costs ($1,000)	$752	$739	$12
Shortage Costs ($1,000)	$68	$69	-$2
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$3,856	-$3,858	$1
Excess Water Savings ($1,000)	-$2,266	-$2,275	$10
Average Annual Changes in Water Supply Costs ($1,000)	**$2,924**	**$2,919**	**$5**

Note:
In 2012 dollars

Table 19.111 Changes in Municipal and Industrial Water Supply Costs for the San Joaquin Valley under Alternative 5 as compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	211	214	-3
Delivery Cost ($1,000)	$3,411	$3,460	-$49
Assumed New Supply Deliveries (TAF)	2	2	1
Annualized New Supply Costs ($1,000)	$601	$429	$171
Water Storage Costs ($1,000)	$966	$942	$24
Lost Water Sales Revenues ($1,000)	$361	$361	$0
Transfer Costs ($1,000)	$2,661	$2,673	-$12
Shortage Costs ($1,000)	$115	$115	$0
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$15,329	-$15,377	$49
Excess Water Savings ($1,000)	-$996	-$1,029	$33
Average Annual Changes in Water Supply Costs ($1,000)	**-$8,211**	**-$8,427**	**$215**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.112 and 19.113, respectively.

Table 19.112 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 5 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.0	0.0
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0
Construction	0	0	0	0	0.0	-0.8	0.1	-0.7
Manufacturing	0	0	0	0	0.0	-0.1	0.6	0.5
Transportation, Warehousing & Utilities	0	0	0	0	-7.8	-0.1	0.5	-7.4
Wholesale Trade	0	0	0	0	0.0	0.0	0.7	0.7
Retail Trade	0	0	0	0	0.0	0.0	1.2	1.1
Information	0	0	0	0	0.0	-0.1	0.5	0.4
Financial Activities	0	0	0	0	0.0	-0.4	3.7	3.4
Services	0	0	0	0	0.0	-0.8	3.9	3.0
Government	0	0	0	0	0.0	0.0	0.1	0.1
Total	**0**	**0**	**0**	**0**	**-7.8**	**-2.3**	**11.2**	**1.1**

Note:
In 2012 dollars

Table 19.113 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 5 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.1	0.7	0.8
Mining & Logging	0	0	0	0	0.0	0.4	0.7	1.0
Construction	0	0	0	0	0.0	13.9	0.6	14.5
Manufacturing	0	0	0	0	0.0	1.4	4.8	6.2
Transportation, Warehousing & Utilities	1	0	0	1	146.6	1.4	4.6	152.6
Wholesale Trade	0	0	0	0	0.0	0.4	3.9	4.3
Retail Trade	0	0	0	0	0.0	0.4	10.6	11.0
Information	0	0	0	0	0.0	1.0	2.8	3.8
Financial Activities	0	0	0	0	0.0	4.5	27.7	32.3
Services	0	0	0	0	0.0	12.2	31.1	43.3
Government	0	0	0	0	0.0	0.1	1.3	1.5
Total	**1**	**0**	**1**	**1**	**146.6**	**35.8**	**88.8**	**271.2**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Recreational opportunities at San Luis Reservoir would be similar under Alternative 5 as compared to the No Action Alternative, as described in Chapter 15, Recreation Resources. Therefore, it is anticipated that recreational economic factors would be similar under Alternative 5 as compared to the No Action Alternative.

Effects Related to Cross Delta Water Transfers

Potential effects to socioeconomic factors could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014c) as described above under the No Action Alternative compared to the Second Basis of Comparison. For the purposes of this EIS, it is anticipated that similar conditions would occur during implementation of cross Delta water transfers under Alternative 5 and the No Action Alternative, and that impacts on socioeconomic factors could be adverse in the seller's service area.

Under Alternative 5 and the No Action Alternative, the timing of cross Delta water transfers would be limited to July through September and include annual volumetric limits, in accordance with the 2008 USFWS BO and 2009 NMFS BO. Overall, the potential for cross Delta water transfers would be similar under Alternative 5 and the No Action Alternative.

San Francisco Bay Area Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, CVP and SWP water supplies within the San Francisco Bay Area Region would be similar under Alternative 5 and the No Action Alternative, and would not result in changes in irrigated acreage or land use changes due to the use of other water supplies.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be lower under Alternative 5 and the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would be similar, as presented in Table 19.114.

Table 19.114 Changes in Municipal and Industrial Water Supply Costs for the San Francisco Bay Area Region under Alternative 5 as compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	394	396	-3
Delivery Cost ($1,000)	$10,962	$11,044	-$82
Assumed New Supply Deliveries (TAF)	18	18	0
Annualized New Supply Costs ($1,000)	$599	$599	$0
Water Storage Costs ($1,000)	$1,495	$1,577	-$81
Lost Water Sales Revenues ($1,000)	$4,360	$4,286	$74
Transfer Costs ($1,000)	$6,156	$5,722	$434
Shortage Costs ($1,000)	$1,450	$1,410	$40
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$470	-$493	$24
Excess Water Savings ($1,000)	-$225	-$225	$0
Average Annual Changes in Water Supply Costs ($1,000)	**$24,328**	**$23,919**	**$409**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.115.

Table 19.115 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Francisco Bay Area Region under Alternative 5 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.5	0.5
Mining & Logging	0	0	0	0	0.0	-0.2	0.3	0.1
Construction	0	0	0	0	0.0	-17.4	2.4	-15.0
Manufacturing	0	0	0	0	0.0	-3.2	30.9	27.8
Transportation, Warehousing & Utilities	-1	0	0	-1	-163.1	-1.2	11.8	-152.5
Wholesale Trade	0	0	0	0	0.0	-0.5	22.9	22.4
Retail Trade	0	0	0	0	0.0	-0.5	36.4	35.9
Information	0	0	0	0	0.0	-1.8	19.8	18.0
Financial Activities	0	0	0	0	0.0	-6.1	112.3	106.2
Services	0	0	1	1	0.0	-14.6	139.4	124.8
Government	0	0	0	0	0.0	-0.1	3.6	3.5
Total	**-1**	**0**	**2**	**1**	**-163.1**	**-45.5**	**380.3**	**171.7**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 5 as compared to the No Action Alternative generally would result in similar reservoir elevations in reservoirs that store CVP and SWP water and similar recreational economic factors under Alternative 5 as compared o the No Action Alternative.

Regional Changes to Salmon Fishing

Changes in commercial and sport ocean salmon fishing primarily would be related to the presence of fall-run Chinook Salmon from Central Valley hatcheries. It is assumed that the production of hatchery fish would be similar under Alternative 15 and the No Action Alternative. However, survival of the fall-run Chinook Salmon hatchery fish to the Pacific Ocean could be related to changes in CVP and SWP operations. As described in Chapter 9, Fish and Aquatic Resources, there would be little change in through-Delta survival by emigrating natural juvenile fall-run Chinook Salmon under Alternative 5 and the No Action Alternative. It is assumed that the survival of the hatchery juvenile fall-run Chinook Salmon would be similar to the survival of the natural juvenile fall-run Chinook Salmon. Therefore, the availability of fish for commercial and sport ocean salmon fishing and the associated economic conditions for the fishing industry would be similar under Alternative 5 and the No Action Alternative.

Central Coast Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, increases in CVP and SWP water supplies within the Central Coast Region would be lower under Alternative 5 and the No Action Alternative, and would not result in changes in irrigated acreage or land use changes due to the use of other water supplies.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be similar under Alternative 5 and the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would be similar, as presented in Table 19.116.

