22. Socioeconomics

22.1 Introduction

This chapter describes the socioeconomic setting for the Extended, Secondary, and Primary study areas. Descriptions and maps of these three study areas are provided in Chapter 1 Introduction. Measures of social and economic activity described in this chapter include population, housing, industry earnings,[1] income,[2] annual jobs,[3] unemployment, agricultural economics, and local government fiscal resources, as well as characteristics of the industries in the Primary Study Area. The agricultural industry is discussed for the Extended Study Area because of the potential for changes in agricultural water deliveries in those areas, as well as agriculture's widespread and substantial contribution to the State's economy. The recreation industry is discussed because of the potential changes in water availability in reservoirs and rivers and the potential for changes in these resources.

Permits and authorizations for socioeconomics resources are presented in Chapter 4 Environmental Compliance and Permit Summary. The regulatory setting for socioeconomics resources is presented in Appendix 4A Environmental Compliance.

The regulatory setting for socioeconomic resources is presented in Chapter 4 Environmental Compliance and Permit Summary of this EIR/EIS.

This chapter focuses primarily on the Primary Study Area. However, potential impacts in the Extended and Secondary study areas were evaluated. Potential local and regional impacts from constructing, operating, and maintaining the alternatives were described and compared to applicable significance thresholds. Mitigation measures are proposed for identified potentially significant impacts, and because none were identified for this resource, no mitigation is included in this chapter.

22.2 Environmental Setting/Affected Environment

22.2.1 Methodology

The collection of Existing Condition socioeconomic information for the Environmental Setting/Affected Environment and impact assessments was based on available data. It is not uncommon for socioeconomic data to be released on a 5- or 10-year interval and for the data to change significantly between intervals. Therefore, the most recent socioeconomic data available at the time this chapter was written was used for the Environmental Setting/Affected Environment and impact assessments.

22.2.2 Extended Study Area

The 33 counties in the Extended Study Area were grouped into five water delivery regions: Bay Area, Central Coast, North Coast, Sacramento Valley, San Joaquin, and Southern California (Table 22-1). These regions encompass both small rural counties and large metropolitan counties that receive water from the State Water Project (SWP) and Central Valley Project (CVP) and that may be affected by Sites Reservoir Project (Project)-related changes in operations and water delivery.

[1] Industry Earnings: Dollar value of production (sales revenues or gross receipts) from each industry.

[2] Income: Employment income (wages and benefits derived at the workplace, including self-employed income).

[3] Annual Jobs: Total of part-time and full-time hourly wage, salary, and self-employed jobs.

Table 22-1
Counties in Water Delivery Regions – Extended Study Area

Water Delivery Region	Counties Included in Water Delivery Region
Bay Area	Alameda, Contra Costa, Napa, Santa Clara
Central Coast	San Benito, San Luis Obispo, Santa Barbara
Sacramento Valley	Butte, Colusa, El Dorado, Glenn, Placer, Plumas, Sacramento, Shasta, Solano, Sutter, Tehama, Yolo
San Joaquin	Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare
Southern California	Los Angeles, Orange, Riverside, San Bernardino, San Diego, Ventura

22.2.2.1 Population

Historical, current, and projected population estimates for the five water delivery regions in the Extended Study Area are summarized in Table 22-2. Historically, the Southern California region has the highest population concentration, with approximately 63 percent of the total Extended Study Area population. Approximately 26 percent of the population in the water delivery regions resides in the Bay Area and San Joaquin regions. The population in the Central Coast region accounts for approximately 2 percent of the overall regional population, and the Sacramento Valley region accounts for approximately 9 percent.

Table 22-2
Historical, Current, and Projected Population and Average Annual Growth Rate within the Extended Study Area and California

Water Delivery Region	Population			Average Annual Growth Rate (%)	
	2000	2016	2030	2000 to 2016	2016 to 2030
Bay Area	4,199,619	4,821,210	5,577,800	0.87	1.05
Central Coast	699,262	781,342	861,614	0.70	0.70
Sacramento Valley	2,759,264	3,333,826	3,885,695	1.19	1.10
San Joaquin	3,302,800	4,188,285	4,972,092	1.50	1.23
Southern California	19,188,175	22,056,864	24,226,932	0.87	0.67
Extended Study Area Total	**30,149,120**	**35,181,527**	**39,524,133**	0.97	0.83
California	33,873,086	39,255,883	44,019,846	0.93	0.82

Sources: California Department of Finance (DOF), 2017a; 2017b; 2017c.

The water delivery regions ranged in population from 781,342 residents in the Central Coast region to more than 22 million residents in the Southern California region in 2016. The Southern California region is projected to continue to have a larger share of the Extended Study Area's future population at 61 percent (larger than all other regions combined). The proportion of the Bay Area and San Joaquin regional populations is expected to continue to be approximately the same as it has been in the past, at 27 percent (DOF, 2017a; 2017b; 2017c).

Table 22-2 also shows the average annual population growth rate in the water delivery regions for the periods from 2000 to 2016 and 2016 to 2030. Between 2000 and 2016, the population in the water delivery regions grew at an average annual rate of 0.97 percent. Among the five regions, the San Joaquin region had the highest growth rate of 1.5 percent, and the Bay Area and the Central Coast regions had the smallest growth rate of 0.87 and 0.70 percent, respectively. The average annual population growth rate is

expected to be highest in the San Joaquin region (1.1 percent) and lowest in the Southern California and Central Coast regions (0.67 and 0.70, respectively) during the 2016 to 2030 period.

22.2.2.2 Economic Activity

Table 22-3 presents measures of economic activity within the Extended Study Area as of 2015. The 33 counties within the Extended Study Area produced approximately $1.5 trillion in total industry output and had a labor force of 16,805,940. The unemployment rate varied from 4.6 percent in the Bay Area region to 16.5 percent in the San Joaquin region.

Table 22-3
Economic Activity within the Extended Study Area and California in 2015 (2015 Dollars)

Water Delivery Region	Total Personal Income[a] (Thousand $)	Total Industry Output[b] (Thousand $)	Total Civilian Labor Force[c]	Unemployment Rate (%)
Bay Area	343,614,664	269,253,747	2,467,900	4.6
Central Coast	40,807,843	26,426,612	393,100	12.5
Sacramento Valley	157,733,051	106,371,365	1,545,640	14.9
San Joaquin	156,674,580	101,309,090	1,835,100	16.5
Southern California	1,108,725,143	791,917,000	10,564,200	14.6
Extended Study Area Total	1,807,555,281	1,295,277,814	16,805,940	6.3
California	2,103,669,473	1,521,816,583	18,981,800	6.2

[a]Total personal income is the sum of income received by all persons from all sources.

[b]Total industry output is the total production from all industries in a region for a given year.

[c]Total civilian labor force is the sum of all persons classified as employed.

Sources: BEA, 2017a; EDD, 2017a.

22.2.2.3 Agricultural Activity

The average irrigated acreage and annual value of production for the five water delivery regions are listed in Table 22-4. The San Joaquin region had the most irrigated crops, in terms of acreage, at 5.6 million acres (approximately 60 percent of the total for the Extended Study Area). The San Joaquin region also had the largest production value of irrigated crops; livestock, dairy, and apiary; and dryland range with $15.6 billion, $8.4 billion, and $77 million, respectively. Of the water delivery regions, the area with the least agricultural production was the Bay Area region, with approximately 105,000 acres of irrigated crops (1.1 percent of the total acreage for the Extended Study Area). Agricultural production value for the Bay Area region was approximately $796 million for irrigated crops; $30 million for livestock, dairy, apiary; and $8.6 million for dryland range.

Table 22-4
Average Irrigated Acreage and Annual Value of Production (2008 to 2010) within the Extended Study Area (2010 Dollars)

	Irrigated Crops		Livestock, Dairy, Apiary	Dryland Range
Water Delivery Region	Acreage	Value (Thousand $)	Value (Thousand $)	Value (Thousand $)
Bay Area	104,914	796,113	30,107	8,620
Central Coast	683,524	6,366,796	161,108	29,586

Water Delivery Region	Irrigated Crops		Livestock, Dairy, Apiary	Dryland Range
	Acreage	Value (Thousand $)	Value (Thousand $)	Value (Thousand $)
Sacramento Valley	1,905,226	3,271,313	431,448	28,720
San Joaquin	5,600,756	15,603,416	8,429,888	77,341
Southern California	944,329	5,498,551	1,093,210	4,083
Extended Study Area Total	**9,238,750**	**31,536,188**	**10,145,761**	**148,350**
California	10,651,347	33,737,268	10,914,904	184,619

Sources: U.S. Department of Agriculture, 2009; 2010; and 2011.

22.2.3 Secondary Study Area

The Secondary Study Area is composed of 18 counties that are grouped into water delivery regions that use CVP water and could be affected by changes in operation and water delivery resulting from the alternatives (Table 22-5).

Table 22-5
Counties in Water Delivery Regions – Secondary Study Area

Water Delivery Region	Counties Included in the Water Delivery Region
Bay Area	Alameda, Contra Costa, Santa Clara
Sacramento Valley	Butte, Colusa, El Dorado, Glenn, Placer, Sacramento, Shasta, Solano, Sutter, Tehama, Yolo, Yuba
North Coast	Del Norte, Humboldt, Trinity

22.2.3.1 Population

Historical, current, and projected population estimates for the three water delivery regions in the Secondary Study Area are summarized in Table 22-6. Historically, the Bay Area region had the highest population concentration, with approximately 58 percent of the total regional population in 2000. Approximately 40 percent of the population in the water delivery regions resides in the Sacramento Valley region. The population in the North Coast region accounts for approximately 2 percent of the overall regional population.

Table 22-6
Historical, Current, and Projected Population and Average Annual Growth Rate within the Secondary Study Area and California

Water Delivery Region	Population			Average Annual Growth Rate (%)	
	2000	2016	2030	2000 to 2016	2016 to 2030
Bay Area	4,075,340	4,679,182	5,423,693	0.87	1.06
Sacramento Valley	2,798,659	3,388,292	3,953,604	1.20	1.11
North Coast	167,047	175,594	182,590	0.31	0.28
Secondary Study Area Total	**7,041,046**	**8,243,068**	**9,559,887**	**0.99**	**1.06**
California	**33,873,086**	**39,255,883**	**44,019,846**	**0.93**	**0.82**

Sources: DOF, 2017a; 2017b; 2017c.

Table 22-6 also shows the average annual population growth rate in the water delivery regions for the periods from 2000 to 2016 and 2016 to 2030. Between 2000 and 2016, the population in the water delivery regions grew at an average annual rate of 1 percent. Among the three regions, the Sacramento Valley region had the highest growth rate of 1.2 percent, and the Bay Area and the North Coast regions had smaller growth rates of 0.87 and 0.31 percent, respectively. The average annual population growth rate is expected to be highest in the Sacramento Valley region (1.11 percent) and lowest in the North Coast regions (0.28 percent) during the 2016 to 2030 period.

22.2.3.2 Economic Activity

Table 22-7 presents measures of economic activity within the Secondary Study Area as of 2015. The 18 counties within the Secondary Study Area produced approximately $370 billion in total industry output and had a labor force of 4,036,660. The unemployment rate varied from a low of 4.6 percent in the Bay Area region to a high of 6.4 percent in the Sacramento Valley region. Agricultural economic activity is included in Table 22-7. Additional detail is not provided because impacts to agriculture are only modeled for the Extended Study Area.

Table 22-7
Economic Activity within the Secondary Study Area and California in 2015 (2015 Dollars)

Water Delivery Region	Total Personal Income[a] (Thousand $)	Total Industry Output[b] (Thousand $)	Total Civilian Labor Force[c]	Unemployment Rate (%)
Bay Area	334,856,091	262,598,885	2,393,100	4.6
Sacramento Valley	152,312,952	103,410,717	1,565,790	6.4
North Coast	7,004,598	4,005,573	77,770	6.1
Secondary Study Area Total	494,173,641	370,015,175	4,036,660	5.3
California	2,103,669,473	1,521,816,583	18,981,800	6.2

[a]Total personal income is the sum of income received by all persons from all sources.

[b]Total industry output is the total production from all industries in a region for a given year.

[c]Total civilian labor force is the sum of all persons classified as employed.

Sources: BEA, 2017a; EDD, 2017a.

22.2.4 Primary Study Area

This section summarizes the existing socioeconomic conditions within the Primary Study Area. Socioeconomic conditions that are described for the Primary Study Area include population, housing, employment, labor force, income, fiscal resources, and agricultural economics. The agriculture sector is discussed in greater detail because of its widespread and substantial contributions to the regional economy.

The Primary Study Area is composed of Colusa and Glenn counties. These two counties are primarily rural with low populations compared to the rest of the State. There are a few small incorporated cities and several unincorporated areas in these counties. Populations vary in the numerous communities, with populations ranging from a few hundred people (e.g., Elk Creek and Stonyford) to a few thousand people (e.g., Orland and Colusa). Surrounding these communities are farms, ranches, and orchards, most of which have residences associated with them that are not in a delineated community, but are socially tied to a community through general proximity or public services (e.g., school district boundaries and public service delivery areas).

Colusa County encompasses approximately 1,151 square miles. The County seat is the City of Colusa. The County has two incorporated cities (Colusa and Williams) and several unincorporated communities: Maxwell, Arbuckle, Stonyford, Princeton, Grimes, and Sites. As of the 2010 census, approximately 70.5 percent of Colusa County's population was 25 years of age or older and had graduated from high school, and approximately 11.7 percent of that population group had a Bachelor's degree or higher education (U.S. Census Bureau, 2012).

Glenn County is located directly north of Colusa County and encompasses 1,314 square miles. The county seat is the City of Willows. The County has two incorporated cities (Willows and Orland) as well as the unincorporated areas of Hamilton City and Elk Creek. As of the 2010 census, approximately 73.9 percent of Glenn County's population was 25 years of age or older and had graduated from high school, and approximately 16.2 percent of that population group had a Bachelor's degree or higher education (U.S. Census Bureau, 2012).

22.2.4.1 Population

The population density in the Primary Study Area is very low. The highest concentration of people is located in the few incorporated towns, and smaller population concentrations are located in the rural communities throughout the Primary Study Area. In addition, numerous residences associated with agricultural parcels are scattered throughout the two counties.

Table 22-8 lists the population and annual growth rate of both counties within the Primary Study Area for 2000, 2016, projections for 2030, the average annual growth rates from 2000 to 2016, and projected growth rate from 2016 to 2030. Population size has increased by approximately 1 percent per year throughout the Primary Study Area, increasing by approximately 4,300 people in 10 years from 2000 to 2016.

Table 22-8
Historical, Current, and Projected Population and Average Annual Growth Rate within the Primary Study Area and California

Area	2000	2016	2030	Average Annual Growth Rate 2000-2016 (%)	Average Annual Growth Rate 2016-2030 (%)
Glenn County	26,453	28,668	45,181	0.5	3.3
Colusa County	18,804	21,948	34,488	1.0	3.3
Primary Study Area Total	**45,257**	**50,616**	**79,669**	0.7	3.3
California	26,453	28,668	45,181	0.5	3.3

Sources: DOF, 2017a; 2017b; 2017c.

Age distribution within the Primary Study Area's counties, compared to the State of California, as of 2015 is shown in Table 22-9. The working age population between ages 20 and 64 is approximately 27,693 people. School age children (ages 5 to 19), adults (ages 20 to 64), and senior citizens (ages 65 and older) represented approximately 23, 56, and 13.6 percent, respectively, of the total population in the Primary Study Area in 2016. This age composition is similar to that of the State.

Table 22-9
Age Distribution within the Primary Study Area Counties and California

Area	2015 Population (Number and Percent of Total)								
	Total	<5 years of age		5 to 19 years of age		20 to 64 years of age		65+ years of age	
		Number	%	Number	%	Number	%	Number	%
Colusa County	21,396	1,690	7.9	4,942	23.1	12,025	56.2	2,717	12.7
Glenn County	28,029	1,990	7.1	6,363	22.7	15,668	55.9	3,980	14.2
Primary Study Area Total	49425	3,680	7.4	11,305	22.9	27,693	56.0	6,697	13.6
California	38,421,464	2,497,395	6.5	7,722,714	20.1	23,437,093	61.0	4,764,262	12.4

Source: U.S. Census Bureau, 2017a.

22.2.4.2 Housing

Table 22-10 shows the housing distribution, vacancy rates, and persons per household for the incorporated cities and unincorporated areas included in the counties that comprise the Primary Study Area. As of 2016, there were 19,189 housing units within the Primary Study Area, representing a little over 0.1 percent of the housing units in the State. Of the two counties, Glenn County had the highest number of single-family and multi-family homes in 2016, with 8,085 single-family and 1,593 multi-family homes. Colusa County had 6,115 single-family and 1,212 multi-family homes in 2016. Glenn County had a vacancy rate of 8.02 percent and Colusa County had a vacancy rate of 10.44 percent.

Table 22-10
Housing Distribution within the Primary Study Area and California

County/City	Single-Family	Multiple-Family	Mobile Homes	Total Housing Units	Percent Vacant	Persons Per Household
Glenn County						
Incorporated Area						
Orland	2,100	685	78	2,863	7.27	2.89
Willows	1,746	691	23	2,460	10.85	2.74
Incorporated Area Subtotal	3,846	1,376	101	5,323	8.92	2.82
Unincorporated Area	4,239	217	1,300	5,756	10.16	2.84
Glenn County Total	**8,085**	**1,593**	**1,401**	**11,079**	**8.02**	**2.83**
Colusa County						
Incorporated Area						
Colusa	1,787	481	120	2,388	4.98	2.74
Williams	1,151	348	61	1,560	6.47	3.64
Incorporated Area Subtotal	2,938	829	181	3,948	5.57	3.09
Unincorporated Area	3,177	383	602	4,162	15.06	2.87
Colusa County Total	**6,115**	**1,212**	**783**	**8,110**	**10.44**	**2,99**
Primary Study Area Total	**14,200**	**2,805**	**2,184**	**19,189**	**9.94**	**2.91**
California	9,072,015	4,348,952	560,853	13,591,866	7.44	2.97

Source: DOF, 2017b.

In 2010, 45 building permits were issued in Glenn County, and 19 building permits were issued in Colusa County (U.S. Census Bureau, 2012).

In 2012, there were nine hotels and two campgrounds/RV parks in Colusa County, and 13 hotels and five campgrounds available in Glenn County (Google Maps, 2012).

22.2.4.3 Economic Activity

Employment and income provide useful insight into an area's economy. A community-level discussion is not provided because employment and income data are available only at the county level.

The Primary Study Area economy is rooted in agriculture. Agriculture became the primary economic driver in the region because of the rich soil, ample water supply, and proximity to urban markets. Today, the agricultural sector is still important in the Primary Study Area, but changes in mechanization and processing have resulted in a much smaller proportion of residents participating in agriculture than during the early part of the 20th century.

Table 22-11 presents measures of economic activity within the Primary Study Area as of 2015. The two counties within the Primary Study Area produced approximately $2 billion in total personal income and $1.3 billion in total industry output in 2015. The distribution of the regional personal income was approximately 54 percent and 46 percent for Glenn and Colusa counties, respectively. The distribution of regional earnings by industry was approximately 49 percent and 51 percent for Glenn and Colusa counties, respectively. The Primary Study Area's regional personal income and total industry earnings accounted for approximately one-tenth of 1 percent of California's total personal income and total industry earnings.

Table 22-11
Personal Income and Industry Earnings within the Primary Study Area and California in 2015 (2015 Dollars)

Area	Total Personal Income in 2009 (Thousand $)	Earning by Industry in 2009 (Thousand $)
Glenn County	1,103,167	655,019
Colusa County	928,809	679,819
Primary Study Area Total	2,031,976	1,334,838
California	2,103,669,473	1,521,816,583

Source: BEA, 2017a.

Table 22-12 presents employment within the Primary Study Area compared to that at the state. In 2015, the total labor force was 13,110 and 11,190 in Glenn and Colusa counties, respectively. During the same year, there were 18,981,800 people in California's labor force; thus, the labor force in the Primary Study Area comprises approximately 0.13 percent of the State's total labor force. The unemployment rates in 2015 were 8.7 percent for Glenn County and 15.3 percent for Colusa County. In comparison, in 2015, the California unemployment rate was 6.2 percent.

Table 22-12
Employment within the Primary Study Area and California in 2015

Area	Civilian Labor Force	Number of Civilians Employed	Unemployment Rate (%)
Glenn County	13,110	11,960	8.7
Colusa County	11,190	9,480	15.3
Primary Study Area Total	**24,300**	**21,440**	11.8
California	18,981,800	17,798,600	6.2

Source: EDD, 2017a.

Table 22-13 provides Glenn County's employment by industry, employment share, and annual growth rates. The top three industries in Glenn County in 2015, as measured by the number of employees, were government, agriculture, and services. The transportation, warehousing and utilities industry had the highest annual growth rates (at 3.0 percent), followed by the agriculture industry, which had a 2.8 percent annual growth rate. The manufacturing; mining, logging and construction; financial activities; and government sectors all experienced negative annual growth rates during that 15-year period.

Table 22-13
Employment by Industry for the Primary Study Area – Glenn County

	2000		2015		2000 to 2015	
Industry	Number of Employees	Employment Share (%)	Number of Employees	Employment Share (%)	Change (%)	Average Annual Growth (%)
Agriculture	1,510	19.6	2,270	25.8	50.3	2.8
Mining, Logging and Construction	320	4.2	290	3.3	-9.4	-0.7
Manufacturing	990	12.9	650	7.4	-34.3	-2.8
Wholesale	340	4.4	370	4.2	8.8	0.6
Retail	570	7.4	800	9.1	40.4	2.3
Transportation, Warehousing, and Utilities	290	3.8	450	5.1	55.2	3.0
Financial Activities	180	2.3	150	1.7	-16.7	-1.2
Services	1,210	15.7	1,790	20.3	47.9	2.6
Government	2,280	29.6	2,030	23.1	-11.0	-0.8
Total Industry Employment	**7,690**	**100.0**	**8,800**	**100.0**	**14.4**	**0.9**

Source: EDD, 2017b.

Table 22-14 provides Colusa County's employment by industry, employment share, and annual growth rates. The top three industries in Colusa County in 2015, as measured by the number of employees, were agriculture, government, and manufacturing. The wholesale industry had the highest annual growth rate (at 4.7 percent), followed by the manufacturing industry, which had a three percent annual growth rate. The mining, logging and construction; transportation, warehousing, and utilities; retail; and financial activities sectors all experienced negative annual growth rates during that 15-year period.

Table 22-14
Employment by Industry for the Primary Study Area – Colusa County

Industry	2000		2015		2000 to 2015	
	Number of Employees	Employment Share (%)	Number of Employees	Employment Share (%)	Change (%)	Average Annual Growth (%)
Agriculture	2,560	36.2	2,580	29.5	1	0.1
Mining, Logging and Construction	100	1.4	90	1.0	-10	-0.7
Manufacturing	870	12.3	1,360	15.5	56	3.0
Wholesale	320	4.5	640	7.3	100	4.7
Retail	520	7.3	470	5.4	-10	-0.7
Transportation, Warehousing, and Utilities	220	3.1	180	2.1	-18	-1.3
Financial Activities	180	2.5	140	1.6	-22	-1.7
Services	870	12.3	1,150	13.1	32	1.9
Government	1,440	20.3	2,150	24.5	49	2.7
Total Industry Employment	**7,080**	**100.0**	**8,760**	**100.0**	**24**	**1.4**

Source: EDD, 2017b.

In total, the Primary Study Area's combined employment in 2000 and 2015 was 14,770 and 17,560, respectively, representing a 18.9 percent increase from 2000 to 2015.

Based on the 2011-2015 American Community Survey the median household income in Colusa County was $52,168 and per capita income was $21,897 (Table 22-15). Both the median household income and per capita income were lower than for California. The percentage of persons below the poverty level, 15 percent, was slightly lower than for the State (U.S. Census Bureau, 2017b; 2017c; 2017d; 2017e). Based on the 2010 U.S. Census Redistricting Data, approximately 60.2 percent of the population was considered minority (U.S. Census Bureau, 2016).

Table 22-15
Demographics of the Primary Study Area

Demographic	Glenn County	Colusa County	California
Median Household Income[a]	$39,349	$51,268	$61.818
Per Capita Income[b]	$21,313	$21,897	$30,318
Percentage of Persons Below Poverty[c] Level	20.8	15.0	16.3
Minority Population[d]	12,964	13,379	23,542,206
Percent Minority Population	46.3	62.5	61.3

Sources:
[a]U.S. Census Bureau, 2017b
[b]U.S. Census Bureau, 2017c
[c]U.S. Census Bureau, 2017d
[d]U.S. Census Bureau, 2017e

Based on the 2011-2015 American Community Survey the median household income in Colusa County was $52,168 and per capita income the median household income in Glenn County was $39,349 and per

capita income was $21,313 (Table 22-15). Both the median household income and per capita income were lower than for California. The percentage of persons below the poverty level was 20.8 percent, which was higher than for the State (U.S. Census Bureau, 2017b; 2017c; 2017d). Approximately 46.3 percent of the population was considered minority (U.S. Census Bureau, 2017e). The population of the Primary Study Area is relatively ethnically diverse as a result of its unique cultural history, the presence of seasonal farm workers, and agricultural past.

22.2.4.4 County Budgets

Glenn and Colusa counties are the local agencies that have taxing authority for the Primary Study Area. Revenues from property taxes are used to fund county governments, local school districts, county roads, local fire departments, libraries, and emergency medical services.

Table 22-16 presents historical and current general fund revenues and expenditures (2008 to 2012) for Glenn County. As shown, the expenditures exceeded revenues in 2010 and 2011, and are expected to exceed revenues in 2012. The majority of the general fund revenues for 2008 to 2012 were from intergovernmental transfers and other financing sources. Taxes ranged from approximately 6.5 percent in 2012 to 13.8 percent in 2009.

Table 22-16
Glenn County General Fund Revenues and Expenditures

	FY 2008 Actual (Thousand $)	FY 2009 Actual (Thousand $)	FY 2010 Actual (Thousand $)	FY 2011 Actual (Thousand $)	FY 2012 Adopted (Thousand $)
Revenues by Source					
Taxes	9,842	10,004	5,614	5,527	5,621
Licenses and Permits	1,109	1,078	1,053	1,004	1,084
Fines, Forfeitures and Penalties	1,456	1,536	1,353	1,368	1,460
Use of Money & Property	616	325	122	144	127
Intergovernmental Transfers	39,319	38,784	42,016	39,095	56,009
Charges for Services	7,571	7,508	8,559	797	6,981
Miscellaneous	2,005	1,148	775	828	876
Other Financing Sources	11,341	12,128	12,091	10,898	13,690
Special Items	N/A	N/A	560	683	446
Total Revenues	**73,259**	**72,511**	**72,143**	**60,344**	**86,293**
Expenditures by Function					
General Government	17,303	16,879	16,297	13,894	16,295
Public Protection	20,770	19,580	18,796	18,014	19,458
Public Ways and Facilities	3,664	4,517	4,594	4,944	16,087
Health and Sanitation	14,124	13,952	14,611	14,344	15,512
Public Assistance	16,097	16,563	16,405	16,333	19,608
Education	563	564	539	536	542
Debt Service	421	407	219	205	220
Contingency	N/A	N/A	N/A	170	200
Reserves	N/A	N/A	2,743	1,747	267
Total Expenditures	**72,941**	**72,461**	**74,204**	**70,189**	**88,190**

Notes:

FY = Fiscal Year
N/A = Not reported

Source: Glenn County, 2012.

Table 22-17 presents historical and current general fund revenues and expenditures for Colusa County. As shown, revenues exceeded expenditures in 2008, 2009, and 2010; expenditures exceeded revenues in 2011; and are expected to exceed revenues in 2012. The majority of the general fund revenues from 2008 to 2012 were from intergovernmental transfers and other revenues. Taxes ranged from approximately 15.8 percent in 2008 to 28.2 percent in 2012.

Table 22-17
Colusa County General Fund Revenues and Expenditures

	FY 2008 Actual (Thousand $)	FY 2009 Actual (Thousand $)	FY 2010 Actual (Thousand $)	FY 2011 Actual (Thousand $)	FY 2012 Adopted (Thousand $)
Revenues by Source					
Taxes	11,613	12,645	13,807	12,485	17,163
Licenses and Permits	1,109	1,048	1,024	1,133	975
Fines and Forfeitures	1,364	1,146	1,385	1,727	1,525
Use of Money and Property	1,028	790	1,037	447	520
Intergovernmental Revenues	31,046	24,191	25,120	26,029	23,764
Charges for Services	2,571	2,359	2,012	2,030	1,664
Other Revenues	24,544	20,984	16,494	14,298	15,183
Total Revenues	**73,275**	**63,164**	**60,878**	**58,148**	**60,793**
Expenditures by Function					
General Government	9,243	9,059	4,045	9,543	4,799
Public Protection	17,056	17,892	17,261	16,583	17,487
Public Ways and Facilities	16,520	7,845	6,429	12,692	8,742
Health and Sanitation	11,392	11,435	12,410	12,744	12,954
Public Assistance	14,996	15,589	15,343	17,558	17,268
Education	889	920	953	933	1,076
Recreation and Culture	249	361	129	211	142
Total Expenditures	**70,346**	**63,101**	**56,571**	**70,265**	**62,467**

Note:

FY = Fiscal Year

Source: Colusa County, 2012.

In total, adopted county general fund revenues and expenditures in 2012 for the Primary Study Area were $147,085,576 and $150,657,602, respectively.

22.2.4.5 Agricultural Economics in the Primary Study Area

Agriculture is a major industry in the Primary Study Area. Major commodities include rice, almonds, dairies, walnuts, and prunes. The total value of production for Glenn County irrigated crops, dryland range, livestock, dairy, and apiary was $750 million per year from 2012 to 2015 (Table 22-18). Almonds were the top irrigated crop in terms of production value. Rice was the next most valuable crop, with almost twice as much harvested acreage.

Table 22-18
Glenn County Average Agricultural Production, 2012 to 2015 (2015 Dollars)

Crop	Harvested Acreage	Production (tons)	Value per acre ($)	Value of Production (Thousand $)
Top Six Irrigated Crops				
Almonds	39,723	32,323	4,500	178,732
Rice	77,933	352,062	1,855	144,557
Walnuts	23,989	48,060	5,791	138,918
Prunes	5,627	13,506	4,110	23,127
Corn	16,728	107,744	1,272	21,278
Olives	4,446	17,989	4,181	18,587
Other Irrigated Crops				
Other Field, Forage, Miscellaneous	60,743	NA	734	44,562
Other Fruit and Nut	6,988	NA	5,017	35,059
Other Vegetables, Nursery	872	NA	10,357	9,034
Total Irrigated Crops	237,048	NA	2,590	613,853
Dryland Range	230,000	NA	9	1,977
Livestock, Dairy, Apiary				134,320
Total All				**750,150**

Sources: Glenn County, 2015a; Glenn County, 2013

Agriculture is also a leading industry in Colusa County. The total value of production for Colusa County irrigated crops, dryland range, livestock, dairy, and apiary averaged over $808 million per year from 2012 to 2015 (Table 22-19). Almonds were the top irrigated crop in terms of production value. Rice was the next most valuable crop, and had more than twice as much harvested acreage.

Table 22-19
Colusa County Average Agricultural Production, 2012 to 2015 (2015 Dollars)

Crop	Harvested Acreage	Production (tons)	Value per acre ($)	Value of Production (Thousand $)
Top Six Irrigated Crops				
Almonds	49,461	48,303	5,924	293,016
Rice	127,491	572,078	1,804	230,052
Walnuts	13,878	26,021	5,413	75,125
Tomatoes, Processing	15,153	782,181	3,965	60,073
Alfalfa Hay	10,306	63,213	1,303	13,433
Wine Grapes	2,225	19,728	5,140	11,437
Other Irrigated Crops				
Other Field, Forage, Miscellaneous	31,468	NA	1,125	35,390
Other Fruit and Nut	3,632	NA	7,130	25,895
Other Vegetables, Nursery	197	NA	114,240	22,505
Total Irrigated Crops	253,811	NA	3,022	766,927
Dryland Range	180,000	NA	18	3,232
Livestock, Dairy, Apiary				38,280
Total All				**808,439**

Sources: Colusa County, 2015a; Colusa County, 2013.

In total, the average irrigated crop acreage from 2012 to 2015 in the Primary Study Area was 490,859, with an average value per acre of $2,813.

22.3 Environmental Impacts/Environmental Consequences

22.3.1 Evaluation Criteria and Significance Thresholds

Significance criteria represent the thresholds that were used to identify whether an impact would be potentially significant. Appendix G of the *CEQA Guidelines* suggests the following evaluation criteria for population and housing:

Would the Project:

- Induce substantial population growth in an area either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extensions of roads or other infrastructure)?
- Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?

The evaluation criteria used for this impact analysis represent a combination of the Appendix G criteria and professional judgment that considers current regulations, standards, and/or consultation with agencies, knowledge of the area, and the context and intensity of the environmental effects, as required pursuant to NEPA. For the purposes of this analysis, an alternative would result in a potentially significant impact if it would result in any of the following:

- Substantial adverse effects on regional economics.
- Substantial adverse effects on population and housing.
- Substantial adverse effects on local government fiscal conditions.
- Substantial adverse effects on recreation economics.
- Substantial adverse effects on agricultural economics.
- Substantial adverse effects on municipal and industrial (M&I) water use economics.

The determination of impact significance is based on the magnitude of socioeconomic effects that the Project would cause.

- **No impact** indicates no change in socioeconomic conditions would occur.
- A **less-than-significant impact** may or may not be perceptible but is considered a minor (less than 5 percent) change in socioeconomic conditions.

A **potentially significant impact** with feasible mitigation may be reduced to less-than-significant levels or avoided. Without mitigation measures, a potentially significant impact would cause a major (greater than 5 percent) change in socioeconomic conditions.

22.3.2 Impact Assessment Assumptions and Methodology

Combinations of Project facilities were used to create Alternatives A, B, C, C_1, and D. In all resource chapters, the Sites Project Authority (Authority) and Reclamation described the potential impacts

associated with the construction, operation, and maintenance of each of the Project facilities for each of the five action alternatives. Some Project features/facilities and operations (e.g., reservoir size, overhead power line alignments, provision of water for local uses) differ by alternative, and are evaluated in detail within each of the resource areas chapters. As such, the Authority has evaluated all potential impacts with each feature individually, and may choose to select or combine individual features as determined necessary.

Impacts associated with the construction, operation, and maintenance for Alternative C_1 would be the same as Alternative C and are therefore not discussed separately below.

22.3.2.1 Assumptions

The following assumptions were made regarding Project-related construction, operation, and maintenance impacts to socioeconomics:

- Direct Project-related construction, operation, and maintenance activities would occur in the Primary Study Area.
- Direct Project-related operational effects would occur in the Secondary Study Area.
- The only direct Project-related construction activity that would occur in the Secondary Study Area is the installation of two additional pumps into existing bays at the Red Bluff Pumping Plant.
- The only direct Project-related maintenance activity that would occur in the Secondary Study Area is the sediment removal and disposal at the two intake locations (i.e., Glenn-Colusa Irrigation District Canal Intake and Red Bluff Pumping Plant).
- No direct Project-related construction or maintenance activities would occur in the Extended Study Area.
- Direct Project-related operational effects that would occur in the Extended Study Area are related to San Luis Reservoir operation; increased reliability of water supply to agricultural, municipal, and industrial water users; and the provision of an alternate Level 4 refuge water supply. Indirect effects to the operation of certain facilities that are located in the Extended Study Area, and indirect effects to the consequent water deliveries made by those facilities, would occur as a result of implementing the alternatives.
- No additional channel stabilization, grade control measures, or dredging in the Sacramento River at or upstream of the Delevan Pipeline Intake/Discharge Facilities would be required.
- Although the size of the regional economy would likely grow, when comparing the Existing Conditions/No Project/No Action Condition, Alternative A, Alternative B, and Alternative C, it is assumed that the type of industries and spending patterns by consumers, as examples, would not.

22.3.2.2 Methodology

Existing conditions and the future No Project/No Action alternatives were assumed to be similar in the Primary Study Area given the generally rural nature of the area and limited potential for growth and development in Glenn and Colusa counties within the 2030 study period used for this EIR/EIS as further described in Chapter 2 Alternatives Analysis. As a result, within the Primary Study Area, it is anticipated

that the No Project/No Action Alternative would not entail material changes in conditions as compared to the existing conditions baseline.

With respect to the Extended and Secondary study areas, the effects of the action alternatives would be primarily related to changes to available water supplies in the Extended and Secondary study areas and the Project's cooperative operations with other existing large reservoirs in the Sacramento watershed, and the resultant potential impacts and benefits to biological resources, land use, recreation, socioeconomic conditions, and other resource areas. The Department of Water Resources has projected future water demands through 2030 conditions that assume the vast majority of CVP and SWP water contractors would use their total contract amounts, and that most senior water rights users also would fully use most of their water rights. This increased demand in addition to the projects currently under construction and those that have received approvals and permits at the time of preparation of the EIR/EIS would constitute the No Project/No Action Condition. As described in Chapter 2 Alternative Analysis, the primary difference in these projected water demands would be in the Sacramento Valley; and as of the time of preparation of this EIR/EIS, the water demands have expanded to the levels projected to be achieved on or before 2030.

Accordingly, existing conditions and the No Project/No Action alternatives are assumed to be the same for this EIR/EIS and as such are referred to as the Existing Conditions/No Project/No Action Condition, which is further discussed in Chapter 2 Alternatives Analysis. With respect to applicable reasonably foreseeable plans, projects, programs and policies that may be implemented in the future but that have not yet been approved, these are included as part of the analysis of cumulative impacts in Chapter 35 Cumulative Impacts.

Part of the socioeconomic analysis is based upon results of hydrologic and water quality analytical model simulations of the Project alternatives and the Existing Conditions/No Project/No Action Condition. Operation of Alternatives A, B, C, and D was analyzed for future conditions that would occur in approximately year 2025. Costs used in the impacts assessment are reported in 2015 dollars (BEA, 2017b).

Although Appendix G of the *CEQA Guidelines* indicates that "economic or social effects of a project shall not be treated as significant effects on the environment", economic and social effects are included in this EIR/EIS for "determining the significance of physical changes caused by the project." Although significance criteria were applied to the Project-related socioeconomic effects, the physical effects related to the socioeconomic effects were addressed in other chapters of this EIR/EIS. Chapters that address the Project-related physical effects related to the economic and social effects include: Chapter 6 Surface Water Resources, Chapter 7 Surface Water Quality, Chapter 20 Land Use, Chapter 21 Recreation Resources, and Chapter 29 Public Services and Utilities.

This chapter addresses the Project-related socioeconomic effects in relation to:

- Regional economics
- Population and housing
- Local government fiscal conditions
- Recreation economics
- Agricultural economics
- M&I water use economics

The Secondary Study Area is defined as the area of potential operational effects, including SWP and CVP facilities that could experience reservoir water surface elevation fluctuations and stream flow changes downstream of their facilities. These operational effects are included in the analysis of the Extended Study Area. Therefore, no separate impact analyses were undertaken for the economic or social effects of the Existing Conditions/No Project/No Action Condition in the Secondary Study Area.