Table 19.116 Changes in Municipal and Industrial Water Supply Costs for the Central Coast Region under Alternative 5 as compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	43	44	-1
Delivery Cost ($1,000)	$6,567	$6,663	-$97
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$8,018	-$8,068	$50
Excess Water Savings ($1,000)	-$2,899	-$2,970	$70
Average Annual Changes in Water Supply Costs ($1,000)	**-$4,350**	**-$4,374**	**$23**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.117.

Table 19.117 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Central Coast Region under Alternative 5 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.0	0.3	0.2
Mining & Logging	0	0	0	0	0.0	-0.4	0.6	0.2
Construction	0	0	0	0	0.0	-13.0	0.7	-12.3
Manufacturing	0	0	0	0	0.0	-1.7	3.5	1.8
Transportation, Warehousing & Utilities	0	0	0	0	-97.1	-1.1	3.9	-94.3
Wholesale Trade	0	0	0	0	0.0	-0.3	4.0	3.7
Retail Trade	0	0	0	0	0.0	-0.4	8.1	7.8
Information	0	0	0	0	0.0	-0.8	2.7	1.9
Financial Activities	0	0	0	0	0.0	-4.4	24.1	19.7
Services	0	0	0	0	0.0	-10.7	30.7	19.9
Government	0	0	0	0	0.0	-0.1	0.9	0.8
Total	**0**	**0**	**1**	**0**	**-97.1**	**-32.9**	**79.5**	**-50.5**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 5 as compared to the No Action Alternative generally would result in similar reservoir elevations in reservoirs that store CVP and SWP water and similar recreational economic factors under Alternative 5 as compared to the No Action Alternative.

Southern California Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, increases in CVP and SWP water supplies within the Southern California Region would be similar under Alternative 5 and the No Action Alternative, and would not result in changes in irrigated acreage or land use changes due to the use of other water supplies.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be lower under Alternative 5 and the No Action Alternative. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would be similar, as presented in Table 19.118.

Table 19.118 Changes in Municipal and Industrial Water Supply Costs for the Southern California Region under Alternative 5 as compared to the No Action Alternative

Differences in Total	Alternative 5	No Action Alternative	Changes
Average Annual CVP/SWP Deliveries (TAF)	1,912	1,932	-20
Delivery Cost ($1,000)	$237,118	$239,692	-$2,575
Assumed New Supply Deliveries (TAF)	81	47	34
Annualized New Supply Costs ($1,000)	$24,191	$12,688	$11,503
Water Storage Costs ($1,000)	$7,474	$7,598	-$124
Lost Water Sales Revenues ($1,000)	$14,206	$14,614	-$408
Transfer Costs ($1,000)	$10,505	$11,484	-$979
Shortage Costs ($1,000)	$16,662	$17,319	-$657
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$58,323	-$57,474	-$849
Excess Water Savings ($1,000)	-$4,588	-$4,629	$41
Average Annual Changes in Water Supply Costs ($1,000)	**$247,243**	**$241,291**	**$5,952**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes t9o employment and regional economic output, as summarized in Table 19.119.

Table 19.119 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Southern California under Alternative 5 as compared to the No Action Alternative

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	2.5	3.3	5.9
Mining & Logging	0	0	0	0	0.0	33.1	3.3	36.4
Construction	0	9	0	9	0.0	1,049.4	5.1	1,054.5
Manufacturing	0	0	0	1	0.0	292.8	80.2	373.0
Transportation, Warehousing & Utilities	35	0	0	36	8,804.2	119.3	37.0	8,960.5
Wholesale Trade	0	0	0	0	0.0	55.5	-0.2	55.3
Retail Trade	0	0	1	2	0.0	34.4	99.3	133.7
Information	0	0	0	0	0.0	128.5	32.2	160.8
Financial Activities	0	2	1	2	0.0	509.8	257.7	767.4
Services	0	9	3	13	0.0	1,117.3	301.8	1,419.1
Government	0	0	0	0	0.0	6.0	7.6	13.6
Total	**35**	**22**	**6**	**63**	**8,804.2**	**3,348.6**	**827.3**	**12,980.1**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 5 as compared to the No Action Alternative generally would result in similar reservoir elevations in reservoirs that store CVP and SWP water and similar recreational economic factors under Alternative 5 as compared to the No Action Alternative.

19.4.3.6.2 Alternative 5 Compared to the Second Basis of Comparison

Trinity River Region

Regional Changes to Irrigated Agriculture

There are no agricultural lands irrigated with CVP and SWP water supplies in the Trinity River Region. Therefore, there would be no changes in irrigated lands under Alternative 5 as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

The CVP would continue to release water in Trinity River for downstream beneficial uses, including water supplies under Alternative 5 and the Second Basis of Comparison. There are no CVP or SWP water contractors in the Trinity River Region.

Regional Changes to Recreational Opportunities

Recreational opportunities would be similar in the Trinity River Region under Alternative 5 as compared to the Second Basis of Comparison as described in Chapter 15, Recreational Resources.

Regional Changes to Salmon Fishing

Trinity River flows would be similar under Alternative 5 as compared to the Second Basis of Comparison. This could result in similar salmon harvest conditions by the Yurok and Hoopa Valley tribes.

Central Valley Region

Regional Changes to Irrigated Agriculture

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 5 than under the Second Basis of Comparison. It is anticipated that groundwater use would increase in response to reduced CVP and SWP water supplies in 2030 because sustainable groundwater management plans would not be fully implemented until the 2040s, as discussed in Chapter 12, Agricultural Resources.

The agricultural production value under long-term average conditions would be reduced by less than 1 percent ($1.5 million/year in the Sacramento Valley and $0.7 million/year in the San Joaquin Valley) primarily due to an increase in groundwater pumping of approximately 6 percent. The agricultural production value under dry and critical dry conditions also would be reduced by less than 1 percent ($10.5 million/year in the Sacramento Valley and $22.9 million/year in the San Joaquin Valley) primarily due to an increase in groundwater pumping.

The overall reduction in agricultural production values are less than 0.05 percent under long-term conditions; and, changes in employment and regional economic output would be minimal. Therefore, the analysis of employment and regional economic output is focused on dry and critical dry years.

The direct changes in agricultural production would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.120 and 19.121, respectively.

Table 19.120 Changes in Agricultural-Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 5 as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-84	-20	0	-104	-10.5	-1.2	0.0	-11.8
Mining & Logging	0	0	0	0	0.0	0.0	0.0	0.0
Construction	0	-1	0	-1	0.0	-0.1	0.0	-0.1
Manufacturing	0	0	0	0	0.0	-0.1	0.0	-0.1
Transportation, Warehousing & Utilities	0	-1	0	-2	0.0	-0.3	-0.1	-0.5
Wholesale Trade	0	-1	0	-1	0.0	-0.2	-0.1	-0.3
Retail Trade	0	0	-3	-4	0.0	0.0	-0.3	-0.3
Information	0	0	0	0	0.0	0.0	-0.1	-0.1
Financial Activities	0	-7	-2	-8	0.0	-1.6	-0.7	-2.3
Services	0	-3	-10	-13	0.0	-0.3	-0.9	-1.1
Government	0	0	0	0	0.0	-0.1	0.0	-0.1
Total	**-84**	**-34**	**-17**	**-135**	**-10.5**	**-4.0**	**-2.2**	**-16.8**

Note:
In 2012 dollars

Table 19.121 Changes in Agricultural-Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 5 as Compared to the Second Basis of Comparison in Dry and Critical Dry Years