For a summary of the economics analytical framework used for this analysis, see Appendix 22A Economics Analytical Framework. Economics model results used in this analysis are included in Appendix 22B Reporting Metrics Tool.

Regional Economics

Regional economic effects include changes in characteristics such as regional employment and income. The magnitude of the economic effects depends on the initial changes in economic activity within the region (such as construction expenditure or loss of production from existing activities), the interactions within the regional economy, and the "leakage" of economic activity from this regional economy to the larger surrounding economy. Economic linkages create multiplier effects in a regional economy as money is circulated by trade. These linkages are often modeled using large mathematical input-output models such as IMPLAN. IMPLAN, a computer database and modeling system used to create regional economics models for any combination of United States counties, is used in this analysis. For a detailed description of IMPLAN, see Appendix 22C Regional Economics Modeling.

An IMPLAN model of the Primary Study Area was used to estimate total changes in employment and income as a result of Project construction and operation, a reduction in temporary and permanent agricultural production, and changes in land use and recreation. Although the size of the economy would change across economic conditions, the structure of the economy would not. The IMPLAN model uses the structural relationship between elements of the economy to identify Project-related socioeconomic impacts. When evaluating temporary impacts, such as Project construction, it is likely that no structural change would occur in the relationship between elements of the economy. Although long-term impacts may incite structural changes, the relatively small Project operation and maintenance impact would not likely do so.

An IMPLAN model was also created for the multi-county Extended Study Area and was used to estimate total changes in employment and income. Changes in employment and income in this study area could result from changes in agricultural production as a result of the operation of the Project. Changes in employment and income in the Secondary Study Area were evaluated as part of the Extended Study Area IMPLAN model. However, Secondary Study Area impacts to employment and income are not reported independent of the Extended Study Area results.

Population and Housing

Estimates of housing demand, both during the construction and operation phases for each alternative, were calculated based on changes in employment that would result from implementation of the Project. The Project is expected to draw from the entire workforce in the Primary Study Area, not merely those workers who are available in the immediate area of construction or operation activity. It is expected that some portion of the construction and operation workforce would be filled by workers in the Primary Study Area who would not demand new housing. However, construction and operation would require specialty occupations that require skills that are not likely available in the local workforce. Thus, out-of-region contractors may import crews to the Project area. These workers may immigrate from

outside the Primary Study Area and demand additional housing. Because of the likelihood that specialized occupations and out-of-region contractors would immigrate to the region, it is expected that additional housing demand would occur in the Primary Study Area. The proportion of construction and operation employees that would be locally supplied from within the Primary Study Area was determined through consultations with the engineering staff who developed Project cost estimates.

The estimates of housing demand increases were compared to the Primary Study Area real estate vacancy rates and availability of temporary lodging to assess whether capacity exists in the area to support additional demand for temporary (during construction) and long-term (during operation) housing as a result of the Project.

Total estimated changes in population as a result of the Project were calculated by multiplying the average number of persons per household (DOF, 2017b) by the average number of workers anticipated to be needed for the Project using the results of the Primary Study Area IMPLAN analysis. As with the IMPLAN analysis, the impact assessment is based on the change in conditions, with the Existing Conditions/No Project/No Action Condition considered the same condition. Population changes were assessed for the short-term construction phase and for the longer-term operation phase. The changes in population resulting from construction and operation of an alternative were then compared to the projected population. In instances where population changes are anticipated to deviate from the historical annual average for the Primary Study Area (2000 to 2010), an impact was identified and discussed.

Local Government Fiscal Conditions

Fiscal effects on local governments would occur from changes to property tax revenue resulting from Project-related land acquisition. The fiscal impact analysis evaluated the estimated loss of property tax revenue resulting from potential conversion of existing land uses. An alternative would result in changes to existing land use that, in turn, would affect the property taxes on affected parcels. Tax rolls and redemption rolls were acquired for lands in the footprint of the alternatives and for the Project Buffer. Each county's tax roll dataset includes an itemization of county and special assessment related taxes. A GIS analysis identified affected parcels and associated property taxes using the tax roll data and parcel boundary information. For the purposes of this analysis, the entire affected parcel is expected to be acquired if it is located in the Project facility footprint. The total annual change in tax revenue associated with the affected parcels was then calculated for each taxing entity for each alternative. As with the IMPLAN analysis, the impact assessment is based on changes in comparison to the Existing Conditions/No Project/No Action Condition.

Recreational Economics

Recreational economic effects in the Primary Study Area would occur from a change in recreational expenditures. It is expected that recreation visitation and expenditures would increase within the Primary Study Area as a result of increased recreation and visitors drawn from other recreational sites. It is anticipated that recreational numbers and patterns would be similar to those of nearby facilities of similar character, specifically Black Butte Reservoir. Recreation visitation is only a function of reservoir water levels and not adjusted for population growth. Informational surveys completed at Black Butte Reservoir were used to estimate the mix of recreational activities at the Project, type of recreational spending that would occur, and the percentage of expenditures originating outside the Primary Study Area (within approximately 60 miles) (Reclamation, 2012). As with the IMPLAN analysis, the impact assessment is based on changes in comparison to the Existing Conditions/No Project/No Action Condition. The change

in recreation expenditures in the Primary Study Area was used in the Primary Study Area IMPLAN model to identify changes in employment and income.

Agricultural Economics

The analysis of the economic effect of land use changes in the Primary Study Area is based on the changes in acreage resulting from the Project facilities' construction and operation. Quantitative estimates were also made of the change in the value of agricultural production. Estimates were based on the acreage changes and the per-acre crop revenue summarized in Section 22.2.

The economic analysis of changes in agricultural production in the Extended Study Area used results from changes in SWP and CVP water delivery and changes in water quality. See Appendix 22F Agricultural Supply Economics Modeling for an overview of the analytical approach. Changes in agricultural production in the Secondary Study Area are included in the Extended Study Area results.

Agricultural economic effects from changes in SWP and CVP water delivery were evaluated using the Statewide Agricultural Production (SWAP) model, a regional agricultural production model developed specifically for large-scale analysis of agricultural water supply and cost changes. SWAP is a regional model of irrigated agricultural production and economics that simulates the decisions of agricultural producers (i.e., farmers) in California. The model assumes that farmers maximize profit subject to available resource and economic conditions. Within this framework, the model estimates changes in acreage, crop production, and revenues resulting from changes in CVP and SWP water delivery. For a detailed description of SWAP see Appendix 22F Agricultural Supply Economics Modeling.

Water quality effects were evaluated using a separate analysis of costs associated with managing salts in irrigation water. The economic effects of changes in water quality of irrigation water are complex and may occur in the short term and over the long term. Immediate effects of an improvement in salinity can include reduced quantity of water needed for leaching and subsequent irrigation costs, lower soil salinity, improved crop yields, and greater crop selection. Long-term effects are important in drainage-affected areas of the western and southern San Joaquin. A calculation of the value of changes in leaching requirement was used to illustrate the relative magnitude of short-term economic changes associated with salinity. The long-term value of salinity changes depends upon complex interactions among irrigation management, crop selection, and groundwater conditions. Because of this complexity, this long-term effect was described but not quantified.

Municipal and Industrial Water Use Economics

The economic analysis of changes in M&I water supply and quality in the Extended Study Area used results from changes in SWP and CVP water delivery and changes in salinity levels. See Appendix 22D Urban Water Supply Economics Modeling and Appendix 22E Urban Water Quality Economics Modeling for an overview of the analytical approach. Changes in M&I water supply and quality in the Secondary Study Area are included in the Extended Study Area results.

M&I water supply economic effects from changes in SWP and CVP water delivery were evaluated using the Least Cost Planning Simulation Model (LCPSIM) and the Other Municipal Water Economics Model (OMWEM). These models were developed by DWR for use in planning and impact studies related to water supply for SWP and CVP. LCPSIM was used to estimate the direct economic effect of changes in the water supply for M&I purposes in the urban areas of the San Francisco Bay – South and the South Coast hydrologic regions (refer to Chapter 7 Surface Water Quality for a description of California's

hydrologic regions). Other affected SWP and CVP delivery regions were modeled using OMWEM. System-related energy costs are included in the assessment of M&I water use economics impacts from changes in SWP and CVP water deliveries and resulting changes in regional water portfolio management. However, the assessment of power- and energy-related impacts is discussed in Chapter 31 Power Production and Energy.

LCPSIM is an annual time-step urban water service system reliability management model. Its objective is to estimate the least-cost water supply management strategy for an area, given the mix of available supplies, and considering the costs of new supply augmentation and use reduction options and the costs of water shortages. OMWEM is a set of individual spreadsheet models that were used to estimate economic benefits of changes in SWP or CVP supplies based on estimated water supply and demand conditions. For a detailed description of LCPSIM and OMWEM see Appendix 22D Urban Water Supply Economics Modeling.

For the M&I water quality assessment, two models corresponding to two regions of M&I water users were used. The Lower Colorado River Basin Water Quality Model (LCRBWQM) covers almost the entire urban coastal region of Southern California. LCRBWQM was developed by Reclamation and Metropolitan Water District of Southern California for assessing regional effects of salinity. The Bay Area Water Quality Economics Model (BAWQM) includes the portion of the Bay Area region from Contra Costa County south to Santa Clara County. The model uses estimated relationships between salinity and residential damages to estimate the benefits from changes in salinity. For a detailed description of LCRBWQM and BAWQM see Appendix 22E Urban Water Quality Economics Modeling. Note that water quality impacts are a function of water quality and total volume of SWP and CVP deliveries. This is a result of blending of SWP and CVP deliveries that occurs with other imported and local water supply in a region.

22.3.3 Topics Eliminated from Further Analytical Consideration

This EIR/EIS does not address the Project-related socioeconomic effect of flood control, biological-related resources, and power production and energy. The socioeconomic effects of flood control and biological related resources were not included in this chapter because no direct socioeconomic-related impacts have been estimated. This is, in part, due to the limited Project-related flood control socioeconomic benefits and the indirect methods used to estimate the socioeconomic benefits of biological resources (Reclamation, 2012). Project-related effects of power production and energy are included in other socioeconomic impact discussions, such as M&I water use economics. Specifically, water supply costs in LCPSIM account for the power production required to convey water to the San Francisco Bay – South and the South Coast regions.

22.3.4 Impacts Associated with Alternative A

22.3.4.1 Extended Study Area – Alternative A

Construction, Operation, and Maintenance Impacts

Hydrologic Regions, Water Delivery Regions, and Water Delivery Service Areas

Impact Socio-1: Substantial Adverse Effects on Regional Economics

Alternative A would potentially result in several socioeconomic impacts to the Extended Study Area's economy. Future agricultural production within the Extended Study Area is expected to increase as a

result of the Alternative A's increased and more reliable SWP and CVP deliveries. The resulting increase in agricultural production activity would result in employment and income growth. As shown in Table 22-20, under Alternative A, the agricultural water supply reliability and deliveries increase would be expected to increase the Extended Study Area's agricultural production's direct annual employment by 45 jobs and annual labor income by $0.9 million per year. This growth would more than offset the comparatively small loss of income and employment associated with agricultural production that would occur from the inundated farmland at the reservoir site (see section 22.3.4.3, Primary Study Area, for details). Alternative A's agricultural production's effects on the Extended Study Area's agricultural sector are further discussed under **Impact Socio-5**.

Table 22-20
Permanent Change in Extended Study Area Regional Employment and Income Associated with Implementation of Alternative A when Compared to the Existing Conditions/No Project/ No Action Condition[a,b]

Impact	Annual Labor Income (Thousand $)[c]		Annual Jobs	
	Direct	Total[d]	Direct	Total[d]
Agriculture	$921.5	$2,169.0	44.7	72.1

[a]Average annual effect based on long-term water year average conditions.
[b]Based on changes in agricultural production (irrigated acreage) and agricultural commodity prices.
[c]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition and have been adjusted into 2015 dollars.
[d]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).
Source: Pavich, 2012a, pers. comm.

Increase in employment and income would not be considered an adverse effect on the Extended Study Area's economy. Furthermore, the magnitude of the economic impact is extremely small when compared to the size of the Extended Study Area total economy. Therefore, Alternative A would be expected to result in a **beneficial impact** on regional economics when compared to the Existing Conditions/No Project/No Action Condition.

Future M&I supply increases can also be expected to support a large number of businesses and residents within the Extended Study Area. However, those deliveries would not be direct and primary determinant in those businesses and jobs outcomes. Therefore, as a conservative approach to the impact analysis, future economic impacts to M&I users and the Extended Study Area were only qualitatively evaluated. Nonetheless, although not estimated, Alternative A's future increases in M&I water supply reliability and deliveries are expected to result in substantial economic benefits by reducing the future water supply shortages. Effects on the Extended Study Area's M&I sector are further discussed under **Impact Socio-6**.

Alternative A's construction spending will result in only a temporary economic benefit for the Extended Study Area's economy. The majority of Alternative A's construction spending effects would also be expected to occur locally (i.e., within the Primary Study Area) and within the larger Secondary Study Area. As a result, Alternative A's construction spending impacts are discussed in more detail in the Primary Study Area impact analysis. In any case, construction spending related employment and labor income increases would not be considered an adverse effect on the regional economy of the Extended Study Area's economy. Furthermore, the magnitude of the economic impact would be very small when compared to the size of the Extended Study Area economy. Therefore, Alternative A's construction

spending would be expected to result in temporary and a **beneficial impact** on regional economics when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-2: Substantial Adverse Effects on Population and Housing

The expected population and housing changes associated with construction, operation, and maintenance of Alternative A would be extremely minor, when compared to the population and housing in the Extended Study Area. Therefore, a **less-than-significant impact** on population and housing is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative A's expected population and housing effects is provided for the Primary Study Area under **Impact Socio-2**.

Impact Socio-3: Substantial Adverse Effects on Local Government Fiscal Conditions

The expected local government fiscal conditions changes associated with the construction, operation, and maintenance of Alternative A would be minor, when compared to the government fiscal conditions in the Extended Study Area. Therefore, a **less-than-significant impact** on local government fiscal conditions is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative A's expected local government fiscal effects is provided for the Primary Study Area under **Impact Socio-3**.

Impact Socio-4: Substantial Adverse Effects on Recreation Economics

The expected changes to recreation economics associated with Alternative would be very minor when compared to the recreation sector's economy in the Extended Study Area. Therefore, a **beneficial impact** on recreation economics is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative A's expected effects on the recreation sector is provided for the Primary Study Area under **Impact Socio-4**.

Impact Socio-5: Substantial Adverse Effects on Agricultural Economics

The Project-related agricultural economic impacts would result from changes in water delivery and water quality conditions. Table 22-21 summarizes the projected changes in irrigated acreage and value of agricultural production to the SWP and CVP export areas as a result of Alternative A operations. The changes are described relative to the Existing Conditions/No Project/No Action Condition. Table 22-20 shows the related future change in agricultural employment and labor income projected to result from the increased agricultural activity.

Table 22-21
Change in Acres and Value of Agricultural Production Associated with Implementation of Alternative A when Compared to the Existing Conditions/No Project/No Action Condition[a,b]

Analysis Metric	Results of Alternative A	Results of Existing Conditions/ No Project/No Action Condition	Change from Existing Conditions/ No Project/No Action Condition
Long-Term Water Year Average			
Total Crop Acreage (Thousand Acres)	6,692	6,688	3.9
Total Value of Production (Million $)	$15,770	$15,768	$4.1
Dry and Critical Water Year Average[b]			
Total Crop Acreage (Thousand Acres)	6,590	6,576	14.5
Total Value of Production (Million $)	$15,731	$15,725	$17.2

[a]Change includes $1.9 million and $11.2 million (average and dry, respectively) of consumer surplus minus fallow costs.
[b]The Existing Conditions/No Project/No Action Condition SWAP model run is based on long-term water year average conditions and does not report Dry and Critical water year average conditions

Notes:
SWAP included relevant regions of agricultural production in the Extended Study Area
Value of production is based on prices received by farmers, in 2015 dollars.

Total value of irrigated crop production in the Extended Study Area would increase on average by approximately $4.1 million per year, with total irrigated crop acreage increasing by approximately 3,900 acres. During Dry and Critical water year average conditions, the value of agricultural production would be approximately $17.2 million per year and 14,500 acres higher than for the Existing Conditions/ No Project/No Action Condition.

The increase in agricultural water deliveries would occur during long term as well as Dry and Critical years. The increase in agricultural water deliveries would not only increase agricultural production acreages (shown in Table 22-21), but also influence crops and cropping patterns. Increased investments would occur from the expected crop acreage changes relative to the Existing Conditions/No Project/ No Action Condition. Since overall water supply and crop acreage would increase relative to the Existing Conditions/No Project/No Action Condition, no losses for any existing investments in production facilities or growing stock be expected as a result Alternative A's implementation.

Table 22-22 summarizes the volume and cost savings of groundwater pumping in the Extended Study Area that would result from the Alternative A's increased surface deliveries. SWAP model analysis projects that there would be nearly 46 thousand acre-feet (TAF) per year decrease in volume of pumped groundwater within the Extended Study Area. The decreased groundwater pumping and related cost savings would be a result of additional surface water available to agriculture.

Table 22-22
Change in Volume and Cost of Groundwater Pumping Associated with Implementation of Alternative A when Compared to the Existing Conditions/No Project/No Action Condition

Analysis Metric	Results of Alternative A	Results of Existing Conditions/No Project/ No Action Condition	Change from Existing Conditions/No Project/ No Action Condition
Long-Term Water Year Average			
Annual Groundwater Pumped (TAF)	5,657	5,704	-46.3
Annual Cost of Pumping[a] (Million $)	$761	$769	-$9
Dry and Critical Water Year Average[b]			
Annual Groundwater Pumped (TAF)	6,350	6,399	-49
Annual Cost of Pumping[a] (Million $)	$894	$903	-$8.2

[a]Cost of pumping is based on prices received by farmers, in 2015 dollars.

[b]The Existing Conditions/No Project/No Action Condition SWAP model run is based on long-term water year average conditions and does not report Dry and Critical water year average conditions.

Altogether the economic benefits of the projected increase in agricultural production value of production, the decrease in groundwater pumping cost and the irrigation water use savings from improved water quality would total over $14.4 million. When comparing Alternative A to the Existing Conditions/No Project/No Action Condition, the Alternative A's water supply increases and water quality improvements both considered having a beneficial effect on the agricultural economy in the Extended Study Area (Tables 22-21 and 22-22). Therefore, a **beneficial impact** on agricultural economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-6: Substantial Adverse Effects on M&I Water Use Economics

The Project-related M&I economic changes would result from in water delivery and water quality conditions. Changes in water supply reliability and related water supply costs in the Extended Study Area attributable to Alternative A operations are described relative to the Existing Conditions/No Project/No Action Condition. Discussion in this section focuses on: the change in water supply reliability (specific to urban areas in the SWP and CVP service areas); estimates of related water supply cost changes, and water quality improvements.

Table 22-23 shows the changes in water supply reliability and related water supply costs in the extended region. In both long-term and Dry and Critical water year average conditions, Alternative A would increase water deliveries compared to the Existing Conditions/No Project/No Action Condition.

The total projected increase in annual M&I supplies is projected to average 93 TAF on a long-term water year average basis. The majority of these M&I deliveries are expected to be used by South Coast (65.6 percent) and other South California users (13.5 percent). The annual economic value of the M&I water supply increase is projected to average approximately $170 million on a long-term water year average basis.