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	-145	-61	0	-206	-22.9	-2.7	-0.1	-25.7
Mining & Logging	0	-1	0	-1	0.0	-0.3	0.0	-0.4
Construction	0	-2	0	-2	0.0	-0.2	0.0	-0.2
Manufacturing	0	-1	-1	-2	0.0	-2.0	-0.4	-2.4
Transportation, Warehousing & Utilities	0	-3	-1	-4	0.0	-0.9	-0.3	-1.2
Wholesale Trade	0	-2	-1	-3	0.0	-0.4	-0.2	-0.6
Retail Trade	0	0	-9	-9	0.0	0.0	-0.7	-0.8
Information	0	0	0	-1	0.0	-0.1	-0.2	-0.2
Financial Activities	0	-13	-4	-16	0.0	-2.8	-1.8	-4.6
Services	0	-6	-25	-31	0.0	-0.6	-2.1	-2.7
Government	0	-1	0	-1	0.0	-0.2	-0.1	-0.3
Total	**-145**	**-90**	**-42**	**-277**	**-22.9**	**-10.2**	**-5.9**	**-39.0**

Note:
In 2012 dollars

As described in Chapter 11, Geology and Soils Resources, increased groundwater pumping under the long-term average conditions may result in an additional

increment of subsidence in those areas within the Central Valley. The additional amount of subsidence and the economic costs associated with it have not been quantified in this EIS. However, total subsidence-related costs have been shown to be substantial, as reported by Borchers et al. (2014) who estimated that the cost of subsidence in San Joaquin Valley between 1955 and 1972 was more than $1.3 billion (in 2013 dollars). These estimates are based on the impacts to major infrastructure in the region including the San Joaquin River, Delta Mendota Canal, Friant-Kern Canal and San Luis Canal in addition to privately owned infrastructure. The incremental subsidence-related costs, expressed on an annual basis, could be an unknown fraction of that cumulative cost.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 5 than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies are presented in Tables 19.122 and 19.123 for the Sacramento and San Joaquin Valley, respectively. Average annual water supply costs would increase by 11 percent in the Sacramento Valley and decrease by 14 percent in the San Joaquin Valley.

Table 19.122 Changes in Municipal and Industrial Water Supply Costs for the Sacramento Valley under Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	447	463	-16
Delivery Cost ($1,000)	$8,022	$8,317	-$295
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$204	$207	-$3
Transfer Costs ($1,000)	$752	$517	$235
Shortage Costs ($1,000)	$68	$68	-$1
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$3,856	-$3,916	$60
Excess Water Savings ($1,000)	-$2,266	-$2,563	$298
Average Annual Changes in Water Supply Costs ($1,000)	**$2,924**	**$2,630**	**$293**

Note:
In 2012 dollars

Table 19.123 Changes in Municipal and Industrial Water Supply Costs for the San Joaquin Valley under Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	211	237	-26
Delivery Cost ($1,000)	$3,411	$3,854	-$443
Assumed New Supply Deliveries (TAF)	2	0	2
Annualized New Supply Costs ($1,000)	$601	$15	$585
Water Storage Costs ($1,000)	$966	$820	$146
Lost Water Sales Revenues ($1,000)	$361	$322	$39
Transfer Costs ($1,000)	$2,661	$2,623	$38
Shortage Costs ($1,000)	$115	$102	$13
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$15,329	-$16,011	$683
Excess Water Savings ($1,000)	-$996	-$1,318	$322
Average Annual Changes in Water Supply Costs ($1,000)	**-$8,211**	**-$9,593**	**$1,381**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output in the Sacramento and San Joaquin valleys, as summarized in Tables 19.124 and 19.125, respectively.

Table 19.124 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Sacramento Valley under Alternative 5 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.1	1.7	1.6
Mining & Logging	0	0	0	0	0.0	-0.4	0.3	-0.1
Construction	0	0	0	0	0.0	-29.9	2.6	-27.3
Manufacturing	0	0	0	0	0.0	-3.2	22.7	19.5
Transportation, Warehousing & Utilities	-1	0	0	-1	-295.2	-2.9	18.4	-279.6
Wholesale Trade	0	0	0	0	0.0	-1.0	27.8	26.8
Retail Trade	0	0	1	1	0.0	-0.9	47.7	46.8
Information	0	0	0	0	0.0	-3.5	21.1	17.6
Financial Activities	0	0	0	0	0.0	-13.4	151.3	137.9
Services	0	0	2	1	0.0	-31.8	158.5	126.8
Government	0	0	0	0	0.0	-0.2	3.9	3.8
Total	**-1**	**-1**	**3**	**1**	**-295.2**	**-87.3**	**456.1**	**73.6**

Note:
In 2012 dollars

Table 19.125 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Joaquin Valley under Alternative 5 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	0.1	7.4	7.5
Mining & Logging	0	0	0	0	0.0	0.8	7.1	7.8
Construction	0	0	0	0	0.0	27.2	6.1	33.4
Manufacturing	0	0	0	0	0.0	2.8	51.3	54.1
Transportation, Warehousing & Utilities	1	0	0	1	287.4	2.8	49.4	339.5
Wholesale Trade	0	0	0	0	0.0	0.7	42.9	43.6
Retail Trade	0	0	1	1	0.0	0.8	107.9	108.7
Information	0	0	0	0	0.0	2.0	29.8	31.8
Financial Activities	0	0	1	1	0.0	8.9	291.4	300.3
Services	0	0	4	4	0.0	23.9	323.4	347.2
Government	0	0	0	0	0.0	0.2	14.2	14.5
Total	**1**	**1**	**6**	**8**	**287.4**	**70.1**	**930.8**	**1,288.4**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Recreational opportunities would decrease by 6 to 9 percent under Alternative 5 as compared to the Second Basis of Comparison, depending upon water year type, , as described in Chapter 15, Recreation Resources. Therefore, it is anticipated that recreational economic factors would be reduced under Alternative 5 as compared to the Second Basis of Comparison.

Effects Related to Cross Delta Water Transfers

Potential effects to socioeconomic factors could be similar to those identified in a recent environmental analysis conducted by Reclamation for long-term water transfers from the Sacramento to San Joaquin valleys (Reclamation 2014c) as described above under the No Action Alternative compared to the Second Basis of Comparison. For the purposes of this EIS, it is anticipated that similar conditions would occur during implementation of cross Delta water transfers under Alternative 5 and the Second Basis of Comparison, and that impacts on socioeconomic factors could be adverse in the seller's service area.

Under Alternative 5, the timing of cross Delta water transfers would be limited to July through September and include annual volumetric limits, in accordance with the 2008 USFWS BO and 2009 NMFS BO. Under Second Basis of Comparison, water could be transferred throughout the year without an annual volumetric limit. Overall, the potential for cross Delta water transfers would be decreased under Alternative 5 as compared to the Second Basis of Comparison.

San Francisco Bay Area Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the San Francisco Bay Area Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under Alternative 5 as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 5 than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would increase by 46 percent, as presented in Table 19.126.

Table 19.126 Changes in Municipal and Industrial Water Supply Costs for the San Francisco Bay Area Region under Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	394	445	-51
Delivery Cost ($1,000)	$10,962	$12,515	-$1,553
Assumed New Supply Deliveries (TAF)	18	16	2
Annualized New Supply Costs ($1,000)	$599	$234	$365
Water Storage Costs ($1,000)	$1,495	$1,963	-$467
Lost Water Sales Revenues ($1,000)	$4,360	$1,595	$2,765
Transfer Costs ($1,000)	$6,156	$1,154	$5,002
Shortage Costs ($1,000)	$1,450	$523	$927
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$470	-$792	$322
Excess Water Savings ($1,000)	-$225	-$549	$324
Average Annual Changes in Water Supply Costs ($1,000)	**$24,328**	**$16,643**	**$7,686**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.127.