Table 22-23
Change in M&I Water Supply Deliveries and Costs from Alternative A when Compared to the Existing Conditions/No Project/No Action Condition

Water Delivery Region	Analysis Metric					
	Average Annual Project Water Delivery (TAF)			Average Annual Shortage and Supply Cost[c] (Thousand $)		
	Results of Alternative A	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition	Results of Alternative A	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average						
Delta	56	54	1.4	$14,118	$14,718	-$601
Bay Area[a]	498	488	9.9	$589,624	$601,494	-$11,871
Central Coast	47	45	1.9	$2,214	$4,086	-$1,873
Sacramento Valley	23	23	0.1	$5,245	$5,425	-$180
San Benito	55	52	2.1	$8,007	$8,304	-$297
San Joaquin	104	100	4.1	$2,178	$2,198	-$20
Southern California[b]	264	252	12.5	$20,751	$30,836	-$10,085
South Coast	1,414	1,353	61.0	$5,165,407	$5,310,870	-$145,463
TOTAL	2,461	2,368	93.0	$5,807,544	$5,977,931	-$170,389
Dry and Critical Water Year Average[d]						
Delta	44	41	2.9	$27,923	$29,295	-$1,372
Bay Area	479	460	19.4	$593,378	$621,395	-$28,017
Central Coast	28	24	3.8	$6,125	$11,306	-$5,181
Sacramento Valley	21	21	0.1	$12,449	$12,909	-$460
San Benito	39	36	3.1	$16,255	$16,892	-$637
San Joaquin	82	73	8.8	$3,851	$3,901	-$50
Southern California[b]	215	186	28.7	$37,284	$64,356	-$27,072
South Coast	1,132	990	141.2	$5,705,319	$6,023,019	-$317,700
TOTAL	2,039	1,831	208.0	$6,402,585	$6,783,073	-$380,489

[a]Excludes San Benito County, which is reported separately.

[b]Excludes South Coast, which is reported separately.

[c]This estimate does not include all water supply-related costs. It includes annual shortage costs and supply costs that might be affected by alternatives (e.g., transfers, groundwater pumping or other water management options).

[d]Sacramento River 40-30-30 index.

Notes:

Energy costs of conveyance are included in the cost estimates.

Costs are presented in 2015 dollars.

Sources: LCPSIM and OMWEM

Table 22-24 shows the changes in salinity-related costs in the Extended Study Area attributable to Alternative A operations relative to the Existing Conditions/No Project/No Action Condition. Discussion in this section focuses on the change in salinity costs specific to regions with modeled salinity costs.

Table 22-24
Change in M&I Water Supply Salinity Costs Associated with Implementation of Alternative A when Compared to the Change from the Existing Conditions/No Project/No Action Condition[a]

Water Delivery Service Area	Analysis Metric	Results of Alternative A	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average				
Metropolitan Water District of Southern California	Long-Term Average Export-Weighted Annual TDS (mg/L)	234.3	239.8	-5.6
Contra Costa and Santa Clara Water Districts	Average Annual Chloride (mg/L)	49.8	50.7	-0.9
Contra Costa and Santa Clara Water Districts	Long-Term Average Export-Weighted Annual TDS (mg/L)	191.3	193.4	-2.1
Metropolitan Water District of Southern California	Average Annual Cost (Million $)	$6,341	$6,354	-$12.5
Contra Costa and Santa Clara Water Districts		N/A	N/A	-$1.3
Dry and Critical Water Year Average[b]				
Metropolitan Water District of Southern California	Long-Term Average Export-Weighted Annual TDS (mg/L)	299.3	313.0	-13.7
Contra Costa and Santa Clara Water Districts	Average Annual Chloride (mg/L)	67.1	69.2	-2.1
Contra Costa and Santa Clara Water Districts	Long-Term Average Export-Weighted Annual TDS (mg/L)	224.3	229.3	-5.0
Metropolitan Water District of Southern California	Average Annual Cost (Million $)	$6,448	$6,472	-$23.9
Contra Costa and Santa Clara Water Districts		N/A	N/A	-$1.7

[a]Results include some damages related to agricultural production in Metropolitan Water District of Southern California's Service Area.

[b]Sacramento River 40-30-30 index.

Notes:
mg/L = milligrams per liter
TDS= total dissolved solids

Costs are presented in 2015 dollars. The LCRBWQM was used for the Metropolitan Water District of Southern California service area and the Bay Area Water Quality Model (BAWQM) was used for the Contra Costa and Santa Clara Water District service areas.

Sources: LCRBWQM and BAWQM

When comparing Alternative A with the Existing Conditions/No Project/No Action Condition, long-term average export-weighted annual TDS and chloride would decrease for both the long-term and Dry and Critical water year average conditions. The greatest water quality benefit are projected to occur for the Metropolitan Water District of Southern California although both the Contra Costa and Santa Clara Water District service areas are also expected to benefit from Alternative A water quality improvements. The improvement in water quality would reduce damages in both for long-term and Dry and Critical water year average conditions. As shown in Table 22-24, the total M&I water quality benefit are estimated to

total $13.7 million on a long-term water year average basis. Other water service areas would also likely gain additional water quality benefits but have not been quantified. Consequently, this water quality benefit value estimate will under-represent the full future benefits under Alternative A.

When comparing Alternative A to the Existing Conditions/No Project/No Action Condition, the increase in water supply and quality would decrease total costs, which is considered a beneficial effect on the M&I water use economics in the Extended Study Area. Therefore, a **beneficial impact** on water use economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

22.3.4.2 Secondary Study Area – Alternative A

The operational effects within the Secondary Study Area are included in the analysis of the Extended Study Area and/or Primary Study Area. For example, the minor construction- and operation-related activities at the Red Bluff Pumping Plant are expected to have less-than-significant socioeconomic effects, but are included in the overall construction and operational expenditures used in the regional economic analysis for the Extended and Primary study areas.

22.3.4.3 Primary Study Area – Alternative A

Construction, Operation, and Maintenance Impacts

All Primary Study Area Project Facilities

Impact Socio-1: Substantial Adverse Effects on Regional Economics

The regional economic effects on employment and income in the Primary Study Area were evaluated for Project construction, and its subsequent long-term operations. Changes are shown relative to the Existing Conditions/No Project/No Action Condition. The short-term effects of construction as shown in Table 22-25.

Table 22-25
Temporary Change in Regional Employment and Income Associated with Implementation of Alternative A when Compared to the Existing Conditions/No Project/No Action Condition[a,b,c]

Impact	Labor Income (Thousand $)		Annual Jobs[d]	
	Direct	Total[e]	Direct	Total[e]
Agriculture	-691	-1,350	-44	-62
Construction	44,479	61,026	143	510
Total	**43,788**	**59,676**	**99**	**448**

[a]Average annual effect based on entire period of construction. The duration of each impact will vary.

[b]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[c]The Primary Study Area IMPLAN model was re-run using the updated construction cost estimates and the 2012 IMPLAN model for the direct construction-related impacts and not for the impacts associated with changes in Agriculture or Land Acquisition.

[d]In FTEs.

[e]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).

Notes:

FTE = full-time equivalent

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

The Project footprint and related facilities, such as roads and utilities, would remove some existing agricultural land from production, which will have a negative effect on local employment and income. However, the most valuable agricultural land would only be temporarily removed from production and would be fully restored to its original use after reservoir construction is completed.

Alternative A would increase economic activity related to land acquisition in the Primary Study Area. This regional economic impact would be temporary and would occur 12 to 18 months prior to the start of construction. The land acquisition activities for Alternative A are expected to result in 15 direct jobs and 18 total jobs, with annual income of $679,000 and $779,000 respectively.

Table 22-26 shows the expected permanent effects to employment and income from Alternative A's future operations activities for the Primary Study Area. Future operations of Sites Reservoir is expected to have largest economic impact on the Primary Study Area by employing about 35 workers with $1.9 million in new labor income paid annually.

Table 22-26
Permanent Change in Regional Employment and Income Associated with Implementation of Alternative A when Compared to the Existing Conditions/No Project/No Action Condition[a,b]

Impact	Labor Income (Thousand $)		Annual Jobs	
	Direct	Total[c]	Direct	Total[c]
Recreation	$396	$478	15	17
Agriculture	-222	-381	-5	-10
Operation	1,902	2,304	35	48
Total[d]	**2,076**	**2,368**	**45**	**56**

[a]Average annual effect based over life of Alternative A.

[b]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[c]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).

[d]Total income and employment may differ from the sum of individual categories, due to rounding.

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

Alternative A would also add new recreational opportunities in the Primary Study Area, which would be expected to affect local employment and income. The employment and labor income impacts are shown in Table 22-26. Alternative A's expected effects on the Primary Study Area's recreation sector are also discussed under **Impact Socio-4**.

However, the increase in agricultural production is expected to occur outside the Primary Study Area and therefore would not be expected to the benefit the Primary Study Area's economy. As shown in Table 22-26, the permanent loss of the inundated rangeland is expected to reduce the total economic benefits by approximately five jobs and $220,000 in local wages.

Total employment and income in the Primary Study Area would increase as a result of construction, operation, land acquisition, and a change in agricultural production and recreational opportunities. The increase in employment and income would be considered a beneficial effect on the regional economy of the Primary Study Area. Therefore, a **beneficial impact** on regional economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-2: Substantial Adverse Effects on Population and Housing

Population

As shown in Tables 22-25 and 22-26, construction and operation of Alternative A would require an estimated annual average of about 140 and 40 workers, respectively. It is anticipated that approximately 30 percent of the construction jobs would be filled from within the existing two-county labor force. However, construction may require specialized skills not readily available in the local labor pool. As a result, it is anticipated that some of the non-local workers would be imported from outside of the two-county region.

When considering the multi-year duration of construction, it is anticipated that 20 percent of the imported workers would relocate to the two-county region, adding to the local population. It is anticipated that all of the workers required for operation would relocate to the two-county region. This additional population from construction and operation would constitute a minor increase in the total 2030 projected Primary Study Area population of approximately 80,000 and would not pose a burden on local public services, utilities, or infrastructure. Therefore, impacts are considered **less-than-significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Housing

Changes in housing demand are based on changes in supply resulting from displacement during Project facility construction and changes in housing demand resulting from employment associated with construction and operation of Alternative A.

The construction and operation workforce would most likely commute daily to the Project sites from within the two-county region; however, if needed, there are approximately 1,900 available housing units, as reported in the Environmental Setting/Affected Environment discussion, to accommodate workers who may choose to commute to the Project sites on a workweek basis or who may choose to relocate to the region for the duration of the construction period. In addition to the available housing units, there are recreational vehicle parks within the two-county region to accommodate construction workers. As a result, construction and operation of the Project is not expected to increase the demand for housing within the two-county region.

Within specific local communities, there could be localized effects on housing during construction. However, given the availability of housing within the two-county region, predicting where this impact would occur would be speculative. Construction and operation of Alternative A would result in minor population increases in the Primary Study Area, with adequate housing supply to accommodate the change in population. Therefore, impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

As a result of the inundation of the land, the Sites Reservoir would displace 20 residences. Households and individuals in these residences would need to relocate from the site. Property owners will be fully compensated for their homes and businesses. Given the availability of existing vacant properties within the Primary Study Area, this small increase in housing demand could be readily met and consequently would not induce any new housing growth. Therefore, Alternative A's housing and population impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-3: Substantial Adverse Effects on Local Government Fiscal Conditions

Table 22-27 lists the change in annual property tax receipts associated with the implementation of Alternative A. For Glenn County, the annual property tax amount that would be removed from the annual tax revenues would be approximately $30,900 or 0.04 percent of Glenn County total revenues. For Colusa County, the annual property tax amount that would be removed from the annual tax revenues from Alternative A would be approximately $274,200 or 0.33 percent of Colusa County total revenues. The counties could also incur increased costs if any increases in County services become necessary as a result of implementing the Project.

Table 22-27
Change in Property Tax Receipts Associated with Implementation of Alternative A when Compared to the Existing Conditions/No Project/No Action Condition

County	Change in Annual Property Tax 2015 ($)	Percentage of County 2015 Budget (%)
Glenn	- $30,892	0.04
Colusa	- $274,239	0.33

Note:
County Revenue in 2015 dollars.
Sources: Colusa County, 2015b; Glenn County, 2015b.

A decrease in property tax receipts in the Primary Study Area would result from Alternative A. However, the decrease in property tax revenue would be less than 5 percent of the overall county revenues. Therefore, impacts of Alternative A to local government fiscal conditions are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-4: Substantial Adverse Effects on Recreation Economics

Alternative A would provide recreational opportunities within the Primary Study Area. Table 22-28 shows the estimated number of visitors to Sites Reservoir if Alternative A is implemented. Also included are recreation expenditures attributable to the portion of visitors outside the Primary Study Area. This recreation expenditure information is used to assess the effects on regional economics, i.e., the impact on employment and income. The anticipated total recreation visitation to Sites Reservoir would be more than 180,000 annual visits, increasing recreation expenditures from outside of the Primary Study Area by almost $2.4 million.

Table 22-28
Estimated Sites Reservoir Recreation Visitation and Expenditures Associated with Implementation of Alternative A[a]

Activity / Spending Category	Alternative A	
	Visits (Recreation Visitor Days)	Associated Non-Local Spending
Shore fishing	15,702	$228,510
Boat fishing	8,122	$118,195
Picnicking	41,512	$531,149
Sightseeing	35,737	$406,236
Swimming / beach use	40,790	$537,208
Walking	5,234	$49,816

Activity / Spending Category	Alternative A	
	Visits (Recreation Visitor Days)	Associated Non-Local Spending
Bicycling	2,346	$53,420
Boating / water-skiing	28,156	$401,999
Other[b]	2,888	$34,853
Total	180,488	$2,361,384

[a]Based on long-term water year average conditions.

[b]Other includes off-road vehicle, horseback riding, hunting and other activities.

Note:

Costs are presented in 2015 dollars.

Source: Pavich, 2012b, pers. comm.

Increased recreation use at Sites Reservoir would increase recreation expenditures in the Primary Study Area. An increase in recreation expenditures is considered a beneficial effect on the recreation economy of the Primary Study Area. Therefore, Alternative A is expected to result in a **beneficial impact** on recreation economics for the Primary Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-5: Substantial Adverse Effects on Agricultural Economics

Construction of Alternative A would convert land from existing agricultural uses to uses that include Project facility footprints, construction staging areas, temporary and permanent roads, utilities, and open space undeveloped lands.

Crop acreage changes were used to determine the related economic value changes that would be expected to occur. Table 22-29 includes the total crop acreage and value of agricultural production that would occur in the Primary Study Area as a result of Alternative A construction and summarizes the changes in acreage and value of agricultural production that would occur in the Primary Study Area as a result of Alternative A construction and operation, relative to the Existing Conditions/No Project/No Action Condition by major crop category.

Table 22-29

Change in Crop Acres and Value of Agricultural Production Associated with Implementation of Alternative A when Compared to the Existing Conditions/No Project/No Action Condition

Analysis Metric	Alternative A	Change from Existing Conditions/ No Project/No Action Condition	
		Temporary[a]	Permanent[b]
Total Crop Acreage (Thousand Acres)[c]	**889.3**	**-4.5**	**-26.2**
Rice	247.2	-3.1	-0.2
Almonds	109.4	-0.1	0.0
Hay and Forage	94.3	-0.2	-0.6
Wheat	22.5	-0.3	-0.1
Tomatoes, Processing	27.9	-0.1	-0.1
Rangeland	388.1	-0.7	-25.3
Total Value of Production (Million $)[c]	$1,202.8	-$6.9	-$1.4
Rice	$450.8	-$5.7	-$0.4
Almonds	$578.7	-$0.5	$0.0
Hay and Forage	$44.2	-$0.1	-$0.3

Analysis Metric	Alternative A	Change from Existing Conditions/ No Project/No Action Condition	
		Temporary[a]	Permanent[b]
Wheat	$13.6	-$0.2	-$0.1
Tomatoes, Processing	$110.6	-$0.4	-$0.4
Rangeland	$4.9	$0.0	-$0.3

[a]Temporary impacts are a result of Project construction.

[b]Permanent impacts result from operating the Project.

[c]Total crop acreage and value of production differ from the sum of individual categories, due to rounding.

Note:

Value of production is based on prices received by farmers, in 2015 dollars.

Source: Pavich, 2012c, pers. comm.; Glenn County, 2015a; Glenn County, 2013; Colusa County, 2015a; Colusa County, 2013.

Total value of crop production in the Primary Study Area would be expected to decline on average by $6.9 million per year during the Project construction period, and by $1.4 million per year during Project operation. Total crop acreage would decline by approximately 4,500 acres during Project construction (temporary change) and 26,200 acres during Project operation (permanent change). The permanent loss in estimated agricultural production value ($1.4 million) estimated to be much less than that projected loss during the construction ($6.9 million). This is due to the fact that the majority of the decrease in crop acreage during construction would be associated with rice production while almost all of the permanently lost acreage would be rangeland.

Alternative A may also affect production costs on lands even if their crop revenues are largely unaffected. Costs could be associated with operational constraints and longer travel times due to Project construction. Construction designs and costs have provided for such effects in two ways. In most cases, affected lands would be within the Project facilities footprint, and are included in the agricultural acreage and value of production described elsewhere in this chapter. For potentially affected lands not included in the facilities footprint, construction costs include temporary and permanent roads and other facilities, as needed to support agricultural production. There could be some additional travel time and other costs associated with using these facilities, but such costs are not environmental impacts requiring mitigation.

Loss of investments in production facilities would occur as a result of Project facilities construction. The value of structures and equipment potentially affected would vary widely across parcels. Much of the equipment is portable (e.g., machinery, tools, portable sprinkler pipe), and could be sold or used on other lands. Shop and storage buildings and permanent irrigation and drainage equipment may have little or no salvage value. The negotiated purchase of lands for the conveyance and associated facilities would compensate for salvage value accordingly. According to Cooperative Extension cost of production studies, permanent structures, irrigation systems, and drainage systems can represent a wide range in investment, from less than $100 per acre for field and vegetable crops up to more than $3,000 per acre for some orchards (University of California Cooperative Extension [UCCE], 2008; 2011). Most of the facilities would not be new, so their depreciated values would be substantially lower.

Land improvements, including orchards, would also be considered during negotiations for land purchases. Typical investments required to bring permanent crops into production were described in Section 22.2. Forage crops, such as irrigated pasture and alfalfa, require an establishment cost of approximately $400 per acre. The depreciated values of the growing stock could be substantially below these establishment costs, depending on the ages of the stands that would be affected.

Construction and operation of Alternative A would reduce the total value of agricultural production in the Primary Study Area. DWR and Reclamation would provide compensation to property owners for the fair market value of any property acquired through eminent domain for the Project. The decrease in the total value of agricultural production would be less than 5 percent of the total value of agricultural production in the Primary Study Area. Therefore, a **less-than-significant impact** is expected to the agricultural economy in the Primary Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-6: Substantial Adverse Effects on M&I Water Use Economics

Refer to the **Socio-6** discussion for the Extended Study Area. Given the absence of any affected M&I facilities serving the Primary Study Area residents, no M&I water use economic effects are expected in the Primary Study Area. Therefore, there would be **no impact**, when compared to the Existing Conditions/No Project/No Action Condition.