Table 19.127 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the San Francisco Bay Area Region under Alternative 5 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.1	8.4	8.3
Mining & Logging	0	0	0	0	0.0	-1.7	5.3	3.5
Construction	0	-1	0	-1	0.0	-176.1	39.5	-136.6
Manufacturing	0	0	1	0	0.0	-32.0	509.0	477.0
Transportation, Warehousing & Utilities	-6	0	1	-5	-1,654.5	-12.4	195.3	-1,471.6
Wholesale Trade	0	0	2	1	0.0	-5.5	373.6	368.1
Retail Trade	0	0	7	7	0.0	-4.7	603.7	599.0
Information	0	0	1	1	0.0	-18.6	326.5	307.9
Financial Activities	0	0	5	5	0.0	-61.9	1,853.1	1,791.2
Services	0	-1	22	20	0.0	-148.2	2,302.6	2,154.4
Government	0	0	0	0	0.0	-0.7	58.7	57.9
Total	**-6**	**-3**	**37**	**29**	**-1,654.5**	**-462.0**	**6,275.6**	**4,159.1**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 5 as compared to the Second Basis of Comparison generally would result in lower reservoir elevations in reservoirs that store CVP and SWP water (up to 10 to 18 percent); and would result in decreased recreational economic factors under Alternative 5 as compared to the Second Basis of Comparison.

Regional Changes to Salmon Fishing

Changes in commercial and sport ocean salmon fishing primarily would be related to the presence of fall-run Chinook Salmon from Central Valley hatcheries. It is assumed that the production of hatchery fish would be similar under Alternative 5 and the Second Basis of Comparison. However, survival of the fall-run Chinook Salmon hatchery fish to the Pacific Ocean could be related to changes in CVP and SWP operations. As described in Chapter 9, Fish and Aquatic Resources, there would be little change in through-Delta survival by emigrating natural juvenile fall-run Chinook Salmon under Alternative 5 as compared to the Second Basis of Comparison. It is assumed that the survival of the hatchery juvenile fall-run Chinook Salmon would be similar to the survival of the natural juvenile fall-run Chinook Salmon. Therefore, the availability of fish for commercial and sport ocean salmon fishing and the associated economic conditions for the fishing industry would be similar under Alternative 5 and the Second Basis of Comparison.

Central Coast Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the Central Coast Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under Alternative 5 as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 5 than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would decrease by 6 percent, as presented in Table 19.128.

Table 19.128 Changes in Municipal and Industrial Water Supply Costs for the Central Coast Region under Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	43	54	-11
Delivery Cost ($1,000)	$6,567	$8,174	-$1,607
Assumed New Supply Deliveries (TAF)	0	0	0
Annualized New Supply Costs ($1,000)	$0	$0	$0
Water Storage Costs ($1,000)	$0	$0	$0
Lost Water Sales Revenues ($1,000)	$0	$0	$0
Transfer Costs ($1,000)	$0	$0	$0
Shortage Costs ($1,000)	$0	$0	$0
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$8,018	-$8,643	$625
Excess Water Savings ($1,000)	-$2,899	-$4,176	$1,277
Average Annual Changes in Water Supply Costs ($1,000)	**-$4,350**	**-$4,645**	**$295**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.129.

Table 19.129 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Central Coast Region under Alternative 5 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	0	0	0.0	-0.6	4.3	3.7
Mining & Logging	0	0	0	0	0.0	-6.8	9.9	3.1
Construction	0	-2	0	-2	0.0	-214.8	10.4	-204.4
Manufacturing	0	0	0	0	0.0	-28.6	55.4	26.8
Transportation, Warehousing & Utilities	-7	0	0	-7	-1,606.9	-18.1	60.1	-1,565.0
Wholesale Trade	0	0	0	0	0.0	-5.1	62.7	57.5
Retail Trade	0	0	1	1	0.0	-6.5	126.7	120.2
Information	0	0	0	0	0.0	-12.8	41.7	29.0
Financial Activities	0	0	1	1	0.0	-73.3	376.2	303.0
Services	0	-2	5	3	0.0	-177.8	478.2	300.4
Government	0	0	0	0	0.0	-1.0	14.1	13.1
Total	**-7**	**-4**	**9**	**-2**	**-1,606.9**	**-545.3**	**1,239.6**	**-912.6**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 5 as compared to the Second Basis of Comparison generally would result in lower reservoir elevations in reservoirs that store CVP and SWP water (up to 10 to 18 percent); and would result in decreased recreational economic factors under Alternative 5 as compared to the Second Basis of Comparison.

Southern California Region

Regional Changes to Irrigated Agriculture

It is anticipated that as in the Central Valley Region, reductions in CVP and SWP water supplies within the Southern California Region would not result in reductions in long-term irrigated acreage or land use changes due to the use of other water supplies. However, there could be a reduction in irrigated acreage in dry and critical dry years under Alternative 5 as compared to the Second Basis of Comparison.

Regional Changes to Municipal and Industrial Water Supplies

As described in Chapter 5, Surface Water Resources and Water Supplies, CVP and SWP water supplies would be less under Alternative 5 than under the Second Basis of Comparison. The analysis assumed CVP and SWP water deliveries, as described in Chapter 5, and determined the need for new water supplies, changes in water storage and groundwater pumping, water transfers, water shortage costs, and excess water savings. The factors and basis of the analysis is described in detail in Appendix 19A, CWEST Model. The analysis assumes that no new supplies would be implemented until shortages were greater than 5 percent. The

costs of these shortages are included in the analysis. It is assumed that communities do not have Alternative water supplies would utilize water transfers.

The average annual water supply costs over the 81-year hydrologic period for M&I water supplies would increase by 20 percent, as presented in Table 19.130.

Table 19.130 Changes in Municipal and Industrial Water Supply Costs for the Southern California Region under Alternative 5 as Compared to the Second Basis of Comparison

Differences in Total	Alternative 5	Second Basis of Comparison	Changes
Average Annual CVP/SWP Deliveries (TAF)	1,912	2,394	-482
Delivery Cost ($1,000)	$237,118	$296,795	-$59,677
Assumed New Supply Deliveries (TAF)	81	11	70
Annualized New Supply Costs ($1,000)	$24,191	$4,032	$20,159
Water Storage Costs ($1,000)	$7,474	$2,824	$4,649
Lost Water Sales Revenues ($1,000)	$14,206	$1,119	$13,087
Transfer Costs ($1,000)	$10,505	$3,705	$6,800
Shortage Costs ($1,000)	$16,662	$353	$16,309
Groundwater Pumping Savings (due to reductions in Groundwater Pumping) ($1,000)	-$58,323	-$91,507	$33,183
Excess Water Savings ($1,000)	-$4,588	-$10,573	$5,985
Average Annual Changes in Water Supply Costs ($1,000)	**$247,243**	**$206,749**	**$40,495**

Note:
In 2012 dollars

The changes in M&I water supply costs would result in changes to employment and regional economic output, as summarized in Table 19.131.