22.3.5 Impacts Associated with Alternative B

22.3.5.1 Extended Study Area – Alternative B

Construction, Operation, and Maintenance Impacts

Hydrologic Regions, Water Delivery Regions, and Water Delivery Service Areas

Impact Socio-1: Substantial Adverse Effects on Regional Economics

Alternative B would potentially result in several socioeconomic impacts to the Extended Study Area's economy. Future agricultural production within the Extended Study Area is expected to increase as a result of the Alternative B's increased and more reliable SWP and CVP deliveries. The resulting increase in agricultural production activity would result in employment and income growth. As shown in Table 22-30, under Alternative B, the agricultural water supply reliability and deliveries increase would be expected to increase the Extended Study Area's agricultural production's direct annual employment by 37 jobs and annual labor income by $0.8 million per year. This growth would more than offset the comparatively small loss of income and employment associated with agricultural production that would occur from the inundated farmland at the reservoir site (see section 22.3.5.3, Primary Study Area, for details). Alternative B's agricultural production's effects on the Extended Study Area's agricultural sector are further discussed under **Impact Socio-5**.

Table 22-30
Change in Extended Study Area Regional Employment and Income Associated with Implementation of Alternative B when Compared to the Existing Conditions/No Project/ No Action Condition[a,b,c]

Impact	Annual Labor Income (Thousand $)		Annual Jobs	
	Direct	Total[d]	Direct	Total[d]
Agriculture	816	1,856	37	60

[a]Average annual effect based on long-term water year average conditions.
[b]Based on changes in agricultural production (irrigated acreage) and agricultural commodity prices.
[c]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.
[d]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).
Note:
Income is reported in 2015 dollars.
Source: Pavich, 2012a, pers. comm.

The expected increased reliability associated with Alternative B water deliveries would increase agricultural production in the Extended Study Area less than 1 percent. This, is turn, would increase total annual employment by approximately 60 individuals and total annual labor income by more than $1.9 million.

Similar to that described for Alternative A, the increase in employment and income would not be considered an adverse effect on the regional economy of the Extended Study Area. Therefore, Alternative B would be expected to result in **beneficial impact** on regional economics when compared to the Existing Conditions/No Project/No Action Condition.

Similar to that described for Alternative A, Alternative B's construction spending will result in only a temporary economic benefit for the Extended Study Area's economy and the increase in employment and income would not be considered an adverse effect on the regional economy of the Extended Study Area. The majority of Alternative B's construction spending effects would also be expected to occur locally (i.e., within the Primary Study Area) and within the larger Secondary Study Area. As a result, Alternative B's construction spending impacts are discussed in more detail in the Primary Study Area impact analysis. In any case, construction spending related employment and labor income increases would not be considered an adverse effect on the regional economy of the Extended Study Area's economy. Furthermore, the magnitude of the economic impact would be very small when compared to the size of the Extended Study Area economy. Therefore, Alternative B's construction spending would be expected to result in temporary and **beneficial impact** on regional economics when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-2: Substantial Adverse Effects on Population and Housing

Similar to that described for Alternative A, the expected population and housing changes associated with construction, operation, and maintenance of Alternative B would be extremely minor, when compared to the population and housing in the Extended Study Area. Therefore, a **less-than-significant impact** on population and housing is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative B's expected population and housing effects is provided for the Primary Study Area under **Impact Socio-2**.

Impact Socio-3: Substantial Adverse Effects on Local Government Fiscal Conditions

Similar to that described for Alternative A, the expected local government fiscal conditions changes associated with the construction, operation, and maintenance of Alternative B would be minor, when compared to the government fiscal conditions in the Extended Study Area. Therefore, a **less-than-significant impact** on local government fiscal conditions is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative B's expected local government fiscal effects is provided for the Primary Study Area under **Impact Socio-3**.

Impact Socio-4: Substantial Adverse Effects on Recreation Economics

Similar to that described for Alternative A, the expected changes to recreation economics associated with Alternative B are shown in Table 22-30 and would be very minor when compared to the recreation sector's economy in the Extended Study Area. Furthermore, Project-related increases in recreation-related jobs and labor income would be expected to represent beneficial effects to the recreation sector economy.

Therefore, a **beneficial impact** on recreation economics is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative B's expected effects on the recreation sector is provided for the Primary Study Area under **Impact Socio-4**.

Impact Socio-5: Substantial Adverse Effects on Agricultural Economics

The Project-related agricultural economic impacts would result from changes in water delivery and water quality conditions. Table 22-31 summarizes the projected changes in irrigated acreage and value of agricultural production to the SWP and CVP export areas as a result of Alternative B operations. The changes are described relative to the Existing Conditions/No Project/No Action Condition. Table 22-30 shows the related future change in agricultural employment and labor income projected to result from the increased agricultural activity.

Table 22-31
Change in Acres and Value of Agricultural Production Associated with Implementation of Alternative B when Compared to the Existing Conditions/No Project/No Action Condition[a,b]

Analysis Metric	Results of Alternative B	Results of Existing Conditions/ No Project/No Action Condition	Change from Existing Conditions/ No Project/No Action Condition
Long-Term Water Year Average			
Total Crop Acreage (Thousand Acres)	6,691	6,688	3.3
Total Value of Production (Million $)	$15,769	$15,768	$3.3
Dry and Critical Water Year Average[b]			
Total Crop Acreage (Thousand Acres)	6,582	6,576	6.24
Total Value of Production (Million $)	$15,729	$15,725	$11.8

[a]Change includes $1.9 million and $7.7 million (average and dry, respectively) of consumer surplus minus fallow costs.
[b]The Existing Conditions/No Project/No Action Condition SWAP model run is based on long-term water year average conditions and does not report Dry and Critical water year average conditions

Notes:
SWAP included relevant regions of agricultural production in the Extended Study Area
Value of production is based on prices received by farmers, in 2015 dollars.

Total value of irrigated crop production in the Extended Study Area would increase on average by approximately $3.3 million per year, with total irrigated crop acreage increasing by approximately 3,900 acres. During Dry and Critical water year average conditions, the value of agricultural production would be approximately $11.8 million per year and 6,200 acres higher than for the Existing Conditions/No Project/No Action Condition.

The increase in agricultural water deliveries would occur during long term as well as Dry and Critical years. The increase in agricultural water deliveries would not only increase agricultural production acreages (shown in Table 22-31), but also influence crops and cropping patterns. Increased investments would occur from the expected crop acreage changes relative to the Existing Conditions/No Project/No Action Condition. Since overall water supply and crop acreage would increase relative to the Existing

Conditions/No Project/No Action Condition, no losses for any existing investments in production facilities or growing stock be expected as a result Alternative B's implementation.

Table 22-32 summarizes the volume and cost savings of groundwater pumping in the Extended Study Area that would result from the Alternative B's increased surface deliveries. SWAP model analysis projects that there would be nearly 23.1 TAF per year decrease in volume of pumped groundwater within the Extended Study Area. The decreased groundwater pumping and related cost savings would be a result of additional surface water available to agriculture.

Table 22-32
Change in Volume and Cost of Groundwater Pumping Associated with Implementation of Alternative B when Compared to the Existing Conditions/No Project/No Action Condition

Analysis Metric	Results of Alternative B	Results of Existing Conditions/ No Project/No Action Condition	Change from Existing Conditions/ No Project/No Action Condition
Long-Term Water Year Average			
Annual Groundwater Pumped (TAF)	5,680	5,703	-23.1
Annual Cost of Pumping[a] (Million $)	$766	$769	-$3.8
Dry and Critical Water Year Average[b]			
Annual Groundwater Pumped (TAF)	6,368	6,398	-30.3
Annual Cost of Pumping[a] (Million $)	$897	$903	-$6.0

[a]Cost of pumping is based on prices received by farmers, in 2015 dollars.

[b]The Existing Conditions/No Project/No Action Condition SWAP model run is based on long-term water year average conditions and does not report Dry and Critical water year average conditions.

Alternative B's agricultural deliveries would also have higher water quality. Long-term average export-weighted TDS and electrical conductivity (EC) would decrease if Alternative B is implemented, when compared to the Existing Conditions/No Project/No Action Condition, resulting in improved water quality for agricultural production. An economic benefit of the salinity change is the avoided cost of groundwater pumping. In addition, the lower salinity in the irrigation water is also expected to result in net water savings from a decrease in the leaching requirements of approximately 2,768 acre feet of water. LCRBWQM of the water quality benefits to South Coast agricultural use and SWAP model values for the leaching water use savings are estimated to total $1.39 million.

Altogether the economic benefits of the projected increase in agricultural production value of production, the decrease in groundwater pumping cost and the irrigation water use savings from improved water quality would total over $8.5 million. Similar to that described for Alternative A, when comparing Alternative B to the Existing Conditions/No Project/No Action Condition, the Alternative B's water supply increases and water quality improvements both considered to have a beneficial effect on the agricultural economy in the Extended Study Area (Tables 22-31 and 22-32). Therefore, a **beneficial impact** on agricultural economics is expected, when compared to the Existing Conditions/No Project/ No Action Condition.

Impact Socio-6: Substantial Adverse Effects on M&I Water Use Economics

The project-related M&I economic changes would result from in water delivery and water quality conditions. Changes in water supply reliability and related water supply costs in the Extended Study Area attributable to Alternative B operations are described relative to the Existing Conditions/No Project/No Action Condition. Discussion in this section focuses on: the change in water supply reliability (specific to urban areas in the SWP and CVP service areas); estimates of related water supply cost changes; and water quality improvements.

Table 22-33 shows the changes in water supply reliability and related water supply costs in the extended region. In both long-term and Dry and Critical water year average conditions, Alternative B would increase water deliveries compared to the Existing Conditions/No Project/No Action Condition.

The total projected increase in annual M&I supplies is projected to average 96.8 TAF on a long-term water year average basis. The majority of these M&I deliveries are expected to be used by South Coast (66.9 percent) and other South California users (13.7 percent). The annual economic value of the M&I water supply increase is projected to average approximately $173 million on a long-term water year average basis.

Table 22-33
Change in M&I Water Supply Deliveries and Costs from Alternative B when Compared to the Existing Conditions/No Project/No Action Condition

Water Delivery Region	Analysis Metric					
	Average Annual Project Water Delivery (TAF)			Average Annual Shortage and Supply Cost[c] (Thousand $)		
	Results of Alternative B	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition	Results of Alternative B	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average						
Delta	56	54	1.5	$14,037	$14,718	-$682
Bay Area[a]	498	488	9.8	$590,605	$601,494	-$10,889
Central Coast	47	45	2.0	$2,480	$4,086	-$1,606
Sacramento Valley	23	23	0.0	$5,362	$5,425	-$63
San Benito	54	52	1.3	$8,237	$8,304	-$66
San Joaquin	104	100	4.2	$2,205	$2,198	$6
Southern California[b]	265	252	13.2	$21,062	$30,836	-$9,774
South Coast	1,418	1,353	64.8	$5,161,420	$5,310,870	-$149,450
TOTAL	2,465	2,368	96.8	$5,805,409	$5,977,931	-$172,524
Dry and Critical Water Year Average[d]						
Delta	44	41	3.2	$27,791	$29,295	-$1,504
Bay Area	477	460	17.3	$599,407	$621,395	-$21,988
Central Coast	27	24	3.5	$6,863	$11,306	-$4,443
Sacramento Valley	21	21	0.0	$12,743	$12,909	-$166
San Benito	38	36	1.6	$16,641	$16,892	-$251

Water Delivery Region	Analysis Metric					
	Average Annual Project Water Delivery (TAF)			Average Annual Shortage and Supply Cost[c] (Thousand $)		
	Results of Alternative B	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition	Results of Alternative B	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
San Joaquin	81	73	8.2	$3,888	$3,901	-$13
Southern California[b]	213	186	26.5	$39,378	$64,356	-$24,978
South Coast	1,121	990	130.6	$5,766,548	$6,023,019	-$256,471
TOTAL	2,022	1,831	190.9	$6,473,259	$6,783,073	-$309,814

[a]Excludes San Benito County, which is reported separately.

[b]Excludes South Coast, which is reported separately.

[c]This estimate does not include all water supply-related costs. It includes annual shortage costs and supply costs that might be affected by alternatives (e.g., transfers, groundwater pumping or other water management options).

[d]Sacramento River 40-30-30 index.

Notes:

Energy costs of conveyance are included in the cost estimates.

Costs are presented in 2015 dollars.

Sources: LCPSIM and OMWEM

Table 22-34 shows the changes in salinity-related costs in the Extended Study Area attributable to Alternative B operations relative to the Existing Conditions/No Project/No Action Condition. Discussion in this section focuses on the change in salinity costs specific to regions with modeled salinity costs.

Table 22-34

Change in M&I Water Supply Salinity Costs Associated with Implementation of Alternative B when Compared to the Change from the Existing Conditions/No Project/No Action Condition[a]

Water Delivery Service Area	Analysis Metric	Results of Alternative B	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average				
Metropolitan Water District of Southern California	Long-Term Average Export-Weighted Annual TDS (mg/L)	233.9	239.8	-5.9
Contra Costa and Santa Clara Water Districts	Average Annual Chloride (mg/L)	49.8	50.7	-0.9
Contra Costa and Santa Clara Water Districts	Long-Term Average Export-Weighted Annual TDS (mg/L)	191.3	193.4	-2.1
Metropolitan Water District of Southern California	Average Annual Cost (Million $)	$6,340	$6,354	-$13.8
Contra Costa and Santa Clara Water Districts		-$1.4	$0	-$1.4

Water Delivery Service Area	Analysis Metric	Results of Alternative B	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Dry and Critical Water Year Average[b]				
Metropolitan Water District of Southern California	Long-Term Average Export-Weighted Annual TDS (mg/L)	298.2	313.0	-14.9
Contra Costa and Santa Clara Water Districts	Average Annual Chloride (mg/L)	66.8	69.2	-2.4
Contra Costa and Santa Clara Water Districts	Long-Term Average Export-Weighted Annual TDS (mg/L)	223.6	229.3	-5.7
Metropolitan Water District of Southern California	Average Annual Cost (Million $)	$6,447	$6,472	-$25.9
Contra Costa and Santa Clara Water Districts		-$2.2	$0	-$2.2

[a]Results include some damages related to agricultural production in Metropolitan Water District of Southern California's Service Area.

[b]Sacramento River 40-30-30 index.

Notes:
BAWQM = Bay Area Water Quality Model

Costs are presented in 2015 dollars. The LCRBWQM was used for the Metropolitan Water District of Southern California service area and the BAWQM was used for the Contra Costa and Santa Clara Water District service areas.

Sources: LCRBWQM and BAWQM

When comparing Alternative B with the Existing Conditions/No Project/No Action Condition, long-term average export-weighted annual TDS and chloride would decrease for both the long-term and Dry and Critical water year average conditions. The greatest water quality benefits are projected to occur for the Metropolitan Water District of Southern California although both the Contra Costa and Santa Clara Water District service areas are also expected to benefit from Alternative B water quality improvements. The improvement in water quality would reduce damages in both for long-term and Dry and Critical water year average conditions. As shown in Table 22-34, the total M&I water quality benefit are estimated to total $15.2 million on a long-term water year average basis. Other water service areas would also likely gain additional water quality benefits but have not been quantified. Consequently, this water quality benefit value estimate will under-represent the full future benefits under Alternative B.

Similar to Alternative A, when comparing Alternative B to the Existing Conditions/No Project/No Action Condition, the increase in water supply and quality would decrease total costs, which is considered a beneficial effect on the M&I water use economics in the Extended Study Area. Therefore, Alternative B would have a **beneficial impact** on water use economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

22.3.5.2 Secondary Study Area – Alternative B

Alternative B's operational effects within the Secondary Study Area are included and evaluated in the analysis of the Extended Study Area and/or Primary Study Area. For example, the minor construction- and operation-related activities at the Red Bluff Pumping Plant are expected to have

less-than-significant socioeconomic effects, but are included in the overall construction and operational expenditures used in the regional economic analysis for the Extended and Primary study areas.

22.3.5.3 Primary Study Area – Alternative B

Construction, Operation, and Maintenance Impacts

All Primary Study Area Project Facilities

Impact Socio-1: Substantial Adverse Effects on Regional Economics

The regional economic effects on employment and income in the Primary Study Area were evaluated for Project construction, and its subsequent long-term operations. Changes are shown relative to the Existing Conditions/No Project/No Action Condition. The short-term effects of construction as shown in Table 22-35.

Table 22-35
Temporary Change in Regional Employment and Income Associated with Implementation of Alternative B when Compared to the Existing Conditions/No Project/No Action Condition[a,b,c]

Impact	Labor Income (Thousand $)		Annual Jobs[d]	
	Direct	Total[e]	Direct	Total[e]
Agriculture	-691	-1,350	-44	-62
Construction	44,896	61,618	144	515
Total	**44,205**	**60,628**	**100**	**453**

[a]Average annual effect based on entire period of construction. The duration of each impact would vary.

[b]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[c]The Primary Study Area IMPLAN model was re-run using the updated construction cost estimates and the 2012 IMPLAN model for the direct construction-related impacts and not for the impacts associated with changes in Agriculture or Land Acquisition.

[d]In FTEs.

[e]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

The Project footprint and related facilities, such as roads and utilities, would remove some existing agricultural land from production, which will have a negative effect on local employment and income. However, the most valuable agricultural land would only be temporarily removed from production and would be fully restored to its original use after reservoir construction is completed.

Similar to that described for Alternative A, Alternative B would increase economic activity related to land acquisition in the Primary Study Area. This regional economic impact would be temporary and would occur 12 to 18 months prior to the start of construction. The land acquisition activities for Alternative B are expected to result in 14 direct jobs and 17 total jobs, with annual income of $668,000 and $767,000 respectively.

Table 22-36 shows the expected permanent effects to employment and income from Alternative B's future operations activities for the Primary Study Area. Future operations of Sites Reservoir is expected to

have largest economic impact on the Primary Study Area by employment nearly 30 workers with $1.6 million in new labor income paid annually.

Table 22-36
Permanent Change in Regional Employment and Income Associated with Implementation of Alternative B when Compared to the Existing Conditions/No Project/No Action Condition[a,b]

Impact	Labor Income (Thousand $)		Annual Jobs	
	Direct	Total[c]	Direct	Total[c]
Recreation	393	474	15	17
Agriculture	-216	-404	-5	-10
Operation	1,630	1,997	30	42
Total[d]	**1,806**	**2,067**	**40**	**49**

[a]Average annual effect based over life of Alternative B.

[b]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[c]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).

[d]Total income and employment may differ from the sum of individual categories, due to rounding.

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

Alternative B would also add new recreational opportunities in the Primary Study Area, which would be expected to affect local employment and income. The employment and labor income impacts are shown in Table 22-36. Alternative B's expected effects on the Primary Study Area's recreation sector are also discussed under **Impact Socio-4**.

However, the increase in agricultural production is expected to occur outside the Primary Study Area and therefore would not be expected to the benefit the Primary Study Area's economy. As shown in Table 22-36, the permanent loss of the inundated rangeland is expected to reduce the total economic benefits by approximately five jobs and $216,000 in local wages.

Total employment and income in the Primary Study Area would increase as a result of construction, operation, land acquisition, and a change in agricultural production and recreational opportunities. Similar to that described for Alternative A, the increase in employment and income would not be considered an adverse effect on the regional economy of the Primary Study Area. Therefore, a **beneficial impact** on regional economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-2: Substantial Adverse Effects on Population and Housing

Population

As shown in Tables 22-35 and 22-36, construction and operation of Alternative B would require an estimated annual average of about 140 and 30 workers, respectively. It is anticipated that approximately 30 percent of the construction jobs would be filled from within the existing two-county labor force. However, construction may require specialized worker skills not readily available in the local labor pool. As a result, it is anticipated that some of the non-local workers would be imported from outside the two-county region.