Table 19.131 Changes in Municipal and Industrial Water Supply Related Employment and Regional Economic Output for the Southern California Region under Alternative 5 as Compared to the Second Basis of Comparison

Economic Sectors	Employment				Economic Output ($ thousands)			
	Direct	Indirect	Induced	Total	Direct	Indirect	Induced	Total
Agriculture	0	0	2	1	0.0	-10.0	276.1	266.1
Mining & Logging	0	0	1	1	0.0	-131.1	372.3	241.2
Construction	0	-35	3	-32	0.0	-4,156.1	400.7	-3,755.4
Manufacturing	0	-2	10	9	0.0	-1,159.8	6,894.7	5,734.9
Transportation, Warehousing & Utilities	-140	-2	12	-130	-34,869.2	-472.7	2,639.9	-32,702.0
Wholesale Trade	0	-1	20	19	0.0	-219.8	4,338.8	4,119.1
Retail Trade	0	-2	59	58	0.0	-136.2	5,205.5	5,069.3
Information	0	-1	7	6	0.0	-509.0	2,994.4	2,485.4
Financial Activities	0	-7	52	45	0.0	-2,019.0	18,055.5	16,036.5
Services	0	-37	215	178	0.0	-4,424.9	20,732.4	16,307.5
Government	0	0	3	3	0.0	-23.8	594.9	571.1
Total	**-140**	**-86**	**384**	**158**	**-34,869.2**	**-13,262.4**	**62,505.2**	**14,373.6**

Note:
In 2012 dollars

Regional Changes to Recreational Opportunities

Changes in CVP and SWP water supplies and operations under Alternative 5 as compared to the Second Basis of Comparison generally would result in lower reservoir elevations in reservoirs that store CVP and SWP water (up to 10 to 18 percent); and would result in decreased recreational economic factors under Alternative 5 as compared to the Second Basis of Comparison.

19.4.3.7 Summary of Environmental Consequences

The results of the environmental consequences of implementation of Alternatives 1 through 5 as compared to the No Action Alternative and the Second Basis of Comparison are presented in Tables 19.132 and 19.133.

Table 19.132 Comparison of Alternatives 1 through 5 to No Action Alternative

Alternative	Potential Change	Consideration for Mitigation Measures
Alternative 1	**Trinity River Region** Similar conditions. **Central Valley Region** Agricultural and M&I water-related employment would be similar (within 5 percent of existing values). M&I water supply costs would decrease by 10 percent in the Sacramento Valley and increase by 14 percent in the San Joaquin Valley. Recreational economic factors would increase related to use of San Luis Reservoir. **San Francisco Region** M&I water-related employment would be similar. M&I water supply costs would decrease by 30 percent. Recreational economic factors would increase related to use of reservoirs that store CVP and SWP water. **Central Coast Region** M&I water-related employment would be similar. M&I water supply costs would increase by 6 percent. Recreational economic factors would increase related to use of reservoirs that store SWP water. **Southern California Region** M&I water-related employment would be similar. M&I water supply costs would decrease by 14 percent. Recreational economic factors would increase related to use of reservoirs that store SWP water.	None available to reduce increased M&I water supply costs in the Central Valley and Central Coast regions.
Alternative 2	No effects on socioeconomic factors.	None needed

Alternative	Potential Change	Consideration for Mitigation Measures
Alternative 3	**Trinity River Region** Similar conditions. **Central Valley Region** Agricultural and M&I water-related employment would be similar. M&I water supply costs would increase by 6 percent in the Sacramento Valley and by 21 percent in the San Joaquin Valley. Recreational economic factors related to Striped Bass would be reduced. **San Francisco Region** M&I water-related employment would be similar. M&I water supply costs would decrease by 21 percent. Recreational economic factors would increase related to use of reservoirs that store CVP and SWP water. **Central Coast Region** M&I water-related employment would be similar. M&I water supply costs would be similar. Recreational economic factors would increase related to use of reservoirs that store SWP water. **Southern California Region** M&I water-related employment would be similar. M&I water supply costs would decrease by 14 percent. Recreational economic factors would be similar.	None available to reduce increased M&I water supply costs in the Central Valley Region
Alternative 4	Same effects as described for Alternative 1 compared to the No Action Alternative for non-recreational economic factors. Reduced recreational economic factors related to Striped Bass fishing.	None needed
Alternative 5	**Trinity River Region** Similar conditions. **Central Valley Region** Agricultural and M&I water-related employment would be similar. M&I water supply costs would be similar in the Sacramento and San Joaquin valleys. Recreational economic factors would be similar. **San Francisco Region** M&I water-related employment would be similar. M&I water supply costs would be similar. Recreational economic factors would be similar. **Central Coast Region** M&I water-related employment would be similar. M&I water supply costs would be similar. Recreational economic factors would be similar. **Southern California Region** M&I water-related employment would be similar. M&I water supply costs would be similar. Recreational economic factors would be similar.	None needed

Table 19.133 Comparison of No Action Alternative and Alternatives 1 through 5 to Second Basis of Comparison

Alternative	Potential Change	Consideration for Mitigation Measures
No Action Alternative	**Trinity River Region** Similar conditions. **Central Valley Region** Agricultural and M&I water-related employment would be similar. M&I water supply costs would increase by 11 percent in the Sacramento Valley and decrease by 12 percent in the San Joaquin Valley. Recreational economic factors would decrease related to use of San Luis Reservoir. **San Francisco Region** M&I water-related employment would be similar. M&I water supply costs would increase by 44 percent. Recreational economic factors would decrease related to use of reservoirs that store CVP and SWP water. **Central Coast Region** M&I water-related employment would be similar. M&I water supply costs would decrease by 6 percent. Recreational economic factors would decrease related to use of reservoirs that store SWP water. **Southern California Region** M&I water-related employment would be similar. M&I water supply costs would increase by 17 percent. Recreational economic factors would decrease related to use of reservoirs that store SWP water.	Not considered for this comparison.
Alternative 1	No effects on socioeconomic factors.	Not considered for this comparison.
Alternative 2	Same effects as described for No Action Alternative as compared to the Second Basis of Comparison.	Not considered for this comparison.
Alternative 3	**Trinity River Region** Similar conditions. **Central Valley Region** Agricultural and M&I water-related employment would be similar. M&I water supply costs would be similar in the Sacramento Valley and by 6 percent in the San Joaquin Valley. Recreational economic factors related to Striped Bass would be reduced. **San Francisco Region** M&I water-related employment would be similar. M&I water supply costs would increase by 13 percent. Recreational economic factors would be similar. **Central Coast Region** M&I water-related employment would be similar. M&I water supply costs would be similar. Recreational economic factors would be similar.	Not considered for this comparison.

Alternative	Potential Change	Consideration for Mitigation Measures
	Southern California Region M&I water-related employment would be similar. M&I water supply costs would increase by 14 percent. Recreational economic factors would be similar.	
Alternative 4	No effects on non-recreational socioeconomic factors. Reduced recreational economic factors related to Striped Bass fishing.	Not considered for this comparison.
Alternative 5	**Trinity River Region** Similar conditions. **Central Valley Region** Agricultural and M&I water-related employment would be similar. M&I water supply costs would increase by 11 percent in the Sacramento Valley and decrease by 14 percent in the San Joaquin Valley. Recreational economic factors would decrease related to use of San Luis Reservoir. **San Francisco Region** M&I water-related employment would be similar. M&I water supply costs would increase by 46 percent. Recreational economic factors would decrease related to use of reservoirs that store CVP and SWP water. **Central Coast Region** M&I water-related employment would be similar. M&I water supply costs would decrease by 6 percent. Recreational economic factors would decrease related to use of reservoirs that store SWP water. **Southern California Region** M&I water-related employment would be similar. M&I water supply costs would increase by 20 percent. Recreational economic factors would decrease related to use of reservoirs that store SWP water.	Not considered for this comparison.