When considering the multi-year duration of construction, it is anticipated that 20 percent of the imported workers would relocate to the two-county region, adding to the local population. It is anticipated that all of the workers required for operation would relocate to the two-county region. Similar to that described for Alternative A, this additional population from construction and operation would constitute a minor increase in the total 2030 projected regional population of 79,669, and would not pose a burden on local public services, utilities, or infrastructure. Therefore, impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Housing

Changes in housing demand are based on changes in supply resulting from displacement during Project facility construction and changes in housing demand resulting from employment associated with construction and operation of Alternative B.

The construction and operation workforce would most likely commute daily to the Project sites from within the two-county region. However, if needed, there are approximately 1,900 available housing units, as reported in the Environmental Setting/Affected Environment discussion, to accommodate workers who may choose to commute to the Project sites on a workweek basis or who may choose to relocate to the region for the duration of the construction period. In addition to the available housing units, there are numerous recreational vehicle parks within the two-county region to accommodate construction workers. As a result, construction and operation of the Project is not expected to increase the demand for housing within the two-county region.

Within specific local communities, there could be localized effects on housing during construction. However, given the availability of housing within the two-county region, predicting where this impact would occur would be speculative. Similar to that described for Alternative A, construction and operation of Alternative B would result in minor population increases in the Primary Study Area, with adequate housing supply to accommodate the change in population. Therefore, impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

As a result of the inundation of the land, the Sites Reservoir would displace 20 residences. Households and individuals in these residences would need to relocate from the site. Property owners will be fully compensated for their homes and businesses. Given the availability of existing vacant properties within the Primary Study Area, this small increase in housing demand could be readily met and consequently would not induce any new housing growth. Therefore, Alternative B's housing and population impacts are considered less than significant, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-3: Substantial Adverse Effects on Local Government Fiscal Conditions

Alternative B construction, operation, and maintenance impacts to local government fiscal conditions within the Primary Study Area would be the same as described for Alternative A. Therefore, impacts of Alternative B to local government fiscal conditions are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-4: Substantial Adverse Effects on Recreation Economics

Alternative B would provide recreational opportunities within the Primary Study Area. Table 22-37 shows the estimated number of visitors to Sites Reservoir if Alternative B is implemented. Also included are recreation expenditures attributable to the portion of visitors outside the Primary Study Area. This

recreation expenditure information is used to assess the effects on regional economics, i.e., the impact on employment and income. The anticipated total recreation visitation to Sites Reservoir would be more than 179,000 annual visits, increasing recreation expenditures for the Primary Study Area by more than $2.3 million.

Table 22-37
Estimated Sites Reservoir Recreation Visitation and Expenditures Associated with Implementation of Alternative B[a]

Activity / Spending Category	Alternative B	
	Visits (Recreation Visitor Days)	Associated Non-Local Spending
Shore fishing	15,575	$226,657
Boat fishing	8,056	$117,236
Picnicking	41,176	$526,842
Sightseeing	35,447	$402,942
Swimming / beach use	40,460	$532,852
Walking	5,192	$49,412
Bicycling	2,327	$52,987
Boating / water-skiing	27,928	$398,739
Other[b]	2,864	$34,570
Total	**179,024**	**$2,342,237**

[a]Based on long-term water year average conditions.

[b]Other includes off-road vehicle, horseback riding, hunting and other activities.

Note:
Costs are presented in 2015 dollars.
Source: Pavich, 2012b, pers. comm.

Similar to Alternative A, increased recreation use at Sites Reservoir would increase recreation expenditures in the Primary Study Area. An increase in recreation expenditures is considered a beneficial effect on the recreation economy of the Primary Study Area. Therefore, Alternative B is expected to result in a **beneficial impact** on recreation economics for the Primary Study Area, when compared to the Existing Conditions and the Existing Conditions/No Project/No Action Condition.

Impact Socio-5: Substantial Adverse Effects on Agricultural Economics

Construction of Alternative B would convert land from existing agricultural uses to uses that include Project facility footprints, construction staging areas, temporary and permanent roads, utilities, and open space undeveloped lands.

Crop acreage changes were used to determine the related economic value changes that would be expected to occur. Table 22-38 includes the total crop acreage and value of agricultural production that would occur in the Primary Study Area as a result of Alternative B construction, and it summarizes the changes in acreage and value of agricultural production that would occur in the Primary Study Area as a result of Alternative B's construction and operation, relative to the Existing Conditions/No Project/No Action Condition by major crop category.

Table 22-38
Change in Crop Acres and Value of Agricultural Production Associated with Implementation of Alternative B when Compared to the Existing Conditions/No Project/No Action Condition

Analysis Metric	Alternative B	Change from Existing Conditions/ No Project/No Action Condition	
		Temporary[b]	Permanent[c]
Total Crop Acreage (Thousand Acres) [a]	**889.4**	**-4.5**	**-26.1**
Rice	247.2	-3.1	-0.2
Almonds	109.4	-0.1	0
Hay and Forage	94.3	-0.2	-0.6
Wheat	22.5	-0.3	-0.1
Tomatoes, Processing	27.9	-0.1	-0.1
Rangeland	388.1	-0.7	-25.3
Total Value of Production (Million $) [a]	**$1,202.8**	**-$6.9**	**-$1.4**
Rice	$450.8	-$5.7	-$0.4
Almonds	$578.7	-$0.5	$0.0
Hay and Forage	$44.2	-$0.1	-$0.3
Wheat	$13.6	-$0.2	-$0.1
Tomatoes, Processing	$110.6	-$0.4	-$0.4
Rangeland	$4.9	$0.0	-$0.3

[a]Total crop acreage and value of production differ from the sum of individual categories due to rounding.
[b]Temporary impacts are a result of Project construction.
[c]Permanent impacts result from operating the Project.
Note:
Value of production is based on prices received by farmers, in 2015 dollars.
Sources: Pavich, 2012c, pers. comm.; Glenn County, 2015a; Glenn County, 2013; Colusa County, 2015a; Colusa County, 2013.

Similar to Alternative A, the decrease in the total value of agricultural production would be 0.1 percent of the total value of agricultural production in the Primary Study Area. Therefore, a **less-than-significant impact** is expected to the agricultural economy in the Primary Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-6: Substantial Adverse Effects on M&I Water Use Economics

Given the absence of any affected M&I facilities serving the Primary Study Area residents, no M&I water use economic effects are expected in the Primary Study Area. Therefore, there would be **no impact** to the Primary Study Area's M&I sector, when compared to the Existing Conditions/No Project/No Action Condition.

22.3.6 Impacts Associated with Alternative C

22.3.6.1 Extended Study Area – Alternative C

Construction, Operation, and Maintenance Impacts

Hydrologic Regions, Water Delivery Regions, and Water Delivery Service Areas

Impact Socio-1: Substantial Adverse Effects on Regional Economics

Alternative C would potentially result in several socioeconomic impacts to the Extended Study Area's economy. Future agricultural production within the Extended Study Area is expected to increase as a result of the Alternative C's increased and more reliable SWP and CVP deliveries. The resulting increase in agricultural production activity would result in employment and income growth. As shown in Table 22-39, under Alternative C, the agricultural water supply reliability and deliveries increase would be expected to increase the Extended Study Area's agricultural production's direct annual employment by 47 jobs and annual labor income by about $1 million per year. This growth would more than offset the comparatively small loss of income and employment associated with agricultural production that would occur from the inundated farmland at the reservoir site (see section 22.3.6.3, Primary Study Area, for details). Alternative C's agricultural production's effects on the Extended Study Area's agricultural sector are further discussed under **Impact Socio-5**.

Table 22-39
Change in Extended Study Area Regional Employment and Income Associated with Implementation of Alternative C when Compared to the Existing Conditions/No Project/ No Action Condition[a,b,c]

Impact	Annual Labor Income (Thousand $)		Annual Jobs	
	Direct	Total[d]	Direct	Total[d]
Agriculture	998	2,365	47	77

[a]Average annual effect based on long-term water year average conditions.

[b]Based on changes in agricultural production (irrigated acreage) and agricultural commodity prices.

[c]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[d]Includes direct, indirect, and induced effects defined in Appendix 22C Regional Economics Modeling).

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

The expected increased reliability associated with Alternative C water deliveries would increase agricultural production in the Extended Study Area less than 1 percent. This, is turn, would increase annual employment by approximately 77 individuals and annual labor income by more than $2.4 million.

Similar to that described for Alternative A, the increase in employment and income would not be considered an adverse effect on the regional economy of the Extended Study Area. Therefore, Alternative C would be expected to result in **beneficial impact** on regional economics when compared to the Existing Conditions/No Project/No Action Condition.

Similar to that described for Alternative A, Alternative C's construction spending will result in only a temporary economic benefit for the Extended Study Area's economy and the increase in employment and income would not be considered an adverse effect on the regional economy of the Extended Study Area. The majority of Alternative C's construction spending effects would also be expected to occur locally (i.e., within the Primary Study Area) and within the larger Secondary Study Area. As a result, Alternative C's construction spending impacts are discussed in more detail in the Primary Study Area impact analysis. In any case, construction spending related employment and labor income increases would not be considered an adverse effect on the regional economy of the Extended Study Area's

economy. Furthermore, the magnitude of the economic impact would be very small when compared to the size of the Extended Study Area economy. Therefore, Alternative C's construction spending would be expected to result in temporary and **beneficial impact** on regional economics when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-2: Substantial Adverse Effects on Population and Housing

Similar to that described for Alternative A, the expected population and housing changes associated with construction, operation, and maintenance of Alternative C would be extremely minor, when compared to the population and housing in the Extended Study Area. Therefore, a **less-than-significant impact** on population and housing is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative C's expected population and housing effects is provided for the Primary Study Area under **Impact Socio-2**.

Impact Socio-3: Substantial Adverse Effects on Local Government Fiscal Conditions

Similar to that described for Alternative A, the expected local government fiscal conditions changes associated with the construction, operation, and maintenance of Alternative C would be minor, when compared to the government fiscal conditions in the Extended Study Area. Therefore, a **less-than-significant impact** on local government fiscal conditions is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative C's expected local government fiscal effects is provided for the Primary Study Area under **Impact Socio-3**.

Impact Socio-4: Substantial Adverse Effects on Recreation Economics

Similar to that described for Alternative A, the expected changes to recreation economics associated with Alternative C are shown in Table 22-39 and would be very minor when compared to the recreation sector's economy in the Extended Study Area. Furthermore, Project-related increases in recreation-related jobs and labor income would be expected to represent beneficial effects to the recreation sector economy. Therefore, a **beneficial impact** on recreation economics is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative C's expected effects on the recreation sector is provided for the Primary Study Area under **Impact Socio-4**.

Impact Socio-5: Substantial Adverse Effects on Agricultural Economics

The Project-related agricultural economic impacts would result from changes in water delivery and water quality conditions. Table 22-40 summarizes the projected changes in irrigated acreage and value of agricultural production to the SWP and CVP export areas as a result of Alternative C operations. The changes are described relative to the Existing Conditions/No Project/No Action Condition. Table 22-39 shows the related future change in agricultural employment and labor income projected to result from the increased agricultural activity.

Total value of irrigated crop production in the Extended Study Area would increase on average by approximately $4.6 million per year, with total irrigated crop acreage increasing by approximately 4,300 acres. During Dry and Critical water year average conditions, the value of agricultural production

would be approximately $17 million per year and 12,500 acres higher than for the Existing Conditions/ No Project/No Action Condition.

Table 22-40
Change in Acres and Value of Agricultural Production Associated with Implementation of Alternative C when Compared to the Existing Conditions/No Project/No Action Condition[a,b]

Analysis Metric	Results of Alternative C	Results of Existing Conditions/ No Project/No Action Condition	Change from Existing Conditions/ No Project/No Action Condition
Long-Term Water Year Average			
Total Crop Acreage (Thousand Acres)	6,692	6,688	4.3
Total Value of Production (Million $)	$15,770	$15,768	$4.6
Dry and Critical Water Year Average[b]			
Total Crop Acreage (Thousand Acres)	6,588	6,576	12.5
Total Value of Production (Million $)	$15,731	$15,725	$17.0

[a]Change includes $2.2 million and $11 million (average and dry, respectively) of consumer surplus minus fallow costs.
[b]The Existing Conditions/No Project/No Action Condition SWAP model run is based on long-term water year average conditions and does not report Dry and Critical water year average conditions

Notes:
SWAP included relevant regions of agricultural production in the Extended Study Area
Value of production is based on prices received by farmers, in 2015 dollars.

The increase in agricultural water deliveries would occur during long term as well as Dry and Critical years. The increase in agricultural water deliveries would not only increase agricultural production acreages (shown in Table 22-40), but also influence crops and cropping patterns. Increased investments would occur from the expected crop acreage changes relative to the Existing Conditions/No Project/No Action Condition. Since overall water supply and crop acreage would increase relative to the Existing Conditions/No Project/No Action Condition, no losses for any existing investments in production facilities or growing stock be expected as a result Alternative C's implementation.

Table 22-41 summarizes the volume and cost savings of groundwater pumping in the Extended Study Area that would result from the Alternative C's increased surface deliveries. SWAP model analysis projects that there would be 39 TAF per year decrease in volume of pumped groundwater within the Extended Study Area. The decreased groundwater pumping and related cost savings would be a result of additional surface water available to agriculture.

Table 22-41
Change in Volume and Cost of Groundwater Pumping Associated with Implementation of Alternative C when Compared to the Existing Conditions/No Project/No Action Condition

Analysis Metric	Results of Alternative C	Results of Existing Conditions/ No Project/No Action Condition	Change from Existing Conditions/ No Project/No Action Condition
Long-Term Water Year Average			
Annual Groundwater Pumped (TAF)	5,665	5,703	-39.0
Annual Cost of Pumping[a] (Million $)	$762	$769	-$7.2
Dry and Critical Water Year Average[b]			
Annual Groundwater Pumped (TAF)	6,349	6,398	-49.1
Annual Cost of Pumping[a] (Million $)	$894	$903	-$8.6

[a]Cost of pumping is based on prices received by farmers, in 2015 dollars.

[b]The Existing Conditions/No Project/No Action Condition SWAP model run is based on long-term water year average conditions and does not report Dry and Critical water year average conditions.

Alternative C's agricultural deliveries would also have higher water quality. Long-term average export-weighted TDS and electrical conductivity (EC) would decrease if Alternative C is implemented, when compared to the Existing Conditions/No Project/No Action Condition, resulting in improved water quality for agricultural production. An economic benefit of the salinity change is the avoided cost of groundwater pumping. In addition, the lower salinity in the irrigation water is also expected to result in net water savings from a decrease in the leaching requirements of approximately 3,850 acre feet of water. LCRBWQM of the water quality benefits to South Coast agricultural use and SWAP model values for the leaching water use savings are estimated to total $1.7 million.

Altogether the economic benefits of the projected increase in agricultural production value of production, the decrease in groundwater pumping cost and the irrigation water use savings from improved water quality would total over $13.4 million. Similar to that described for Alternative A, when comparing Alternative C to the Existing Conditions/No Project/No Action Condition, the Alternative C's water supply increases and water quality improvements both considered to have a beneficial effect on the agricultural economy in the Extended Study Area (Tables 22-40 and 22-41). Therefore, a **beneficial impact** on agricultural economics is expected, when compared to the Existing Conditions/No Project/ No Action Condition.

Impact Socio-6: Substantial Adverse Effects on M&I Water Use Economics

The Project-related M&I economic changes would result from in water delivery and water quality conditions. Changes in water supply reliability and related water supply costs in the Extended Study Area attributable to Alternative C operations are described relative to the Existing Conditions/No Project/No Action Condition. Discussion in this section focuses on: the change in water supply reliability (specific to urban areas in the SWP and CVP service areas); estimates of related water supply cost changes; and water quality improvements.

Table 22-42 shows the changes in water supply reliability and related water supply costs in the extended region. In both long-term and Dry and Critical water year average conditions, Alternative C would increase water deliveries compared to the Existing Conditions/No Project/No Action Condition.

Table 22-42
Change in M&I Water Supply Deliveries and Costs from Alternative C when Compared to the Existing Conditions/No Project/No Action Condition

Water Delivery Region	Analysis Metric					
	Average Annual Project Water Delivery (TAF)			Average Annual Shortage and Supply Cost[c] (Thousand $)		
	Results of Alternative C	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition	Results of Alternative C	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average						
Delta	56	54	1.8	$13,943	$14,718	-$775
Bay Area[a]	499	488	11.0	$589,307	$601,494	-$12,187
Central Coast	47	45	2.1	$2,062	$4,086	-$2,025
Sacramento Valley	23	23	0.1	$5,258	$5,425	-$166
San Benito	54	52	1.9	$8,067	$8,304	-$237
San Joaquin	104	100	4.6	$2,176	$2,198	-$22
Southern California[b]	266	252	13.6	$19,345	$30,836	-$11,491
South Coast	1,419	1,353	66.5	$5,157,482	$5,310,870	-$153,388
TOTAL	2,469	2,368	101.6	$5,797,641	$5,977,931	-$180,290
Dry and Critical Water Year Average[d]						
Delta	45	41	4.0	$27,436	$29,295	-$1,860
Bay Area	482	460	22.1	$589,007	$621,395	-$32,387
Central Coast	28	24	4.3	$5,703	$11,306	-$5,602
Sacramento Valley	21	21	0.1	$12,485	$12,909	-$424
San Benito	39	36	2.5	$16,301	$16,892	-$591
San Joaquin	83	73	10.2	$3,837	$3,901	-$64
Southern California[b]	218	186	31.5	$33,519	$64,356	-$30,837
South Coast	1,145	990	154.3	$5,666,386	$6,023,019	-$356,634
TOTAL	2,060	1,831	229.1	$6,354,675	$6,783,073	-$428,400

[a]Excludes San Benito County, which is reported separately.

[b]Excludes South Coast, which is reported separately.

[c]This estimate does not include all water supply-related costs. It includes annual shortage costs and supply costs that might be affected by alternatives (e.g., transfers, groundwater pumping or other water management options).

[d]Sacramento River 40-30-30 index.

Notes:

Energy costs of conveyance are included in the cost estimates.

Costs are presented in 2015 dollars.

Sources: LCPSIM and OMWEM

The total projected increase in annual M&I supplies is projected to average 102 TAF on a long-term water year average basis. The majority of these M&I deliveries are expected to be used by South Coast (65.5 percent) and other South California users (13.4 percent). The annual economic value of the M&I water supply increase is projected to average approximately $180 million on a long-term water year average basis.

Table 22-43 shows the changes in salinity-related costs in the Extended Study Area attributable to Alternative C operations relative to the Existing Conditions/No Project/No Action Condition. Discussion in this section focuses on the change in salinity costs specific to regions with modeled salinity costs.

Table 22-43
Change in M&I Water Supply Salinity Costs Associated with Implementation of Alternative C when Compared to the Change from the Existing Conditions/No Project/No Action Condition[a]

Water Delivery Service Area	Analysis Metric	Results of Alternative C	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average				
Metropolitan Water District of Southern California	Long-Term Average Export-Weighted Annual TDS (mg/L)	232.0	239.8	-7.8
Contra Costa and Santa Clara Water Districts	Average Annual Chloride (mg/L)	49.5	50.7	-1.2
Contra Costa and Santa Clara Water Districts	Long-Term Average Export-Weighted Annual TDS (mg/L)	190.6	193.4	-2.7
Metropolitan Water District of Southern California	Average Annual Cost (Million $)	$6,337	$6,354	-$16.6
Contra Costa and Santa Clara Water Districts		-$2.0	$0	-$2.0
Dry and Critical Water Year Average[b]				
Metropolitan Water District of Southern California	Long-Term Average Export-Weighted Annual TDS (mg/L)	295.1	313.0	-18.0
Contra Costa and Santa Clara Water Districts	Average Annual Chloride (mg/L)	66.7	69.2	-2.5
Contra Costa and Santa Clara Water Districts	Long-Term Average Export-Weighted Annual TDS (mg/L)	223.3	229.3	-6.0
Metropolitan Water District of Southern California	Average Annual Cost (Million $)	$6,442	$6,472	-$30.6
Contra Costa and Santa Clara Water Districts		-$2.5	$0	-$2.5

[a]Results include some damages related to agricultural production in Metropolitan Water District of Southern California's Service Area.