19.4.3.8 Potential Mitigation Measures

Changes in CVP and SWP operations under Alternatives 1 through 5 as compared to the No Action Alternative would result in adverse changes in socioeconomic factors related to the average annual M&I water supply costs as compared to the No Action Alternative. These adverse impacts would occur in the Central Valley and Central Coast regions under Alternative 1 and the Central Valley region under Alternative 3 as compared to the No Action Alternative.

19.4.3.9 Cumulative Effects Analysis

As described in Chapter 3, the cumulative effects analysis considers projects, programs, and policies that are not speculative; and are based upon known or reasonably foreseeable long-range plans, regulations, operating agreements, or other information that establishes them as reasonably foreseeable.

The No Action Alternative, Alternatives 1 through 5, and Second Basis of Comparison include climate change and sea level rise, implementation of general plans, and completion of ongoing projects and programs (see Chapter 3, Description of Alternatives). The effects of these items were analyzed quantitatively and qualitatively, as described in the Impact Analysis of this chapter. The discussion below focuses on the qualitative effects of the alternatives and other past, present, and reasonably foreseeable future projects identified for consideration of cumulative effects (see Chapter 3, Description of Alternatives).

19.4.3.9.1 No Action Alternative and Alternatives 1 through 5

Continued coordinated long-term operation of the CVP and SWP under the No Action Alternative would result in reduced CVP and SWP water supply availability as compared to recent conditions due to climate change and sea level rise by 2030. These conditions are included in the analysis presented above.

Future water resource management projects considered in cumulative effects analysis could increase water supply availability, as described in Chapter 5, Surface Water Resources and Water Supplies; and reduce economic impacts in the San Francisco Bay Area, Central Coast, and Southern California regions by providing additional water supplies that could be stored in existing reservoirs.

There also are several ongoing programs that could result in reductions in CVP and SWP water supply availability due to changes in flow patterns in the Sacramento and San Joaquin rivers watersheds and the Delta that could reduce availability of CVP and SWP water deliveries as well as local and regional water supplies, as described in Chapter 5, Surface Water Resources and Water Supplies. Reduction in available surface water supplies as compared to projected water supplies under the No Action Alternative and Alternatives 1 through 5 could result in reduced water supplies, and further increase the cost of future water supplies.

There were be adverse economic impacts associated related to the cost of M&I water supplies in the Central Valley and Central Coast regions under Alternatives 1 and 3 as compared to the No Action Alternative. Therefore, Alternatives 1 and 3 would contribute cumulative impacts to economics factors associated with the cost of M&I water.

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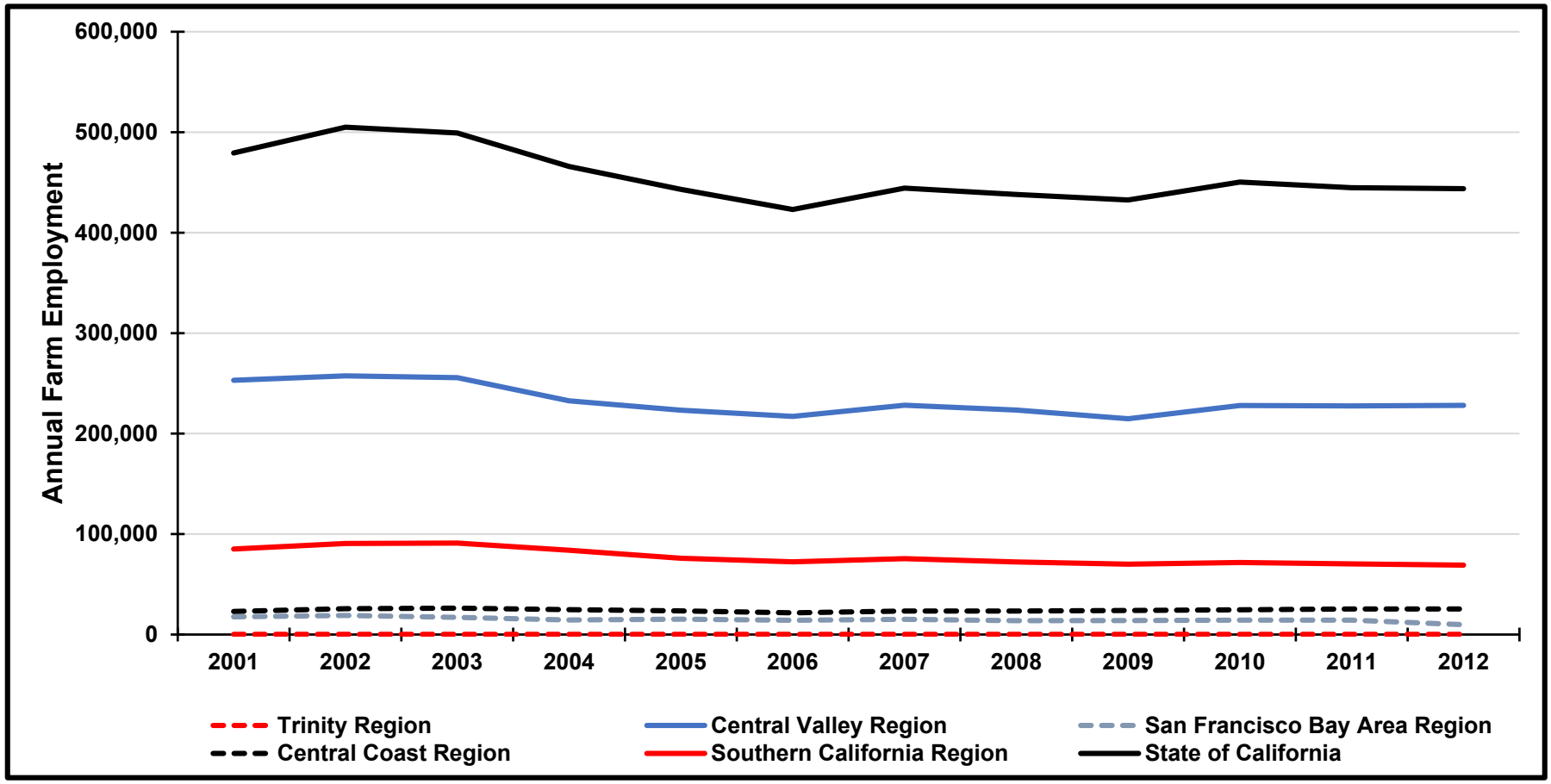

Figure 19.1 Farm Employment in Counties within the Study Area

Source: BEA 2014a

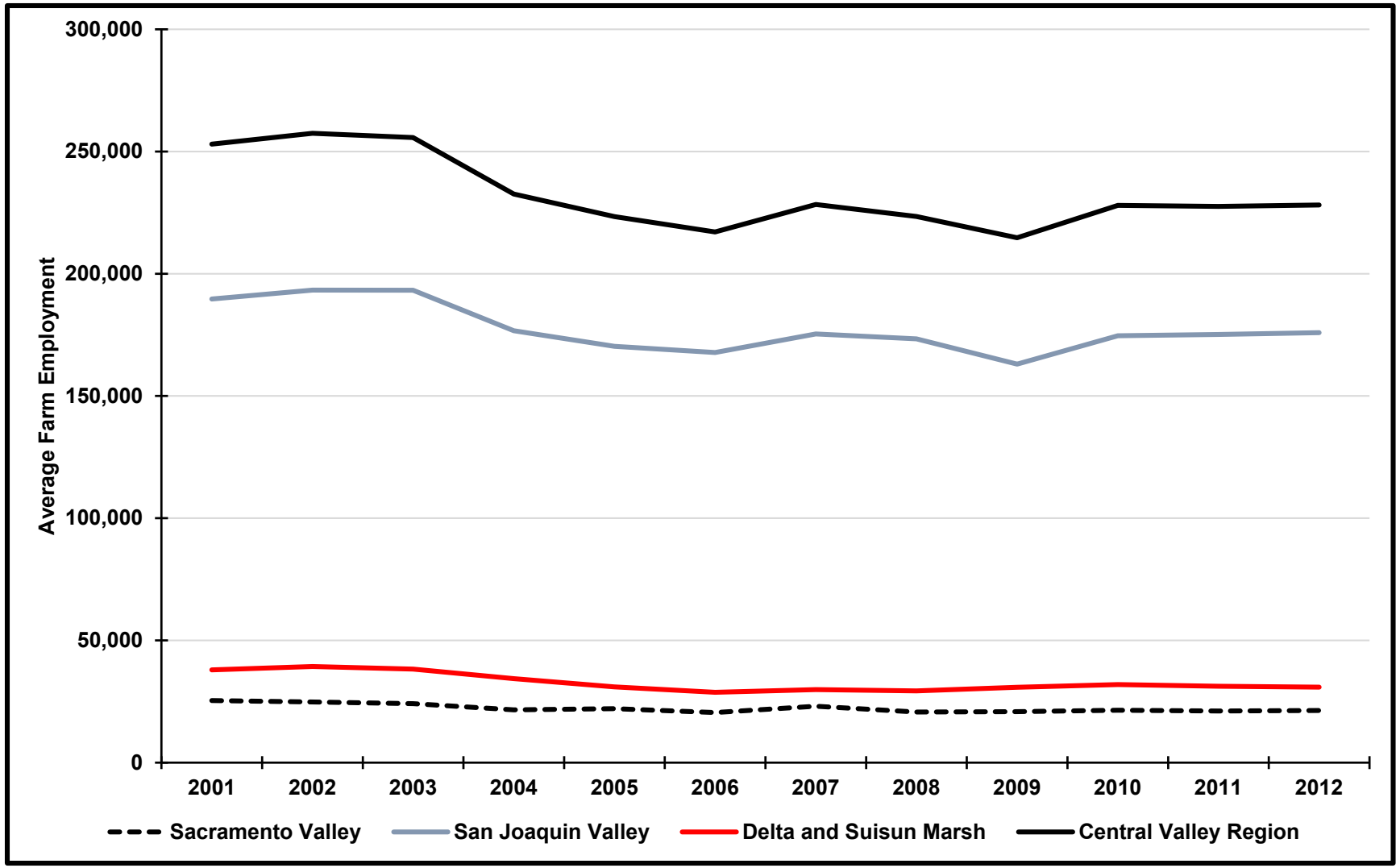

Figure 19.2 Farm Employment in Counties within the Central Valley Region

Source: BEA 2014a

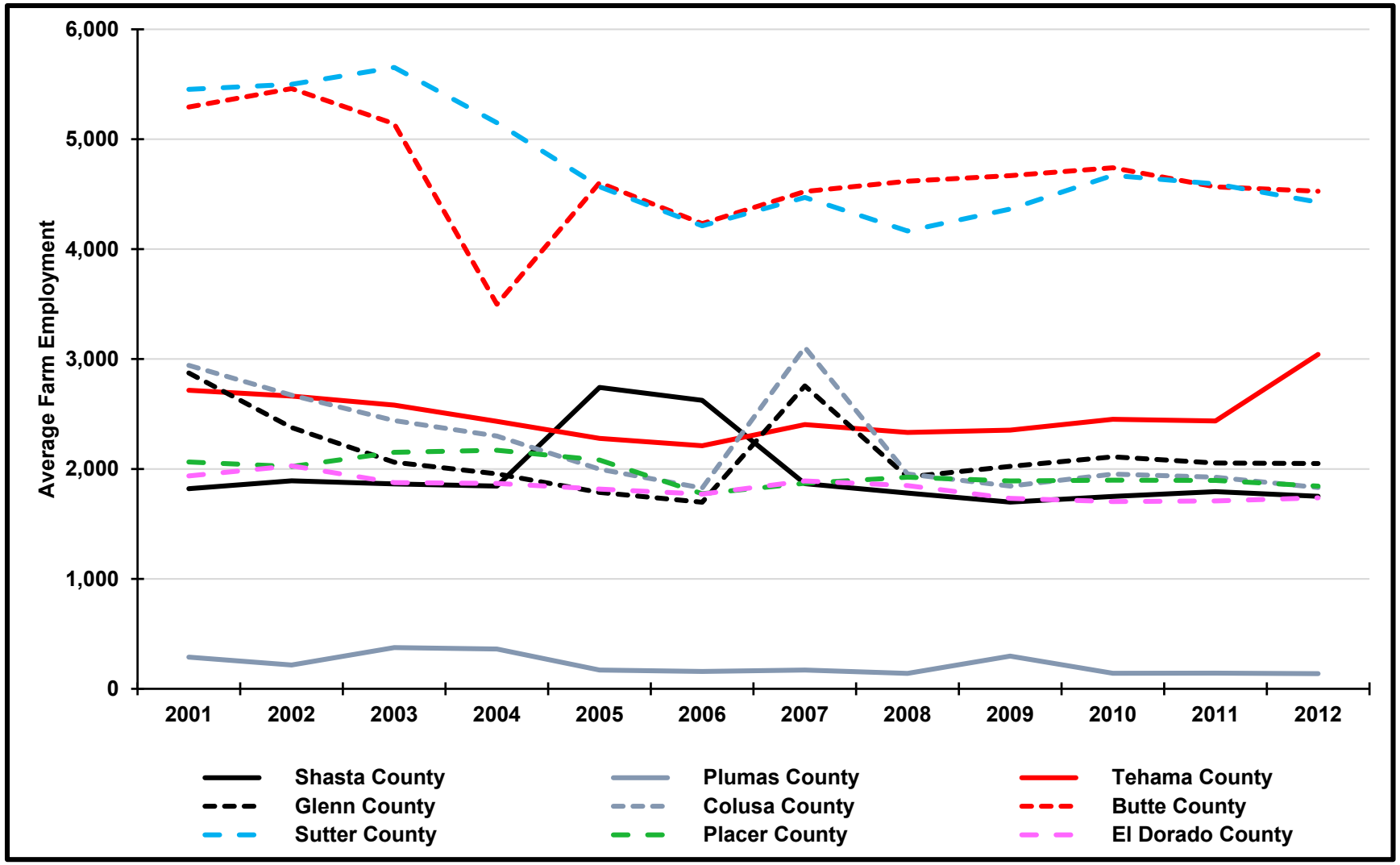

Figure 19.3 Farm Employment in Counties within the Sacramento Valley Portion of the Central Valley Region