[b]Sacramento River 40-30-30 index.

Notes:

Costs are presented in 2015 dollars. The LCRBWQM was used for the Metropolitan Water District of Southern California service area and the Bay Area Water Quality Model (BAWQM) was used for the Contra Costa and Santa Clara Water District service areas.

Sources: LCRBWQM and BAWQM

When comparing Alternative C with the Existing Conditions/No Project/No Action Condition, long-term average export-weighted annual TDS and chloride would decrease for both the long-term and Dry and Critical water year average conditions. The greatest water quality benefits are projected to occur for the Metropolitan Water District of Southern California although both the Contra Costa and Santa Clara Water District service areas are also expected to benefit from Alternative C water quality improvements. The improvement in water quality would reduce damages in both for long-term and Dry and Critical water year average conditions. As shown in Table 22-43, the total M&I water quality benefit are estimated to total $18.6 million on a long-term water year average basis. Other water service areas would also likely gain additional water quality benefits but have not been quantified. Consequently, this water quality benefit value estimate will under-represent the full future benefits under Alternative C.

Similar to Alternative A, when comparing Alternative C to the Existing Conditions/No Project/No Action Condition, the increase in water supply and quality would decrease total costs, which is considered a beneficial effect on the M&I water use economics in the Extended Study Area. Therefore, a **beneficial impact** on water use economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

22.3.6.2 Secondary Study Area – Alternative C

Alternative C's operational effects within the Secondary Study Area are included and evaluated in the analysis of the Extended Study Area and/or Primary Study Area. For example, the minor construction- and operation-related activities at the Red Bluff Pumping Plant are expected to have less-than-significant socioeconomic effects, but are included in the overall construction and operational expenditures used in the regional economic analysis for the Extended and Primary study areas.

22.3.6.3 Primary Study Area – Alternative C

Construction, Operation, and Maintenance Impacts

All Primary Study Area Project Facilities

Impact Socio-1: Substantial Adverse Effects on Regional Economics

The regional economic effects on employment and income in the Primary Study Area were evaluated for Project construction, and its subsequent long-term operations. Changes are shown relative to the Existing Conditions/No Project/No Action Condition. The short-term effects of construction as shown in Table 22-44.

Table 22-44
Temporary Change in Regional Employment and Income Associated with Implementation of Alternative C when Compared to the Existing Conditions/No Project/No Action Condition[a,b,c]

Impact	Labor Income (Thousand $)		Annual Jobs[d]	
	Direct	Total[e]	Direct	Total[e]
Agriculture	-691	-1,350	-44	-62
Construction	48,639	66,750	156	558
Total	**47,948**	**65,400**	**112**	**496**

[a]Average annual effect based on entire period of construction. The duration of each impact will vary.

[b]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[c]The Primary Study Area IMPLAN model was re-run using the updated operations and maintenance cost estimates and the 2012 IMPLAN model for the direct permanent operation-related impacts and not for the impacts associated with changes in Recreation or Agriculture.

[d]In FTEs.

[e]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

The Project footprint and related facilities, such as roads and utilities, would remove some existing agricultural land from production, which will have a negative effect on local employment and income. However, the most valuable agricultural land would only be temporarily removed from production and would be fully restored to its original use after reservoir construction is completed.

Similar to that described for Alternative A, Alternative C would increase economic activity related to land acquisition in the Primary Study Area. This regional economic impact would be temporary, occurring 12 to 18 months prior to construction. The land acquisition activities for Alternative C are expected to result in 15 direct jobs and 18 total jobs, with annual income of $679,000 and $779,000 respectively.

Table 22-45 shows the expected permanent effects to employment and income from Alternative C's future operations activities for the Primary Study Area. Future operations of Sites Reservoir is expected to have largest economic impact on the Primary Study Area by employing about 35 workers with $1.9 million in new labor income paid annually.

Table 22-45
Permanent Change in Regional Employment and Income Associated with Implementation of Alternative C when Compared to the Existing Conditions/No Project/No Action Condition[a,b]

Impact	Labor Income (Thousand $)		Annual Jobs	
	Direct	Total[c]	Direct	Total[c]
Recreation	410	494	16	18
Agriculture	-222	-414	-5	-10
Operations	1,902	2,304	35	48
Total	2,090	2,384	46	56

[a]Average annual effect based over life of Alternative C.

[b]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[c]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

Alternative C would also add new recreational opportunities in the Primary Study Area, which would be expected to affect local employment and income. The employment and labor income impacts are shown in Table 22-45. Alternative C's expected effects on the Primary Study Area's recreation sector are also discussed under **Impact Socio-4**.

However, the increase in agricultural production is expected to occur outside the Primary Study Area and therefore would not be expected to the benefit the Primary Study Area's economy. As shown in Table 22-45, the permanent loss of the inundated rangeland is expected to reduce the total economic benefits by approximately five jobs and $222,000 in local wages.

Total employment and income in the Primary Study Area would increase as a result of construction, operation, land acquisition, and a change in agricultural production and recreational opportunities. Similar to that described for Alternative A, the net increase in employment and income would be considered a beneficial effect on the regional economy of the Primary Study Area. Therefore, a **beneficial impact** on regional economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-2: Substantial Adverse Effects on Population and Housing

Population

Construction and operation of Alternative C would require an estimated annual average of 160 and 40 workers, respectively. It is anticipated that approximately 30 percent of the construction jobs would be filled from within the existing two-county labor force. However, construction may require specialized worker skills not readily available in the local labor pool. As a result, it is anticipated that some of the non-local workers would be imported from outside the two-county region.

Considering the multi-year duration of construction, it is anticipated that 20 percent of the imported workers would relocate to the two-county region, adding to the local population. It is anticipated that all of the workers required for operation would relocate to the two-county region. Similar to that described for Alternative A, this additional population from construction and operation would constitute a minor increase in the total 2030 projected regional population of 79,669, and would not pose a burden on local public services, utilities, or infrastructure. Therefore, impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Housing

Changes in housing demand are based on changes in supply resulting from displacement during Project facility construction and changes in housing demand resulting from employment associated with construction and operation of Alternative C.

The construction and operation workforce would most likely commute daily to the Project sites from within the two-county region; however, if needed, there are approximately 1,900 available housing units, as reported in the Environmental Setting/Affected Environment discussion, to accommodate workers who may choose to commute to the Project sites on a workweek basis or who may choose to relocate to the region for the duration of the construction period. In addition to the available housing units, there are recreational vehicle parks within the two-county region to accommodate construction workers. As a result, construction and operation of the Project is not expected to increase the demand for housing within the two-county region.

Within specific local communities, there could be localized effects on housing during construction. However, given the availability of housing within the two-county region, predicting where this impact would occur would be speculative. Construction and operation of Alternative C would result in minor population increases in the Primary Study Area, with adequate housing supply to accommodate the change in population. Therefore, impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

As a result of the inundation of the land, the Sites Reservoir would displace 20 residences. Households and individuals in these residences would need to relocate from the site. Property owners will be fully compensated for their homes and businesses. Given the availability of existing vacant properties within the Primary Study Area, this small increase in housing demand could be readily met and consequently would not induce any new housing growth. Therefore, Alternative C's housing and population impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-3: Substantial Adverse Effects on Local Government Fiscal Conditions

Alternative C construction, operation, and maintenance impacts to local government fiscal conditions within the Primary Study Area would be the same as described for Alternative A. Therefore, impacts of Alternative C to local government fiscal conditions are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-4: Substantial Adverse Effects on Recreation Economics

Alternative C would provide recreational opportunities within the Primary Study Area. Table 22-46 shows the estimated number of visitors to Sites Reservoir if Alternative C is implemented. Also included are recreation expenditures attributable to the portion of visitors outside the Primary Study Area. This recreation expenditure information is used to assess the effects on regional economics, i.e., the impact on employment and income. The anticipated total recreation visitation to Sites Reservoir would be almost 187,000 annual visits, increasing recreation expenditures for the Primary Study Area by more than $2.4 million.

Table 22-46
Estimated Sites Reservoir Recreation Visitation and Expenditures Associated with Implementation of Alternative C[a]

Activity / Spending Category	Alternative C	
	Visits (Recreation Visitor Days)	Associated Non-Local Spending
Shore fishing	16,254	$236,538
Boat fishing	8,407	$122,347
Picnicking	42,971	$549,811
Sightseeing	36,992	$420,509
Swimming / beach use	42,223	$556,082
Walking	5,418	$51,566
Bicycling	2,429	$55,297

Activity / Spending Category	Alternative C	
	Visits (Recreation Visitor Days)	Associated Non-Local Spending
Boating / water-skiing	29,145	$416,123
Other[b]	2,989	$36,077
Total	**186,829**	**$2,444,351**

[a]Based on long-term water year average conditions.

[b]Other includes off-road vehicle, horseback riding, hunting and other activities.

Note:

Costs are presented in 2015 dollars.

Source: Pavich, 2012b, pers. comm.

Similar to Alternative A, increased recreation use at Sites Reservoir would increase recreation expenditures in the Primary Study Area. An increase in recreation expenditures is considered a beneficial effect on the recreation economy of the Primary Study Area. Therefore, Alternative C is expected to result in a **beneficial impact** on recreation economics for the Primary Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-5: Substantial Adverse Effects on Agricultural Economics

Construction of Alternative C would convert land from existing agricultural uses to uses that include Project facility footprints, construction staging areas, temporary and permanent roads, utilities, and open space undeveloped lands.

Crop acreage changes were used to determine the related economic value changes that would be expected to occur. Table 22-47 includes the total crop acreage and value of agricultural production that would occur in the Primary Study Area as a result of Alternative C construction, and it summarizes the changes in acreage and value of agricultural production that would occur in the Primary Study Area as a result of Alternative C construction and operation, relative to the Existing Conditions/No Project/No Action Condition by major crop category.

Table 22-47
Change in Crop Acres and Value of Agricultural Production Associated with Implementation of Alternative C when Compared to the Existing Conditions/No Project/No Action Condition

Analysis Metric	Alternative C	Change from Existing Conditions/ No Project/No Action Condition	
		Temporary[a]	Permanent[b]
Total Crop Acreage (Thousand Acres)[c]	**889.3**	**-4.5**	**-26.2**
Rice	247.2	-3.1	-0.2
Almonds	109.4	-0.1	0
Hay and Forage	94.3	-0.2	-0.6
Wheat	22.5	-0.3	-0.1
Tomatoes, Processing	27.9	-0.1	-0.1
Rangeland	388.1	-0.7	-25.3
Total Value of Production (Million $)[c]	**$1,202.8**	**-$6.9**	**-$1.4**
Rice	$450.8	-$5.7	-$0.4

Analysis Metric	Alternative C	Change from Existing Conditions/ No Project/No Action Condition	
		Temporary[a]	Permanent[b]
Almonds	$578.7	-$0.5	$0.0
Hay and Forage	$44.2	-$0.1	-$0.3
Wheat	$13.6	-$0.2	-$0.1
Tomatoes, Processing	$110.6	-$0.4	-$0.4
Rangeland	$4.9	$0.0	-$0.3

[a]Temporary impacts are a result of Project construction.

[b]Permanent impacts result from operating the Project.

[c]Total crop acreage and value of production differ from the sum of individual categories, due to rounding.

Note:

Value of production is based on prices received by farmers, in 2015 dollars.

Sources: Pavich, 2012c, pers. comm.; Glenn County, 2015a; Glenn County, 2013; Colusa County, 2015a; Colusa County, 2013.

Similar to Alternative A, the decrease in the total value of agricultural production would be 0.1 percent of the total value of agricultural production in the Primary Study Area. Therefore, a **less-than-significant impact** is expected to the agricultural economy in the Primary Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-6: Substantial Adverse Effects on M&I Water Use Economics

Given the absence of any affected M&I facilities serving the Primary Study Area residents, no M&I water use economic effects are expected in the Primary Study Area. Therefore, there would be **no impact** to the Primary Study Area's M&I sector, when compared to the Existing Conditions/No Project/No Action Condition.

22.3.7 Impacts Associated with Alternative D

22.3.7.1 Extended Study Area – Alternative D

Construction, Operation, and Maintenance Impacts

Hydrologic Regions, Water Delivery Regions, and Water Delivery Service Areas

Impact Socio-1: Substantial Adverse Effects on Regional Economics

Alternative D would potentially result in several socioeconomic impacts to the Extended Study Area's economy. Future agricultural production within the Extended Study Area is expected to increase as a result of the Alternative D's increased and more reliable SWP and CVP deliveries. The resulting increase in agricultural production activity would result in employment and income growth. As shown in Table 22-48, under Alternative D, the agricultural water supply reliability and deliveries increase would be expected to increase the Extended Study Area's agricultural production's direct annual employment by 47 jobs and annual labor income by about $1 million per year. This growth would more than offset the comparatively small loss of income and employment associated with agricultural production that would occur from the inundated farmland at the reservoir site (see section 22.3.7.3, Primary Study Area, for details). Alternative D's agricultural production's effects on the Extended Study Area's agricultural sector are further discussed under **Impact Socio-5**.

Table 22-48
Change in Extended Study Area Regional Employment and Income Associated with Implementation of Alternative C when Compared to the Existing Conditions/No Project/ No Action Condition[a,b,c]

Impact	Annual Labor Income (Thousand $)		Annual Jobs	
	Direct	Total[d]	Direct	Total[d]
Agriculture	998	2,364	47	77

[a]Average annual effect based on long-term water year average conditions.

[b]Based on changes in agricultural production (irrigated acreage) and agricultural commodity prices.

[c]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[d]Includes direct, indirect, and induced effects defined in Appendix 22C Regional Economics Modeling).

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

The expected increased reliability associated with Alternative D water deliveries would increase agricultural production in the Extended Study Area less than 1 percent. This, is turn, would increase annual employment by approximately 77 individuals and annual labor income by more than $2.4 million.

Similar to that described for Alternative A, the increase in employment and income would not be considered an adverse effect on the regional economy of the Extended Study Area. Therefore, Alternative D would be expected to result in **beneficial impact** on regional economics when compared to the Existing Conditions/No Project/No Action Condition.

Similar to that described for Alternative A, Alternative D's construction spending will result in only a temporary economic benefit for the Extended Study Area's economy and the increase in employment and income would not be considered an adverse effect on the regional economy of the Extended Study Area. The majority of Alternative D's construction spending effects would also be expected to occur locally (i.e., within the Primary Study Area) and within the larger Secondary Study Area. As a result, Alternative D's construction spending impacts are discussed in more detail in the Primary Study Area impact analysis. In any case, construction spending related employment and labor income increases would not be considered an adverse effect on the regional economy of the Extended Study Area's economy. Furthermore, the magnitude of the economic impact would be very small when compared to the size of the Extended Study Area economy. Therefore, Alternative D's construction spending would be expected to result in temporary and **beneficial impact** on regional economics when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-2: Substantial Adverse Effects on Population and Housing

Similar to that described for Alternative A, the expected population and housing changes associated with construction, operation, and maintenance of Alternative D would be extremely minor, when compared to the population and housing in the Extended Study Area. Therefore, a **less-than-significant impact** on population and housing is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative D's expected population and housing effects is provided for the Primary Study Area under **Impact Socio-2**.

Impact Socio-3: Substantial Adverse Effects on Local Government Fiscal Conditions

Similar to that described for Alternative A, the expected local government fiscal conditions changes associated with the construction, operation, and maintenance of Alternative D would be minor, when compared to the government fiscal conditions in the Extended Study Area. Therefore, a **less-than-significant impact** on local government fiscal conditions is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative D's expected local government fiscal effects is provided for the Primary Study Area under **Impact Socio-3**.

Impact Socio-4: Substantial Adverse Effects on Recreation Economics

Similar to that described for Alternative A, the expected changes to recreation economics associated with Alternative D are shown in Table 22-48 and would be very minor when compared to the recreation sector's economy in the Extended Study Area. Furthermore, Project-related increases in recreation-related jobs and labor income would be expected to represent beneficial effects to the recreation sector economy. Therefore, a **beneficial impact** on recreation economics is expected in the Extended Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Additional discussion of Alternative D's expected effects on the recreation sector is provided for the Primary Study Area under **Impact Socio-4**.

Impact Socio-5: Substantial Adverse Effects on Agricultural Economics

The Project-related agricultural economic impacts would result from changes in water delivery and water quality conditions. Table 22-49 summarizes the projected changes in irrigated acreage and value of agricultural production to the SWP and CVP export areas as a result of Alternative D operations. The changes are described relative to the Existing Conditions/No Project/No Action Condition. Table 22-48 shows the related future change in agricultural employment and labor income projected to result from the increased agricultural activity.

Table 22-49
Change in Acres and Value of Agricultural Production Associated with Implementation of Alternative D when Compared to the Existing Conditions/No Project/No Action Condition[a,b]

Analysis Metric	Results of Alternative D	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average			
Total Crop Acreage (Thousand Acres)	6,692	6,688	4.2
Total Value of Production (Million $)	$16,739	$16,736	$4.7

Analysis Metric	Results of Alternative D	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Dry and Critical Water Year Average[b]			
Total Crop Acreage (Thousand Acres)	6,612	6,576	36.2
Total Value of Production (Million $)	$16,710	$16,690	$44.4

[a]Change includes $1.9 million and $24.5 million (average and dry, respectively) of consumer surplus minus fallow costs.

[b]The Existing Conditions/No Project/No Action Condition SWAP model run is based on long-term water year average conditions and does not report Dry and Critical water year average conditions

Notes:

SWAP included relevant regions of agricultural production in the Extended Study Area

Value of production is based on prices received by farmers, in 2015 dollars.

Total value of irrigated crop production in the Extended Study Area would increase on average by approximately $4.7 million per year, with total irrigated crop acreage increasing by approximately 4,200 acres. During Dry and Critical water year average conditions, the value of agricultural production would be approximately $44.4 million per year and 36,200 acres higher than for the Existing Conditions/ No Project/No Action Condition.

The increase in agricultural water deliveries would occur during long term as well as Dry and Critical years. The increase in agricultural water deliveries would not only increase agricultural production acreages (shown in Table 22-49), but also influence crops and cropping patterns. Increased investments would occur from the expected crop acreage changes relative to the Existing Conditions/No Project/ No Action Condition. Since overall water supply and crop acreage would increase relative to the Existing Conditions/No Project/No Action Condition, no losses for any existing investments in production facilities or growing stock be expected as a result Alternative D's implementation.

Table 22-50 summarizes the volume and cost savings of groundwater pumping in the Extended Study Area that would result from the Alternative D's increased surface deliveries. SWAP model analysis projects that there would be 105 TAF per year decrease in volume of pumped groundwater within the Extended Study Area. The decreased groundwater pumping and related cost savings would be a result of additional surface water available to agriculture.

Table 22-50
Change in Volume and Cost of Groundwater Pumping Associated with Implementation of Alternative D when Compared to the Existing Conditions/No Project/No Action Condition

Analysis Metric	Results of Alternative D	Results of Existing Conditions/No Project/ No Action Condition	Change from Existing Conditions/ No Project/No Action Condition
Long-Term Water Year Average			
Annual Groundwater Pumped (TAF)	5,599	5,703	-105.0
Annual Cost of Pumping[a] (Million $)	$754	$769	-$15.4

Analysis Metric	Results of Alternative D	Results of Existing Conditions/No Project/ No Action Condition	Change from Existing Conditions/ No Project/No Action Condition
Dry and Critical Water Year Average[b]			
Annual Groundwater Pumped (TAF)	6,318	6,398	-80.7
Annual Cost of Pumping[a] (Million $)	$890	$903	-$12.2

[a]Cost of pumping is based on prices received by farmers, in 2015 dollars.