Source: BEA 2014a

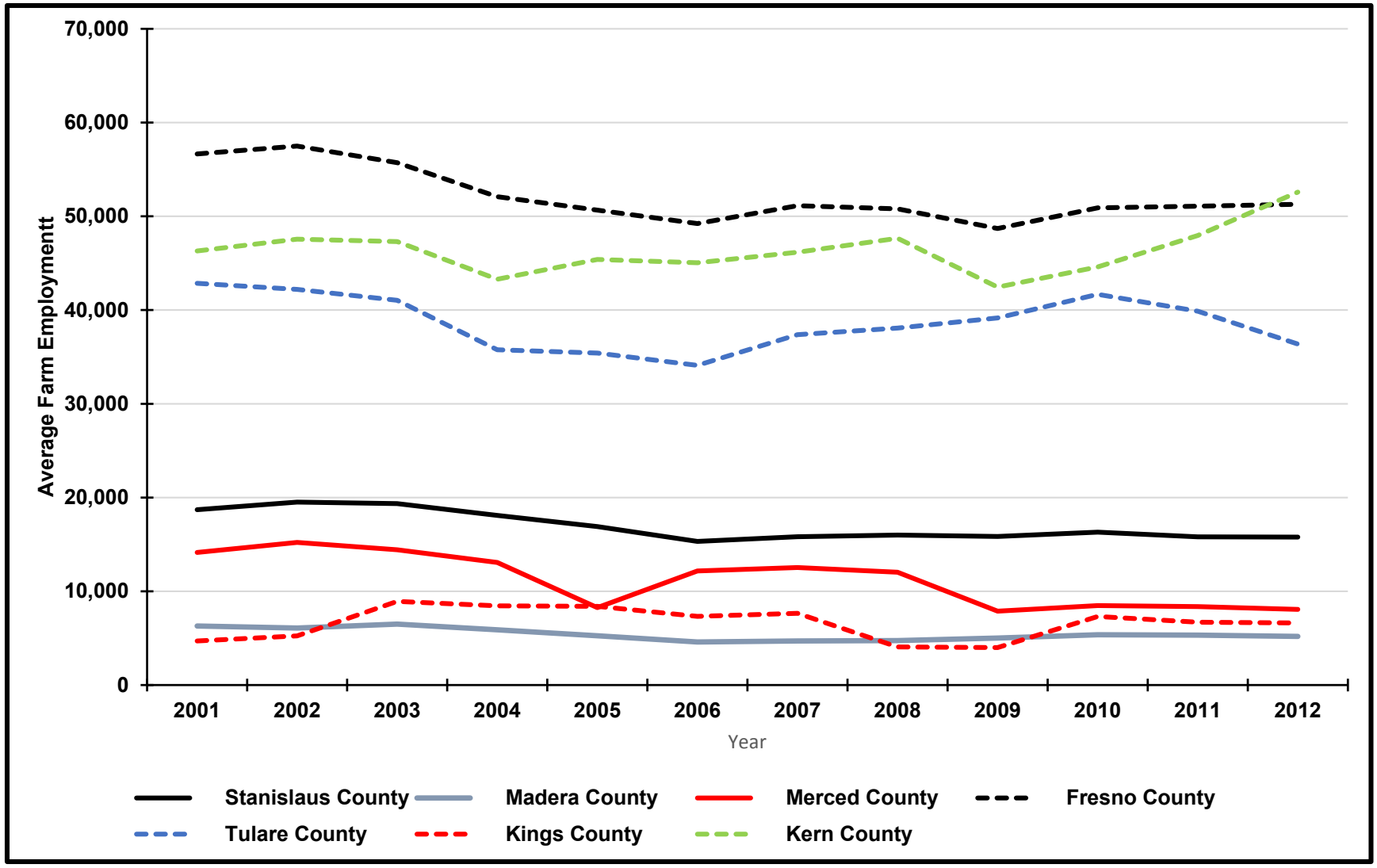

Figure 19.4 Farm Employment in Counties within the San Joaquin Valley Portion of the Central Valley Region

Source: BEA 2014a

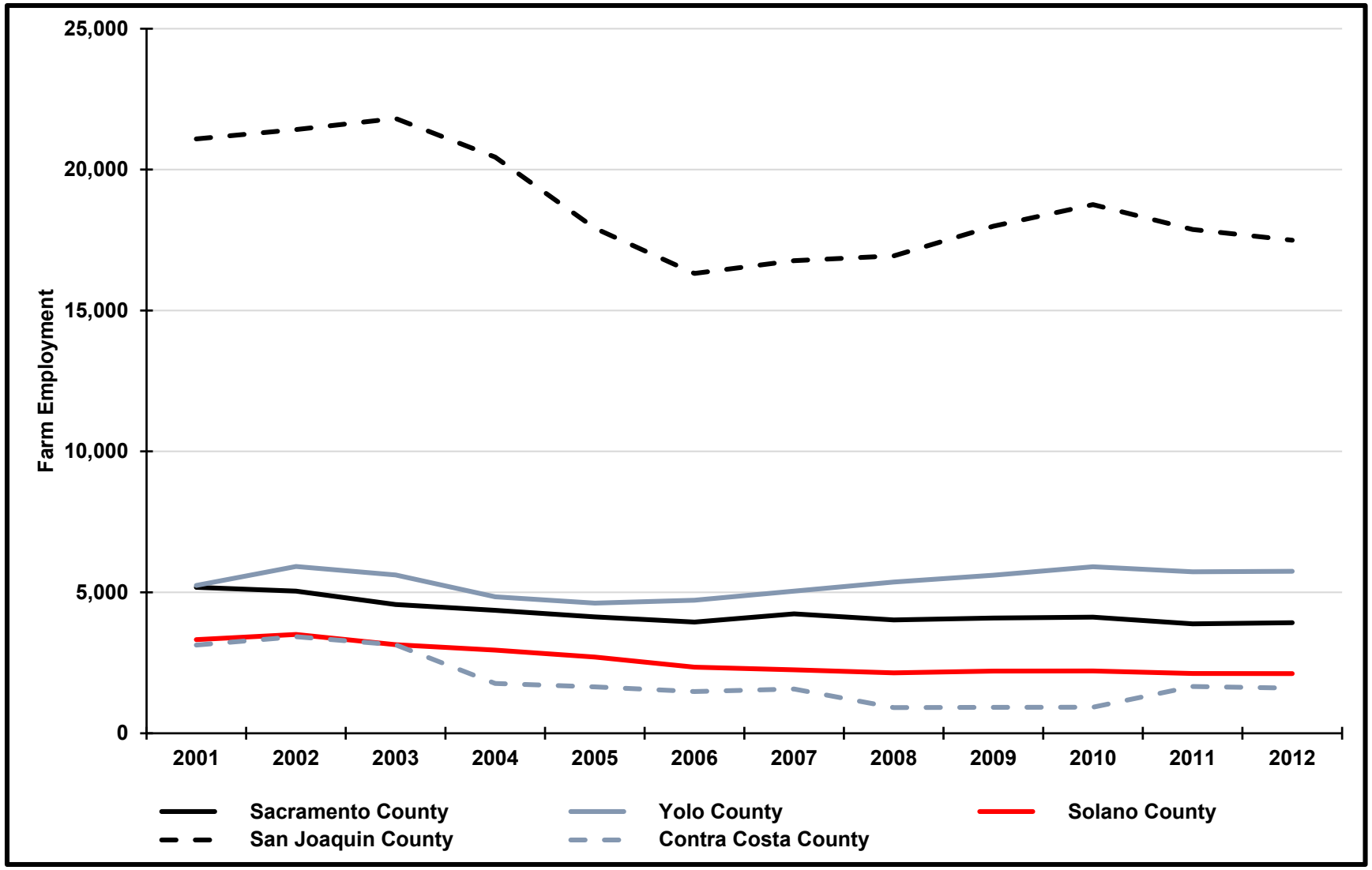

Figure 19.5 Farm Employment in Counties within the Delta and Suisun Marsh Portion of the Central Valley Region

Source: BEA 2014a

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