[b]The Existing Conditions/No Project/No Action Condition SWAP model run is based on long-term water year average conditions and does not report Dry and Critical water year average conditions.

Alternative D's agricultural deliveries would also have higher water quality. Long-term average export-weighted TDS and electrical conductivity (EC) would decrease if Alternative D is implemented, when compared to the Existing Conditions/No Project/No Action Condition, resulting in improved water quality for agricultural production. An economic benefit of the salinity change is the avoided cost of groundwater pumping. In addition, the lower salinity in the irrigation water is also expected to result in net water savings from a decrease in the leaching requirements of approximately 1,455 acre feet of water. LCRBWQM of the water quality benefits to South Coast agricultural use and SWAP model values for the leaching water use savings are estimated to total $925,000.

Altogether the economic benefits of the projected increase in agricultural production value of production, the decrease in groundwater pumping cost and the irrigation water use savings from improved water quality would total $21 million. Similar to that described for Alternative A, when comparing Alternative D to the Existing Conditions/No Project/No Action Condition, the Alternative D's water supply increases and water quality improvements both considered to have a beneficial effect on the agricultural economy in the Extended Study Area (Tables 22-49 and 22-50). Therefore, a **beneficial impact** on agricultural economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-6: Substantial Adverse Effects on M&I Water Use Economics

The Project-related M&I economic changes would result from in water delivery and water quality conditions. Changes in water supply reliability and related water supply costs in the Extended Study Area attributable to Alternative D operations are described relative to the Existing Conditions/No Project/No Action Condition. Discussion in this section focuses on: the change in water supply reliability (specific to urban areas in the SWP and CVP service areas); estimates of related water supply cost changes; and water quality improvements.

Table 22-51 shows the changes in water supply reliability and related water supply costs in the extended region. In both long-term and Dry and Critical water year average conditions, Alternative D would increase water deliveries compared to the Existing Conditions/No Project/No Action Condition.

The total projected increase in annual M&I supplies is projected to average 88 TAF on a long-term water year average basis. The majority of these M&I deliveries are expected to be used by South Coast (66.7 percent) and other South California users (13.4 percent). The annual economic value of the M&I water supply increase is projected to average approximately $144 million on a long-term water year average basis.

Table 22-51
Change in M&I Water Supply Deliveries and Costs from Alternative D when Compared to the Existing Conditions/No Project/No Action Condition

Water Delivery Region	Analysis Metric					
	Average Annual Project Water Delivery (TAF)			Average Annual Shortage and Supply Cost[c] (Thousand $)		
	Results of Alternative D	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition	Results of Alternative D	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average						
Delta	56	54	1.2	$14,204	$14,718	-$514
Bay Area[a]	497	488	9.0	$592,396	$601,494	-$9,098
Central Coast	47	45	1.7	$2,637	$4,086	-$1,450
Sacramento Valley	23	23	0.1	$5,316	$5,425	-$109
San Benito	54	52	1.8	$8,078	$8,304	-$226
San Joaquin	103	100	3.7	$2,194	$2,198	-$5
Southern California[b]	264	252	11.8	$21,758	$30,836	-$9,078
South Coast	1,411	1,353	58.6	$5,187,121	$5,310,870	-$123,749
TOTAL	2,455	2,368	87.8	$5,833,703	$5,977,931	-$144,229
Dry and Critical Water Year Average[d]						
Delta	43	41	2.3	$28,178	$29,295	-$1,118
Bay Area	476	460	16.0	$598,946	$621,395	-$22,448
Central Coast	27	24	3.1	$7,294	$11,306	-$4,012
Sacramento Valley	21	21	0.1	$12,634	$12,909	-$275
San Benito	39	36	2.3	$16,356	$16,892	-$535
San Joaquin	80	73	7.5	$3,870	$3,901	-$31
Southern California[b]	211	186	24.3	$40,921	$64,356	-$23,435
South Coast	1,109	990	118.8	$5,736,452	$6,023,019	-$286,567
TOTAL	2,005	1,831	174.3	$6,444,652	$6,783,073	-$338,423

[a] Excludes San Benito County, which is reported separately.

[b] Excludes South Coast, which is reported separately.

[c] This estimate does not include all water supply-related costs. It includes annual shortage costs and supply costs that might be affected by alternatives (e.g., transfers, groundwater pumping or other water management options).

[d] Sacramento River 40-30-30 index.

Notes:

Energy costs of conveyance are included in the cost estimates.

Costs are presented in 2015 dollars.

Sources: LCPSIM and OMWEM

Table 22-52 shows the changes in salinity-related costs in the Extended Study Area attributable to Alternative D operations relative to the Existing Conditions/No Project/No Action Condition. Discussion in this section focuses on the change in salinity costs specific to regions with modeled salinity costs.

Table 22-52
Change in M&I Water Supply Salinity Costs Associated with Implementation of Alternative D when Compared to the Change from the Existing Conditions/No Project/No Action Condition[a]

Water Delivery Service Area	Analysis Metric	Results of Alternative D	Results of Existing Conditions/ No Project/ No Action Condition	Change from Existing Conditions/ No Project/ No Action Condition
Long-Term Water Year Average				
Metropolitan Water District of Southern California	Long-Term Average Export-Weighted Annual TDS (mg/L)	237.1	239.8	-2.7
Contra Costa and Santa Clara Water Districts	Average Annual Chloride (mg/L)	50.4	50.7	-0.3
Contra Costa and Santa Clara Water Districts	Long-Term Average Export-Weighted Annual TDS (mg/L)	192.5	193.4	-0.9
Metropolitan Water District of Southern California	Average Annual Cost (Million $)	$6,345	$6,353,795	-$8.8
Contra Costa and Santa Clara Water Districts		-$1.6	$0	-$1.6
Dry and Critical Water Year Average[b]				
Metropolitan Water District of Southern California	Long-Term Average Export-Weighted Annual TDS (mg/L)	306.5	313.0	-6.5
Contra Costa and Santa Clara Water Districts	Average Annual Chloride (mg/L)	68.4	69.2	-0.8
Contra Costa and Santa Clara Water Districts	Long-Term Average Export-Weighted Annual TDS (mg/L)	227.0	229.3	-2.3
Metropolitan Water District of Southern California	Average Annual Cost (Million $)	$6,459	$6,472	-$13.9
Contra Costa and Santa Clara Water Districts		-$1.9	$0	-$1.9

[a]Results include some damages related to agricultural production in Metropolitan Water District of Southern California's Service Area.

[b]Sacramento River 40-30-30 index.

Notes:

Costs are presented in 2015 dollars. The LCRBWQM was used for the Metropolitan Water District of Southern California service area and the Bay Area Water Quality Model (BAWQM) was used for the Contra Costa and Santa Clara Water District service areas.

Sources: LCRBWQM and BAWQM

When comparing Alternative D with the Existing Conditions/No Project/No Action Condition, long-term average export-weighted annual TDS and chloride would decrease for both the long-term and Dry and Critical water year average conditions. The greatest water quality benefit are projected to occur for the Metropolitan Water District of Southern California although both the Contra Costa and Santa Clara Water District service areas are also expected to benefit from Alternative D water quality improvements. The improvement in water quality would reduce damages in both for long-term and Dry and Critical water year average conditions. As shown in Table 22-52, the total M&I water quality benefit are estimated to total $10.4 million on a long-term water year average basis. Other water service areas would also likely

gain additional water quality benefits but have not been quantified. Consequently, this water quality benefit value estimate will under-represent the full future benefits under Alternative D.

Similar to Alternative A, when comparing Alternative D to the Existing Conditions/No Project/No Action Condition, the increase in water supply and quality would decrease total costs, which is considered a beneficial effect on the M&I water use economics in the Extended Study Area. Therefore, a **beneficial impact** on water use economics is expected, when compared to the Existing Conditions/No Project/No Action Condition.

22.3.7.2 Secondary Study Area – Alternative D

Alternative D's operational effects within the Secondary Study Area are included and evaluated in the analysis of the Extended Study Area and/or Primary Study Area. For example, the minor construction- and operation-related activities at the Red Bluff Pumping Plant are expected to have less-than-significant socioeconomic effects, but are included in the overall construction and operational expenditures used in the regional economic analysis for the Extended and Primary study areas.

22.3.7.3 Primary Study Area – Alternative D

Construction, Operation, and Maintenance Impacts

All Primary Study Area Project Facilities

Impact Socio-1: Substantial Adverse Effects on Regional Economics

The regional economic effects on employment and income in the Primary Study Area were evaluated for Project construction, and its subsequent long-term operations. Changes are shown relative to the Existing Conditions/No Project/No Action Condition. The short-term effects of construction as shown in Table 22-53. The impacts shown for agriculture were not separately evaluated using the IMPLAN model but were, instead, assumed to be the same as those under Alternative C.

Table 22-53
Temporary Change in Regional Employment and Income Associated with Implementation of Alternative D when Compared to the Existing Conditions/No Project/No Action Condition[a,b,c]

Impact	Labor Income (Thousand $)		Annual Jobs[d]	
	Direct	Total[e]	Direct	Total[e]
Agriculture	-691	-1,350	-44	-62
Construction	49,711	67,957	159	565
Total	**49,020**	**66,607**	**115**	**503**

[a]Average annual effect based on entire period of construction. The duration of each impact will vary.

[b]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[c]The Primary Study Area IMPLAN model was re-run using the updated construction cost estimates and the 2012 IMPLAN model for the direct construction-related impacts and not for the impacts associated with changes in Agriculture or Land Acquisition.

[d]In FTEs.

[e]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

The Project footprint and related facilities, such as roads and utilities, would remove some existing agricultural land from production, so the effects on employment and income would be negative. Some agricultural land removed from production would only be temporary, and restored to its original use following the construction period.

Similar to that described for Alternative A, Alternative D would increase economic activity related to land acquisition in the Primary Study Area. This regional economic impact would be temporary and would occur 12 to 18 months prior to the start of construction. The land acquisition activities for Alternative D are expected to result in 15 direct jobs and 18 total jobs, with annual income of $679,000 and $779,000 respectively.

Table 22-54 shows the expected permanent effects to employment and income from Alternative D's future operations activities for the Primary Study Area. Future operations of Sites Reservoir is expected to have largest economic impact on the Primary Study Area by employment of almost 35 workers with $1.9 million in new labor income paid annually.

Table 22-54
Permanent Change in Regional Employment and Income Associated with Implementation of Alternative D when Compared to the Existing Conditions/No Project/No Action Condition[a,b]

Impact	Labor Income (Thousand $)		Annual Jobs	
	Direct	Total[c]	Direct	Total[c]
Recreation	410	494	16	18
Agriculture	-222	-414	-5	-10
Operation	1,902	2,304	35	50
Total[d]	**2,090**	**2,384**	**46**	**57**

[a]Average annual effect based over life of Alternative D.

[b]IMPLAN results are changes relative to the Existing Conditions/No Project/No Action Condition.

[c]Includes direct, indirect, and induced effects (defined in Appendix 22C Regional Economics Modeling).

[d]Total income and employment may differ from the sum of individual categories, due to rounding.

Note:

Income is reported in 2015 dollars.

Source: Pavich, 2012a, pers. comm.

Alternative D would also add new recreational opportunities in the Primary Study Area, which would be expected to affect local employment and income. The employment and labor income impacts are shown in Table 22-54. Alternative D's expected effects on the Primary Study Area's recreation sector are also discussed under **Impact Socio-4**.

However, the increase in agricultural production is expected to occur outside the Primary Study Area and therefore would not be expected to the benefit the Primary Study Area's economy. As shown in Table 22-54, the permanent loss of the inundated rangeland is expected to reduce the total economic benefits by approximately five jobs and $222,000 in local wages.

The expected permanent effects to employment and income from operation and maintenance are shown in Table 22-54. The impacts shown for recreation and agriculture were not separately evaluated using the IMPLAN model but were, instead, proportionately estimated from those under Alternative D. Alternative D would also increase recreational opportunities in the Primary Study Area. The increased

recreational expenditures would affect employment and income. The regional economic effects to employment and income in the Primary Study Area from the increase in recreational expenditures are reported in Table 22-54.

Total employment and income in the Primary Study Area would increase as a result of construction, operation, land acquisition, and a change in agricultural production and recreational opportunities. The increase in employment and income would not be considered an adverse effect on the regional economy of the Primary Study Area. Therefore, a **beneficial impact** on regional economics is expected, similar to that described for Alternative A.

Impact Socio-2: Substantial Adverse Effects on Population and Housing

Population

Construction and operation of Alternative d would require an estimated annual average of about 160 and about 40 workers, respectively. It is anticipated that approximately 30 percent of the construction jobs would be filled from within the existing two-county labor force. However, construction may require specialized worker skills not readily available in the local labor pool. As a result, it is anticipated that some of the non-local workers would be imported from outside the two-county region.

Considering the multi-year duration of construction, it is anticipated that 20 percent of the imported workers would relocate to the two-county region, adding to the local population. It is anticipated that all of the workers required for operation would relocate to the two-county region. Similar to that described for Alternative A, this additional population from construction and operation would constitute a minor increase in the total 2030 projected regional population of 79,669, and would not pose a burden on local public services, utilities, or infrastructure. Therefore, impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Housing

Changes in housing demand are based on changes in supply resulting from displacement during Project facility construction and changes in housing demand resulting from employment associated with construction and operation of Alternative D.

The construction and operation workforce would most likely commute daily to the Project sites from within the two-county region. However, if needed, there are approximately 1,900 available housing units, as reported in the Environmental Setting/Affected Environment discussion, to accommodate workers who may choose to commute to the Project sites on a workweek basis or who may choose to relocate to the region for the duration of the construction period. In addition to the available housing units, there are numerous recreational vehicle parks within the two-county region to accommodate construction workers. As a result, construction and operation of the Project is not expected to increase the demand for housing within the two-county region.

Within specific local communities, there could be localized effects on housing during construction. However, given the availability of housing within the two-county region, predicting where this impact would occur would be speculative. Similar to that described for Alternative A, construction and operation of Alternative D would result in minor population increases in the Primary Study Area, with adequate housing supply to accommodate the change in population. Therefore, impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

As a result of the inundation of the land, the Sites Reservoir would displace 20 residences. Households and individuals in these residences would need to relocate from the site. Property owners will be fully compensated for their homes and businesses. Given the availability of existing vacant properties within the Primary Study Area, this small increase in housing demand could be readily met and consequently would not induce any new housing growth. Therefore, Alternative D's housing and population impacts are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-3: Substantial Adverse Effects on Local Government Fiscal Conditions

Alternative D construction, operation, and maintenance impacts to local government fiscal conditions within the Primary Study Area would be the same as described for Alternative A. Therefore, impacts of Alternative D to local government fiscal conditions are considered **less than significant**, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-4: Substantial Adverse Effects on Recreation Economics

Alternative D would provide recreational opportunities within the Primary Study Area. Table 22-55 shows the estimated number of visitors to Sites Reservoir if Alternative D is implemented. Also included are recreation expenditures attributable to the portion of visitors outside the Primary Study Area. This recreation expenditure information is used to assess the effects on regional economics, i.e., the impact on employment and income. The anticipated total recreation visitation to Sites Reservoir would be almost 187,000 annual visits, increasing recreation expenditures for the Primary Study Area by more than $2.4 million.

Table 22-55
Estimated Sites Reservoir Recreation Visitation and Expenditures Associated with Implementation of Alternative D[a]

Activity / Spending Category	Alternative D	
	Visits (Recreation Visitor Days)	Associated Non-Local Spending
Shore fishing	16,254	$236,538
Boat fishing	8,407	$122,347
Picnicking	42,971	$549,811
Sightseeing	36,992	$420,509
Swimming / beach use	42,223	$556,082
Walking	5,418	$51,566
Bicycling	2,429	$55,297
Boating / water-skiing	29,145	$416,123
Other[b]	2,989	$36,077
Total	**186,829**	**$2,444,351**

[a]Based on long-term water year average conditions.

[b]Other includes off-road vehicle, horseback riding, hunting and other activities.

Note:

Costs are presented in 2015 dollars.

Source: Pavich, 2012b, pers. comm.

Similar to Alternative A, increased recreation use at Sites Reservoir would increase recreation expenditures in the Primary Study Area. An increase in recreation expenditures is considered a beneficial effect on the recreation economy of the Primary Study Area. Therefore, Alternative D is expected to result in a **beneficial impact** on recreation economics for the Primary Study Area, when compared to Existing Conditions and the Existing Conditions/No Project/No Action Condition.

Impact Socio-5: Substantial Adverse Effects on Agricultural Economics

Construction of Alternative D would convert land from existing agricultural uses to uses that include Project facility footprints, construction staging areas, temporary and permanent roads, utilities, and open space undeveloped lands.

Crop acreage changes were used to determine the related economic value changes that would be expected to occur. Table 22-56 includes the total crop acreage and value of agricultural production that would occur in the Primary Study Area as a result of Alternative D construction, and it summarizes the changes in acreage and value of agricultural production that would occur in the Primary Study Area as a result of Alternative D construction and operation, relative to the Existing Conditions/No Project/No Action Condition by major crop category.

Table 22-56
Change in Crop Acres and Value of Agricultural Production Associated with Implementation of Alternative D when Compared to the Existing Conditions/No Project/No Action Condition

Analysis Metric	Alternative D	Change from Existing Conditions/ No Project/No Action Condition	
		Temporary[a]	Permanent[b]
Total Crop Acreage (Thousand Acres)[c]	**889.3**	**-4.5**	**-26.2**
Rice	247.2	-3.1	-0.2
Almonds	109.4	-0.1	0
Hay and Forage	94.3	-0.2	-0.6
Wheat	22.5	-0.3	-0.1
Tomatoes, Processing	27.9	-0.1	-0.1
Rangeland	388.1	-0.7	-25.3
Total Value of Production (Million $)[c]	**$1,202.8**	**-$6.9**	**-$1.4**
Rice	$450.8	-$5.7	-$0.4
Almonds	$578.7	-$0.5	$0.0
Hay and Forage	$44.2	-$0.1	-$0.3
Wheat	$13.6	-$0.2	-$0.1
Tomatoes, Processing	$110.6	-$0.4	-$0.4
Rangeland	$4.9	$0.0	-$0.3

[a]Temporary impacts are a result of Project construction.

[b]Permanent impacts result from operating the Project.

[c]Total crop acreage and value of production differ from the sum of individual categories, due to rounding.

Note:
Value of production is based on prices received by farmers, in 2015 dollars.

Source: Pavich, 2012c, pers. comm.; Glenn County, 2015a; Glenn County, 2013; Colusa County, 2015a; Colusa County, 2013.

Similar to Alternative A, the decrease in the total value of agricultural production would be 0.1 percent of the total value of agricultural production in the Primary Study Area. Therefore, a **less-than-significant impact** is expected to the agricultural economy in the Primary Study Area, when compared to the Existing Conditions/No Project/No Action Condition.

Impact Socio-6: Substantial Adverse Effects on M&I Water Use Economics

Given the absence of any affected M&I facilities serving the Primary Study Area residents, no M&I water use economic effects are expected in the Primary Study Area. Therefore, there would be **no impact** to the Primary Study Area's M&I sector, when compared to the Existing Conditions/No Project/No Action Condition.

22.4 Mitigation Measures

Because no potentially significant impacts were identified, no mitigation is required or recommended.